

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.

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, 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 sections 13 and 19 (Reputational risk) and in sections 14 and 20 (Operational risk).

DZ BANK Group

2 Summary

2.1 Risk management system

2.1.1 Fundamental features

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.

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 strategy and have been approved by the Board of Managing Directors. The **risk appetite statement** contains risk policy guidelines and risk strategy requirements applicable throughout the group. It also sets out quantitative requirements reflecting risk appetite.

The methods used to **measure risk** are an integral element of the risk management system and are progressively refined and enhanced. Risk model calculations are used to manage the DZ BANK Group, DZ BANK, and its subsidiaries.

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 system therefore incorporates various elements, including 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 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.

2.1.2 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 and the minimum requirement for own funds and eligible liabilities (MREL).

2.1.3 Management units

Based on the requirements set out in GAS 20.A1.3, this risk report is structured according to **risk type**. 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**).

All entities in the DZ BANK Group are integrated into the groupwide risk management system. The DZ BANK Group largely comprises the DZ BANK banking group and R+V. The management units form the core of the financial services 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 have been created within the DZ BANK Group for the purposes of economic risk management. The management units are assigned to the Bank sector and Insurance sector as follows:

Bank sector:

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

Insurance sector:

- R+V.

The management units represent the operating segments of the DZ BANK Group. From a risk perspective, the 'DZ BANK' management unit equates to the central institution and corporate bank operating segment and the holding function.

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.

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.

Risk is managed groupwide on a consolidated basis.

2.1.4 Expansion of ESG risk management

DZ BANK is currently analyzing the effects of various regulatory initiatives on the management of environmental, social, and corporate governance (ESG) risks, in particular, the Guide on climate-related and environmental risks published by the European Central Bank (ECB) and the delegated regulation concerning the EU's climate taxonomy. In addition, DZ BANK will participate in the ECB's macroeconomic climate stress test, which is scheduled for 2022.

2.2 Risks and risk profile

2.2.1 Risks

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 correspond to the outcome of the risk inventory check carried out for 2021 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 from the migration of the credit ratings of these counterparties	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 divergence in the eurozone– Challenging markets in the cruise ship business– Risks to the global economy– 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">– Low 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:<ul style="list-style-type: none">Violations of legal provisions; failure to comply with corporate policies– Legal risk:<ul style="list-style-type: none">Violations of legal provisions or failures in applying such provisions; adverse changes in the legal environment– Information risk including ICT risk:<ul style="list-style-type: none">Failure to maintain the confidentiality, integrity, availability, or authenticity of information or data– Security risk:<ul style="list-style-type: none">Inadequate protection of individuals, premises, assets, or time-critical processes– Outsourcing risk:<ul style="list-style-type: none">Disruptions to outsourced processes and services– Project risk:<ul style="list-style-type: none">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		Operating segments (management units)							
		DZ BANK	BSH	DVB	DZ HYP	DZ PRIVATBANK	TeamBank	UMH	VR Smart Finanz
Risk management KPIs disclosed									
– Liquid securities	Section 6.2.6								
– Unsecured short-term and medium-term funding	Section 6.2.6								
– Minimum liquidity surplus	Section 6.2.7								
– LCR	Section 6.3.3								
– NSFR	Section 6.3.4								
– Lending volume	Sections 8.6, 8.7, and 8.8								
– Risk capital requirement for credit risk	Section 8.9								
– Carrying amounts of investments	Section 9.5								
– Risk capital requirement for equity investment risk	Section 9.5								
– Value-at-risk for market risk	Section 10.7.1								
– Risk capital requirement for market risk	Section 10.7.2								
– Risk capital requirement for the technical risk of a home savings and loan company	Section 11.5								
– Risk capital requirement for business risk	Section 12.6								
– Losses from operational risk	Section 14.6								
– Risk capital requirement for operational risk	Section 14.7								

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	Life actuarial risk:	– Claims rate trend in non-life insurance	Section 16.6
	– Life actuarial risk		– Adverse change in the calculation assumptions for life insurance over the lifetime of the contract		
	– Health actuarial risk	– 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	– Increase in claim events as a result of pollution and climate change	– Overall solvency requirement	Section 16.7
	– Non-life actuarial risk	– 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	Health actuarial risk: – Higher drawdown of benefits by health insurance policyholders – Increase in claim events as a result of pollution and climate change		
			Non-life actuarial risk: – 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	– Lending volume	Section 17.4
	– Interest-rate risk		– a protracted period of low interest rates	– Overall solvency requirement	Section 17.5
	– Spread risk		– a narrowing of spreads on investments		
	– Equity risk		The fair values of investments fall because of		
	– Currency risk		– a fast rise in interest rates		
	– Real-estate risk		– a widening of spreads on investments		
	– Concentration risk		– the issuer's transition 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	Section 18.4
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 social risks and corporate government risks assessed in connection with the ESG risk factors		
	Operational risk	Risk of losses arising from inadequate or failed internal processes, personnel, or systems, or from external events (including legal risk)	– 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 IT 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	Section 20.4
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	Section 21

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

2.2.2 Risk profile

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' in this (group) management report) shape the risk profile of the group. 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 sections 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, 2021	Dec. 31, 2020	2021	2020	2021	2020
LIQUIDITY ADEQUACY						
DZ BANK Group (economic perspective)						
Economic liquidity adequacy (€ billion) ¹	19.4	15.3	4.0	4.0	0.0	0.0
DZ BANK banking group						
Liquidity coverage ratio (%) ²	147.7	146.3	110.0	110.0	100.0	100.0
Net stable funding ratio (%)	127.1	122.4	105.0		100.0	
CAPITAL ADEQUACY						
DZ BANK Group (economic perspective)						
Economic capital adequacy (%)	208.1	171.7	120.0	120.0	100.0	100.0
DZ BANK financial conglomerate (normative internal perspective)						
Coverage ratio (%) ³	152.7	146.0	110.0	110.0	100.0	100.0
DZ BANK banking group (normative internal perspective)						
Common equity Tier 1 capital ratio (%) ^{3, 4}	15.3	15.3	10.0	10.0	9.0	9.0
Tier 1 capital ratio (%) ^{3, 4}	16.8	17.0	11.9	11.9	10.8	10.8
Total capital ratio (%) ^{3, 4}	18.5	19.5	14.3	14.3	13.3	13.3
Leverage ratio (%) ^{3, 5}	7.3	5.7	3.5	3.5	3.26	
MREL ratio (%) ⁶	11.5	11.9	8.3	8.3		8.0

Not available

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

² In view of the COVID-19 pandemic, the supervisory authorities tolerated a value below the external minimum target of 100 percent until December 31, 2021.

³ Measured values based on the CRR transitional guidance. In the 2020 risk report, the values stated as at December 31, 2020 were based on full application of the CRR.

⁴ The external minimum targets are the binding regulatory minimum capital requirements. Details on the minimum capital requirements can be found in section 7.3.3.

⁵ The external minimum target for 2021 applies from June 28, 2021.

⁶ The supervisory authorities temporarily suspended the external minimum target for the second half of the year.

In view of the fallout from the COVID-19 pandemic, the supervisory authorities tolerated values that had temporarily fallen below the external minimum targets for regulatory liquidity adequacy and regulatory capital adequacy during the reporting period.

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.

In addition, the DZ BANK Group remained within its economic **risk-bearing capacity** in 2021 and also complied with regulatory requirements for capital adequacy on every reporting date.

3 Dealing with the impact of the COVID-19 pandemic

3.1 Relaxation of supervisory requirements

The lowering of the **external minimum targets** for regulatory key figures that had been carried out by the supervisory authorities in 2020 continued to apply unchanged in 2021. The same was true for the lower **internal thresholds** 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 relaxing of requirements relating to the preparation of a group recovery plan in 2020 was scaled back. In particular, the number of stress scenarios to be prepared increased from one in 2020 to two in the reporting year. Before the start of the COVID-19 pandemic, banks had been required to present four stress scenarios to the banking supervisor.

3.2 Risk management measures

3.2.1 Risk reporting

The changes to the **risk reporting** (financial and risk radar, CET1 radar, credit risk report) to the Board of Managing Directors of DZ BANK that had been made in 2020 due to the COVID-19 pandemic were maintained in 2021. The same applied to the **stress testing** regarding the impact of the COVID-19 pandemic that had been introduced in 2020 and to the associated internal reporting.

Credit risk management and monitoring

Over the course of 2021, the economies of the countries relevant to the DZ BANK Group's lending business began to recover. The credit risk situation improved compared with the previous year, and this was reflected in the positive trend in the credit risk metrics. Nevertheless, the credit portfolio of the Bank sector remains subject to **close monitoring** in view of the fifth wave of COVID-19 now taking place. This is especially the case for the subportfolios in which the fallout from the COVID-19 situation was evident.

The COVID-19 pandemic primarily affected credit risk in the Bank sector in 2021. Ad hoc remeasurements mostly related to **cruise ships** and companies from the **service and automotive sectors**. The quality of the **hotel, department store, and shopping mall financing** portfolio of DZ HYP remains stable. Further information on the volume of lending to industries that have been hit particularly hard by the COVID-19 pandemic is provided in section 8.7.

The COVID-19 pandemic may continue to have an adverse impact on credit risk in the Bank sector in **2022**. The extent of this impact will depend primarily on the duration and intensity of the pandemic and any measures taken by the government in response. An increase in corporate insolvencies and private bankruptcies could become a source of pressure, although there were no signs of a pronounced increase as at the reporting date.

3.2.2 Operational risk

To ensure that day-to-day operations could continue during the lockdowns that were imposed to contain the pandemic, the entities in the DZ BANK Group made additional technical equipment available to facilitate **remote working**. Medical protective measures and safety plans for enclosed spaces were implemented in order to protect the **health of employees**.

4 Fundamental principles of risk management

4.1 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 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 2021 and submitted to BaFin on time.

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 2021 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 2021 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.

4.2 Risk culture

The risk culture at DZ BANK is shaped by the high degree of responsibility assumed by the cooperative financial network for its members and for society. At DZ BANK, activities involving risk are based on the values of drive, integrity, and trust. The priority is on compliance with strategic and associated operating requirements when dealing with risk. The risk culture is reflected in the existing risk management processes and methods and in the conduct of employees.

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.

4.3 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 when implementing their business models. 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 monthly overall risk report is used to monitor the internal threshold values.

4.4 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 Finance, and Credit divisions in close consultation with other relevant divisions at DZ BANK and its subsidiaries.

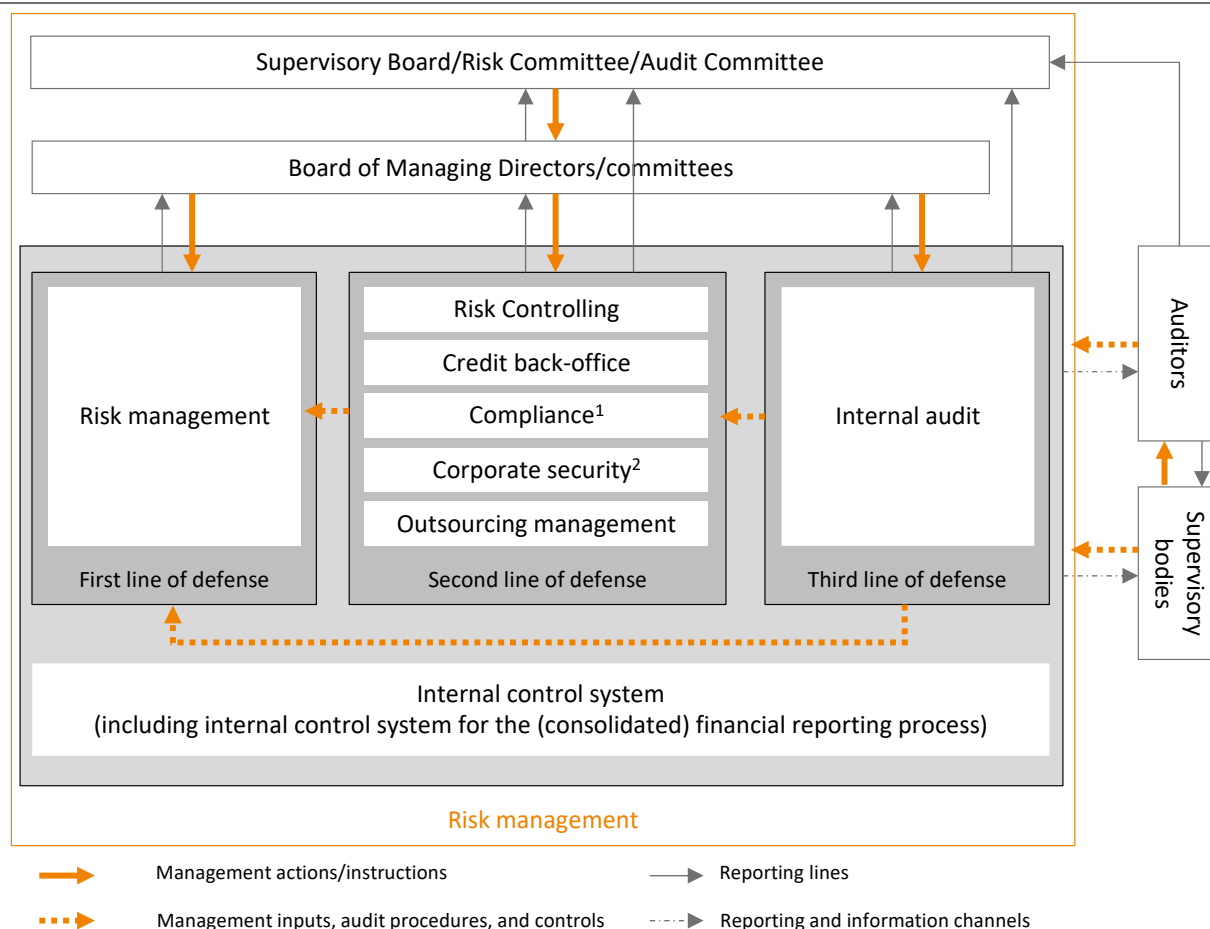
The risk strategies are described in the sections covering the individual risk types in this risk report.

4.5 Risk-oriented corporate governance

4.5.1 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. This particularly affects the Group Risk Controlling, Credit, Credit Services, and Compliance divisions and the Group IT Governance department. These rules do not limit the data protection officers' freedom to operate independently.
- The Group Risk Controlling division and the Credit divisions (Credit and Credit Services) 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' in this (group) management report.

4.5.2 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.

4.5.3 Risk control

Group Risk Controlling at DZ BANK is 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. Risk Controlling also reports risks to the Supervisory Board, the Board of Managing Directors, and the management units. Group Risk Controlling at DZ BANK lays down the fundamental requirements for the risk measurement methods to be used throughout the group and coordinates implementation with the risk control units in the other management units. The aim of this structure is to ensure that the management of risk capital is consistent throughout the group. In cooperation with the other management units, Group Risk Controlling at DZ BANK establishes a groupwide risk reporting system covering all material types of risk based on specified minimum standards using methods agreed between the management units.

