

Pillar III Disclosure Report of Eurex Clearing AG 2018

Disclosures as of 31 December 2018

Pillar III Disclosure Report of Eurex Clearing AG 2018

According to Part 8 of the Regulation (EU) No 575/2013 (Capital Requirements Regulation [CRR]) in conjunction with § 26a German Banking Act (Kreditwesengesetz, KWG).

May 2019

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Foreword

The purpose of the document is to fulfil the regulatory disclosure requirements based on the revised Basel banking framework commonly known as “Basel III”. For the European Union (EU), the current disclosure framework covers the “Basel III” requirements and includes some additional components as laid down by Directive 2013/36/EU (Capital Requirements Directive, CRD IV) and Regulation (EU) No 575/2013 (Capital Requirements Regulation, CRR), commonly known as CRD IV package as well as subsequent issued level 2 acts and guidelines.

Eurex Clearing AG (“Eurex Clearing” or “ECAG”) is licensed as a Central Counterparty (CCP) under Regulation (EU) No 648/2012 (EMIR) and in addition is authorised as credit institution taking deposits and granting loans to a limited extent under the German Banking Act (Kreditwesengesetz, KWG). Eurex Clearing is subject to supervision by the German Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin).

Eurex Clearing has no subsidiary that requires consolidated supervision based on Article 18 CRR or § 10a KWG. In addition, Eurex Clearing is not included in a group of undertakings that is subject to supervision on a consolidated level.

Therefore, ECAG fulfils the disclosure requirements detailed in Part 8 CRR and § 26a KWG, which have transposed the disclosure requirements of Articles 89 to 96 CRD IV into German law, on a stand-alone level as follows:

- A remuneration report that fulfils the requirements according to Article 450 CRR. That report is disclosed by year on the website of Eurex Clearing:
www.eurexclearing.com/clearing-en/about-us/regulatory-standards/remuneration
- All other disclosure requirements as defined in Part 8 CRR and the related technical standards are published within this Pillar III Disclosure Report which can also be found by year on the website of Eurex Clearing:
www.eurexclearing.com/clearing-en/about-us/regulatory-standards/pillar-iii-disclosure-report
- Moreover, this Disclosure Report contains information about Governance Arrangements as stipulated in § 26a (1) sentence 1 KWG (implementation of Article 88 CRD IV into German law).
- The Country-by-Country reporting to fulfil the requirements according to § 26a (1) sentence 2 KWG (implementation of Article 89 CRD IV into German law) is included as an annex to the financial statements of Eurex Clearing which is published on the website of the German Federal Gazette (www.bundesanzeiger.de) and can also be found on the website of Eurex Clearing:
www.eurexclearing.com/clearing-en/about-us/corporate-overview/annual-reports
- Information about the Return on Assets (RoA) according to § 26a (1) sentence 4 KWG (implementation of Article 90 CRD IV into German law) is disclosed in the management report of the financial statement of Eurex Clearing which is published on the website of the German Federal Gazette (www.bundesanzeiger.de) and can also be found on the website of ECAG:
www.eurexclearing.com/clearing-en/about-us/corporate-overview/annual-reports.

In the following, we refer to the respective laws in place during the reporting period (that is 2018 and in principle as valid on 31 December 2018 if not stated otherwise).

How this document is organised

The report is presented over nine chapters, as follows:

1. Introduction
2. Implementation of Basel III at Eurex Clearing AG
3. Risk Management overview
4. Management of credit risk
5. Management of operational risk
6. Management of market risk, including interest rate risk of exposures on positions not included in the trading book
7. Management of liquidity risk
8. Capital structure, Capital Ratio and Leverage Ratio
9. Governance Arrangements

An explanatory list of the abbreviations used is provided as an appendix to this document.

Contact details

For further information or if you have specific questions regarding this report, please contact us at media.relations@eurexclearing.com.

Eurex Clearing AG May 2019

1. Introduction

1.1 Background

1.1.1 Current banking framework (Basel III)

In June 2011, the Basel Committee on Banking Supervision (BCBS) published the first and major cornerstones of its global revised banking regulatory framework, commonly known as “Basel III”¹.

The “Basel III” framework itself does not apply to Eurex Clearing AG. Nevertheless, the term “Basel III” is used throughout this document as it has become the commonly used synonym for the current regulatory banking framework.

“Basel III” contains capital requirements for credit risk (including credit risk mitigation techniques), operational risk and market risk as well, as additional transitional rules starting 2013 and lasting until 2019. In addition, “Basel III” includes a definition of regulatory capital, the requirement of capital buffers, the Leverage Ratio, strict liquidity management requirements and close monitoring of liquidity by supervisory authorities (Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR)).

In the European Union, the “Basel III” rules have been implemented by a regulatory package commonly known as “CRD IV”, consisting of Regulation (EU) No 575/2013 (Capital Requirements Regulation or “CRR”)² and Directive 2013/36/EU (Capital Requirements Directive or “CRD IV”)³. Both legal documents were published in July 2013 and are in force since 1 January 2014. The CRD IV Directive itself was transposed into German national law by that date.

In addition to CRD IV and CRR, substantial parts of the implementation are steered via technical standards drafted by the European Banking Authority (EBA). The EBA has prepared many such standards which have been approved by the EU Commission, under the delegated authority granted by the CRD IV package.

The CRD IV-package did not only transform the 2011 Basel III rules as such but also implemented some early Basel amendments, such as the rule set for exposures towards CCPs and additional components. These components include dedicated rules for capital requirements related to systematic risk and systematically important institutions. On top of that, limits on the variable part of remuneration, strengthened corporate governance rules and, by means of CRR being valid directly in all EU (EEA) countries, an increasingly harmonised “Single Rulebook” has been introduced EU wide.

Whereas the Basel III rules only apply directly to global commercial banks with an international remit, the EU rules apply to all banks that operate in the EU. The CRD IV-package therefore partly addresses both regional and size-related issues and provides specific or modified regulations for certain types of business.

Several important regulatory measures within the EU play an additional role in defining future requirements for banks and have impact on the disclosure requirements.

Since the implementation of the CRD IV package several Basel adjustments have been put in

¹ The main documents of this package are: “Basel III: A global regulatory framework for more resilient banks and banking systems”: <http://www.bis.org/publ/bcbs189.htm> and “Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools”: <http://www.bis.org/publ/bcbs238.pdf> as well as “Basel III: the net stable funding ratio”: <http://www.bis.org/bcbs/publ/d295.pdf>

² Regulation (EU) No 575/2013: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:176:0001:0337:EN:PDF>

³ Directive 2013/36/EU: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:176:0338:0436:EN:PDF>

place: for example, the Liquidity Coverage Ratio, the Net Stable Funding Ratio and the Leverage Ratio, as well as the Total Loss-Absorbing Capacity (TLAC) rules issued by the Financial Stability Board (FSB). Some of these amendments, such as the rules on LCR and Leverage Ratio, have already been transposed into national law.

1.1.2 Recent and ongoing developments of the banking framework

On 23 November 2016, the EU Commission issued a draft package amending mainly the CRD IV⁴ and the CRR⁵ to adopt several Basel III developments and other adjustments at EU level. In addition, the EU Commission also proposed amendments to Directive 2014/59/EU (Banking Recovery and Resolution Directive (BRRD)⁶), including the Minimum Requirement for own funds and Eligible Liabilities (MREL) and the Single Resolution Mechanism-Regulation (SRM-R⁷). The proposals are still in the legislative process and are expected to be in place the second quarter of 2019 and applicable as of Q2/2021. A political agreement on the proposal of the package has been issued in February 2019⁸.

On Basel level the BCBS has proposed several amendments over the last years aiming the finalisation of the Basel III framework of 2011.

In December 2017, the BCBS issued its package of further changes which are supposed to finalise the Basel III framework⁹. In general, the finally introduced changes are applicable as of 2022. Main changes are the enhancement of standardised approaches for credit risk, credit valuation adjustment (CVA) risk and operational risk as well as amendments on the IRB approach. In addition, internal approaches for CVA risk and for operational risk have been removed. In order to place a limit on the regulatory capital benefits that a bank using internal models can derive relative to the standardised approaches, an output floor has been determined.

Furthermore, the Basel Committee introduced in the Basel III finalisation document a binding leverage ratio requirement including an additional buffer for global systemically important banks. Aiming for an appropriate leverage ratio requirement, the leverage ratio exposure measure has also been modified especially regarding the treatment of derivatives and off-balance sheet exposures.

In January 2019, an additional revision of the market risk framework has been finalised¹⁰. It mainly determines the rules to allocate instruments to the trading book or to the banking book depending on their type and the respective trading intent. The final standards are applicable as of 2022.

The European Commission regulatory proposal of November 2016 as well as the Presidency compromise issued in February 2019 respectively do not include the elements of the December 2017 Basel III finalisation. Potentially, the European Commission will issue a proposal on a "CRD VI/ CRR III" package in the beginning of 2020 that will potentially be in place as of

⁴ Proposed amendments to Directive 2013/36/EU: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016PC0854&from=EN>

⁵ Proposed amendments to Regulation (EU) No 575/2013: <http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52016PC0850&from=EN>

⁶ BRRD: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016PC0852&from=EN>

⁷ SRM-R: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016PC0851&from=EN>

⁸ Presidency compromise on banking package: <https://www.consilium.europa.eu/en/press/press-releases/2019/02/15/banking-union-eu-ambassadors-endorse-full-package-of-risk-reduction-measures/>

⁹ Basel III: Finalising post-crisis reforms: <https://www.bis.org/bcbs/publ/d424.pdf>

¹⁰ Standards: Minimum capital requirements for market risk: <https://www.bis.org/bcbs/publ/d457.pdf>

2022.

Regarding the fundamental review of the trading book the general agreement of the EU Commission, EU Parliament and EU Council on the banking package (CRD V/CRR II) announced in November 2018 to introduce only reporting obligations considering the new standards on capital requirements for market risks issued by the BCBS in January 2016. The final version of the Basel standards will eliminate certain irregularities found within the original standard and recalibrates certain rules. The three European authorities agreed to implement the finalised Basel standards as soon as possible, most likely within the CRD VI/ CRR III" package.

In addition, some initiatives are still ongoing on Basel level and have not led to a final ruleset yet.

The future regulatory treatment of sovereign exposures is also still in discussion. After an internal development of a potential future ruleset, the BCBS issued in December 2017 a discussion paper on this topic.¹¹ The current framework is treating certain high-quality sovereign exposures as risk-free from a regulatory perspective. The future treatment is looking for a more differentiated view to capture at least the theoretical risk of a sovereign default.

The Basel Committee consulted in October 2018 on the leverage ratio treatment of client cleared derivatives¹².

1.2 The “Three Pillars” framework

1.2.1 Overview

The banking framework contains of three pillars:

- Minimum quantitative (capital) requirements (Pillar I);
- Supervisory Review Process (Pillar II);
- Disclosure requirements, to reach market discipline by public transparency (Pillar III).

