

VII DZ BANK Group and DZ BANK risk report

1 Disclosure principles

In its capacity as the parent company in the DZ BANK Group, DZ BANK is publishing this risk report in order to meet the transparency requirements for risks applicable to the DZ BANK Group as specified in **section 114 and section 117 of the German Securities Trading Act (WpHG)** and **section 315 of the German Commercial Code (HGB)** in conjunction with **German Accounting Standard (GAS) 20**. Furthermore, the risk report meets the transparency requirements regarding risks applicable to DZ BANK as a separate entity that are specified in **section 289 HGB** in accordance with GAS 20. Based on the requirements set out in GAS 20.A1.3, this risk report is structured according to risk type. The chapters about the individual risk types are preceded by general information and information relating to all risk types.

This report also implements the risk reporting requirements specified in the International Accounting Standards (IASs) and International Financial Reporting Standards (IFRSs), specifically those set out in the following legal standards:

- **IAS 1.134–136** (capital)
- **IFRS 7.31–42** (nature and extent of risks arising from financial instruments)
- **IFRS 4.38–39A** (nature and extent of risks arising from insurance contracts)

This does not include the legal standards below, because the required disclosures are not used to manage risk. In these instances, the disclosures are included in the notes to the consolidated financial statements ('notes'):

- Accounting-related credit disclosures in accordance with **IFRS 7.35F(a)–36(b)**: note 88
- Maturity analysis in respect of financial assets and financial liabilities in accordance with **IFRS 7.39(a) and (b)**: note 89
- Maturity analysis in respect of financial assets and financial liabilities in accordance with **IFRS 4.39(d)(i)**: note 89
- Claims rate trend for direct non-life insurance business and for the inward reinsurance business in accordance with **IFRS 4.39(c)(iii)**: note 42

The requirements set out in IFRS 7 are generally limited to financial instruments, shifting the focus of reporting to credit risk, equity investment risk, market risk, and liquidity risk. In contrast, the DZ BANK Group takes a holistic view of all these risks when using risk management tools and when assessing the risk position. As a consequence, the groupwide risk management system not only covers risks that arise specifically in connection with financial instruments, but also all other relevant types of risk. This integrated approach is reflected in this risk report.

The risk report also includes information in compliance with those **recommended risk-related disclosures** that have been issued by the Financial Stability Board (FSB), the European Banking Authority (EBA), and the European Securities and Markets Authority (ESMA) that are intended to improve the usefulness of the disclosures in the decision-making process.

The quantitative disclosures in this risk report are based on information that is presented to the Board of Managing Directors and used for internal management purposes (known as the **management approach**). The disclosure of this information, which is important for knowledgeable users, is designed to ensure that external reporting is useful when such users need to make decisions.

The details relating to DZ BANK are included in the risk report for the DZ BANK Group so that the disclosures are more transparent and understandable. A separate risk report is not prepared for DZ BANK. Unless stated otherwise, the disclosures relating to the DZ BANK Group and the Bank sector also apply to DZ BANK.

Detailed information on individual subsidiaries of DZ BANK is only provided if the subsidiaries are of material significance to risk management, risk factors or the risk position, and if the situation in the subsidiaries differs substantially from the overall descriptions applicable to the DZ BANK Group. However, subsidiaries are always mentioned where this is necessary to explain the amount, structure, and management of the risks in the DZ BANK Group, and the changes in these risks.

The disclosure of **non-financial risks** in accordance with section 315c HGB in conjunction with section 289c HGB is included in the separate combined non-financial report of the DZ BANK Group and DZ BANK, which forms part of the Sustainability Report. The statement analyzes the impact of the activities of the entities in the DZ BANK Group on economic units and persons outside the DZ BANK Group. The concept of risk in section 315c HGB therefore fundamentally differs from the standard concept of risk as defined in Basel Pillar 2, which is concerned with risks that affect the entities in the DZ BANK Group themselves. The risks as defined in Basel Pillar 2 are disclosed in this risk report. Non-financial risks subject to regulatory standards comprise reputational risk and operational risk. Details on the management of these risks are included in chapters VII.14 and VII.20 'Reputational risk' and in chapters VII.15 and VII.21 'Operational risk'.

DZ BANK Group

2 Summary

2.1 Risk management system

2.1.1 Management units and sectors

The DZ BANK Group is managed using the main types of risk, taking into account particular features relating to DZ BANK and its material subsidiaries (referred to below as management units). Where a subsidiary acts as the parent company of a subgroup, the entire subgroup comprising the parent company plus its subsidiaries and second-tier subsidiaries is considered to be the management unit.

The management units represent the operating segments of the DZ BANK Group and form the core of the financial services group. All entities in the DZ BANK Group are integrated into the groupwide risk management system. Risk is managed groupwide on a consolidated basis. From a risk perspective, the 'DZ BANK' management unit equates to the central institution and corporate bank operating segment and the holding function.

The management units are deemed to be material in terms of their contribution to the DZ BANK Group's aggregate risk and are directly incorporated into the group's risk management system. The other subsidiaries and investee entities of DZ BANK are integrated into the risk management system either indirectly as part of equity investment risk or directly as part of other types of risk. This is decided for each of them annually.

The management units' subsidiaries and investees are also included in the DZ BANK Group's risk management system – indirectly via the majority-owned entities – with due regard to the minimum standards applicable throughout the group.

The **insurance business** operated at **R+V** differs in material respects from the other businesses of the DZ BANK Group. For example, actuarial risk is subject to factors that are different from those affecting the risks typically assumed in banking business. Furthermore, policyholders have a share in any gains or losses from investments in connection with life insurance, as specified in statutory requirements, and this must be appropriately taken into account in the measurement of risk. Not least, the supervisory authorities also treat banking business and

insurance business differently and this is reflected in differing regulatory regimes for banks and insurance companies.

Because of these circumstances, two **sectors** – Bank sector and Insurance sector – have been created within the DZ BANK Group for the purposes of economic risk management. The management units are assigned to these sectors as follows:

Bank sector:

- DZ BANK
- BSH
- DZ HYP
- DZ PRIVATBANK
- TeamBank
- UMH
- VR Smart Finanz

Insurance sector:

- R+V

Following an entry in the commercial register on August 12, 2022, **DVB** was retrospectively merged into DZ BANK with effect from January 1, 2022 and therefore is no longer a management unit. The risks relating to DVB have passed to DZ BANK and have been integrated into DZ BANK's management processes and its internal and external reporting.

DZ BANK and **DZ HYP** have elected to apply the **liquidity waiver** pursuant to article 8 CRR. The waiver enables the LCR and NSFR to be applied at the level of a single liquidity subgroup consisting of DZ BANK and DZ HYP. This means that it is no longer necessary to comply with the regulatory liquidity requirements at the level of the two individual institutions.

Furthermore, **DZ HYP** has applied the **capital waiver** pursuant to section 2a (1), (2), and (5) of the German Banking Act (KWG) in conjunction with article 7 (1) of the Capital Requirements Regulation (CRR), under which – provided certain conditions are met – regulatory supervision at individual bank level may be replaced by supervision of the entire banking group.

2.1.2 Fundamental features of risk management

Risks result from adverse developments affecting financial position or financial performance, and essentially comprise the risk of an unexpected future liquidity shortfall or unexpected future losses. A distinction is made between liquidity and capital. Risks that materialize can affect both of these resources.

DZ BANK and its subsidiaries have a **risk management system** that is updated on an ongoing basis in line with changes to the business and regulatory environment. The risk management system is designed to enable them to identify material risks – particularly risks to their survival as a going concern – at an early stage and to initiate the necessary control measures. The main elements of the risk management system are organizational arrangements, methods, IT systems, the limit system based on economic risk-bearing capacity, stress testing of all material risk types, and internal reporting.

The risk management system is based on the **risk appetite statement** – the fundamental document for determining risk appetite in the DZ BANK Group – and the specific details and additions in **risk strategies**, which are consistent with the business strategies and have been approved by the Board of Managing Directors. The risk appetite statement contains risk policy guidelines and risk strategy guidance that are applicable throughout the group. It also sets out quantitative requirements reflecting risk appetite.

The DZ BANK Group strives to avoid **concentrations of risk** that are not the conscious result of business policy.

The methods used to **measure risk** are an integral element of the risk management system. They are regularly reviewed, refined where necessary, and adapted to changes in internal and external requirements. Risk model calculations are used to manage the DZ BANK Group.

The tools used for the purposes of risk management are also designed to enable the DZ BANK Group to respond appropriately to **significant market movements**. Possible changes in risk factors are reflected in adjusted risk parameters in the mark-to-model measurement of credit risk and market risk. Conservative crisis scenarios for short-term and medium-term liquidity are intended to ensure that liquidity risk management also takes adequate account of market crises.

2.1.3 KPIs

Risks affecting liquidity and capital resources are managed on the basis of groupwide liquidity risk management and groupwide risk capital management. The purpose of **liquidity risk management** is to ensure adequate levels of liquidity reserves are in place in respect of risks arising from future payment obligations (liquidity adequacy). The aim of **risk capital management** is to ensure the availability of capital resources that are commensurate with the risks assumed (capital adequacy).

The key risk management figures used in respect of **liquidity** are the minimum liquidity surplus, the liquidity coverage ratio (LCR), and the net stable funding ratio (NSFR). The key risk management figures used in respect of **capital** are economic capital adequacy, the coverage ratio for the financial conglomerate, and the regulatory capital ratios, plus the leverage ratio, the minimum requirement for own funds and eligible liabilities (MREL), and the subordinated MREL ratio.

2.2 Risk factors and risks

The entities in the DZ BANK Group are exposed to a number of risk factors. These include adverse factors concerning the entity's environment that either affect multiple types of risk (general risk factors) or are typical of specific types of risk (specific risk factors). Disclosures on **general risk factors** can be found in chapter VII.4. The **specific risk factors** are shown in the risk-type-specific chapters of this risk report.

The main features of the directly managed **risks** and their significance for the operating segments in the Bank and Insurance sectors are shown in Fig. 3 and Fig. 4. The risks shown there correspond to the outcome of the risk inventory check and reflect the risks that are material to the DZ BANK Group.

To ensure that the presentation of the disclosures remains clear, the risk management system disclosures included in the risk report are limited to the main material entities in the group (indicated in Fig. 3 by a dot on a dark gray background). This selection is based on a **materiality assessment**, which takes into account the contribution of each management unit to the DZ BANK Group's overall risk for each type of risk. However, the figures presented in the risk report cover all the management units included in the internal reporting system (indicated additionally in Fig. 3 by a dot on a light gray background).

FIG. 3 – RISKS AND OPERATING SEGMENTS IN THE BANK SECTOR¹

Risks			
Risk type	Definition	Risk factors	
RISK NOT COVERED BY CAPITAL			
Liquidity risk	Risk that cash and cash equivalents will not be available in sufficient amounts to ensure that payment obligations can be met (insolvency risk)	<ul style="list-style-type: none">– Follow-up funding risk– Collateral risk– Fair value risk– Drawdown risk– Termination risk– New business risk– Repurchase risk– Intraday risk– Foreign currency funding risk	
RISK COVERED BY CAPITAL			
Financial risks	Credit risk <ul style="list-style-type: none">– Traditional credit risk– Issuer risk– Replacement risk	Risk of losses arising from the default of counterparties (borrowers, issuers, other counterparties) and of losses in connection with the recovery of loans, advances, receivables, or collateral	General credit risk factors: <ul style="list-style-type: none">– Increase in the concentration of volume in counterparties, industries, or countries– Accumulation of exposures with longer terms to maturity Specific credit risk factors: <ul style="list-style-type: none">– Economic policy divergence in the eurozone– Challenging markets in the cruise ship business– Macroeconomic conditions– Correction in real estate markets– Physical climate-related and environmental risks
	Equity investment risk	Risk of losses arising from negative changes in the fair value of that portion of the long-term equity investments portfolio for which the risks are not included in other types of risk	Increased requirement for the recognition of impairment losses on the carrying amounts of investments <ul style="list-style-type: none">– as a result of impaired carrying amounts– as a result of a lack of information in the case of non-controlling interests
	Market risk <ul style="list-style-type: none">– Interest-rate risk– Equity risk– Fund price risk– Currency risk– Commodity risk– Spread risk and migration risk– Asset-management risk– Market liquidity risk	<ul style="list-style-type: none">– Risk of losses that could arise from adverse changes in market prices or in the parameters that influence prices (market risk in the narrow sense of the term)– Risk of losses that could arise from adverse changes in market liquidity such that assets can only be liquidated in markets if they are discounted and that it is only possible to carry out active risk management on a limited basis (market liquidity risk)	General market risk factors: <ul style="list-style-type: none">– Changes in the yield curve– Changes in credit spreads– Changes in exchange rates– Changes in share prices Specific market risk factors: <ul style="list-style-type: none">– A further unexpected rise in interest rates– Risks to the global economy
	Technical risk of a home savings and loan company ² <ul style="list-style-type: none">– New business risk– Collective risk	<ul style="list-style-type: none">– Risk of a negative impact from possible variances compared with the planned new business volume (new business risk)– Risk of a negative impact that could arise from variances between the actual and forecast performance of the collective building society operations caused by significant long-term changes in customer behavior unrelated to changes in interest rates (collective risk)	<ul style="list-style-type: none">– Decline in new business– Changed customer behavior (unrelated to changes in interest rates)
	Business risk	Risk that financial performance is not in line with expectations, and this is not covered by other types of risk	<ul style="list-style-type: none">– Costs of regulation– Competition based on pricing and terms
	Non-financial risks	Reputational risk ³	Risk of losses from events that damage confidence, mainly among customers (including the cooperative banks), shareholders, employees, the labor market, the general public, and the supervisory authorities, in the entities in the Bank sector or in the products and services that they offer
Operational risk		Risk of losses from human behavior, technological failure, weaknesses in process or project management, or external events	<ul style="list-style-type: none">– Compliance risk including conduct risk: Violations of legal provisions; failure to comply with corporate policies– Legal risk: Violations of legal provisions or failures in applying such provisions; adverse changes in the legal environment– Information risk including ICT risk: Failure to maintain the confidentiality, integrity, availability, or authenticity of information or data– Security risk: Inadequate protection of individuals, premises, assets, or time-critical processes– Outsourcing risk: Disruptions to outsourced processes and services– Project risk: Failure to complete projects on schedule

¹ Apart from migration risk on traditional loans, which are covered by the capital buffer.

² Including business risk and reputational risk of BSH.

³ The Bank sector's reputational risk is contained in the risk capital requirement for business risk. BSH's reputational risk, which is covered mainly by the technical risk of a home savings and loan company, is not included here.

Risks								
		DZ BANK	BSH	DZ HYP	DZ PRIVATBANK	TeamBank	UMH	VR Smart Finanz
Risk management KPIs disclosed								
– Liquid securities – Unsecured short-term and medium-term funding – Minimum liquidity surplus – LCR – NSFR	Chapter VII.7.2.6 Chapter VII.7.2.6 Chapter VII.7.2.7 Chapter VII.7.3.3 Chapter VII.7.3.4	•	•	•	•	•		•
– Lending volume – Risk capital requirement for credit risk	Chapters VII.9.6 and VII.9.9 Chapter VII.9.10	•	•	•	•	•		•
– Carrying amounts of investments – Risk capital requirement for equity investment risk	Chapter VII.10.5 Chapter VII.10.5	•	•	•		•	•	•
– Value-at-risk for market risk – Risk capital requirement for market risk	Chapter VII.11.7.1 Chapter VII.11.7.2	•	•	•	•	•	•	•
Risk capital requirement for the technical risk of a home savings and loan company	Chapter VII.12.5		•					
Risk capital requirement for business risk	Chapter VII.13.6	•		•	•	•		•
		•	•	•	•	•	•	•
– Losses from operational risk – Risk capital requirement for operational risk	Chapter VII.15.7 Chapter VII.15.8	•	•	•	•	•	•	•

Management unit disclosures in the risk report:



Quantitative and qualitative disclosures



Quantitative disclosures



Not relevant

FIG. 4 – RISKS IN THE INSURANCE OPERATING SEGMENT AND SECTOR

Risk type	Definition		Risk factors	Risk management KPIs disclosed	
RISK COVERED BY CAPITAL PURSUANT TO SOLVENCY II					
Financial risks	Actuarial risk				
	– Life actuarial risk	Risk arising from the assumption of life insurance obligations in relation to the risks covered and the processes used in the conduct of this business	– Adverse change in the calculation assumptions for life insurance over the lifetime of the contract – Increase in claim events as a result of pollution and climate change	– Claims rate trend in non-life insurance – Overall solvency requirement	Chapter VII.17.7 Chapter VII.17.8
	– Health actuarial risk	Risk arising from the assumption of health and casualty insurance obligations in relation to the risks covered and the processes used in the conduct of this business	– Higher drawdown of benefits by health insurance policyholders – Increase in claim events as a result of pollution and climate change		
	– Non-life actuarial risk	Risk arising from the assumption of non-life insurance obligations in relation to the risks covered and the processes used in the conduct of this business	– Unexpected rise in claims incurred, e.g. due to weather-related natural disasters attributable to climate change – Rise in claims incurred as a result of silent cyber risk		
	Market risk	Risk arising from fluctuation in the level or volatility of market prices of assets, liabilities, and financial instruments that have an impact on the value of the assets and liabilities of the entity	It becomes difficult to generate a guaranteed rate of return because of a narrowing of spreads on investments The fair values of investments fall because of – a further unexpected rise in interest rates – a widening of spreads on investments – the issuer's transition risk	– Lending volume – Overall solvency requirement	Chapter VII.18.4 Chapter VII.18.5
	– Interest-rate risk – Spread risk – Equity risk – Currency risk – Real-estate risk				
	Counterparty default risk	Risk of losses due to unexpected default or deterioration in the credit standing of counterparties or debtors of insurance or reinsurance companies over the subsequent twelve months	Deterioration of counterparties' financial circumstances	– Lending volume – Overall solvency requirement	Chapter VII.19.4
Non-financial risks	Reputational risk ¹	Risk of losses that could arise from damage to the reputation of R+V or of the entire industry as a result of a negative perception among the general public	– Decrease in new and existing business – Backing of stakeholders is no longer guaranteed – Materialization of the risks assessed in connection with ESG risks		
	Operational risk	Risk of losses arising from inadequate or failed internal processes, personnel, or systems, or from external events	– Legal and compliance risk: Violations of legal provisions or failures in applying such provisions; adverse changes in the legal environment; violations of statutory provisions; failure to comply with corporate policies – Information risk, including ICT risk: Malfunctions or breakdowns in IT systems – Security risk: Business interruptions could result in lasting disruptions to processes and workflows – Outsourcing risk: Disruptions to outsourced processes and services – Project risk: Failure to complete projects on schedule	Overall solvency requirement	Chapter VII.21.4
RISK COVERED BY CAPITAL PURSUANT TO SOLVENCY I					
	Risks from entities in other financial sectors	The entities in other financial sectors mainly consist of pension funds and occupational pension schemes	Generally corresponding to the risk factors for risks backed by capital pursuant to Solvency II	Overall solvency requirement	Chapter VII.22

¹ The Insurance sector's reputational risk is included in the overall solvency requirement for life actuarial risk (lapse risk).

2.3 Risk profile and risk appetite

The DZ BANK Group's **business model** and the associated business models used by the management units (see chapter I.1 in 'DZ BANK Group fundamentals') determine the risk profile. The main risks associated with the business models are shown in Fig. 3 and Fig. 4. The businesses operated by the management units that have a significant impact on the risk profile are described under 'Business background and risk strategy' within the chapters of the risk report covering the different risk types.

The values for the measurement of **liquidity and capital adequacy** presented in Fig. 5 reflect the liquidity risks and the risks backed by capital assumed by the DZ BANK Group. They illustrate the **risk profile** of the DZ BANK Group. The values for these KPIs are compared against the (internal) threshold values specified by the Board of Managing Directors of DZ BANK – also referred to below as **risk appetite** – and against the (external) minimum targets laid down by the supervisory authorities. The KPIs are explained in more detail later in this risk report.

FIG. 5 – LIQUIDITY AND CAPITAL ADEQUACY KPIS

	Measured figure		Internal minimum threshold value		External minimum target	
	Dec. 31, 2022	Dec. 31, 2021	2022	2021	2022	2021
LIQUIDITY ADEQUACY						
DZ BANK Group (economic perspective)						
Minimum liquidity surplus (€ billion) ¹	14.3	19.4	4.0	4.0	0.0	0.0
DZ BANK banking group (normative perspective)						
Liquidity coverage ratio – LCR (percent)	145.9	147.7	110.0	110.0	100.0	100.0
Net stable funding ratio – NSFR (percent)	122.3	127.1	105.0	105.0	100.0	100.0
CAPITAL ADEQUACY						
DZ BANK Group (economic perspective)						
Economic capital adequacy (percent)	220.8	210.7	120.0	120.0	100.0	100.0
DZ BANK financial conglomerate (normative perspective)						
Coverage ratio (percent)	152.1	150.8	110.0	110.0	100.0	100.0
DZ BANK banking group (normative perspective)						
Common equity Tier 1 capital ratio (percent) ²	13.7	15.3	10.0	10.0	9.0	9.0
Tier 1 capital ratio (percent) ²	15.2	16.8	11.9	11.9	10.8	10.8
Total capital ratio (percent) ²	18.0	18.5	14.3	14.3	13.2	13.3
Leverage ratio (percent) ²	4.7	7.3	4.0	3.5	3.0	3.3
MREL ratio as a percentage of risk-weighted assets ^{3, 4}	38.3	37.3	26.8		25.1	
Subordinated MREL ratio as a percentage of risk-weighted assets ³	28.5	26.5	25.5		23.8	

Not available

¹ The measured value relates to the stress scenario with the lowest minimum liquidity surplus. The internal threshold value relates to the observation threshold.

² The external minimum targets are the binding regulatory minimum capital requirements. Further details can be found in chapter VII.8.3.3.

³ Calculated as the ratio of the total of regulatory own funds and eligible bail-in-able liabilities to the total risk exposure amount (TREA).

⁴ The calculation of the MREL ratio was changed with effect from January 1, 2022. This means that the figure as at December 31, 2021 differs from the corresponding disclosures in the 2021 risk report. Details on the minimum capital requirements can be found in chapter VII.8.3.3.

The **solvency** of DZ BANK and its subsidiaries was never in jeopardy at any point during the reporting period. They also complied with regulatory requirements for liquidity adequacy. By holding ample liquidity reserves, the group aims to be able to protect its liquidity against any potential crisis-related threats.

The DZ BANK Group remained within its economic **risk-bearing capacity** in 2022 and also complied with regulatory requirements for capital adequacy on every reporting date.

3 Fundamental principles of risk management

3.1 Regulatory framework for risk management

The **DZ BANK Group's risk management system** takes into account the statutory requirements specified in section 25 (1) of the German Supervision of Financial Conglomerates Act (FKAG) in conjunction with section 25a KWG and the German Minimum Requirements for Risk Management for Banks and Financial Services Institutions (MaRisk BA). In respect of risk management for the relevant management units, the DZ BANK Group also observes the requirements specified in sections 26 and 27 of the German Act on the Supervision of Insurance Undertakings (VAG) and section 28 of the German Capital Investment Code (KAGB) in conjunction with the German Minimum Requirements for Risk Management for Investment Management Companies (KAMaRisk).

When the DZ BANK Group designed the risk management system, it followed the guidance provided by the EBA and the European Insurance and Occupational Pensions Authority (EIOPA), together with the pronouncements of the Basel Committee on Banking Supervision (BCBS) and the Financial Stability Board (FSB) on risk management issues.

In the reporting year, DZ BANK updated its **group recovery plan** for the DZ BANK Group in accordance with the requirements specified by banking supervisors and submitted it to the European Central Bank (ECB). The recovery plan is based on the requirements specified in the German Bank Recovery and Resolution Act (SAG) and in other legal sources, especially Commission Delegated Regulation (EU) 2016/1075, various EBA guidelines, and the German Regulation on Minimum Requirements for the Design of Recovery Plans (MaSanV). As requested by the Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin) [German Federal Financial Supervisory Authority], R+V prepared a hypothetical recovery plan in accordance with section 26 (1) VAG in conjunction with section 275 (1) VAG. **R+V's recovery plan** was updated in 2022 and submitted to BaFin.

In accordance with article 7 (2) of Regulation (EU) No. 806/2014, the Single Resolution Board (SRB) is the European regulator responsible under the **Single Resolution Mechanism (SRM)** for the preparation of resolution plans and for all decisions in connection with the resolution of all institutions that are under the direct supervision of the ECB. A group resolution plan is drawn up for institutions that are subject to supervision at consolidated level. The SRB works closely with the national resolution authorities (in 2022 in Germany, this was BaFin).

The **resolution plan** is aimed at ensuring the resolvability of the banking group. In accordance with section 42 (1) SAG, the resolution authority (BaFin) can demand that the institution provide it with comprehensive assistance in connection with drawing up and updating the resolution plan. For this reason, as in prior years, DZ BANK once again in 2022 supported the ongoing preparation of the resolution plan for the DZ BANK Group. It supplied the resolution authority with numerous analyses related to DZ BANK and completed standardized questionnaires.

3.2 Risk culture

The DZ BANK Group's risk culture is shaped by the high degree of responsibility assumed by the cooperative financial network for its members and for society, by the values of sustainability, stability, and diversity, and by a strong culture of dialogue. The priority for the day-to-day handling of risk is compliance with strategic and associated operating requirements.

The following **principles** apply in respect of the day-to-day handling of risk:

- **Leadership culture:** The management must set out clear expectations regarding the handling of risk and lead by example.
- **Risk appetite:** Every individual at DZ BANK must understand their role and their part in the risk management system; they must assume responsibility for their decisions.
- **Communications:** Internal communications must be open and consensus-based. Alternative opinions must be respected and employees encouraged to analyze risk transparently.

- **Employees and expertise:** Employees must bear responsibility for conscious handling of risk. They must use the available expertise and undertake continuing professional development in a changing environment.
- **Change management:** DZ BANK must learn from past experience and ensure the business model is sustainable by managing change proactively.

The key features of the risk culture are documented in a framework, which is available to all employees of DZ BANK.

3.3 Risk appetite

The entities in the DZ BANK Group define risk appetite as the nature and extent of the risks that will be accepted at group level or by the management units within their risk capacity when implementing their business models and business objectives. Risk capacity is the maximum risk that the DZ BANK Group can take on based on its capital adequacy, liquidity adequacy, capacity for risk management and control, and regulatory restrictions. Risk capacity is therefore largely determined by the DZ BANK Group's available internal capital, own funds, and available liquid assets. Risk appetite equates to the term '**risk tolerance**' used by the supervisory authorities in a disclosure context.

The **risk appetite statement** formulates risk policy principles on risk tolerance in the DZ BANK Group. The principles are overarching statements that are consistent with the business model and the risk strategies. The qualitative principles are supplemented by quantitative key figures, for which threshold values are set internally. The values for the KPIs and the internal threshold values are shown in Fig. 5. The overall risk report is used to monitor the internal threshold values.

3.4 Risk strategies

The **systematic controlled assumption of risk in relation to target returns** is an integral part of corporate control in the DZ BANK Group. The activities resulting from the business model require the ability to identify, measure, assess, manage, monitor, and communicate risks. The need to hold appropriate reserves of cash and to cover risks with adequate capital is also recognized as an essential prerequisite for the operation of the business and is of fundamental importance.

For each of the material risks, the Board of Managing Directors of DZ BANK draws up risk strategies that are linked to the **business strategy**. The risk strategies each encompass the main risk-bearing business activities, the objectives of risk management (including the requirements for accepting or preventing risk), and the action to be taken to attain the objectives. The risk strategies are each valid for one calendar year.

The annual updating of the risk strategies is integrated with the **strategic planning process** and is carried out by the Group Risk Controlling, Group Risk Management & Services, and Group Finance divisions in close consultation with other relevant divisions at DZ BANK and its subsidiaries.

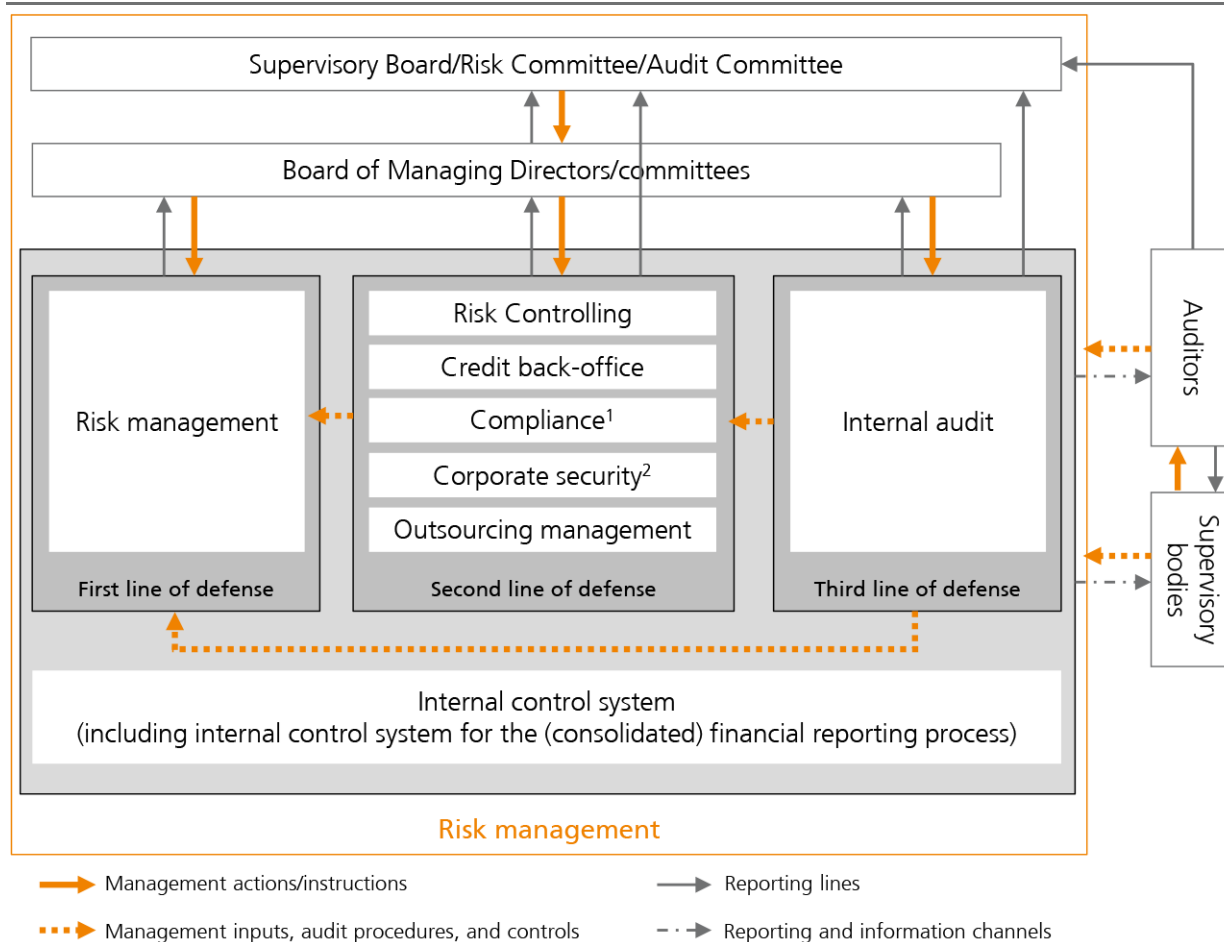
The risk strategies are described in the chapters covering the individual risk types in this risk report.

3.5 Risk-oriented corporate governance

3.5.1 Governance structure

The DZ BANK Group's **risk management system** builds on the risk appetite statement and risk strategies. It is based on three lines of defense that are interlinked and well established in the monitoring and control environment. Fig. 6 shows the governance structure for risk management. R+V has implemented a modified governance structure because it is subject to different regulatory requirements.

FIG. 6 – GOVERNANCE STRUCTURE OF RISK MANAGEMENT IN THE DZ BANK GROUP (SCHEMATIC DIAGRAM)



1 Including data protection.

2 Including information security and business continuity management.

The **three-lines-of-defense model** clarifies the understanding of risk management within the DZ BANK Group and sets out the roles and responsibilities.

The interaction between the three functional areas, or lines of defense, is intended to provide the basis for effective groupwide risk management. The tasks of the individual lines of defense are as follows:

First line of defense:

Day-to-day assumption and management of risk; related reporting to the Board of Managing Directors

Second line of defense:

- Establishment and enhancement of a framework for risk management
- Monitoring of compliance with the framework in the first line of defense and related reporting to the Supervisory Board and Board of Managing Directors
- Second vote in credit decisions as defined in MaRisk BA and KAMaRisk
- Development and monitoring of principles for compliance with data protection requirements and structuring and monitoring of corporate security. These rules do not limit the data protection officers' freedom to operate independently.
- The tasks listed are primarily carried out by the Group Risk Controlling, Group Risk Management & Services, Credit, and Compliance divisions. They are also part of the remit of the Group IT Governance department.
- The Group Risk Controlling, Group Risk Management & Services, and Credit divisions together form the risk management function.

Third line of defense:

- Process-independent examination and assessment of risk management and control processes in the first and second lines of defense
- Reporting to the Board of Managing Directors, Supervisory Board, and Audit Committee
- Communication with external control functions

Independent auditors, together with banking and insurance supervisory authorities, form the **external control functions** and these functions regularly hold discussions with all three lines of defense. The supervisory authorities can specify key points to be covered by independent auditors in their audits of financial statements. The auditors report to the supervisory authorities on the findings of their audits of financial statements and special audits.

Risk management is an integral component of governance and is therefore taken into account in the general management approach, in the management of subsidiaries via appointments to key posts, and in the DZ BANK Group's committees. The governance of the DZ BANK Group is described in chapter I.2.2 in 'DZ BANK Group fundamentals'.

3.5.2 Risk management

Risk management refers to the operational implementation of the risk strategies based on standards applicable throughout the group.

The management units make conscious decisions on whether to assume or avoid risks. They must observe guidelines and risk limits specified by the head office. The divisions responsible for risk management in the first line of defense are separated in terms of both organization and function from the divisions in the second and third lines of defense.

3.5.3 Risk control

The Group Risk Controlling and Group Risk Management & Services divisions, which form DZ BANK's central risk control function, are responsible for **identifying, measuring, and assessing** risk in the DZ BANK Group. This role includes early detection, full recording of data (to the extent that this is possible), and internal monitoring for all material risks. The risk control function lays down the fundamental requirements for the risk measurement methods to be used throughout the group and coordinates implementation with the risk control functions in the other management units. This structure is designed to ensure that risk is managed consistently throughout the group. DZ BANK's risk control function also draws up groupwide rules for the credit risk processes.

Both at DZ BANK and in the other management units, the risk control function is responsible for the transparency of risks assumed and aims to ensure that all risk measurement methods used are up to date. In cooperation with the other management units, the risk control function at DZ BANK therefore prepares groupwide **risk reports** covering all material types of risk based on specified minimum standards using methods agreed between the management units. The risk reports are compiled for the Supervisory Board and the Board of Managing Directors of DZ BANK and for the other management units.

The risk control units in the management units **monitor** compliance with the limits defined for the minimum liquidity surplus and with the entity-related limits that have been set based on the risk capital allocated by DZ BANK.

3.5.4 Credit back-office division

The Credit divisions of the entities in the Bank sector form the back office within the meaning of MaRisk BA. They are responsible for aspects of identifying, measuring, monitoring, and managing credit risk. These aspects include analyzing the risk (including ratings), approving or rejecting a credit decision with the back office's 'second vote', ensuring compliance with the credit risk strategy, and identifying and appropriately assessing the risks from loans to members of the governing bodies. The responsibilities of the back office also comprise the ongoing monitoring of loan exposures, including identifying and processing non-performing exposures and deciding on measures to be implemented if limits are exceeded, as well as the management of loan collateral. In the case of exposures that are relevant for management, the exposure throughout the group is taken into account and appropriate management guidance is given to the management units.

3.5.5 Compliance

Compliance function

The Board of Managing Directors of DZ BANK and the Boards of Managing Directors of the other management units are responsible for compliance with legal provisions and requirements and with the principles and measures implemented for this purpose. To fulfill these duties, the Boards of Managing Directors generally appoint an independent compliance function.

The main tasks of the compliance function are to identify, manage, and mitigate compliance risk in order to protect customers, the entities in the DZ BANK Group, and their employees against breaches of legal provisions and requirements. The compliance function is also responsible for monitoring compliance with legal provisions, external and internal agreements, and internal standards. Other tasks of the compliance function are to keep senior management up to date with new regulatory requirements and to advise the departments on implementing new provisions and requirements.

In accordance with the requirements of the Supervisory Review and Evaluation Process for Basel Pillar 2 (SREP), there is a single compliance framework for the main entities in the DZ BANK Group. This framework lays down rules on cooperation between the individual compliance functions and sets out their authority and responsibilities. The compliance framework comprises the compliance policy of the DZ BANK Group and compliance standards. The compliance policy sets out requirements for establishing and organizing the compliance functions and details of their duties. It is supplemented by compliance standards, which specify how to implement these requirements at an operational level. If individual requirements in the compliance standards cannot be fulfilled by a management unit, for example because they conflict with local rules or special legal requirements, the affected management unit must provide an explanation. Special circumstances may arise because R+V is subject to different legal and regulatory requirements. The DZ BANK Group's compliance framework is reviewed annually to check that it is up to date.

Further disclosures relating to compliance risk can be found in chapters VII.15.5.1 and VII.21.3.1.

Code of conduct

The risk culture principles (see chapter VII.3.2) are mirrored in the DZ BANK Group's code of conduct. The code of conduct represents a framework for the group entities, the details of which are implemented by means of internal regulations and policies in the management units according to their respective core businesses and entity-specific requirements.

The code of conduct encompasses the responsibility to stakeholders who are directly affected by the management unit concerned. These stakeholders include customers, business partners, shareholders, and employees. Compliance with social and ethical standards also forms part of the code of conduct, as do aspects of sustainability.

The subsidiaries of DZ BANK have undertaken to comply with DZ BANK's standards on preventing money laundering, the financing of terrorism, and other criminal offenses where required by law. The measures required by the German Anti-Money Laundering Act (GwG) have been put in place and implemented. They are reviewed regularly to check that they are up to date and, if necessary, amended. No corruption is tolerated, either in the entities of the DZ BANK Group or at business partners or other third parties. The DZ BANK Group implements appropriate organizational arrangements designed to ensure compliance with all applicable sanctions and embargoes.

Data protection

The entities in the DZ BANK Group have introduced suitable precautions aimed at ensuring that they comply with data protection provisions relating to customers, business partners, and employees. The data protection officers required by law have been appointed and their names have been submitted to the competent data protection authorities. Standard data protection principles have been issued within the DZ BANK Group. In addition, employees regularly receive updates on the currently applicable data protection provisions.

In the management units, independent data protection officers report to the relevant Board of Managing Directors. The Data Protection Officers working group in the DZ BANK Group generally meets three times a year. The working group deals with current issues relating to data protection.

3.5.6 Corporate security

The entities in the DZ BANK Group take into account the relevant regulatory requirements in the following areas of corporate security:

- Information security
- Business continuity management (contingency and crisis management)

The regulatory requirements are implemented in all of the group's subsidiaries by means of written specifications and compliance is monitored by DZ BANK.

Information security

The aim of information security is to safeguard the confidentiality, integrity, authenticity, and availability of the data and information used in business processes. Suitable measures must be taken to adequately protect this data and information against unauthorized access, disclosure, or modification and against loss or theft.

To manage information security, the **DZ BANK Group** has established a groupwide information security management system (Group ISMS) based on ISO/IEC 27001:2013.

DZ BANK has implemented an information security management system (ISMS). The rules that it contains, along with the methodological framework that it provides, are also based on the ISO/IEC 27001:2013 standard. The ISMS is designed to ensure the confidentiality, integrity, availability, and authenticity of the data and information (information assets) used in DZ BANK's core processes, management processes, and support processes. The governance model implemented defines the methods, processes, roles, responsibilities, authority, and reporting channels that are necessary to achieve the strategic objectives and carry out the tasks of information security at operational level. It also provides an operational framework for the consistent quantitative and qualitative evaluation and management of information security risk, which forms part of operational risk.

Further disclosures relating to information risk, including ICT risk, can be found in chapters VII.15.5.3 and VII.21.3.2.

Business continuity management

A groupwide business continuity management (contingency and crisis management) system has been set up to implement regulatory requirements throughout the group and to mitigate security risk relating to time-critical

processes. Group standards are applied to address the regulatory minimum requirements for this system, and a governance process is used to track compliance with the standards.

At DZ BANK, business continuity management provides structures and methodologies that will enable time-critical business processes to be maintained should an emergency arise (dealing with emergencies). Measures to protect people, premises, and assets are also developed and implemented (preventing emergencies). In this way, DZ BANK aims to ensure that it can maintain its operations in the event of emergencies, even though the level of activity may have to be reduced. This applies particularly if there are situations in which whole groups of individuals, significant parts of the buildings or IT infrastructure, or the procurement of services are affected.

At DZ BANK, time-critical business processes are identified in accordance with the rules of the head-office team for business continuity management using business impact analyses and protected by business continuity planning. DZ BANK's business continuity management system has been certified in accordance with the ISO 22301 standard.