Both at DZ BANK and in the other management units, Risk Controlling is responsible for the transparency of risks assumed and aims to ensure that all risk measurement methods used are up to date. The risk control units in the management units also monitor compliance with the entity-related limits that have been set based on the risk capital allocated by DZ BANK.

4.5.4 Credit back-office division

The Credit divisions of the entities in the Bank sector form the back office within the meaning of MaRisk BA and KAMaRisk. 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.

The Credit back-office division also specifies credit standards, processes, and procedures for the lending business and monitors compliance in a number of ways, notably through the comply-or-explain approach. In addition, the Credit divisions are responsible for supervising and updating the group credit risk reporting system, which complements the risk control reporting system.

4.5.5 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), a single compliance framework must be established for the main entities in the DZ BANK Group. This framework must lay down rules on cooperation between the individual compliance functions and set out their authority and responsibilities. The DZ BANK Group's compliance framework comprises the compliance policy. The policy includes 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. The compliance framework is reviewed annually to check that it is up to date.

Further disclosures relating to compliance risk can be found in sections 14.5.1 and 20.3.1.

Code of conduct

The risk culture principles (see section 4.2) 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 uphold DZ BANK's standards on preventing money laundering, the financing of terrorism, and other criminal offenses. The measures required by the German Anti-Money Laundering Act (GwG) have been put in place and implemented. They are reviewed and modified on an ongoing basis. 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. This has involved, in particular, creating the function of data protection officer and issuing standard data protection principles. 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. A Data Protection Officers working group was created for the DZ BANK Group in the reporting year; it generally meets three times a year. The working group deals with current issues relating to data protection.

4.5.6 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 DZ BANK Group understands information security management to encompass organizational structures, processes, and IT infrastructures that serve to protect data and information.

DZ BANK has implemented an information security management system (ISMS). The rules that it contains, along with the methodological framework that it provides, are based on the ISO/IEC 27001:2013 standard. The ISMS is designed to ensure the confidentiality, integrity, availability, and authenticity of data, information, and the media on which data is stored (IT applications, IT systems, and infrastructure components). 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 sections 14.5.3 and 20.3.2.

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 sections 14.5.4 and 20.3.3.

4.5.7 Outsourcing management

At DZ BANK, the Central Outsourcing Management unit acts as the central point of contact for all issues relating to the management of 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 sections 14.5.5 and 20.3.4.

4.5.8 Control functions

Internal audit

The internal audit departments of the management units are responsible for control and monitoring tasks, which are carried out independently of individual processes. They carry out systematic, regular risk-based audits focusing on compliance with statutory and regulatory requirements. The internal audit departments also review and assess risk management and the internal control system to ensure that they are fully operational and effective, and that processing is properly carried out. In addition, they monitor the action taken in response to audit findings to ensure that identified problems have been 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.

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.

4.5.9 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 section 4.5.10 below, is a sub-system of the bank-wide internal control system.

4.5.10 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.

4.6 Risk management tools

4.6.1 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.

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	Actuarial risk			Market risk							
		Traditional credit risk	Issuer risk	Replacement risk	Equity investment risk	General market risk					Asset-management risk		Life	Health	Non-life	Interest-rate risk	Spread risk	Equity risk	Currency risk	Real-estate risk	Counterparty default risk	Operational risk	
						Interest-rate risk	Equity risk	Fund price risk	Currency risk	Commodity risk													Spread risk and migration risk
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															•	•	•	•	•	•	•	
	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 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 section 8.6.2.

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**. Insurance liabilities are also a determining factor in the calculation of **risks from entities in other financial sectors**. 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.

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 section 6.2.6.

The link between available internal capital, which is used to determine economic capital adequacy, and the consolidated balance sheet is covered in section 7.2.1.

4.6.2 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 internal perspectives within the ILAAP and ICAAP.

A distinction is also made between **economic and normative internal 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).

Liquidity risk at R+V (Insurance sector) is not material at DZ BANK Group level. 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.

4.6.3 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, funding, and balance sheet planning, as well as 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.

4.6.4 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 therefore 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 monitored using a traffic light system.

4.6.5 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 and currency 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 has not recognized any hedges on the balance sheet in accordance with section 254 HGB.

4.6.6 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.

4.6.7 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.

5 General risk factors

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

The management of risk factors has been reorganized, as a result of which the **regulatory risk factors** previously assigned to business risk and the **rating downgrades** risk factor have been reclassified as risk factors affecting all types of risk. Consequently, the disclosures included in sections 10.3.1 (Regulatory risk factors) and 10.3.3 (Rating downgrades) in the 2020 risk report have been moved to sections 5.1 and 5.4 respectively in the 2021 risk report.

5.1 Regulatory risk factors

5.1.1 Regulatory capital buffers

BaFin has set a countercyclical capital buffer rate for banks of 0.75 percent. It is also planning to introduce a systemic risk buffer for the residential real estate sector of 2 percent of the risk-weighted assets attributable to these exposures. The domestic buffer rate for the countercyclical capital buffer is currently 0 percent. The sectoral systemic risk buffer is a new risk buffer. These two capital buffers are to be met using common equity Tier 1 capital and are likely to result in higher minimum requirements for the common equity Tier 1 capital ratio, Tier 1 capital ratio, and total capital ratio. Based on the latest information, the new rules are expected to apply from February 1, 2023 onward.

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

There is a risk that, in the face of higher minimum requirements, it will not be possible to obtain the necessary additional own funds needed to comply with the stricter requirements, it will be possible to obtain them only at increased cost, or existing risk-weighted assets will 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.

5.1.2 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 is currently pressing ahead with the replacement of the present 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. This means that Euribor can continue to be used, but EONIA can no longer be used because it was discontinued at the end of 2021. In the case of Libor rates, which are already compliant with the EU benchmark requirements, the banks involved were expected to continue supplying the necessary data only up to the end of 2021. The Financial Conduct Authority (FCA), which is responsible for regulating interest-rate benchmarks in the United Kingdom, had published the announcement of ICE Benchmark Administration (the administrator engaged by the UK government to manage Libor), according to which the Libor settings in Swiss francs, pound sterling, Japanese yen, and euros would be discontinued at the end of 2021. The administrator will provide a 'synthetic' (non-representative) Libor for the Japanese yen and pound sterling until further notice. However, it can only be used for existing business that is difficult to amend, known as the 'tough legacy'.

Since December 31, 2021, the aforementioned Libor settings have no longer been deemed representative by the supervisory authorities. US dollar Libor will be discontinued on June 30, 2023. From January 1, 2022 to June 30, 2023, US dollar Libor will continue to be available, primarily for existing business. 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. Under the IBOR reforms, the new risk-free interest-rate benchmarks were designated as the replacements for the previous interest-rate benchmarks, such as EONIA and Libor. 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. The changeover of the transactions that previously referenced EONIA was carried out as at December 31, 2021. Business continuity is assured due to Implementing Regulation (EU) 2021/1848 dated October 21, 2021 on the designation of a replacement interest rate. The changeover of individual transactions referencing non-US dollar Libor is to be completed by the relevant first fixing after the benchmark is discontinued. The deadline for the changeover of the transactions referencing US dollar Libor is June 30, 2023. However, a number of issues need to be clarified before then, especially regarding new market practices and the establishment of possible successor interest-rate benchmarks.

If the changeover of the relevant contracts to the successor interest-rate benchmarks for US dollar Libor is not completed by the aforementioned deadlines, 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, Libor 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.

5.2 Macroeconomic risk factors

5.2.1 Low interest rates

Chapter V.1.5 in the outlook describes the anticipated trend in interest rates in 2022. Permanently low interest rates could have the following negative consequences for the DZ BANK Group.

- In BSH's **building society operations**, the current very low level of interest rates means that home savings loans are not particularly appealing for customers, whereas high-interest home savings deposits under older contracts are attractive. If interest rates were to go down yet again, interest income on home savings loans could fall further, while the interest expense for home savings deposits could rise. Furthermore, available liquidity could only be invested on the capital markets at low rates of return or disbursed in non-collective loans. Despite countermeasures being taken, such as the introduction of new scales of rates and charges and the implementation of portfolio measures, this would be an additional factor depressing earnings and could lead to a decrease in capital. The portfolio measures in the collective business (e.g. the use of termination rights) help to reduce high-interest home savings deposits under older contracts. When deciding whether to terminate older contracts, the business necessity and the interests of the stakeholders are always taken into consideration.
- In addition, a long period of low interest rates and the growing importance of central banks' bond-buying programs also increase the risk of **incorrect valuations** in the financial and real estate markets in the form of significant overpricing. If bubbles like this are created, there is a risk of a sudden correction, which could lead to a sharp drop in share prices and widening credit spreads. In extreme cases, a **market crisis** of this nature could cause the interbank market to crash. These effects could increase the specific risk factors applicable to liquidity risk and the risks covered by capital, resulting in a fall in the DZ BANK Group's liquidity and capital adequacy. Information on the inclusion of market crises in liquidity risk management can be found in sections 6.2.5 and 6.2.7.

Further potential effects of the low interest rates on **individual risks in the DZ BANK Group** are described within the sections of this risk report covering the following:

- Market risk factors in the Bank sector (section 10.3.2)
- Market risk factors in the Insurance sector (sections 17.2 and 17.3.5).

5.2.2 Risks to the global economy

Chapter V.1 in the outlook includes assessments as to the expected economic impact of the **COVID-19 pandemic** in the coming year. Chapter V.1.1 in the outlook also provides information on the anticipated developments in **international trade disputes** and risks arising from geopolitical disputes, such as the **military confrontation between Russia and Ukraine**.

In addition to the above information, the impact of the COVID-19 pandemic and the international trade disputes on **the DZ BANK Group's risks** is also discussed within the sections of this risk report covering the following:

- Credit risk factors in the Bank sector (section 8.3.2)
- Market risk factors in the Bank sector (section 10.3.2)
- Market risk factors in the Insurance sector (section 17.2).

5.2.3 Economic 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. In 2020, the financial performance of Italian banks had suffered due to large additions to loss allowances as well as losses relating to the ongoing elimination of non-performing loans. In 2021, however, the brighter economic outlook meant there was a much smaller need for loss allowances, which

boosted the banks' financial performance. This trend is set to continue in 2022 in view of the expected robust rate of economic growth. Despite the forecast decrease in government debt – as a percentage of gross domestic product (GDP) – in 2022 and 2023, it will remain at a high level, partly due to the devastating initial impact of the COVID-19 pandemic and the resulting economic problems. This means that Italy will continue to have very high funding requirements. The financial risks arising from capital markets funding are currently being mitigated by the bond-buying program, the ECB's low-interest-rate policy, and the high level of central bank liquidity. However, a rise in interest rates, a reduction in bond purchases, or the absence of progress with eliminating government debt could again make it very difficult for Italy and its banks to access the capital markets in 2022.

The ongoing COVID-19 pandemic continues to substantially exacerbate the existing difficulties in **Spain**. Its already high level of government debt is coming under even more pressure due to increased government spending as part of its fiscal support measures, although COVID-19 support provided by the EU is helping to ease the situation. Despite early signs of economic recovery and thus the prediction of slightly higher growth rates for GDP, the macroeconomic outlook is only cautiously optimistic in view of the persistently high unemployment rate. The tensions in Catalonia could give rise to further risks 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, but this is contingent on economic policy remaining focused on cost-saving measures and reforms after the snap election that was brought forward to January 2022. 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. To add to this, the earnings prospects for the sector are weak because of the current low level of interest rates. 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. Expansion of the ECB's asset purchase programs has so far limited the widening of credit spreads. But there is a risk that this situation could change if the pandemic emergency purchase program (PEPP) were to end. Highly indebted countries could find it considerably more difficult to arrange funding through capital markets.

The effects of the economic divergence in the eurozone particularly impact on the **credit risk of the Bank sector**. Details are provided in section 8.3.2 (Credit risk factors in the Bank sector).

5.2.4 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.

Prices in the eurozone increased markedly in 2021 due to a combination of several factors. As well as low prices in the previous year and pent-up demand for consumer products and capital goods as a result of the pandemic, the main reasons were rising energy prices worldwide and problems in global supply chains. The military confrontation between Russia and Ukraine is causing energy prices to rise even more quickly. Current shortages of some products as a result of the supply bottlenecks may still trigger substantial price increases for manufacturers, which may pass them on to consumers. This means that there is a risk that the currently elevated level of inflation may not be a temporary phenomenon and some major components could keep the inflation rate 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, also made consumers reluctant to spend and wages rise, as this would result in a wage/price spiral. This could ultimately lead to a phase 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.

The effects of stagflation on the risks in the Bank sector are described in section 8.3.2 (Specific credit risk factors) of this risk report.

5.3 ESG risk factors

5.3.1 Concept of ESG risk factors

The ESG risk factors are not delineated as a separate risk type in the DZ BANK Group. Rather, they are events or conditions affecting environmental (E), social (S), or corporate governance (G) matters that have an effect on the managed risks and, through this transmission mechanism, could have an adverse impact on the DZ BANK Group's financial position or financial performance.

Fundamentally, all of the risk types relevant to the DZ BANK Group are affected by the ESG risk factors. The risks that are managed as part of ICAAP are covered by capital. Evaluation of the ESG risk factors was a focus of the risk inventory check conducted in 2021.

DZ BANK is currently analyzing the effects of various regulatory initiatives on the management of environmental, social, and corporate governance (ESG) risks, in particular, the Guide on climate-related and environmental risks published by the European Central Bank (ECB) and the delegated regulation concerning the EU's climate taxonomy. In addition, DZ BANK will participate in the ECB's macroeconomic climate stress test, which is scheduled for 2022. DZ BANK uses a classification tool based on the 17 sustainable development goals of the United Nations to assess the sustainability of the lending business. 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.

5.3.2 Climate-related and environmental risks

The significant risks in relation to the environmental aspect of the ESG risk factors are physical climate-related and environmental risks and transition risks. The **physical climate-related and environmental risks** may relate to acute events, for example the more frequent occurrence of natural disasters such as flooding, or negative effects attributable to long-term climate change.

Transition risks may occur in connection with the switch to a lower-carbon and more environmentally friendly economy. They are frequently linked to new legislation and changes in consumer behavior.

Property damage caused by climate change and the transformation to a low-emission economy could have a considerable negative impact on the real economy, the financial system, and banks.

Climate-related and environmental risks affect the following risks managed by the DZ BANK Group:

- **Physical climate-related and environmental risks** affect the lending business of the entities in the Bank sector. Their significance to **credit risk** in the Bank sector is described in section 8.3.2.
- In the Insurance sector, catastrophe risk (which forms part of **non-life actuarial risk**) is the main type of risk that could be significantly affected by physical climate-related risk (see sections 16.2 and 16.5). Specifically, in any one year, the actual impact from the size and frequency of losses could exceed the forecast impact.
- In both the Bank sector and the Insurance sector, physical climate-related risk materializing in a number of forms, such as weather or environmental events, could also give rise to **operational risk** from the non-availability of buildings. This type of security risk is described for the Bank sector in section 14.5.4, and for the Insurance sector in section 20.3.3.