The “Three Pillars” framework, originally introduced with Basel II in 2004, evolved over time and further details have been defined. The “Three Pillars” complement each other and are mutually reinforcing; Figure 1-1 below illustrates the “Three Pillars” model of the Basel framework.

¹¹ Discussion paper on the regulatory treatment of sovereign exposures: <https://www.bis.org/bcbs/publ/d425.pdf>

¹² Consultative document: Leverage ratio treatment of client cleared derivatives: <https://www.bis.org/bcbs/publ/d451.pdf>

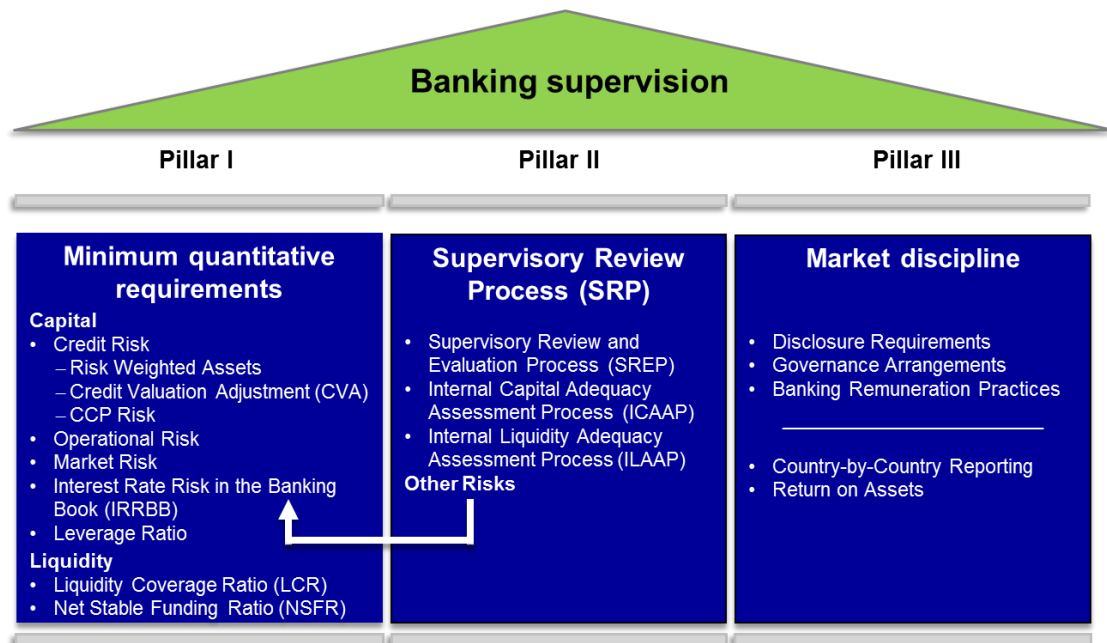


Figure 1-1 "Three Pillars" model of Basel III /CRD IV

Within the "Three Pillars" model, Pillar I offers the possibility to use different risk measurement approaches per risk category for capital requirements in the range of simple (standardised) to sophisticated model based methods, according to their business model. Here, credit risk contains under Basel III a capital requirement for CVA risk and for CCP counterparty risk. In addition to capital requirements, Pillar I also covers the liquidity requirements (LCR and NSFR). Furthermore, a mandatory Leverage Ratio (Pillar I ratio) is proposed to be introduced in CRR II, most likely been applicable as of 2021.¹³

Pillar II, also called the Supervisory Review Process (SRP), comprises of the Supervisory Review and Evaluation Process (SREP) as well as the banks' Internal Capital Adequacy Assessment Process (ICAAP) and Internal Liquidity Adequacy Assessment Process (ILAAP). Supervisors are obliged to develop a structured approach to review, evaluate and assess the robustness of banks and their risk models including capital and liquidity adequacy.

In addition, the supervisors evaluate and assess the Interest Rate Risk in the Banking Book (IRRBB) within the Supervisory Review and Evaluation Process (SREP). National competent authorities may require a capital add-on in case the IRRBB is, in its view, not covered by the capital requirements. BaFin has issued a General Administrative Act which requires the calculation of additional capital needs in absence of an official decision of the competent authority in course of the SREP. As BaFin is gradually issuing these notifications, the General Administrative Act will be then irrelevant. The Pillar II capital requirements add-on imposed by the respective competent authority will cover all risks including the IRRBB.

To get a common view on the risk situation and to allow the market participants to benchmark the capital adequacy of any given bank, disclosure requirements are laid down in Pillar III. On EU level, additional elements such as the Country-by-Country reporting and the Return on Assets are required to be disclosed to increase transparency. Governance Arrangements in-

¹³ According to the political agreement on CRR II, issued in February 2019, the leverage ratio will be most likely not applicable to central counterparties.

cluding the structure within an institution and information regarding remuneration are further disclosures which are required to be made.

The next chapters describe each of the three pillars and the Basel III framework as applicable in the EU in more detail.

1.2.2 Pillar I

1.2.2.1 Capital

The first Pillar deals, among others, with the minimum capital requirements. Capital requirements are to be calculated for credit risk, including CVA risk and CCP counterparty risk, market risk and operational risk. The capital requirement for each risk category has to be calculated using an approach that is suitable and sufficient for the individual bank. For the sake of an evolutionary approach, both simple and more refined measurement methods have been defined for each risk category (for detailed information see below).

The own funds requirements for operational, market, CVA and CCP Risk have to be multiplied by 12.5 and are summed up with the Risk Weighted Assets for credit risk to build the total risk exposure. The total risk exposure has to be multiplied by the required Capital Ratio of the related entity representing the total minimum own funds with is currently at least 8% (see figure below).

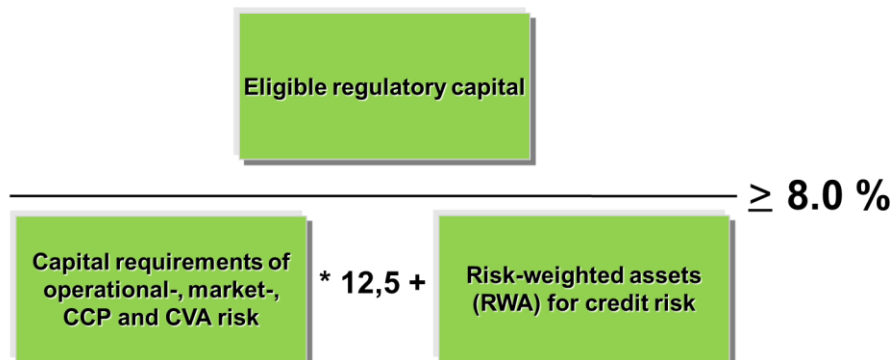


Figure 1-2 Calculation of the minimum capital requirements (Capital Ratio)

1.2.2.2 Capital requirements

Basel III sets out provisions regarding the quantity of minimum capital requirements. As described in Figure 1-3, the required portion of the highest possible quality of own funds (Common Equity Tier 1 (CET1)) has to be at least 4.5% of the total risk exposure amount.

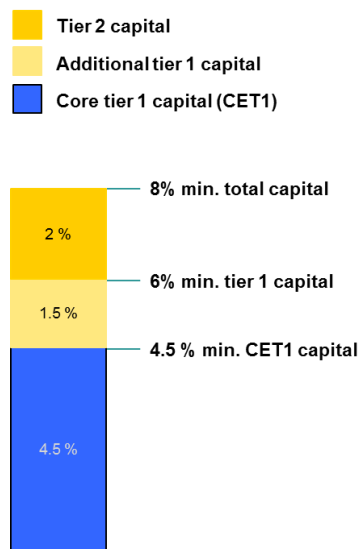


Figure 1-3 Quantitative minimum capital requirements

On top of the minimum capital requirements of 8%, Basel III requires additional capital/risk buffers: A countercyclical buffer and a capital conservation buffer. Subsequently, the BCBS introduced further buffers for Systemically Important Banks (SIBs): the G-SIB buffer (for Global SIBs) and the O-SIB buffer (for Other SIBs). In the EU, CRD IV also requires the systemic risk buffer, which is non-cumulative (the highest applies) to these buffers and might be imposed on all total risk exposures or on risk exposures relating to exposures towards particular countries or on dedicated exposure types.

The capital conservation buffer has to be maintained in order to strengthen the capital basis of a bank during profitable times, but allowing for a temporary underrun in case of an economic downturn of the bank or unexpected/sudden losses.

Similarly, the countercyclical capital buffer has to be held available to ensure that the capital basis increases during periods of economic growth in a dedicated region while it may be set to lower levels in case of an economic downturn in that region.

The capital conservation buffer has been phased in until 2019 to finally reach 2.5% of the total risk exposure of the institution. In the same manner, the maximum value of the countercyclical buffer is also phased in. However, the value will be fluctuating over time depending on the economic situation. The respective percentage in principle is set by the competent authority of the individual country in which the (credit) exposures are domiciled. The individual rate of any given bank will therefore be a blended rate taking the size of credit operations in the various countries into account. It is to be noted though, that the authority supervising any given bank may set higher levels of buffer requirements or phase-in the requirements faster than the standard phase-in schedule.

The standard phase-in schedule with the maximum standard requirements is shown in Figure 1-4.

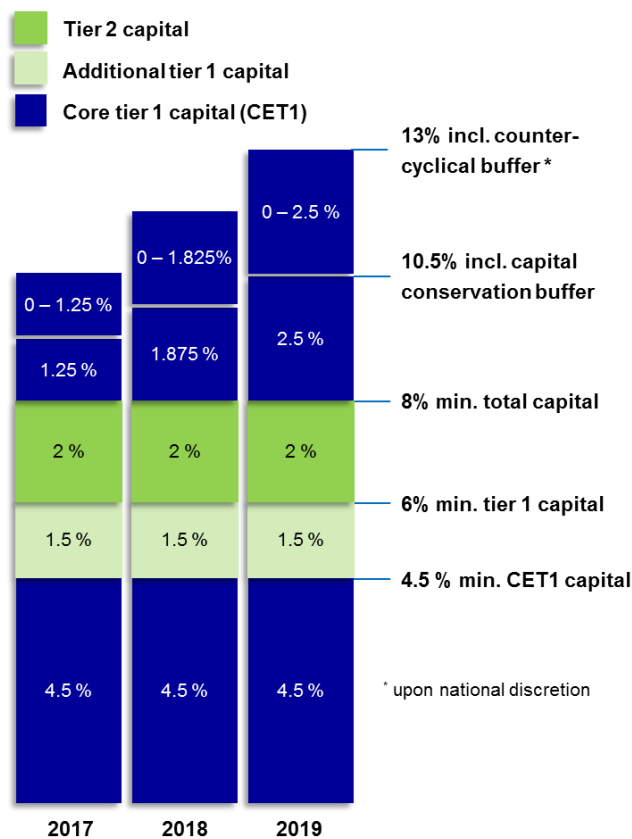


Figure 1-4 Overview of capital requirements and related transitional periods

In addition to the buffers illustrated in Figure 1-4, a buffer for systemically important institutions (applicable as of 1 January 2016) and a systemic risk buffer (applicable as of 1 January 2014) have to be maintained where the competent authority requires them. For G-SIBs the maximum surcharge is 3.5% of the total risk exposure amount, while for O-SIBs the maximum buffer is limited to 2.0% of the total risk exposure amount. The systemic risk buffer is limited to 5.0% of the total risk exposure amount and might be imposed on isolated exposures as well as upon national discretion, e.g. for exposures in a particular country or region. As already described, only the higher of “Systemic risk” or “Systemically Important Bank” buffer is applicable.