Further disclosures relating to security risk can be found in chapters VII.15.5.4 and VII.21.3.3.

3.5.7 Outsourcing management

At DZ BANK, the Central Outsourcing Management unit acts as the central point of contact for all issues relating to risk management for external procurement. This includes outsourcing and management-relevant external procurement (external procurement of IT services and other purchases from third parties). The Central Outsourcing Management unit is responsible for developing, introducing, and monitoring the framework specifications as well as for appropriately implementing the statutory requirements in respect of regulated external procurement at DZ BANK.

The sector-wide rules on outsourcing management include general requirements for the management units in the Bank sector to ensure that the management of outsourcing is largely standardized throughout the DZ BANK Group. The Insurance sector is subject to separate regulatory requirements that are described in internal guidance issued by R+V.

Further disclosures relating to outsourcing risk can be found in chapters VII.15.5.5 and VII.21.3.4.

3.5.8 Control functions

Internal audit

The internal audit departments of the management units are responsible for control and monitoring tasks. Independently of individual processes and with a focus on risk, they review and assess compliance with statutory and regulatory requirements and the effectiveness and appropriateness of risk management in general and the internal control system in particular. They also check that all activities and processes are carried out properly, regardless of whether they are outsourced or not. The internal audit departments also ensure that problems identified in audit findings are rectified.

The internal audit departments at the entities in the DZ BANK Group report to the chief executive officer or other senior managers of the entity concerned.

DZ BANK's internal audit department is responsible for internal audit tasks at group level. These tasks include, in particular, the design and coordination of audits involving multiple entities, the implementation of which lies within the remit of the individual internal audit departments in the management units concerned, and the evaluation of individual management unit audit reports of relevance to the group as a whole. Cooperation between internal audit departments in the DZ BANK Group is governed by general parameters, the operational details of which are set out in a separate group audit manual. DZ BANK's internal audit department also carries out audit activities for selected subsidiaries under service agreements.

Supervisory Board

The Board of Managing Directors reports to the Supervisory Board of DZ BANK four times a year about the risk situation, the risk strategies, and the status and further development of the risk management system of the DZ BANK Group and DZ BANK. The Board of Managing Directors also provides the Supervisory Board with reports about significant loan and investment exposures and the associated risks, again four times a year. The Supervisory Board discusses these issues with the Board of Managing Directors, advises it, and monitors its management activities. The Supervisory Board is involved in decisions of fundamental importance.

The Supervisory Board has set up a Risk Committee, which addresses issues related to overall risk appetite and risk strategy. The chairman of the Risk Committee reports to the full Supervisory Board four times a year on the material findings of the committee's work.

At least quarterly, the Board of Managing Directors makes the centrally produced risk reports available to the members of the Risk Committee and the other members of the Supervisory Board. The chairman of the Risk Committee informs the full Supervisory Board about the main content of these reports no later than at its next meeting. In addition, the Audit Committee regularly examines the effectiveness of the internal control system, risk management system, and internal audit. It passes on important information to the other Supervisory Board members in the Audit Committee Chairman's reports at Supervisory Board meetings and by distributing the minutes from Audit Committee meetings to the other Supervisory Board members.

External control functions

Independent **auditors** carry out audits pursuant to section 29 (1) sentence 2 no. 2a KWG in conjunction with section 25a (1) sentence 3 KWG in relation to the risk management system, including the internal control functions, of the entities in the Bank sector. For the Insurance sector, verification of the Solvency II balance sheet is carried out pursuant to section 35 (2) VAG and an audit of the early-warning system for risk, including the internal monitoring system of R+V, is carried out pursuant to section 35 (3) VAG in conjunction with section 317 (4) HGB and section 91 (2) of the German Stock Corporation Act (AktG).

The **banking and insurance supervisory authorities** also conduct audits focusing on risk.

3.5.9 General internal control system

The objective of the internal control systems operated in the entities of the DZ BANK Group is to ensure the effectiveness and efficiency of business activity and compliance with the relevant legal provisions by means of suitable basic principles, action plans, and procedures.

DZ BANK has a bank-wide internal control system that is able to adapt to changing business and operating environments. The methodology of this control system is based on the Internal Control – Integrated Framework of the Committee of Sponsoring Organizations of the Treadway Commission (COSO), a comprehensive and internationally accepted framework for the appropriate design of internal control systems.

As part of the control system, regular updates and assessments are carried out in respect of the internal controls for reducing material risk in the business processes documented in the written set of procedural rules. The outcome of the assessments provides a statement on the appropriateness and effectiveness of the bank-wide internal control system for the Board of Managing Directors and Supervisory Board. The organizational and technical measures integrated into DZ BANK's operational and organizational structure are the starting point for the design of the controls.

The internal control system for the (consolidated) financial reporting process, which is described in chapter VII.3.5.10 below, is a sub-system of the bank-wide internal control system.

3.5.10 Internal control system for the (consolidated) financial reporting process

Objective and responsibilities

DZ BANK is subject to a requirement to prepare consolidated financial statements and a group management report as well as separate financial statements and a management report. The primary objective of external (consolidated) financial reporting is to provide decision-useful information for the users of the reports. This includes all activities to ensure that (consolidated) financial reporting is properly prepared and that material violations of accounting standards – which could result in the provision of inaccurate information to users or in mismanagement of the group – are avoided with a sufficient degree of certainty.

In order to limit operational risk in this area of activity, the entities in the DZ BANK Group have set up internal control systems for the (consolidated) financial reporting process as an integral component of the control systems put in place for the general risk management process. In this context, the activities of employees, the implemented controls, the technologies used, and the design of work processes are structured to ensure that the objectives associated with (consolidated) financial reporting are achieved.

Overall responsibility for (consolidated) financial reporting lies with DZ BANK's Group Finance division, with all the consolidated entities in the DZ BANK Group responsible for preparing and monitoring the quantitative and qualitative information required for the consolidated financial statements.

Instructions and rules

The methods to be applied within the DZ BANK Group in the preparation of the consolidated financial statements are set out in writing in a group manual. The methods to be applied within DZ BANK in the preparation of the separate financial statements are documented in a written set of procedural rules. Both of these internal documents are updated on an ongoing basis. The instructions and rules are audited to assess whether they remain appropriate and are amended in line with changes to internal and external requirements.

Resources and methods for minimizing risk

The group's financial reporting process is decentralized. Responsibility for preparing and checking the quantitative and qualitative information required for the consolidated financial statements lies with the organizational units used for this purpose in the entities of the DZ BANK Group. DZ BANK implements the relevant controls and checks in respect of data quality and compliance with the DZ BANK Group rules.

The organizational units post the accounting entries for individual transactions. The consolidation processes are carried out by DZ BANK's Group Finance division and by the accounting departments of each entity in the DZ BANK Group. The purpose of this structure is to ensure that all accounting entries and consolidation processes are properly documented and checked.

Financial reporting, including consolidated financial reporting, is chiefly the responsibility of employees of DZ BANK and the other organizational units used for this purpose in the entities of the DZ BANK Group. If required, external experts are brought in for certain accounting-related calculations as part of the financial reporting process, such as determining the defined benefit obligation and valuing collateral.

Consolidated financial reporting is based on mandatory workflow plans agreed between DZ BANK's Group Finance division and the individual accounting departments of the subsidiaries. These plans set out the procedures for collating and generating the quantitative and qualitative information required for the preparation of statutory financial reports. The plans also apply to the financial reports prepared for DZ BANK.

Generally accepted valuation methods are used in the preparation of the consolidated financial statements and group management report, and the separate financial statements and the management report. These methods are regularly reviewed to ensure they remain appropriate.

In order to ensure the efficiency of the (consolidated) financial reporting system, the processing of the underlying data is extensively automated using IT systems. Control mechanisms are in place with the aim of ensuring the quality of processing and are one of the elements used to limit operational risk. (Consolidated) accounting input and output data undergoes automated and manual checks.

Business continuity plans have also been put in place. These plans are intended to ensure the availability of HR and technical resources required for the (consolidated) accounting and financial reporting processes.

Information technology

The IT systems used for (consolidated) financial reporting have to satisfy the applicable security requirements in terms of confidentiality, integrity, availability, and authenticity. Automated controls are used to ensure that the processed (consolidated) accounting data is handled properly and securely in accordance with the relevant requirements. The controls in IT-supported (consolidated) accounting processes include, in particular, validation procedures to ensure consistent issue of authorizations, verification of master data modifications, logical access controls, and change management validation procedures in connection with developing, implementing, or modifying IT applications.

The IT infrastructure required for the use of electronic (consolidated) accounting systems is subject to the security controls implemented on the basis of the general IT security principles in the entities of the DZ BANK Group.

The information technology used for consolidated accounting purposes is equipped with the functionality to enable it to handle the journal entries in individual organizational units as well as the consolidation transactions carried out by DZ BANK's group accounting department and by the accounting departments in the subgroups.

IT-supported (consolidated) accounting processes are audited as an integral part of the internal audits carried out by the internal audit departments of the entities in the DZ BANK Group.

Ensuring and improving effectiveness

The processes used are reviewed to ensure they remain appropriate and fit for purpose; they are adapted in line with new products, circumstances, or changes in statutory requirements. To guarantee and increase the quality of (consolidated) accounting in the entities of the DZ BANK Group, the employees charged with responsibility for financial reporting receive needs-based training in the legal requirements and the IT systems used. When statutory changes are implemented, external advisors and auditors are brought in to provide quality assurance for financial reporting. At regular intervals, the internal audit department audits the internal control system related to the process for (consolidated) financial reporting.

3.6 Risk management tools

3.6.1 Accounting basis for risk management

Accounting basis for risk measurement

The transaction data that is used to prepare the DZ BANK Group's consolidated financial statements forms the basis for the measurement of risk in the Bank sector and Insurance sector. Similarly, the transaction data used by the entities in the DZ BANK Group to prepare separate financial statements and subgroup financial statements is also used for the measurement of risk in the management units. A wide range of other factors are also taken into account in the calculation of risk. These factors are explained in more detail during the course of this risk report.

The line items in the consolidated financial statements significant to risk measurement are shown in Fig. 7. The information presented is also applicable to the measurement of risk for the separate financial statements of DZ BANK and the measurement of its risk, which does not include the technical risk of a home savings and loan company or the risks incurred by the Insurance sector.

The sections below provide a further explanation of the link between individual types of risk and the consolidated financial statements.

A further breakdown of the line items in the consolidated financial statements used to determine **credit risk** is given in chapter VII.9.6.2.

The investments used for the purposes of measuring **equity investment risk** are the following items reported in note 56 of the notes to the consolidated financial statements: shares and other shareholdings, investments in subsidiaries, investments in associates, and investments in joint ventures.

In the **Bank sector**, the measurement of financial instruments both for the purposes of determining market risk and for financial reporting purposes is based on financial market data provided centrally. Discrepancies in carrying amounts arise from the differing treatment of impairment amounts in the market risk calculation and in the accounting figures. Differences also arise because the market risk calculation measures bonds on the basis of issuer and credit spreads using available market data whereas the accounting treatment uses liquid bond prices. If no liquid prices are available for bonds, issuer and credit spreads are also used to measure bonds for accounting purposes. With the exception of these differences, the disclosures relating to **market risk** reflect the fair values of the assets and liabilities concerned.

The measurement for the **technical risk of a home savings and loan company** is based on the loans and advances to banks and customers (home savings loans) and also the home savings deposits (deposits from banks and customers) described in notes 64 and 65 of the notes to the consolidated financial statements.

Insurance liabilities, as reported in the financial statements, are a key value for determining all types of **actuarial risk**. The line item Investments held by insurance companies is used to determine all types of **market risk** and **counterparty default risk**. The line item Other assets is included in the computation of actuarial risk and counterparty default risk.

Operational risk in the Bank sector, **business risk** (Bank sector), and **reputational risk** (Bank sector and Insurance sector) are measured without a direct link to balance sheet line items reported in the consolidated financial statements. On the other hand, **operational risk in the Insurance sector** is based on insurance liabilities.

FIG. 7 – RISK-BEARING LINE ITEMS IN THE CONSOLIDATED FINANCIAL STATEMENTS¹

		BANK SECTOR										INSURANCE SECTOR										
		Credit risk					Market risk					Technical risk of a home savings and loan company	Actuarial risk			Market risk						
							General market risk						Life	Health	Non-life	Interest-rate risk	Spread risk	Equity risk	Currency risk	Real-estate risk	Counterparty default risk	Operational risk
		Traditional credit risk	Issuer risk	Replacement risk	Equity investment risk	Interest-rate risk	Equity risk	Fund price risk	Currency risk	Commodity risk	Spread risk and migration											
Consolidated financial statements																						
Risk-bearing assets	Loans and advances to banks	•		•		•			•		•		•									
	Loans and advances to customers	•		•		•			•		•		•									
	Derivatives used for hedging (positive fair values)			•		•	•	•	•	•	•											
	Financial assets held for trading		•	•		•	•	•	•	•	•											
	Investments		•	•	•	•	•	•	•	•	•											
	Investments held by insurance companies															•	•	•	•	•	•	
	Property, plant and equipment, investment property, and right-of-use assets				•																	
	Other assets	•		•										•	•	•					•	
	Financial guarantee contracts and loan commitments	•				•			•													
Risk-bearing liabilities	Deposits from banks					•			•			•										
	Deposits from customers					•			•			•										
	Debt certificates issued including bonds					•	•	•	•													
	Derivatives used for hedging (negative fair values)			•		•	•	•	•	•	•	•										
	Financial liabilities held for trading			•		•	•	•	•	•	•											
	Insurance liabilities													•	•	•	•					•

¹ As liquidity risk is determined on the basis of all line items in the consolidated financial statements, the details for liquidity risk are not provided here for reasons of clarity.

The calculation of **liquidity risk** is derived from future cash flows, which in general terms are determined from all of the on-balance-sheet and off-balance-sheet items in the consolidated financial statements.

Accounting basis for risk coverage

The link between available liquidity reserves, which are used to determine economic liquidity adequacy, and the consolidated balance sheet is described in chapter VII.7.2.6.

The link between available internal capital, which is used to determine economic capital adequacy, and the consolidated balance sheet is covered in chapter VII.8.2.1.

3.6.2 Measurement of risk and risk concentrations

Framework

Risk management in the DZ BANK Group is based on a **resource-oriented perspective of liquidity and capital**. The group uses this approach to implement the regulatory requirements for the internal liquidity adequacy assessment process (ILAAP) and the internal capital adequacy assessment process (ICAAP). This involves dovetailing between the economic and normative perspectives within the ILAAP and ICAAP.

A distinction is also made between **economic and normative liquidity adequacy and between economic and normative capital adequacy**. The impact of each risk type on both economic capital and economic liquidity is taken into consideration. The effect and materiality of the various types of risk may vary, depending on the resource in question.

Economic liquidity adequacy

To ascertain the DZ BANK Group's economic liquidity adequacy, the minimum surplus cash that would be available if various scenarios were to materialize within the following year is determined as part of the **measurement of liquidity risk**. There is no capital requirement in connection with liquidity risk.

Concentrations of liquidity risk can occur primarily due to the accumulation of outgoing payments at particular times of the day or on particular days (concentrations of maturities), the distribution of funding across particular currencies, markets, products, and liquidity providers (concentrations of funding sources), and the distribution of liquidity reserves across particular currencies, ratings, and issuers (concentrations of reserves).

R+V (Insurance sector) is not material with regard to liquidity risk in the DZ BANK Group. This is because liquidity is typically tied up in liabilities with maturities of five years or more in insurance business.

Economic capital adequacy

In the **Bank sector**, **economic capital** (risk capital requirement) is calculated for credit risk, equity investment risk, market risk, the technical risk of a home savings and loan company, operational risk, and business risk in order to ascertain economic capital adequacy. This risk capital requirement is generally calculated as value-at-risk with a holding period of one year and a unilateral confidence level of 99.9 percent.

The capital requirement for the individual risk types is aggregated into the total risk capital requirement for the Bank sector taking into account various diversification effects. The diversified risk capital requirement reflects the interdependency of individual types of risk. The risks relating to the Bank and Insurance sectors are aggregated, disregarding diversification effects between the sectors.

In the **Insurance sector**, risk measurement is based on the method specified in Solvency II with the aim of determining value-at-risk, which is the measure of **economic capital**. The value-at-risk for the change in economic own funds is determined with a confidence level of 99.5 percent over a period of one year.

The DZ BANK Group holds a **capital buffer** as a component of aggregate risk to allow for a possible lack of precision in the measurement of the risks backed by capital.

Based on an analysis of portfolios, the sector-specific and cross-sector management of **risk concentrations** aims to identify potential downside risks that may arise from the accumulation of individual risks and, if necessary, to take corrective action. A distinction is made between risk concentrations that occur within a risk type (intra-risk concentrations) and concentrations that arise as a result of the interaction between different types of risk (inter-risk concentrations). Inter-risk concentrations are implicitly taken into account when determining correlation matrices for the purposes of inter-risk aggregation. They are mainly managed by using quantitative stress test approaches and qualitative analyses, which aim to provide a holistic view across all types of risk.

Normative perspective

The normative perspective is a forward-looking multi-year analysis of regulatory KPIs for liquidity adequacy and capital adequacy that are used to manage the DZ BANK banking group and its entities. It comprises the following management dimensions: monitoring of the actual figures for regulatory KPIs, liquidity planning, funding planning, capital planning, and adverse stress tests.

3.6.3 Stress tests

In addition to the risk measurements, the effects of extreme but plausible events are also analyzed. Stress tests of this kind are used to establish whether the DZ BANK Group can sustain its business models, even under extreme economic conditions. Stress tests are carried out in respect of liquidity, economic risk-bearing capacity, and regulatory capital ratios. They also help to identify and quantify specific risks and potential risk concentrations in the DZ BANK Group or in individual portfolios and to assess risk drivers, vulnerabilities, and threats.

The stress tests include scenarios for the purposes of liquidity management, capital planning, and internal capital and risk management. Stress tests are also carried out as part of bank recovery and resolution planning. Furthermore, the DZ BANK Group takes part in supervisory stress tests organized by the EBA and ECB. The outcome of the stress tests provides guidance for the management of risk, business planning, and decisions on liquidity measures or corporate action.

3.6.4 Limitation principles

The DZ BANK Group has implemented a system of limits to ensure that it retains an adequate level of liquidity and maintains its risk-bearing capacity. A system of limits and pre-set threshold values aims to ensure that the **liquidity surplus** at the level of the DZ BANK Group does not become a shortfall and that an adequate level of liquidity is guaranteed.

In the case of **risks backed by capital**, the limits take the form of risk limits or volume limits, depending on the type of business and type of risk. Whereas risk limits in all types of risk restrict exposure measured with an economic model, volume limits are applied additionally in transactions involving counterparties. Risk management is also supported by limits for relevant key performance indicators. Specific amendments to risk positions based on an adjustment of the volume and risk structure in the underlying transactions are intended to ensure that the measured exposure does not exceed the approved volume and risk limits. Risks that are incurred are compared with the limits allocated to them and undergo monitoring.

3.6.5 Hedging objectives and hedging transactions

Hedging activities can be undertaken where appropriate in order to transfer credit risk, market risk (Bank sector), market risk (Insurance sector), actuarial risk, and operational risk to the greatest possible extent to third parties outside the DZ BANK Group. All hedging activities are conducted within the strategic rules specified in writing and applicable throughout the group. Derivatives and other instruments are used to hedge credit risk and market risk.

If the hedging of risk in connection with financial instruments gives rise to **accounting mismatches** between the hedged item and the derivative hedging instrument used, the DZ BANK Group designates the hedging transaction as a hedge in accordance with the hedge accounting requirements of IFRS 9 in order to eliminate or reduce such mismatches. The DZ BANK Group continues to account for portfolio hedges in application of the rules under IAS 39. Hedge accounting in the DZ BANK Group encompasses the hedging of interest-rate risk. It therefore affects market risk in both the Bank and Insurance sectors. Hedging information is disclosed in note 86 of the notes to the consolidated financial statements.

DZ BANK uses derivatives to hedge **interest-rate risk**. In 2022, DZ BANK used micro hedges between securities in the liquidity reserve and derivatives used for hedging for the first time in order to account for economic hedging in accordance with the provisions of section 254 HGB. Internal hedging instruments are included by means of the deputization principle.

3.6.6 Risk reporting and risk manual

The quarterly **overall risk report** includes the risks throughout the group identified by DZ BANK. Together with the **DZ BANK Group stress tests report**, which is also compiled on a quarterly basis, the overall risk report is the main channel through which risks incurred by the DZ BANK Group and the management units are communicated to the Supervisory Board's Risk Committee, the Board of Managing Directors, and the Group Risk and Finance Committee. Economic and regulatory key risk indicators are also made available to the Board of Managing Directors in a **monthly overall risk report**, which is intended to ensure that the Board is informed promptly about the overall risk situation. In addition, the Board of Managing Directors and the Supervisory Board's Risk Committee receive portfolio and exposure-related management information in the quarterly **credit risk report for the DZ BANK Group**. The Board of Managing Directors also receives monthly information on **liquidity risk** in the DZ BANK Group and in the management units.

To complement the above, the management units have further reporting systems for all relevant types of risk. Depending on the degree of materiality in the risk exposures concerned, these systems aim to ensure that decision-makers and supervisory bodies receive transparent information at each measurement date on the risk profile of the management units for which they are responsible.

The **risk manual**, which is available to all employees of the management units, sets out the general parameters for identifying, measuring, assessing, managing, monitoring, and communicating risks. These general parameters are intended to ensure that risk management is properly carried out in the DZ BANK Group. The manual forms the basis for a shared understanding of the minimum standards for risk management throughout the group.

The main subsidiaries also have their own risk manuals covering special aspects of risk related specifically to these management units. R+V has Solvency II guidelines.

3.6.7 Risk inventory and appropriateness test

Every year, DZ BANK draws up a **risk inventory**, the objective of which is to identify the types of risk that are relevant for the DZ BANK Group and assess the materiality of these risk types. According to need, a risk inventory check may also be carried out at other times in order to identify any material changes in the risk profile during the course of the year. A materiality analysis is carried out for those types of risk that could arise in connection with the operating activities of the entities in the DZ BANK Group. The next step is to assess the extent to which there are concentrations of risk types classified as material in the Bank sector, the Insurance sector, and across sectors.

DZ BANK also conducts an annual **appropriateness test**, both for itself and at DZ BANK Group level. The appropriateness test may also be carried out at other times in response to specific events. The aim is to check whether the risk measurement methods used for all types of risk classified as material are in fact fit for purpose. The appropriateness test found that risk measurement in the DZ BANK Group is generally appropriate, although potential improvements to some aspects of risk measurement were identified.

The risk inventory check and appropriateness test are coordinated in terms of content and timing. All management units in the DZ BANK Group are included in both processes. The findings of the risk inventory and the appropriateness test are incorporated into the risk management process.

Risk inventory checks and appropriateness tests are generally conducted in a similar way for the main subsidiaries.

4 General risk factors

The entities in the DZ BANK Group are exposed to a range of risk factors that affect multiple risk types. These general risk factors are explained below.

4.1 Regulatory risk factors

DZ BANK and its subsidiaries are exposed to changes in the regulatory environment. This applies especially to regulation of the financial services sector, which is undergoing rapid change. The term 'regulation' refers to all aspects of intervention in the financial services industry involving the imposition of rules. Regulation may involve standards related to supervisory law, commercial law, capital markets law, company law, or tax law. Changes in the regulatory environment could have a negative impact on the business activities of DZ BANK and its subsidiaries.

4.1.1 Regulatory capital buffers

BaFin decided to introduce a sectoral systemic risk buffer of 2.0 percent of risk-weighted assets for domestic loans secured by residential real estate and to raise the countercyclical capital buffer rate for Germany from 0.0 percent to 0.75 percent. Since February 1, 2023, these two capital buffers are to be met entirely from common equity Tier 1 capital and result in higher minimum requirements for the common equity Tier 1 capital ratio, Tier 1 capital ratio, and total capital ratio.

All credit institutions in the Bank sector are affected by the countercyclical capital buffer. The sectoral systemic risk buffer affects DZ BANK, BSH, and DZ HYP. The two capital buffers also apply at the level of the DZ BANK banking group.

There is a risk that, in the face of higher minimum requirements, it is not possible to obtain the necessary additional own funds needed to comply with the stricter requirements, it is possible to obtain them only at increased cost, or existing risk-weighted assets have to be scaled back. This could reduce profitability and limit the flexibility enjoyed by the management units in the Bank sector and by the DZ BANK Group as a whole in the operation of their business. However, this would only be the case if the capital ratios measured in the future were significantly lower than at present. This scenario is not currently foreseeable.

4.1.2 Switch in interest-rate benchmarks

To implement Regulation (EU) 2016/1011 (Benchmarks Regulation) and to respond to international market developments, the German and European financial industry have been driving the replacement of key interest-rate benchmarks (some of which do not comply with the EU Benchmarks Regulation) with (virtually) risk-free interest-rate benchmarks.

The reformed interest-rate benchmarks and the new risk-free interest-rate benchmarks are provided by central banks or administrators. Such administrators must be entered in the benchmarks register maintained by ESMA. The Libor settings in Swiss francs, pound sterling, Japanese yen, and euros were discontinued at the end of 2021. The administrator provided a 'synthetic' (non-representative) Libor for the Japanese yen and pound sterling. Publication of the setting for Japanese yen was discontinued at the end of 2022. Publication of the setting for pound sterling will be discontinued at the end of March 2023 for the 1-month and 6-month tenors and at the end of June 2023 for the overnight and 12-month tenors. For the 3-month tenor, publication is likely to be discontinued at the end of March 2024. However, the synthetic Libor can only be used for existing business that is difficult to amend, known as the 'tough legacy'.

With effect from June 30, 2023, US dollar Libor will be classed as non-representative and subsequently will be discontinued by the administrator. From January 1, 2022 to June 30, 2023, US dollar Libor will continue to be available, primarily for existing business. The administrator is expected to provide a 'synthetic' (non-representative) Libor for the US dollar until the end of September 2024. The extension of the deadline for US dollar Libor offers significant relief to the entities in the DZ BANK Group because they now have more flexibility

regarding timing for the required changeover of the affected contracts to successor interest-rate benchmarks. This reduces the risk that the affected transactions of the entities in the Bank sector will be adversely affected by a late or delayed changeover to an alternative interest-rate benchmark.

The main reformed interest-rate benchmark of significance for the entities in the DZ BANK Group is Euribor; the new risk-free interest-rate benchmarks of significance are €STR, SOFR, SONIA, and SARON. Assets and liabilities of entities in the DZ BANK Group in national and international interbank and customer business are linked to the aforementioned interest-rate benchmarks. Under the IBOR reforms, these new risk-free interest-rate benchmarks were designated as the replacements for the previous interest-rate benchmarks, such as EONIA and Libor. The changeover of the transactions that previously referenced EONIA was completed as at December 31, 2021. Business continuity is assured due to Implementing Regulation (EU) 2021/1848 dated October 21, 2021, which specifies €STR plus a spread adjustment of 8.5 basis points as the replacement for EONIA. The changeover of individual transactions referencing non-US dollar Libor was also completed. The deadline for the changeover of the transactions referencing US dollar Libor is June 30, 2023.

If the changeover of the relevant contracts to the successor interest-rate benchmarks for US dollar Libor is not completed by the aforementioned deadlines, or the organizational and technical requirements are not implemented in time, there is a risk that the ability of the entities in the Bank sector to handle the transactions concerned may be constrained. The transactions affected are, for example, the issuance of floating-rate securities referencing a Libor rate or interest-rate derivatives. Both the acquisition of new business and the calculation and billing of interest payments in connection with securities already issued, and the valuation of these securities, could be adversely affected. This could give rise to business risks (such as withdrawal from profitable areas of business), legal risks (such as compensation claims), and reputational risks.

The risks described above also apply in relation to interest-rate benchmarks from administrators based in third countries, in respect of which the European Commission has not yet made any decision regarding equivalence. Such administrators have thus not yet been able to obtain approval or register as third-country administrators with ESMA. In this regard, other interbank rates and term rates based on risk-free rates are relevant to DZ BANK. For supervised entities such as DZ BANK, a reference to these third-country interest-rate benchmarks is only permitted in respect of financial instruments, financial contracts, and the measurement of the performance of investment funds if the reference to the interest-rate benchmark concerned has been completed by the end of the transitional period on December 31, 2023. There are plans to extend the transitional period until December 31, 2025.

4.2 Macroeconomic risk factors

4.2.1 Further escalation of the war in Ukraine; energy shortages

At present, the war in Ukraine is casting a shadow over the outlook for the global economy. Western countries imposed sanctions on Russia at an early stage and have gradually tightened them. The effects are being felt not only by Russia. The entire global economy is suffering from steep increases in the cost of commodities and high energy prices. Germany and other European Union (EU) countries are particularly badly affected because of their dependence on Russian energy supplies. As it is impossible to predict how the war will progress in Ukraine, there is also a risk that Russia will deliberately seek to escalate the conflict further.

Supplies of gas from Russia to Europe have been gradually reduced, and cut off completely to Germany and some other countries. This has resulted in high energy prices, putting a huge strain on the health of the economy as a whole. In the event of problems with the supply of liquefied petroleum gas or if next winter is particularly cold, gas prices may go up once more. There would also be the risk of a shortage of gas next winter until temperatures start to rise again in spring 2024. This would likely have a further severe impact on growth and inflation, lead to restrictions on supply – particularly for industry – and trigger an increase in company insolvencies.

4.2.2 A further unexpected rise in interest rates

Market interest rates rose significantly across all maturity periods in the reporting year as a result of the shift in monetary policy introduced in the United States by the Federal Reserve Board and the tightening implemented by the ECB. After the low-interest-rate environment of previous years, this abrupt change, with its potentially ongoing interest-rate rises, poses a challenge to the Bank sector and the Insurance sector. In 2023, key interest rates in the United States and eurozone are expected to continue rising initially. The cycle of interest-rate hikes will then come to an end, provided that the Federal Reserve Board and ECB are satisfied that they have inflation under control. If this is not the case and the central banks feel compelled to continue raising interest rates beyond the levels priced in by the markets, market interest rates across all maturity periods are likely to climb even higher.

In the **Bank sector**, any further rapid rise in interest rates could trigger market risk. Any resulting fair value losses on BSH's securities portfolios could impact on capital. Liquidity problems would arise due to cash outflows in collective building society operations. In the **Insurance sector**, a rise in interest rates would result in fair value losses on investments. There is also a risk that policyholders could increasingly allow existing life insurance policies to lapse and that new business declines.

4.2.3 Inflation – stagflation

Chapter V.1 of the outlook describes the anticipated trend in inflation. Given the risk that prices will continue to rise faster than the currently expected rates of inflation, this issue is also addressed below as a risk factor.

In 2022, the eurozone and United States recorded their highest inflation rates in decades. This can be explained by low prices in the previous year and pent-up demand for consumer products and capital goods as a result of the COVID-19 pandemic, the consequences of highly expansionary fiscal policy in the United States and, in particular, rising energy prices worldwide and problems in global supply chains. The war in Ukraine further accelerated the increase in energy and food prices. Shortages of some products as a result of the supply bottlenecks – a situation that was exacerbated by the pandemic – may still trigger substantial price increases for manufacturers, some of which will be passed on to consumers.

This means that there is a risk that the currently elevated level of inflation may not be a temporary phenomenon and may persist above the ECB's inflation target for an extended period. This would be particularly problematic if the higher prices, combined with the reduction in manufacturing output, made consumers reluctant to spend and wages simultaneously rose as this would result in a wage/price spiral. This could ultimately lead to a period of stagflation, i.e. a combination of elevated inflation, stagnant output and demand, and rising unemployment. Moreover, the ECB's latitude for tackling inflation is probably more limited than in the past, not least because the pandemic has resulted in further increases in government debt in vulnerable eurozone countries.

Stagflation may impact on **credit risk** in the Bank sector and on **market risk** in the Insurance sector, in particular. As at the reporting date, no stagflation-related increase in these risks was evident.

4.2.4 International trade disputes and supply chain problems

For global trade, there continues to be a risk of a renewed escalation of **trade disputes between the United States, China, and Europe** in addition to the effects of disrupted supply chains described in chapter V.1 of the outlook. This could have negative consequences for the global economy, and for the export-dependent German economy in particular. The sanctions imposed on Russia by western countries create further potential for tension between the EU and the United States in respect of countries that either fail to implement these sanctions or only partially impose them, for example China.

The considerable **vulnerability of international supply chains** to specific critical events has become evident in recent years. Examples include the blocking of the Suez Canal by a ship that became stuck, the war in Ukraine, and COVID-19-related stoppages in production and logistics in China. In particular, the Chinese government's restrictive COVID-19 policy led to extensive restrictions on production both in China and for manufacturers in

industrialized countries that make use of Chinese base products. Beijing abruptly pivoted away from its existing COVID-19 strategy at the start of January 2023, lifting all restrictions on entering and leaving China. This has created greater uncertainty about the future course of the pandemic in the country, especially as worker absences attributable to waves of infection may deepen the supply chain problems and increase the risks for the global economy.

For companies in Germany, restrictions on global trade may, on the one hand, lead to higher import prices and a shortage of base products, and on the other, cause a decline in exports. A reduction of the global trade volume may have a negative impact on **credit risk** in the Bank sector (chapter VII.9.3.2) and on **market risk** in the Insurance sector (chapter VII.18).

4.2.5 Economic policy divergence in the eurozone

Although **Italy** has made significant progress, its government debt remains high and its credit quality is still in need of improvement. Italian banks therefore have to accept an appropriate risk premium if they want to obtain funding in the capital markets. Despite the forecast decrease in government debt – as a percentage of gross domestic product (GDP) – in 2023 and 2024, it will remain at a high level. This means that Italy will probably continue to have very high funding requirements. However, the return to rising interest rates has pushed up Italy's funding costs substantially. A reduction in the ECB's bond purchases or the absence of progress with eliminating government debt could make it much more difficult for Italy and its banks to access the capital markets. Although Italy reached the 45 milestones required for a further payment from the EU recovery fund, it remains to be seen whether the new government in Rome will continue to implement reforms and projects designed to stimulate growth.

The COVID-19 pandemic substantially exacerbated the existing difficulties in **Spain**. Its already considerable level of government debt came under even more pressure due to increased government spending as part of its fiscal support measures, although COVID-19 support provided by the EU helped to ease the situation. Growing inflationary pressures are slowing down the real economy in an environment of global uncertainty, which may have an adverse impact on the already high unemployment rate. This in turn would create slightly gloomier prospects for the economy as a whole. The proportion of non-performing loans in the banking sector, which remains high compared with other EU countries, may therefore rise even higher in the medium term. The tightening of monetary policy by the ECB is also making it harder for Spain to reduce its government debt. The tensions in Catalonia are a further source of risk for the Spanish economy. Overall, these factors could prejudice the ability of the country and its banks to obtain funding in international capital markets.

Portugal's financial strength is restricted by a significant level of government, corporate, and personal debt that has risen even higher owing to the COVID-19 pandemic. An economic recovery is forecast in the medium term thanks to domestic and EU-funded economic support. However, higher interest rates, inflationary pressures, and the currently challenging external environment are holding back economic growth and therefore making it more difficult to reduce debt levels as planned. There are further risks to financial stability in the still ailing banking sector, where banks are carrying substantial portfolios of non-performing loans and have relatively poor capital ratios. The Portuguese financial market is highly susceptible to volatility in investor confidence. At the same time, the country's ability to respond to negative shocks with fiscal policy measures is limited because of the high level of public debt.

In the last few years, the **expansionary monetary policy of the ECB**, and particularly its buying programs in various bond segments, largely prevented the structural problems in some European Monetary Union (EMU) member countries from being reflected in the capital markets. This may change as a result of the tightening of monetary policy and the expiry of the pandemic emergency purchase program. The ECB has developed the transmission protection instrument so that it can intervene in the markets in order to counteract any excessive rise in risk premiums. However, if it is unable to do so, the risk premiums of more highly indebted member states could increase sharply, which would make it considerably more difficult for these countries to obtain funding through the capital markets.

The effects of economic policy divergence in the eurozone particularly impact on **credit risk** in the Bank sector and on **market risk** in the Insurance sector. Details can be found in chapter VII.9.3.2 and chapter VII.18.4.3.

4.2.6 Correction in real estate markets

Germany's prolonged real estate cycle, which had continued to push up property prices even after the outbreak of the COVID-19 pandemic despite warnings about over-inflated valuations, came to a temporary halt in 2022. In the face of already high price levels, the rises in inflation and home-finance interest rates observed in 2022 increased the risk of a correction in real estate markets. Rising interest rates impose a greater financial burden on real estate buyers, while inflation reduces the income that households and investors have available for repayments.

In the commercial real estate market, project developers and property developers are especially affected by the increasing costs of materials and energy as well as by disrupted supply chains. There continues to be uncertainty about the effect of economic trends and inflation and about the process of adjustment in the wake of the pandemic. This uncertainty particularly affects hotel real estate, office real estate, department stores, shopping malls, and inner-city commercial properties that are mainly used for retail/wholesale businesses not offering day-to-day essentials.

These developments mainly relate to **credit risk** in the Bank sector and **market risk** in the Insurance sector. No material impact on the risk key figures was evident as at the reporting date.

4.2.7 Geopolitical tensions

Some regions of the world are experiencing conflict that extends beyond their borders and is resulting in tensions between superpowers. This is particularly true of Asia.

The protracted dispute on the Korean peninsula flares up repeatedly due to **North Korea's** nuclear weapons program and its many military provocations, for example missile testing off the **coast of South Korea**. Any escalation would directly affect the interests of the superpowers China and the United States and could potentially widen into a conflict with global consequences.

Attention has recently shifted back to the dispute between **China and Taiwan**, in which Taiwan believes it is at constant risk of invasion. The United States reiterated its security guarantees for Taiwan in response to a more aggressive stance from the Chinese government and a series of military maneuvers. As China does not recognize Taiwan's independence, this dispute is likely to continue fueling tensions between China and the United States. However, it is difficult to gauge China's willingness to escalate the dispute. There is also potential for conflict between China and Japan due to Chinese territorial claims on islands situated close to Taiwan that are administered by Japan.

Disputes also exist in other regions. Although they currently appear to be contained within these regions, they intersect with geostrategic interests of other countries and, in unfavorable circumstances, could potentially spread to other regions. This is the case for **Iran** and **countries of the former Soviet Union** that remain under Russian influence.

4.3 Rating downgrades for DZ BANK

For the entities in the DZ BANK Group, their own credit rating is an important element in any comparison with competitor banks. A downgrade or even just the possibility of a downgrade in the rating for a management unit could have a detrimental effect in all entities in the DZ BANK Group on the relationship with customers and on the sale of products and services.

If DZ BANK's credit rating or the network rating for the cooperative financial network were to be downgraded, this would have a negative impact on DZ BANK's **costs of raising equity and borrowing**. In the event of a

rating downgrade, new **liabilities** could also arise, or liabilities dependent on the maintenance of a specific credit rating could become due for immediate payment.

Furthermore, if a rating downgrade were to occur, the management units could face a situation in which they had to furnish additional **collateral** in connection with rating-linked collateral agreements for derivatives (regulated by a credit support annex to an appropriate master agreement for financial futures) or in which they were no longer considered suitable **counterparties for derivative transactions** at all.

If the credit rating for a management unit were to fall out of the range covered by the top four rating categories (investment-grade ratings, disregarding rating subcategories), the operating businesses of all the entities in the DZ BANK Group could be adversely affected. This could also lead to an increase in the **liquidity requirement in relation to derivatives** and to a rise in **funding costs**. The effects of downgrades of long-term ratings are discussed in the chapter covering the measurement of liquidity risk (see chapter VII.7.2.5).

The rating agencies S&P Global Ratings, Moody's, and Fitch Ratings confirmed **DZ BANK's ratings** in 2022. The outlooks for the ratings also remained stable.

5 Dealing with the impact of acute global crises

5.1 Relaxation of supervisory requirements

The lowering of the **external minimum targets** for some regulatory key figures that had been carried out by the supervisory authorities in 2020 in response to the **COVID-19 pandemic** continued to apply unchanged in 2022. The same was true for the lower **internal threshold values** for selected regulatory capital adequacy metrics that had been adopted by the Board of Managing Directors of DZ BANK in 2020. The banking supervisor's pandemic-related relaxing of requirements relating to the preparation of a group recovery plan in previous years ceased to apply. In particular, the number of stress scenarios to be prepared was increased to four again, compared with only two in the previous year.

5.2 Risk management measures

As a result of the normalization of the risks arising from the COVID-19 pandemic, the **special reporting measures relating to the pandemic** implemented in 2020 were integrated into the standard risk reporting system in the first half of 2022. The financial and risk radar and the CET1 radar were no longer used.

A new instrument for reporting to the Board of Managing Directors of DZ BANK was established in February 2022, the **Russia/Ukraine radar**, which is used to closely manage and monitor risks arising from the war in Ukraine.

In response to the war in Ukraine, a one-year ad hoc scenario was added to the groupwide **stress test report** in March 2022. Among other things, this scenario assumes a complete halt in gas supplies from Russia and incorporates rising inflation and interest rates. A two-year scenario was developed in the second quarter based on the threats and risks that continue to be relevant (inflation, interest-rate increases, war in Europe) and contains the medium-term outlook of a halt in gas supplies from Russia. This two-year scenario has been reported since June 30, 2022.