- Furthermore, negative effects from physical climate-related risk on the **reputation** of individual entities in the DZ BANK Group or on the DZ BANK Group as a whole cannot be ruled out.

Climate-related transition risk, as a consequence of the transition to a lower-carbon, more sustainable economy, could be reflected in all of the risk types that are material to the DZ BANK Group. In the case of **credit risk** in the Bank sector, for example, this could be the deterioration of borrowers' ability to service their debts owing to regulatory changes to public policy, such as the transition to clean energy, carbon pricing, environmental protection requirements, and resource conservation requirements. Moreover, climate-related and environmental legal risks could create reputational damage, as could changes in consumer behavior.

5.3.3 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 **leadership 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.

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.

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.

Both risk factors may also arise as a **primary effect**, initially at the level of customers in the lending business of the Bank sector and at the level of counterparties and debtors of R+V. There is then a danger that the materialization of these risk factors leads to a **second-round effect** because the deterioration of customers' credit quality creates heightened credit risk (Bank sector) and counterparty default risk (Insurance sector), thereby resulting in a growing requirement for impairment losses at the entities in the Bank sector and at R+V.

5.4 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 section covering the measurement of liquidity risk (see section 6.2.5).

In June 2021, **Standard & Poor's** lowered DZ BANK's long-term issuer rating by one notch to A+ with a stable outlook. This change of rating also affected the majority of issue ratings and the short-term rating. The main reason for the downgrade was the bleaker view of the German banking market. In October 2021, **Moody's** also lowered DZ BANK's long-term issuer rating by one notch to Aa2 with a stable outlook. The main reason for this downgrade was a changed assessment of the cooperative financial network owing to the difficult market conditions. This led to a reduction in the support factor from the cooperative financial network for DZ BANK's rating, which was previously three notches and is now two notches. In the reporting year, **Fitch** confirmed DZ BANK's ratings at AA- and raised the outlook from negative to stable.

6 Liquidity adequacy

6.1 Principles

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 internal (regulatory) perspective. Whereas the economic perspective takes into account the requirements of MaRisk BA and the ECB Guide to the ILAAP, the normative internal 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 the 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.

6.2 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.

6.2.1 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.

6.2.2 Business background and risk strategy

The activities of DZ BANK and the management units BSH, DVB, 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 in the form of crisis scenarios, and stress tests must demonstrate that there is adequate cover for these scenarios. The crisis 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.

6.2.3 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 events are incorporated into the calculation of liquidity risk as **stress scenarios** (see section 6.2.5).

6.2.4 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 **Treasury and Capital 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 **Treasury and Capital 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.

6.2.5 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 relevant to 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.

The internal liquidity risk model is constantly revised using an **appropriateness test** and adjusted in line with changes in the market, products, and processes. The appropriateness test is conducted 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.

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 for economic liquidity adequacy specified in the risk appetite statement. The observation threshold and limit as at December 31, 2021 were unchanged compared with the end of 2020. 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.

6.2.6 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.

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

FIG. 8 – LIQUID SECURITIES

€ billion	DZ BANK Group		DZ BANK	
	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Liquid securities eligible for GC Pooling (ECB Basket)¹	16.4	21.7	9.8	14.1
Securities in own portfolio	23.0	29.7	10.3	15.9
Securities received as collateral	16.9	8.5	16.9	8.5
Securities provided as collateral	-23.6	-16.5	-17.4	-10.3
Liquid securities eligible as collateral for central bank loans	8.0	9.1	4.5	5.8
Securities in own portfolio	20.5	20.5	13.4	13.4
Securities received as collateral	8.2	5.7	8.2	5.7
Securities provided as collateral	-20.6	-17.2	-17.0	-13.3
Other liquid securities	5.9	6.1	5.6	5.8
Securities in own portfolio	5.8	5.7	5.5	5.2
Securities received as collateral	0.1	0.8	0.1	0.8
Securities provided as collateral	-	-0.3	-	-0.2
Total	30.3	36.9	19.9	25.7
Securities in own portfolio	49.3	55.9	29.1	34.5
Securities received as collateral	25.3	15.0	25.3	15.0
Securities provided as collateral	-44.2	-33.9	-34.5	-23.8

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

As at December 31, 2021, the total liquidity value at the level of the **DZ BANK Group** was €30.3 billion (December 31, 2020: €36.9 billion). The total liquidity value attributable to **DZ BANK** as at December 31, 2021 was €19.9 billion (December 31, 2020: €25.7 billion). The decline in the volume of liquid securities was largely attributable to the sale of securities from the DZ BANK Group's own portfolio, and not replacing others as they matured, in favor of investments at the ECB.

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 were almost exclusively responsible for maintaining solvency in the stress scenarios with defined limits.

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. 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 information presented has changed compared with the 2020 risk report due to adjustments in internal management reporting. The changes in the composition of the sources of funding compared with the end of 2020 were attributable to money market policy implemented by the ECB and a pandemic-related increase in the savings ratio.

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

€ billion	DZ BANK Group		DZ BANK	
	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Deposits	97.5	94.5	83.6	84.4
Deposits of local cooperative banks	58.5	61.6	58.5	61.5
Current account deposits of other customers	39.0	32.9	25.2	22.9
Money market borrowing	32.2	26.6	28.7	22.7
Central banks, interbank, and customer banks	5.5	6.0	5.2	5.1
Corporate customers and institutional customers	14.1	13.2	14.0	12.5
Certificates of deposit/commercial paper	12.6	7.5	9.5	5.1

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

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.

6.2.7 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	
	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Downturning	-22.5	-31.1	51.7	58.4	29.2	27.4
Corporate crisis	-11.0	-34.2	32.9	49.6	21.9	15.3
Market crisis	-13.2	-32.8	42.2	53.9	29.0	21.1
Combination crisis	0.5	-35.8	18.9	53.5	19.4	17.7

The liquidity risk value measured for the **DZ BANK Group** as at December 31, 2021 for the stress scenario with defined limits with the lowest minimum liquidity surplus (squeeze scenario) was €19.4 billion (December 31, 2020: €15.3 billion). The liquidity risk value attributable to **DZ BANK** as at December 31, 2021 was €4.5 billion (December 31, 2020: €4.4 billion). The increase in the minimum liquidity surplus for the DZ BANK Group was largely due to an increase in current account deposits at DZ PRIVATBANK and to the issuance of Pfandbriefe at BSH.

The risk values as at December 31, 2021 for the **DZ BANK Group** were above the internal threshold value (€4.0 billion) and above the limit (€1.0 billion). They were also above the external minimum target (€0 billion). The observation threshold, limit, and external minimum target remained unchanged compared with 2020. Furthermore, **DZ BANK** did not exceed the limit of €325 million (December 31, 2020: €700 million).

The minimum liquidity surplus as at December 31, 2021 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.

6.2.8 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**.

6.3 Normative internal perspective

6.3.1 Regulatory framework

The normative internal 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**). This was approved by the ECB in 2021. 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. The two regulatory liquidity ratios did not change at the level of the DZ BANK banking group as a result of applying the waiver.

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 its own LCR and that of the DZ BANK 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. The NSFR-related requirements came into force on June 28, 2021 as part of CRR II. Since then, the NSFR has been managed within the groupwide liquidity risk management system.

6.3.2 Organization, responsibility, and reporting

The liquidity ratios reported for supervisory purposes resulting from the CRR and Commission Delegated Regulation (EU) 2015/61 are calculated for DZ BANK by the **Group Financial Services** division and aggregated at the level of the DZ BANK banking group with the corresponding values for the management units.

Both the **Treasury and Capital Committee** and the **Board of Managing Directors** are notified of the LCR and the NSFR each month.

6.3.3 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, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020 ²
Total liquidity buffer (€ billion)	97.3	91.4	84.6	73.7
Total net liquidity outflows (€ billion)	65.9	62.5	63.8	55.2
LCR (%)	147.7	146.3	132.5	133.5

¹ DZ BANK and DZ HYP have formed a liquidity subgroup pursuant to article 8 CRR since December 31, 2021.

² The values stated as at December 31, 2020 are those that were disclosed in the 2020 risk report and therefore do not reflect the effects of the liquidity waiver. DZ HYP is not included in the values for DZ BANK as at December 31, 2020.

The increase in the LCR for the **DZ BANK banking group** from 146.3 percent as at December 31, 2020 to 147.7 percent as at December 31, 2021 was largely attributable to higher excess cover at **DZ BANK**, although some of the gain was offset by countervailing effects in the other management units. The rise in excess cover at DZ BANK was mainly due to the issuance of long-term funding instruments. Excess cover in relation to the LCR is the difference between the liquidity buffer and the net liquidity outflows.

Due to the application of the liquidity waiver for the first time, the LCR as at December 31, 2021 comprised the liquidity buffer and the net liquidity outflows of the single liquidity subgroup consisting of DZ BANK and DZ HYP. Consequently, the LCR as at December 31, 2021 is not directly comparable with the LCR as at December 31, 2020 (before the liquidity waiver was applied).

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** applicable to the DZ BANK banking group and to DZ BANK (100 percent) was also exceeded as at December 31, 2021. In view of the COVID-19 pandemic, the supervisory authorities tolerated a value that was temporarily below the external minimum target until December 31, 2021, but the DZ BANK Group did not need to use this option.

6.3.4 Net stable funding ratio

Since June 28, 2021, when CRR II began to apply, DZ BANK has been obliged to calculate the NSFR for the DZ BANK banking group. Following the granting of approval by the ECB to apply the liquidity waiver, it has also had to calculate the NSFR for the liquidity subgroup consisting of DZ BANK and DZ HYP since December 31, 2021. It manages the NSFR within groupwide liquidity risk management.

The NSFR is intended to limit mismatches between the maturity structures of 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. The NSFR, which has a longer-term focus, complements the LCR, which has a short-term focus.

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, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020 ²
Available stable funding (weighted equity and liabilities; € billion)	293.7	268.2	225.3	145.9
Required stable funding (weighted assets; € billion)	231.1	219.1	185.2	124.9
Excess cover/shortfall (€ billion) ³	62.6	49.2	40.2	21.1
NSFR (%)	127.1	122.4	121.7	116.9

¹ DZ BANK and DZ HYP have formed a liquidity subgroup pursuant to article 8 CRR since December 31, 2021.

² DZ HYP is not included in the values as at December 31, 2020. The values relate to DZ BANK and correspond to the simulation produced for internal reporting purposes.

³ 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 increase in the NSFR from 122.4 percent as at December 31, 2020 to 127.1 percent as at December 31, 2021 and the related rise in excess cover were primarily due to the higher amount of available stable funding owing to DZ BANK's drawing down of long-term funding in the context of its participation in the ECB's TLTRO III program. The improved NSFR was also attributable to the greater volume of retail customer deposits at subsidiaries.

A change of method for the inclusion of deposits of the banks in the cooperative financial network (operational deposits from the cooperative financial network) also contributed to the increase in the NSFR. The method was changed with effect from September 30, 2021 following the ECB's approval of an application to increase the operational deposits from the cooperative financial network as a source of available stable funding from 50 percent to 75 percent.

As at the reporting date, both the **internal threshold** for the NSFR of 105.0 percent and the regulatory **external minimum target** of 100 percent were exceeded at the level of the **DZ BANK banking group**. The regulatory **external minimum target** of 100 percent was also satisfied at the level of **DZ BANK (including DZ HYP)** as at the reporting date.

7 Capital adequacy

7.1 Strategy, organization, and responsibility

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 internal perspective. Whereas the economic perspective takes into account the requirements of the ECB Guide to the ICAAP and MaRisk BA, the normative internal 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 internal 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 internal 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.

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 balance between risk and available internal capital (calculated from both economic and normative internal perspectives). DZ BANK is responsible for risk and capital management, and for compliance with capital adequacy at group level.

The management of economic and normative internal 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 Treasury and Capital 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 managing 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.

7.2 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.

7.2.1 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 comprises equity and hidden reserves. It is reviewed on a quarterly basis. 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 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. Since the third quarter of 2021, AT1-related components have no longer been included in the available internal capital. The method was changed due to implementation of a directive of the ECB.

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. Both measures have a positive impact on economic and regulatory capital adequacy. 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 and regulatory capital adequacy.

7.2.2 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 2021 was unchanged compared with the previous year at 120 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 2020. The threshold values for economic capital adequacy are reviewed annually and adjusted if necessary.

7.2.3 Risk-bearing capacity

Retrospective recalculation of the overall solvency requirement

The annual recalculation of the overall solvency requirement took place as at December 31, 2020 owing to scheduled changes to the parameters for the risk measurement procedures carried out in the second quarter of 2021 for the Insurance sector on the basis of R+V's 2020 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, 2020 given in this risk report have been restated accordingly and are not directly comparable with the figures in the 2020 opportunity and risk report.

Available internal capital and limit

The DZ BANK Group's **available internal capital** as at December 31, 2021 stood at €31,532 million. The comparable figure as at December 31, 2020 was €30,020 million. The increase in available internal capital compared with December 31, 2020 was largely attributable to the Insurance sector, where the main factors were developments in the capital markets, portfolio changes, and the merger of R+V Luxembourg S.A., Luxembourg-Strassen, with R+V Lebensversicherung AG in 2021.

Fehler! Verweisquelle konnte nicht gefunden werden. The **limit** derived from the available internal capital was specified at €23,588 million as at December 31, 2021 (December 31, 2020: €23,730 million).

As at December 31, 2021, **aggregate risk** was calculated at €15,151 million. The comparable figure as at December 31, 2020 was €17,482 million. The decrease was primarily driven by lower credit risk and market risk in the Bank sector and by a sharp fall in actuarial risk in the Insurance sector.

Economic capital adequacy

As at December 31, 2021, the economic capital adequacy ratio for the **DZ BANK Group** was calculated at 208.1 percent. The comparable figure as at December 31, 2020 was 171.7 percent. 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 2021 were unchanged compared with those for 2020. The increase in the economic capital adequacy ratio compared with the end of 2020 was due to the higher amount of available internal capital and the reduction in aggregate risk.

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

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

	Dec. 31, 2021	Dec. 31, 2020
Available internal capital (€ million) ¹	31,532	30,020
Limit (€ million)	23,588	23,730
Aggregate risk (€ million) ¹	15,151	17,482
Economic capital adequacy (%)¹	208.1	171.7

¹ Value as at December 31, 2020 after recalculation of R+V's overall solvency requirement. Different values were stated in the 2020 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, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Credit risk	7,188	6,978	5,037	5,496	2,750	2,730	2,134	2,227
Equity investment risk	1,220	1,090	996	936	700	725	636	634
Market risk	5,725	5,725	3,713	4,310	2,400	2,600	1,517	1,908
Technical risk of a home savings and loan company ¹	706	550	639	545				
Business risk ²	640	550	407	382	445	500	295	356
Operational risk	1,102	1,020	941	844	596	547	515	467
Total (after diversification)³	15,403	14,835	10,871	11,647				

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, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020 ¹
Life actuarial risk	600	1,400	328	1,070
Health actuarial risk	350	700	240	293
Non-life actuarial risk	4,600	4,500	1,762	3,780
Market risk	4,400	5,750	3,127	3,511
Counterparty default risk	350	220	222	178
Operational risk	1,000	800	715	694
Risks from entities in other financial sectors	180	140	124	126
Total (after diversification)	7,460	8,170	3,705	5,201

¹ Values after recalculation of the overall solvency requirement. Different values were stated in the 2020 risk report.