The G-/O-SIB buffer has been developed by the BCBS in order to reduce the implicit reliance on state aid (“too-big-to-fail”). The objective of the buffer for systemic risk in the EU is to allow further strengthening of the capital basis in case exposures with systemic risk exist.

Figure 1-5 demonstrates how the capital requirements and the additional capital buffers will add up once they are completely phased-in as of 2019.

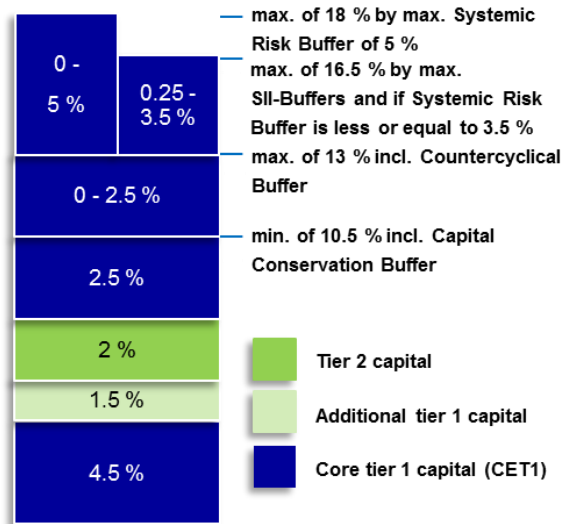


Figure 1-5 Overview of the total own funds requirements feasible as of 1 January 2019

The minimum capital requirements of 8.0% of the total risk exposure amount and the mandatory minimum portion of a certain quality may not be breached by the credit institutions. By contrast, the capital buffers may be underrun for a certain period of time as they are no binding minimum ratios and are explicitly foreseen to balance out unexpected events. The buffers are foreseen to maintain a sufficient capital base to absorb losses in stressed periods. All four mentioned capital buffers must consist of CET1 capital instruments.

If the supervisory authority concludes that application of the risk measurement method is not adequate or appropriate (for example, the method is not sufficient for the particular bank or specific type of business, or the business risk is not appropriately reflected in the method), the supervisory authority may set additional capital requirements via Pillar II measures as an add-on to Pillar I.

Credit risk (Risk Weighted Assets - RWA)

To measure the credit risk, one simple approach (Standardised approach - STA) and two advanced approaches ("Foundation Internal Rating Based Approach" (FIRB) and "Internal Rating Based Approach Advanced" (IRBA)) are available. The standardised approach is based on external credit risk assessments and the two advanced approaches are based on internal ratings. The Advanced Approach also makes use of internal models for other credit parameters such as Loss Given Default.

The calculation of the risk-weighted assets (RWA) for credit risk is shown in Figure 1-6.



Figure 1-6 Calculation of the RWA

The basis for assessment is, in principle, the asset value, taking into account the eligible credit risk mitigation techniques. This basis for the assessment must be multiplied by a regulatory risk weight that depends on predefined regulatory asset classes and the counterparties credit risk assessment by a nominated External Credit Assessment Institution (ECAI) or based on internal data depending on the approach chosen.

Figure 1-7 illustrates the choices regarding the assessment of credit risk. In general, the capital charge decreases and the risk sensitivity increases with the complexity of the approach. Furthermore, the implementation and running efforts and costs are also increasing with complexity.

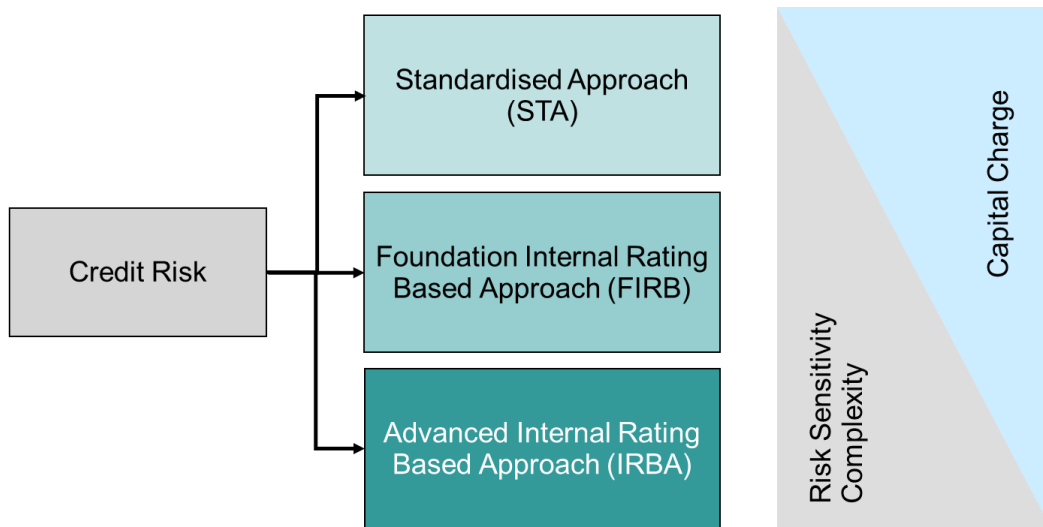


Figure 1-7 Possible calculation methods for the credit risk

The Standardised Approach defines 17 regulatory asset classes that relate partially to counterparty type only and partially to a specific type of business. The risk weights of each of these classes (for example, central governments, public sector entities, corporate institutions, securitisations, covered bonds, participations etc.) are fixed (for example, 0%, 20%, 50%, 100% etc.) or depend on ratings given by an accepted External Credit Assessment Institution (ECAI), such as Moody's, Standard & Poor's or Fitch, or are based on credit assessments by Export Credit Agencies (for example, Euler Hermes Kreditversicherungs-AG, the Organisation for Economic Cooperation and Development (OECD) etc.).

Credit institutions may use these Export Credit Agencies' credit assessments if the chosen Export Credit Agency participates in the OECD "Arrangement for Officially Supported Export Credits" or the Export Credit Agency publishes its credit assessment and subscribes to the OECD agreed methodology for the purposes of exposures to central governments and central banks only.

Furthermore, the credit assessment of the Export Credit Agency must be associated with one of the minimum export insurance premiums (MEIP) that the OECD establishes under this methodology (for so-called high-income states, e.g. Germany, the OECD does not provide country risk classifications anymore since 2013).

In the EU, in principle the risk weights for banks are derived from their individual credit assessments (ratings). However, as a fall-back solution it is also possible to derive the risk weight from the central government of the country of residence in case no credit assessment exists or no rating agency for the regulatory asset class for banks has been nominated.

In order to use the FIRB or the IRBA, banks must fulfil a number of additional requirements. A detailed review of processes, estimates and documentation as well as an explicit permission from the respective authority are necessary to be allowed to use one of the Internal Rating Based Approaches for the calculation of the risk-weighted asset amounts.

Even further developments of the advanced risk measurement systems must be approved by the respective supervisory authority. Using these approaches, the bank does not rely on information provided by an external rating agency but carries out its own assessments, which form the basis for determining potential future losses. These calculated potential losses are in turn used as the basis for the corresponding capital requirements.

The permission of the supervisory authority may be granted:

- In general, for probability of default (PD¹⁴) estimates (Foundation Internal Rating Based Approach (FIRB)); or
- For probability of default estimates, own estimates of loss given default (LGD¹⁵) and maturity adjustment for effective maturity based on PD (Advanced Internal Rating Based Approach (IRBA)).

Credit Risk Mitigation (CRM)

It is at the discretion of each institution whether to use credit risk mitigation techniques or not.

If an institution decides to use any credit risk mitigation techniques, the institution must consider various operational and procedural requirements beside quantitative requirements. The pool of possible collateral to be used is in principle enlarged in the two advanced credit risk approaches compared with the standardised credit risk approach.

Two methods to calculate the credit risk mitigation of financial collaterals are available: the Simple Approach and the Comprehensive Approach. Depending on the calculation method used, only predefined financial collateral types can be considered.

The Simple Approach is a substitution approach. The risk weight that would be assigned under the provisions of the standardised credit risk approach, if the lender institution had a direct exposure to the issuer of the collateral instrument, is assigned to those portions of claims collateralised by the market value of generally eligible financial collateral. The remainder of the exposure receives the risk weight that would be assigned to an unsecured exposure to the counterparty under the provisions of the standardised credit risk approach.

In the Comprehensive Approach, institutions calculate their adjusted exposure to a counterparty in order to take account of the effects of that collateral. Using haircuts, banks adjust both the amount of the exposure to the counterparty and the value of any collateral received in support of that counterparty to take account of possible future fluctuations in the value of either, occasioned by market movements. This will produce volatility adjusted amounts for both exposure and collateral.

Additionally, where the exposure and collateral are held in different currencies an additional downwards adjustment must be made to the volatility adjusted collateral amount to take account of possible future fluctuations in exchange rates. Institutions have two ways of calculating the haircuts:

¹⁴ PD: the probability (as a percentage) of default by a counterparty over a one-year period;

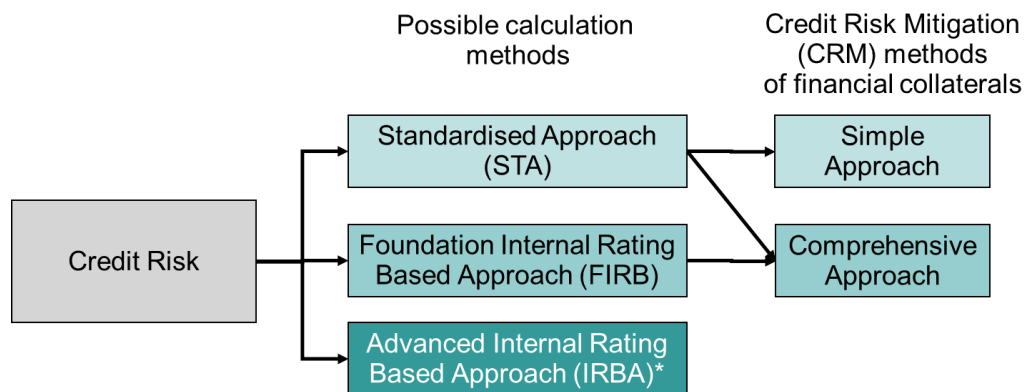
¹⁵ LGD: the ratio (as a percentage) of the loss on an exposure due to the default of a counterparty to the amount outstanding at default.