Disclosures on the **risks** resulting from the macroeconomic conditions and the war in Ukraine can be found in the relevant risk-type-specific chapters of this report. This concerns credit risk (chapters VII.9.7 and 9.8) in the Bank sector and actuarial risk (chapter VII.17) and market risk (chapters VII.18.4.3 and 18.4.4) in the Insurance sector.

6 ESG risks

6.1 Expansion of ESG risk management

ESG risks are defined as events or circumstances in the climate-related and environmental ('E'), social ('S'), or corporate governance ('G') spheres that, if they materialized, would definitely or potentially have a significant adverse impact on the financial position or financial performance of the DZ BANK Group and on its reputation.

The focus is currently on climate-related and environmental risks resulting from climate change. These risks comprise both physical risks, such as more frequent natural disasters and floods, and transition risks, which can arise particularly as a result of legislative initiatives and changes in consumer behavior. ESG risks primarily have medium- to long-term effects.

The DZ BANK Group does not classify ESG risks as a risk type in their own right. In accordance with the regulatory definitions, it instead views them as drivers of the classic financial and non-financial risk types (**risk factors**). Risk factors are based on, for example, economic, societal, and (geo)political events and conditions. Sustainability risks have an impact on various risk categories because they bring about a change in the risk factors.

Since 2021, these ESG risk factors have been analyzed as part of the **risk inventory check**. This makes it possible to assess each year which potentially material risk factors in the climate-related and environmental, social, and corporate governance spheres the DZ BANK Group is exposed to. The analysis was refined and backed up by quantitative data in 2022. Potentially material ESG risk factors affect the risk types credit risk, operational risk, reputational risk, and actuarial risk. An analysis of the transition risks for DZ BANK's credit portfolio was also conducted.

ESG risks are **managed** centrally at the level of the DZ BANK Group and on a decentralized basis at the level of the management units. DZ BANK is currently working on implementing various regulatory requirements regarding the management of ESG risks as part of its sustainability umbrella program. The main program requirements are the Guide on climate-related and environmental risks published by the ECB, the delegated regulation on the EU taxonomy, and the ESG disclosure requirements issued by the EBA.

In 2022, DZ BANK participated in the ECB's macroeconomic **climate stress test** and conducted its first **climate risk scenario analyses**.

DZ BANK also uses an **internal classification tool** based on the 17 sustainable development goals (SDGs) of the United Nations to assess the sustainability of the lending business. The tool measures the positive and adverse SDG impacts of DZ BANK's business from an ESG perspective. This primarily relates to the traditional corporate customer lending business, in which the positive impacts outweigh the adverse impacts overall. Building on this, DZ BANK has set itself the target of increasing the positive SDG impacts so that they cover two-thirds of the volume of lending to corporate customers by 2026.

In addition, DZ BANK analyzes the transition risks of its credit portfolio, focusing in particular on the combination of climate-related, environmental, and credit risks.

6.2 Climate-related and environmental risks

The significant risks in relation to the climate and environmental aspect are physical climate-related and environmental risks and transition risks.

6.2.1 Physical climate-related and environmental risks

The physical climate-related and environmental risks may relate to acute events, for example more frequent natural disasters such as flooding, or negative effects attributable to long-term climate change.

Losses in the **lending business** may arise, for example, if the recoverability of collateral for loan exposures is adversely impacted by climate events. In addition, as a result of transition effects, there is a risk in the lending business that the earnings power of **corporate finance** borrowers (mainly at DZ BANK) and of **real estate finance** borrowers (mainly at BSH and DZ HYP) could diminish. These effects could lead to a deterioration of the borrowers' credit quality and thus to higher impairment losses. Further information on the significance of physical climate-related and environmental risks is provided in chapter VII.9.3.2.

In the Insurance sector, **non-life actuarial risk** (catastrophe risk) at R+V is the main type of risk that could be significantly affected by physical climate risk. Specifically, in any one year, the actual impact from the size and frequency of losses could exceed the forecast impact. Details can be found in chapters VII.17.2 and VII.17.5.

In both the Bank sector and the Insurance sector, physical climate risk could also give rise to **operational risk**, for example in connection with the non-availability of buildings or IT systems due to weather or environmental events. This type of security risk is described for the Bank sector in chapter VII.15.5.4 and for the Insurance sector in chapter VII.21.3.3.

Furthermore, negative effects from physical climate-related risk on the **reputation** of the DZ BANK Group and DZ BANK cannot be ruled out.

6.2.2 Transition risks

Transition risks are a major risk factor. They may occur in connection with the switch to a lower-carbon and more environmentally friendly economy, particularly if business partners in industries with particular relevance to climate change do not transition to the necessary extent or with the necessary speed. The causes of transition risk include political conditions and transformation targets, changes to legislation, changes in consumer preferences, and the accompanying technological shift. The transition to a low-emission economy is resulting in a changed business and regulatory environment that creates risks for the real economy and could have a negative impact on the financial system and on banks. As a result, climate-related transition risks have a substantial impact on the DZ BANK Group's customers and, in turn, have a direct impact on the DZ BANK Group too. The medium-term nature of these effects means that they are particularly relevant to the lending business. Furthermore, negative effects from transition risks on the reputation of the DZ BANK Group and DZ BANK cannot be ruled out.

Transition risks are relevant to credit risk in the Bank sector (see chapter VII.9.3.2) and to **market risk** in the Insurance sector (see chapter VII.18.3.3).

The DZ BANK Group has developed binding, groupwide rejection criteria for **lending activities** in order to address ESG risks and their effect on its reputation. In general, the rejection criteria prohibit lending in connection with items that pose a high risk of contamination as well as dangerous goods, arms trading, transactions connected with controversial weapons, pornography and prostitution, controversial gambling, and transactions that are deemed illegal according to the laws and regulations of the target country or according to international conventions and agreements. Controversial business practices involving significant breaches of human rights or environmental standards are rejected too. And in view of the associated climate-related and environmental risks, DZ BANK does not permit exposures to customers or activities with links to thermal coal, oil

or gas extraction by means of fracking or from oil shale or tar sands, mining using the mountaintop removal method, or trading of endangered animal or plant species.

DZ BANK also has **sectoral rules** for sectors that are particularly vulnerable from a sustainability perspective. The main areas of focus are dam construction, commodities mining/extraction in general, forestry, fishing, maritime industries, and palm oil production.

Since 2021, an **ad hoc committee** has been available to provide support where risks are identified or where there is a lack of clarity regarding the interpretation of rejection criteria and sectoral rules.

Depending on their individual business model, the entities in the DZ BANK Group have implemented their own strategic response in order to deal with climate-related and environmental risks. This includes the definition of additional rejection criteria.

DZ BANK has undertaken to **comply with voluntary frameworks**, such as the UN Global Compact, the Equator Principles, and the Performance Standards developed by the International Finance Corporation (IFC). All factors of relevance to a financing arrangement are assessed in relation to social, ethical, and environmental risks using a sustainability checklist that is based on the ten principles of the UN Global Compact. Project finance and eligible project-specific corporate finance transactions are also checked for compliance with the IFC Performance Standards using a questionnaire that is aligned with the Equator Principles. This enables possible negative environmental impacts, including on biodiversity, of project finance or trade finance transactions to be identified and the potential resulting risks to be mitigated.

6.3 Social risks and corporate governance risks

Social risks could arise due to inadequate standards for upholding DZ BANK Group employees' **basic rights** and for **protecting them against discrimination** or due to inappropriate **customer practices**. If social risks materialize, employees may bring financial claims against entities in the DZ BANK Group or employees may leave who are particularly crucial to the success of the business. Ineffective or disruptive **business processes** may also lead to the loss of key employees. Other potential sources of social risk are unfair, opaque, or improper business practices in respect of customers, especially if these lead to changes in customer behavior or in demand.

Social risk may also have a financial impact in the long term with regard to borrowers and business partners. At individual loan level, social risk in DZ BANK's lending business is assessed as part of the **lending processes**. In the same way as for climate-related and environmental risks, the rejection criteria for social risk are checked and sustainability checklists are used. In particular, it is prohibited to maintain business relationships with customers if significant breaches of human rights in their business practices cannot be ruled out.

Potential causes of **corporate governance risks** include **governance structures** that are inadequate or lack transparency. Another possibility is if an entity has an inadequate **code of conduct** or does not have one at all. These shortcomings may weaken employees' confidence in the effectiveness of the entity's senior management and lead to ineffective business processes. A lack of, or only inadequate, measures to tackle **money laundering** and all forms of **corruption** (acceptance of advantages, granting of advantages, active bribery, and passive bribery) constitute further forms of corporate governance risk. They may damage the DZ BANK Group entities' reputation among employees, customers, and business partners.

Corporate governance risks can also arise for **borrowers and business partners** if there are indications that the company in question is not being run in an orderly fashion. The relevant factors include suspected corruption, tax evasion proceedings, and ongoing antitrust proceedings. Similarly to social risk, the risk here lies in the effects of possible judicial proceedings and in a potential drop in revenue as a result of declining demand. To prohibit transactions that do not satisfy the minimum corporate governance requirements defined by the DZ BANK Group, exposures are checked against the rejection criteria during the lending process. DZ BANK also applies its sustainability checklist. Checks for critical corporate governance aspects, such as in the anticorruption and competition/tax categories, are conducted and evaluated in a standardized manner.

Social and corporate governance risks alike may have negative effects on the **reputation** of individual entities in the DZ BANK Group or on the DZ BANK Group as a whole.

7 Liquidity adequacy

7.1 Strategy

The management of liquidity adequacy is an integral component of business management in the DZ BANK Group and the management units. Liquidity adequacy is defined as the holding of sufficient liquidity reserves in relation to the risks arising from future payment obligations. It is considered from both an economic and a normative (regulatory) perspective. Whereas the economic perspective takes into account the requirements of MaRisk BA and the ECB Guide to the ILAAP, the normative perspective – while also taking account of the ECB Guide to the ILAAP – additionally applies the requirements from the CRR and the German national requirements for the implementation of the Capital Requirements Directive (CRD) in KWG.

Economic liquidity adequacy is managed on the basis of the internal liquidity risk model, which takes account of the impact on liquidity of other risks when measuring liquidity risk. Liquidity risk is significantly influenced by the risks that are backed by capital and those that are not backed by capital. In particular, reputational risk is relevant to liquidity risk. The DZ BANK Group fulfills the regulatory liquidity adequacy requirements by managing economic liquidity adequacy.

7.2 Economic perspective

Owing to the close ties between management of economic liquidity adequacy at DZ BANK and that of the DZ BANK Group, the information below on economic liquidity adequacy also applies to DZ BANK. Liquidity risk is a key aspect of economic liquidity adequacy. Liquidity risk at DZ BANK to a large degree determines liquidity risk in the DZ BANK Group.

7.2.1 Definition

Liquidity risk is the risk that cash and cash equivalents will not be available in sufficient amounts to ensure that payment obligations can be met. It is therefore defined as insolvency risk.

7.2.2 Business background and risk strategy

The activities of DZ BANK and the management units BSH, DZ HYP, DZ PRIVATBANK, TeamBank, and VR Smart Finanz are relevant to the level of liquidity risk in the DZ BANK Group.

A key component of the liquidity risk strategy is the process of specifying and monitoring the risk appetite for liquidity risk. The liquidity risk strategy aims to establish a binding basis for implementing these requirements at operational level.

The operations of the entities in the DZ BANK Group are governed by the principle that liquidity risk must only be assumed if it is in compliance with the **risk appetite** specified by the Board of Managing Directors. Solvency must be ensured, even in times of serious crisis. Risk appetite is expressed by the key figures and internal threshold values in the risk appetite statement and by the stress scenarios defined for risk measurement in the economic perspective within the ILAAP. The stress scenarios also take into account the specific MaRisk BA requirements for the structure of stress scenarios at capital-market-oriented banks.

However, further **extreme scenarios** are not covered by the risk appetite. The risks arising in this regard are accepted and therefore not taken into account in the management of risk. Examples of such scenarios are a run on the bank, i.e. an extensive withdrawal of customer deposits as a result of damage to the reputation of the banking system, or a situation in which all non-collateralized funding sources on money markets completely dry up over the long term, also encompassing transactions with those corporate customers, institutional customers, and customer banks that have close ties to the entities in the DZ BANK Group. On the other hand, the risk of a

short-term and complete loss, or the risk of a medium-term and substantial loss, of unsecured funding from institutional investors is not accepted and this risk is the subject of relevant stress scenarios.

Liquidity reserves in the form of liquid securities are held by the entities so that they can remain solvent, even in the event of a crisis. Potential sources of funding in the secured and unsecured money markets are safeguarded by maintaining a broadly diversified national and international customer base. The local cooperative banks also provide a significant source of funding.

DZ BANK aims to ensure that the liquidity risk strategy is consistent with the **business strategies**. To this end, the liquidity risk strategy is reviewed at least once a year with due regard to the business strategies and adjusted as necessary.

7.2.3 Risk factors

The following factors, alone or in combination with each other, could lead to an increase in liquidity risk, adversely affect financial position and, in an extreme case, cause the insolvency of DZ BANK:

- Funding is withdrawn but cash nevertheless still flows out when legally due (**follow-up funding risk**).
- Derivatives result in greater collateral requirements that involve cash outflows (**collateral risk**).
- Changes in the fair value of financial instruments mean that less liquidity can be generated (**fair value risk**).
- Cash is paid out earlier than expected because drawing rights are exercised (**drawdown risk**).
- Cash outflows are earlier than expected or cash inflows later than expected because termination rights are exercised (**termination risk**).
- New business is entered into on a significant scale, resulting in cash outflows (**new business risk**).
- Products are repurchased on a significant scale, resulting in cash outflows (**repurchase risk**).
- The liquidity requirement to ensure intraday payment obligations can be satisfied is greater than expected (**intraday risk**).
- There has been a negative impact on opportunities for funding in foreign currencies, for example the generation of currency-related liquidity through currency swaps (**foreign currency funding risk**).

These and other events are incorporated into the calculation of liquidity risk as **stress scenarios** (see chapter VII.7.2.5).

7.2.4 Organization, responsibility, and risk reporting

Organization and responsibility

The strategic guidelines for the management of liquidity risk by the entities in the DZ BANK Group are established by the **Group Risk and Finance Committee**. At the level of DZ BANK, this is the responsibility of the **Asset/Liability Committee**.

Liquidity risk control in the DZ BANK Group is coordinated by the Group Risk Management working group and carried out in Risk Controlling at DZ BANK independently of the units that are responsible for liquidity risk management. The risk data calculated by the subsidiaries on the basis of intra-group guidelines is aggregated to provide a group perspective.

Risk reporting

Liquidity up to one year and structural liquidity of one year or more are reported by liquidity risk control at DZ BANK on a daily basis to the **members of the Board of Managing Directors** of DZ BANK responsible for the Group Treasury and Group Risk Controlling divisions. The **Board of Managing Directors** receives a monthly report on liquidity risk. The DZ BANK Group Treasury division and the units in the subsidiaries responsible for the management of liquidity risk also receive detailed daily information showing the contribution from each individual position to the aggregate position.

The **Group Risk and Finance Committee** receives a quarterly report on the liquidity risk of the DZ BANK Group and the individual management units. The entities in the DZ BANK Group have their own corresponding reporting procedures that help to manage and monitor liquidity risk at individual entity level.

Group Treasury is informed on a daily basis of the largest providers of liquidity in the unsecured money markets. This is reported to the **Asset/Liability Committee** and the **Board of Managing Directors** on a monthly basis. These reports make a distinction between customers and banks, ensuring that any possible concentration risk as regards sources of liquidity can be clearly identified at an early stage.

7.2.5 Risk management

Measurement of liquidity risk

DZ BANK uses an **internal risk model** to determine liquidity risk for the DZ BANK Group and DZ BANK over a time horizon of one year. Using this model, four stress scenarios and one risk scenario are simulated on a daily basis. In addition to DZ BANK, all other entities in the DZ BANK Group that are material in terms of liquidity risk are integrated into the groupwide measurement of this risk.

A **minimum liquidity surplus** figure is calculated for each scenario. This figure quantifies the minimum surplus cash that would be available if the scenario were to materialize suddenly within the next 12 months. To carry out this calculation, cumulative cash flow (forward cash exposure) is compared against available liquidity reserves (counterbalancing capacity) on a day-by-day basis. The minimum liquidity surplus expresses economic liquidity adequacy. **Forward cash exposure** includes both expected and unexpected payments.

The **counterbalancing capacity** includes balances on nostro accounts, liquid securities, and unsecured funding capacity with customers, banks, and institutional investors. By including the counterbalancing capacity, the calculation of the minimum liquidity surplus already takes into account the effect on liquidity of the measures that could be implemented to generate liquidity in each scenario. These measures include collateralized funding of securities in the repo market.

DZ BANK's internal liquidity risk model is validated using an **appropriateness test** independently of the organizational unit responsible for developing the model. Furthermore, the model is adjusted in line with changes in the market, products, and processes. Validation is carried out for each entity in the DZ BANK Group and aggregated at group level.

Liquidity risk stress tests

Stress tests are conducted for the forward cash exposure and for the counterbalancing capacity using the following four scenarios with defined limits: downgrading, corporate crisis, market crisis, and combination crisis. The stress scenarios are defined as follows:

- **Downgrading:** Long-term ratings awarded by Standard & Poor's, Moody's, and Fitch Ratings to one or more entities in the DZ BANK Group downgraded by one notch. The downgrade is triggered by a deterioration in profitability or in the earnings forecast or by a preceding loss of confidence among customers and banks.
- **Corporate crisis:** Serious entity-specific crisis, for example caused by reputational damage. The main consequences of this scenario could be a considerable negative impact on customer behavior and the downgrading by three notches of the long-term ratings awarded by all of the aforementioned rating agencies.
- **Market crisis:** Turmoil in global money and capital markets. The primary feature of this scenario is a sudden, sharp fall in the value of assets traded in these markets. The scenario assumes, for example, a loss of confidence among money market players, which could lead to a liquidity squeeze.

- **Combination crisis:** Analysis of a combination of bank-specific and market-related factors. However, it does not constitute a mere aggregation of the two stress scenarios arising from a market crisis and a corporate crisis. Instead, the interaction between the two scenarios is taken into account. The combination crisis assumes that the financial sector would be particularly badly affected. The underlying scenario is also based on a deterioration in the reputation of the entities in the DZ BANK Group. It assumes there would only be very limited access to unsecured funding from customers, banks, and institutional investors over the forecast period of one year.

The stress scenario with the lowest minimum liquidity surplus is deemed to be the **squeeze scenario**. Economic liquidity adequacy is determined as the amount of the minimum liquidity surplus in the squeeze scenario.

Further stress scenarios in addition to the scenarios with defined limits are analyzed, and a **reverse stress test** is carried out and reported on a monthly basis. The reverse stress test shows which stress events (changes in risk factors) could still occur without liquidity falling below the limit in a subsequent liquidity risk measurement and triggering the need for a business model adjustment. In addition, **adverse stress tests** are carried out to provide a forward-looking assessment of liquidity risk. They involve analyzing whether the DZ BANK Group would be able to ensure an adequate level of liquidity even in the event of exceptional, but plausible, developments over a medium-term horizon. The adverse stress test scenarios underlying this forecast are also used in ICAAP stress testing.

Management of limits for liquidity risk

Liquidity risk is monitored and managed with the aim of ensuring economic liquidity adequacy at every measurement date. This is based on the minimum liquidity surplus calculated for the four stress scenarios with defined limits. The Board of Managing Directors of DZ BANK has set, at the level of the **DZ BANK Group**, a **limit** (€1.0 billion) for liquidity risk and an **observation threshold** (€4.0 billion) that is higher than the limit. The observation threshold equates to the threshold value specified in the risk appetite statement for the minimum liquidity surplus. The observation threshold and limit as at December 31, 2022 were unchanged compared with the end of 2021. The Board of Managing Directors of DZ BANK has also specified a limit for **each management unit**. The observation threshold and the limits are monitored by the liquidity risk control function at DZ BANK both at group level and also for the management units.

The limit system aims to ensure that the DZ BANK Group remains solvent even in serious stress scenarios.

Emergency liquidity plans are in place so that the group is able to respond to crisis events rapidly and in a coordinated manner. The emergency plans are revised annually.

Liquidity risk mitigation

Within liquidity management activities, measures to reduce liquidity risk are initiated by the treasury units of the management units. Active liquidity risk management is made possible by holding instruments in the form of cash and liquid securities, and by managing the maturity profile of money market and capital market transactions.

Liquidity transfer pricing system

The DZ BANK Group aims to use liquidity – which is both a resource and a success factor – in line with risks. Liquidity costs, benefits, and risks are allocated among the entities in the DZ BANK Group based on the liquidity transfer pricing system using internal prices charged by the units generating liquidity and paid by those consuming liquidity. Care is taken to ensure that the transfer prices are consistent with risk measurement and risk management.

Transfer prices are set for all significant products. The transfer pricing system takes into account the holding period and market liquidity of the products and has an impact on risk/return management.

7.2.6 Quantitative variables

Liquid securities

The available liquid securities have a significant influence on the level of the minimum liquidity surplus. Liquid securities are a component of the **counterbalancing capacity** and are largely held in the portfolios managed by DZ BANK's Group Treasury and Capital Markets Trading divisions or in the portfolios of the treasury units at the subsidiaries of DZ BANK. Only bearer bonds are counted as liquid securities.

Liquid securities comprise highly liquid securities that are suitable for collateralizing funding in private markets, securities eligible as collateral for central bank loans, and other securities that can be liquidated in the one-year forecast period that is relevant for liquidity risk.

Securities are only eligible as liquid securities if they are not pledged as collateral, e.g. for secured funding. Securities that have been borrowed or taken as collateral for derivatives business or in connection with secured funding only become eligible when they are freely transferable. Eligibility is recognized on a daily basis and also takes into account factors such as restrictions on the period in which the securities are freely available.

Liquid securities represent the largest proportion of the counterbalancing capacity and make a major contribution to maintaining solvency in the stress scenarios with defined limits at all times during the relevant forecast period. In the first month, which is a particularly critical period in a crisis, liquid securities are almost exclusively responsible for maintaining solvency in the stress scenarios with defined limits.

Fig. 8 shows the liquidity value of the liquid securities that would result from secured funding or if the securities were sold.

As at December 31, 2022, the total liquidity value at the level of the **DZ BANK Group** was €35.4 billion (December 31, 2021: €30.3 billion). The total liquidity value attributable to **DZ BANK** as at December 31, 2022 was €26.6 billion (December 31, 2021: €19.9 billion). The rise in the volume of liquid securities was largely attributable to a reduction in the collateral provided for targeted longer-term refinancing operations (TLTRO) entered into with the ECB. The DZ BANK Group made TLTRO repayments amounting to €21.4 billion ahead of schedule in November 2022. The amount repaid by DZ BANK was €18.4 billion.

Unsecured short- and medium-term funding

Other than liquid securities, the main factors determining the minimum liquidity surplus are the availability and composition of the sources of funding.

The DZ BANK Group has a diversified funding base for operational liquidity. A considerable portion is accounted for by money market activities resulting from the cash-pooling function with the **local cooperative banks**. Under these arrangements, the cooperative banks can invest free cash flow with DZ BANK.

FIG. 8 – LIQUID SECURITIES

€ billion	DZ BANK Group		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Liquid securities eligible for GC Pooling (ECB Basket)¹	22.3	16.4	17.4	9.8
Securities in own portfolio	16.0	23.0	8.4	10.3
Securities received as collateral	17.4	16.9	17.4	16.9
Securities provided as collateral	-11.1	-23.6	-8.4	-17.4
Liquid securities eligible as collateral for central bank loans	9.1	8.0	5.5	4.5
Securities in own portfolio	16.7	20.5	11.8	13.4
Securities received as collateral	4.1	8.2	4.1	8.2
Securities provided as collateral	-11.7	-20.6	-10.3	-17.0
Other liquid securities	3.9	5.9	3.7	5.6
Securities in own portfolio	3.7	5.8	3.4	5.5
Securities received as collateral	0.3	0.1	0.3	0.1
Securities provided as collateral	-0.1	–	-0.1	–
Total	35.4	30.3	26.6	19.9
Securities in own portfolio	36.4	49.3	23.6	29.1
Securities received as collateral	21.8	25.3	21.8	25.3
Securities provided as collateral	-22.9	-44.2	-18.7	-34.5

¹ GC = general collateral, ECB Basket = eligible collateral for ECB funding.

Conversely, if the cooperative banks need liquidity, they can obtain it from DZ BANK. This regularly results in a liquidity surplus in the DZ BANK Group and at DZ BANK, which provides one of the main bases for short-term funding in the unsecured money markets.

Corporate customers and **institutional customers** are another important source of funding for covering operational liquidity requirements in the DZ BANK Group. In the context of liquidity risk, corporate customers are those customers that are not banks and are not classified as institutional customers.

For funding purposes, the management units also issue **money market products based on debt certificates** under a standardized groupwide multi-issuer euro commercial paper program through the offices and branches in Frankfurt, New York, Hong Kong, London, and Luxembourg. DZ BANK also runs a US-dollar-denominated commercial paper program for Frankfurt. Key repo and securities lending activities, together with the collateral management process, are managed centrally in DZ BANK's Group Treasury division. Funding on the **interbank market** is not strategically important, either to the DZ BANK Group or to DZ BANK.

Each month, Group Treasury at DZ BANK prepares a groupwide **funding outlook** that is based on the funding requirements calculated for the DZ BANK Group and DZ BANK for the next twelve months.

The range of funding sources in the unsecured money markets is shown in Fig. 9. The changes in the composition of the sources of funding compared with December 31, 2021 arose because customers and investors were more focused on diversification than in the previous year due to the interest-rate situation. This was largely attributable to the monetary policy measures implemented by the ECB in the second half of 2022.

Further information on liquidity management and funding can be found in chapter II.5 of the business report.

FIG. 9 – UNSECURED SHORT-TERM AND MEDIUM-TERM FUNDING

€ billion	DZ BANK Group		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Deposits	98.7	97.5	84.2	83.6
Deposits of local cooperative banks	57.3	58.5	56.6	58.5
Current account deposits of other customers	41.4	39.0	27.6	25.2
Money market borrowing	57.1	32.2	54.5	28.7
Central banks, interbank, and customer banks	9.4	5.5	9.3	5.2
Corporate customers and institutional customers	33.6	14.1	32.8	14.0
Certificates of deposit/commercial paper	14.1	12.6	12.3	9.5

The **maturity analysis of contractual cash inflows and cash outflows** is set out in note 89 of the notes to the consolidated financial statements. However, the cash flows in these disclosures are not the same as the expected and unexpected cash flows used for internal liquidity risk management.

7.2.7 Risk position

Economic liquidity adequacy is assured if none of the four stress scenarios with defined limits exhibit a negative value for the key risk indicator 'minimum liquidity surplus'. Fig. 10 shows the results of measuring liquidity risk. The results are based on a daily calculation and comparison of forward cash exposure and counterbalancing capacity. The values reported are the values that occur on the day on which the liquidity surplus calculated over the forecast period of one year is at its lowest point.

FIG. 10 – LIQUIDITY UP TO 1 YEAR IN THE STRESS SCENARIOS WITH DEFINED LIMITS: MINIMUM LIQUIDITY SURPLUSES FOR THE DZ BANK GROUP

€ billion	Forward cash exposure		Counterbalancing capacity		Minimum liquidity surplus ¹	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Downgrading	-39.1	-22.5	67.8	51.7	28.7	29.2
Corporate crisis	-30.2	-11.0	44.5	32.9	14.3	21.9
Market crisis	-32.9	-13.2	57.6	42.2	24.7	29.0
Combination crisis	-31.8	0.5	51.4	18.9	19.6	19.4

¹ The values with an orange background are the minimum liquidity surplus in the squeeze scenario.

The reduction in the forward cash exposure and the increase in the counterbalancing capacity mainly resulted from the early TLTRO repayment.

The liquidity risk value measured for the **DZ BANK Group** as at December 31, 2022 for the stress scenario with defined limits with the lowest minimum liquidity surplus (squeeze scenario) was €14.3 billion (December 31, 2021: €19.4 billion). The liquidity risk value attributable to **DZ BANK** as at December 31, 2022 was €4.2 billion (December 31, 2021: €4.5 billion). The decrease in the minimum liquidity surplus for the DZ BANK Group was largely due to a rise in lending business and in purchases of own issues of the local cooperative banks. New issues did not fully cover the funding requirements.

The risk values as at December 31, 2022 for the **DZ BANK Group** were above the internal threshold value (€4 billion) and above the **limit** (€1 billion). They were also above the external minimum target (€0 billion). The observation threshold, limit, and external minimum target remained unchanged compared with 2021. Furthermore, **DZ BANK** did not exceed the **limit** of €700 million (December 31, 2021: €325 million).

The minimum liquidity surplus as at December 31, 2022 for both the DZ BANK Group and DZ BANK was positive in the stress scenarios with defined limits that were determined on the basis of risk appetite. This is due to the

fact that the counterbalancing capacity was above the cumulative cash outflows on each day of the defined forecast period in every scenario, which indicates that the cash outflows assumed to take place in a crisis could be comfortably covered.

The rise in interest rates during the reporting year led to significant movements in the market for interest-rate derivatives and to funding changes, making DZ BANK's minimum liquidity surplus more volatile. **A further unexpected rise in interest rates**, which is described as a risk factor affecting all types of risk in chapter VII.4.2.2, could potentially result in the continuation of the effects described for 2022 and may even cause them to become more pronounced.

7.2.8 Possible impact from crystallized liquidity risk

One of the main operating activities of the management units is to make long-term liquidity available to their customers for different maturity periods and in different currencies, for example in the form of loans. The units generally organize their funding to match these transactions that tie up liquidity. Any funding needs that are not covered by the local cooperative banks are met by obtaining additional funding in the money and capital markets, with the deposit base from money market funding reducing the need for long-term funding. When funding matures, it is therefore possible that the replacement funding required to fund transactions with longer maturities has to be obtained at **unfavorable terms and conditions**.

The entities in the DZ BANK Group are also exposed to the risk that the minimum liquidity surplus will fall below the limit. If the minimum liquidity surplus were to fall below the limit for an extended period, the possibility of **reputational damage and a rating downgrade** could not be ruled out.

Crystallization of liquidity risk causes an unexpected **reduction in the liquidity surplus**, with potential negative consequences for DZ BANK's financial position and enterprise value. If a crisis were to occur in which the circumstances were more serious or the combination of factors were significantly different from those assumed in the stress scenarios, there would be a risk of **insolvency**.

7.3 Normative perspective

7.3.1 Regulatory framework

The normative perspective is based on the liquidity ratios required under Basel Pillar 1. Its objective is to assess the DZ BANK banking group's ability to comply with regulatory minimum requirements (plus an internally specified management buffer).

Since December 31, 2021, **DZ BANK** and **DZ HYP** have been applying the waiver pursuant to article 8 CRR (**liquidity waiver**). Consequently, the requirements for calculating and reporting the LCR and NSFR are applied at the level of a single liquidity subgroup consisting of DZ BANK and DZ HYP. The liquidity waiver means that it is not necessary to comply with the regulatory liquidity requirements at the level of the two individual institutions.

Internal liquidity risk management is supplemented by the LCR specified in the Basel III framework, which was transposed into law with the CRR and Commission Delegated Regulation (EU) 2015/61, and by the NSFR, which is based on the Basel III framework (BCBS 295) and which was implemented in European law with CRR II.

The **liquidity coverage ratio** has a short-term focus and is intended to ensure that institutions can withstand a liquidity stress scenario lasting 30 days. This KPI is defined as the ratio of available liquid assets (liquidity buffer) to total net cash outflows in defined stress conditions over the next 30 days. DZ BANK reports the LCR of the liquidity subgroup and that of the banking group, calculated in accordance with the CRR in conjunction with Commission Delegated Regulation (EU) 2015/61, to the supervisory authority on a monthly basis.

The **net stable funding ratio** has a long-term focus and is intended to ensure that institutions restrict mismatches between the maturity structures of their assets-side and liabilities-side business. The ratio is the

amount of available stable funding (equity and liabilities) relative to the amount of required stable funding (assets-side business). The funding sources are weighted according to their degree of stability and assets are weighted according to their degree of liquidity based on factors defined by the supervisory authority.

7.3.2 Organization, responsibility, and reporting

The **Group Financial Services** division calculates the liquidity ratios reported for supervisory purposes resulting from the CRR and Commission Delegated Regulation (EU) 2015/61 for the liquidity subgroup and, using the corresponding values for the management units, for the DZ BANK banking group.

Both the **Asset/Liability Committee** and the **Board of Managing Directors** are notified of the LCR and the NSFR each month.

7.3.3 Liquidity coverage ratio

The LCRs for the **DZ BANK banking group** and **DZ BANK** (including DZ HYP) calculated in accordance with Commission Delegated Regulation (EU) 2015/61 are shown in Fig. 11.

FIG. 11 – LIQUIDITY COVERAGE RATIOS AND THEIR COMPONENTS

	DZ BANK banking group		DZ BANK (including DZ HYP) ¹	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Total liquidity buffer (€ billion)	122.0	97.3	103.7	84.6
Total net liquidity outflows (€ billion)	83.6	65.9	72.6	63.8
LCR (percent)	145.9	147.7	142.7	132.5

¹ DZ BANK and DZ HYP form a liquidity subgroup pursuant to article 8 CRR.

The decrease in the LCR for the **DZ BANK banking group** from 147.7 percent as at December 31, 2021 to 145.9 percent as at December 31, 2022 resulted from the LCR's greater sensitivity in respect of the increased net liquidity outflows. This negative effect had a larger impact than the countervailing, positive effect of the higher excess cover (calculated by deducting the net liquidity outflows from the liquidity buffer).

The larger liquidity buffer was mainly due to the growth of balances with central banks on the back of a higher volume of short-term and long-term deposits from financial and non-financial customers, particularly at the level of DZ BANK. Whereas short-term deposits are added to the liquidity outflows immediately, fixed-term deposits are only included in outflows in the last 30 days before their maturity date. This led to a smaller increase in net liquidity outflows relative to the rise in the liquidity buffer and thus to an increase in excess cover.

The **internal threshold value** that applies only to the DZ BANK banking group (110.0 percent) was exceeded as at the reporting date. The regulatory **external minimum target** of 100.0 percent applicable to the DZ BANK banking group and to DZ BANK (including DZ HYP) was also exceeded as at December 31, 2022. Both the internal threshold value and the external minimum target were unchanged compared with those for 2021.

7.3.4 Net stable funding ratio

The NSFR of the **DZ BANK banking group** and of **DZ BANK** (including DZ HYP) is shown in Fig. 12.

FIG. 12 – NET STABLE FUNDING RATIO AND ITS COMPONENTS

	DZ BANK banking group		DZ BANK (including DZ HYP) ¹	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Available stable funding (weighted equity and liabilities; € billion)	269.5	293.7	199.6	225.3
Required stable funding (weighted assets; € billion)	220.3	231.1	176.1	185.2
Excess cover/shortfall (€ billion) ²	49.2	62.6	23.5	40.2
NSFR (percent)	122.3	127.1	113.4	121.7

¹ DZ BANK and DZ HYP form a liquidity subgroup pursuant to article 8 CRR.

² Excess cover = positive values, shortfall = negative values.

Excess cover in relation to the NSFR is the difference between the available stable funding and the required stable funding.

The fall in the NSFR from 127.1 percent as at December 31, 2021 to 122.3 percent as at December 31, 2022 was mainly due to a reduction in the excess cover. The reduction in excess cover was due to a more pronounced fall – relative to the decrease in the funding requirements – in the amount of available stable funding following the partial TLTRO repayment and a reduced volume of operational deposits of the cooperative financial network. The decrease in the funding requirements from encumbered securities that was due to the partial TLTRO cancellation was partly offset by an increase in loans and therefore led to negative excessive cover.

As at the reporting date, both the **internal threshold value** for the NSFR of 105.0 percent and the regulatory **external minimum target** of 100.0 percent were exceeded at the level of the **DZ BANK banking group**. The regulatory **external minimum target** of 100.0 percent was also satisfied at the level of **DZ BANK (including DZ HYP)** as at the reporting date. Both the internal threshold value and the external minimum target were unchanged compared with those for 2021.

8 Capital adequacy

8.1 Strategy, organization, and responsibility

8.1.1 Strategy

The management of capital adequacy is an integral component of business management in the DZ BANK Group and the management units. Capital adequacy is defined as the holding of sufficient capital to cover the risks assumed by the business. It is considered from both an economic and a normative perspective. Whereas the economic perspective takes into account the requirements of the ECB Guide to the ICAAP and MaRisk BA, the normative perspective – while also taking account of the ECB Guide to the ICAAP – additionally applies the requirements from the CRR and the German national requirements for the implementation of the CRD.

The aim of the ICAAP is to ensure that, from two complementary perspectives (the economic and the normative perspectives), **capital resources are adequate** for an institution to be able to continue operating. Both perspectives are equally valid management approaches. They are integrated mainly on the basis of the risk inventory check, which the management uses to determine and specify the main risks in the DZ BANK Group.

All management units are included in the groupwide management of capital adequacy. Management of economic and normative capital adequacy aims to ensure that the assumption of risk is consistent with the capital resources of the DZ BANK Group, the DZ BANK financial conglomerate, and the DZ BANK banking group.

8.1.2 Organization and responsibility

The **Board of Managing Directors of DZ BANK** defines the corporate objectives of the DZ BANK Group and DZ BANK in terms of both risks and returns. In managing the risk profile, the Board of Managing Directors strives for an appropriate ratio between risk and risk coverage potential. DZ BANK is responsible for risk and capital management, and for compliance with capital adequacy at group level.

The management of economic and normative capital adequacy is based on internal target values. To avoid any unexpected adverse impact on **target values and capital ratios** and ensure that any changes in risk are consistent with corporate strategy, groupwide economic limits and risk-weighted assets are planned on an annual basis as part of the **strategic planning process**. This process results in a requirements budget for the economic and regulatory capital needed by the group. Any corresponding measures to raise capital are approved by the Asset/Liability Committee or recommended to the Board of Managing Directors for approval. The implementation of the measures is then coordinated by **Group Treasury** at DZ BANK.

At DZ BANK, the **Group Finance** division is responsible for monitoring and reporting on regulatory capital adequacy. Regular monitoring is designed to ensure that the applicable minimum regulatory requirements for solvency are met at every reporting date. Monitoring takes place monthly for the DZ BANK financial conglomerate, the DZ BANK banking group, and DZ BANK, and at least quarterly for the R+V Versicherung AG insurance group. The Board of Managing Directors and the supervisory authority are notified of the results within the monthly reports on capital management.

8.2 Economic perspective

Owing to the close ties between the management of economic capital adequacy at DZ BANK and that of the DZ BANK Group, the information below also applies to DZ BANK.

8.2.1 Measurement methods

The **economic perspective** is an internally defined management perspective aimed at ensuring that all of the DZ BANK Group's material capital risks are fully backed by capital plus an internally specified management buffer. The economic perspective is based on the assumption that an institution will continue to operate as a going concern.

The economic perspective is based on internal risk measurement methods that take into account all types of risk that are material with regard to capital adequacy. The methods selected ensure that risk capital management is integrated across the group.

In the **risk-bearing-capacity analysis**, the risk capital requirement is compared with the available internal capital. The risk capital requirement is determined by aggregating the capital required for the various risk types relevant to the DZ BANK Group.

Available internal capital is the economic value of equity. The equity used to determine available internal capital is the equity recognized on the balance sheet as calculated in accordance with the relevant accounting standards, plus/minus reserves and liabilities in respect of assets and liabilities, measured at present value. Adjustments are also made, in particular the deduction of components of additional Tier 1 capital.

The available internal capital is determined as follows:

- The available internal capital of the **Bank sector** is calculated on the basis of the IFRS data in accordance with regulatory financial reporting. In this process, R+V is not fully consolidated but taken into account using the equity method.
- The available internal capital of the **Insurance sector** is based on the own funds of the R+V Versicherung AG insurance group in accordance with Solvency II.
- The available internal capital from the two sectors is combined to produce the available internal capital of the DZ BANK Group. During this process, the effects of consolidation between the Bank and Insurance sectors are taken into account, resulting in a reduction in the available internal capital at group level.

The available internal capital is reviewed on a quarterly basis and, to some extent, on a monthly basis.

The Board of Managing Directors determines the risk capital requirement **limits** for the year on the basis of the available internal capital. If necessary, the limits can be adjusted during the year, e.g. if economic conditions change.

The purpose of the **capital buffer** is to cover the lack of precision in some areas of risk measurement. A distinction is made between centralized and decentralized capital buffer requirements. Decentralized capital buffer requirements are managed within the limits for the individual risk types, whereas the centralized capital buffer is managed on the basis of a limit covering all sectors and risk types.

R+V uses two measures defined by the supervisory authorities – the transitional measure on technical provisions and the volatility adjustment – for individual personal insurance companies. The transitional measure on technical provisions is a time-limited measure designed to make it easier for insurance companies to transition from Solvency I to the current regulatory regime, Solvency II. The volatility adjustment, which can be used indefinitely, prevents a brief phase of heightened market volatility from affecting the valuation of long-term insurance guarantees. Both measures have a positive impact on economic capital adequacy.