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 €575 million as at December 31, 2021 (December 31, 2020: €633 million). The corresponding **limit** was €725 million (December 31, 2020: €725 million). The reduction in the central capital buffer requirement was predominantly due to DVB's business risk being transferred to the decentralized capital buffer requirement.

7.2.4 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 DZ BANK Group would **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. In addition, a decrease in available internal capital, for example because its components have expired or are no longer eligible, could mean that the risk capital requirement exceeds the available internal capital. 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.

7.3 Normative internal perspective

7.3.1 Regulatory framework

The normative internal perspective is based on the capital ratios in Basel Pillar 1. 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 internal 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 at any future reporting

date, 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 internal perspective is an integral part of the ICAAP. The key risk indicators in the normative internal 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 I transitional guidance.

Until the end of 2020, the internal management of the regulatory capital adequacy of the DZ BANK banking group and thus the DZ BANK financial conglomerate was based on full application of the CRR. At the start of 2021, internal management was switched to the CRR transitional guidance. As a result, the values in this risk report have been calculated in accordance with the CRR transitional guidance. To ensure the comparability of the key figures shown as at the reporting date (CRR transitional guidance) with the figures as at the end of 2020 (full application of the CRR), the figures as at December 31, 2020 shown in sections 7.3.2 and 7.3.3 are in accordance with the changed calculation method. This means that they differ from the corresponding disclosures in the 2020 risk report.

7.3.2 DZ BANK financial conglomerate

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

The 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 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, 2021 ²	Dec. 31, 2020 ³
Own funds (€ million)	36,719	35,805
Solvency requirements (€ million)	24,049	24,516
Coverage ratio (%)	152.7	146.0

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 taking account of the CRR transitional guidance. The preliminary figures stated in the 2020 risk report were based on full application of the CRR.

The rise in the coverage ratio calculated for the DZ BANK financial conglomerate from 146.0 percent as at December 31, 2020 to 152.7 percent as at December 31, 2021 was attributable, in particular, to the reduction in capital requirements. By contrast, the DZ BANK financial conglomerate's own funds increased. The change in the coverage ratio is attributable to effects in the DZ BANK banking group and in the R+V Versicherung AG insurance group (see sections 7.3.3 and 7.3.4).

The preliminary coverage ratio calculated for the financial conglomerate as at December 31, 2021 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 2022.

7.3.3 DZ BANK banking group

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 and the IRB approach for the retail business (the regulatory credit risk measurement methods used by DVB are based on the advanced IRB approach)
- **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, 2021 determined in accordance with the CRR transitional guidance amounted to a total of €27,729 million (December 31, 2020: €28,669 million). This equates to a decline in own funds of €940 million compared with the end of 2020, comprising an increase in common equity Tier 1 capital of €546 million, a decrease in additional Tier 1 capital of €441 million, and a decrease in Tier 2 capital of €1,045 million.

The increase in **common equity Tier 1 capital** was primarily due to the profit for the year of €1,601 million.

Tier 2 capital declined from €3,591 million as at December 31, 2020 to €2,546 million as at December 31, 2021, a decrease of €1,045 million. Of this decrease, €918 million was attributable to the termination of non-CRR-compliant hybrid capital instruments that had still been partly eligible as Tier 2 capital under the CRR transitional guidance until December 31, 2020. The decrease in Tier 2 capital was also attributable, in an amount of €132 million, to the reduced level of eligibility under CRR rules for own funds instruments in the last five years before their maturity date.

Risk-weighted assets in the DZ BANK banking group went up from €147,252 million as at December 31, 2021 to €150,137 million as at December 31, 2020, a rise of €2,885 million that comprised two opposing effects. On the one hand, credit risk increased as a result of the CRR II rules being applied for the first time with effect from June 28, 2021, in particular the new standardized approach to measuring the counterparty risk of derivative financial transactions. Conversely, market risk declined because the market scenarios that materialized in spring 2020 in the context of the COVID-19 pandemic were no longer included in the historical observation period used in the market risk model.

As at December 31, 2021, the DZ BANK banking group's **common equity Tier 1 capital ratio** was 15.3 percent. This was the same as the figure at the end of 2020. The **Tier 1 capital ratio** of 16.8 percent calculated as at the reporting date was lower than the figure of 17.0 percent as at December 31, 2020. The **total capital ratio** also went down, from 19.5 percent as at December 31, 2020 to 18.5 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, 2021	Dec. 31, 2020 ²	Dec. 31, 2021	Dec. 31, 2020 ²
Capital				
Common equity Tier 1 capital (€ million)	23,021	22,476	14,197	13,620
Additional Tier 1 capital (€ million)	2,161	2,602	2,150	2,150
Tier 1 capital (€ million)	25,183	25,078	16,347	15,770
Total Tier 2 capital (€ million)	2,546	3,591	2,414	3,840
Own funds (€ million)	27,729	28,669	18,761	19,611
Risk-weighted assets				
Credit risk including long-term equity investments (€ million)	132,296	128,256	85,150	83,585
Market risk (€ million)	7,355	8,388	6,504	7,502
Operational risk (€ million)	10,487	10,608	3,379	3,249
Total (€ million)	150,137	147,252	95,033	94,336
Capital ratios				
Common equity Tier 1 capital ratio (%)	15.3	15.3	14.9	14.4
Tier 1 capital ratio (%)	16.8	17.0	17.2	16.7
Total capital ratio (%)	18.5	19.5	19.7	20.8

¹ In accordance with the CRR transitional guidance.

² The values differ from those shown in the 2020 risk report. In the 2020 risk report, the values stated as at December 31, 2020 were based on full application of the CRR.

Regulatory minimum capital requirements specified by the SREP

The minimum capital requirements that the **DZ BANK banking group** had to comply with in 2021 under the 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 2020, also had to be satisfied. In this process, the banking supervisor specified a mandatory add-on (**Pillar 2 requirement**) that is factored 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 for capital planning.

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 2021.

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 under the SREP, and their components, are shown in Fig. 18. For 2022, the minimum capital requirements shown will be lowered by 0.05 percentage points with effect from March 1, 2022. This is predominantly attributable to a reduction in the additional capital requirements in Pillar 2.

FIG. 18 – REGULATORY MINIMUM CAPITAL REQUIREMENTS ACCORDING TO SREP¹

	DZ BANK banking group		DZ BANK	
%	2021	2020	2021	2020
Minimum requirement for common equity Tier 1 capital	4.50	4.50	4.50	4.50
Additional Pillar 2 capital requirement	0.98	0.98		
Capital conservation buffer	2.50	2.50	2.50	2.50
Countercyclical capital buffer ¹	0.02	0.01	0.01	0.01
O-SII capital buffer	1.00	1.00		
Mandatory minimum requirement for common equity Tier 1 capital	9.01	9.00	7.01	7.01
Minimum requirement for additional Tier 1 capital	1.50	1.50	1.50	1.50
Additional Pillar 2 capital requirement	0.33	0.33		
Mandatory minimum requirement for Tier 1 capital	10.84	10.82	8.51	8.51
Minimum requirement for Tier 2 capital ²	2.00	2.00	2.00	2.00
Additional Pillar 2 capital requirement	0.44	0.44		
Mandatory minimum requirement for total capital	13.27	13.26	10.51	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 2021 and 2020 relate solely to the reporting dates.

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

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, including in relation to the **binding minimum capital requirements**. For example, a bank can temporarily use up its capital conservation buffer and O-SII capital buffer without incurring sanctions. In such an eventuality, it must submit a capital conservation plan to the supervisory authorities. If, as a result, the combined capital buffer requirement and thus one of the three thresholds for the maximum distributable amount can no longer be met, the rules regarding the limits for distributions continue to apply. Consequently, DZ BANK does not use the aforementioned relief measures and 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 percent. In a general administrative act dated March 31, 2020, BaFin also lowered the domestic countercyclical capital buffer rate for Germany to 0 percent (it was originally supposed to be raised to 0.25 percent with effect from July 1, 2020). On February 26, 2021, BaFin announced that the rate would not be raised until at least December 31, 2021. These reduced capital buffer rates for Germany and other countries are factored into the calculation of the institution-specific countercyclical capital buffer rate. DZ BANK is therefore obliged to apply them.

Banks are also temporarily permitted to not comply with the **Pillar 2 capital recommendation** without this having any impact on a possible distribution. DZ BANK does not currently exercise this option.

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, 2021. The internal threshold values are shown in Fig. 5 in section 2.2.2.

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 up by 1.6 percentage points from 5.7 percent as at December 31, 2020 to 7.3 percent as at December 31, 2021. This increase was mainly the result of applying the CRR II rules for the first time with effect from June 28, 2021. It was primarily attributable to the introduction of the exemption from the total exposure for exposures within the cooperative financial network. This means that domestic loans and advances to members of the protection scheme of the Bundesverband der Deutschen Volksbanken und Raiffeisenbanken (BVR) [National Association of German Cooperative Banks] no longer have to be included. The resulting mitigating effect amounted to €106.8 billion. The main countervailing effects were expansion of the portfolio of reverse repos on securities of DZ BANK and the growth of on-balance-sheet business.

The exempted amount for balances with central banks rose from €62.0 billion as at December 31, 2020 to €79.8 billion as at December 31, 2021, an increase of €17.8 billion. This exemption had originally applied until June 27, 2021 but was extended by the ECB until March 31, 2022. In a press release dated February 10, 2022, the ECB announced that this exemption would not be extended again. Excluding the preferential treatment of balances with central banks, the DZ BANK Group's leverage ratio would be 5.9 percent as at December 31, 2021.

DZ BANK's leverage ratio as at December 31, 2021 was calculated at 9.2 percent (December 31, 2020: 4.1 percent). As was also the case for the DZ BANK banking group, this increase was mainly due to applying the CRR II rules for the first time with effect from June 28, 2021, especially the exemption for exposures within the cooperative financial network. This reduced the total exposure at DZ BANK by €234.0 billion. Another reason for the increase in the leverage ratio was the €577 million rise in Tier 1 capital.

As at June 30, 2021, the banking supervisor introduced a binding **external minimum target** of 3.0 percent in connection with initial application of CRR II. Because both the DZ BANK banking group and DZ BANK are applying the aforementioned temporary exemption for balances with central banks, this external minimum target has temporarily increased to 3.26 percent until the exemption expires on March 31, 2022.

Both the **internal threshold value** of 3.5 percent for the leverage ratio of the DZ BANK banking group and the **external minimum target** of 3.26 percent specified by the banking regulator since June 28, 2021 were exceeded as at December 31, 2021.

Minimum requirement for own funds and eligible liabilities

The BRRD, Regulation (EU) No. 806/2014 establishing a Single Resolution Mechanism, and the transposition of the BRRD into German law in the form of the SAG have created the legal basis at European and national level for a single resolution mechanism for banks and the MREL regulatory ratio.

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 is the ratio of the total of the regulatory own funds of the DZ BANK banking group and the eligible bail-in-able liabilities of DZ BANK to the total liabilities and own funds (TLOF) of the DZ BANK banking group (known as the hybrid approach).

DZ BANK's Board of Managing Directors set the **internal threshold value** for the **DZ BANK banking group's** MREL ratio for 2021 at 8.3 percent. This was the same as the figure for 2020. No external minimum target had been set by December 31, 2021.

The **MREL ratio** measured for the DZ BANK banking group in TLOF was 11.5 percent as at December 31, 2021 (December 31, 2020: 11.9 percent). The fall in the ratio compared with the figure at the end of 2020 was attributable to the decrease in own funds and a significant increase in total assets on the back of secured borrowing in the money markets. An increased volume of liabilities eligible for the MREL only partly offset these two effects. The MREL ratio was above the **internal threshold** of 8.3 percent.

The calculation of the MREL ratio was changed with effect from January 1, 2022. The MREL ratio is now the ratio of the total of the regulatory own funds and the eligible bail-in-able liabilities to the total risk exposure amount (TREA) or to the leverage ratio exposure (LRE) of the DZ BANK banking group. Furthermore, TLOF is used solely as a benchmark for calibrating subordinated requirements. The MREL ratios based on TREA and LRE have to be met, as do the subordinated MREL ratios based on TREA and LRE. The numerator of these ratios may only include the subordinated liabilities eligible for MREL, including senior non-preferred issues of DZ BANK, and the regulatory own funds of the DZ BANK banking group.

7.3.4 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.

Since 2020, R+V has been using 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 under Economic capital adequacy in section 7.2.1.

The preliminary figure for the **regulatory risk-bearing capacity** of the R+V Versicherung AG insurance group as at December 31, 2021 was calculated at 232.1 percent. The coverage ratio was thus above the external minimum target of 100.0 percent. The final figure as at December 31, 2020 was 182.8 percent (preliminary figure given in the 2020 risk report: 173.2 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 GROUP¹

	Dec. 31, 2021 ¹	Dec. 31, 2020 ²
Own funds (€ million)	17,499	15,161
Solvency requirements (€ million)	7,539	8,295
Coverage ratio (%)	232.1	182.8

¹ Preliminary figures.

² Final figures. The preliminary figures were stated in the 2020 risk report.

The growth of **own funds** was primarily attributable to the increase in the transitional measure on technical provisions. The remeasurement of the transitional measure on technical provisions, which was agreed with BaFin, was carried out due to the merger of R+V Luxembourg S.A. into R+V Lebensversicherung AG during the reporting year.

The lower **solvency requirements** can mainly be explained by the reduction in life actuarial risk and in market risk. Disclosures on the reasons for this reduction can be found in sections 16.7 and 17.5.

The **recalculation of the overall solvency requirement** described in section 7.2.3 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 2020. The prior-year figures as at December 31, 2020 given in this risk report have been restated accordingly and are not directly comparable with the figures in the 2020 risk report.

7.4 Stress tests for types of risk covered by capital

7.4.1 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. 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**.

Specific **COVID-19 scenarios** were also analyzed as adverse scenarios in 2021. These consisted of a two-year scenario and a three-year scenario. The two-year scenario, which was reported on as at the reporting dates of March 31, 2021 and June 30, 2021, assumed severe economic disruption during further waves of the pandemic. The three-year scenario, which was introduced as at the reporting date of September 30, 2021, looked at the fallout from the pandemic, assuming that the ongoing global infection situation – including new variants – would prevent an economic recovery in the eurozone and this would ultimately result in a severe economic and capital markets crisis in Europe.

7.4.2 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 bank 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.

The 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**.

7.4.3 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 internal 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

8 Credit risk

8.1 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** refers to securities business and unsecured money market business. The securities business comprises securities in both the banking book and the trading book, promissory notes, derivatives, and secured money market business (such as repo transactions).

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 fund components.