- Standard supervisory haircuts;
- Own estimate haircuts, using own internal estimates of market price volatility.

Supervisors allow banks to use own estimate haircuts only when they fulfil certain qualitative and quantitative criteria.

In summary, it can be noted that the Comprehensive Approach for credit risk mitigation allows taking into account many more financial collateral types with only a slight increase in the complexity of the calculation method.

Figure 1-8 gives a simplified overview of the calculation methods of financial collaterals under Basel III.



*Credit Risk Mitigation is taken into account as part of the LGD assessment.

Figure 1-8 Overview of possible calculation methods of financial collaterals

Credit Valuation Adjustment (CVA and CVA Risk)

Credit Valuation Adjustment is an accounting term, and refers to an adjustment to the mid-market valuation of the portfolio of transactions with a counterparty in OTC derivative transactions. That adjustment reflects the current market value of the institution’s counterparty credit risk, but does not reflect the current market value of the credit risk of the counterparty towards the institution.

An institution is required to calculate the own funds requirements for CVA risk – the risk of loss due to adverse changes in CVA - for all OTC derivative instruments in respect of all of its business activities, with the exception of purchased credit derivatives recognised to reduce risk-weighted exposure amounts for credit risk.

In addition, CVA risk may also be applicable on SFT exposures in case the competent authority determines that the institution’s CVA risk exposures arising from those transactions are material.

Central Counterparty Risk (CCP Risk)

When a bank acts as a clearing member of a CCP, a risk weight of 2% is applied to the bank’s trade exposure to the CCP in respect of OTC derivatives, exchange traded derivative transactions, and SFTs. This preferential treatment may only be applied in case the CCP in question is classified as qualified CCPs. Under CRR, a CCP is considered to be a “qualified CCP” if it has been granted an authorisation under Regulation (EU) No 648/2012 (European Markets Infrastructure Regulation - EMIR) or an equivalent regulation in its country of residence.

In addition to the 2% risk weight for the trade exposure, additional capital requirements are applied on the contribution of the clearing members to the default funds of the qualified CCP.

There are further rules with regards to client positions of a clearing member related to CCP business. As they are not applicable for Eurex Clearing, it is not explained here in detail. The comprehensive basis for the CCP Risk is defined in Articles 300 – 311 CRR.

Operational risk

The main drivers of operational risk in banks are the growing dependence of banking operations on IT systems, the enlarged use of electronic banking, the progressive development of risk systems and, especially, the increasing complexity of business processes in banking.

Legal, compliance and cyber risk have become increasingly important drivers for operational risk. In this context, operational risk is by nature very different from credit risk and market risk. Operational risk is far more difficult to capture because it is inherent to many activities and is still nearly inevitable.

Recent events have shown that operational risk can be significant, and resulting losses can even threaten a bank's existence.

Under Basel III three methods are applicable to calculate the capital requirements for operational risk as shown in Figure 1-9.

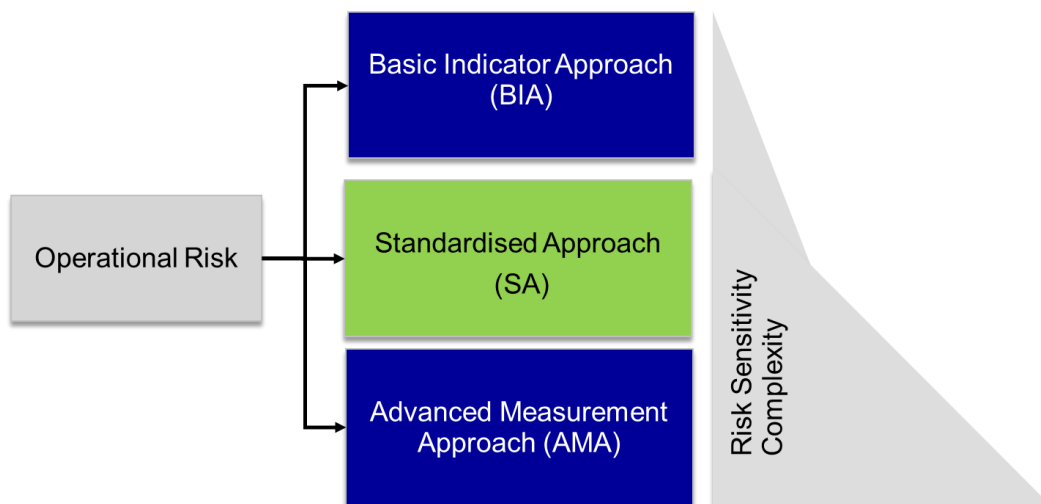


Figure 1-9 Possible calculation methods for the operational risk

Complexity and risk sensitivity in the two more simple approaches are nearly similar, whereas it is much higher in the advanced approach.

First, there is the **Basic Indicator Approach (BIA)**, in which a bank's operational risk capital requirements are estimated as a percentage (alpha factor 15%) of the gross income (calculated as the average of the previous three financial years). This approach involves a simple calculation but is not very risk sensitive.

Next is the **Standardised Approach (SA)**, which splits business into predefined business lines. Operational risk capital requirements are estimated as a specified percentage (beta factor 12%, 15% or 18%) of gross income per business line. This can be seen as a basic indicator approach applied to each business line.

The **Advanced Measurement Approach (AMA)** requires internal loss data and model-based methods to calculate the regulatory capital requirements. Comparable to the Advanced Internal Rat-

ing Based approaches, an explicit permission as well as a detailed review of processes, estimates and documentation by the respective supervisory authority is necessary to be allowed to use the AMA to calculate the operational risk amounts. The application of advanced measurement approaches is subject to both qualitative and quantitative criteria, and banks may be allowed to recognise the risk mitigating impact of insurance.

Market risk

Market risk is typically defined as the uncertainty about future earnings and about the value of assets and liabilities (on- or off-balance sheet items) due to changes in interest rates, foreign exchange rates, security prices or commodity prices.

Basel III distinguishes between the bank's trading book (held with trading intent [short-term] and typically valued mark-to-market) and the non-trading book (typically held for a longer term or to generate permanent earnings [hold or income-making intention]) and attaches different requirements accordingly.

Certain positions cannot be allocated by the nature of the position but need dedication. The institution needs to have a clear policy for allocation and must document the current allocation. If the positions finally allocated to the trading book exceed certain thresholds, capital requirement rules for the trading book apply. If the thresholds are not surpassed, those rules are not relevant.

Market risk under the perspective of Pillar I is defined as the risk of losses in positions (on- and off-balance sheet) arising from movements in market prices. The risks subject to this requirement are as follows:

- The risks pertaining to interest rate related instruments and equities in the trading book only;
- Foreign exchange risk and commodities risk independent of trading book allocation.

Basel III defines two methods to calculate the capital requirements for market risk (standardised approach and internal models).

The Basel Committee concluded its work on the fundamental review of the trading book (FRTB) in January 2016. The FRTB standards address several weaknesses, enhance the risk-sensitivity of the market risk framework by setting an amount of own fund requirements that is more proportionate to the risks of trading book positions and they clarify the definition of the boundary between banking and trading books. The BCBS standards are applicable as of 2022 (according to the Basel III finalisation package issued in December 2017) and are transposed into the proposal of the European Commission amending mainly CRR and CRD IV not being applicable before 2021.

Interest Rate Risk in the Banking Book (IRRBB)

The Interest Rate Risk in the Banking Book is evaluated and assessed by the supervisors in the SREP. As such, the IRRBB is considered by the supervisors in order to capture the current or prospective risk to the bank's capital and earnings arising from adverse movements in interest rates that affect the bank's banking book positions. Any potentially material IRRBB are met with a capital add-on. This resulting capital add-on is announced by an official decision of the supervisor (BaFin). In absence of the supervisor's assessment and the official decision BaFin has put a Pillar I capital add-on rule in place which needs to be respected. The resulting capital add-on is in a range of 0% up to 2.6% of the total risk exposure amount.

Leverage Ratio

In the EU, the ratio will be introduced with CRR II which will be most likely applicable as of Q2/2021. It shall be a binding minimum ratio of 3%, as agreed by the standard-setting institutions

in February 2019¹⁶. For G-SIIs a 50% add-on of the G-SII buffer in addition to the 3% leverage ratio will be most likely introduced.

According to the political agreement on CRR II, CCPs will be exempted from the leverage ratio requirement.

1.2.2.3 Liquidity

Beside the capital requirements Basel III contains a quantitative (minimum) ratio for the management of liquidity risk. Two liquidity standards, the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR), were introduced to achieve this objective. Both ratios reflect the minimum level of liquidity banks must provide to meet the liquidity risks they face from a regulatory perspective either short-term (LCR) or mid-term (NSFR).

Liquidity Coverage Ratio

The LCR requires institutions to hold sufficient liquid assets (i.e. assets that can be liquidated at negligible loss of value) to withstand the excess of liquidity outflows over inflows that could be expected to accumulate over a thirty-day stressed period.

Consequently, institutions are required to hold liquid assets, the sum of which equals or is greater than the liquidity outflows less inflows over the next thirty days under stressed conditions (inflows are limited to 75 % of liquidity outflows). Under the Basel III rules, the LCR phasing-in rules foresaw a start with 60% minimum ratio as of 1 January 2015 (after an observation period started in 2013) and a full application (100% binding ratio) as of 2019. The EU has decided that because of delays in the legislative process to start with a 60% minimum ratio as of 1 October 2015 but to reduce the phase-in period and reach the 100% minimum ratio as from 1 January 2018. Mathematically the LCR is expressed as follows:

$$\frac{\text{Stock of high quality liquid assets}}{\text{Total net cash outflows next 30 days}} \geq 100 \%$$

Figure 1-10 Calculation of LCR

Net Stable Funding Ratio (NSFR)

The NSFR has been established as a measure that should be used to optimise the structural liquidity of credit institutions over a time horizon of one year.

The NSFR is defined by BCBS as ratio between the available stable funding and the amount for which a stable funding is required. Those amounts are calculated by multiplying the nominal amount with the so-called available stable funding factor and the required stable funding factor. The amount of available stable funding must match the amount of required stable funding. The NSFR introduced by BCBS is applicable as of 1 January 2018. It is expected, that the NSFR will start entering into force in the EU as of 2021 at the earliest, as it is part of the European Commission proposal amending CRR and CRD IV issued in November 2016.