8.2.2 Traffic light system

Economic capital adequacy is monitored and managed using a traffic light system based on the ratio of available internal capital to aggregate risk (expressed as a percentage). The switch from green to amber in the traffic light system (**amber threshold**) is set at the internal threshold value for economic capital adequacy specified in the risk appetite statement, which in 2022 was unchanged compared with the previous year at 120.0 percent. The amber threshold serves as an early warning indicator. The **red threshold**, i.e. the borderline between amber and red in the traffic light system, was set at 110.0 percent in the year under review, again unchanged compared with 2021. The threshold values for economic capital adequacy are reviewed annually and adjusted if necessary.

8.2.3 Risk-bearing capacity

Retrospective recalculation of the overall solvency requirement

The annual recalculation of the overall solvency requirement took place as at December 31, 2021 owing to scheduled changes to the parameters for the risk measurement procedures carried out in the second quarter of 2022 for the Insurance sector on the basis of R+V's 2021 consolidated financial statements and the updating of actuarial assumptions. The recalculation reflects updated measurements of insurance liabilities based on annual actuarial analyses and updates to parameters in the risk capital calculation. Because of the complexity and the amount of time involved, the parameters are not completely updated in the in-year calculation and an appropriate projection is made.

The recalculation led to changes in the available internal capital, the key risk indicators at the level of the DZ BANK Group, and economic capital adequacy. The figures as at December 31, 2021 given in this risk report have been restated accordingly and are not directly comparable with the figures in the 2021 opportunity and risk report.

Available internal capital and limit

The DZ BANK Group's **available internal capital** as at December 31, 2022 stood at €30,481 million. The comparable figure as at December 31, 2021 was €31,873 million. The year-on-year decrease in available internal capital was largely attributable to the Insurance sector and can primarily be explained by developments in the capital markets.

The **limit** derived from the available internal capital was specified at €22,215 million as at December 31, 2022 (December 31, 2021: €23,588 million).

As at December 31, 2022, **aggregate risk** was calculated at €13,807 million. The comparable figure as at December 31, 2021 was €15,131 million. The decrease was primarily driven by lower credit risk and business risk in the Bank sector.

Economic capital adequacy

As at December 31, 2022, the **economic capital adequacy ratio** for the DZ BANK Group was calculated at 220.8 percent. The comparable figure as at December 31, 2021 was 210.7 percent. The year-on-year decreases in available internal capital and aggregate risk were virtually the same amount. This led to a small rise in economic capital adequacy. As at the reporting date, the economic capital adequacy ratio was higher than the internal threshold value of 120.0 percent and the external minimum target of 100.0 percent. The internal threshold value and the external minimum target for 2022 were unchanged compared with those for 2021.

Fig. 13 provides an overview of economic capital adequacy and its components.

FIG. 13 – ECONOMIC CAPITAL ADEQUACY OF THE DZ BANK GROUP

	Dec. 31, 2022	Dec. 31, 2021
Available internal capital (€ million) ¹	30,481	31,873
Limit (€ million)	22,215	23,588
Aggregate risk (€ million) ¹	13,807	15,131
Economic capital adequacy (percent)¹	220.8	210.7

¹ Value as at December 31, 2021 after recalculation of R+V's overall solvency requirement. Different values were stated in the 2021 risk report.

In the case of the risk types in the Bank sector and Insurance sector, the risk capital requirement also contains any decentralized **capital buffer requirement** that has been assigned. To simplify matters, only the terms 'risk capital requirement' and 'overall solvency requirement' will be used in the remainder of this risk report. These include the decentralized capital buffer requirement.

The limits and risk capital requirements for the **Bank sector**, broken down by risk type, are shown in Fig. 14.

FIG. 14 – LIMITS AND RISK CAPITAL REQUIREMENTS IN THE BANK SECTOR

€ million	Bank sector				DZ BANK			
	Limit		Risk capital requirement		Limit		Risk capital requirement	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Credit risk	6,387	7,188	3,766	5,037	2,854	2,750	2,254	2,134
Equity investment risk	1,230	1,220	997	996	767	700	632	636
Market risk	6,680	5,725	3,730	3,713	3,175	2,400	1,481	1,517
Technical risk of a home savings and loan company ¹	785	706	698	639				
Business risk ²	280	640	43	407	235	445	43	295
Operational risk	1,112	1,102	966	941	625	596	554	515
Total (after diversification)³	15,380	15,403	9,485	10,871				

Not relevant

¹ Including business risk and reputational risk of BSH.

² Apart from that of BSH, reputational risk is contained in the risk capital requirement for business risk.

³ The total after diversification is not shown for DZ BANK because the management within the Bank sector is by risk type.

Fig. 15 sets out the limits and overall solvency requirements for the **Insurance sector**, broken down by risk type, and includes policyholder participation. The definition of the limits and determination of overall solvency requirements take into account the ability to offset deferred taxes against losses (which arises where deferred tax liabilities can be eliminated in the loss scenario). Diversification effects between the risk types are also taken into consideration. Owing to these effects of correlation, the overall solvency requirement and limit for each risk type are not cumulative.

FIG. 15 – LIMITS AND OVERALL SOLVENCY REQUIREMENTS IN THE INSURANCE SECTOR

€ million	Limit		Overall solvency requirement	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021 ¹
Life actuarial risk ²	1,200	600	1,045	343
Health actuarial risk	300	350	163	231
Non-life actuarial risk	3,000	4,600	1,807	1,939
Market risk	3,880	4,400	3,188	3,169
Counterparty default risk	350	350	227	235
Operational risk	1,000	1,000	599	718
Risks from entities in other financial sectors	180	180	130	130
Total (after diversification)	6,155	7,460	3,852	3,685

¹ Values after recalculation of the overall solvency requirement. Different values were stated in the 2021 risk report.

² Reputational risk is implicitly included in the overall solvency requirement for life actuarial risk (lapse risk).

In addition to the figures shown in Fig. 14 and Fig. 15, the aggregate risk includes a **centralized capital buffer requirement across all types of risk**, which was calculated at €470 million as at December 31, 2022 (December 31, 2021: €575 million). The corresponding **limit** was €680 million (December 31, 2021: €725 million). This decrease in the centralized capital buffer requirement was predominantly due to the updating of components of credit risk.

8.2.4 Possible impact from crystallized risk covered by capital

If risk were to materialize and associated losses be incurred, there would be a risk that the risk capital requirement would exceed the available internal capital and the DZ BANK Group would thus **miss its economic capital adequacy target**. However, this situation could also occur with an increase in risk arising from

heightened market volatility or as a consequence of changes in the business structure. Additional or more stringent regulatory requirements could also have a negative impact on the economic capital adequacy of the DZ BANK Group.

In a situation in which the economic capital adequacy of the DZ BANK Group could not be guaranteed, there would be insufficient capital available to meet the group's own standards with regard to the coverage of risk. If there is also insufficient capital to meet the level of protection demanded by the supervisory authority, this authority could initiate action, which in extreme cases could lead to the **resolution** of DZ BANK or its subsidiaries.

8.3 Normative perspective

8.3.1 Regulatory framework

The normative perspective is based on the capital ratios laid down by the supervisory authorities. It comprises three management dimensions: monitoring of actual regulatory KPIs, capital planning, and adverse stress tests.

Whereas the monitoring of actual and projected figures, together with capital planning, in the baseline scenario focuses on the current regulatory ratios and their changes in probable scenarios, the analysis of these ratios in adverse scenarios is based on capital planning and the quarterly adverse stress tests.

From the normative perspective, the DZ BANK Group's risk-bearing capacity is assured if, in the medium term, the group is in a position to meet all regulatory minimum solvency requirements, even in crisis situations. An internal management buffer over and above the regulatory requirements for each ratio is also included in order to ensure that the group has an adequate level of capital.

The normative perspective is an integral part of the ICAAP. The key risk indicators in the normative perspective are specified by the regulatory requirements, mainly the CRR, but the selection and specific design of the scenarios are internal decisions. With due regard to regulatory and supervisory guidance, such as the ECB Guide to the ICAAP and the EBA Guidelines on stress testing, the DZ BANK Group selects and simulates scenarios that adequately reflect the vulnerabilities of the business models operated in the group. The scenarios to be analyzed are determined at least once a year.

The regulatory ratios presented below are used as part of the internal management of the DZ BANK financial conglomerate, the DZ BANK banking group, and DZ BANK. The procedures used to determine these ratios are those that are required under the CRR transitional guidance.

8.3.2 DZ BANK financial conglomerate

The DZ BANK financial conglomerate comprises the DZ BANK banking group and the R+V Versicherung AG insurance group.

FKAG forms the main legal basis for the supervision of the DZ BANK financial conglomerate. The calculation methodology for the coverage ratio is taken from Commission Delegated Regulation (EU) No. 342/2014 in conjunction with article 49 (1) CRR. The financial conglomerate coverage ratio is the ratio between the total of own funds in the financial conglomerate and the total of solvency requirements for the conglomerate. The resulting ratio must be at least 100.0 percent.

The changes in the coverage ratio and in the own funds and solvency requirements of the DZ BANK financial conglomerate are shown in Fig. 16.

FIG. 16 – REGULATORY CAPITAL ADEQUACY OF THE DZ BANK FINANCIAL CONGLOMERATE¹

	Dec. 31, 2022 ²	Dec. 31, 2021 ³
Own funds (€ million)	36,021	36,896
Solvency requirements (€ million)	23,679	24,470
Coverage ratio (percent)	152.1	150.8

¹ The values for the DZ BANK banking group included in the calculations were determined in accordance with the CRR transitional guidance.

² Preliminary figures.

³ Final figures.

The rise in the coverage ratio calculated for the DZ BANK financial conglomerate from 150.8 percent as at December 31, 2021 to 152.1 percent as at December 31, 2022 was due, in particular, to the more pronounced decrease in the solvency requirements. The effects that led to this change in the coverage ratio were attributable to the DZ BANK banking group and the R+V Versicherung AG insurance group (see chapters VII.8.3.3 and VII.8.3.4 of this risk report).

The preliminary coverage ratio calculated for the financial conglomerate as at December 31, 2022 was higher than both the internal threshold value (110.0 percent) and the external minimum target (100.0 percent). According to current projections, this is also expected to be the case in 2023.

8.3.3 DZ BANK banking group

The banking group for regulatory purposes pursuant to section 10a KWG in conjunction with articles 11 and 18 CRR consists of DZ BANK as the superordinated entity plus other institutions, financial institutions, and ancillary services undertakings that qualify as subsidiaries according to article 4 (1) no. 16 CRR. Insurance companies and companies not in the financial sector are not required to be consolidated in the banking group for regulatory purposes. In this context, R+V is fully consolidated for commercial-law purposes but is not included in the banking group for regulatory purposes.

Procedure for determining regulatory risk-weighted assets

The entities in the DZ BANK banking group use the following methods to calculate the regulatory risk-weighted assets in accordance with the CRR:

- **Credit risk:** Primarily the foundation internal ratings-based (IRB) approach, the IRB approach for the retail business and, in some cases, the Standardized Approach to credit risk
- **Market risk:** Predominantly the group's own internal models and, to a minor extent, the Standardized Approaches
- **Operational risk:** Primarily the Standardized Approach

Regulatory capital ratios

The regulatory **own funds** of the **DZ BANK banking group** as at December 31, 2022 determined in accordance with the CRR transitional guidance amounted to a total of €24,719 million (December 31, 2021: €27,729 million). This equated to a decline in own funds of €3,010 million compared with the end of 2021, mainly comprising a decrease in common equity Tier 1 capital of €4,259 million and a rise in Tier 2 capital of €1,261 million.

The decrease in **common equity Tier 1 capital** from €23,021 million as at December 31, 2021 to €18,762 million was mostly due to temporary accounting effects at R+V. As a member of the DZ BANK Group, R+V already had to measure its assets at fair value in accordance with IFRS 9. Equity and liabilities, and therefore liabilities to policyholders, will only be treated in the same way after the transition to IFRS 17 in the coming year. This led to a temporary technical interest-rate risk caused by the strong increase in interest rates during the reporting period. The result was a negative contribution to earnings and a significantly lower contribution to common equity Tier 1 capital as at December 31, 2022. A countervailing effect is anticipated in 2023.

Tier 2 capital advanced from €2,546 million as at December 31, 2021 to €3,807 million as at December 31, 2022, a year-on-year increase of €1,261 million that was essentially attributable to the issuance of new Tier 2 capital amounting to €1,663 million in the reporting year.

Risk-weighted assets in the DZ BANK banking group went down from €150,137 million as at December 31, 2021 to €137,379 million as at December 31, 2022. This decrease of €12,758 million was mainly due to a reduction in the carrying amount of DZ BANK's long-term equity investment in R+V, which is accounted for using the equity method. The same period saw highly volatile movements in the capital markets, which led to a rise in market risk.

As at December 31, 2022, the DZ BANK banking group's **common equity Tier 1 capital ratio** was 13.7 percent, a decrease of 1.6 percentage points compared with December 31, 2021 (15.3 percent). The **Tier 1 capital ratio** of 15.2 percent calculated as at the reporting date was 1.6 percentage points lower than the figure as at December 31, 2021 too (16.8 percent). The **total capital ratio** also went down, from 18.5 percent as at December 31, 2021 to 18.0 percent as at the reporting date.

Fig. 17 provides an overview of the regulatory capital ratios for the DZ BANK banking group and for DZ BANK.

FIG. 17 – REGULATORY CAPITAL RATIOS¹

	DZ BANK banking group		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Capital				
Common equity Tier 1 capital (€ million)	18,762	23,021	15,259	14,197
Additional Tier 1 capital (€ million)	2,150	2,161	1,900	2,150
Tier 1 capital (€ million)	20,912	25,183	17,159	16,347
Total Tier 2 capital (€ million)	3,807	2,546	3,794	2,414
Own funds (€ million)	24,719	27,729	20,953	18,761
Risk-weighted assets				
Credit risk including long-term equity investments (€ million)	119,283	132,296	92,608	85,150
Market risk (€ million)	7,369	7,355	6,944	6,504
Operational risk (€ million)	10,727	10,487	3,630	3,379
Total (€ million)	137,379	150,137	103,182	95,033
Capital ratios				
Common equity Tier 1 capital ratio (percent)	13.7	15.3	14.8	14.9
Tier 1 capital ratio (percent)	15.2	16.8	16.6	17.2
Total capital ratio (percent)	18.0	18.5	20.3	19.7

¹ In accordance with the CRR transitional guidance.

Regulatory minimum capital requirements specified by the SREP

The minimum capital requirements that the DZ BANK banking group had to comply with in 2022 under the Supervisory Review and Evaluation Process for Basel Pillar 2 (SREP) comprised those components of Pillar 1 laid down as mandatory by law and those individually specified by the banking supervisor. Institution-specific requirements under the additional capital requirements in Pillar 2, determined in the outcome of the SREP conducted for the DZ BANK banking group in 2021, also had to be satisfied. In this process, the banking supervisor specified a mandatory add-on (**Pillar 2 requirement**) that is factored into the external minimum targets for the capital ratios and into the basis of calculation used to determine the threshold for the maximum distributable amount (MDA). Distributions are restricted if capital falls below the MDA threshold.

In addition to this mandatory component, there is a recommended own funds amount under Pillar 2 (**Pillar 2 guidance**), which likewise is determined from the SREP, but unlike the mandatory component relates only to

common equity Tier 1 capital. Failure to comply with the own funds guidance under Pillar 2 does not constitute a breach of regulatory capital requirements. Nevertheless, this figure is relevant as an early warning indicator.

BaFin has classified DZ BANK as an other systemically important institution (O-SII). The DZ BANK banking group had to comply with an **O-SII capital buffer** (comprising common equity Tier 1 capital) as defined in section 10g (1) KWG at a level of 1.0 percent in 2022.

The minimum capital requirements applicable to **DZ BANK** comprised those components of **Pillar 1** laid down as mandatory by law and those individually specified by the banking supervisor. Pillar 2 add-ons are currently not relevant to DZ BANK.

The mandatory minimum capital requirements relevant to the DZ BANK banking group and DZ BANK under the SREP, and their components, are shown in Fig. 18.

FIG. 18 – REGULATORY MINIMUM CAPITAL REQUIREMENTS ACCORDING TO THE SREP

Percent	DZ BANK banking group		DZ BANK	
	2022	2021	2022	2021
Minimum requirement for common equity Tier 1 capital	4.50	4.50	4.50	4.50
Additional Pillar 2 capital requirement	0.96	0.98		
Capital conservation buffer	2.50	2.50	2.50	2.50
Countercyclical capital buffer ¹	0.05	0.02	0.03	0.01
O-SII capital buffer	1.00	1.00		
Mandatory minimum requirement for common equity Tier 1 capital	9.00	9.01	7.03	7.01
Minimum requirement for additional Tier 1 capital	1.50	1.50	1.50	1.50
Additional Pillar 2 capital requirement	0.32	0.33		
Mandatory minimum requirement for Tier 1 capital	10.82	10.84	8.53	8.51
Minimum requirement for Tier 2 capital ²	2.00	2.00	2.00	2.00
Additional Pillar 2 capital requirement	0.43	0.44		
Mandatory minimum requirement for total capital	13.25	13.27	10.53	10.51

Not available

¹ The value for the countercyclical capital buffer is recalculated at each reporting date. Unlike the other reported values, which apply to the entire financial year, the countercyclical capital buffers shown for 2022 and 2021 relate solely to the reporting dates.

² The minimum requirement can also be satisfied with common equity Tier 1 capital.

The minimum capital requirements will rise sharply, by 0.84 percentage points, for 2023. This is due to an increase in the additional capital requirements in Pillar 2 from January 1, 2023 and an increase in the countercyclical capital buffer and the introduction of the systemic risk buffer from February 1, 2023.

Relaxation of the minimum capital requirements in response to the COVID-19 pandemic

Because of the COVID-19 pandemic, the supervisory authorities introduced various relief measures for banks that expired at the end of 2022. They included relief measures in relation to the **binding minimum capital requirements**. DZ BANK did not use these relief measures and consequently they are not taken into account in Fig. 18.

Because of the COVID-19 pandemic, the supervisory authorities in some countries reduced the capital buffer rates used to calculate the countercyclical capital buffer, which is another part of the mandatory minimum capital requirements. In some cases, the authorities lowered the rates right down to 0.0 percent. In a general administrative act, BaFin raised Germany's countercyclical capital buffer rate from 0.0 percent to 0.75 percent with effect from February 1, 2022. The scope of application of the general administrative act includes institutions

as defined in section 1 (1b) KWG and is thus mandatory for DZ BANK. The new rate must be used to calculate the institution-specific countercyclical capital buffer from February 1, 2023 onward.

Also in connection with the COVID-19 pandemic, the supervisory authority did not require banks to comply with the **Pillar 2 capital recommendation** in the period up to December 31, 2022. DZ BANK did not use this relief measure either.

Compliance with the minimum capital requirements

The **internal threshold values** and **external minimum targets** applicable at the level of the DZ BANK banking group for the common equity Tier 1 capital ratio, the Tier 1 capital ratio, and the total capital ratio were exceeded at the level of the DZ BANK banking group and DZ BANK as at December 31, 2022. The internal threshold values are shown in Fig. 5 in chapter VII.2.3.

Leverage ratio

The leverage ratio shows the ratio of a bank's Tier 1 capital to its total exposure. In contrast to credit-risk-related capital requirements for which the assumptions are derived from models, the individual exposures in the calculation of the leverage ratio are not allocated their own risk weight but are generally included in the total exposure without any risk weight at all.

The leverage ratio of the **DZ BANK banking group** determined in accordance with the CRR transitional guidance went down by 2.6 percentage points from 7.3 percent as at December 31, 2021 to 4.7 percent as at December 31, 2022. The first reason for this decline was the ending of the temporary exemption from including balances with central banks. These exposures have had to be included in the total exposure again since April 1, 2022. This increased the total exposure at DZ BANK by €95.4 billion. Secondly, the significant fall in Tier 1 capital of €4,276 million contributed substantially to the decrease in the leverage ratio.

DZ BANK's leverage ratio as at December 31, 2022 was calculated at 6.3 percent (December 31, 2021: 9.2 percent). This decline was also mainly due to the aforementioned ending of the temporary exemption from including balances with central banks. This increased the total exposure at DZ BANK by €96.2 billion. Tier 1 capital as at December 31, 2022 was up by €812 million compared with the end of 2021.

Because both the DZ BANK banking group and DZ BANK had used the aforementioned temporary exemption for balances with central banks, the **external minimum target** stood at 3.26 percent in 2021 and in 2022 until this exemption expired on March 31, 2022. Since April 1, 2022, the external minimum target has again been 3.0 percent.

Both the **internal threshold value** of 4.0 percent for the leverage ratio of the DZ BANK banking group and the **external minimum target** of 3.0 percent specified by the banking regulator were exceeded as at December 31, 2022.

Minimum requirement for own funds and eligible liabilities

The Bank Recovery and Resolution Directive (BRRD), Implementing Regulation (EU) No. 806/2014 establishing a Single Resolution Mechanism, and the transposition of the BRRD into German law in the form of SAG created the legal basis at European and national level for a single resolution mechanism for banks and the regulatory MREL ratio as a percentage of risk-weighted assets.

The MREL requirements are intended to ensure that banks hold a sufficiently large volume of own funds and liabilities that can be 'bailed-in' to make it possible at all times to carry out an orderly resolution. 'Bail-in-able' liabilities are those that provide for creditors to take an interest in losses incurred and recapitalization if a bank gets into financial difficulties, enabling resolution to take place on the basis of the bail-in and other instruments without recourse to government help and without jeopardizing the stability of the financial system.

The DZ BANK banking group's MREL ratio as a percentage of risk-weighted assets is the ratio of the total of the regulatory own funds of the DZ BANK banking group and the eligible external MREL liabilities of DZ BANK to the total risk exposure amount (risk-weighted assets) of the DZ BANK banking group. The subordinated MREL ratio of the DZ BANK banking group is the ratio of the total of the regulatory own funds of the DZ BANK banking group and the eligible external, subordinated MREL liabilities of DZ BANK to the total risk exposure amount (risk-weighted assets) of the DZ BANK banking group.

The MREL ratio as a percentage of the leverage ratio exposure and the subordinated MREL ratio as a percentage of the leverage ratio exposure have been used to manage the DZ BANK banking group in addition to the MREL ratio as a percentage of risk-weighted assets and the subordinated MREL ratio as a percentage of risk-weighted assets since January 1, 2023. Internal threshold values and external minimum targets have had to be applied in respect of these additional ratios since January 1, 2023.

MREL ratio

The MREL ratio as a percentage of risk-weighted assets measured for the **DZ BANK banking group** was 38.3 percent as at December 31, 2022 (December 31, 2021: 37.3 percent). The year-on-year rise in this key figure was attributable to the fall of €12,758 million in the risk-weighted assets of the DZ BANK banking group. The €3,340 million contraction of the MREL volume offset this rise only insignificantly.

DZ BANK's Board of Managing Directors set the **internal threshold value** for the **DZ BANK banking group's** MREL ratio as a percentage of risk-weighted assets for 2022 at 26.8 percent. The **external minimum target** for 2022 was 25.1 percent. In 2021, neither an internal threshold value nor an external minimum target had applied to the MREL ratio. The MREL ratio measured as at December 31, 2022 was above the internal threshold value and the external minimum target.

Subordinated MREL ratio

The DZ BANK banking group's subordinated MREL ratio as a percentage of risk-weighted assets was 28.5 percent as at December 31, 2022 (December 31, 2021: 26.5 percent). The reasons for this increase were the same as those given above for the MREL ratio as a percentage of risk-weighted assets. The reduction in equity meant that the subordinated MREL volume declined by €524 million year on year.

The **internal threshold value** applicable to the DZ BANK banking group's subordinated MREL ratio as a percentage of risk-weighted assets was 24.8 percent for the first six months of the year. For the second half of 2022, this value was 25.5 percent. The supervisory authorities specified an **external minimum target** of 23.8 percent for 2022 as a whole. In 2021, neither an internal threshold value nor an external minimum target had applied to the subordinated MREL ratio as a percentage of risk-weighted assets. The subordinated MREL ratio as a percentage of risk-weighted assets measured as at December 31, 2022 was above the internal threshold value and the external minimum target.

8.3.4 R+V Versicherung AG insurance group

The regulatory solvency requirements for insurance companies and insurance groups provide a means of evaluating the overall risk position in the R+V Versicherung AG insurance group.

The group's risk-bearing capacity for regulatory purposes is defined as the eligible own funds at group level in relation to the risks arising from operating activities. The changes in the regulatory risk-bearing capacity of the R+V Versicherung AG insurance group as a whole and each of its constituent entities are analyzed at least once a quarter.

R+V uses two measures defined by the supervisory authorities – the transitional measure on technical provisions and the volatility adjustment – for individual personal insurance companies. Both measures have a positive impact on regulatory and economic capital adequacy. Further disclosures on these measures can be found in chapter VII.8.2.1 'Economic capital adequacy'.

The preliminary figure for the **regulatory risk-bearing capacity** of the R+V Versicherung AG insurance group as at December 31, 2022 was calculated at 219.8 percent. The coverage ratio was thus above the external minimum target of 100.0 percent, which was the same target as had applied in 2021. The final figure as at December 31, 2021 was 221.8 percent (preliminary figure given in the 2021 risk report: 232.1 percent). Fig. 19 shows how the solvency requirements are covered by eligible own funds.

FIG. 19 – REGULATORY CAPITAL ADEQUACY OF THE R+V VERSICHERUNG AG INSURANCE GROUP

	Dec. 31, 2022 ¹	Dec. 31, 2021 ²
Own funds (€ million)	15,482	17,656
Solvency requirements (€ million)	7,044	7,960
Coverage ratio (percent)	219.8	221.8

¹ Preliminary figures.

² Final figures. The preliminary figures were stated in the 2021 risk report.

The decrease in own funds and in the solvency requirement was primarily due to the sharp rise in interest rates in 2022.

The **recalculation of the overall solvency requirement** described in chapter VII.8.2.3 for economic risk-bearing capacity also affected the regulatory risk-bearing capacity of the R+V Versicherung AG insurance group and led to retrospective changes in the solvency requirements as at the end of 2021. The prior-year figures as at December 31, 2021 given in this risk report have been restated accordingly and are not directly comparable with the figures in the 2021 risk report.

8.4 Stress tests for types of risk covered by capital

8.4.1 Adverse stress tests

Adverse stress tests are used to examine the impact on capital and risk from potential **crisis scenarios** that are exceptional, but plausible, and particularly relevant to the DZ BANK Group's value and risk drivers (see also chapter VII.5.2). The **KPIs** relating to economic and regulatory capital adequacy are analyzed in this context. However, the stress tests also reflect events that go beyond the methods established for calculating capital adequacy. The term 'adverse stress tests' encompasses those stress scenarios that represent negative macroeconomic trends or events from the perspective of the DZ BANK Group. In this context, 'adverse' indicates that the scenarios may be particularly disadvantageous or even harmful.

Adverse stress tests can provide information on whether the level of capital resources – especially the buffer held to cover crisis situations – is also sufficient to cover various types of moderate to serious crisis scenario. The stress test results also facilitate an assessment of the extent to which the analyzed value and risk drivers are material for the DZ BANK Group.

The methods used are designed so that the specific features of R+V's business model and its risk and capital management systems are taken into account when determining the results of stress testing in the DZ BANK Group.

For the adverse stress tests, DZ BANK has put in place a system of threshold values as an **early-warning mechanism**. The threshold values for the scenarios across all risk types are monitored in the ongoing reporting system. These early-warning signals trigger various risk management processes so that there can be an early response to the potential risks highlighted by the stress tests. Control measures potentially available for the crisis scenario in question are also taken into account so that there is a comprehensive, critical evaluation of the stress test results.

The adverse stress tests are carried out quarterly. The results are submitted in the DZ BANK Group stress tests report and are noted by the **Board of Managing Directors** and by the DZ BANK Supervisory Board's **Risk Committee**.

8.4.2 Reverse stress tests

Reverse stress tests complement the adverse stress tests and are used to investigate which of the hypothetical scenarios could conceivably be sufficiently plausible and relevant to jeopardize the ability of the DZ BANK Group to **continue as a going concern**.

'Reverse' indicates that the tests are in the opposite direction and distinguishes them from the adverse stress tests. In adverse stress tests, scenarios are defined and the corresponding KPIs determined in order to assess whether there is a sufficient level of capital resources available to cover moderate or serious crisis scenarios. Reverse stress tests, on the other hand, examine which scenarios would have to occur to jeopardize the survival of the DZ BANK Group as a going concern.

In reverse stress tests, the risk particularly to the regulatory KPIs is simulated with scenarios in which it would no longer be feasible to **continue the business model** or in which the business model would prove to be no longer sustainable. In the case of reverse stress tests, the priorities are therefore as follows: firstly, to identify relevant scenario approaches that could have the potential to jeopardize the bank's survival as a going concern, and secondly, to estimate the probability and plausibility of a specific, sufficiently serious scenario of this nature.

Reverse stress tests are generally carried out annually. The results are noted by the **Board of Managing Directors** and by the DZ BANK **Supervisory Board's Risk Committee**.

8.4.3 Scenario analyses in the risk types

The quarterly report on stress tests in the DZ BANK Group is supplemented by a credit risk stress test in the normative perspective and by various scenario analyses in the risk types in the economic perspective. These analyses serve as a link between risk drivers and sensitivities, and between potential events and adverse scenarios. The scenario analyses also enhance the risk quantification for each risk type by including an alternative perspective.

In the scenario analyses, specific risk drivers, risk concentrations, or events are examined in detail for each type of risk by simulating economic losses and comparing them against the relevant risk limit.

Scenario analyses in the risk types are carried out quarterly. The results are submitted in the DZ BANK Group stress tests report and are noted by the **Board of Managing Directors** and by the DZ BANK **Supervisory Board's Risk Committee**.

Bank sector

9 Credit risk

9.1 Definition

Credit risk is defined as the risk of losses arising from the default of counterparties (borrowers, issuers, other counterparties) or from the migration of the credit ratings of these counterparties, or of losses in connection with the recovery of loans, advances, receivables, or collateral.

Credit risk may arise in traditional lending business and also in trading activities. **Traditional lending business** is for the most part commercial lending, including financial guarantee contracts and loan commitments. In the context of credit risk management, **trading activities** refer to securities business in the banking book and trading book, money market business, transactions involving tradable loans and advances (such as promissory notes), currency transactions, transactions involving derivatives, and transactions involving commodities (such as precious metals).

In **traditional lending business**, credit risk arises mainly in the form of default risk and migration risk. In this context, default risk refers to the risk that a customer may be unable to settle receivables arising from loans or advances made to the customer (including lease receivables) or make overdue payments. It also includes risks arising from contingent liabilities (such as issued guarantees and indemnities). The calculation of the exposure encompasses loan facilities promised to third parties and any existing overdrawn accounts in addition to loans that have already been drawn down. Migration risk is a sub-risk within traditional credit risk and reflects changes in the fair value of types of exposure subject to credit risk caused by a change in the rating for a borrower (rating migration).

Credit risk in connection with **trading activities** arises in the form of default risk, which can be subdivided into issuer risk, replacement risk, and settlement risk, depending on the type of transaction involved.

Issuer risk is the risk of incurring losses from the default of issuers of tradable debt or equity instruments (such as bonds, shares, profit-participation certificates), losses from a default in connection with the underlying instrument in derivatives (for example, credit or equity derivatives), or losses from a default in connection with investment fund units.

Replacement risk on derivatives is the risk of a counterparty defaulting during the term of a trading transaction.

Transaction processing risk is a default risk subcategory of replacement risk. It is factored into the exposure calculation for replacement risk. Transaction processing risk arises in connection with both delivery-versus-payment (DVP) settlement and unilateral payments in a trading transaction. It arises when the counterparty in a trading transaction cannot perform its contractual obligation.

Settlement risk arises when there are two mutually conditional payments and there is no guarantee that when the outgoing payment is made the incoming payment will be received. Settlement risk is the risk of a loss if counterparties do not meet their obligations, counter-performance already having taken place.

Recovery risk forms part of credit risk. It cannot be determined as an exposure amount but increases the risk capital requirement for traditional credit risk, issuer risk, and replacement risk. Recovery risk results from uncertainty regarding the recovery rate for existing collateral and uncertainty regarding the recovery rate for unsecured receivables (or partial receivables).

Country risk is also included within credit risk. Country risk in the narrower sense of the term refers to conversion, transfer, payment prohibition, or moratorium risk. It is the risk that a foreign government may impose restrictions preventing a debtor in the country concerned from transferring funds to a foreign creditor. In the broader sense of the term, country risk refers to sovereign risk (the risk arising from exposure to a government itself) or the risk that the quality of the overall exposure in a country may be impaired as a result of country-specific events (country-related borrower risk). In this case, it is not viewed as a separate risk type but as a component of credit risk and is thus recorded within traditional credit risk, issuer risk, and replacement risk.

9.2 Business background and risk strategy

The DZ BANK Group is exposed to considerable credit risk in the Bank sector. The lending business is one of the most important core activities of the entities in the Bank sector. In its role as the central institution, DZ BANK covers a **broad range of lending business**, either in partnership with the local cooperative banks or in direct business, and provides its customers with financing solutions. Its customers include the local cooperative banks themselves, corporate customers, retail customers, the public sector, international companies, and banks and institutions both in Germany and abroad.

Default risk from traditional lending business arises primarily at DZ BANK, BSH, and DZ HYP. The risk results from the specific transactions in each management unit and therefore has varying characteristics in terms of diversification and size in relation to the volume of business.

Default risk relating to trading transactions arises from issuer risk, particularly in connection with the trading activities and investment business of DZ BANK and DZ HYP. Replacement risk arises for the most part at DZ BANK.

The entities in the Bank sector pursue a decentralized business policy aimed at promoting the cooperative banks and are bound by the core strategic guiding principle of a **'network-oriented central institution and financial services group'**. The business and risk policy for the credit-risk-bearing core businesses in the group is formulated on the basis of risk-bearing capacity. The credit risk strategy therefore forms the basis for credit risk management and reporting across the whole group and ensures that there is a standard approach to credit risk within the group. It takes into account the business models of each of the management units.

The management units aim to ensure that their credit portfolios always have **a sound credit quality and risk structure**. One of the objectives is to make sure that the portfolios remain highly diversified going forward.

9.3 Risk factors

9.3.1 General credit risk factors

Key values used in determining credit risk include the concentrations of lending volume in terms of counterparties, sectors, country groups, and residual maturities, and the credit quality structure of the credit portfolio. **Significant concentrations of volume** in counterparties, sectors, or countries increase the risk that an accumulation of credit risk will become critical, for example if there are defaults among greater concentrations of counterparties or, in economic crises, defaults in sectors or countries with significant concentrations in the credit portfolio.

The term of loan agreements is also a key credit risk factor because the probability of a deterioration in credit rating and therefore of a counterparty default during the term of an agreement generally increases over time. Particularly in the case of an **accumulation of exposures that have longer terms to maturity** and a non-investment-grade rating, there is a danger that the credit risk will materialize and the recognition of impairment losses will become necessary.

9.3.2 Specific credit risk factors

Definition

In addition to the general risk factors, the **macroeconomic and environmental trends** described below could lead to higher credit risk, more defaults among individual counterparties, and therefore to a greater requirement for the recognition of impairment losses in the lending business.

The following sections explain risk factors that are directly relevant to distinct subportfolios in the lending business and have a material measurable effect in those subportfolios. Information is also provided on risk factors

that are potentially significant for the whole of the credit portfolio, but that do not at the moment have any material impact on portfolio quality.

Credit risk factors of material importance to individual credit portfolios

DZ BANK and DZ HYP hold investments in Italian, Spanish, and Portuguese bonds. DZ BANK has also entered into lending, derivatives, and money market business with Italian and Spanish counterparties. The prolonged **economic policy divergence in the eurozone**, combined with the ECB's expansionary monetary policy, thus leads to heightened risk in the Bank sector's lending business. The macroeconomic background to this risk factor is described in chapter VII.4.2.5. Disclosures on the exposures in Italy, Spain, and Portugal can be found in chapter VII.9.7.1.

DZ BANK finances the building, purchase, and operation of **cruise ships**. The COVID-19 pandemic had a direct impact on this business in 2022. The economic background to this risk factor is described in chapters V.1.1 to V.1.4 of the outlook. The lending volumes related to cruise ship finance and the financing of cruise ship building, together with the associated credit value-at-risk, are presented in chapters VII.9.9.1 onward and chapter VII.9.10.2.

Credit risk factors with a potential impact on the entire lending business

The war in Ukraine, higher energy prices, the COVID-19 pandemic and the resulting supply chain disruptions, international trade disputes, and geopolitical tensions represent the biggest threats to **economic growth**.

The **real estate markets underwent a correction** in 2022. The potential negative impact on real estate finance at BSH and DZ HYP was analyzed. No increase in systematic risk has been identified so far.

The background to these risk factors is explained in chapter VII.4.2. If the developments described there persist for a while longer yet, or escalate, there is a danger that credit risk in the Bank sector will rise significantly.

There is also a risk that collateral for loan exposures could become impaired if **physical climate-related and environmental risks** were to materialize. In addition, the profitability of corporate finance borrowers (mainly at DZ BANK) and of real estate finance borrowers (mainly at BSH and DZ HYP) could be diminished by **transition effects** such as those arising from the transition to a carbon-neutral economy. A resulting deterioration of the borrowers' credit quality could lead to a greater requirement for the recognition of impairment losses.

9.4 Organization, responsibility, and reporting

Responsibilities in the lending process have been laid down and are documented in a written set of procedural rules. These responsibilities cover loan applications, approvals, and termination, including periodic credit control with regular analysis of ratings. Decision-making authority levels are specified by the relevant **rules** based on the risk content of lending transactions.

Established **reporting and monitoring processes** help to provide decision-makers with information about changes in the risk structure of credit portfolios and form the basis for managing credit risk.

The **credit risk report** keeps the Board of Managing Directors, the Group Risk and Finance Committee, and the Supervisory Board's Risk Committee informed of the economic capital required to cover credit risk. In addition to providing management with recommendations for action, internal reporting also includes an in-depth analysis of the portfolio structure in regard to risk concentrations based on key risk characteristics such as credit rating class, industry, country group, and the lending volume to single borrowers. In addition, the report includes details on specific exposures. In the context of the risk limit, the credit value-at-risk is also included in the credit risk report.

9.5 Risk management

9.5.1 Rating systems

Use and characteristics of the rating systems

The generation of internal credit ratings for the counterparties of entities in the Bank sector helps to provide a solid basis for lending decisions in the management of transactions, in that the expected losses from defaults in the lending business are then factored into pricing. In addition, internal ratings are used to incorporate the credit quality of the counterparties when calculating unexpected losses in the credit portfolio.

The **VR rating system** used as standard throughout the cooperative financial network aims to ensure that all the entities in the network apply a sophisticated uniform methodology producing ratings that are comparable.

DZ BANK primarily uses rating systems in its credit risk management system to assess large and medium-sized companies, major corporate customers, banks, investment funds, and project finance (slotting approach). The internal assessment approach is also used to evaluate the liquidity lines and credit enhancements made available by DZ BANK to programs for the issuance of asset-backed commercial paper (ABCP). These rating systems have been approved by the competent supervisory authority for the purposes of calculating regulatory capital using the **foundation IRB approach** or the **slotting approach**.

For **internal management purposes**, DZ BANK uses further rating systems to assess SMEs (German Mittelstand), countries, asset finance, acquisition financing, agricultural businesses, public-sector entities, not-for-profit organizations, foreign SMEs, and insurance companies.

Most of the other entities in the Bank sector use the DZ BANK rating systems for banks, countries, and major corporate customers. Rating systems for specific business segments are also used by individual subsidiaries.

Development and expansion of rating systems

All internal rating systems and those approved by the banking supervisor for solvency reporting were validated in the reporting year. The regulatory review of the new rating system for major corporations was completed in 2022. The rating system is likely to be implemented in 2023.

DZ BANK credit rating master scale

The credit rating master scale serves as a groupwide rating benchmark with which to standardize the different rating systems used by the entities in the Bank sector as a result of differences in their business priorities. It thereby provides all management units with a uniform view of counterparties' credit ratings.

Fig. 20 shows DZ BANK's credit rating master scale and matches the internal credit ratings to the ratings used by Moody's, Standard & Poor's, and Fitch Ratings. Some internal ratings cannot be matched with a particular external rating because of the greater degree of refinement in the credit rating master scale. The ratings for securitization exposures are matched to various different external ratings depending on the asset class and region.

In DZ BANK's master scale, the default bands remain unchanged to ensure comparability over the course of time, whereas some fluctuation in default rates can be seen in external ratings. Therefore, it is not possible to map the internal ratings directly to the ratings used by the rating agencies. Consequently, the chart can only be used as a starting point for comparison between internal and external credit ratings.

DZ BANK rating desk

The VR rating systems for banks and countries are also available to DZ BANK subsidiaries and the cooperative banks. Users can enter into a master agreement to access the ratings via an IT application (Rating Desk), which is available throughout the cooperative financial network, in return for the payment of a fee. Any accessed ratings are first validated by the entities in the Bank sector or the cooperative banks before they are included in the user's credit procedures.