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 and is considered as 'extended' replacement risk. It is therefore also 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 (for example in an interest-rate swap). Transaction processing risk arises when the counterparty in a trading transaction fails to perform its contractual obligation. For the purposes of determining economic capital, the amount of the transaction processing risk is the net present value of the reciprocally required performance in favor of the entities in the Bank sector.

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, the recovery rate for unsecured receivables (or partial receivables), and the cure rate following counterparty default.

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.

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.

8.2 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 the **entire 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, DZ HYP, and TeamBank. 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 strictly 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.

Lending throughout the group is predominantly based on the **VR rating** system, a rating procedure developed by DZ BANK in collaboration with the BVR.

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.

Where required, the Board of Managing Directors of DZ BANK makes decisions during the course of the year to ensure that the rules for the medium-term and long-term credit risk strategy are adjusted in line with changing circumstances and current developments.

8.3 Risk factors

8.3.1 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.

8.3.2 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 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 section 5.2.3. Disclosures on the lending volume and credit value-at-risk in relation to the exposures in Italy, Spain, and Portugal can be found in sections 8.8.2 and 8.9.2.

DZ BANK finances the building, purchase, and operation of cruise ships. The **COVID-19 pandemic** is having a direct impact on this business. The economic background to this risk factor is described in chapters V.1.1 to V.1.4 in 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 sections 8.8.3 and 8.9.2.

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

The COVID-19 pandemic, international trade disputes, and the conflict between Russia and Ukraine constitute **risks for the global economy**. The background to these risk factors is described in chapters V.1.1 to V.1.4 in the outlook. If the pandemic persists for a while longer yet, the international trade disputes cannot be resolved, or the military confrontation between Russia and Ukraine continues, there is a risk that the Bank sector's credit risk will rise significantly.

The reporting year saw an increase in **stagflation risk** in the eurozone and therefore in the risk of an economic recession. If this trend were to persist or become more entrenched, the credit quality of corporate financing arrangements could be gradually eroded. A situation in which stagflation took hold over the long term could also lead to interest rate hikes, which would have a negative impact on real estate and funding activities. Overall, these effects could lead to a substantial deterioration in credit risk in the Bank sector. The macroeconomic context for this risk factor is explained in section 5.2.4.

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.

8.4 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.

8.5 Risk management

8.5.1 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 VR 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 rating system for major corporations was initiated in December of the reporting year, but had not yet been completed by the Board of Managing Directors on the date the group management report was prepared.

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, in which internal credit ratings are matched 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 scale 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.

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-	Non-investment grade
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+	
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				

8.5.2 Lending business pricing

The management units in the Bank sector use the risk-adjusted pricing of the financing as a criterion in lending decisions. Adequate standard risk costs and risk-adjusted capital costs are taken into account. The methods used by the management units to manage transactions reflect the particular features of the product or business concerned.

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.

8.5.3 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.

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. 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.

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.

8.5.4 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 (nominal amounts are used in building society operations), 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. Covered bonds are subject to separate limits. The main subsidiaries have their own comparable limit systems.

The issuer risk in treasury's investment book is restricted by means of portfolio limits in addition to the individual issuer limits.

In the reporting year, the standardized methodology for measuring and monitoring trading exposure at DZ BANK (**post-transaction control**) was migrated in its entirety from two IT-supported limit monitoring systems to one IT system. All relevant trading systems are directly or indirectly connected to this IT system. The second IT system still exists but is used solely for most of the **pre-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.

8.5.5 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 (see also section 8.5.7).

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. The modeling of these risk concentrations was improved in July 2021 with the help of the groups of connected clients defined by the regulators.

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 guarantor, garnishee, or issuer forms a group of connected clients or a similar economic entity with the borrower or counterparty unless the value of the furnished collateral can be objectively assessed to be stable over time (as in the case of a pledged credit balance or a charge over real estate).

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 described under collateral management in section 8.5.6.

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.

8.5.6 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 section 8.5.8 'Credit-portfolio management').

Collateral in line with the level of risk in medium-term or long-term financing arrangements is generally sought. In particular, recoverable collateral equivalent to 50 percent of the finance volume is required for new business 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, registered ship and aircraft 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 reviewed 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 content of collateral agreements and the responsibilities and authorities for implementing the rights and obligations they confer within the bank. This policy specifies contractual parameters, such as the quality of collateral, frequency of transfer, minimum transfer amounts, and thresholds. Under the collateral policy, only collateral in the form of cash (mainly in euros or US dollars), investment-grade government bonds, and/or Pfandbriefe can 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). Exceptions to this rule are permitted, mainly for local cooperative banks, although a very good credit rating (at least 2B on DZ BANK's credit rating master scale) is required for the relevant securities collateral. The collateral must also be eligible for use as collateral at the ECB.

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 entities in the Bank sector have been meeting this obligation since September 1, 2021 for all relevant new transactions. 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.

8.5.7 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 aims to ensure that non-performing loan exposures, or exposures that are close to non-performing, are highlighted in good time. The objective of managing and monitoring is to return the quality of the risk in the identified loans to acceptable levels and minimize losses from loan defaults.

Risk is identified at an early stage by using a **risk classification system** that specifies when exposures must become subject to special monitoring (intensified loan management) and when the management of the relationship must be transferred to units specifically responsible for loan restructuring and workout.

The following lists are maintained to closely monitor non-performing loans, or loans that are close to non-performing:

- The **yellow list** covers latent risk. There is no direct risk to the loan exposure, as yet.
- The **watchlist** is concerned with heightened risk. The loan exposures are already close to being non-performing.
- The **default list** consists of exposures that are classified as non-performing because of serious heightened risk.

A loan is classified as **non-performing** if it has been rated between 5A and 5E on the VR credit rating master scale. This corresponds to the definition of default specified by the CRR. 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.

The use of forbearance measures can be contemplated if a borrower is found to meet one of the following **criteria** during the monitoring of credit risk:

- Borrower is included in the default list, watchlist, or yellow list with a rating of 4A
- Borrower is classified with a rating of 4B or worse, regardless of whether it is on one of the lists or not
- Borrower is classified with a rating of 4A and payments are past due by more than 30 days within a period of three months prior to the concession.

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

- Borrower is classified as performing.
- 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.
- Borrower has made regular interest payments or repayments of principal during at least half of the probation period.

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.

8.5.8 Credit-portfolio management

Internal credit-portfolio models operated decentrally 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 section 7.2.1. A **traffic light system** is used to monitor Bank sector management units' compliance with the limits specified for credit risk.

8.6 Lending volume

8.6.1 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.

8.6.2 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.

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, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021		Dec. 31, 2020		
Traditional lending business	337.2	321.5	4.6	3.8	26.6	24.2	368.4	96.5	349.5	87.6	
								96.5		87.6	
								-		-	
								189.3		184.6	
								191.2		186.9	
								-1.9		-2.2	
								82.6		77.3	
Securities business	75.4	83.0	-	0.3	-14.6	-15.0	60.8	60.8	68.2	68.2	
								10.8		10.1	
								1.3		1.2	
								48.6		56.9	
Derivatives business	11.0	12.4	-0.1	-0.2	-11.4	-12.5	-0.5	-0.5	-0.3	-0.3	
								0.4		0.2	
								16.2		22.3	
								-1.7		-2.6	
								-15.4		-20.1	
Money market business	7.1	5.8	-	-	26.3	21.4	33.3	33.3	27.2	27.2	
								11.2		15.4	
								4.4		3.4	
								0.1		0.4	
								17.1		7.4	
								0.5		0.5	
Total	430.7	422.6	4.5	3.9	26.9	18.0	462.0		444.5		
Balance as at Dec. 31, 2021									31.3	7.3%	
Balance as at Dec. 31, 2020									21.9	5.2%	

Not relevant

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.

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

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.

8.6.3 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. The presentation of asset classes replaces the sectoral presentation used in this section in the 2020 risk report, which was based solely on sector classification.

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 DZ BANK 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.

The total lending volume of the **Bank sector** increased by 2 percent in the year under review, from €422.6 billion as at December 31, 2020 to €430.7 billion as at December 31, 2021. The rise in the lending volume was mainly due to an increase in volume in the entities within the cooperative financial network and real estate asset classes, which went up by €8.5 billion and €6.2 billion respectively compared with the end of 2020. DZ BANK accounted for most of the increase, which was driven by lending business with entities in the cooperative financial network (primarily support loan business) and business performance in the Corporate Banking and Structured Finance divisions. The increase in the real estate asset class was mainly attributable to real estate finance transactions with retail customers of BSH and DZ HYP. By contrast, the lending volume in the public sector asset class went down. This mainly related to the portfolios of bonds in this asset class. The asset-based lending/project finance asset class also saw a contraction in lending volume due to DVB's run-off strategy.

As at December 31, 2021, a significant proportion (38 percent) of the Bank sector's lending volume was concentrated in the financial sector (December 31, 2020: 37 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.

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

€ billion	Bank sector		DZ BANK	
	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Entities within the cooperative financial network	123.6	115.1	123.2	114.6
Financials	40.6	40.3	30.2	30.9
Corporates	67.1	65.2	61.8	60.0
Asset-based lending/project finance	11.9	13.5	10.4	9.7
Public sector	43.5	51.7	10.4	15.0
Real estate (commercial and retail customers)	117.9	111.7	-	0.6
Retail business (excluding real estate customers)	16.7	15.8	-	-
ABSs ¹ and ABCPs	7.4	7.5	7.1	7.2
Other	1.9	1.7	0.8	0.9
Total	430.7	422.6	244.0	238.8

¹ Asset-backed securities.

As at December 31, 2021, a significant proportion (63 percent) of **DZ BANK's** lending volume was also concentrated in the **financials** asset class (December 31, 2020: 61 percent). The composition of this asset class is the same both at DZ BANK and in the Bank sector.

8.6.4 Geographical structure of the credit portfolio

Fig. 23 shows the geographical distribution of the credit portfolio by country group. The lending volume is assigned to the individual country groups using the International Monetary Fund's breakdown, which is updated annually. The relevant country is the one in which the economic risk arises.

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

€ billion	Bank sector		DZ BANK	
	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Germany	362.4	351.6	194.8	189.1
Other industrialized countries	53.9	57.4	36.3	38.2
of which: USA	8.5	8.7	7.6	7.4
of which: France	6.5	7.1	4.0	4.9
of which: Austria	5.2	4.7	2.8	2.6
Advanced economies	2.5	2.2	2.1	1.7
Emerging markets	9.0	8.3	8.6	7.6
Supranational institutions	2.9	3.0	2.2	2.2
Total	430.7	422.6	244.0	238.8

As at December 31, 2021, 97 percent of the total lending in the Bank sector and 95 percent of the total lending by DZ BANK (unchanged year on year in both cases) was concentrated in Germany and other industrialized countries.

8.6.5 Residual maturity structure of the credit portfolio

The breakdown of the credit portfolio by residual maturity as at December 31, 2021 presented in Fig. 24 shows that the lending volume had increased by €1.3 billion in the **short-term maturity band** compared with December 31, 2020. This was attributable to BSH and DZ HYP.

There was an increase of €10.8 billion in the **medium-term maturity band**, which was mainly attributable to BSH and DZ BANK.

By contrast, the lending volume in the **long-term maturity band** declined by €4.0 billion, which was mainly accounted for by BSH and DZ BANK.

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

€ billion	Bank sector		DZ BANK	
	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
≤ 1 year	103.0	101.7	82.6	83.4
> 1 year to ≤ 5 years	114.6	103.8	65.6	64.0
> 5 years	213.1	217.2	95.9	91.4
Total	430.7	422.6	244.0	238.8

8.6.6 Rating structure of the credit portfolio

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, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Investment grade	1A	32.7	39.8	11.5	16.3
	1B	7.6	5.3	4.1	2.8
	1C	135.8	127.2	127.3	119.6
	1D	13.4	12.7	6.7	6.6
	1E	14.4	15.9	3.4	4.8
	2A	16.7	15.3	7.0	5.9
	2B	25.7	24.2	9.5	9.0
	2C	23.3	17.6	10.0	9.3
	2D	30.8	21.1	10.9	10.4
	2E	39.7	27.5	14.4	13.5
	3A	25.8	27.3	9.8	10.9
Non-investment grade	3B	17.4	25.4	7.5	7.6
	3C	14.7	22.2	5.8	5.0
	3D	9.6	14.5	5.3	6.1
	3E	6.2	7.4	2.5	2.9
	4A	2.9	4.6	1.0	2.1
	4B	3.5	3.5	2.1	1.5
	4C	1.2	1.5	0.5	0.5
	4D	1.7	0.7	1.4	0.3
	4E	1.6	1.8	0.6	0.5
Default		3.4	4.4	1.8	2.1
Not rated		2.6	2.7	1.0	1.3
Total		430.7	422.6	244.0	238.8

In the **Bank sector**, the proportion of the total lending volume accounted for by rating classes 1A to 3A (investment grade) was 85 percent as at December 31, 2021 (December 31, 2020: 79 percent). Rating classes 3B to 4E (non-investment grade) represented 14 percent as at the reporting date (December 31, 2020: 19 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, 2021 (December 31, 2020: 1.0 percent).

The increase in the investment-grade proportion of the lending volume was mainly due to updates to the rating systems at BSH. The methodology change resulted in a reduction in default rates and thus an improvement in the credit ratings in BSH's credit portfolio. There was a countervailing effect as a result of updates to the model used by BSH to determine loss given default (LGD) that led to an increase in the LGD. The two effects largely offset each other at the level of the expected loss.

Rating classes 1A to 3A (investment grade) also dominated lending at **DZ BANK**, where they accounted for 88 percent of the total lending volume (December 31, 2020: 88 percent). Rating classes 3B to 4E (non-investment grade) represented 11 percent as at the reporting date (December 31, 2020: 11 percent). As at the end of the previous year, defaults (rating classes 5A to 5E) accounted for less than 1 percent of the total lending volume as at December 31, 2021.

In the analysis of individual concentrations in the **Bank sector**, the **ten counterparties associated with the largest lending volumes** accounted for 5 percent of total lending as at December 31, 2021 (December 31, 2020: 6 percent). The equivalent proportion for **DZ BANK** was 6 percent, which was unchanged

compared with the figure at the end of the previous year. These counterparties largely comprised borrowers from the public sector domiciled in Germany and from the financial sector (including the cooperative banks) with investment-grade ratings.

8.6.7 Securitization portfolio

Securitization exposure in the Bank sector has been reduced significantly since the beginning of the 2007 financial crisis. The volume of securitizations as at December 31, 2007 stood at €31.2 billion (fair value), whereas the exposure as at December 31, 2021 amounted to €2.1 billion (nominal amount). The vast majority of the remaining exposures are investment grade, as a result of which the extent of the monitoring was brought back down to a normal level in the reporting year. Correspondingly, the internal reporting system no longer includes a separate analysis of the securitization portfolio. In view of these changes, this risk report no longer contains the securitization portfolio disclosures previously included as standard. The securitization exposure is included in the disclosures on overall lending volume (see section 8.6).