¹⁶ Presidency compromise on banking package: <https://www.consilium.europa.eu/en/press/press-releases/2019/02/15/banking-union-eu-ambassadors-endorse-full-package-of-risk-reduction-measures/>

$$\frac{\text{Available Stable Funding (ASF)}}{\text{Required Stable Funding (RSF)}} \geq 100 \%$$

Figure 1-11 Calculation of NSFR

1.2.3 Pillar II

The risks of Pillar I and further significant and substantial risks must be included in an integrated capital management and risk management consideration.

The following figure gives an overview which risks were to be considered under such an integrated risk approach.

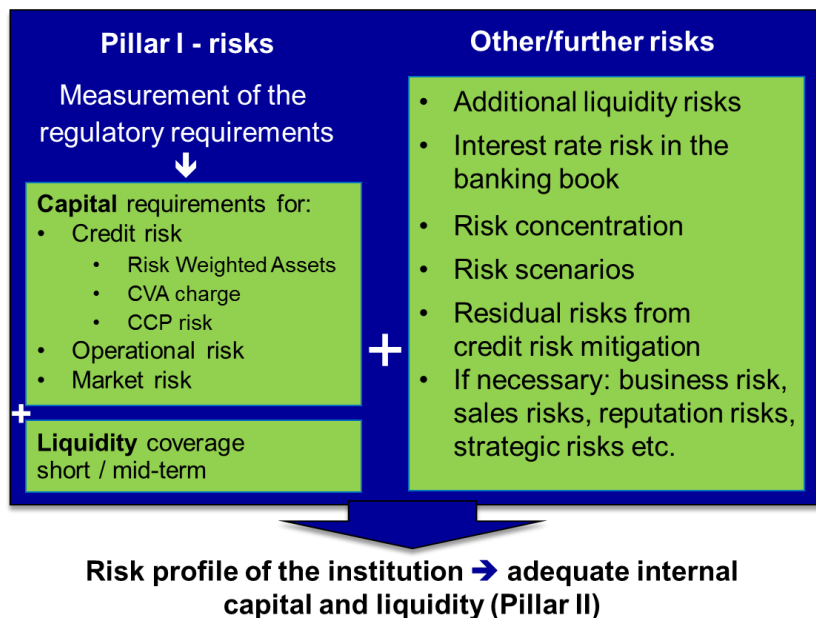


Figure 1-12 Integrated risk consideration (Pillar II) under Basel III

The bank's internal assessment comprises of internal procedures and strategies to identify all risks, to assess the necessary amount of capital, and to maintain this at all times (Internal Capital Adequacy Assessment Process - ICAAP) In addition, the Internal Liquidity Adequacy Assessment Process (ILAAP) assesses the liquidity profile of an institution in relation to its business and complexity.

A review and evaluation process by the supervisors (Supervisory Review and Evaluation Process - SREP) also includes a review and evaluation of amongst others the bank's capital and liquidity adequacy, as well as the possibility to require capital in excess of the minimum Pillar I amount and to intervene at an early stage in case risks are not captured adequately. Altogether, Pillar II is also called the Supervisory Review Process (SRP).

The EU has set the necessary standards on internal organisation, risk management, capital and liquidity management, corporate governance, remuneration as well as the related Pillar II review processes within CRD IV (Chapter II, Articles 73 – 110). These rules have been transposed into German law.

In addition, EBA has issued guidelines in order to ensure comparable and appropriate SREP methodologies and processes.¹⁷ According to these guidelines the SREP judgement arises considering four key elements: the analysis of the respective business model including its related risk profile, the assessment of the internal governance and institution-wide control arrangements, and the above described ICAAP and ILAAP. As a result of the SREP judgement quantitative capital, liquidity or other supervisory measures could be imposed by the authorities. In addition, the SREP is the basis for the annual institution-specific workplan of the authority. Overall, the objective of the SREP is to ensure an appropriate and effective risk management as well as an adequate coverage of the existing risks.

In the following figure the SREP including its four elements is shown:

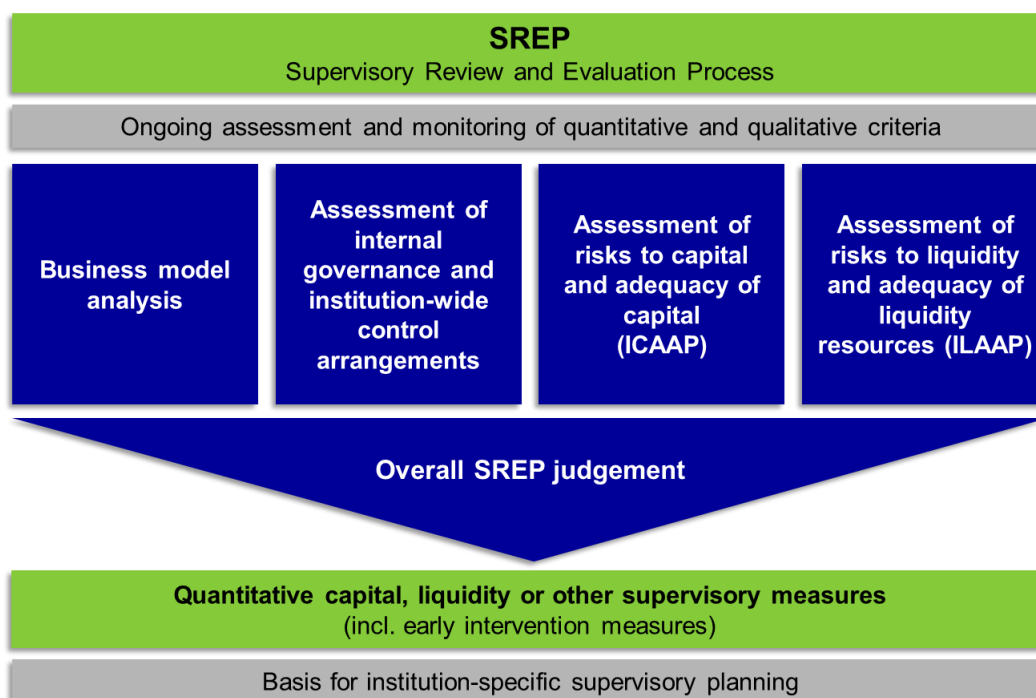


Figure 1-13 SREP methodology according to EBA Guidelines

1.2.4 Pillar III

The third Pillar, named market discipline, is also known as “regulatory disclosure” requirements. The disclosure requirements are a basic prerequisite for sound information standards among all market participants. This in turn allows market forces to take effect without obstructions, thus indicating the prevalence of market discipline.

The current Pillar III framework contains disclosure requirements and recommendations for various areas of banking operations, including the methods a bank uses to estimate its risks or how the bank determines its capital adequacy (that is the relationship between equity and overall risk). The bulk of these disclosure requirements applies to all banks, and more detailed requirements have to be fulfilled from banks using internal methods.

¹⁷ EBA/GL/2014/13 – Guidelines on common procedures and methodologies for the supervisory review and evaluation process (SREP): <https://www.eba.europa.eu/documents/10180/1051392/EBA-GL-2014-13+GL+on+Pillar+2+%28SREP%29%20-+DE.pdf/5d63aad3-5b03-4301-b1c9-174e3670ad66>

The published EBA Guidelines on LCR disclosure¹⁸ are only applicable to G-SIIs and O-SIIs. Therefore, this disclosure report only contains the LCR figure as of 31 December 2018 in Chapter 7.5.

In addition, further information has to be disclosed on corporate governance and governance arrangements of the respective entity as well as information about the Return on Assets (RoA).

RoA indicates the efficiency of invested capital during a specific period of time. Mathematically the RoA is expressed as follows:

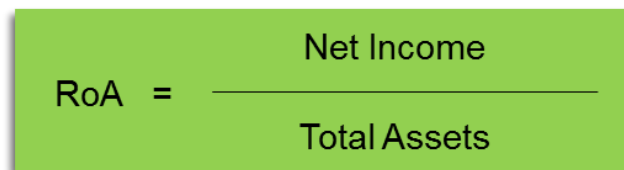
A green rectangular box containing the formula for Return on Assets (RoA). The formula is:
$$\text{RoA} = \frac{\text{Net Income}}{\text{Total Assets}}$$

Figure 1-14 Calculation of Return on Assets

The present report serves the purpose of meeting the requirements of Pillar III as outlined in the foreword and providing interested parties with further essential information about the business and risk situation of Eurex Clearing.

¹⁸ EBA/GL/2017/01: <http://www.eba.europa.eu/documents/10180/1807490/Guidelines+on+LCR+disclosure+to+complement+the+disclosure+of+liquidity+risk+management+%28EBA-GL-2017-01%29.pdf>

1.3 Information about Eurex Clearing AG

1.3.1 Corporate structure

Eurex Clearing and its subsidiary, Eurex Clearing Security Trustee GmbH, are fully owned by Deutsche Börse AG and are integrated into Deutsche Börse Group. The ownership and corporate structure is shown in Figure 1-15 below:

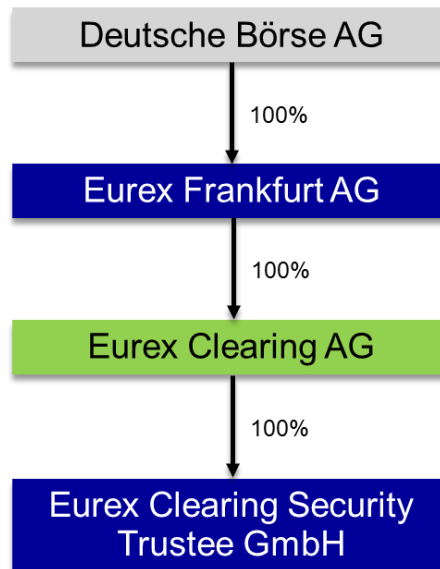


Figure 1-15 Corporate structure

Sole owner of Eurex Clearing AG is Eurex Frankfurt AG which is a 100% subsidiary of Deutsche Börse AG. Thus, Eurex Clearing is included in the consolidated accounts of Deutsche Börse AG. Consequently, Eurex Clearing is according to § 291 German Commercial Code (Handelsgesetzbuch, HGB) exempted to draw up consolidated statutory accounts. Due to the small size of Eurex Clearing Security Trustee GmbH the drawing up of consolidated statutory accounts is also not necessary in line with the provisions of § 293 HGB.

The purpose of Eurex Clearing Security Trustee GmbH is to hold, enforce and release security interests in the Difference Claims that are granted to it in the form of pledges by UK and/ or Welsh Clearing Members under the Individual Clearing Model (ICM). As such, Eurex Clearing Security Trustee GmbH is not a regulated entity according to CRR or KWG and is neither to be classified as a financial institution (Article 4 paragraph 26 CRR), nor a financial enterprise (§ 1 (3) KWG) nor an ancillary service undertaking (Article 4 paragraph 18 CRR) and is therefore to be regarded as an “other undertaking”.