9.5.2 Lending business pricing

The management units in the Bank sector use risk-adjusted pricing as a key decision-making criterion for the management of the lending business. Adequate standard risk costs and risk-adjusted capital costs are taken into account. The methods used by the management units to manage the lending business reflect the particular features of their products and business.

To ensure that lending business remains profitable, **standard risk costs** are determined in the management of individual transactions in many parts of the **Bank sector**. The purpose of these costs is to cover average expected losses from borrower defaults. The aim is to ensure that the net loss allowances recognized in the financial statements are covered on average over the long term in an actuarial-type approach by the standard risk costs included in the pricing.

In addition to standard risk costs, **economic and regulatory costs of capital** based on the capital requirement are integrated into the contribution margin costing carried out by the entities in the Bank sector. This enables the Bank sector to obtain a return on the capital tied up that is in line with the risk involved and that covers any unexpected losses arising from the lending business.

FIG. 20 – BANK SECTOR: DZ BANK'S VR CREDIT RATING MASTER SCALE AND EXTERNAL CREDIT RATINGS

Internal rating class	Average default probability	External rating classes			Rating category
		Moody's	Standard & Poor's	Fitch	
1A	0.01%	Aaa to Aa2	AAA to AA	AAA to AA	Investment grade
1B	0.02%	Aa3	AA-	AA-	
1C	0.03%				
1D	0.04%	A1	A+	A+	
1E	0.05%				
2A	0.07%	A2	A	A	
2B	0.10%	A3	A-	A-	
2C	0.15%	Baa1	BBB+	BBB+	
2D	0.23%	Baa2	BBB	BBB	
2E	0.35%				
3A	0.50%	Baa3	BBB-	BBB-	
3B	0.75%	Ba1	BB+	BB+	
3C	1.10%	Ba2	BB	BB	
3D	1.70%				
3E	2.60%	Ba3	BB-	BB-	
4A	4.00%	B1	B+	B+	Non-investment grade
4B	6.00%	B2	B	B	
4C	9.00%	B3	B-	B-	
4D	13.50%				
4E	30.00%	Caa1 or lower	CCC+ or lower	CCC+ or lower	
5A	DPD default				Default
5B	Specific loan loss allowance / internal neutralization of interest / rating-related sale with significant loss / further bank-internal criteria				
5C	Distressed restructuring				
5D	Insolvency				
5E	Direct impairment / workout				
NR	Not rated				

9.5.3 Management of exposure in traditional lending business

Measuring exposure in traditional lending business

Individual lending exposures are managed on the basis of an analysis of gross lending exposure. The period taken into account in this case is equivalent to the monitoring cycle of one year. Together with risk-related credit-portfolio management, volume-oriented credit risk management is one of the components in the management of risk concentrations in the lending business.

In traditional lending business, the credit exposure or lending volume is generally the same as the nominal value of the total loan book and reflects the maximum volume at risk of default. The credit exposure is a gross value because risk-bearing financial instruments are measured before the application of any credit risk mitigation and before the recognition of any loss allowances. The maximum credit exposure comprises the total lines of credit committed to third parties, or in the case of limit overruns, the higher amounts already drawn.

In building society operations, nominal amounts are used as a basis for measuring the gross lending volume. In addition, loans and advances to customers in building society operations are reduced by the associated deposits.

Limit system for managing exposures in traditional lending business

Limits are set in the relevant entities in the Bank sector for individual borrowers and groups of connected customers. Counterparties are also managed centrally at the level of the Bank sector, depending on the limit level and credit rating.

As a prerequisite for prompt monitoring of limits, suitable **early-warning processes** have been established in the management units that are of material significance for the Bank sector's credit risk. In this context, financial covenants are often incorporated into loan agreements to act as early-warning indicators for changes in credit standing and as a tool for the proactive risk management of lending exposures.

In addition, processes have been set up in the Bank sector to handle instances in which limits are **exceeded**. Such excess exposures must be approved by the relevant level of authority in the management units concerned and in accordance with applicable internal requirements, and must be reduced if necessary.

Country exposure in the traditional lending business is managed by setting **country limits** for industrialized countries and emerging markets at the Bank sector level.

9.5.4 Management of credit exposure in trading transactions

Measuring credit exposure in trading transactions

Issuer risk, replacement risk, and settlement risk are exposure-based measurements of the potential loss in trading transactions. These are determined without taking into account the likelihood of a default. In order to determine the credit exposure, securities in the banking book and trading book are predominantly measured at fair value, while derivatives are measured at fair value and, in respect of settlement risk, at the cash-flow-based accepted value.

The fair value of a securities exposure is used to determine the **issuer risk**. Risks relating to the underlying instruments in derivative transactions are also included in issuer risk.

At the level of the **Bank sector**, **replacement risk** is generally determined on the basis of fair value, taking into account appropriate add-ons. At **DZ BANK**, which is of particular significance as far as replacement risk is concerned, these add-ons are determined primarily according to each individual transaction as part of a portfolio simulation. The portfolio simulation models future exposures, taking into account a large number of risk factors. The add-ons for the remaining derivatives not included in the portfolio simulation are determined on the basis of a product-specific allocation, which also takes into account specific risk factors and residual maturities. Transaction processing risk is additionally factored into the exposure calculation for replacement risk. This risk is largely determined as the net present value of the reciprocally required performance.

With regard to exchange-traded derivatives, the replacement risk vis-à-vis the customer in customer brokerage business consists of the actual collateral exchanged (the variation margin for the daily settlement of profits and losses, and the initial margin as the collateral to be provided in advance to cover the loss risk), the fair value, and additional collateral requirements. To calculate the replacement risk vis-à-vis stock exchanges, additional potential for changes in value or add-ons for individual transactions are also taken into consideration. Where legally enforceable, netting agreements and collateral agreements are used at counterparty level for all derivatives in order to reduce exposure. In the case of repos and securities lending transactions, haircuts are applied instead of add-ons. Unsecured money market transactions are measured at fair value.

As regards **settlement risk**, the risk amount is the expected payment due. Settlement risk is recognized for the specified settlement period. It takes into account the amount and timing of outstanding cash flows for the purposes of managing the risk associated with mutual settlement at some point in the future. These future cash flows are already factored into the replacement risk through the fair value measurement and are therefore

included in the risk capital requirement. As a result, settlement risk does not need to be covered with risk capital in addition to that for the other types of credit risk related to trading activities.

Limit system for managing trading exposure

DZ BANK has established an exposure-oriented **limit system** related to credit ratings to limit the default risk arising from trading business. Replacement risk is managed via a structure of limits broken down into maturity bands. Unsecured money market transactions are subject to separate limits. The transaction processing risk forming part of the replacement risk is included in the shortest maturity band. A daily limit is set in order to manage settlement risk. A specific limit for each issuer or, in certain circumstances, a general limit is determined as the basis for managing issuer risk. The specific limit can also be broken down into seniority bands; in the case of asset-backed securities, the specific limit can be broken down into rating bands. Issuer risk relating to cover assets is subject to separate limits, as are settlement risk and replacement risk attaching to cover assets. Since mid-2022, issuer risk in connection with the trading book and issuer risk in connection with the banking book have been subject to separate limits. The main subsidiaries have their own comparable limit systems.

The standardized methodology for measuring and monitoring trading exposure at DZ BANK (**post-transaction control**) is included in an IT-supported limit monitoring system, to which all relevant trading systems are directly or indirectly connected. A second IT system is used solely for most of the **pre-transaction control**. This functionality is currently being migrated to the system used for post-transaction control. Furthermore, the trading exposure in the Bank sector is managed on a decentralized basis at management unit level.

As in the traditional lending business, appropriate processes have also been established for the trading business to provide **early warnings and notification of limit overruns**. The member of the Board of Managing Directors responsible for risk monitoring is sent a daily list of significant exceeded trading limits. A monthly report is prepared covering the utilization of replacement and issuer risk in connection with trading activities.

Country exposure in the trading business is managed in the same way as in the traditional lending business by setting **limits for countries** at the Bank sector level.

9.5.5 Management of risk concentrations and correlation risks

Identifying risk concentrations

One of the Bank sector's key concerns in the management of credit risk is to avoid undesirable concentrations and correlations of risks in the credit portfolio. To this end, it has established credit risk strategies, policies, and principles that must be applied in the various areas of business. The main structural elements are managed on this basis with the aim of ensuring that the credit portfolio is appropriately diversified. The structural elements include specifications for rating-related maximum exposures, strategic borrower limits, restriction of areas of business to specified countries or regions, maturity limits, specific requirements for certain operating segments and industries, and requirements relating to collateral, loan agreement clauses, and key credit-risk-related figures.

Measurement and monitoring of risk concentrations

The structural requirements include general parameters to ensure that the credit portfolio in the Bank sector is comprehensively diversified. They therefore provide important guidance for managing new business. The ongoing monitoring of potential risk concentrations is also of fundamental importance. With this in mind, the Bank sector's credit portfolio is constantly checked for concentrations in terms of asset class, area of business, industry, country, country group, residual maturity, size category, and rating class. Significant attention is also paid to monitoring concentrations linked to individual borrowers. Exposures are analyzed and managed using monitoring lists, particularly to identify if specified volume limits are exceeded.

Besides volume-oriented parameters, the credit value-at-risk for individual exposures and borrowers is a core parameter used in modeling concentration risk. A key factor is the possibility of a simultaneous default by a

number of borrowers who share the same characteristics. This is why determining the correlated exposure to loss as a part of the calculation of the risk capital required for credit risk is essential for managing risk concentrations.

Risk concentrations in credit and collateral portfolios

In managing the traditional lending business and its trading business, DZ BANK takes into account the correlation between collateral and the borrower pledging the collateral or between the collateral and the counterparty whose replacement risk the collateral is intended to mitigate. If there is a significant positive correlation between the collateral and the borrower or the counterparty pledging the collateral, the collateral is disregarded or accorded a reduced value as collateral. This situation arises, for example, where a protection provider, garnishee, or issuer forms a group of connected clients or a similar economic entity with the borrower or counterparty.

Wrong-way risk in trading activities

General wrong-way risk can arise as a result of DZ BANK's trading activities. This is defined as the risk of a positive correlation between the default probability of a counterparty and the replacement value (replacement risk exposure) of a (hedging) transaction entered into with this counterparty because of a change in the macroeconomic market factors of the traded underlying instrument (e.g. price changes for exchange rates).

Specific wrong-way risk can also occur. This is the risk of a positive correlation between the default probability of a counterparty and the replacement value (replacement risk exposure) of a (hedging) transaction entered into with this counterparty because of an increase in the default probability of the issuer of the traded underlying instrument. This type of risk largely arises in connection with OTC equity and credit derivatives in which the underlying instrument is a (reference) security or (reference) issuer.

Other measures to prevent concentration risk and wrong-way risk in trading activities

In order to prevent unwanted risks that may arise from the concentration or correlation of collateral in the trading business or from general wrong-way risk, DZ BANK has brought into force a **collateral policy** and its own internal **minimum requirements for bilateral reverse repo transactions and securities lending transactions**. Both policies are explained in chapter VII.9.5.6 under 'Collateral management'.

If material specific wrong-way risk arises in connection with a bilateral OTC trading transaction, it is taken into account when the exposure is calculated.

The **Risk Committee** receives quarterly reports on relevant wrong-way risk and concentration risk arising in connection with derivatives and securities financing, including any necessary exposure adjustments.

9.5.6 Mitigating credit risk

Collateral strategy and secured transactions

In accordance with the credit risk strategy, customer credit quality forms the main basis for any lending decision; collateral has no bearing on the borrower's credit rating. However, depending on the structure of the transaction, collateral may be of material significance in the **assessment of risk** in a transaction. In particular, collateral received reduces the credit value-at-risk (see chapter VII.9.5.8 'Credit-portfolio management').

Collateral in line with the level of risk is generally sought where the rating category is 3B or below on the credit rating master scale and in medium-term or long-term financing arrangements. In addition, recoverable collateral equivalent to 50.0 percent of the finance volume is required in the joint credit business with the local cooperative banks for new business entered into with SME customers in rating category 3E or below on the credit rating master scale.

Collateral is used as an appropriate tool for the management of risk in export finance or structured trade finance transactions. In the case of project finance, the financed project itself or the assignment of the rights in the underlying agreements typically serve as collateral.

Secured transactions in traditional lending business encompass commercial lending including financial guarantee contracts and loan commitments. In order to limit defaults in these transactions, traditional collateral is obtained, the decision being made on a case-by-case basis.

Types of collateral

The entities in the Bank sector use all forms of **traditional loan collateral**. Specifically, these include mortgages on residential and commercial real estate, registered ship and aircraft mortgages, guarantees (including sureties, credit insurance, and letters of comfort), financial security (certain fixed-income securities, shares, and investment fund units), assigned receivables (blanket and individual assignments of trade receivables), and physical collateral.

Privileged mortgages, guarantees, and financial collateral are the main sources of collateral recognized for regulatory purposes under the CRR.

In accordance with DZ BANK's collateral policy, only cash, investment-grade government bonds, and/or Pfandbriefe are normally accepted as **collateral for trading transactions** required by the collateral agreements used to mitigate the risk attaching to OTC derivatives. Entities in the Bank sector also enter into netting agreements to reduce the credit risk arising in connection with OTC derivatives. The prompt evaluation of collateral within the agreed margining period also helps to limit risk.

Credit derivatives, such as credit default swaps, are used to reduce the issuer risk arising on bonds and derivatives. Macro hedges are used dynamically to mitigate spread risk and migration risk as well as risks attaching to underlying assets. In isolated cases, transactions are conducted on a back-to-back basis. For risk management purposes, the protection provided by credit derivatives is set against the reference entity risk, thereby mitigating it. The main protection providers/counterparties in credit derivatives are financial institutions, mostly investment-grade banks in the VR rating classes 1A to 2C.

Management of traditional loan collateral

Collateral management is the responsibility mainly of **specialist units**, generally outside the front-office divisions. The core tasks of these units include providing, inspecting, measuring, recording, and managing collateral and providing advice to all divisions in related matters.

To a large extent, standardized contracts are used for the provision of collateral and the associated declarations. Specialist departments are consulted in cases where customized collateral agreements are required. Collateral is managed in separate IT systems.

Collateral **is measured** in accordance with internal guidelines and is usually the responsibility of back-office units. As a minimum, carrying amounts are normally monitored annually or on the agreed submission date for documents relevant to measurement of the collateral. Shorter monitoring intervals may be specified for critical lending exposures. Regardless of the specified intervals, collateral is tested for impairment without delay if any indications of impairment become evident.

The workout units are responsible for **recovering collateral**. In the case of non-performing loans, it is possible to depart from the general measurement guidelines and measure collateral on the basis of its likely recoverable value and time of recovery. Contrary to the general collateralization criteria, collateral involved in restructuring exposures can be measured using market values or the estimated liquidation proceeds.

Collateral management

In addition to **netting agreements** (ISDA Master Agreement and German Master Agreement for Financial Futures), both collateral agreements for variation margin (Credit Support Annex to the ISDA Master Agreement and Collateralization Annex to the German Master Agreement for Financial Futures) and collateral agreements for initial margin are entered into as instruments to reduce credit exposure in OTC transactions.

DZ BANK's **collateral policy** regulates the economic aspects of collateral agreements and the responsibilities and authorization levels. This policy specifies contractual parameters, such as the type and quality of collateral, minimum transfer amounts, and delivery deadlines as permitted by regulatory requirements. As a rule, the collateral policy permits only collateral in the form of cash (in euros) to be accepted for mitigating risks arising from OTC derivatives on the basis of the Credit Support Annex (ISDA Master Agreement) and the Collateralization Annex (German Master Agreement for Financial Futures). General exceptions to this rule exist for older contracts entered into before the collateral agreement obligation came into force and, in particular, for contracts with local cooperative banks that permit thresholds and securities collateral. Securities collateral must be eligible as collateral with the ECB and have a minimum credit rating of A3 (Moody's) or A- (Standard & Poor's, Fitch Ratings). Exceptions to the standard conditions are approved on the basis of the authorization levels specified in the collateral policy.

High-grade collateral is also required for repo and securities lending transactions in compliance with generally accepted master agreements and DZ BANK's own internal **minimum requirements for bilateral reverse repo transactions and securities lending transactions**, although the range of collateral is somewhat broader here than in the case of OTC derivatives. There are a few individual exceptions for banks in the cooperative financial network.

Furthermore, the minimum requirements applicable at DZ BANK exclude prohibited correlations and specify collateral quality depending on the credit rating of the counterparties. The relevant rules are monitored on a daily basis and any infringements of the requirements are reported each month to the Risk Committee.

DZ BANK regularly uses **bilateral collateral agreements**. Exceptions apply to cover assets and special-purpose entities, as the special legal status of the counterparties means that only unilateral collateral agreements can be usefully enforced, and to supranational or government entities. Any decision not to use a bilateral collateral agreement for counterparties not subject to the European Market Infrastructure Regulation (EMIR) rules must be approved by a person with the relevant authority.

Netting and collateralization generally result in a significant reduction in the exposure from trading business. IT systems are used to measure exposures and collateral. **Margining** is carried out on a daily basis for the vast majority of collateral agreements in accordance with the collateral policy requirements.

Collateral agreements generally include minimum transfer amounts and, in some cases, also **thresholds** that are independent of the credit rating. There are also some agreements with triggers based on the credit rating. In these agreements, for example, the unsecured part of an exposure is reduced in the event of a ratings downgrade or the borrower is required to make additional payments (for example, payments known as 'independent amounts'). The supervisory authorities have specified these contractual provisions as standard for EMIR-compliant agreements.

EMIR requires the exchange of an initial margin in bilateral OTC derivatives transactions in addition to the variation margin. The transfer of initial margin takes account of counterparty-specific thresholds.

Central counterparties

Under EMIR, market players must report all exchange-traded and OTC derivatives to central trade repositories and use predefined steps to settle certain standardized OTC derivatives via central counterparties (known as clearing houses). Furthermore, risk mitigation methods have to be used for OTC derivatives that are not settled centrally through a clearing house. This is intended to minimize counterparty risk.

Any market players not exempted from this new clearing obligation must be connected to a central counterparty. The market player concerned may be a direct member of a clearing house or may process its derivative contracts using a bank that is a member of a central counterparty.

DZ BANK is a direct member of the London Clearing House, which is Europe's largest clearing house for interest-rate derivatives, and of Eurex Clearing AG. DZ BANK therefore has direct access to central counterparties for derivatives for the purposes of clearing derivative transactions. In the case of credit derivatives, it also has indirect access to the Intercontinental Exchange clearing house via clearing broker Deutsche Bank.

9.5.7 Management of closely monitored and non-performing lending exposures

The following descriptions apply to **DZ BANK**. Where required, similar procedures have been implemented in the main **subsidiaries**, which adapt them to the characteristics of the risks faced in their particular business.

Management and monitoring

Early identification of risk is a key component of the management and monitoring of traditional lending business. The system for identifying risk at an early stage is designed to detect emerging risks at the earliest opportunity and return the affected lending exposures to acceptable levels of risk quality. Another objective is to minimize losses from loan defaults.

In order to identify risk at an early stage, criteria are defined as early-warning indicators that should show when exposures must become subject to special, closer monitoring (intensified loan management) and when lending exposures must be transferred to the specialist units responsible for loan restructuring and workout.

The following lists are maintained to closely monitor lending exposures that are subject to intensified management and lending exposures that are in default:

- The **yellow list** for exposures with latent risk
- The **watch list** for exposures with heightened risk
- The **default list** for exposures with acute risk (exposures that are classified as in default and thus non-performing)

Borrowers are classified as in default and thus **non-performing** either if a material portion of their overall obligation under the loan agreement is past due by more than 90 consecutive calendar days or if it is unlikely that they will meet their payment obligations under the loan agreement in full without the management unit in the Bank sector that granted the loan having recourse to actions such as the recovery of any available collateral. This corresponds to the definition of default specified by the CRR. Borrowers in default are assigned a rating of between 5A and 5E on the VR credit rating master scale.

Non-performing loan exposures are also referred to by the abbreviation NPL. They are managed using the following key figures:

- **Coverage ratio** (specific loan loss allowances plus collateral as a proportion of the volume of non-performing loans)
- **NPL ratio** (volume of non-performing loans as a proportion of total lending volume)

Workout units become involved at an earlier stage of identified difficulties. By providing intensified loan management for critical exposures and applying problem-solving strategies, these special units aim to establish the basis for securing and optimizing exposures with heightened risk.

Exposures with heightened risk are generally reviewed, updated, and reported on a quarterly basis. The process is also carried out at shorter intervals if required. This process is supported by IT systems. Prompt internal reporting focused on target groups is a key component of this approach.

Forbearance

Forbearance is a tool for managing non-performing exposures or those close to non-performing. Forbearance measures include **concessions** regarding the borrower's obligations under a loan agreement. Such concessions may consist of **contractual modifications**, such as adjustments to covenants or changes to the interest rate, repayment structure, or loan maturity. They may also amount to **refinancing measures**, such as debt-equity

swaps, further loan facilities, turnaround or bridging financing, or debt restructuring. The aim of such concessions is to ensure that borrowers who cannot satisfy the terms and conditions of their loan agreements because of their financial circumstances are placed in a position whereby they can repay the loans granted by DZ BANK.

Concessions qualify as forbearance measures if a borrower is found to meet one of the following **criteria** during the monitoring of credit risk:

- The borrower is included in the default list, watchlist, or yellow list with a rating of 4A.
- The borrower is classified with a rating of 4B or worse, regardless of whether it is on one of the lists or not.
- The borrower is classified with a rating of 4A and payments are past due by more than 30 days.

The borrower must satisfy all of the following criteria before it can exit **forbearance status**:

- The borrower is classified as performing.
- The borrower has undergone a probation period of at least two years. In the case of borrowers who have recovered from a default, the probation period begins with their reclassification as 'recovered'. Borrowers not previously in default begin the probation period when forbearance measures are initiated.
- The borrower has made regular interest payments or repayments of principal during at least half of the probation period.
- No payments are past due by more than 30 days.

Recognition of loss allowances

The description required by GAS 20 A1.7(c) of the methods used for recognizing loss allowances is included in note 5 of the notes to the consolidated financial statements.

9.5.8 Credit-portfolio management

Internal credit-portfolio models operated on a decentralized basis in the main management units are used together with value-at-risk methods to quantify unexpected losses from lending and trading business. The **credit value-at-risk** reduced by the expected loss is referred to as the risk capital requirement for transactions subject to credit risk. The risk capital requirement quantifies the risk of unexpected losses if default or migration events were to materialize.

Expected loss is calculated by multiplying the exposure at default (EAD) by the loss given default (LGD) and by the probability of default (PD). **Exposure at default** equates to the expected outstanding loan or receivable or the potential economic loss in respect of a counterparty if the counterparty defaults, without taking into account any collateral. **Loss given default** refers to the expected percentage loss on default of a borrower, whereby the loss is reduced by any proceeds anticipated from the recovery of **collateral**. **Probability of default** is the probability, calculated on the basis of historical data, that a borrower will not be able to meet his or her payment obligations within a particular, future period. For the purposes of credit-portfolio management in the Bank sector, this period is one year. The probability of default reflects the borrower's current rating and, in individual cases, also takes into account business-specific factors.

When determining credit value-at-risk, **recovery risk** is taken into account as the amount by which the actual loss deviates from the expected recovery rate or – in the case of transactions already in default – from the specific loan loss allowances. Existing netting agreements are included in the measurement of trading exposures subject to default risk.

The credit value-at-risk amounts determined for the management units are aggregated by DZ BANK at **Bank sector** level.

For the purposes of **managing** the credit portfolio, the credit value-at-risk and the decentralized capital buffer requirement are restricted by the **credit risk limit**. The calculation of the decentralized capital buffer

requirement is explained in chapter VII.8.2.1. A **traffic light system** is used to monitor Bank sector management units' compliance with the limits specified for credit risk.

9.6 Lending volume

9.6.1 Definition of lending volume

One of the ways in which credit risk is managed is on the basis of the **lending volume**. In the traditional lending business, the lending volume is no more than the total amount of loans already drawn down, plus commitments to third parties. In the trading business (securities business, together with derivatives business and money market business), the lending volume largely equates to the exposure at default.

9.6.2 Reconciliation of lending volume to the consolidated financial statements

To reconcile the lending volume managed at Bank sector level with the lending volume reported on the balance sheet, the volume is broken down by traditional lending business, securities business, derivatives business, and money market business, because this breakdown corresponds to the classes of risks from financial instruments used for external reporting purposes.

Fig. 21 shows a reconciliation of the gross lending volume on which the risk management is based to individual balance sheet items in order to provide a transparent illustration of the link between the consolidated financial statements and risk management. There are discrepancies between the internal management and external consolidated financial reporting measurements for some products owing to the focus on the risk content of the items. The other main reasons for the discrepancies between the internal management figures and those in the external consolidated financial statements are differences in the scope of consolidation and differences in recognition and measurement methods.

Differences in the **scope of consolidation** result from the fact that, in internal credit risk management, only the entities in the Bank sector that contribute significantly to the aggregate risk of the sector are included.

The discrepancy in the **securities business** is mainly due to the variations in carrying amounts that arise because credit derivatives are offset against the issuer risk attaching to the underlying transaction in the internal management accounts, whereas such derivatives are recognized at their fair value as financial assets or financial liabilities held for trading in the consolidated financial statements.

The differences between the measurements in the **derivatives business** and those in the **money market business** arise because of differences in the treatment of offsetting items in internal risk management and in external financial reporting. Offsetting items are actually netted for the purposes of risk management, whereas netting of this nature is not permitted in the consolidated financial statements. In addition, add-ons are attached to the current fair values of derivative positions in the internal management accounts to take account of potential future changes in their fair value. By contrast, the external (consolidated) financial statements focus exclusively on the fair values determined on the valuation date, and, unlike in the internal accounts, collateral must not be recognized for risk mitigation purposes.

In **money market business**, further discrepancies arise between the consolidated financial statements and internal risk management due to the method used for the recognition of repo transactions. In contrast to the treatment in the consolidated financial statements, securities provided or received as collateral are offset against the corresponding assets or liabilities for the purposes of the internal analysis.

9.6.3 Asset class structure of the credit portfolio

The reporting to the Board of Managing Directors on concentrations of credit risk includes a presentation of the credit portfolio broken down by asset class. This is done by dividing the credit portfolio into business-related homogeneous segments on the basis of characteristics such as industry code to reflect the sector, product type, and the rating system used to determine the credit rating. The characteristics are selected in such a way that the segments are subject to uniform risk drivers.

In its role as central institution for the cooperative financial network, DZ BANK provides funding for the entities in the Bank sector and for the cooperative banks. For this reason, the cooperative banks, which are assigned to the asset class **entities within the cooperative financial network**, account for one of the largest loans and receivables items in the group's credit portfolio.

DZ BANK also supports the cooperative banks in the provision of larger-scale funding to corporate customers. Corporate banking exposures relate to business with commercial customers, which is assigned mainly to one of the following asset classes: corporates, commercial real estate customers, and asset-based lending/project finance. The syndicated business resulting from the corporate customer lending business, the direct business of DZ BANK, the real estate lending business of DZ HYP and BSH, and DZ HYP's local authority lending business determine the asset-class breakdown for the remainder of the portfolio.

FIG. 21 – BANK SECTOR: RECONCILIATION OF THE LENDING VOLUME

€ billion		Reconciliation									
Lending volume for internal management accounts		Scope of consolidation				Carrying amount and measurement					
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021		Dec. 31, 2022		Dec. 31, 2021	
Traditional lending business	358.9	337.2	14.2	4.6	18.3	26.6	391.4	103.4		96.5	
								103.5		96.5	
								-0.1		-	
								198.8	368.4	189.3	
								200.8		191.2	
								-2.0		-1.9	
								89.1		82.6	
Securities business	66.3	75.4	-	-	-17.9	-14.6	48.4	48.4		60.8	
								7.5	60.8	10.8	
								1.3		1.3	
								39.7		48.6	
Derivatives business	15.4	11.0	-0.3	-0.1	-19.1	-11.4	-4.0	-4.0		-0.5	
								1.6		0.4	
								21.5	-0.5	16.2	
								-0.4		-1.7	
								-26.6		-15.4	
Money market business	7.1	7.1	0.8	-	33.3	26.3	41.2	41.2		33.3	
								20.0		11.2	
								2.9	33.3	4.4	
								0.2		0.1	
								17.1		17.1	
								1.1		0.5	
Total	447.7	430.7	14.7	4.5	14.6	26.9	477.0		462.0		

Not relevant

The total lending volume of the **Bank sector** increased by 4 percent in the year under review, from €430.7 billion as at December 31, 2021 to €447.7 billion as at December 31, 2022. The rise in the lending volume was mainly due to an increase in volume in the 'entities within the cooperative financial network' and 'corporates' asset classes, with both asset classes recording a rise of approximately €9 billion compared with the end of 2021. DZ BANK accounted for most of the increase, which was driven by its lending business (primarily loans and money market lending) with entities in the cooperative financial network and its business performance in the Corporate Banking and Structured Finance divisions.

As at December 31, 2022, a significant proportion (39 percent) of the Bank sector's lending volume was concentrated in the financial sector (December 31, 2021: 38 percent). In addition to the local cooperative banks, the borrowers in this customer segment comprised banks from other sectors of the banking industry and other financial institutions.

Fig. 22 shows the breakdown of the credit portfolio by asset class.

As at December 31, 2022, a significant proportion (62 percent) of **DZ BANK's** lending volume was also concentrated in the **financials** asset class (December 31, 2021: 63 percent). The composition of this asset class is the same both at DZ BANK and in the Bank sector.

Lending volume for the consolidated financial statements	Note
Loans and advances to banks	
of which: loans and advances to banks excluding money market placements	52
of which: loss allowances for loans and advances to banks	61
Loans and advances to customers	
Loans and advances to customers excluding money market placements	53
of which: loss allowances for loans and advances to customers	61
Financial guarantee contracts and loan commitments	92
Bonds and other securities	
of which: financial assets held for trading/bonds excluding money market placements	55
of which: financial assets held for trading/promissory notes, registered bonds, and loans and advances	55
of which: investments/bonds excluding money market placements	56
Derivatives	
of which: derivatives used for hedging (positive fair values)	54
of which: financial assets held for trading/derivatives (positive fair values)	55
of which: derivatives used for hedging (negative fair values)	67
of which: financial liabilities held for trading/derivatives (negative fair values)	68
Money market placements	
of which: loans and advances to banks/money market placements	52
of which: loans and advances to customers/money market placements	53
of which: financial assets held for trading/money market instruments	55
of which: financial assets held for trading/money market placements	55
of which: investments/money market instruments	56

9.6.4 Geographical structure of the credit portfolio

Fig. 23 shows the geographical distribution of the credit portfolio by country group. The relevant country for the assignment to a country group is the one in which the economic risk arises. This table has been changed to reflect an adjustment in the internal reporting and now shows the lending volume outside Germany.

As at December 31, 2022, 66 percent of the total lending in the Bank sector outside Germany (December 31, 2021: 68 percent) and 60 percent of the total lending by DZ BANK outside Germany (December 31, 2021: 61 percent) was concentrated in Europe.

9.6.5 Residual maturity structure of the credit portfolio

The breakdown of the credit portfolio by residual maturity as at December 31, 2022 presented in Fig. 24 shows that the lending volume had increased by €10.2 billion in the **short-term maturity band** compared with December 31, 2021. This was attributable to DZ BANK.

By contrast, there was a decrease of €2.2 billion in the **medium-term maturity band** that was primarily attributable to BSH. DZ BANK offset some of the decrease.

The lending volume in the **long-term maturity band** increased by €9.0 billion, which was mainly accounted for by BSH and DZ BANK. However, DZ HYP saw a decline in this maturity band.

FIG. 22 – BANK SECTOR: LENDING VOLUME, BY ASSET CLASS

€ billion	Bank sector		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Entities within the cooperative financial network	132.9	123.6	132.5	123.2
Financials	42.7	40.6	31.6	30.2
Corporates	76.1	67.1	70.7	61.8
Asset-based lending/project finance	11.9	11.9	11.9	10.4
Public sector	36.0	43.5	10.6	10.4
Real estate (commercial and retail customers)	119.0	117.9	–	–
Retail business (excluding real estate customers)	18.0	16.7	0.1	–
ABSs and ABCPs ¹	8.5	7.4	8.2	7.1
Other	2.7	1.9	1.0	0.8
Total	447.7	430.7	266.6	244.0

¹ ABSs = asset-backed securities, ABCPs = asset-backed commercial paper.

FIG. 23 – BANK SECTOR: LENDING VOLUME, BY COUNTRY GROUP

€ billion	Bank sector		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Europe	50.3	48.2	36.6	32.0
of which: eurozone	31.5	31.8	21.2	18.6
North America	14.0	12.2	12.7	10.7
Central America	0.2	0.3	0.2	0.2
South America	1.0	0.9	1.0	0.9
Asia	7.3	6.7	7.1	6.3
Africa	1.3	1.0	1.3	1.0
Other	2.2	2.0	1.8	1.6
Total	76.4	71.3	60.6	52.8

FIG. 24 – BANK SECTOR: LENDING VOLUME, BY RESIDUAL MATURITY

€ billion	Bank sector		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
≤ 1 year	113.2	103.0	93.2	82.6
> 1 year to ≤ 5 years	112.4	114.6	71.1	65.6
> 5 years	222.1	213.1	102.3	95.9
Total	447.7	430.7	266.6	244.0

9.6.6 Rating structure of the credit portfolio

In the **Bank sector**, the proportion of the total lending volume accounted for by rating classes 1A to 3A (investment grade) was 87 percent as at December 31, 2022 (December 31, 2021: 85 percent). Rating classes 3B to 4E (non-investment grade) represented 11 percent as at the reporting date (December 31, 2021: 14 percent). Defaults, represented by rating classes 5A to 5E, accounted for less than 1 percent of the total lending volume in the Bank sector as at December 31, 2022, as had also been the case at the end of 2021.

Rating classes 1A to 3A (investment grade) also dominated lending at **DZ BANK**, where they accounted for 90 percent of the total lending volume (December 31, 2021: 88 percent). Rating classes 3B to 4E (non-investment grade) represented 9 percent as at the reporting date (December 31, 2021: 11 percent). Defaults (rating classes 5A to 5E) accounted for less than 1 percent of the total lending volume as at December 31, 2022, as had also been the case at the end of 2021.

Fig. 25 shows the lending volume in the Bank sector and at DZ BANK by rating class according to the VR credit rating master scale.

FIG. 25 – BANK SECTOR: LENDING VOLUME, BY RATING CLASS

€ billion		Bank sector		DZ BANK	
		Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Investment grade	1A	29.5	32.7	11.9	11.5
	1B	8.5	7.6	5.0	4.1
	1C	146.6	135.8	139.2	127.3
	1D	13.2	13.4	5.8	6.7
	1E	18.1	14.4	6.4	3.4
	2A	19.4	16.7	7.3	7.0
	2B	26.6	25.7	11.1	9.5
	2C	28.5	23.3	13.8	10.0
	2D	32.9	30.8	12.9	10.9
	2E	41.2	39.7	15.7	14.4
	3A	26.8	25.8	10.0	9.8
Non-investment grade	3B	14.7	17.4	7.5	7.5
	3C	11.9	14.7	4.6	5.8
	3D	8.6	9.6	4.2	5.3
	3E	4.2	6.2	2.0	2.5
	4A	2.3	2.9	0.7	1.0
	4B	3.7	3.5	2.3	2.1
	4C	1.2	1.2	0.6	0.5
	4D	0.9	1.7	0.5	1.4
	4E	3.3	1.6	2.4	0.6
	Default	3.1	3.4	2.0	1.8
	Not rated	2.6	2.6	0.6	1.0
Total		447.7	430.7	266.6	244.0

9.6.7 Collateralized lending volume

Fig. 26 shows the breakdown of the collateralized lending volume at overall portfolio level by type of collateral.

In the case of **traditional lending business**, lending volume is generally reported as a gross figure before the application of any offsetting agreements, whereas the gross lending volume in the **derivatives and money market business** is shown on a netted basis. In the derivatives and money market business, collateral values are relatively low and are in the form of personal and financial collateral. In the **securities business**, there is generally no further collateralization to supplement the collateral already taken into account. For this reason, securities business is not included in the presentation of the collateralized lending volume.

Total collateral value in the **Bank sector** rose from €132.6 billion as at December 31, 2021 to €133.0 billion as at December 31, 2022. The collateralization rate was 34.9 percent as at the reporting date (December 31, 2021: 37.3 percent).

At €12.2 billion, **DZ BANK's** total collateral value as at December 31, 2022 was up year on year (December 31, 2021: €11.5 billion). The collateralization rate had declined to 5.4 percent as at the reporting date (December 31, 2021: 5.7 percent).

FIG. 26 – BANK SECTOR: COLLATERAL VALUE, BY TYPE OF COLLATERAL

€ billion	Bank sector		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Guarantees, indemnities, risk subparticipation	7.4	7.3	1.8	1.9
Credit insurance	5.6	4.9	5.6	4.9
Land charges, mortgages, registered ship and aircraft mortgages	116.2	116.0	2.4	2.1
Pledged loans and advances, assignments, other pledged assets	2.0	2.3	1.2	1.4
Financial collateral	1.4	1.8	0.9	1.1
Other collateral	0.4	0.2	0.3	0.2
Total collateral	133.0	132.6	12.2	11.5
Lending volume	381.4	355.3	225.8	201.7
Uncollateralized lending volume	248.3	222.7	213.5	190.2
Collateralization rate (percent)	34.9	37.3	5.4	5.7

9.6.8 Volume of closely monitored and non-performing loans

Closely monitored loans and forborne exposure

Fig. 27 shows the volume of loans on the three monitoring lists – **yellow list**, **watchlist**, and **default list** – and the forborne exposure also included in these lists. A further item in the table shows the exposure managed as forborne but not subject to intensified loan management, i.e. not included in the lists.

FIG. 27 – BANK SECTOR: CLOSELY MONITORED LENDING VOLUME AND FORBORNE EXPOSURE

€ million	Bank sector		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Yellow list lending volume	3,458	3,348	2,608	2,558
of which: forborne exposure	151	120	149	78
Watchlist lending volume	6,221	4,397	4,458	3,032
of which: forborne exposure	919	753	763	662
Default list lending volume	3,124	3,363	2,021	1,827
of which: forborne exposure	1,536	1,878	1,063	972
Total lending volume on monitoring lists	12,804	11,109	9,086	7,416
of which: forborne exposure	2,606	2,751	1,975	1,712
Off-monitoring-list forborne exposure	394	461	–	–
Total forborne exposure¹	2,999	3,213	1,975	1,712

¹ Both on and off the monitoring lists.

The **closely monitored lending volume** in the **Bank sector** rose by 15 percent from December 31, 2021 to December 31, 2022. This increase was primarily attributable to customers of DZ BANK and was mainly due to the fallout from the war in Ukraine. The economic conditions and the credit ratings of borrowers in the countries affected by the war, Russia, Ukraine, and Belarus, deteriorated in 2022.

By contrast, the lending volume of the **Bank sector** classed as **forborne** fell by 7 percent to €2,999 million (December 31, 2021: €3,213 million). This decrease was primarily attributable to cases at the former DVB.

At **DZ BANK**, the closely monitored lending volume went up by 23 percent and the closely monitored forborne exposure by 15 percent.

Non-performing loans

As at December 31, 2022, the volume of non-performing loans in the **Bank sector** had fallen to €3.1 billion from €3.4 billion as at December 31, 2021. As a result of this decrease, the NPL ratio went down from 0.8 percent to 0.7 percent.

Non-performing loans at **DZ BANK** amounted to €2.0 billion as at December 31, 2022 (December 31, 2021: €1.8 billion), causing the NPL ratio to rise to 0.8 percent (December 31, 2021: 0.7 percent).

Fig. 28 shows key figures relating to the volume of non-performing loans.

FIG. 28 – BANK SECTOR: KEY FIGURES FOR NON-PERFORMING LOANS

	Bank sector		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Total lending volume (€ billion)	447.7	430.7	266.6	244.0
Volume of non-performing loans (€ billion) ¹	3.1	3.4	2.0	1.8
Balance of loss allowances (€ billion) ²	1.3	1.5	0.9	0.8
Coverage ratio (percent) ³	75.7	75.7	75.5	67.6
NPL ratio (percent) ⁴	0.7	0.8	0.8	0.7

¹ Volume of non-performing loans excluding collateral.

² IFRS specific loan loss allowances at stage 3, including provisions.

³ Loss allowances as specified in footnote 2, plus collateral, as a proportion of the volume of non-performing loans.

⁴ Volume of non-performing loans as a proportion of total lending volume.

9.7 Credit portfolios particularly affected by negative macroeconomic conditions

The following sections describe credit portfolios in which the effects of negative macroeconomic conditions were more noticeable than in the rest of the credit portfolios. The figures presented below are included in the disclosures for the lending volume as a whole (see chapter VII.9.6).

9.7.1 Loans and advances to borrowers in eurozone periphery countries

The volume of loans and advances to borrowers in eurozone periphery countries decreased in the second half of 2022, resulting in an improvement in the key risk indicators. This means that, unlike in the 2021 risk report, the affected exposures are no longer considered to be a credit portfolio with increased risk content. Nevertheless, Portugal, Spain and, in particular, Italy continue to be monitored closely as their debt levels remain high. If there is a further rise in interest rates in the future, the credit risk in these countries may potentially increase again.