8.6.8 Collateralized lending volume

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

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

€ billion	Bank sector		DZ BANK	
	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Guarantees, indemnities, risk subparticipation	7.3	7.4	1.9	1.9
Credit insurance	4.9	4.2	4.9	4.2
Land charges, mortgages, registered ship and aircraft mortgages	116.0	111.4	2.1	2.7
Pledged loans and advances, assignments, other pledged assets	2.3	2.8	1.4	1.8
Financial collateral	1.8	1.9	1.1	1.3
Other collateral	0.2	0.3	0.2	0.2
Total collateral	132.6	128.0	11.5	12.1
Lending volume	355.3	339.6	201.7	191.2
Uncollateralized lending volume	222.7	211.6	190.2	179.1
Collateralization rate (%)	37.3	37.7	5.7	6.3

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 €128.0 billion as at December 31, 2020 to €132.6 billion as at December 31, 2021. The collateralization rate was 37.3 percent as at the reporting date (December 31, 2020: 37.7 percent).

At €11.5 billion, **DZ BANK's** total collateral value as at December 31, 2021 was down year on year (December 31, 2020: €12.1 billion). The collateralization rate had declined to 5.7 percent as at the reporting date (December 31, 2020: 6.3 percent).

8.6.9 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, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Yellow list lending volume	3,348	4,456	2,558	3,418
of which: forborne exposure	120	116	78	61
Watchlist lending volume	4,397	3,780	3,032	2,261
of which: forborne exposure	753	430	662	265
Default list lending volume	3,363	4,284	1,827	2,078
of which: forborne exposure	1,878	2,381	972	1,086
Total lending volume on monitoring lists	11,109	12,519	7,416	7,757
of which: forborne exposure	2,751	2,928	1,712	1,413
Off-monitoring-list forborne exposure	461	496	-	6
Total forborne exposure¹	3,213	3,424	1,712	1,419

¹ Both on and off the monitoring lists.

The closely monitored lending in the **Bank sector** declined by 11 percent from December 31, 2020 to December 31, 2021. The decrease was primarily attributable to DVB's reduction of its portfolio as part of its run-off strategy. This was also accompanied by a decrease of 6 percent in the closely monitored forborne exposure. Including the off-monitoring-list forborne exposure, the overall fall in the forborne exposure was also 6 percent. At **DZ BANK**, the closely monitored lending volume went down by 4 percent. The decrease was spread across a range of borrowers.

Non-performing loans

As at December 31, 2021, the volume of non-performing loans in the **Bank sector** had fallen to €3.4 billion from €4.4 billion as at December 31, 2020. The year-on-year decrease, which was mainly attributable to the reduction in the portfolio at DVB, was accompanied by a fall in the NPL ratio from 1.0 percent to 0.8 percent.

Non-performing loans at **DZ BANK** amounted to €1.8 billion as at December 31, 2021 (December 31, 2020: €2.1 billion). Combined with a rise in the total lending volume from €238.8 billion to €244.0 billion, this resulted in a lower NPL ratio of 0.7 percent (December 31, 2020: 0.9 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, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Total lending volume (€ billion)	430.7	422.6	244.0	238.8
Volume of non-performing loans (€ billion) ¹	3.4	4.4	1.8	2.1
Balance of loss allowances (€ billion) ²	1.5	2.0	0.8	1.0
Coverage ratio (%) ³	75.7	81.3	67.6	76.2
NPL ratio (%) ⁴	0.8	1.0	0.7	0.9

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.

8.7 Credit portfolios particularly affected by the COVID-19 pandemic

The following sections describe credit portfolios in which the effects of the COVID-19 pandemic were more noticeable than in the rest of the credit portfolios. However, no significantly heightened risk was as yet evident in connection with the exposures in the affected portfolios as at the reporting date. They are described solely for reasons of transparency. The figures presented below are included in the disclosures for the lending volume as a whole (see section 8.6).

The **automotive sector** is in a state of upheaval and faced with a number of issues, notably low margins and huge capital requirements. The COVID-19 pandemic is amplifying the pressure created by the transformation process. Supply shortages in many plants are currently resulting in production outages. DZ BANK's automotive finance portfolio, which is assigned to the corporates segment, is still deemed to be stable with a good credit quality despite pandemic-related rating downgrades for a few counterparties and a comparatively high NPL ratio of 5.9 percent as at December 31, 2021 (DZ BANK as a whole: 0.7 percent). This was also attributable to the stabilization resulting from government support and buyers' incentives for individual segments of the automotive industry and to the general recovery of demand. As at December 31, 2021, the lending volume in DZ BANK's automotive finance portfolio stood at €4.5 billion, which was unchanged compared with the end of the previous year.

DZ HYP's lending business with corporates includes financing for **hotels, department stores, and shopping malls**. In the reporting year, these asset classes were identified as being subject to a heightened degree of uncertainty in view of the ongoing COVID-19 pandemic, government-imposed safeguards, and potential long-term structural changes. Overall, however, the quality of the hotel, department store, and shopping mall financing portfolio of DZ HYP remains stable. To date, no risks of note have materialized in connection with any individual exposures. As at December 31, 2021, the volume of corporate loans extended by DZ HYP amounted to €47.6 billion (December 31, 2020: €46.4 billion). Of this total, €2.7 billion (December 31, 2020: €2.8 billion) related to hotel financing, €0.7 billion (December 31, 2020: €0.6 billion) to department store financing, and €2.9 billion (December 31, 2020: €3.5 billion) to shopping mall financing.

The **cruise ship industry**, for which **DZ BANK** provides funding (comprising cruise ship finance and the financing of cruise ship building), was also significantly impacted by the COVID-19 pandemic. However, unlike the portfolios previously referred to, the financing provided for the cruise ship industry has been assigned to the credit portfolios with increased risk content (see section 8.8.3).

The improvement in the pandemic situation in the reporting year meant that the volume of **liquidity support** fell sharply, to the extent that there is no longer any need to publish disclosures in this regard here.

8.8 Credit portfolios with increased risk content

8.8.1 Reporting method and changes to reporting

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 section 8.6).

The classification of credit portfolios as subject to heightened risk is based on the credit risk factors of material importance to individual credit portfolios described in section 8.3.2 '**Credit risk factors of material importance to individual credit portfolios**' as follows:

- The risk factor 'economic divergence in the eurozone' is relevant to the loans and advances to borrowers in the eurozone periphery countries.
- The risk factor 'COVID-19 pandemic' is significant for cruise ship finance and the financing of cruise ship building.

The situation in **shipping markets** eased during the reporting year because of the recovery of freight and charter rates and the rise in the price of oil. In view of this trend, the shipping market situation is no longer considered a credit risk factor for the Bank sector in the DZ BANK Group. At the same time, DVB continued to scale back its shipping finance exposure as part of its run-off strategy, which provides for an orderly reduction of the entire shipping finance portfolio as exposures mature. DZ BANK's shipping finance portfolio also contracted slightly, while at the same time the rating structure improved overall. This meant that shipping finance was no longer considered a credit portfolio with increased risk content. The economic situation in **offshore markets** continues to be challenging. However, the volume of offshore finance at DVB is now no longer of any significance because of the reduction in the size of the portfolio under the run-off strategy and this portfolio has thus also ceased to be subject to heightened credit risk. As a consequence of the above, disclosures on shipping finance and the offshore portfolio have been discontinued in this risk report, although these disclosures were still present in the 2020 risk report.

8.8.2 Loans and advances to borrowers in eurozone periphery countries

As at December 31, 2021, loans and advances to borrowers in the countries directly affected by the **economic divergence in the eurozone** attributable to the **Bank sector** and to **DZ BANK** amounted to €6,465 million (December 31, 2020: €7,276 million) and €2,057 million (December 31, 2020: €1,956 million) respectively. This mainly consisted of securities business. The decrease in the Bank sector was mainly due to reductions in fair value and to disposals and maturities at DZ HYP.

Fig. 29 shows the borrower structures for the lending volume in the eurozone periphery countries.

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

€ million	Bank sector		DZ BANK	
	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Portugal	917	1,150	153	144
of which: public sector	827	1,057	76	67
of which: non-public sector	90	93	77	77
of which: financial sector	-	-	-	-
Italy	3,002	3,181	856	888
of which: public sector	2,548	2,929	415	649
of which: non-public sector	454	252	441	239
of which: financial sector	144	100	144	100
Spain	2,547	2,945	1,049	923
of which: public sector	1,625	2,022	272	323
of which: non-public sector	922	922	777	601
of which: financial sector	273	321	242	140
Total	6,465	7,276	2,057	1,956
of which: public sector	4,999	6,008	764	1,039
of which: non-public sector	1,466	1,268	1,294	917
of which: financial sector	417	421	386	240

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

8.8.3 Finance for cruise ships and cruise ship building

Cruise ship finance

Cruise ship finance in the Bank sector is brought together under **DZ BANK**. Because global cruise ship operations remained at an almost total standstill as a result of the COVID-19 pandemic, borrowers' credit quality continued to deteriorate during 2021 and their credit ratings were again downgraded. In an industry-wide memorandum, the suspension of loan repayments covered by export credit insurance was extended until March 2022, having originally been due to expire in March 2021. The industry's prospects slowly began to brighten in the third and fourth quarters of the reporting year thanks to the increased containment of the pandemic as a result of vaccination programs. The rise in the number of infections and the spread of the Omicron variant are now jeopardizing the recovery of cruise operations and threatening to prolong the crisis in the industry for some time.

Cruise ship finance is predominantly covered by export credit insurance. The remaining risk arises mainly from working capital facilities and the underwriting provided for one acquisition finance transaction.

As at December 31, 2021, the volume of cruise ship finance amounted to €1,099 million (December 31, 2020: €1,099 million). Of this total, €678 million was covered by export credit insurance as at December 31, 2021 (December 31, 2020: €645 million). The proportion of the lending volume that was not covered predominantly consisted of working capital facilities and support for an acquisition finance transaction.

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 currently undergoing consolidation. 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. Customers' credit quality is expected to remain under pressure in the coming financial year, which is why the subportfolio is classified as a portfolio with increased risk content. The lending volume related to the financing of cruise ship building stood at €341 million as at

December 31, 2021 (December 31, 2020: €410 million). The decrease was due to the fall in traditional lending business.

8.9 Risk position

8.9.1 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, 2021, the credit value-at-risk in the **Bank sector** was €5,037 million (December 31, 2020: €5,496 million) with a limit of €7,188 million (December 31, 2020: €6,978 million). The decrease was mainly attributable to the ongoing reduction of the portfolio at DVB.

DZ BANK's credit value-at-risk as at December 31, 2021 amounted to €2,134 million (December 31, 2020: €2,227 million). The year-on-year decline was largely explained by upgrades to the methodology used in the modeling of credit risk. The corresponding limit was €2,750 million (December 31, 2020: €2,730 million).

Fig. 30 shows the credit value-at-risk together with the average probability of default and expected loss.

FIG. 30 – BANK SECTOR: FACTORS DETERMINING THE CREDIT VALUE-AT-RISK

	Average probability of default (%)				Expected loss (€ million)				Credit value-at-risk ¹ (€ million)			
	Bank sector		DZ BANK		Bank sector		DZ BANK		Bank sector		DZ BANK	
	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Traditional lending business	0.5	0.5	0.2	0.2	432	430	166	142	2,448	2,547	1,150	1,118
Securities business	0.2	0.2	0.2	0.2	44	48	28	30	1,498	1,757	268	331
Derivatives and money market business	0.2	0.2	0.2	0.2	13	14	12	13	238	262	158	192
Total					489	492	206	185	4,184	4,565	1,576	1,641
Average	0.4	0.4	0.2	0.2								

Not relevant

¹ As it is not possible to show the risk capital requirement including the capital buffer requirement in the analysis of credit-risk-bearing instruments, the risk capital requirement is presented without the decentralized capital buffer requirement.

8.9.2 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. 31.

FIG. 31 – BANK SECTOR: CREDIT VALUE-AT-RISK¹ FOR CREDIT PORTFOLIOS WITH INCREASED RISK CONTENT

€ million	Bank sector		DZ BANK	
	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Eurozone periphery countries	1,109	1,255	12	22
Cruise ship finance	13	15	13	15
Finance for cruise ship building	4	2	4	2

¹ Excluding decentralized capital buffer requirement.

The decline in the credit value-at-risk for the Bank sector entities' exposure in the **peripheral countries of the eurozone** was in line with the change in the loans and advances to borrowers in these countries.

As at December 31, 2021, the credit value-at-risk in respect of **cruise ship** finance and the financing of **cruise ship building** amounted to €13 million (December 31, 2020: €15 million) and €4 million (December 31, 2020: €2 million) respectively and was attributable in full to DZ BANK. The credit value-at-risk relating to cruise ship building went up following a deterioration in borrower credit ratings.

9 Equity investment risk

9.1 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 UMH.

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.

9.2 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 UMH, the investments are mainly the responsibility of the Central Services department.

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.

9.3 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.

9.4 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. 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.

The measurement of equity investment risk takes into account both the equity-accounted investments and the fully consolidated investees. As part of acquisition accounting and during the course of preparing the consolidated financial statements, the investment carrying amounts for consolidated subsidiaries are offset against the relevant share of net assets. Consequently, the investment carrying amounts disclosed in the notes to the consolidated financial statements are considerably lower than the carrying amounts used for determining risk.

9.5 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 €2,953 million as at December 31, 2021 (December 31, 2020: €2,893 million). As at December 31, 2021, the carrying amounts of the long-term equity investments of **DZ BANK** came to €1,815 million (December 31, 2020: €1,930 million).

The **risk capital requirement** for equity investment risk in the **Bank sector** was calculated to be €996 million as at the reporting date (December 31, 2020: €936 million). The limit was €1,220 million (December 31, 2020: €1,090 million). The corresponding figure for **DZ BANK** as at December 31, 2021 came to €636 million (December 31, 2020: €634 million). The limit as at December 31, 2021 was €700 million (December 31, 2020: €725 million).

The rise in the risk capital requirement was largely attributable to the increase in the carrying amount and risk capital requirement in respect of SCHUFA Holding AG.

10 Market risk

10.1 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.

10.2 Business background and risk strategy

10.2.1 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.

10.2.2 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.

10.3 Risk factors

10.3.1 General market 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**. Credit spreads are the key risk factor for all the market risk in the Bank sector.

Spread risk, including migration risk, is the most significant type of market risk for the entities in the Bank sector. A proportion of the spread and migration risk is attributable to securities issued by southern eurozone periphery countries and held by 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.

10.3.2 Specific market risk factors

Because of the long period of **low interest rates**, the challenge faced by the asset management activities brought together under UMH is to ensure that the guarantee commitments given to customers in respect of individual products can actually be met from the investment instruments in those products. This particularly affects the pension products and the guarantee fund product group. 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. Guarantee funds are products for which UMH guarantees that a minimum percentage of capital is preserved, depending on the precise product specification. If UMH is unable to draw some of the management fees, or has to inject fresh capital, so that it can meet its guarantee commitments, this could have a substantial 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 V.1.5 in the outlook.

The widening of credit spreads can be triggered by macroeconomic risk factors. These factors are the **risks to the global economy** from the COVID-19 pandemic, international trade disputes, and the military confrontation between Russia and Ukraine (see chapters V.1.1 to V.1.4 in the outlook).