Consequently, Eurex Clearing Security Trustee GmbH is according to Article 18 CRR also not to be consolidated under regulatory terms. Thus, ECAG has to fulfil the regulatory requirements on a stand-alone level only.

1.3.2 Business operations and supervision

Eurex Clearing operates as a CCP, including the operation of a clearing system for cash and settlement of transactions on domestic and international securities or derivatives exchanges, multilateral trading platforms and of OTC transactions in various financial instruments such as derivatives, equities and bonds. Eurex Clearing ensures the performance of delivery and payment obligations after transactions are concluded on Eurex Deutschland and Eurex Zürich AG (Eurex exchanges; existed until 31st of March 2019), the Frankfurter Wertpapierbörse (FWB®, the Frankfurt Stock Exchange), the Irish Stock Exchange; and Eurex Repo GmbH.

Eurex Clearing is a CCP in accordance with EMIR. In this regard, Eurex Clearing has been authorised in line with Article 14 EMIR as a CCP. BaFin issued the relevant license to Eurex Clearing on 10 April 2014.

Eurex Clearing is also authorised by BaFin to operate deposit taking and lending business to a limited extent. In connection with this authorisation, it grants loans and extends credit lines for affiliated companies and accepts cash deposits from affiliated companies. As a consequence, Eurex Clearing has to fulfil the regulatory obligations towards the German supervisory authorities and presents this report in compliance with the disclosure requirements pursuant to Part 8 of the CRR and § 26a (1) sentence 1 KWG.

However, the banking business is only minor, as the main activity of Eurex Clearing is to act as a CCP.

2. Implementation of Basel III at Eurex Clearing AG

2.1 Pillar I: Minimum capital requirements

According to its business operations and the associated risks, Eurex Clearing has selected for each risk category the most appropriate and efficient approach for measurement of minimum capital requirements.

Granting loans is not Eurex Clearing’s core business. Credit risk mainly arises in the short term and with credit institutions or central banks. Therefore, Eurex Clearing has selected the standardised approach to assess the credit risk under Pillar I.

Credit risk is derived from short-term money-market investments (without trading intent), exposures on central bank or interbank operational accounts. Treasury counterparties as well as cash correspondent banks for the operational network are selected based on a high degree of creditworthiness and operational reliability.

As the money market investments are collateralised to a high degree, Eurex Clearing has selected the comprehensive approach for credit risk mitigation.

Contrary to credit risk, operational risk is much more important to Eurex Clearing compared to conventional commercial banks.

To calculate the own funds requirements for operational risks, Eurex Clearing uses the Basic Indicator Approach pursuant to Articles 315 et seq. CRR. In consultation with BaFin, Eurex Clearing expands the basis for calculating its capital requirements to include an adequate clearing portion of the fees collected for the account of the operating companies.

Eurex Clearing uses the standardised approach for assessing market risk. The complete business activity belongs to the non-trading book. Market risk, according to the regulatory classification, is currently derived from foreign currency risks only and is very limited.

The following table gives an overview of the calculation methods chosen by Eurex Clearing:

Risk Category	Calculation Method
Credit Risk	Standardised Approach
Credit Risk Mitigation (CRM) of financial collaterals	Comprehensive Approach
Operational Risk	Basis Indicator Approach
Market Risk	Standardised Approach

Table 2-1 Calculation methods chosen by Eurex Clearing

2.2 Pillar II: Supervisory Review Process (SRP)

Eurex Clearing has implemented all necessary organisational and methodological requirements for the Internal Capital Adequacy Assessment Process (ICAAP), the Internal Liquidity Adequacy Assessment Process (ILAAP) and all other elements which constitute the basis for the Supervisory Review & Evaluation Process (SREP).

The Executive Management of Eurex Clearing is informed at least on a quarterly basis about all significant and substantial risks. If necessary, risks are reported ad hoc. This reporting

includes also risk that is not in the scope of Pillar I and is the basis for Eurex Clearing's internal capital and liquidity planning.

Eurex Clearing's required Economic Capital (EC) is determined using the Value-at-Risk method (VaR, see 3.2 Risk management methodology). EC measures the amount of capital that is required in order to be able to cover even extreme events over a period of 12 months. EC is calculated at a confidence level of 99.98%. This means that losses within the next twelve months will not exceed the calculated EC with a probability of 99.98%.

With the introduction of Basel III, the Pillar II and its SREP was amended by the assessment of an institutions' liquidity adequacy.

Basel III requires Eurex Clearing to have in place robust strategies, policies and systems for the identification, measurement, management and monitoring of liquidity risk over an appropriate set of time horizons to ensure that Eurex Clearing maintains adequate levels of liquidity buffers.

Within the SREP, competent authorities collect quantitative and qualitative information on Eurex Clearing's ILAAP to determine Eurex Clearing's ability to cover its liquidity and funding risks, even under stressed conditions.

Eurex Clearing performed a self-assessment to check compliance of its ILAAP Framework against the EBA Guidelines on common procedures and methodologies for the supervisory review and evaluation process. The analysis took into account the nature, scale and complexity of Eurex Clearing's business activities. As a result, Eurex Clearing considers its Liquidity Risk Management Framework to be commensurate with the requirements of the Directive, Regulation and EBA technical standards.

As part of SREP, the management of Eurex Clearing is in a constant dialogue with its supervisors.

Eurex Clearing is licensed as a CCP under EMIR and in addition is authorised as a credit institution taking deposits and granting loans to a limited extend under the KWG. Eurex Clearing is subject to supervision by BaFin.

In 2018, Eurex Clearing has received a SREP notification by BaFin requiring additional capital in order to capture all risks (incl. IRRBB) not covered via Pillar I.

2.3 Pillar III: Market discipline

ECAG as regulated credit institution fulfils the regulatory obligations on an individual level towards the German supervisory authorities and presents this report in compliance with the disclosure requirements pursuant to Part 8 of the CRR and § 26a (1) KWG. The information required by Article 450 CRR (information regarding remuneration), § 26a (1) sentence 2 KWG (Country-by-Country reporting) and § 26a (1) sentence 4 KWG (Return on Assets) is disclosed separately. For a comprehensive overview of all disclosures please see foreword.

Beside this, certain requirements do not apply for Eurex Clearing. As Eurex Clearing does not perform any kind of trading, related disclosure requirements are not applicable (Article 439 CRR). The following articles are not relevant to Eurex Clearing due to its business activities – although they apply in principle: Article 441 CRR (Indicators of global systemic importance), Article 449 CRR (Exposure to securitisation positions), Article 452 CRR (Use of the IRB Approaches to credit risk), Article 454 CRR (Use of the Advanced Measurement Approaches to operational risk) and Article 455 CRR (Use of Internal Market Risk Models).

The applicable disclosures have to be published at least on an annual basis¹⁹ in conjunction with the date of publication of the financial statements. In addition, Eurex Clearing assess annually the need to publish certain information more frequently in order to ensure stakeholder's access to a core set of up-to-date information. The related assessment process of Eurex Clearing according to EBA Guideline 2014/14²⁰ was heading to the result that more frequently disclosures have not to be made.

2.4 Regulatory environment

Eurex Clearing fulfils the "Basel III" regulatory equity requirements as implemented in the European Union by CRD IV and CRR.

On 15 October 2013, the EU adopted the Single Supervisory Mechanism (SSM) Regulation, under which the ECB assumes responsibility in principle for banking supervision in the Eurozone; countries outside the Eurozone have the option to join the supervisory mechanism. The SSM has been set up in order to further harmonise supervisory practices in the EU and to structure a "banking union". In the first step, supervision over the largest banks (Significant Institutions, (SIs)) with international operations was transferred directly to the European Central Bank (ECB) in November 2014.

However, for the less significant institutions (LSIs), the ECB only lays down supervisory principles, harmonises interpretation decisions and coordinates the national supervisory authorities. How far that coordination will reach and how this new function of the ECB will develop over time is currently an open question.

In June 2014, the ECB decided to classify Eurex Clearing as a LSI. The decision reflects the dedicated role of Eurex Clearing outside the core banking business which is the focus of the SSM. Although, Eurex Clearing continues to be seen as systemically important as Financial Market Infrastructure (FMI), Eurex Clearing is not classified as a SI for the purposes of the SSM. As such, Eurex Clearing remains as a credit institution under the supervision of BaFin.

ECB confirmed the classification of ECAG based on its annual review also for 2018.

¹⁹ BaFin interpretation of the disclosure requirements ("Arbeitskreis Basel II - Fachgremium Säule 3"): https://www.bafin.de/SharedDocs/Downloads/DE/Protokoll/dl_protokoll_150115_fg_offenlegung_auslegungsfra-gen_ba.pdf?__blob=publicationFile&v=3

²⁰ EBA Guideline transposed in Germany via BaFin Rundschreiben 05/2015 (BA): https://www.bafin.de/SharedDocs/Veroeffentlichungen/DE/Rundschreiben/2015/rs_1505_ba_offenlegung.html

3. Risk Management overview

3.1 Strategy and organisation

Risk management is a fundamental component of the management and control of Eurex Clearing. Effective and efficient risk management is vital to protecting Eurex Clearing's interests and enables Eurex Clearing to achieve its corporate goals and safeguards its continued existence. Eurex Clearing has therefore established a risk management system comprising roles, processes and responsibilities applicable to all staff and organisational units of Eurex Clearing. This concept is designed to ensure that emerging risks can be identified and dealt with as early as possible.

Eurex Clearing's risk strategy is based upon its business strategy and regulates the extent of risk taken within the various business activities carried out by Eurex Clearing. The risk strategy does this by determining conditions for risk management, control and limitation. Eurex Clearing gives considerable attention to its risk mitigation process and ensures that appropriate measures are taken to avoid, reduce and transfer risk or intentionally accept it.

Eurex Clearing's risk strategy ensures and enables the timely and adequate control of risks. The information required for controlling risks is assessed using structured and consistent methods and methodologies. The results are collated and incorporated into a reporting system enabling measurement and control of the risks. Risk reporting is based on reliable information and is carried out on a regular basis and ad-hoc for existing and potential risks.

The members of the Executive Management of Eurex Clearing are ultimately responsible for the risk strategy of Eurex Clearing. The risk strategy reflects ECAG's risk appetite that defines the maximum loss that the Executive Management is willing to assume in one year, the tolerance in light of the risk as well as the desired performance levels. It is Eurex Clearing's intention to maintain risk at an appropriate and acceptable level (see also 3.4 Risk management approach).

The members of the Executive Management ensure that the risk strategy is integrated into the business activities and that adequate measures are in place to implement the strategies, policies and procedures.

Risk awareness and a corresponding risk-conscious culture are encouraged, amongst other things, through appropriate organisational structures and responsibilities, adequate processes and the knowledge of the employees. The appropriateness of the risk management and controlling systems is continuously checked.

Initiatives on Eurex Clearing's risk culture are based on the Financial Stability Board's four indicators of a sound risk culture: Tone from the top, accountability, effective communication and challenge, and incentives. Eurex Clearing's risk management strives for clear risk ownership and accountability.