As at December 31, 2022, loans and advances to borrowers in the countries directly affected by the economic policy divergence in the eurozone attributable to the **Bank sector** and to **DZ BANK** amounted to €3,660 million (December 31, 2021: €6,465 million) and €1,751 million (December 31, 2021: €2,057 million) respectively. They mainly consisted of securities transactions. The decrease was predominantly due to disposals, maturities, and reductions in fair value at DZ HYP.

Fig. 29 shows the country breakdown of the exposures.

9.7.2 Automotive finance

The **automotive sector** has been in a state of upheaval for a number of years and is faced with a number of issues, notably low margins and huge capital requirements. The European Parliament's decision to end the sale of vehicles with internal combustion engines by 2035 will further accelerate the switch to electric vehicles and so keep the pressure on borrowers to transform. COVID-19 lockdowns in China, shortages of base products (especially semiconductors), and the war in Ukraine led to supply chain disruptions that impacted on production in the reporting year.

FIG. 29 – BANK SECTOR: LOANS AND ADVANCES TO BORROWERS IN EUROZONE PERIPHERY COUNTRIES¹

€ million	Bank sector		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Portugal	192	917	106	153
Italy	1,374	3,002	782	856
Spain	2,093	2,547	863	1,049
Total	3,660	6,465	1,751	2,057

¹ Unlike the other presentations of lending volume, traditional lending business in this case includes long-term equity investments.

Increased costs for commodities, energy, and transportation also weighed heavily. In addition, demand was increasingly depressed by the uncertainty created by price rises, the war in Ukraine, and the energy supply.

While automotive manufacturers are delivering a very healthy financial performance, component suppliers are clearly feeling the effects of cost increases and disruptions to production.

Nonetheless, the credit quality of the DZ BANK's automotive finance portfolio, which is assigned to the corporates segment, is still in line with the average for all sectors in the corporates portfolio. The volume of lending in DZ BANK's automotive finance portfolio came to €5.0 billion as at December 31, 2022 (December 31, 2021: €4.5 billion).

9.7.3 Commercial real estate finance

DZ HYP's lending business with corporates includes financing for **hotels, office real estate, department stores, shopping malls, and inner-city commercial properties** that are mainly used for retail/wholesale businesses not offering day-to-day essentials (retail/wholesale segment). Since 2020, an increasingly high degree of uncertainty has been identified for these asset classes in view of the COVID-19 pandemic and related government-imposed safeguards, potentially long-term structural changes, and the negative macroeconomic conditions described in chapter VII.4.2. So far, those credit portfolios have shown themselves to be crisis-resistant overall due to their conservative finance structures, the quality of the real estate, and borrower credit ratings. The effects of the pandemic to date have impacted on cash flows and the valuation of the real estate in recent years.

High inflation rates and negative economic forecasts are currently creating uncertainty for these asset classes. For example, the rise in prices resulted in higher operating costs for commercial real estate finance. The hotel industry is likely to see a fall in demand owing to customers' efforts to reduce travel costs. For office real estate, there is uncertainty because the majority of actors in an economic system create and/or manage their value added in offices; a reduction in revenue can therefore lead to lower demand for office space in the long term. In the retail/wholesale segment, high inflation and muted economic growth are taking their toll. As a result, purchases of items that are not day-to-day essentials are being postponed. Early positive indicators have recently emerged, such as lower producer prices, weakening inflation, and much better economic prospects, but it remains to be seen whether these will bring lasting relief. Moreover, any reintroduction of government restrictions in order to contain the COVID-19 pandemic would weigh heavily on all of the aforementioned asset classes.

Increased levels of uncertainty surround loans to **project developers and property developers**, primarily due to the increases in the cost of materials and energy and to shortages of materials and staff. These developments, which had been triggered by disruptions to supply chains, were further exacerbated by the war in Ukraine. Project developers and property developers responded to this by delaying the start of new projects. Although there have recently been signs that the situation is easing, thanks to improved availability of materials and a fall in price levels, it is not yet clear whether this can be sustained.

As at December 31, 2022, the **volume** of corporate loans extended by DZ HYP amounted to a total of €46.8 billion (December 31, 2021: €47.6 billion). Of this total, the following amounts were attributable to the aforementioned asset classes as at the reporting date (figures as at December 31, 2021 shown in parentheses):

- Hotel financing: €2.4 billion (€2.7 billion)
- Office real estate finance: €14.6 billion (€13.5 billion)
- Department store financing: €0.6 billion (€0.7 billion)
- Shopping mall financing: €2.7 billion (€2.9 billion)
- Inner-city commercial properties mainly used for retail/wholesale businesses not offering day-to-day essentials: €0.8 billion
- Property developer and project developer finance: €5.1 billion (€4.5 billion)

9.8 Credit portfolios particularly affected by acute global crises

The following sections describe credit portfolios in which the effects of acute global crises were more noticeable than in the rest of the credit portfolios. The figures presented below are included in the disclosures for the lending volume as a whole (see chapter VII.9.6).

9.8.1 Credit portfolios particularly affected by the war in Ukraine

In 2022, the **war in Ukraine** had a significant negative impact on the credit ratings of borrowers in the countries affected directly (Russia, Ukraine, and Belarus). The exposure of Bank sector entities in these countries totaled €702 million as at December 31, 2022 (December 31, 2021: €959 million). The proportion of the Bank sector's total lending volume as at the reporting date was less than 1 percent, as was also the case at the end of 2021. The exposure was notable for export and trade finance as well as project finance and securities.

FIG. 30 shows the breakdown of the net lending volume by country affected.

FIG. 30 – BANK SECTOR: NET LENDING VOLUME IN COUNTRIES AFFECTED DIRECTLY BY THE WAR IN UKRAINE

€ million	Bank sector		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Russia	130	222	128	221
Belarus	6	13	6	13
Ukraine	2	15	2	15
Total	139	250	136	249

Taking account of recoverable collateral, the net lending volume was €139 million as at December 31, 2022 (December 31, 2021: €250 million). The collateral predominantly consists of cover provided by export credit agencies.

Over and above the countries directly involved in the war in Ukraine, the conflict has a negative impact globally on the credit ratings of borrowers. This was reflected in the figures for the Bank sector's total lending volume (see chapter VII.9.6). The closely monitored lending volume had increased as at the reporting date as a result of the war in Ukraine (see chapter VII.9.6.8).

9.8.2 Credit portfolios particularly affected by the general rise in energy prices

Despite supplies of gas from Russia being cut off, no acute shortage of gas had materialized by the reporting date. So far, only a few subportfolios have been particularly affected by the rise in general energy prices. Overall, the impact in 2022 was moderate. Nonetheless, the increase in prices may lead to higher credit risk in the Bank sector going forward.

9.9 Credit portfolios with increased risk content

The credit portfolios with increased risk content are analyzed separately because of their significance for the risk position. The figures presented below are included in the above analyses of the total lending volume (see chapter VII.9.6).

9.9.1 Finance for cruise ships

The Omicron variant of COVID-19 held back the recovery of cruise ship companies. Nevertheless, they all have a comfortable liquidity buffer and their entire fleets are in operation. The latest capacity utilization and booking figures are encouraging and are either on a par with, or even above, the levels seen in 2019 before the pandemic. Most of the companies have been in profit again since the second half of 2022. These companies do need to regain their former strength quickly so that they can meet their increased repayment obligations that have arisen as a result of repayments being deferred in the past two years. High inflation, the threat of recession, rising fuel prices, interest rates (with regard to refinancing), and the risk of new variants of the virus pose a threat to the recovery of the cruise ship companies' operations and could result in the risk of trips not going ahead. Companies would then have to refund customers' advance payments.

Cruise ship finance in the Bank sector is mainly brought together under **DZ BANK**. As at December 31, 2022, the volume of cruise ship finance amounted to €1,052 million (December 31, 2021: €1,099 million). Of this total, €652 million was covered by export credit insurance as at December 31, 2022 (December 31, 2021: €678 million).

9.9.2 Finance for cruise ship building

A distinction is made between cruise ship finance and the financing of cruise ship building. This segment, which likewise only affects **DZ BANK** in the Bank sector, is continuing to consolidate. In consultation with the parties ordering cruise ships, the order book has been stretched out, thereby ensuring a basic level of capacity utilization in the next few years. However, the shipyards that build cruise ships face the challenge of significantly reducing their production capacity and workforce capacity. The shipyards currently find themselves in the middle of this transformation process, which – together with rising energy and procurement costs – is also likely to affect customer credit quality in the year ahead. This subportfolio is therefore classified as a portfolio with increased risk content.

The lending volume related to the financing of cruise ship building stood at €332 million as at December 31, 2022 (December 31, 2021: €341 million).

9.10 Risk position

9.10.1 Risks in the entire credit portfolio

The risk capital requirement for credit risk is based on a number of factors, including the size of single-borrower exposures, individual ratings, collateral, and the industry sector of each exposure.

As at December 31, 2022, the **risk capital requirement** in the Bank sector was €3,766 million (December 31, 2021: €5,037 million) with a **limit** of €6,387 million (December 31, 2021: €7,188 million). The decrease was mainly attributable to the reduced portfolios of DZ HYP in eurozone periphery countries.

DZ BANK's credit value-at-risk as at December 31, 2022 amounted to €2,254 million (December 31, 2021: €2,134 million). The corresponding **limit** was €2,854 million (December 31, 2021: €2,750 million).

Fig. 31 shows the credit value-at-risk together with the average probability of default and expected loss.

FIG. 31 – BANK SECTOR: FACTORS DETERMINING THE CREDIT VALUE-AT-RISK

	Bank sector		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Average probability of default (percent)	0.3	0.4	0.2	0.2
Expected loss (€ million)	460	489	217	206
Credit value-at-risk (€ million)	3,766	5,037	2,254	2,134

In the analysis of **individual concentrations** in the **Bank sector**, the 20 counterparties associated with the largest credit value-at-risk accounted for 28 percent of the total credit value-at-risk as at December 31, 2022 (December 31, 2021: 38 percent). These counterparties largely comprised borrowers from the financial sector (including the cooperative banks) with investment-grade ratings, eurozone periphery countries, and individual borrowers with non-investment-grade ratings. The decrease in 2022 was mainly attributable to the reduced portfolios of DZ HYP in eurozone periphery countries.

The proportion for **DZ BANK** was 40 percent (December 31, 2021: 35 percent). These counterparties largely comprised borrowers from the financial sector (including the cooperative banks) with an investment-grade rating.

9.10.2 Risks in the credit portfolios with increased risk content

The risk capital required in the **Bank sector** and at **DZ BANK** for credit portfolios exposed to increased credit risk is shown in Fig. 32.

FIG. 32 – BANK SECTOR: CREDIT VALUE-AT-RISK¹ FOR CREDIT PORTFOLIOS WITH INCREASED RISK CONTENT

€ million	Bank sector		DZ BANK	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Cruise ship finance	14	13	14	13
Finance for cruise ship building	3	4	3	4

¹ Excluding decentralized capital buffer requirement.

As at December 31, 2022, the credit value-at-risk in respect of **cruise ship** finance and the financing of **cruise ship building** amounted to €14 million (December 31, 2021: €13 million) and €3 million (December 31, 2021: €4 million) respectively. These amounts were attributable in full to DZ BANK.

10 Equity investment risk

10.1 Definition and business background

Equity investment risk is defined as the risk of losses arising from negative changes in the fair value of that portion of the long-term equity investments portfolio for which the risks are not included in other types of risk. Equity investment risk also includes the risk of losses arising from negative changes in the fair value of the real estate portfolio caused by a deterioration in the general real estate situation or specific factors relating to individual properties (such as a vacancy period, tenant default, loss of use).

In the Bank sector, equity investment risk arises primarily at DZ BANK, BSH, and TeamBank.

The entities in the Bank sector hold long-term equity investments largely for strategic reasons, especially to cover markets, market segments, or parts of the value chain in which they themselves or the cooperative banks are not active. These investments therefore support the sales activities of the cooperative banks or help reduce costs by

bundling functions. The investment strategy is continuously aligned with the needs of cooperative financial network policy.

10.2 Risk strategy, responsibility, and reporting

Risk strategy requirements must be observed in the management of long-term equity investments. Such management is subject to the principle that equity investment risk (measured as risk capital requirement) may be taken on only if the risk remains below the existing limits.

Decisions on whether to acquire or dispose of **long-term equity investments** are made by the Board of Managing Directors of the entities in the Bank sector in consultation with the relevant committees.

At DZ BANK, the Group Finance division is responsible for **supporting these investments**, whereas at BSH the task falls within the scope of the Central Services/Policy/International division and the Financial Controlling division. At TeamBank, the investments are mainly the responsibility of the Corporate Development division.

Equity investment risk in the Bank sector is **measured and monitored** by DZ BANK. The Board of Managing Directors is kept up to date through the overall risk reports.

10.3 Risk factors

Key factors when determining equity investment risk are the equity investment's industry sector, the location of its registered office, and the nominal amount of the investment. The possibility cannot be ruled out that a future impairment test on the long-term equity investments held by the entities in the Bank sector could lead to a significant reduction in the carrying amounts of these investments reported on the balance sheet. In the case of non-controlling interests, there is also a risk that key information may not be available or cannot be obtained promptly by virtue of the fact that the investment is a minority stake and this could result in a need to recognize impairment losses.

10.4 Risk management

The carrying amounts of the long-term equity investments are regularly tested for possible impairment in the last quarter of the financial year. If there are any indications during the course of the year of possible impairment, more frequent impairment tests are also carried out. In the impairment tests, the carrying amounts of the long-term equity investments are compared against the amount that could be realized on the market on the same date.

The risk capital requirement for the vast majority of the long-term equity investments in the **Bank sector** is determined using a Monte Carlo simulation (portfolio risk measurement). In this method, portfolio concentrations in sectors and individual counterparties are taken into account by simulating industry-wide and individual investment-related risk factors. The risk capital requirement is influenced, in particular, by the market values of the long-term equity investments, the volatility of the market values, and the correlations between the market values, with market price fluctuations mainly derived from reference prices listed on an exchange. For a minority of the long-term equity investments, a look-through approach is taken in which the individual risk types that exist in each long-term equity investment are measured (differentiated risk measurement).

10.5 Carrying amounts of long-term equity investments and risk position

The **carrying amounts of long-term equity investments** in the **Bank sector** relevant for the measurement of equity investment risk amounted to €2,858 million as at December 31, 2022 (December 31, 2021: €2,953 million). As at December 31, 2022, the carrying amounts of the long-term equity investments of **DZ BANK** came to €1,880 million (December 31, 2021: €1,815 million). These two figures differ from the total of the carrying amounts of long-term equity investments shown in the notes to the consolidated financial statements due to the method for measuring equity investment risk.

The **risk capital requirement** for equity investment risk in the **Bank sector** was calculated to be €997 million as at the reporting date (December 31, 2021: €996 million). The **limit** was €1,230 million (December 31, 2021: €1,220 million). The **risk capital requirement** for **DZ BANK** as at December 31, 2022 came to €632 million (December 31, 2021: €636 million) with a **limit** of €767 million (December 31, 2021: €700 million).

11 Market risk

11.1 Definition

Market risk in the Bank sector comprises market risk in the narrow sense of the term, and market liquidity risk.

Market risk in the narrow sense of the term – referred to below as market risk – is the risk of loss arising from adverse movements in market prices or in the parameters that influence prices. Market risk encompasses a number of risk subtypes, including interest-rate risk (interest-rate risk in the banking book, interest-rate risk in the trading book), spread risk (constantly monitored component) and migration risk (as intermittent spread risk), currency risk, equity risk, fund price risk, commodity risk, and asset-management risk. Parameters that determine market risk also include a category of risk factors referred to as ‘opaque’. These risk factors are parameters that are relevant to measurement but cannot be directly observed and must therefore be derived from quoted market prices using models. For the purposes of measuring and managing risk, market risk is broken down into spread and migration risk, asset-management risk, and general market risk, the last of which encompasses all the other risk subtypes.

Market liquidity risk is the risk of losses that could arise from adverse changes in market liquidity – for example, because of market disruption or a reduction in market depth – such that assets can only be liquidated in markets if they are discounted and that it is only possible to carry out active risk management on a limited basis.

11.2 Business background and risk strategy

11.2.1 Business background

The DZ BANK Group is exposed to considerable market risk in the Bank sector. Market risk arises mainly in connection with BSH, DZ HYP, and UMH in addition to DZ BANK. The assumption of market risk by these entities in the Bank sector is primarily attributable to the DZ BANK Group’s strategic focus on the cooperative financial network. This strategy means that each entity in the DZ BANK Group specializes in certain types of product with a corresponding impact on the respective entity’s risk profile.

Market risk arises in the Bank sector mainly as a consequence of the following business activities:

- **DZ BANK:** own trading activities; traditional lending business with non-retail customers
- **BSH:** traditional lending business; building society operations aimed at financing privately owned real estate; securities portfolios
- **DZ HYP:** financing for real estate and local authorities; portfolios of securities held to manage liquidity and cover assets
- **UMH:** own-account investing activities; guarantee obligations to customers contained in Riester fund-linked savings plans and guarantee funds

Liabilities and – where present in a group entity – assets related to direct pension commitments are a further source of market risk. Market liquidity risk arises primarily in connection with securities already held in the portfolio as well as funding and money market business.

11.2.2 Risk strategy

The following principles for managing market risk apply to the entities in the **Bank sector**:

- Market risk is only taken on to the extent that it is necessary to facilitate attainment of business policy objectives.
- The assumption of market risk is only permitted within the existing limits.
- Statutory restrictions, provisions in the Articles of Association, or other limitations enshrined in the risk strategy that prohibit the assumption of certain types of market risk for individual management units are observed.

The entities in the Bank sector pursue the following strategies in relation to the individual **types of market risk**:

- Spread and migration risk is assumed.
- Interest-rate risk associated with the original business purpose of the management units is kept within defined limits.
- In contrast, interest-rate risk from pension obligations is accepted and included in the calculation of risk-bearing capacity.
- Virtually all currency risk is eliminated.
- Commodity risk is assumed only to a very small degree.

Market liquidity risk is consciously assumed following an analysis that takes into account the prevailing liquidity.

11.3 Risk factors

Interest-rate risk, spread and migration risk, equity risk, fund price risk, and currency risk are caused by changes in the **yield curve**, **credit spreads**, **exchange rates**, and **share prices**.

Spread risk, including migration risk, is the most significant type of market risk for the entities in the Bank sector.

Wider credit spreads are an indication that markets believe credit quality has deteriorated. If credit spreads were to widen, this would therefore lead to a fall in the fair value of the government and corporate bonds affected. Fair value losses of this nature could have a temporary or permanent adverse impact on capital. The widening of credit spreads can be triggered by the macroeconomic risk factors described in chapter VII.4.2.

In the context of the **asset management activities** brought together under UMH, **rising interest rates** are causing the fair values of fixed-income funds to fall. Particularly in the case of pension schemes with an unfavorable duration asymmetry and a high volume of fixed-income funds, this may mean that the guarantee commitments given to customers cannot be met from the investment instruments in the products. The pension products mainly consist of UniProfiRente, a retirement pension solution certified and subsidized by the German government. The amounts paid in during the contributory phase and the contributions received from the government are guaranteed to be available to the investor at the pension start date. The pension is then paid out under a payment plan with a subsequent life annuity. If UMH has to provide additional capital to be able to meet its guarantee commitments, this could have a detrimental impact on the financial performance of the DZ BANK Group. Information on the economic background to this risk factor can be found in chapter VII.4.2.2.

11.4 Organization, responsibility, and reporting

Market risk in the **Bank sector** is managed on a decentralized basis by the individual management units within the centrally specified limits for the capital requirement for market risk. Each unit bears responsibility for the risk and performance associated with each portfolio. Responsibility for managing risk within a management unit is normally brought together under a local treasury unit.

One exception is **DZ BANK**, where portfolios are managed at the level of subordinate organizational units (group, department, division). In this case, the relevant traders bear direct responsibility for risk and performance. The organizational units are structured in such a way that the responsibility for the marketing of certain types of product is assigned in each case to a trading division with product responsibility.

Key figures for market risk are reported at sector level and for DZ BANK to the **Group Risk and Finance Committee** in the quarterly overall risk report.

11.5 Management of market risk

11.5.1 Central market risk measurement

Central market risk measurement in the overall portfolio

Various components are used to quantify market risk in the Bank sector from a present value perspective. These components are combined to determine the aggregate risk capital requirement for market risk, taking into account the effects of concentration and diversification. The risks arising in connection with the assets and liabilities associated with direct pension commitments are also factored in. The models are operated centrally by DZ BANK and are fed with input data provided by the management units on each trading day. Sector-wide standards and rules are in place to ensure that the modeling is appropriate.

The first component of the measurement approach creates a spread and migration risk model based on a **Monte Carlo simulation**. It determines the combined spread and migration risk over a longer-term (strategic) horizon of one year with a confidence level of 99.9 percent. Whereas spread risk quantifies credit-risk-related losses from financial instruments in a short-term view of value-at-risk, this becomes the combined spread and migration risk in the risk capital requirement over a longer-term perspective. For this reason, migration risk is not shown in the table of values-at-risk in Fig. 33.

The second component is a value-at-risk model based on a **historical simulation** in which the general market risk is determined from a short-term (operational) perspective over one day and with a unilateral confidence level of 99.0 percent. The model calculated day by day is based on a historical observation period of 250 trading days and includes a number of risk factors. The most important risk factor groups include yield curves, basis and credit spreads, share prices, exchange rates, and commodity prices. The model also includes implied volatility in the risk measurement. Drawing on the results of the value-at-risk measurement, a transformation model turns the operational key risk indicators (also taking account of stress events) into a strategic perspective in which a one-year holding period and a confidence level of 99.9 percent are assumed.

In the last step, the results from the spread and migration risk model and from the transformation model are then combined to give the **aggregate risk capital requirement** for market risk.

Central market risk measurement for interest-rate risk in the banking book

For internal sector-wide management purposes, the banking book and trading book are treated in the same way in terms of the models and key risk indicators used, the frequency of risk measurement, and the main risk measurement parameters. To supplement this risk measurement approach in which the banking and trading books are analyzed holistically, interest-rate risk in the banking books of the entities in the Bank sector from a regulatory perspective is managed separately using a present-value approach.

On behalf of the other management units in the Bank sector, DZ BANK also operates a partially centralized model for quantifying periodic interest-rate risk. Overall, these methods are used to record the impact from changes in interest rates, both from an economic perspective (based on present value) and from the angle of net interest income.

Concentrations of market risk

Concentrations in the portfolio affected by market risk are identified by classifying the exposure in accordance with the risk factors associated with interest rates, spreads, migration, equities, currencies, and commodities. This incorporates the effects of correlation between these different risk factors, particularly in stress phases.

11.5.2 Decentralized market risk measurement

Decentralized measurement of general market risk and spread risk

In addition to the models specified in chapter VII.11.5.1, the main **management units** operate their own risk models to satisfy ICAAP requirements from the perspective of the individual institution. With the exception of asset-management risk at UMH, the results from these models are not used to manage market risk on a present value basis in the Bank sector and therefore do not form part of this risk report.

Decentralized measurement of asset-management risk

The risk capital requirement for asset-management risk is determined locally by **UMH** and then added to the risk capital requirement for general market risk and spread risk calculated centrally for the Bank sector. Following the approach used for the central measurement of market risk, the risk capital requirement for asset-management risk is calculated using a one-year holding period and a confidence level of 99.9 percent. The risk calculation makes a distinction between guarantee fund and Riester pension products. In the case of the Riester pension product, which is the most significant product in terms of risk capital requirement, the measurement of the risk is based on a Monte Carlo simulation, taking into account the specific investment selections made in the customer investment account.

11.5.3 Backtesting and stress tests

The central value-at-risk model is subject to **backtesting**, the purpose of which is to verify the predictive quality of the model. Changes in the value of portfolios on each trading day are usually compared against the value-at-risk calculated using risk modeling.

Risks arising from extreme market situations are primarily recorded using **stress tests**. The crisis scenarios underlying the stress tests include the simulation of significant fluctuations in risk factors and serve to highlight potential losses not generally recognized in the value-at-risk approach. Stress tests are based on extreme market fluctuations that have actually occurred in the past together with crisis scenarios that – regardless of market data history – are considered to be economically relevant. The crisis scenarios used in this case are regularly reviewed to ensure they are appropriate. The following are deemed to be risk factors: interest-rate risk, spread risk, migration risk, equity risk, and currency risk.

11.5.4 Management of limits for market risk

The starting point for limiting market risk is a limit for the capital requirement for market risk in the **Bank sector** specified as part of operational planning. This limit is broken down into an individual limit for the market risk capital requirement in each management unit.

Within **DZ BANK**, this limit is then further subdivided into a system of limits for the divisions, departments, and groups to appropriately reflect the decentralized portfolio responsibility assigned to these units and the nature of the bank from a regulatory perspective as a trading book institution. Limits are monitored on every trading day.

11.5.5 Mitigating market risk

The entities in the Bank sector use various approaches to mitigate market risk. For example, some market risk from the assets-side business (such as traditional lending business) or from the liabilities-side business (such as home savings deposits) is offset by suitable countervailing liability or asset transactions (such as own issues or securities). These activities are carried out as part of asset/liability management. In other cases, financial derivatives are used for hedging purposes.

As the measurement of market risk is based on the inclusion of the individual items subject to market risk, there is no need to monitor the economic effectiveness of hedges.

11.5.6 Managing the different types of market risk

Management of spread risk and migration risk

Most of the spread and migration risk in the **Bank sector** arises from non-trading portfolios and is consciously assumed within the established limits in accordance with the associated long-term investment strategy. Hedging instruments are also used in carefully selected trading book portfolios. The central measurement of this risk means that the level of the risk on every trading day is transparent. If there is any indication that the ability to bear the spread and migration risk is in jeopardy, Group Treasury at DZ BANK will initiate corrective measures across the sector.

Management of interest-rate risk

Interest-rate risk arising from operating activities at **DZ BANK** and **DZ HYP** is mitigated primarily by means of hedging using interest-rate derivatives, on the basis of either individual transactions or portfolios. At **BSH**, an asset/liability management approach based on the maturities of the securities in the investment portfolio is the predominant method used to manage interest-rate risk arising from the collective building society operations and the traditional lending business, including the interest-rate risk associated with direct pension commitments. Interest-rate derivatives are also used for risk management purposes but are currently of minor significance.

DZ BANK is notably exposed to significant **interest-rate risk from direct pension commitments** in addition to the interest-rate risk arising from operating activities. This risk is consciously assumed within the existing limits.

Management of equity risk and fund price risk

Equity risk and fund price risk from the non-trading portfolios are managed first and foremost by directly changing the underlying exposure. Derivative products are also used within the trading portfolio to keep the type of risk involved within the allocated limits. Some funds are broken down into their constituent parts for the purposes of measuring the risk. In such cases, the risk is not treated as part of fund price risk, but is managed within the type of market risk determined for the constituent part concerned.

Management of asset-management risk

Asset-management risk arises from minimum payment commitments given by **UMH** and/or its subsidiaries for guarantee products. The risks from these guarantee products are managed mainly by using asset allocation. Asset-management risk is reported using a separate internal system and is monitored regularly by UMH.

11.6 Management of market liquidity risk

The calculation of general market risk in the Bank sector using the transformation model and the spread and migration risk model takes market liquidity risk into account.

Within the transformation model, stress events are expressly integrated into the analysis when market risk is transferred from an operating perspective to a strategic perspective. The change in risk factors in these events is based on the assumption that it is not possible to make changes to the exposures in the portfolio of the Bank sector over a specified period.

The spread and migration risk model implicitly factors in phases of diminishing market liquidity via the calibration of the credit spread volatility included in the model. The estimation of volatility based on market data from the recent past also uses a lower limit determined from longer-term data. This prevents any low level of credit spread volatility in a calm market environment with normal liquidity from being transferred directly into the model parameters.

11.7 Risk position

11.7.1 Value-at-risk

Fig. 33 shows the average, maximum, and minimum values-at-risk measured for the Bank sector and DZ BANK over the reporting year, including a further breakdown by type of market risk. In addition, Fig. 34 shows the change in market risk for the Bank sector by trading day in the reporting period. In both figures, the value-at-risk relates to the **trading and banking books for regulatory purposes**.

As at December 31, 2022, the value-at-risk for the **interest-rate risk in the banking book for regulatory purposes** was as follows (prior-year figures in parentheses):

- **Bank sector:** €54 million (€10 million)
- **DZ BANK:** €11 million (€10 million)

The significant increase in the key value-at-risk figures for interest-rate risk, spread risk, and aggregate risk was primarily attributable to the sharp rise in market volatility in 2022.

The value-at-risk for interest-rate risk in all of the portfolios (comprising the trading and non-trading books presented in Fig. 33) and the value-at-risk for interest-rate risk in the banking book for regulatory purposes are calculated using identical risk models. Variations in risk values are attributable directly to differences in the calculation bases used for the various portfolios.

FIG. 33 – BANK SECTOR: CHANGE IN MARKET RISK BY RISK SUBTYPE^{1, 2}

€ million	Interest-rate risk		Spread risk		Equity risk ³		Currency risk		Commodity risk		Diversification effect ^{4, 5}		Aggregate risk	
	Bank sector	DZ BANK	Bank sector	DZ BANK	Bank sector	DZ BANK	Bank sector	DZ BANK	Bank sector	DZ BANK	Bank sector	DZ BANK	Bank sector	DZ BANK
Dec. 31, 2022	53	12	70	31	11	2	3	3	3	2	-34	-17	107	34
Average	41	11	66	29	12	2	3	3	3	2	-30	-18	97	29
Maximum	69	20	79	33	14	4	6	6	4	2	-44	-26	128	39
Minimum	9	7	41	13	10	1	1	1	2	1	-16	-9	48	15
Dec. 31, 2021	10	10	43	14	14	4	2	2	2	1	-22	-13	48	18

¹ The disclosures relate to general market risk and spread risk. Asset-management risk is not included.

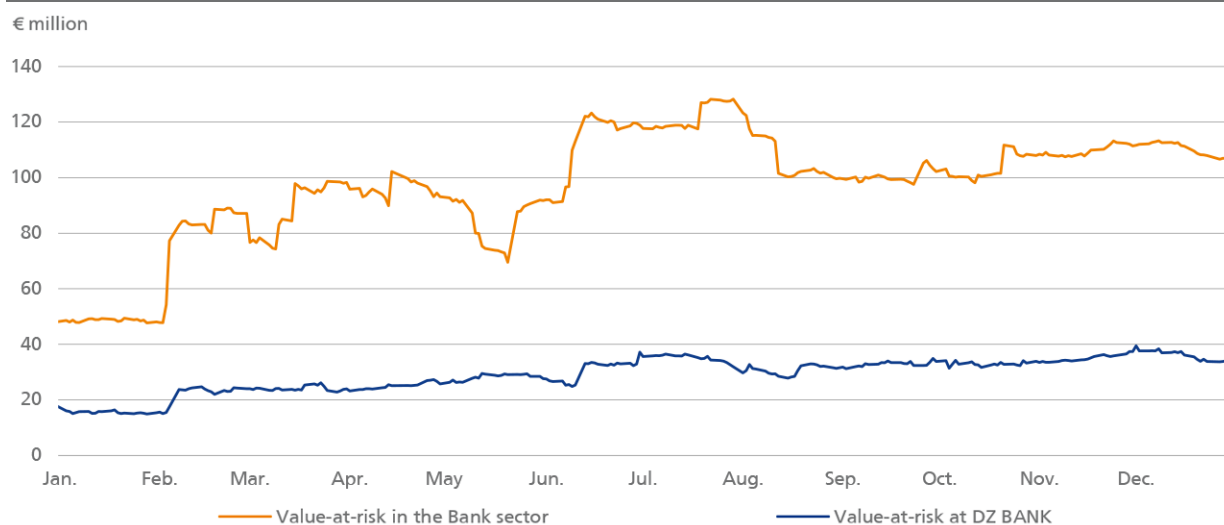
² Value-at-risk with 99.0% confidence level, 1-day holding period, 1-year observation period, based on a central market risk model for the Bank sector. Concentrations and effects of diversification were taken fully into account when calculating the risks.

³ Including funds, if not broken down into constituent parts.

⁴ Total effects of diversification between the types of market risk for all consolidated management units.

⁵ The minimum and maximum amounts for the different subcategories of market risk may stem from different points in time during the reporting period. Consequently, they cannot be aggregated to produce the minimum or maximum aggregate risk due to the diversification effect.

FIG. 34 – BANK SECTOR: CHANGE IN MARKET RISK BY TRADING DAY¹



¹ Value-at-risk with 99.0% confidence level, 1-day holding period, 1-year observation period, based on a central market risk model for the Bank sector. Concentrations and effects of diversification were taken fully into account when calculating the risks.

11.7.2 Risk capital requirement

As at December 31, 2022, the **risk capital requirement** for market risk in the **Bank sector** and at **DZ BANK** amounted to €3,730 million (December 31, 2021: €3,713 million) and €1,481 million (December 31, 2021: €1,517 million) respectively, with **limits** of €6,680 million (December 31, 2021: €5,725 million) and €3,175 million (December 31, 2021: €2,400 million) respectively.

The Bank sector's risk capital requirement encompasses the **asset-management risk of UMH**. Asset-management risk as at December 31, 2022 amounted to €342 million (December 31, 2021: €347 million). Heightened volatility in the interest-rate and equity markets led to fluctuations in the risk capital requirement during the year. At the end of 2022, the level of risk was roughly the same as at the end of the previous year.

12 Technical risk of a home savings and loan company

12.1 Definition

Technical risk of a home savings and loan company is subdivided into two components: new business risk and collective risk. **New business risk** is the risk of a negative impact from possible variances compared with the planned new business volume. **Collective risk** refers to the risk of a negative impact that could arise from variances between the actual and forecast performance of the collective building society operations caused by significant long-term changes in customer behavior unrelated to changes in interest rates.

BSH's business risk and reputational risk are included within the technical risk of a home savings and loan company.

12.2 Business background and risk strategy

Technical risk of a home savings and loan company arises in the Bank sector in connection with the business activities of BSH. This risk represents the entity-specific business risk of BSH. A home savings arrangement is a system in which the customer accumulates savings earmarked for a specific purpose. The customer enters into a home savings contract with fixed credit balance and loan interest rates, so that when the savings phase (which may be subsidized under statutory arrangements) is completed at a later point and a loan is allocated under the contract, he/she can receive a home savings loan at a favorable interest rate. A home savings agreement is therefore a combined asset/liability product with a long maturity.

Technical risk of a home savings and loan company is closely linked with the BSH business model and cannot therefore be avoided. Against this backdrop, the **risk strategy** aims to prevent an uncontrolled increase in risk.

12.3 Risk factors

A variance between the actual and planned new business volume (**new business risk**) could lead to lower deposits from banks and customers over the short to medium term. Over the medium to long term, the lower level of new business could also lead to a decrease in loans and advances to banks and customers. Variances between the actual and forecast performance of the collective building society operations caused by significant long-term changes in customer behavior unrelated to changes in interest rates (**collective risk**) could also lead to lower loans and advances to banks and customers and to lower deposits from banks and customers. Over the medium to long term, there is a risk that a lower level of new business and change in customer behavior could lead to a fall in earnings and therefore to a decline in capital.

12.4 Responsibility, reporting, and risk management

BSH is **responsible** for managing the technical risk of a home savings and loan company within the Bank sector. This includes measuring the risk and communicating risk information to the risk management committees at BSH and to the Board of Managing Directors and Supervisory Board of BSH. Technical risk of a home savings and loan company forms an integral part of the DZ BANK Group's internal **risk reporting system**.

A special collective simulation, which includes the integrated effects of a (negative) change in customer behavior and a drop in new business, is used to **measure the technical risk of a home savings and loan company** on a quarterly basis. The results from the collective simulation for the technical risk of a home savings and loan company are fed into a long-term forecast of earnings. The variance between the actual earnings in the risk scenario and the earnings in a base forecast with the same reference date is used as a risk measure. The variance is discounted to produce a present value. The total present value of the variances represents the technical risk of a home savings and loan company and therefore the risk capital requirement for this type of risk.

Concentrations of this risk are most likely to arise from new business risks.

Technical risk of a home savings and loan company is **managed** in particular through a forward-looking policy for products and scales of rates and charges, and through appropriate marketing activities and sales management.

12.5 Risk position

As at December 31, 2022, the **risk capital requirement** for the technical risk of a home savings and loan company amounted to €698 million (December 31, 2021: €639 million) with a **limit** of €785 million (December 31, 2021: €706 million). In the prevailing market conditions, stronger effects – that therefore lead to increased risk – result from the changes in the parameters 'customer behavior' and 'decline in new business' that are simulated in the risk calculation.

13 Business risk

13.1 Definition and business background

Business risk refers to the risk that financial performance is not in line with expectations, and this is not covered by other types of risk. In particular, this comprises the risk that, as a result of changes in material circumstances (for example, economic conditions, product environment, customer behavior, market competitors) or inadequate strategic positioning, corrective action cannot be taken to prevent losses.

Business risk mainly affects DZ BANK. DZ BANK's core functions as a **central institution and corporate bank** and **holding company** mean that it focuses closely on the local cooperative banks, which are its customers and owners. In this context, business risk can arise from corporate banking, retail banking, capital markets business, and transaction banking.

13.2 Risk strategy

The objective of the business risk strategy is to specify how business risk is to be managed, taking into account the relevant **business drivers**, and thus contribute to achieving the targets set out in the business strategy. The focus is on preventing both an unplanned increase in risk and potential losses arising from a slump in income or from increases in staff expenses or operating costs.

The following **instruments** are used to support the attainment of targets:

- Forward-looking assessment of success factors and specification of targets as part of the strategic planning process
- Groupwide coordination of risk management, capital allocation, and corporate strategy, together with the leveraging of synergies
- Setting of limits and monitoring

13.3 Risk factors

Over the next few years, the DZ BANK Group is likely to continue to face **increased costs**, and thus reduced profits, in connection with implementing the requirements resulting from **regulatory legislative initiatives**.

Fiercer **competition in retail and corporate banking based on pricing and terms** could give rise to margins that are economically unattractive for the entities in the Bank sector or that do not adequately cover the risk arising from the corresponding transactions.

13.4 Organization, responsibility, and reporting

The management of business risk is a primary responsibility of the **Board of Managing Directors of DZ BANK** and is carried out in consultation with the senior management of the main subsidiaries and the heads of the DZ BANK divisions involved. Group management is integrated into a committee structure, headed by the **Group Coordination Committee**. The Group Finance division supports the Board of Managing Directors as part of its role in supervising the activities of the subsidiaries. Details of the committee structure and the supervision of subsidiaries can be found in chapter I.2.2 in 'DZ BANK Group fundamentals'.

Business risk is **reported** to the Board of Managing Directors quarterly as part of the overall risk report. The Board of Managing Directors is also updated monthly about the risk situation and capital situation and about the income situation from an HGB perspective.

13.5 Risk management

The management of business risk is closely linked with the tools used in the **strategic planning process**. It is based on setting targets for the subsidiaries involved in active management and for the divisions of DZ BANK. The strategic planning process is described in chapter I.2.4 in 'DZ BANK Group fundamentals'.

To identify regulatory initiatives with a material impact on the DZ BANK Group and its entities, a **centralized regulation management office** has been set up at DZ BANK. This office establishes direct contact with the relevant units at DZ BANK and the other management units, and organizes regular bank-wide and groupwide dialogue on identified and new strategic regulatory initiatives. It also uses a 'regulatory map' to report to the relevant steering committees, the Board of Managing Directors, and the Supervisory Board of DZ BANK.

Business risk in the Bank sector is **quantified** using a risk model operated by DZ BANK and centralized data at the level of the DZ BANK Group. The risk model is based on an earnings-at-risk approach with due regard to the definition of economic available internal capital. A Monte Carlo simulation is used to model a probability distribution for the earnings relevant to business risk, which comprise selected income and expense items from the IFRS income statement, with an analysis period of one year. This distribution produces the risk capital requirement in the amount of the actual loss.

The broad diversification and sustainability of the business models used by the entities in the Bank sector are intended to prevent excessive **concentrations of income**. As part of a groupwide risk concentration analysis, which itself forms part of the risk inventory check, a review is carried out annually, and on an ad hoc basis as required, to identify concentrations of income and assess their materiality. This aims to ensure that income concentrations are appropriately taken into account in risk-bearing capacity.

13.6 Risk position

As at December 31, 2022, the **risk capital requirement** for business risk (including reputational risk) both in the **Bank sector** and at **DZ BANK** amounted to €43 million (December 31, 2021: €407 million and €295 million respectively). The **limit** in the **Bank sector** was €280 million as at the reporting date (December 31, 2021: €640 million). At **DZ BANK**, the **limit** was €235 million (December 31, 2021: €445 million). Reputational risk is included in the figures shown.

The decrease in risk was attributable to an improvement in the budgeted figures taken from the IFRS income statement that are used to calculate risk. The limit was also lowered to tie in with this decline in risk.