10.4 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.

10.5 Management of market risk

10.5.1 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. 32.

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 1 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 used, key risk indicators, frequency of risk measurement, and main risk measurement parameters. To supplement this risk management 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 and at DZ BANK 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.

10.5.2 Decentralized market risk measurement

Decentralized measurement of general market risk and spread risk

In addition to the models specified in section 10.5.1, 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.

10.5.3 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.

10.5.4 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.

10.5.5 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.

10.5.6 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 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.

10.6 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.

10.7 Risk position

10.7.1 Value-at-risk

Fig. 32 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. 33 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.

FIG. 32 – BANK SECTOR: CHANGE IN MARKET RISK BY RISK SUBTYPE^{1, 2}

€ million	Inter- est rate risk		Spread risk		Equity risk ³		Cur- rency risk		Com- mod- ity risk		Diver- sification effect ^{4, 5}		Aggre- gate 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, 2021	10	10	43	14	14	4	2	2	2	1	-22	-13	48	18
Average	11	9	89	28	13	3	3	2	2	1	-28	-13	90	30
Maximum	20	13	291	103	32	13	4	4	3	2			290	107
Minimum	7	6	41	10	7	2	1	1	2	2			43	12
Dec. 31, 2020	17	12	283	93	29	4	3	2	3	2	-52	-21	282	92

Not relevant

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

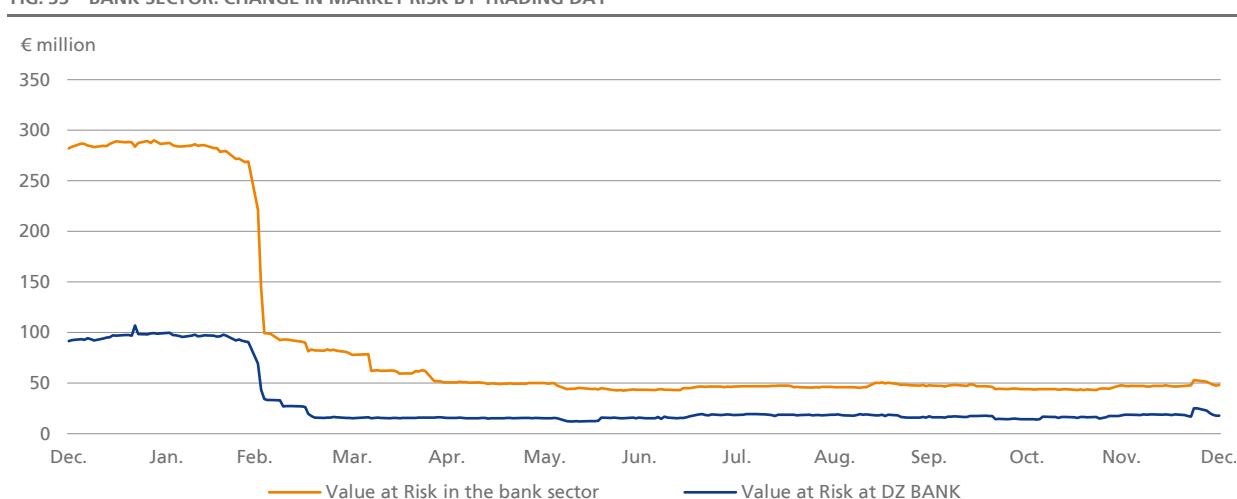
² Value-at-risk with 99.00% confidence level, 1-day holding period, 1-year observation period, based on a central market risk model for the Bank sector. Concentrations and effects of diversification were taken fully into account when calculating the risks.

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



¹ Value-at-risk with 99.00% 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.

As at December 31, 2021, 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:** €10 million (€19 million)
- **DZ BANK:** €10 million (€12 million).

The value-at-risk for interest-rate risk in all of the portfolios (comprising the trading and non-trading books presented in Fig. 32) 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. Rounding of the key figures reported in this risk report meant that both value-at-risk figures for interest-rate risk were identical as at the reporting date.

Market risk declined primarily because the market scenarios that materialized in spring 2020 in the context of the COVID-19 pandemic were no longer included in the historical observation period used in the calculation of risk.

10.7.2 Risk capital requirement

As at December 31, 2021, the **risk capital requirement** for market risk in the **Bank sector** and at **DZ BANK** amounted to €3,713 million (December 31, 2020: €4,310 million) and €1,517 million (December 31, 2020: €1,908 million) respectively, with **limits** of €5,725 million (December 31, 2020: €5,725 million) and €2,400 million (December 31, 2020: €2,600 million) respectively. In this case too, the decline in market risk was because the market scenarios that materialized in spring 2020 in the context of the COVID-19 pandemic were no longer included in the historical observation period used in the calculation of risk.

The Bank sector's risk capital requirement encompasses the **asset-management risk of UMH**. The asset-management risk of the Bank sector as at December 31, 2021 amounted to €347 million (December 31, 2020: €319 million). The increase in risk was primarily attributable to a change to the calculation of risk. DZ BANK is not exposed to any asset-management risk.

11 Technical risk of a home savings and loan company

11.1 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.

11.2 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.

11.3 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 business 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.

11.4 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.

11.5 Risk position

As at December 31, 2021, the **capital requirement** for the technical risk of a home savings and loan company amounted to €639 million (December 31, 2020: €545 million) with a **limit** of €706 million (December 31, 2020: €550 million). The increase in risk was mainly attributable to a change to the calculation of risk.

12 Business risk

12.1 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 and DVB. 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.

12.2 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.

12.3 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.

12.4 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' in this (group) management report.

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 income situation from an HGB perspective.

12.5 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' in this (group) management report.

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 dialog 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.

12.6 Risk position

As at December 31, 2021, the **risk capital requirement** for business risk in the **Bank sector** and at **DZ BANK** amounted to €407 million (December 31, 2020: €382 million) and €295 million (December 31, 2020: €356 million) respectively. The **limits** as at the reporting date were €640 million (December 31, 2020: €550 million) and €445 million (December 31, 2020: €500 million) respectively. Reputational risk is included in the figures shown. The increase in risk and the higher limit were predominantly due to DVB's risk being transferred from the centralized to the decentralized capital buffer requirement.

13 Reputational risk

13.1 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.

13.2 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.

13.3 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 social and corporate governance risks assessed in connection with ESG risk factors were to materialize, this could give rise to heightened reputational risk. These risk factors are described in section 5.3.3.

13.4 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 generally 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.

14 Operational risk

14.1 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.

14.2 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 HYP, DZ PRIVATBANK, and UMH are particularly subject to operational risk.

The Bank sector entities 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.

14.3 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 Controlling 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 also manage some operational risk tasks. 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.

14.4 Central risk management

14.4.1 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 also enable risk concentrations to be identified.

Risk indicators

In addition to the loss database and risk self-assessment, risk indicators help the Bank sector to identify risk trends and concentrations at an early stage and 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 on a wide scale.

14.4.2 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.

14.4.3 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.

14.4.4 Mitigating and avoiding operational risk

Continual improvement of business 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.

14.5 Operational risk subtypes

14.5.1 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, or support 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 section 4.5.5. The data protection measures in place and the code of conduct are also explained in the same section. Measures such as the strict separation of functions, the requirement for verification by second person, restrictions on IT and building access authorizations, and a sustainability-oriented remuneration system aim to contain risk, in particular the risk of internal fraud.

14.5.2 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'.

14.5.3 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, 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 (including hacker attacks and the installation of malware). 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.

Risk management

The basic principles for managing information security applicable to the entities in the DZ BANK Group are described in section 4.5.6. 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 units 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.

IT units apply comprehensive physical and logical precautionary measures to guarantee the security of data and applications 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 section 4.5.6.

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.

14.5.4 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 section 4.5.6.

14.5.5 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:

- The relevant service provider fails 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 section 4.5.7.

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 corporate and reviewing units, including compliance, legal affairs, 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.

14.5.6 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 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.

14.6 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.

Fig. 34 shows the net losses from loss events reported in the last four quarters, i.e. in the period from January 1 to December 31, 2021, classified by operational risk subtype, accompanied by a comparison against the corresponding long-term mean.

FIG. 34 – BANK SECTOR: NET LOSSES BY OPERATIONAL RISK SUBTYPE

	Bank sector		DZ BANK	
	Jan. 1, 2021– Dec. 31, 2021	Long-term mean ¹	Jan. 1, 2021– Dec. 31, 2021	Long-term mean ¹
Proportion of total net losses (%)				
Compliance risk	39.8	44.9	42.0	46.7
Legal risk	43.4	37.1	44.3	39.9
Information risk including ICT risk	1.9	5.6	2.4	4.3
Security risk	0.9	1.9	1.0	0.9
Outsourcing risk	1.8	0.6	3.9	0.5
Project risk	6.0	0.8	0.4	0.5
Other operational risk	6.2	9.2	6.0	7.0

¹ The long-term mean is derived from loss data recorded since 2006.

In the past four quarters, which is the relevant observation period for the analysis of net losses, internal losses in the **Bank sector** were dominated by **compliance risk** and **legal risk**. While the internal losses in these risk subtypes were still well below the respective annual averages as at December 31, 2020, provisions recognized in connection with general banking operations meant that the internal losses related to compliance risk and legal risk went up in the reporting year to the extent that, in the case of legal risk, the long-term mean as at December 31, 2021 was exceeded.

Net losses related to **project risk** rose compared with the figure as at December 31, 2020 and were also higher than the long-term mean calculated as at December 31, 2021. The increase was mainly attributable to losses in large-scale projects.

Although the net losses for the **other risk subtypes** as at December 31, 2021 were on a par with the end of 2020, the proportion of the total internal net losses attributable to these risk subtypes declined owing to the increase in losses attributable to compliance risk and legal risk.

At **DZ BANK**, net losses in the last four quarters were likewise concentrated in **legal risk** (44.3 percent), followed by **compliance risk** (42.0 percent) and **other operational risk** (6.0 percent).

Losses did not reach a critical level relative to the expected loss from operational risk at any point during 2021, either in the Bank sector or at DZ BANK.

14.7 Risk position

As at December 31, 2021, the capital requirement for operational risk at **Bank sector** level was calculated at €941 million (December 31, 2020: €844 million) with a limit of €1,102 million (December 31, 2020: €1,020 million).

As at December 31, 2021, the corresponding requirement at **DZ BANK** was €515 million (December 31, 2020: €467 million). The limit as at December 31, 2021 was €596 million (December 31, 2020: €547 million).

Fig. 35 shows the structure of the risk profile for operational risk in the Bank sector and at DZ BANK based on **risk subtypes**.

FIG. 35 – BANK SECTOR: DISTRIBUTION OF RISK CAPITAL REQUIREMENT FOR OPERATIONAL RISK, BY RISK SUBTYPE

%	Bank sector ¹		DZ BANK ²	
	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020
Compliance risk	32.5	32.4	15.1	15.2
Legal risk	20.6	19.2	9.5	10.4
Information risk including ICT risk	14.3	14.4	4.8	5.5
Security risk	5.5	5.7	1.6	1.5
Outsourcing risk	6.5	6.9	2.1	2.3
Project risk	7.4	7.8	2.8	3.0
Other operational risk	13.3	13.6	6.8	6.2

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, 2021 compared with the end of the previous year. In 2021, **compliance risk** and **legal risk** accounted for the most significant proportions of the risk capital requirement, both in the Bank sector and at DZ BANK. The proportions of the risk capital requirement for these two risk subtypes were determined by the recorded losses and the hypothetical risk scenarios arising in connection with risks from capital market and credit products and risks from general banking operations. The third-largest proportion was accounted for by **information risk including ICT risk**, the risk contribution for the Bank sector and DZ BANK in this case being determined to a large degree by hacker-attack scenarios. The proportions of risk capital accounted for by other operational risk (which mainly consists of HR risk, financial reporting risk, and model risk), project risk, outsourcing risk, and security risk were also shaped by hypothetical risk scenarios.

Insurance sector

15 Basic principles of risk management in the Insurance sector

15.1 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: ensuring required returns on investments taking into account individual risk-bearing capacities, achieving defined minimum investment returns in stress scenarios, and securing a certain hidden asset level 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.

15.2 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.

16 Actuarial risk

16.1 Definition and business background

16.1.1 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.

16.1.2 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.

16.2 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, and disproportionately sharp cost increases. If the actual trends in life expectancy, disability-morbidity, and costs 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.

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).

16.3 Management of life actuarial risk

16.3.1 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; an increase of 1 percentage point in the cost inflation rate.

16.3.2 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.

16.4 Management of health actuarial risk

16.4.1 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 sections on life actuarial risk (section 16.3) and non-life actuarial risk (section 16.5) 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.

16.4.2 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, 2021, R+V used the new PKV mortality table valid for 2021 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.

16.5 Management of non-life actuarial risk

16.5.1 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 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.

16.5.2 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.

16.5.3 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. Cyber and pandemic exclusions were added to policy terms and conditions in the reporting year. 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, R+V has entered into a retrocession agreement as part of its inward reinsurance business. In the second half of the reporting year, it also purchased retrocession cover to minimize the risk arising in connection with hurricanes in the US.

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.

16.6 Claims rate trend in non-life insurance

In the **direct non-life insurance** business, a number of storms meant that the budget for the year allocated to natural disasters was exceeded. Gross claims arising from natural disaster events amounted to €1,088 million, of which €730 million was accounted for by **Storm Bernd** alone. It was possible to limit the impact on net insurance gains and losses by making use of existing reinsurance arrangements for natural disasters. The net charge caused by natural disasters was offset by positive effects from the **motor vehicle insurance** division as a consequence of the pandemic. Beyond the impact from natural disasters and the COVID-19 pandemic, other major claims remained at normal levels and within budget. 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 73.3 percent at the end of the previous year to 74.0 percent at the end of 2021, which was within the forecast range.

The budget for major and natural disaster claims was also exceeded in **inward reinsurance** because of the impact from several storms. **Storm Bernd** in Europe, the extreme onset of winter that affected a number of states in the US Midwest (**Texas Freeze**), and other natural disasters gave rise to gross claims totaling €453 million. Multiple reinsurance arrangements to reduce the risk from natural disasters meant that the negative financial impact for R+V was limited. 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 83.2 percent as at December 31, 2020 to 73.5 percent as at the reporting date.

Changes in claims rates and settlements (net of reinsurance) in direct non-life insurance and inward non-life reinsurance business are shown in Fig. 36.

FIG. 36 – INSURANCE SECTOR: CLAIMS RATE AND SETTLEMENTS (NET OF REINSURANCE)¹

	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Claims rate (net) as percentage of premiums earned										
Including major/natural disaster claims	73.8	76.5	76.3	76.2	76.6	76.1	76.2	75.5	78.2	75.6
Excluding major/natural disaster claims	68.0	70.4	72.7	71.1	72.8	72.3	74.0	73.8	69.1	72.7
Settlements (net) as percentage of provision for incoming claims										
Non-life	2.9	1.9	0.6	1.1	3.1	3.6	1.6	2.1	0.5	0.3

¹ Direct non-life insurance business and inward non-life reinsurance.