Risks are openly and fully reported to the responsible level of management. The responsible management is informed fully and in a timely manner about the unit's risk profile, relevant risk(s) as well as about relevant losses. Internal reporting and communication is amended by annual reports.

Eurex Clearing has developed its own corporate risk structure and distinguishes between operational, financial, business and project risks (see also 3.3 Risk types).

The members of the Executive Management of Eurex Clearing are responsible for the management of all risks. Eurex Clearing's risk management organisation is decentralised. Thus, the various operational units are responsible for identifying risks and for reporting them promptly to Enterprise Risk Management (ERM), a central function which belongs to Eurex

Clearing’s CCP Risk Management department. CCP Risk Management is responsible for consolidation and integration of all CCP risk management functions at ECAG in order to maintain one integrated risk framework.

ERM assesses all existing and potential new risks. It also reports on a quarterly basis and, if necessary, ad-hoc to the Executive Management. Controlling of risks is performed in the decentralised business areas, that is, in the areas where the risks occur.

Risk control in the Eurex Clearing operational units is ensured by nominating “Operational Risk Representatives”, who are responsible for identifying, notifying and controlling any risk in their area whereas ERM is responsible for the assessment and monitoring/reporting of risks (as seen in Figure 3-1).

The risk management framework of Eurex Clearing, as stated in the Risk Management Policy aims at ensuring that all threats, causes of loss and potential disruptions are:

- Properly identified as soon as possible;
- Centrally recorded;
- Assessed (that is, quantified in financial terms to the largest possible extent);
- Reported consistently and in a timely manner together with suitable recommendations to the respective Executive Management;
- Mitigated and controlled.

These five key processes, as well as adequate quality standards, have been established in the Risk Management Policy and are reviewed on an ongoing basis. The risk management processes are critically reviewed by an independent audit function, which ensures the suitability and effectiveness of the risk management process by independently monitoring the process and the reporting system.



Figure 3-1 Five-level risk management system with central and decentralised responsibilities

3.1.1 Risk identification

Risk identification consists in the identification of all threats to Eurex Clearing, as well as causes of loss and potential disruptions. Risks may arise as a result of internal activities or external factors and the risk examination must be performed with regard to existing or new processes, when concluding new business or entering new service areas.

For the purpose of investigating potential risks for the Eurex Clearing, a risk inventory process is established to ensure the completeness of the scope of risk management. The risk inventory is carried out at least on a yearly basis by Enterprise Risk Management with the involvement of relevant business units.

The risk identification process is on the one hand proactive, based on regular review of processes in order to identify weak areas and points of failure (manual input required, process without double keying or four eyes controls in place, specific procedures subject to high volumes or tight deadlines etc.) or based on scenarios of disruption or failure taking into consideration all sources of issues (unavailability of systems, human error etc.). On the other hand, the risk identification process is also reactive, following an incident and, where appropriate, learning from this event.

The identification phase also includes the quantification of risks in the form of parameters that can be based either on statistical data, in the case of actual process monitoring, or on subjective expert appraisal when insufficient statistics are available.

All organisational units and individual employees must themselves identify and quantify potential risks in their area of responsibility.

3.1.2 Risk notification

Risk notification is the step in the risk management process that ensures that risks are centrally recorded.

All organisational units and individual employees must notify Enterprise Risk Management, in a timely manner, of the risks that they have identified and quantified.

3.1.3 Risk assessment

The assessment of an incident or a potential risk development aims at quantifying the risk in financial terms using the "Value-at-Risk" methodology and comparing the result with the available risk cover. It takes into account mitigation measures currently in place, such as business continuity measures (see also 3.2 Risk management methodology and 3.3 Risk types).

A qualitative assessment may be used whenever it adds value or is deemed more adequate.

The risk assessment phase is carried out by Enterprise Risk Management based on data and information collected and produced either in a periodic or ad-hoc report by the relevant area or upon request of ERM.

Moreover, low frequency/high impact risks are assessed by identifying scenarios of threats to which the enterprise is exposed. The evolution of their probability is monitored by using input from internal and external experts.

3.1.4 Risk mitigation and control

Risk control involves determining and implementing the most appropriate treatment for the identified risk. It encompasses risk avoidance, risk reduction, risk transfer and intentional risk acceptance.

All organisational units and employees must perform risk control and implement mitigating actions according to the established escalation process.

3.1.5 Risk monitoring and reporting

The relevant boards and committees are informed consistently and in a timely manner about material risks - whether existing or potential - and about the related risk control measures in order to take appropriate action. Risk Management is in charge of providing this information to the relevant boards and committees (see also 3.5 Risk reporting and monitoring). Moreover, upon request of the relevant boards, Risk Management will issue reports to external parties.

3.2 Risk management methodology

Eurex Clearing has installed a standardised approach for measuring and reporting all operational and financial business and project risk across its organisation: the concept of “Value-at-risk” (VaR). The purpose is to allow the overall risk appetite to be expressed in a comprehensive and easily understandable way and to facilitate the prioritisation of risk management actions.

The VaR quantifies the risks to which a company is exposed. It indicates the maximum cumulative loss that Eurex Clearing could face if certain independent loss events materialise over a specific time horizon for a given probability. Eurex Clearing’s models are based, in line with the Basel III framework, on a one-year time horizon.

The VaR is calculated at a confidence level of 99.98% (Required Economic Capital - REC) Besides the value-at-risk measure, Eurex Clearing defines other metrics in order to detect potential risk concentrations, as well as stress test calculations, which consider stressed parameters as compared to the regular VaR calculations.

Risk-wide stress tests, which are combining the interaction between all material risk types (e.g. market, credit and operational risks) are also calculated. They are carried out and reported to the Executive Board quarterly.

In addition to classical stress tests, which analyse the impacts of predefined stress scenarios, Eurex Clearing also calculates reverse stress tests. With the help of this instrument, stress scenarios that would exceed the Available Risk Bearing Capacity are identified. The findings in the reverse stress tests can give rise to further analyses and implementations of measures to reduce risks.

Eurex Clearing also calculates VaR at 99% confidence level for the determination of the Earnings at Risk (EaR). This VaR is used as a going concern risk measure on ECAG level and it is not expected to have impact on capital and therefore it is not used for capital management. This VaR is used to determine the maximum risk appetite of ECAG, however it is not the only measure. So, on the one hand the allocated EBITDA can be significantly higher than Earnings at Risk, but on the other hand exceptional breaches of this limit do not automatically require a risk reduction. According to ECAG’s first risk statement, Earnings at Risk should not exceed 20% of the planned EBITDA of the Eurex segment.

3.3 Risk types

ECAG defines risk as a potential negative impact on its financial, revenue and liquidity situation. According to the current risk inventory which is carried out regularly on a yearly basis the risk types operational risk, credit risk, and liquidity risk are considered material for Eurex Clearing. Market risk (as part of financial risk) and business risk are considered non-material. The risk types are illustrated in the following figure:

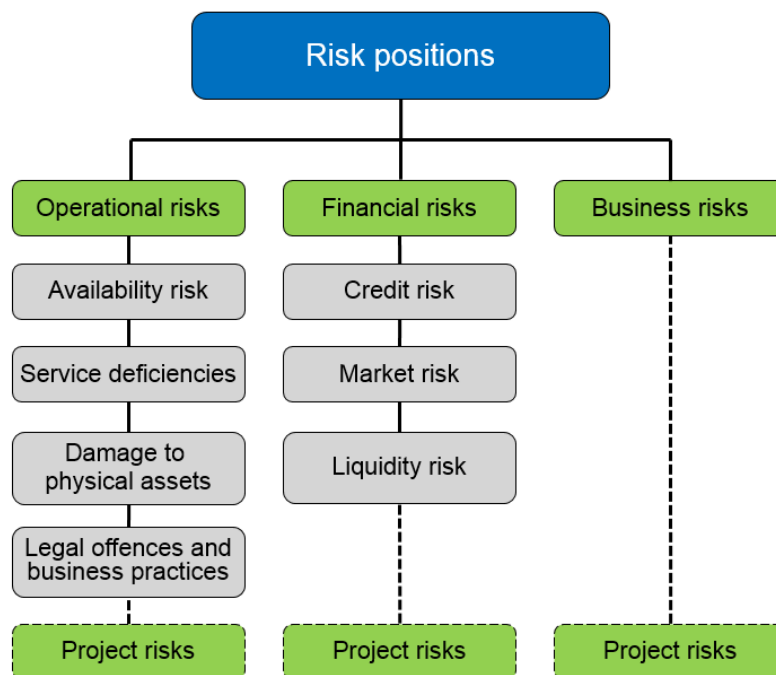


Figure 3-2 Risk structure of Eurex Clearing

Operational risk is defined as the risk of loss resulting from inadequate or defective systems and internal processes, from human or technical failure, from inadequate or defective external processes, from damage to physical assets and from legal risks that could arise from non- or inappropriate compliance with new or existing laws and regulations and all contractual commitments. Operational risks for Eurex Clearing relate to system availability, processing, legal disputes and business practice.

Financial risk includes credit risk, which describes the danger that a counterparty or contract partner might not meet its contractual obligations, market risk, that can arise in the case interest rate, currency or general adverse fluctuations, as well as liquidity risk, which applies if Eurex Clearing is unable to meet any payment obligation or due to increased refinancing costs:

- Credit risk can arise from participation in default fund after clearing member default and margin collateral usage, collateralized and uncollateralized cash investments, liabilities, and fund assets for pension plans;
- Market risk can arise from investment in securities and assets covering pension obligations;
- Liquidity risk can arise in case of customer default, payment obligations or repayment of customer deposits. Liquidity risks are not included into the aggregate risk. They are instead controlled by a limit system as defined in the Eurex Clearing Treasury Policy.

Business risk reflects sensitivity to macroeconomic evolution and vulnerability to event risk arising from external threats, such as regulatory adjustments or changes in the competitive environment, or internal weaknesses. According to the shareholders agreement and the related contract set up, ECAG does not generate sales on its own but on behalf of its mother companies. For this reason, ECAG is not exposed to business risk and thus no risk-bearing capacity is allocated to business risk.

Project risk arises from the change of the current risk profile once a project goes live in the future. Indeed, the launch of a new product, process or system may have a significant impact on one of the above-mentioned risk categories. Therefore, project risks figures are included in operational, financial and business risks, which is why they are quantified within these risk types.

The following sections 4 to 7 describe the operational risk and financial risks in more detail.

3.4 Risk management approach

It is Eurex Clearing's intention to confine risk to an appropriate and acceptable level. Depending on the risk characteristics, there are basically four types of management strategy further elaborated at the level of the single risk type:

- Risk acceptance: a deliberate decision to take risks and monitor their development;
- Risk reduction or elimination: measures to reduce either the severity or the frequency of losses;
- Risk transfer: contracts to give risks to the market;
- Risk avoidance: changes to the businesses that anticipate and prevent built-in risks.