14 Reputational risk

14.1 Definition and business background

Reputational risk refers to the risk of losses from events that damage confidence, mainly among customers (including the cooperative banks), shareholders, employees, the labor market, the general public, and the supervisory authorities, in the entities in the Bank sector or in the products and services that they offer. Reputational risk can arise either as an independent risk (primary reputational risk) or as an indirect or direct consequence of other types of risk (secondary reputational risk).

Reputational risk can arise in connection with any of the business activities in the entities within the Bank sector.

14.2 Risk strategy

Reputational risk is incorporated into the risk strategy by pursuing the following **objectives**:

- Avoiding loss resulting from reputation-damaging incidents by taking preventive action
- Mitigating reputational risk by taking preventive and responsive action
- Raising awareness of (potential) reputational risk within the Bank sector, e.g. by defining the people responsible for risk and establishing a sector-wide reporting system and set of rules for reputational risk

These objectives are applicable both at the Bank sector level and in the management units. The management units are responsible for complying with the rules and for deciding what suitable preventive and responsive action to take.

The reputational risk strategy is based on the **business strategies** in each management unit and to this end is reviewed at least once a year and adjusted as necessary.

14.3 Risk factors

If the Bank sector as a whole or the individual management units acquire a negative reputation, there is a risk that existing or potential customers will be unsettled with the result that existing **business relationships** might be terminated or it might not be possible to carry out planned transactions. There is also a risk that it will no longer be possible to guarantee the **backing** of stakeholders, such as shareholders and employees, necessary to conduct business operations.

If the transition risks, social risks, and corporate governance risks assessed in connection with **ESG risks** were to materialize, this could give rise to heightened reputational risk.

14.4 Responsibility and risk management

Each management unit is responsible for managing its reputational risk and must comply with the requirements laid down in the set of rules for reputational risk. The principle of **decentralized** responsibility applies equally within the management units. Based on this approach, responsibility for managing reputational risk lies with each division with the involvement of other functions such as communications & marketing, corporate security, and compliance.

Reputational risk in the Bank sector is taken into account within **business risk** and is therefore implicitly included in the measurement of risk and assessment of capital adequacy. At BSH, reputational risk is measured and the capital requirement determined mainly as part of the technical risk of a home savings and loan company.

In addition, the risk that obtaining funding may become more difficult as a consequence of reputational damage is specifically taken into account in liquidity risk management. The management units follow a stakeholder-based approach in which reputational risk is identified and evaluated from a qualitative perspective depending on the stakeholder concerned.

15 Operational risk

15.1 Definition

Operational risk refers to the risk of losses from human behavior, technological failure, weaknesses in process or project management, or external events.

In the reporting year, the following subtypes of operational risk were material for the Bank sector:

- Compliance risk including conduct risk
- Legal risk
- Information risk including ICT risk
- Security risk
- Outsourcing risk
- Project risk

Other subtypes of operational risk that are not material when viewed in isolation are brought together under 'Other operational risk'. This category is used to cover operational risks that cannot be allocated to the other subtypes of operational risk and – measured on the basis of risk profile – are of lesser importance.

15.2 Business background and risk strategy

Operational risk can arise in any division of the entities in the Bank sector. DZ BANK as well as DZ PRIVATBANK and UMH are particularly subject to operational risk.

The management units aim to manage operational risk efficiently. They apply the following principles:

- Reinforce risk awareness
- Handle operational risk openly and largely without penalties
- Avoid, reduce, transfer, or accept risk as optional courses of action
- Manage operational risk on a decentralized basis but within the limits set out in the framework for operational risk
- Ensure that the impact of corporate policy decisions on operational risk is taken into account

15.3 Organization, responsibility, and reporting

Each management unit is responsible for managing its operational risk. The principle of **decentralized** responsibility applies equally within the management units.

One of the purposes of the **framework for operational risk** is to harmonize risk management throughout the sector. The sector-wide coordinated approach to operational risk is also managed by a **committee** assigned to the Group Risk Management working group.

A **DZ BANK** organizational unit responsible for controlling operational risk located within the Group Risk Management & Services division develops the management and control methods based on regulatory requirements and business needs applicable to the Bank sector. This organizational unit ensures that operational risk is monitored independently and is responsible for central reporting on operational risk in the Bank sector and at DZ BANK. Similar organizational units are also in place at the other main entities in the **Bank sector**.

Specialist divisions with central risk management functions are also assigned tasks relating to the management of operational risk. As part of their overarching responsibility, these specialist divisions also perform an advisory and guiding function for the matters within their remit in the relevant entities of the Bank sector.

Because operational risk can affect all divisions in the management units, **local operational risk coordinators** are located in each division and they liaise with central Risk Controlling.

Regular **reports** on loss data, risk self-assessments, risk indicators, and risk capital are submitted to the Board of Managing Directors, the Group Risk and Finance Committee, the Risk Committee, and operational management with the aim of facilitating effective management of operational risk on a timely basis.

15.4 Central risk management

15.4.1 Identifying operational risk

The main tools used to manage and control operational risk in the DZ BANK Group's Bank sector are described below.

Loss database

The collation of loss data in a central database allows the Bank sector to identify, analyze, and evaluate loss events, highlighting patterns, trends, and concentrations of operational risk. In particular, data is recorded for operational risk that materializes and results in a gross loss of €1,000 or more.

Risk self-assessment

All management units assess operational risk using a scenario-supported risk self-assessment process in order to identify and evaluate all material operational risks and ensure maximum possible transparency regarding the risk position. The main potential risks for all first-level event categories as defined by the CRR are calculated and described using risk scenarios. The scenarios are also designed to enable risk concentrations to be identified.

Risk indicators

In addition to the loss database and risk self-assessment, risk indicators are intended to enable risk trends and concentrations to be identified at an early stage and to detect weaknesses in business processes. A system of warning lights is used to indicate risk situations based on specified threshold values. Risk indicators within the Bank sector are collected systematically and regularly.

15.4.2 Measurement of operational risk

An **internal portfolio model** that takes into account loss data and the results from the risk self-assessments is used to determine the risk capital requirement for operational risk in the Bank sector. Within the portfolio model, the distributions of loss frequency and amount are brought together in a Monte Carlo simulation. This determines potential losses that could arise over a period of one year. The results from the model, combined with the tools used to identify risk, are used to manage operational risk centrally. Alongside the economic risk capital requirement, the model also calculates specific risk contributions for each management unit.

In addition, **risk concentrations** are identified by using separate model-based analyses, taking into account event categories and areas of business specified by regulatory requirements. These risk concentrations could occur in the different areas of business within the entities of the Bank sector.

In addition, a simplified procedure based on the allocation mechanism in the capital model is used to identify **risk drivers**. The risk driver analysis is carried out for all standard scenarios. The list of standard scenarios is maintained for use throughout the group and contains a list of general scenario descriptions that are relevant to operational risk in the Bank sector entities.

15.4.3 Limiting operational risk

The limits for operational risk are used as the basis for central monitoring of the risk capital requirement at the Bank sector level. The risk capital requirement for the Bank sector is broken down into risk contributions for each management unit using a risk-sensitive allocation procedure so that the management units in the Bank sector can be monitored centrally. These risk contributions are then monitored centrally using limits for each management unit.

15.4.4 Mitigating and avoiding operational risk

Continual improvement of business processes and control processes is one of the methods used with the aim of **mitigating** operational risk. The transfer of risk by means of insurance or outsourcing as permitted by liability regulations provides further protection.

Operational risk is **avoided**, for example, by rejecting products that can be identified during the new product process as entailing too much risk.

15.5 Operational risk subtypes

15.5.1 Compliance risk including conduct risk

Risk factors

Compliance risk could arise if the compliance and risk management systems implemented in the Bank sector entities prove insufficient to completely prevent or detect breaches of obligations to third parties. Such obligations include legal requirements (laws, regulations) as well as both internal and external agreements. Examples are misuse of confidential information, failure to comply with sanctions or embargoes, data protection infringements, and support – or inadequate preventive measures – for money laundering, terrorist financing, or other criminal offenses. Wrongdoing by employees (conduct risk) forms part of compliance risk.

Effects if risk materializes

Violations of internal rules or legal provisions could render contracts null and void or have legal implications for the entity concerned, for the members of its decision-making bodies, or for its employees. They may give rise, for example, to fines, penalties, retrospective tax payments, or claims for damages by third parties. The reputation of individual entities in the Bank sector and the DZ BANK Group as a whole could also suffer as a result. These effects could reduce the Bank sector entities' appeal as partners in business transactions and consequently lead to losses in value.

Risk management

The basic principles for managing compliance risk applicable to the entities in the DZ BANK Group are described in chapter VII.3.5.5. The data protection measures in place and the code of conduct are also explained in the same chapter. Measures such as the strict separation of functions, the requirement for verification by a second person, restrictions on IT and building access authorizations, and a sustainability-oriented remuneration system are designed to contain risk, in particular the risk of internal fraud.

15.5.2 Legal risk

Risk factors

Legal risk can arise from legal violations or incorrect application of legal provisions. Legal risk can also arise from changes to the legal position (laws or judgments by the courts) relating to transactions completed in the past.

Effects if risk materializes

If legal risk were to materialize, this could result in official sanctions or the need to pay damages. It is also possible that existing contractual rights could be lost retrospectively or could otherwise not be enforced for legal reasons. These effects could lead to losses and reduce the Bank sector entities' appeal as partners in business transactions.

Risk management

The entities in the Bank sector pursue a strategy of avoiding legal risk. Identified risks are limited and mitigated by means of legal or procedural organizational measures. If the legal position is uncertain, the management units generally adopt a defensive approach.

In the entities of the Bank sector, responsibility for managing legal disputes normally lies with their organizational units responsible for dealing with legal issues. These units continuously monitor proposed legislation and regulatory requirements that are legally relevant, as well as developments in decisions by the courts. In the Bank sector entities, the legal affairs units are responsible for reviewing and assessing circumstances from a legal perspective and also for coordinating any legal proceedings. The latter consists of both defending claims pursued against the entities in the Bank sector and enforcing claims by the management units against third parties. If any legal risk is identified, the management unit concerned assesses the risk parameters in terms of their probability of occurrence and possible impact.

The legal affairs divisions in the Bank sector entities also submit reports on risk-related issues to the member(s) of the Board of Managing Directors with relevant responsibility, independently of the established regular reports on cases pending before the courts.

Provisions for risk

If identified legal risks cannot be excluded, the potential associated losses are accounted for by the recognition of provisions in the financial statements. The relevant (consolidated) financial reporting requirements apply. Disclosures covering the provisions recognized for risks arising from ongoing legal disputes, in particular in connection with capital market and credit products, and for risks arising from general banking operations are included in note 69 of the notes to the consolidated financial statements under 'Other provisions'.

15.5.3 Information risk including ICT risk

Risk factors

Information risk arises from a failure to maintain the confidentiality, integrity, availability, or authenticity of data. If the risk is in connection with the use of information or communication technology (data media), it is referred to as ICT risk. This also includes cyber risk.

Effects if risk materializes

If information risk materializes (e.g. due to hacker attacks), the damage to, or loss of, confidentiality, integrity, availability, or authenticity of data could lead to the malfunction, breakdown, misuse, or manipulative use of IT systems. This could impair the processes necessary to conduct operating activities. Furthermore, such malfunctions or breakdowns could lead to the temporary or permanent loss of data or to unauthorized data access, modification, or publication. In such cases, this could also potentially lead to restrictions on business operations, which in turn could inflict reputational damage and losses from operational risk.

Risk management

The basic principles for managing information security applicable to the entities in the DZ BANK Group are described in chapter VII.3.5.6. The nature of these principles is described below.

The entities in the Bank sector use computers and IT systems to carry out their operating activities. Practically all business transactions and activities are processed electronically using appropriate IT systems. The supporting IT systems are networked with each other and are operationally interdependent.

Processes in the IT divisions of the entities in the Bank sector are designed with risk issues in mind and are monitored using a variety of control activities in order to ensure that information risk is appropriately managed. The starting point is to determine which risks are unavoidable in certain aspects of IT. Detailed requirements can then be specified. These requirements determine the extent to which checks need to be carried out and are intended to ensure that all activities are conducted in compliance with the previously defined risk appetite.

The IT divisions apply comprehensive physical and logical precautionary measures to guarantee the security of data and IT systems and to ensure that day-to-day operations are maintained. Measures used by the Bank sector to counter the risk of a partial or complete loss of IT systems include segregated data processing centers in which the data and systems are mirrored, special access security, fire control systems, and an uninterruptible power supply supported by emergency power generators. Regular exercises are carried out to test defined restart procedures to be used in emergency or crisis situations with the aim of checking the efficacy of these procedures. Data is backed up and held within highly secure environments in different buildings.

Further details on information security management can be found in chapter VII.3.5.6.

DZ BANK's risk assessment methodology for information risk is made available centrally by information security management and applied locally by the managers responsible for the various IT systems using tool-supported control processes. All variances identified in these processes are assessed from the perspective of the associated risks. All information risks classified as material are included in regular information security reports to the Board of Managing Directors.

15.5.4 Security risk

Risk factors

Security risk can arise from inadequate protection of individuals, premises, assets, or time-critical processes. Examples are epidemics or pandemics resulting from the spread of pathogens over a huge area, restrictions on access to workplaces caused by natural disasters or demonstrations, or limitations on the use of resources because of a power outage or other interruption to energy supply. Climate change could lead to more frequent and more severe natural disasters.

Effects if risk materializes

If security risk were to materialize, this could lead to a range of problems from staff shortages to restrictions, or even the loss, of the use of buildings and resources such as IT systems and third-party services. In such eventualities, it is possible that mission-critical processes could not be carried out or could not be carried out on time, which could lead to loss of business and/or compensation claims from customers. Furthermore, such scenarios could also have a negative impact on reputation.

Risk management

The relevant organizational units in the management units prepare requirements for the protection of time-critical business processes, people, premises, and other assets. These requirements are implemented by the departments responsible in each case. In all relevant management units, a comprehensive business continuity management system (with business continuity plans covering time-critical activities and processes) has been established to ensure the continuation of business in the event of process disruption or IT system breakdown. These business continuity plans are regularly reviewed and tested to ensure they are fully functional.

Further details on business continuity management can be found in chapter VII.3.5.6.

15.5.5 Outsourcing risk

Risk factors

The entities in the Bank sector have outsourced activities and processes to third-party service providers to a considerable extent. Outsourcing risk can arise if the service provider fails to comply with the strategic principles established by the management units or the related operational requirements when carrying out the outsourced activities.

The reasons may be as follows:

- Failure of the relevant service provider to comply with regulatory requirements
- Lack of transparency regarding the delivery of the services and little opportunity for control over outsourcing outside the home market
- Highly complex outsourced processes that are far from a standard service
- Need to outsource core competencies or knowledge processes because of a potential loss of expertise
- Defective performance caused by service provider failures or the loss of service provider
- Inadequate management or monitoring of service providers, in particular as a result of a lack of transparency regarding service delivery

Effects if risk materializes

If these risk factors were to materialize, they could lead to a loss of business and to claims for damages from customers. They could also result in a negative impact on reputation.

Risk management

The basic principles for managing outsourcing applicable to the entities in the DZ BANK Group are described in chapter VII.3.5.7.

The process of assessing the risk and determining the degree to which an outsourcing arrangement is material is carried out as part of the analysis of outsourcing risk by the division responsible for the outsourcing with the involvement of a number of reviewing and control units, including compliance, information security, and business continuity management, and in consultation with the local coordinators for operational risk. Internal audit is also involved as part of its auditing activities.

At DZ BANK, external service providers are managed by the department responsible for the outsourcing in accordance with the currently applicable policy for external procurement management. Service meetings are regularly held with service providers to facilitate communication and coordinate the IT services and other services to be provided by the third parties concerned. Compliance with contractually specified service level agreements is monitored by means of status reports and uptime statistics. The external service providers submit annual audit reports in which they evaluate and confirm the effectiveness of the general controls and procedures.

Business continuity plans, specific contractual liability provisions, and exit strategies are some of the approaches used to reduce outsourcing risk.

15.5.6 Project risk

Risk factors

Project risk refers to the risk that project requirements will not be completed on schedule. Project risk could arise, for example, from the inadequate clarification of project targets or orders, from deficiencies in subsequent implementation, from communication shortcomings both inside and outside the project, or from unexpected changes in the general parameters applicable to a project.

Effects if risk materializes

If project risk were to materialize, this could mean that the implementation of the project could require exceptional additional funds in excess of the budget (primary project risk). It could also give rise to further costs attributable to the failure to complete project requirements on schedule (secondary project risk). Examples of such costs are additional costs in the line organization, impairment losses on capital investment related to the project, and penalty payments.

Risk management

In accordance with the statutory requirements that need to be observed, the project organization serves as the framework for implementing projects. The projects as a whole are broken down into portfolios with shared characteristics to enable the projects to be managed in a focused, efficient manner. A committee structure with defined roles and responsibilities is designed to look after the detailed management of the portfolios and the projects assigned to them.

The management of project risk is an ongoing process over the lifecycle of a project and is a component of project management and project portfolio management. Accepting a project risk is a valid option if the project customer believes that the measures to eliminate, reduce, or mitigate the risk are not reasonable in relation to their expected benefit.

15.6 Impact of the war in Ukraine

The monitoring of sanctions necessitates manual transaction checks that entail an increased workload. This may result, for example, in delays to the execution of transactions or, if applicable, penalty interest payments for trading that involves securities subject to sanctions. As at December 31, 2022, the relevant risk indicators revealed latent increased risk. Risk indicators are intended to enable risk trends and concentrations to be identified at an early stage and to detect weaknesses in business processes.

15.7 Losses

Losses from operational risk do not follow a consistent pattern. The overall risk profile can be seen from the total losses incurred over the long term and is shaped by a small number of large losses. Over the course of time, regular fluctuations are evident in the pattern of losses as the frequency of relatively large losses in each individual case is very low. Presenting the change in losses meaningfully therefore requires a sufficiently long and unchanging time horizon for reporting purposes. The data is therefore selected from the loss history for the past four quarters and on the basis of the date on which the expense is recognized in the income statement.

The past four quarters – that is, the period from January 1 to December 31, 2022 – represent the relevant reporting period for an analysis of net losses. Fig. 35 shows the internal net losses from loss events reported in this period, classified by operational risk subtype, and a comparison with their long-term mean.

FIG. 35 – BANK SECTOR: NET LOSSES¹ BY OPERATIONAL RISK SUBTYPE

	Bank sector		DZ BANK	
	Jan. 1, 2022– Dec. 31, 2022	Long-term mean ²	Jan. 1, 2022– Dec. 31, 2022	Long-term mean ²
Proportion of total net losses (percent)				
Compliance risk	40.9	44.1	44.7	45.3
Legal risk	40.4	36.4	46.3	39.3
Information risk including ICT risk	1.5	5.5	0.4	4.0
Security risk	1.3	2.0	0.6	1.3
Outsourcing risk	0.3	0.6	0.2	0.5
Project risk	0.6	0.8	–	0.5
Other operational risk	15.0	10.5	8.0	9.1

¹ Internal losses.

² The long-term mean is derived from loss data recorded since 2006.

In the past four quarters, internal losses both in the **Bank sector** and at **DZ BANK** were dominated by **compliance risk** and **legal risk**. The absolute losses for these two risk subtypes were lower than in the prior period.

Losses did not reach a critical level relative to the expected loss from operational risk at any point during 2022, either in the Bank sector or at DZ BANK.

15.8 Risk position

As at December 31, 2022, the capital requirement for operational risk at **Bank sector** level was calculated at €966 million (December 31, 2021: €941 million) with a **limit** of €1,112 million (December 31, 2021: €1,102 million).

As at December 31, 2022, the corresponding requirement at **DZ BANK** was €554 million (December 31, 2021: €515 million). The **limit** as at December 31, 2022 was €625 million (December 31, 2021: €596 million).

Fig. 36 shows the structure of the risk profile for operational risk in the Bank sector and at DZ BANK based on **risk subtypes**.

FIG. 36 – BANK SECTOR: DISTRIBUTION OF RISK CAPITAL REQUIREMENT FOR OPERATIONAL RISK, BY RISK SUBTYPE

Percent	Bank sector ¹		DZ BANK ²	
	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021
Compliance risk	31.7	32.5	15.0	15.1
Legal risk	19.2	20.6	9.3	9.5
Information risk including ICT risk	15.5	14.3	5.3	4.8
Security risk	5.5	5.5	1.9	1.6
Outsourcing risk	5.6	6.5	2.1	2.1
Project risk	6.6	7.4	2.8	2.8
Other operational risk	15.9	13.3	8.1	6.8

¹ Proportion of the Bank sector's risk capital requirement attributable to each risk subtype.

² Proportion of the Bank sector's risk capital requirement attributable to DZ BANK, broken down by risk subtype.

The distribution of the risk capital requirement among the operational risk subtypes in the Bank sector and at DZ BANK remained largely unchanged as at December 31, 2022 compared with the end of the previous year. **Compliance risk** and **legal risk** accounted for the most significant proportions of the risk capital requirement. A large proportion of the risk capital requirement for these two risk subtypes was determined by the recorded losses and by the hypothetical risk scenarios for changes to case law and for breaches of sanctions and embargoes. The largest increase in the risk capital requirement was seen in **other operational risk**. It largely resulted from adjustments to the hypothetical scenarios for the incorrect communication/interpretation of business information and incorrect execution of transactions and processes. The growth of information risk including ICT risk was mainly attributable to adjustments to the hypothetical hacker-attack scenarios. The small decrease in the share of risk capital for project risk and outsourcing risk was predominantly due to adjustments to the underlying hypothetical scenarios for additional project costs and for outsourcing.

Insurance sector

16 Basic principles of risk management in the Insurance sector

16.1 Risk strategy

The principles of risk management in the Insurance sector are based on the risk strategy of the DZ BANK Group for the Insurance sector, which is closely interlinked with the business strategy. Under its risk strategy, R+V aims to assume risk on a conscious, calculated basis within the constraints of the specified risk appetite.

Life actuarial risk is managed with the objectives of holding a broadly diversified product portfolio and of developing existing products while designing new ones. Pension, endowment and risk insurance, working life and semi-retirement products, index-linked products, and unit-linked products are underwritten in order to diversify the life insurance and pension provision portfolios.

The objectives of managing **health actuarial risk** are a risk-conscious underwriting policy, cost/benefit management, the development of existing products, and the design of new products.

The management of **non-life actuarial risk in direct business** aims to optimize portfolios in terms of risk and reward. R+V focuses on business in Germany, offering a full range of non-life insurance products.

In **inward non-life reinsurance business**, R+V also aims to achieve a broad balance of risk across all sectors, diversify geographically around the globe, and optimize the portfolio from a risk/reward perspective.

The management of **market risk** is connected with the following fundamental objectives of risk policy: optimizing the economic risk/return profile, ensuring required returns on investments taking into account individual risk-bearing capacities, achieving defined minimum investment returns in stress scenarios, and conserving hidden assets to ensure consistent earnings. The aim is also to guarantee that there is a sufficient proportion of fungible investments.

In line with the risk strategy for **counterparty default risk**, R+V aims to maintain a high average credit rating for its portfolios, avoid concentrations of issuers at portfolio level, and comply with the limits that have been set for counterparties and debtors of insurance and reinsurance companies.

The risk strategy for **operational risk** aims to further raise awareness of operational risk.

The objective of the **reputational risk strategy** is to promote the image of the R+V brand with due regard to the need for transparency and credibility.

16.2 Organization, responsibility, and reporting

As specified in the own risk and solvency assessment (ORSA), the risk management process encompasses all the steps involved in identifying, analyzing, assessing, managing, monitoring, reporting, and communicating risk. Risk-bearing capacity is reviewed and measured at least once a quarter and the process includes a review of binding key performance indicators and threshold values. Corrective action must be assessed and, where necessary, initiated if a specified index value is exceeded. Risk-bearing capacity and all material risks are then finally evaluated each quarter by the Risk Committee.

Reports are submitted to the Board of Managing Directors of R+V in the event of material changes in risk. Company information that has a bearing on risk exposure is passed to the relevant supervisory bodies at R+V, both quarterly and on an ad hoc basis.

17 Actuarial risk

17.1 Definition and business background

17.1.1 Definition

Actuarial risk is the risk that the actual cost of claims and benefits deviates from the expected cost as a result of chance, error, or change. It is broken down into the following categories defined by Solvency II:

- Life actuarial risk
- Health actuarial risk
- Non-life actuarial risk

Life actuarial risk

Life actuarial risk refers to the risk arising from the assumption of life insurance obligations, in relation to the risks covered and the processes used in the conduct of this business. The following subtypes of life actuarial risk are material for R+V:

- **Mortality risk** describes the risk of loss or an adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of mortality rates, where an increase in the mortality rate leads to an increase in the value of insurance liabilities.
- **Longevity risk** describes the risk of loss or an adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of mortality rates, where a decrease in the mortality rate leads to an increase in the value of insurance liabilities.

- **Lapse risk** describes the risk of loss or an adverse change in the value of insurance liabilities, resulting from changes in the level or volatility of the rates of policy lapses, cancellations, renewals, and surrenders.
- **Life expense risk** describes the risk of loss or an adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of the expenses incurred in servicing insurance or reinsurance contracts.

Health actuarial risk

Health actuarial risk refers to the risk arising from the assumption of health and casualty insurance obligations, in relation to the risks covered and the processes used in the conduct of this business.

Non-life actuarial risk

Non-life actuarial risk refers to the risk arising from the assumption of non-life insurance obligations, in relation to the risks covered and the processes used in the conduct of this business. The following subtypes of non-life actuarial risk are material for R+V:

- **Premium and reserve risk** describes the risk of loss or an adverse change in the value of insurance liabilities, resulting from fluctuations in the timing, frequency, and severity of insured events, and in the timing and amount of claim settlements.
- **Non-life catastrophe risk** describes the risk of loss or an adverse change in the value of insurance liabilities, resulting from the significant uncertainty of pricing and assumptions when recognizing provisions related to extreme or unusual events.

17.1.2 Business background

In the DZ BANK Group, considerable actuarial risk arises from the business activities of R+V. The risk arises from the direct life insurance and health insurance business, the direct non-life insurance business, and the inward reinsurance business.

17.2 Risk factors

In the case of long-term products, which constitute the bulk of R+V's **direct life insurance business**, there is a risk of negative variances over the term of the contracts compared with calculation assumptions because of the length of time covered by the contracts. The relevant risk factors include changes in life expectancy, increasing rates of disability-morbidity, disproportionately sharp cost increases, and a rise in contract lapses. If the actual trends in life expectancy, disability-morbidity, costs, or contract lapses vary from the calculation assumptions, there is a risk over the medium to long term that the gross profit generated from life insurance will decline.

In **health insurance** at R+V, which accounts for a substantial proportion of health actuarial risk, there is a risk of higher claims caused by the behavior of the policyholders and service providers. Subject to certain legal requirements, there is a possibility of adjusting the premiums in the health insurance business, a process in which all actuarial assumptions can be reviewed and modified. Significant premium adjustments could have a negative impact on future new business if rate scales lose their appeal because of high premiums. The number of lapses in the portfolio could also increase as a result.

Environmental pollution and climate change represent additional risk factors in respect of **life and health actuarial risks** because they could have a negative impact on the health of policyholders and increase the number of claim events.

R+V's **direct non-life insurance and inward non-life reinsurance business** involves the provision of cover for a range of disasters. This includes both natural disasters, such as earthquakes, storms, and floods, and man-made disasters. These events cannot be predicted. Generally speaking, there is both the risk of particularly significant individual loss events and also the risk of a large number of loss events that are each not necessarily

significant in themselves. As a result, in any one year, the actual impact from the size and frequency of losses could exceed the forecast impact. Climate change represents an additional risk factor in connection with the occurrence of natural disasters. It is reasonable to expect that climate change will lead to an increase in weather-related natural disasters.

Inflation, which rose sharply in 2022, represents a cost driver for claims incurred because higher prices for procuring commodities and other items result in higher claims settlement expenses. This may lead to adjustments to premiums, primarily in residential building insurance and motor vehicle insurance.

Cyber risk is becoming increasingly significant within the underwriting business as a consequence of ongoing digitalization. There is a risk that cyber risk may not be comprehensively set out, or may not be mentioned at all, in insurance terms and conditions, or that it may not be expressly included or excluded (referred to as silent cyber risk).

17.3 Management of life actuarial risk

17.3.1 Risk measurement

The risk for insurance contracts subject to **mortality risk** is modeled with the assumption of a 15 percent permanent increase in mortality.

The risk for insurance contracts subject to **longevity risk** is modeled with the assumption of a 20 percent permanent increase in longevity.

The risk for insurance contracts subject to **lapse risk** is modeled for the following scenarios: for an increase in lapses, a 50 percent rise in the lapse rate; for a decrease in lapses, a 50 percent reduction in the lapse rate; for a mass lapse event, lapse of 40 percent of the contracts.

The overall solvency requirement for **life expense risk** is based on the following stress scenarios: a permanent 10 percent rise in the costs reflected in the measurement of the insurance liabilities and an increase of 1 percentage point in the cost inflation rate.

17.3.2 Risk management in direct life insurance business

Actuarial risk is taken into account by carrying out a prudent cost calculation while products are still in development. This applies to the development of existing products as well as the design of new types of insurance. Safety margins are included in the actuarial assumptions to achieve this. The assumptions are structured in such a way that they not only withstand the current risk situation, but should also accommodate potential changes in the risk position. Actuarial control systems are used to decide whether the cost calculation for future new business needs to be changed. The calculation is also adjusted on an ongoing basis in line with the latest actuarial findings. The appointed actuary carries out reviews as part of product development and during the course of the term of contracts to verify that the actuarial assumptions used are appropriate.

A number of measures are taken to prevent a concentration of risks in the portfolio. Before contracts are signed, extensive risk reviews are carried out to limit **mortality risk**. In general, risk is only assumed in compliance with fixed underwriting guidelines. High levels of individual or cumulative risk are limited by reinsurance.

Generally speaking, the risk is mitigated if the insured risks are diversified. For example, an increase in mortality has an adverse impact on endowment life and risk insurance policies, but at the same time has a positive impact on the **longevity risk** associated with pension insurance.

Cost control tools are used to manage **life expense risk**.

Lapse risk is mitigated by structuring life insurance contracts to provide maximum flexibility should policyholders' circumstances change. A range of different options during the term of an insurance contract

enables customers to maintain their contract instead of canceling it. Appropriate design of policyholder participation and, in particular, the final bonus also counteracts lapse risk.

In addition, advance notice of **policyholder participation** in the form of declarations of future bonuses is also a key instrument with which to reduce actuarial risk relating to life insurance.

17.4 Management of health actuarial risk

17.4.1 Risk measurement

Health actuarial risk is calculated by combining the capital requirements for the subcategories 'similar to life techniques, health actuarial risk' (risk on health insurance pursued on a similar technical basis to that of life insurance), 'non-similar to life techniques, health actuarial risk' (risk on health insurance pursued on a similar technical basis to that of non-life insurance), and 'health catastrophe risk'.

The methods described in the chapters on life actuarial risk (chapter VII.17.3) and non-life actuarial risk (chapter VII.17.5) are used to measure risk in the subcategories.

Health actuarial risk also includes significant parts of the group's casualty insurance business as well as its health and occupational disability insurance business.

17.4.2 Risk management in health and casualty insurance

Risk management in health insurance business

In the health insurance business, the Insurance sector aims to manage actuarial risk by means of an **underwriting policy**, the features of which are underwriting guidelines and selection of risk, and management of benefits and costs. The risk exposure in the case of large individual risks may be limited by taking out appropriate reinsurance. In many of the health insurance rate scales, deductibles are used to control the extent of claims. Provisions are recognized to ensure that all benefit obligations under insurance contracts can be met. The appointed actuary carries out monitoring as part of product development and over the course of time to verify that the actuarial assumptions used are appropriate.

In accordance with VAG provisions, R+V carries out an annual comparison of its calculations with the insurance benefits it is required to pay. If this comparison of claims for an observation unit within a particular scale of insurance rates reveals a variance that is other than temporary, the relevant **premiums** are adjusted. All actuarial assumptions are reviewed and specified in consultation with an independent trustee. A safety margin factored into premiums is also intended to ensure that obligations can be met if claims are higher than the level provided for in cost calculations.

In the health insurance business, the **decrement tables** include assumptions regarding mortality and the probability of other relevant withdrawal factors. Under the requirements set out in the German Health Insurance Supervision Regulation (KVAV), these assumptions must be specified and reviewed from the perspective of prudent risk assessment. It is for this reason that a new mortality table is developed annually by the Verband der privaten Krankenversicherung e.V. (PKV) [Association of German private healthcare insurers] in consultation with BaFin. In accordance with statutory provisions, R+V carries out an annual comparison of its calculations with the most recently published mortality tables.

When determining **lapse probabilities** for the purposes of its calculations, R+V uses both its own observations and the latest figures published by BaFin.

Where premiums were adjusted on January 1, 2022, R+V used the new PKV mortality table valid for 2022 to determine both new business premiums and those **premium adjustments** in existing business.

Unisex insurance rate scales are offered in R+V's **new business**. The cost calculation for these rates is not only based on the existing gender breakdown, but also takes into account the expected pattern of switching by existing policyholders to the new rates. The appropriateness of the composition of the portfolio resulting from the calculations is reviewed by actuaries using comparable calculations.

Risk management in casualty insurance business

The risk situation in the casualty insurance division is characterized by the fact that it is fixed-sum insurance and not indemnity insurance. Consequently, the maximum benefit per insured person is restricted to the sum insured.

A risk review also forms part of the underwriting policy in the case of casualty insurance. Premiums are reviewed on an ongoing basis to ensure that they remain appropriate. Claims are assessed on a case-by-case basis.

17.5 Management of non-life actuarial risk

17.5.1 Risk measurement

The capital requirements for **premium and reserve risk** are calculated on the basis of risk factors and volume measures for all branches of insurance in which business is conducted. The risk factors (e.g. the standard deviation as a percentage of the volume measure) describe the degree of threat posed by the risk. The volume measure for the **premium risk** is essentially the net premium income earned in the financial year and in the first and second years after that. The net claims provisions in the form of a best-estimate valuation constitute the volume measure for the **reserve risk**.

The capital requirement for **catastrophe risk** is calculated as an aggregation of four risk modules. These are natural catastrophe risk (broken down into the following natural hazards: hail, storm, flood, earthquake, and subsidence), the catastrophe risk of non-proportional reinsurance in non-life insurance, risk of man-made catastrophe, and other catastrophe risk in non-life insurance. Catastrophe risk is calculated using the volume measures of sums insured and premiums. Risk mitigation through reinsurance is taken into consideration.

To determine the overall solvency requirement as part of internal risk assessment, empirical distributions are generated for the relevant parameters for most parts of the portfolio, such as the claim amount and the number of claims per sector and claim type (e.g. basic claims, major claims, catastrophe claims). The value-at-risk can then be determined with the required confidence level directly from the underwriting result modeled in this way, recorded as a loss function. The parameters for the analyzed distributions are set using historical portfolio data and related planning data. They are therefore intended to reflect the actual risk position of the entity concerned.

In the case of catastrophe risk in connection with the direct insurance business, the risk modeling for calculating basic claims relating to the natural hazard earthquake and basic claims and minor cumulative events relating to the natural hazards hail, storm, and flood is based on mathematical/statistical methods. The minimum and maximum claim amounts for minor cumulative events are derived from the group's own claims history. Modeling is based on the group's own claims data. The risk modeling for major cumulative events relating to the natural hazards hail, storm, flood, and earthquake uses probability-based natural hazard models. This approach uses catastrophe claims that have been modeled by external providers for each natural hazard and take account of the specific risk profile.

In its **inward reinsurance business**, R+V deploys a simulation tool for stochastic modeling of catastrophe risk. To model the natural catastrophe risk on an individual contract basis, event catalogs from external providers containing predefined scenarios based on historical observations are used. The event catalogs cover the main countries and natural hazards related to the underwritten risk in the inward reinsurance concerned. In the case of countries and natural hazards for which there is no event catalog, modeling is based on R+V's own claims history. This involves generating scenarios for the current portfolio on the basis of historical major claims.

For inward reinsurance purposes, modeling based on the group's own claims history is also used to determine the overall solvency requirement for the risk of **man-made catastrophe**. This involves generating scenarios for the current portfolio on the basis of the historical major claims.

17.5.2 Risk management in direct non-life insurance business

Premium and reserve risk is managed through risk selection, risk-oriented premiums and products, and profit-oriented underwriting guidelines. In order to maintain a balanced risk profile, R+V ensures it has reinsurance cover for major individual risks. Managers use planning and control tools to ensure they are in a position at an early stage to identify unexpected or adverse portfolio or claim trends and to initiate appropriate corrective action in response to the changes in the risk situation. To make these risks manageable, pricing is based on a calculation that uses mathematical/statistical modeling.

The measurement of the overall solvency requirement for **natural catastrophe risk** is supplemented by analysis of the policy portfolio. This analysis carried out with the aid of tools such as the ZÜRS Geo information system (zoning system for flooding, backwater flooding, and heavy rainfall) investigates risk concentrations and changes in these concentrations over time. The use of geographical diversification and the deployment of underwriting guidelines form the basis for managing risks arising from natural disasters.

R+V uses a prospective limit system to verify whether prescribed limits for the risk from natural disasters will be adhered to. The risk exposure reached on the basis of projected business growth is compared against a limit determined from the allocated internal risk capital.

To reduce actuarial risk, R+V purchases facultative and obligatory reinsurance cover, formulates risk exclusions, and designs risk-appropriate deductible models. Risk-bearing capacity is reviewed as part of the reinsurance decision-making process. This is used as the basis for reinsurance structures and liability layers.

The effects of inflation are factored into the costing of insurance rate scales for new business and into premium and index adjustments for in-force business.

17.5.3 Risk management in inward non-life business

R+V counters **premium and reserve risk** by continuously monitoring the market as well as the economic and political situation, by managing risk in accordance with its corporate strategy, and by setting insurance rates appropriate to the risk involved. The risk is managed on the basis of an earnings-driven underwriting policy. The assumption of risk is circumscribed by mandatory underwriting guidelines and limits that restrict potential liability arising from both individual and cumulative claims. R+V takes account of economic capital costs when underwriting risk. Compliance with these requirements is monitored.

The material actuarial risks in the inward reinsurance portfolio are **catastrophe risk**, long tail risk, reserve risk and also far-reaching changes in the trends underlying the main markets. The actual and potential losses arising from the level and frequency of claims under natural disaster insurance are recorded and assessed using industry-standard software and R+V's own additional verification systems. The portfolio is continuously monitored for possible concentrations of natural disaster risk.

Limits are set to support central management and limitation of cumulative risks arising from individual natural hazards. One of the mechanisms for managing risk is a systematic check on the cumulative authorized limits for natural disaster risks. The monitoring and management of limits may include the reallocation or adjustment of capacities. The modeled exposures remained within the authorized limits.

Action that can be taken to mitigate the risk includes management of deductibles and retrocession taking into account risk-bearing capacity and the effective costs of retrocession. Minimum requirements apply in relation to the credit rating of retrocessionaires. To minimize peak risk in connection with natural disasters in Europe, the

United States, and other regions of the world to which it is exposed, R+V has entered into a number of retrocession agreements as part of its inward reinsurance business.

R+V monitors the claims rate trend promptly and continuously, allowing it to initiate preventive measures so that it always has a sufficient level of reserves. The reserves position is monitored in a number of ways, including by means of an expert report, which is prepared once a year.

17.6 Impact of the war in Ukraine

In view of the developments in connection with the war in Ukraine, no risks are underwritten in respect of Russia and Belarus in new **direct non-life insurance business** as a rule. In in-force business, no policies are extended. Exceptions apply in respect of corporate customer business. Furthermore, the effects of a possible gas embargo are considered using impact analyses and stress tests.

In relation to credit insurance policies assigned to inward reinsurance business, R+V imposed extensive underwriting restrictions in respect of Russian, Ukrainian, and Belarusian counterparties in 2022. A small volume of claims were recorded for these counterparties during the reporting period. The war in Ukraine did not lead to any significant increase in non-life actuarial risk, within which risk from credit insurance policies is included.

17.7 Claims rate trend in non-life insurance

In **direct non-life insurance business**, costs for natural disaster claims and major claims declined year on year. The natural disasters of particular note were a series of winter storms (Ylenia, Zeynep, and Antonia) and another series of storms (Emmelinde and Finja), which together resulted in a total claims volume for R+V of €161 million. A major claim of €71 million arose in the property insurance business. In both 2022 and 2021, R+V had reinsurance arrangements in place for natural disasters in the direct non-life insurance business, which is concentrated in Germany. The costs for basic claims in the non-life insurance business increased year on year. Taking into account the settlements relating to the provisions for claims outstanding carried over from the previous year, the net claims rate (based on figures recognized in the financial statements) rose from 74.0 percent in 2021 to 74.2 percent in 2022.

Costs for major claims and natural disaster claims went up year on year in the **inward reinsurance business**. Major claim events occurred in the United States, Caribbean, and Canada (derecho storms, hail and tornadoes, Hurricane Ian), South Africa (flooding), and Europe (series of winter storms, June storms). The resulting total claims incurred at R+V came to €327 million. To reduce the risk from the global reinsurance portfolio, a retrocession program was put in place that was more extensive than in previous years. Taking into account the settlements relating to the provisions for claims outstanding carried over from the previous year, the net claims rate (based on figures recognized in the financial statements) fell from 73.5 percent in 2021 to 73.3 percent in 2022.