16.7 Risk position

As at December 31, 2021, the overall solvency requirement for **life actuarial risk** amounted to €328 million (December 31, 2020: €1,070 million) with a limit of €600 million (December 31, 2020: €1,400 million).

As at December 31, 2021, the overall solvency requirement for **health actuarial risk** was €240 million (December 31, 2020: €293 million) with a limit of €350 million (December 31, 2020: €700 million).

The decrease in the risk associated with the above categories of actuarial risk resulted from the greater potential for risk mitigation from the higher policyholder participation anticipated in the future. The rise in policyholder participation was attributable to the merger of R+V Luxembourg S.A., Luxembourg-Strassen, with R+V Lebensversicherung AG during the reporting year.

The overall solvency requirement for **non-life actuarial risk** amounted to €1,762 million as at December 31, 2021 (December 31, 2020: €3,780 million) with a limit of €4,600 million (December 31, 2020: €4,500 million). This decline in risk was largely due to the introduction of internal modeling for premium and reserve risk in the inward reinsurance business and to a modification of the reinsurance structure.

17 Market risk

17.1 Definition and business background

17.1.1 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).
- **Concentration risk** represents the additional risk for an insurance or reinsurance company stemming either from lack of diversification in the asset portfolio or from a large exposure to the risk of default by a single issuer of securities or a group of related issuers.

17.1.2 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.

17.2 Risk factors

R+V could face additional challenges in respect of the requirement to generate guaranteed returns in the life insurance business because income from new investments will be lower if **interest rates remain low over the long term** or turn negative and **credit spreads on investments are narrow**. Whereas the low interest rates are largely caused by the ECB's expansionary monetary policy, lower spreads could reflect a number of factors, including a view in the markets that the credit quality of the issuers of investments has improved. Information on the anticipated trend in interest rates in 2022 can be found in chapter V.1.5 in the outlook.

On the other hand, if **interest rates were to rise sharply and rapidly** or **risk premiums on bonds widen**, this would lead to a substantial fall in the fair values of R+V's investments. 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, and the military confrontation between Russia and Ukraine (see chapters V.1.1 to V.1.4 in the outlook). 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.

17.3 Risk management

17.3.1 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.

17.3.2 Principles of market risk management

The risk attaching to investments is managed in accordance with the guidelines specified by EIOPA, the stipulations in the VAG, the information provided in regulatory circulars, and internal investment guidelines (for details, see 'Market risk strategy' in section 15.1). 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 long period of low interest rates and volatile capital markets. R+V uses derivatives to manage market risk.

17.3.3 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 42 in section 17.4.2). 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 score, controversy reports). The related key figures are obtained from third-party data providers. If ESG controversies arise at certain issuers, R+V can initiate processes to engage with such issuers in order to mitigate ESG risks.

17.3.4 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.

17.3.5 Distinctive features of managing market risk in personal insurance business

Due to the persistently low level of interest rates, there is a risk that the guaranteed minimum return agreed for certain products when contracts are signed cannot be generated on the capital markets over the long term. This particularly applies to life insurance contracts and casualty insurance contracts with premium refund clauses that guarantee minimum returns. 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. A protracted period of low interest rates increases the market risk arising from investments. Chapter V.1.5 in the outlook describes the anticipated trend in interest rates in 2022.

Market risk can be countered by writing new business that takes into account the current capital market situation and by taking the following 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 2021, R+V added a total of €750 million to these supplementary reserves in its life insurance business, bringing the overall amount

to €5,408 million. The addition to these reserves for casualty insurance with premium refund was €3 million, bringing the total to €43 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. 37.

FIG. 37 – INSURANCE SECTOR: BENEFIT RESERVES BY DISCOUNT RATE FOR THE MAIN INSURANCE PORTFOLIOS¹

Discount rate	Proportion of total benefit reserve in 2021 ²		Proportion of total benefit reserve in 2020 ²	
	€ million	%	€ million	%
0.00%	6,897	9.3	6,254	8.9
0.01%	98	0.1	-	-
0.08%	5	-	4	-
0.10%	21	-	46	0.1
0.25%	1,453	2.0	928	1.3
0.30%	159	0.2	159	0.2
0.35%	956	1.3	308	0.4
0.40%	44	0.1	18	-
0.50%	213	0.3	163	0.2
0.75%	-	-	8	-
0.90%	8,545	11.5	7,555	10.7
1.00%	121	0.2	116	0.2
1.10%	225	0.3	59	0.1
1.25%	2,721	3.7	2,589	3.7
1.50%	12	-	31	-
1.55%	14	-	22	-
1.75%	6,403	8.6	5,999	8.5
1.80%	1,054	1.4	361	0.5
2.00%	610	0.8	765	1.1
2.25%	11,640	15.7	11,791	16.7
2.50%	96	0.1	92	0.1
2.75%	8,962	12.1	8,675	12.3
3.00%	1,974	2.7	2,004	2.8
3.25%	7,159	9.6	7,310	10.4
3.50%	3,108	4.2	3,321	4.7
3.75%	3	-	182	0.3
4.00%	7,102	9.6	7,233	10.3

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.

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 2021 for observation units with a premium adjustment effective January 1, 2021.

17.3.6 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.

17.4 Lending volume

17.4.1 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. 38 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. 38 – 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				
Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Dec. 31, 2021	Dec. 31, 2020	Investments held by insurance companies (note 57 to the consolidated financial statements)
								13.0	10.9	of which: mortgage loans
								7.2	7.0	of which: promissory notes and loans
								8.5	9.1	of which: registered bonds
								1.0	0.9	of which: other loans
								13.7	11.6	of which: variable-yield securities
								61.4	61.5	of which: fixed-income securities
								0.2	0.6	of which: derivatives (positive fair values)
								0.5	0.6	of which: deposits with ceding insurers
104.5	103.0	-1.4	-1.2	-0.3	0.5	2.8	-0.1	105.6	102.2	Total
Balance as at Dec. 31, 2021								1.1	1.1%	
Balance as at Dec. 31, 2020								-0.8	-0.8%	

Not relevant

17.4.2 Change in lending volume

As at December 31, 2021, the **total lending volume** of R+V had increased by 1 percent to €104.5 billion (December 31, 2020: €103.0 billion). This increase was attributable to the expansion of the investment portfolios in connection with the growth in the insurance business.

The volume of lending in the **home finance** business totaled €13.1 billion as at December 31, 2021 (December 31, 2020: €11.9 billion). Of this amount, 87 percent (December 31, 2020: 88 percent) was accounted for by loans for less than 60 percent of the value of the property.

The volume of home finance was broken down by finance type as at the reporting date as follows (figures as at December 31, 2020 shown in parentheses):

- Consumer home finance: €11.9 billion (€10.8 billion)
- Commercial home finance: €0.1 billion (€0.1 billion)
- Commercial finance: €1.1 billion (€1.0 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 67 percent of the total lending volume as at December 31, 2021 (December 31, 2020: 69 percent). The explanation of the asset class concept in the Bank sector (see section 8.6.3) applies analogously to the Insurance sector. Fig. 39 shows the breakdown of the lending volume by asset class.

FIG. 39 – INSURANCE SECTOR: LENDING VOLUME, BY ASSET CLASS

€ billion	Dec. 31, 2021	Dec. 31, 2020
Financials	46.7	47.1
Corporates	16.3	15.7
Public sector	22.9	23.7
Real estate (commercial and retail customers)	16.3	15.1
ABSs and ABCPs	1.5	1.4
Other	0.8	-
Total	104.5	103.0

An analysis of the **geographical breakdown** of the lending volume in Fig. 40 reveals that Germany and other industrialized countries accounted for the lion's share – 90 percent – of the lending volume as at the reporting date (December 31, 2020: 91 percent).

FIG. 40 – INSURANCE SECTOR: LENDING VOLUME, BY COUNTRY GROUP

€ billion	Dec. 31, 2021	Dec. 31, 2020
Germany	37.8	37.8
Other industrialized countries	56.6	55.5
of which: France	12.6	12.6
of which: USA	7.5	6.6
of which: Netherlands	6.0	5.3
Advanced economies	1.3	1.3
Emerging markets	5.2	5.1
Supranational institutions	3.7	3.3
Total	104.5	103.0

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. 41. As at December 31, 2021, 86 percent (December 31, 2020: 84 percent) of the total lending volume had a residual maturity of more than five years. The percentage of the total lending volume due to mature within one year was 3 percent as at the reporting date. This figure was unchanged year on year.

FIG. 41 – INSURANCE SECTOR: LENDING VOLUME, BY RESIDUAL MATURITY

€ billion	Dec. 31, 2021	Dec. 31, 2020
≤ 1 year	2.6	2.7
> 1 year to ≤ 5 years	12.3	13.5
> 5 years	89.5	86.8
Total	104.5	103.0

The **rating structure** of the lending volume in the Insurance sector is shown in Fig 42. Of the total lending volume as at December 31, 2021, 79 percent was attributable to investment-grade borrowers (December 31, 2020: 80 percent). The lending volume that is not rated, which remained unchanged compared with the end of 2020 at 19 percent of the total lending volume, 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 42 – INSURANCE SECTOR: LENDING VOLUME, BY RATING CLASS

€ billion		Dec. 31, 2021	Dec. 31, 2020
Investment grade	1A	27.0	27.4
	1B	11.7	14.8
	1C	-	-
	1D	12.6	10.2
	1E	-	-
	2A	11.1	9.2
	2B	6.2	7.3
	2C	7.3	6.5
	2D	3.2	3.2
	2E	-	-
	3A	3.5	3.7
Non-investment grade	3B	0.3	0.4
	3C	0.5	0.3
	3D	-	-
	3E	0.2	0.4
	4A	0.1	0.1
	4B	0.5	0.3
	4C	0.1	0.1
	4D	-	-
	4E	-	-
Default		-	-
Not rated		20.2	19.1
Total		104.5	103.0

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 (section 8.5.1).

As at December 31, 2021, the **ten counterparties associated with the largest lending volumes** accounted for 18 percent of R+V's total lending volume. This was the same as the figure at the prior-year reporting date.

17.4.3 Credit portfolios with increased risk content

R+V's exposure in credit portfolios with increased risk content is analyzed separately because of its significance for the risk position in the Insurance sector. The figures presented here are included in the above analyses of the total lending volume.

Investments in **eurozone periphery countries** totaled €5,822 million as at December 31, 2021 (December 31, 2020: €6,328 million). This constituted a decrease of 8 percent, which was attributable to a fall in fair values and disposals.

Fig. 43 shows the country breakdown of the exposure.

FIG. 43 – INSURANCE SECTOR: EXPOSURE IN EUROZONE PERIPHERY COUNTRIES

€ million	Dec. 31, 2021	Dec. 31, 2020
Portugal	49	46
of which: public sector	40	42
of which: non-public sector	9	4
of which: financial sector	4	4
Italy	2,844	3,190
of which: public sector	1,866	2,104
of which: non-public sector	978	1,086
of which: financial sector	838	826
Spain	2,929	3,092
of which: public sector	1,607	1,562
of which: non-public sector	1,322	1,529
of which: financial sector	1,080	1,295
Total	5,822	6,328
of which: public sector	3,513	3,708
of which: non-public sector	2,309	2,620
of which: financial sector	1,922	2,125

17.5 Risk position

As at December 31, 2021, the **overall solvency requirement** for market risk amounted to €3,127 million (December 31, 2020: €3,511 million) with a **limit** of €4,400 million (December 31, 2020: €5,750 million). The decline in risk was due to the merger effects described in section 16.7 and to effects from a rise in interest rates.

Fig. 44 shows the overall solvency requirement for the various types of market risk.

FIG. 44 – INSURANCE SECTOR: OVERALL SOLVENCY REQUIREMENT FOR MARKET RISK, BY RISK SUBTYPE

€ million	Dec. 31, 2021	Dec. 31, 2020
Interest-rate risk	1,218	951
Spread risk	1,388	1,622
Equity risk	1,258	1,561
Currency risk	354	277
Real-estate risk	432	442
Total (after diversification)	3,127	3,511

The overall solvency requirement for market risk includes a **decentralized capital buffer requirement**. This capital buffer requirement covers the spread and migration risk arising from sub-portfolios of Italian government bonds while also taking account of the increase in market risk that could arise from refinement of the modeling used for equity risk.

As at December 31, 2021, the decentralized capital buffer requirement for market risk totaled €212 million (December 31, 2020: €127 million). This uplift resulted from the recognition of a new capital buffer requirement for equity risk.

18 Counterparty default risk

18.1 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 12 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.

18.2 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 or policyholders, or insurance brokers.

18.3 Risk management

18.3.1 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.

18.3.2 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, 2020.

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.

18.4 Risk position

Receivables arising from ceded reinsurance amounted to €121 million as at December 31, 2021 (December 31, 2020: €19 million). Almost 100 percent of this amount (December 31, 2020: 95 percent) was accounted for by entities with an external rating of A or better. As at the prior-year reporting date, receivables from entities with an external rating of BBB or worse made up less than 1 percent of the total volume. 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 €149 million as at December 31, 2021 (December 31, 2020: €174 million).

As at December 31, 2021, the **overall solvency requirement** for counterparty default risk was €222 million (December 31, 2020: €178 million) with a **limit** of €350 million (December 31, 2020: €220 million). This increase was attributable to higher amounts past due and greater reinsurance cover.

19 Reputational risk

19.1 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).

19.2 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 social and corporate governance risks assessed in connection with ESG risk factors were to materialize, this could give rise to heightened reputational risk. These risk factors are described in section 5.3.3.

19.3 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).

20 Operational risk

20.1 Definition and business background

Operational risk is defined as the risk of loss 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 IT 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.

20.2 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 R+V's business processes are structured in accordance with the requirements of the **framework guidelines** for employee authority and power of attorney in R+V companies. 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.

20.3 Operational risk components

20.3.1 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 section 4.5.5. The data protection measures in place and the code of conduct are also explained in the same section.

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.

20.3.2 Information risk including IT 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 IT 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 and have a negative impact on reputation.

Risk management

The basic principles for managing information security applicable to the entities in the DZ BANK Group are described in section 4.5.6.

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 high degree of inhouse input into the development and operation of IT solutions, 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.

20.3.3 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 section 4.5.6.

20.3.4 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 section 4.5.7.

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.

20.3.5 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.

20.4 Risk position

As at December 31, 2021, the **overall solvency requirement** determined for operational risk amounted to €715 million (December 31, 2020: €694 million). The rise compared with the prior year resulted first and foremost from business growth. The **limit** was €1,000 million as at the reporting date (December 31, 2020: €800 million).

21 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 section 16.3.2), market risk (see section 17.3), counterparty default risk (see section 18.3), and operational risk (see section 20.2). 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. Again, 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.

As at December 31, 2021, the **overall solvency requirement** for risks in connection with non-controlling interests in insurance companies and entities in other financial sectors stood at €124 million (December 31, 2020: €126 million) with a **limit** of €180 million (December 31, 2020: €140 million).