Changes in claims rates and settlements (net of reinsurance) in direct non-life insurance and inward non-life reinsurance business are shown in Fig. 37.

FIG. 37 – INSURANCE SECTOR: CLAIMS RATE AND SETTLEMENTS (NET OF REINSURANCE)¹

	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Claims rate (net) as percentage of premiums earned										
Including major/natural disaster claims	73.9	73.8	76.5	76.3	76.2	76.6	76.1	76.2	75.5	78.2
Excluding major/natural disaster claims	66.1	68.0	70.4	72.7	71.1	72.8	72.3	74.0	73.8	69.1
Settlements (net) as percentage of provision for incoming claims										
Non-life	2.9	2.9	1.9	0.6	1.1	3.1	3.6	1.6	2.1	0.5

¹ Direct non-life insurance business and inward non-life reinsurance.

17.8 Risk position

As at December 31, 2022, the **overall solvency requirement** for **life actuarial risk** amounted to €1,045 million (December 31, 2021: €343 million) with a **limit** of €1,200 million (December 31, 2021: €600 million). The increase in risk was due to higher lapse risk resulting from the rise in interest rates during the reporting year.

As at the reporting date, the **overall solvency requirement** for **health actuarial risk** was €163 million (December 31, 2021: €231 million) with a **limit** of €300 million (December 31, 2021: €350 million). The decrease in risk was due to the decline in insurance liabilities as a consequence of the rise in interest rates.

The **overall solvency requirement** for **non-life actuarial risk** amounted to €1,807 million as at December 31, 2022 (December 31, 2021: €1,939 million) with a **limit** of €3,000 million (December 31, 2021: €4,600 million). Again, the reduction in risk was largely due to decreased insurance liabilities as a consequence of the rise in interest rates.

18 Market risk

18.1 Definition and business background

18.1.1 Definition

Market risk describes the risk arising from fluctuation in the level or volatility of market prices of assets, liabilities, and financial instruments that have an impact on the value of the assets and liabilities of the entity. It reflects the structural mismatch between assets and liabilities, in particular with respect to their maturities. In accordance with the breakdown specified in Solvency II, the bulk of credit risk within market risk is assigned to spread risk. The other parts of credit risk are measured within counterparty default risk and other risk types.

Market risk is broken down into the following subcategories:

- **Interest-rate risk** describes the sensitivity of the values of assets, liabilities, and financial instruments to changes in the term structure of interest rates or to the volatility of interest rates.
- **Spread risk** describes the sensitivity of the values of assets, liabilities, and financial instruments to changes in the level or volatility of credit spreads above the risk-free interest-rate term structure. Default risk and migration risk are also included in this subcategory. The credit spread is the difference in interest rates between a high-risk and a risk-free fixed-income investment. Changes in the credit risk premiums lead to changes in the market value of the corresponding securities.
- **Equity risk** describes the sensitivity of the values of assets, liabilities, and financial instruments to changes in the level or volatility of the market prices of equities. Equity investment risk is also a part of equity risk. Equity risk arises from existing equity exposures as a result of market volatility.
- **Currency risk** describes the sensitivity of the values of assets, liabilities, and financial instruments to changes in the level or volatility of exchange rates. Currency risk arises as a result of exchange rate volatility either from investments held in a foreign currency or the existence of a currency imbalance between insurance liabilities and investments.
- **Real-estate risk** describes the sensitivity of the values of assets, liabilities, and financial instruments to changes in the level or volatility of the market prices of real estate. Real-estate risk can arise as a result of negative changes in the fair value of real estate held directly or indirectly. This may be the result of a deterioration in the specific characteristics of the real estate or a general change in market prices (for example in connection with a real estate crash).

18.1.2 Business background

Market risk arises in the insurance business as a result of investing activities. It is caused by the timing difference between the payment of premiums by the policyholder and the payments for claims and benefits by the insurance company, and by endowment-type business in personal insurance.

18.2 Risk factors

A **further rise in interest rates** and a widening of bond spreads could lead to a further reduction in the fair values of investments. Information on a further unexpected rise in interest rates can be found in chapter VII.4.2.2. The **widening of spreads** could be triggered by **macroeconomic risk factors**. These factors are the risks to the global economy from the COVID-19 pandemic, international trade disputes, Russia's war of aggression in Ukraine, and geopolitical tensions (see chapter VII.4.2). Falls in fair value caused by a rapid rise in interest rates or the widening of spreads could have a temporary impact on operating profit at R+V, or a permanent impact if investments have to be sold. A negative change in the fair values of investments associated with a widening of spreads in isolation could also have an adverse impact on R+V's solvency situation.

Other risk factors associated with investing activities could arise from **sustainability risk**. For example, action by policymakers, decisions by the courts, or the withdrawal of licenses could have an adverse effect on the price of corporate bonds or on the share prices of equities held in the R+V portfolio and exposed to transition risk. The value of the portfolio could also be hit by rising inflation as a consequence of higher energy and carbon prices. Furthermore, R+V is exposed to a risk of reputational damage if it invests in businesses that are responsible for environmental pollution, fail to adhere to social norms, neglect their data protection responsibilities, or inadequately implement measures to prevent corruption, fraud, or tax evasion.

The **real estate markets underwent a correction** in 2022. The potential negative impact on real estate finance at R+V was analyzed. No increase in risk has been identified so far.

18.3 Risk management

18.3.1 Market risk measurement

The measurement of market risk involves analyzing shock scenarios specified in **Solvency II** requirements, in some cases supplemented by the group's own parameterization.

The capital requirements for **interest-rate risk** are determined on the basis of shock scenarios calculated for an increase in interest rates and a decrease in interest rates. R+V uses the shock factors in the standard formula to calculate the overall solvency requirement for interest-rate risk. It also includes a capital buffer that takes into account changes in the direction of interest-rate trends.

The capital requirements for **spread risk** are calculated using a factor approach based on the relevant lending volume. The level of the shock factor is determined by the security's rating and the modified duration of the investment. With loan securitizations, a distinction is made between single, double, and multiple securitization structures. Depending on which is applicable, different rating-dependent shock factors are used. R+V uses its own shock factors, based on a portfolio model and with particular regard to concentration risk, to calculate the overall solvency requirement.

The capital requirements for **equity risk** are determined on the basis of stress scenarios calculated for a decrease in market value. The stress amounts depend on the equity type, e.g. whether it is listed on a regulated market in a member state of the European Economic Area or Organisation for Economic Co-operation and Development (OECD). The capital requirement for equity risk is based on the relevant equity exposure. It is determined using modeling and risk quantification based on observable data. The parameters are increased in order to take account of default risk and concentration risk. Default risk describes the risk of loss resulting from issuer insolvency.

Currency risk is calculated using a scenario approach that reflects the impact of a decrease or increase in the exchange rate for a foreign currency. The shock factor for determining the overall solvency requirement is based on the individual currency portfolio of R+V. Lower factors are applied for currencies that are pegged to the euro than for those that are not pegged to the euro.

The calculation of **real-estate risk** looks at both property held directly (e.g. land and buildings) and real estate funds. The shock factor for determining the overall solvency requirement for real-estate risk is a stress scenario adapted from the standard formula and reflects the fact that direct holdings consist overwhelmingly of investments in German real estate and fund holdings consist primarily of European real estate.

The overall solvency requirement for **concentration risk** is not calculated separately because this risk is taken into account in the calculations for equity risk, spread risk, and counterparty default risk.

18.3.2 Principles of market risk management

The risk attaching to investments is managed in accordance with the guidelines specified by EIOPA, the stipulations in VAG, the information provided in regulatory circulars, and internal investment guidelines (for details, see 'Market risk strategy' in chapter VII.16.1). R+V aims to ensure compliance with the internal provisions in the risk management guidelines for investment risk and with other regulatory investment principles and regulations by means of investment management, internal control procedures, a forward-looking investment policy, and organizational measures. The management of risk encompasses both economic and accounting aspects.

R+V counters investment risk by observing the principle of achieving the greatest possible security and profitability while safeguarding liquidity. By maintaining a mix and diversification of investments, R+V's investment policy aims to take into account the objective of mitigating risk.

In addition to diversification via maturity dates, issuers, countries, counterparties, and asset classes, limits are also applied in order to mitigate risk.

Asset/liability management investigations are carried out at R+V. The necessary capital requirement to maintain solvency is reviewed on an ongoing basis with the support of stress tests and scenario analyses. Specifically, reviews are carried out to assess the effects of a further increase in interest rates and volatile capital markets. R+V uses derivatives to manage market risk.

18.3.3 Management of individual market risk categories

In the management of **interest-rate risk**, R+V adheres to the principle of a mix and diversification of investments, combined with balanced risk-taking in selected asset classes and duration management that takes account of the structure of obligations. Furthermore, the use of pre-emptive purchases helps to provide a constant return from investments and to manage changes in interest rates and duration. A portion of the fixed-income investment portfolio has also been protected against a fall in prices.

In the management of **spread risk**, R+V pays particular attention to high credit ratings for investments, with the overwhelming majority of its fixed-income portfolio being held in investment-grade paper (see also Fig. 43 in chapter VII.18.4.2). The use of third-party credit risk evaluations and internal expert assessments, which are often more rigorous than the credit ratings available in the market, serves to further minimize risk.

Mortgage lending is also subject to internal rules that help to limit default risk.

Equity risk is mitigated by diversifying holdings across different equity asset classes and regions. Asymmetric strategies are also used to reduce or increase equity exposure under a rules-based approach. At R+V, equities are used as part of a long-term investment strategy to guarantee that obligations to policyholders can be satisfied; generating profits by exploiting short-term fluctuations to sell shares is not its objective. The risk of having to sell equities at an inopportune moment is mitigated by the broadly diversified portfolio of investments.

Currency risk is controlled by systematic foreign-exchange management. Virtually all reinsurance assets and liabilities are denominated in the same currency.

Real-estate risk is mitigated by diversifying holdings across different locations and types of use.

Concentration risk is reduced by mixing and diversifying investments. This is particularly apparent from the granular structure of the issuers in the portfolio.

R+V's investment portfolio is regularly evaluated on the basis of **key sustainability figures**, including ESG scores obtained from third-party data providers. These are drawn from assessments of climate risk, controversies, and breaches of standards, such as the UN Global Compact. A target has been set of achieving climate neutrality for investments by 2050. This target includes existing CO₂ targets for the corporate bonds and equities asset classes as well as the definition of specific targets for other asset classes as soon as this is possible. R+V can initiate processes to engage with individual issuers in order to mitigate ESG risks.

18.3.4 Management of risk concentrations

R+V's investment approach focuses on avoiding risk concentrations in the portfolio and optimizing its risk profile by broadly diversifying investments. To achieve this, it applies the principle of an appropriate mix and diversification of investments and complies with the quantitative limits specified through the internal rules in the risk management guidelines for investment risk.

Risk concentrations are analyzed at least annually to assess whether they are material or not. Potential risk concentrations arise from the combination of analyzed risk type and type of concentration (e.g. individual exposure, sector, country, or region). The analysis pays particular attention to the risk-adjusted view, i.e. risk remaining after the risk-mitigating effects of insurance liabilities have been taken into account. Items currently of particular note in this regard are the portfolios of Italian government bonds combined with the shares held in the Italian Assimoco companies for business-policy reasons and the long-term interest-rate risks arising from pension products in force for a long period of time. These risks are consciously assumed.

18.3.5 Distinctive features of managing market risk in personal insurance business

For life insurance contracts and for casualty insurance contracts with premium refund clauses that guarantee minimum returns, there is a risk that the guaranteed minimum return agreed for certain products when contracts are signed cannot be generated in the capital markets over the long term. In the case of products with long-term guarantees, there is a risk of negative variances over the term of the contracts compared with calculation assumptions because of the length of time covered by the contracts. The main reasons for variances are the change in the capital market environment and maturity mismatches between investments and insurance contracts.

Market risk can be countered by writing new business that takes into account the current capital market situation and by taking action to boost the portfolio's risk-bearing capacity. It is crucial to ensure that there is enough free capital that can be made available even in adverse capital market scenarios. The necessary capital requirement to maintain solvency is reviewed on an ongoing basis with the aid of stress tests and scenario analyses as integral components of asset/liability management.

Risk is essentially mitigated by recognizing a supplementary change-in-discount-rate reserve as specified in the Regulation on the Principles Underlying the Calculation of the Premium Reserve (DeckRV) and adding to the

discount rate reserves for existing contracts, thereby reducing the average interest liabilities. In 2022, R+V reduced these supplementary reserves in the life insurance business by a total of €175 million to €5,233 million due to the rise in interest rates. These reserves for casualty insurance with premium refund were lowered by €7 million to €36 million.

Policyholder participation in the form of future declarations of bonuses is also a key instrument used to reduce market risk attaching to life insurance.

The breakdown of benefit reserves by discount rate for the main life and casualty insurance portfolios is shown in Fig. 38.

A summary of the actuarial assumptions for calculating the benefit reserves for the main life and casualty insurance portfolios is presented in note 11 of the notes to the consolidated financial statements. It forms part of the notes on the accounting policies applicable to the 'Benefit reserve' line item on the balance sheet.

The company actuarial discount rate calculated in accordance with the procedure developed by the Deutsche Aktuarvereinigung e.V. (DAV) [German Actuarial Association] is used in determining the health insurance discount rate. This procedure is based on a fundamental professional principle issued by the DAV for determining an appropriate discount rate. As a result of these calculations, the discount rate was reduced in 2022 for observation units with a premium adjustment effective January 1, 2022.

FIG. 38 – INSURANCE SECTOR: BENEFIT RESERVES BY DISCOUNT RATE FOR THE MAIN INSURANCE PORTFOLIOS¹

Discount rate	Proportion of total benefit reserve in 2022 ²		Proportion of total benefit reserve in 2021 ²	
	€ million	Percent	€ million	Percent
0.00%	7,074	9.4	6,897	9.3
0.01%	73	0.1	98	0.1
0.08%	5	–	5	–
0.10%	38	0.1	21	–
0.15%	65	0.1	–	–
0.25%	2,438	3.2	1,453	2.0
0.30%	160	0.2	159	0.2
0.35%	1,026	1.4	956	1.3
0.40%	60	0.1	44	0.1
0.50%	215	0.3	213	0.3
0.75%	1	–	–	–
0.90%	8,675	11.5	8,545	11.5
1.00%	93	0.1	121	0.2
1.10%	372	0.5	225	0.3
1.25%	2,780	3.7	2,721	3.7
1.50%	47	0.1	12	–
1.55%	8	–	14	–
1.75%	6,643	8.8	6,403	8.6
1.80%	285	0.4	1,054	1.4
2.00%	858	1.1	610	0.8
2.25%	11,922	15.8	11,640	15.7
2.50%	95	0.1	96	0.1
2.75%	9,194	12.2	8,962	12.1
3.00%	1,468	2.0	1,974	2.7
3.25%	7,209	9.6	7,159	9.6
3.50%	2,704	3.6	3,108	4.2
3.75%	120	0.2	3	–
4.00%	6,865	9.1	7,102	9.6

¹ The table covers the following insurance products that include a guaranteed rate of return:

- Casualty insurance policies with premium refund
- Casualty insurance policies with premium refund as pension insurance
- Pension insurance policies
- Endowment insurance policies, including capital accumulation, risk and credit insurance policies, pension plans with guaranteed insurance-based benefits
- Capital deposit products

² The share of the total benefit reserve attributable to supplementary insurance policies is listed under the relevant actuarial assumptions for the associated main insurance policy.

18.3.6 Managing risk arising from defined benefit pension obligations

The R+V entities have pension obligations (defined benefit obligations) to their current and former employees. By entering into such direct defined benefit obligations, they assume a number of risks, including risks associated with the measurement of the amounts recognized on the balance sheet, in particular risk arising from a change in the discount rate, risk of longevity, inflation risk, and risk in connection with salary and pension increases. A requirement may arise to adjust the existing provisions for pensions and other post-employment benefits as a result of decisions by the courts, legislation, or changes in the (consolidated) financial reporting. The plan assets at R+V are assets in reinsured pension schemes and funds, and are subject to interest-rate risk. The strategy adopted for the pension assets is predominantly driven by the defined benefit obligations.

18.4 Lending volume

18.4.1 Reconciliation of the lending volume

The amount and structure of the lending volume are key factors for the aspects of credit risk reflected in market risk and counterparty default risk. To identify possible risk concentrations, the volume liable to credit risk is broken down by rating class, industry sector, and country group.

Fig. 39 shows a reconciliation of the lending volume on which the risk management is based to individual balance sheet items in order to provide a transparent illustration of the link between the consolidated financial statements and risk management. There are discrepancies between the internal management and external consolidated financial reporting measurements for some portfolios owing to the focus on the risk content of the items. Other main reasons for the discrepancies between the two sets of figures are differences in the scope of consolidation, differences in the definition of lending volume, and various differences in recognition and measurement methods.

FIG. 39 – INSURANCE SECTOR: RECONCILIATION OF THE LENDING VOLUME

€ billion		Reconciliation						Lending volume for the consolidated financial statements		
Lending volume for internal management accounts		Scope of consolidation		Definition of the lending volume		Carrying amount and measurement				Investments held by insurance companies (note 57 to the consolidated financial statements)
Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	Dec. 31, 2022	Dec. 31, 2021	
								11.0	13.0	of which: mortgage loans
								5.9	7.2	of which: promissory notes and loans
								5.4	8.5	of which: registered bonds
								0.8	1.0	of which: other loans
								13.0	13.7	of which: variable-yield securities
								47.7	61.4	of which: fixed-income securities
								0.3	0.2	of which: derivatives (positive fair values)
								0.4	0.5	of which: deposits with ceding insurers
84.4	104.5	-1.5	-1.4	–	-0.3	1.6	2.8	84.5	105.6	Total
Balance as at Dec. 31, 2022								0.1	0.1%	
Balance as at Dec. 31, 2021								1.1	1.1%	

Not relevant

18.4.2 Change in lending volume

In accordance with the breakdown specified in Solvency II, the bulk of credit risk within market risk is assigned to spread risk. The capital requirements for spread risk are calculated using a factor approach based on the relevant lending volume.

As at December 31, 2022, the **total lending volume** of R+V had decreased by 19 percent to €84.4 billion (December 31, 2021: €104.5 billion). This decrease was primarily the result of a fall in the fair values of fixed-income securities as a consequence of the rise in interest rates.

The volume of lending in the **home finance** business totaled €13.7 billion as at December 31, 2022 (December 31, 2021: €13.1 billion). Of this amount, 87 percent was accounted for by loans for less than 60 percent of the value of the property, a situation that was unchanged compared with December 31, 2021.

The volume of home finance was broken down by finance type as at the reporting date as follows (figures as at December 31, 2021 shown in parentheses):

- Consumer home finance: €12.3 billion (€11.9 billion)
- Commercial home finance: €0.1 billion (€0.1 billion)
- Commercial finance: €1.3 billion (€1.1 billion)

In the case of home finance, the entire volume disbursed is backed by traditional loan collateral.

The financial sector and the public sector, which are the dominant **asset classes**, together accounted for 64 percent of the total lending volume as at December 31, 2022 (December 31, 2021: 67 percent).

The explanation of the asset class concept in the Bank sector (see chapter VII.9.6.3) applies analogously to the Insurance sector. Fig. 40 shows the breakdown of the lending volume by asset class.

FIG. 40 – INSURANCE SECTOR: LENDING VOLUME, BY ASSET CLASS

€ billion	Dec. 31, 2022	Dec. 31, 2021
Financials	36.4	46.7
Corporates	12.2	16.3
Public sector	17.5	22.9
Real estate (commercial and retail customers)	16.8	16.3
ABSs and ABCPs ¹	1.6	1.5
Other	–	0.8
Total	84.4	104.5

¹ ABSs = asset-backed securities, ABCPs = asset-backed commercial paper.

The **geographical breakdown** used for the lending volume has been changed in the same way as for the Bank sector (see chapter VII.9.6.4). Fig. 41 reveals that Europe accounted for the lion's share – 74 percent – of the lending volume outside Germany as at December 31, 2022 (December 31, 2021: 75 percent).

FIG. 41 – INSURANCE SECTOR: LENDING VOLUME, BY COUNTRY GROUP

€ billion	Dec. 31, 2022	Dec. 31, 2021
Europe	40.2	50.7
of which: eurozone	31.6	38.1
North America	7.5	9.0
Central America	0.5	0.6
South America	0.8	1.0
Asia	3.0	3.6
Africa	0.3	0.3
Other	1.6	2.2
Total	54.0	67.5

Obligations in connection with the life insurance business require investments with longer maturities. This is also reflected in the breakdown of **residual maturities** shown in Fig. 42. As at December 31, 2022, 85 percent (December 31, 2021: 86 percent) of the total lending volume had a residual maturity of more than five years. The proportion of the total lending volume due to mature within one year was 3 percent as at the reporting date (December 31, 2021: 3 percent).

FIG. 42 – INSURANCE SECTOR: LENDING VOLUME, BY RESIDUAL MATURITY

€ billion	Dec. 31, 2022	Dec. 31, 2021
≤ 1 year	2.1	2.6
> 1 year to ≤ 5 years	10.9	12.3
> 5 years	71.4	89.5
Total	84.4	104.5

The **rating structure** of the lending volume in the Insurance sector is shown in Fig. 43. Of the total lending volume as at December 31, 2022, 75 percent was attributable to investment-grade borrowers (December 31, 2021: 79 percent). The lending volume that is not rated, which made up 24 percent of the total lending volume (December 31, 2021: 19 percent), essentially comprised consumer home finance for which external ratings were not available. The unrated lending volume is deemed to be low-risk because the lending is based on a selective approach and the mortgageable value of the assets is limited.

FIG. 43 – INSURANCE SECTOR: LENDING VOLUME, BY RATING CLASS

€ billion		Dec. 31, 2022	Dec. 31, 2021
Investment grade	1A	21.2	27.0
	1B	9.0	11.7
	1C	–	–
	1D	9.9	12.6
	1E	–	–
	2A	7.9	11.1
	2B	4.8	6.2
	2C	5.1	7.3
	2D	2.6	3.2
	2E	–	–
	3A	2.6	3.5
Non-investment grade	3B	0.3	0.3
	3C	0.3	0.5
	3D	–	–
	3E	0.2	0.2
	4A	0.1	0.1
	4B	0.3	0.5
	4C	0.1	0.1
	4D	–	–
	4E	–	–
Default		–	–
Not rated		20.1	20.2
Total		84.4	104.5

To rate the creditworthiness of the lending volume, R+V uses external ratings that have received general approval. It also applies its own expert ratings in accordance with the provisions of Credit Rating Agency Regulation III to validate the external credit ratings. R+V has defined the external credit rating as the maximum, even in cases where its own rating is better. The ratings calculated in this way are matched to the DZ BANK credit rating master scale using the methodology shown in Fig. 20 (chapter VII.9.5.1).

In the analysis of **individual concentrations**, the ten counterparties associated with the largest lending volumes accounted for 17 percent of R+V's total lending volume as at December 31, 2022 (December 31, 2021: 18 percent).

18.4.3 Credit portfolios particularly affected by negative macroeconomic conditions

The lending volume in **eurozone periphery countries** decreased in the second half of 2022. This means that, unlike in the 2021 risk report, R+V's affected exposures are no longer considered to be credit portfolios with increased risk content. Nevertheless, Portugal, Spain and, in particular, Italy continue to be monitored closely as their debt levels remain high and because there is continuing fallout from the COVID-19 pandemic. If there is a further rise in interest rates in the future, the credit risk in these countries may potentially increase again. The figures presented below are included in the above analyses of the total lending volume (see chapter VII.18.4.2).

Investments in eurozone periphery countries totaled €4,404 million as at December 31, 2022 (December 31, 2021: €5,822 million). This constituted a reduction of 24 percent, which was largely attributable to a fall in fair values and maturities.

Fig. 44 shows the country breakdown of the investments.

FIG. 44 – INSURANCE SECTOR: EXPOSURE IN EUROZONE PERIPHERY COUNTRIES

€ million	Dec. 31, 2022	Dec. 31, 2021
Portugal	37	49
Italy	2,082	2,844
Spain	2,285	2,929
Total	4,404	5,822

18.4.4 Credit portfolios particularly affected by acute global crises

Credit portfolios particularly affected by the war in Ukraine

As at December 31, 2021, R+V's net lending volume in Russia, Ukraine, and Belarus had stood at €191 million. It related to a securities portfolio that has since been disposed of entirely. As a result, there was no longer any risk in this regard as at December 31, 2022.

Over and above the countries involved in the war in Ukraine, the conflict has a negative impact globally on the credit ratings of securities issuers. This was also reflected in R+V's other securities exposures, which showed minor rating downgrades in 2022.

Credit portfolios particularly affected by the general rise in energy prices

Despite supplies of gas from Russia being cut off, no acute shortage of gas had materialized by the reporting date. So far, only a few subportfolios have been particularly affected by the rise in general energy prices. Overall, the impact in 2022 was moderate. Nonetheless, the increase in prices may lead to higher credit risk in the Insurance sector going forward.

18.5 Risk position

As at December 31, 2022, the **overall solvency requirement** for market risk amounted to €3,188 million (December 31, 2021: €3,169 million) with a **limit** of €3,880 million (December 31, 2021: €4,400 million). The change was largely driven by the increased risk capital buffer for interest-rate risk. This outweighed the countervailing effects from the decrease in the fair values of investments on the back of the rise in interest rates and from falls in share prices.

Fig. 45 shows the overall solvency requirement for the various types of market risk.

FIG. 45 – INSURANCE SECTOR: OVERALL SOLVENCY REQUIREMENT FOR MARKET RISK, BY RISK SUBTYPE

€ million	Dec. 31, 2022	Dec. 31, 2021
Interest-rate risk	2,063	1,250
Spread risk	889	1,305
Equity risk	1,227	1,332
Currency risk	269	319
Real-estate risk	445	441
Total (after diversification)	3,188	3,169

19 Counterparty default risk

19.1 Definition and business background

Counterparty default risk reflects losses that could arise from unexpected default or deterioration in the credit standing of counterparties and debtors of insurance and reinsurance companies over the following twelve months. It covers risk-mitigating contracts, such as reinsurance arrangements, securitizations and derivatives, and receivables from intermediaries, as well as any other credit risk that is not otherwise covered by risk measurement.

Counterparty default risk takes account of collateral or other security that is held by the insurance or reinsurance company and any associated risks.

19.2 Risk factors

Counterparty default risk can arise as a result of unexpected default or deterioration in the credit standing of mortgage loan borrowers, counterparties of derivatives, reinsurance counterparties, policyholders, or insurance brokers.

19.3 Risk management

19.3.1 Measurement of counterparty default risk and management of limits

The capital requirements for counterparty default risk are determined on the basis of the relevant exposure and the expected losses per counterparty. R+V manages counterparty default risk at individual entity level.

Volume and counterparty limits apply to transactions involving derivatives. The various risks are monitored and transparently presented as part of the reporting system. Only economic hedges are used and they are not reported on a net basis in the consolidated financial statements.

R+V uses the views expressed by the international rating agencies in conjunction with its own credit ratings to help it to assess counterparty and issuer risk. Compliance with the limits for major counterparties is reviewed on an ongoing basis, with checks on limit utilization and compliance with investment guidelines.

19.3.2 Mitigating counterparty default risk

Default management mitigates the risks arising from defaults on receivables relating to direct insurance operations with policyholders and insurance brokers. The risk of default on receivables is also addressed by recognizing general loan loss allowances, which are calculated on the basis of past experience. The average ratio of defaults to gross premiums written over the past three years was 0.1 percent, which was unchanged on the figure as at December 31, 2021.

The default risk for receivables arising from inward and ceded reinsurance business is limited by constantly monitoring credit ratings and making use of other sources of information in the market.

19.4 Risk position

Receivables arising from ceded reinsurance amounted to €145 million as at December 31, 2022 (December 31, 2021: €121 million). At the end of both 2022 and 2021, almost all of this amount was accounted for by entities with an external rating of A or better. Receivables from entities with an external rating of BBB or worse made up less than 1 percent of the total volume, as had also been the case at the end of 2021. The remaining receivables related to entities without a rating.

Overdue receivables from policyholders and insurance brokers more than 90 days past due as at the reporting date amounted to €158 million as at December 31, 2022 (December 31, 2021: €149 million).

As at December 31, 2022, the **overall solvency requirement** for counterparty default risk amounted to €227 million (December 31, 2021: €235 million) with a **limit** of €350 million that was unchanged compared with the end of 2021.

20 Reputational risk

20.1 Definition and business background

Reputational risk is defined as the risk of losses that could arise from damage to the reputation of R+V or of the entire industry as a result of a negative perception among the general public (for example, customers, business partners, shareholders, authorities, media).

Reputational risk can arise as an independent risk (primary reputational risk) or as an indirect or direct consequence of other types of risk, such as operational risk (secondary reputational risk).

20.2 Risk factors

If R+V acquires a negative reputation, there is a risk that existing or potential customers will be unsettled with the result that existing business relationships might be terminated or it might not be possible to carry out planned transactions. There is also a risk that R+V's adverse reputation is then transferred to the entities in the Bank sector and it may no longer be possible to guarantee the backing of stakeholders, such as network partners and employees, necessary to conduct business operations.

If the transition risks, social risks, and corporate governance risks assessed in connection with ESG risks were to materialize, this could give rise to heightened reputational risk.

20.3 Risk management

R+V's corporate communications are coordinated centrally so that any inaccurate presentation of circumstances can be countered. Media reports about the insurance industry in general and R+V in particular are monitored and continuously analyzed across all R+V departments.

R+V's reputational risk is not specifically quantified within the Solvency II framework. However, it is implicitly included in the overall solvency requirement for life actuarial risk (lapse risk).

21 Operational risk

21.1 Definition and business background

Operational risk is defined as the risk of losses arising from inadequate or failed internal processes, personnel, or systems, or from external events.

Operational risk in the Insurance sector is broken down into the following components:

- Legal and compliance risk
- Information risk including ICT risk
- Security risk
- Outsourcing risk
- Project risk

Operational risk could arise in any division of R+V.

Sustainability risk in the form of environmental, social, or corporate governance risk could be a risk factor that gives rise to operational risk. Risk factors are described under the relevant component of operational risk.

21.2 Central risk management

The **risk capital requirement** for operational risk in the Insurance sector is determined in accordance with the standard formula in Solvency II. The risk calculation uses a factor approach, taking account of premiums, provisions and, in the case of unit-linked business, costs.

R+V uses scenario-based risk self-assessments and risk indicators to manage and control operational risk. In the **risk self-assessments**, operational risk is assessed in terms of the probability of occurrence and the level of loss. Qualitative assessments can be used in exceptional cases.

Risk indicators are intended to help the Insurance sector to identify risk trends and concentrations at an early stage and to detect weaknesses in business processes. A system of warning lights is used to indicate risk situations based on specified threshold values.

To support the management of operational risk, all of R+V's business processes are structured in accordance with the requirements of the **framework guidelines** for the authorizations and powers of attorney of employees in R+V entities. Divisions not covered by these guidelines are subject to other policy documents, including policies on new business and underwriting.

The **internal control system** is a key instrument used by R+V to **limit operational risk**. Rules and controls in each department and reviews of the use and effectiveness of the internal control system carried out by Group Audit at R+V aim to avert the risk of errors and fraud. Payments are largely automated. Powers of attorney and authorizations stored in user profiles, as well as automated submissions for approval based on a random generator, are also used. Manual payments are approved by a second member of staff.

21.3 Operational risk components

21.3.1 Legal and compliance risk

Risk factors

Legal risk may arise from changes in the legal environment, including changes in the way that the authorities or the courts interpret legal provisions. In particular, there is a risk that the implemented compliance and risk management systems could be inadequate for completely preventing or uncovering violations of legal provisions, for identifying and assessing all relevant risks, or for initiating appropriate corrective measures. Examples of relevant situations are notifiable infringements of data protection regulations, breaches of reporting or notification requirements to supervisory or tax authorities, and violations of sanctions or embargoes.

Effects if risk materializes

Violations of legal provisions may have legal implications for R+V, for the members of its decision-making bodies, or for its employees. They may give rise, for example, to fines, penalties, retrospective tax payments, or claims for damages by third parties. These effects could reduce R+V's appeal as a partner in business transactions and lead to losses in value.

Risk management

The basic principles for managing compliance risk applicable to the entities in the DZ BANK Group are described in chapter VII.3.5.5. The data protection measures in place and the code of conduct are also explained in the same chapter.

At R+V, legal disputes arising from the processing of insurance claims or benefit payments are covered by insurance liabilities, and therefore do not form part of operational risk. R+V monitors and analyzes relevant decisions by the courts with a view to mitigating legal risk by identifying any need for action in good time and implementing specific corrective measures. The compliance function has also implemented systems, processes, and controls in order to counter compliance risks.

21.3.2 Information risk including ICT risk

Risk factors

Information risk can arise from a failure to uphold the confidentiality, integrity, availability, or authenticity of information or data. If the risk is in connection with the use of information or communication technology (data media), it is referred to as ICT risk. This also includes cyber risk.

Effects if risk materializes

Malfunctions or breakdowns in data processing systems or in the programs used on these systems, including attacks from external sources – such as hackers or malware –, could have an adverse impact on the ability of the Insurance sector to efficiently maintain the processes necessary to carry out operating activities, protect saved data, ensure sufficient control, or continue to develop products and services. Furthermore, such malfunctions or breakdowns could lead to temporary or permanent loss of data. This could restrict operating activities, have a negative impact on reputation, or result in economic losses.

Risk management

The basic principles for managing information security applicable to the entities in the DZ BANK Group are described in chapter VII.3.5.6.

A core focus of R+V's IT risk strategy is to ensure that the operation of the information and communications infrastructures and application systems is stable, secure, and efficient. This is achieved through a risk-based IT provider approach, systematic identification of protection requirements, appropriate security strategies based on defined IT security standards, and business continuity planning.

Quality assurance in IT follows best practice. A daily meeting is held to discuss current topics and assign people to work on them. In addition, measures relating to adherence to service level agreements (e.g. system availability) are decided upon at monthly meetings attended by the IT divisional managers.

Physical and logical precautionary measures have been established for the purpose of data and application security and to ensure that day-to-day operations are maintained. A particular risk would be a partial or total breakdown in data processing systems. R+V counters this risk by using two segregated data processing centers in which the data and systems are mirrored, special access security, fire control systems, and an uninterruptible power supply supported by emergency power generators. Exercises are carried out to test a defined restart procedure to be used in disaster situations with the aim of checking the efficacy of this procedure. Data is backed up and held within highly secure environments in different buildings. Furthermore, data is mirrored to a tape library at a remote, off-site location.

Various IT security management procedures are used to identify, assess, and document cyber risks and then to systematically allocate these risks for processing. The processing status and risk treatment are tracked and reported centrally each month.

21.3.3 Security risk

Risk factors

Security risk can arise from inadequate protection of individuals, premises, assets, or time-critical processes. Examples are epidemics or pandemics resulting from the spread of pathogens over a huge area, or limitations on the use of resources because of a power outage, other interruption to energy supply, or natural disaster. Climate change could lead to more frequent and more severe natural disasters.

Effects if risk materializes

Business interruptions could mean that processes and workflows are disrupted over several days. Moreover, sensitive internal and external interfaces could be jeopardized by long-term business interruptions. Furthermore, such scenarios could also have a negative impact on reputation.

Risk management

To ensure that it is operational at all times, R+V has a business continuity management (BCM) system. This also includes the contingency and crisis management system and is documented in internal corporate guidelines. The R+V security and BCM conference with representatives from all divisions and sites provides strategic and functional support and is intended to ensure that activities within the R+V subgroup are coordinated. Reports on significant findings relevant to risk and on any exercises and tests that have been carried out are also submitted to the R+V Risk Committee.

The purpose of the BCM system is to ensure that R+V's operating activities can be maintained in the event of an emergency or crisis. To this end, (time-)critical business processes are recorded with the necessary resources. Any necessary documentation (such as business continuity planning) is prepared and reviewed. Special organizational structures, such as the R+V crisis management team and situation room, and the individual business continuity teams in the divisions and sites, have also been set up to deal with emergency and crisis situations.

Further details on business continuity management can be found in chapter VII.3.5.6.

21.3.4 Outsourcing risk

Risk factors

R+V aims to provide high-quality services at competitive terms and conditions based on efficient internal organization of its business activities. In this context, the outsourcing of activities to third-party service providers can bring benefits in terms of quality and costs. Outsourcing risk can arise if the service provider fails to comply with the strategic principles established by R+V or the related operational requirements when carrying out the outsourced activities. If a service provider is not suitable for the task or does not have the requisite financial stability, this could lead to defective performance or even loss of the service. Moreover, inappropriate management of operational risk by the service provider could have an adverse impact on business operations.

Effects if risk materializes

If the risk factors were to materialize, they could lead to a loss of business and to claims for damages from customers. They could also result in a negative impact on reputation.

Risk management

The basic principles for managing outsourcing applicable to the entities in the DZ BANK Group are described in chapter VII.3.5.7.

Using these principles as a starting point, R+V has put in place the following measures to protect against potential outsourcing risk:

- Structured categorization of outsourcing arrangements
- Identification of potential risk factors as part of the risk analysis
- Requirements for the mitigation of risk, including standard provisions that must be contractually agreed and integrated into business continuity management

21.3.5 Project risk

Risk factors

Project risk could arise from the inadequate clarification of project targets or orders, from deficiencies in subsequent implementation, from communication shortcomings both inside and outside the project, or from unexpected changes in the general parameters applicable to a project.

Effects if risk materializes

If project risk were to materialize, this could mean that the implementation of the project could require additional funds in excess of the budget. It could also give rise to further costs attributable to the failure to complete project requirements on schedule. Examples of such costs are additional costs in the line organization and impairment losses on capital investment related to the project.

Risk management

To provide a regulating framework for secure, efficient execution of projects, R+V has set up a Capital Investment Committee, which submits proposals for decision or approval and provides support for large-scale projects. After projects have been approved, project managers of all large-scale projects must report to the Capital Investment Committee. This ensures that projects are then subject to independent, close monitoring and control. The Capital Investment Committee is kept informed of adjustments to project targets and can intervene to provide guidance by becoming involved in discussions on targets.

21.4 Risk position

As at December 31, 2022, the **overall solvency requirement** determined for operational risk amounted to €599 million (December 31, 2021: €718 million). At €1,000 million, the **limit** as at the reporting date was unchanged compared with the end of the previous year. The reduction in risk was due to a decrease in insurance liabilities on the back of the rise in interest rates.

22 Risks from entities in other financial sectors

All entities that form part of the regulatory R+V Versicherung AG insurance group are generally included in the calculation of group solvency.

At R+V, the entities in other financial sectors mainly consist of pension funds and occupational pension schemes. Their **risk factors** generally correspond to the risk factors for risks backed by capital pursuant to Solvency II.

Risk is quantified for the pension funds and occupational pension schemes in accordance with the requirements currently specified by the insurance supervisor. This means applying the capital requirements in Solvency I, which are essentially calculated by applying a factor to the volume measures of benefit reserves and capital at risk.

R+V Pensionskasse AG is exposed to risks comparable with those faced by the life insurance entities in the R+V subgroup. The main risk management activities applicable in this case are those relating to life actuarial risk (see chapter VII.17.3.2), market risk (see chapter VII.18.3), counterparty default risk (see chapter VII.19.3), and operational risk (see chapter VII.21.2). R+V Pensionskasse AG largely stopped taking on new business on January 1, 2021. It is continuing to manage existing contracts as before.

The risk situation in a **pension fund** is determined to a significant degree by the nature of the pension plans offered. In pension plans offered by R+V involving defined contributions with a minimum benefit, it must be ensured that at least the sum of the contributions paid into the plan (net of any contributions covering biometric risk assumed by R+V) is available on the agreed pension start date.

R+V also offers pension plans that include guaranteed insurance-based occupational incapacity cover as well as pension benefits and benefits for surviving dependants. Market risk and all the risk types covered by actuarial risk are relevant as far as occupational pension provision is concerned. Longevity risk is also important in relation to pensions because of the guaranteed benefits involved. The risk management activities relating to life actuarial risk, market risk, counterparty default risk, and operational risk apply in this case. R+V aims to ensure that the ongoing pension plan contributions and the benefit reserve include sufficient amounts to cover the costs of managing pension fund contracts.

In the pension plans involving a benefit commitment without any insurance-based guarantees, R+V does not assume responsibility for any of the pension fund risk or investment risk because the benefits promised by the pension fund are subject to the proviso that the employer will also make up any difference required. This also applies to the period in which pensions are drawn. If the employer fails to make up the difference required, R+V's commitment is reduced to insurance-based guaranteed benefits based on the amount of capital still available.

In purely defined-contribution plans, the amount of the lifelong payments depends on the value of the pension capital upon retirement and, subsequently, on the performance of the collateral assets for covering the current annuities. This means that there is a risk for pension beneficiaries that the payments may fluctuate – and, specifically, may fall – depending on the value of the investment. Appropriate market risk management activities are carried out to counter this risk.

As at December 31, 2022, the **overall solvency requirement** for risks in connection with non-controlling interests in insurance companies and with entities in other financial sectors stood at €130 million with a **limit** of €180 million. Both figures were unchanged year on year.