The latter three management strategies are risk mitigating. Within Eurex Clearing, several mechanisms are used to reduce both the frequency and impact of incidents according to the type of risk.

3.5 Risk reporting and monitoring

Monitoring and reporting are essential parts of Eurex Clearing's risk management, designed to give Executive Management and the Supervisory Board timely, consistent and accurate information about the material risks that Eurex Clearing may encounter or have encountered.

All relevant data and information is collected, assessed and prepared by CCP Risk Management, who assemble the relevant information and prepare the regular management reports according to the principles set down in this document (see also 3.1 Strategy and organisation).

3.5.1 Regular reports

Risk reports are issued to the Executive Management, Supervisory Board and Risk Committee of Eurex Clearing on a regular basis. These reports provide the status of a new risk situation and/or updates on existing risk developments covering causes, potential early mitigation measures, assessment and recommendations.

3.5.2 Ad-hoc reports

CCP Risk Management may issue ad-hoc reports when a new risk situation or the development of an existing risk should be reported to the Executive Management of Eurex Clearing, because of the material impact it has on the risk profile of the relevant units.

3.5.3 Monitoring

Internal Audit ensures, through independent audits, that the adequacy of the risk control and risk management functions is monitored. The results of these audits are also fed into the risk management system.

4. Management of credit risk

4.1 Strategy, process, structure and organisation

Eurex Clearing's general risk management structure, organisation and process, as well as the risk strategy, is specified in Chapter 3 - Risk Management overview. The present status and the business direction for credit risk are stated in the risk strategy. The Executive Management periodically examines and adjusts the risk strategy as necessary. The risk strategy is set in accordance with the Risk Management Policy and is reported at least annually to the Supervisory Board.

Group Credit assesses the creditworthiness of potential new counterparties and the creditworthiness of issuers of collateral accepted by ECAG. Beside this Group Credit reviews the creditworthiness of existing counterparts and approves Treasury counterparts credit limits.

Eurex Clearing takes into account its overall credit risk exposures to individual counterparty from different types of relationships the counterparty may have with Eurex Clearing:

- Credit risk related to pure CCP business;
- Credit risk related to other business activities of Eurex Clearing.

4.1.1 Credit risk related to pure CCP business

Within the core CCP business, Eurex Clearing acts from a legal perspective as a principal. However, Eurex Clearing is economically not involved in the transactions and their related risks. As such, the positions are not recognised in the balance sheet and thus, do not form part of the risk positions under CRR Pillar I. Furthermore, securities collateral is not taken into account for Pillar I purposes of CRR. By contrast, cash collateral taken and placed in the markets result in on-balance sheet items and is therefore included for Pillar I purposes. Cash margins and the investments thereof are not considered Pillar I but are in scope of the risks from other business activities. The remaining credit risk stemming from the core CCP business is therefore dealt with under Pillar II (see below).

Throughout this process, all positions are mark-to-market on a near to real-time basis. The profits and losses are calculated based on the changes in market prices or positions and result in margin credits and margin debits. Besides this backward-looking component Eurex Clearing estimates potential future price risks with its margin models. The exposure must be covered with sufficient and eligible collateral so that no shortfall arises at any time. The calculation of this future risk exposure is aligned with the liquidation horizons assumed for the default management process and covers the risk for all products on given confidence levels in line with regulatory standards.

Moreover, Eurex Clearing has established prudent clearing membership requirements and admission criteria which needs to be met prior to admission. On an on-going basis, additional exposure and credit risk monitoring is performed ensuring that clearing members fulfil relevant requirement at all times. All counterparts are initially and after admission, at least annually, internally rated. Depending on the internal credit assessment additional limits might be set in order to manage the risk of lower rated counterparts.

If a participant defaults and if its collateral (margin collateral and default fund collateral) is not sufficient to cover all of its obligations, Eurex Clearing maintains sufficient financial resources to enable Eurex Clearing to cover losses resulting from defaults by applying the following default risk protection mechanism:

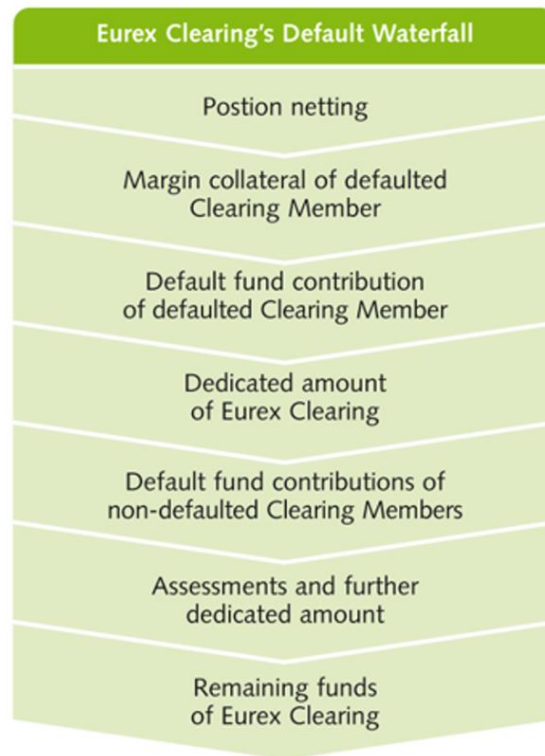


Figure 4-1 Default risk protection mechanism

4.1.2 Credit risk related to other business activities of Eurex Clearing

For the credit risk arising from other business activities, Eurex Clearing defines limits per counterparty based on different exposure types, such as notional amounts, secured exposures and unsecured exposures. These credit risk exposures can exist against individual counterparties from different types of relationships the counterparties may have with Eurex Clearing:

- Part of payment infrastructure;
- Part of settlement infrastructure;
- Part of Treasury activities.

The monitoring of credit risk is performed by Group Credit. Group Credit is responsible for issuing monthly credit reports to the Executive Management and to Enterprise Risk Management. The monitoring of the treasury limits is performed by Treasury Middle Office that is responsible for issuing monthly financial investment reports to the Executive Management and to ERM.

4.2 Credit risk exposures under Pillar I

4.2.1 Application of the standardised approach

As described in section 4.1.1 above, the credit risk under Pillar I does not include the pure CCP business of Eurex Clearing.

For the purpose of Pillar I credit risk capital requirements, Eurex Clearing uses for the central governments and central banks exposure class the credit assessments by OECD²¹. In addition, Eurex Clearing nominated the External Credit Assessment Institution (ECAI) Standard & Poor's for the same exposure class as OECD ceased to assess so-called "high income countries" in 2013. For regional governments or local authorities, public sector entities and institutions (credit institutions, investment firms and other dedicated financial counterparties) exposure classes, the dedicated risk weight is derived from that of the respective country of residence. The use of these credit assessments by OECD and Standard & Poor's ratings has been notified to the German supervisors.

The exposures of Eurex Clearing belong mainly to the exposure classes of central governments and central banks and to institutions. As per year end 2018 (and also year-end 2017) all exposures to central governments and central banks are risk-weighted by 0%. The exposures to institutions have only a short maturity of less than or equal to three months, thus, pursuant to Article 120 paragraph 2 CRR the risk weight is 20%.

All other exposures in the different exposure classes mostly achieve the prescribed risk weighting of an unrated position ("unrated" implies that no ECAI was nominated).

Eurex Clearing complies with the risk weighting as defined in Section 2 of Chapter 2 of Part Three, Title II of the CRR.

The following table shows the respective total credit risk exposure values in the standardised approach, before and after applying credit risk mitigation techniques, that have been allocated to each exposure class, as well as credit quality step prescribed in Chapter 2 of Part Three, Title II of the CRR.

²¹ Country Risk Classification: <http://www.oecd.org/tad/xcred/crc.htm>

31 December 2018 (€' 000)			
Exposure class	Risk weight class	Exposure value	Exposure value after CRM* and Credit Conversion Factor (CCF)
Central governments and central banks	0%	24.285.153	24.285.153
	20%		
	50%		
	100%		
	150%		
	Total		24.285.153
Regional governments, local authorities and other public bodies	0%	9.392	9.392
	10%		
	20%		
	35%		
	50%		
	100%		
	Total		9.392
Multilateral development banks and international Organisations	0%		
	20%		
	50%		
	100%		
	150%		
	Total		-
Institutions (banks)	0%		
	20%	1.546.763	1.503.519
	50%		
	100%		
	150%		
	Total		1.546.763
Corporates	20%		
	50%		
	100%	2.873	2.873
	Total		2.873
Undertakings for collective investment (Investment shares)	100%		
	150%		
	Total		
Covered bonds	10%		
	20%		
	50%		
	100%		
	Total		
Other (including equity holding)	0%		
	20%		
	100%	7.007	7.007
	250%	75	75
	1250%		
	Total		7.082
Total 2018		25.851.264	25.808.020
Total 2017		27.089.186	27.077.559

* CRM (Credit Risk Mitigation techniques) is described in detail in 5.3 Credit risk mitigation.

Table 4-1 Total credit risk exposure values

4.2.2 Detailed information and distribution of credit risk exposures

Distribution of credit risk exposures

In the following the distribution of the credit risk exposures is broken down by exposure classes, by geographical areas and by the residual maturity according to Article 442 CRR.

As of 31 December 2018, the geographical allocation of credit risk exposures was as shown in the following table.

31 December 2018 (€'000)	Geographical areas				Total
	European Union	Rest of Europe	North America	Rest of World	
Central governments and central banks	18.246.251	6.038.903	0	0	24.285.153
Regional governments, local authorities and other public bodies	9.392	0	0	0	9.392
Institutions (banks)	1.415.707	125.696	48	5.312	1.546.763
Corporates	2.710	0	163	0	2.873
Other (including equity holding)	7.068	15	0	0	7.082
Total 2018	19.681.127	6.164.613	211	5.312	25.851.264
Total 2017	19.317.471	7.757.376	13.033	1.306	27.089.186

Table 4-2 Geographical allocation of credit risk exposures

The following table provides information about the residual contract maturity, broken down by exposure classes. Most exposures are short-term with a significant part being overnight exposures.

31 December 2018 (€'000)		Maturity		
Exposure class	Not more than three months	Up to one year	Over one year	Total
Central governments and central banks	24.285.153	0	0	24.285.153
Regional governments, local authorities and other public bodies	0	5.004	4.388	9.392
Multilateral development banks and international organisations	0	0	0	0
Institutions (banks)	1.546.763	0	0	1.546.763
Corporates	2.873	0	0	2.873
Undertakings for collective investment (Investment shares)	0	0	0	0
Covered Bonds	0	0	0	0
	0	0	0	0
	0	0	0	0
Other (including equity holding)	6.214	781	87	7.082
Total 2018	25.841.004	5.785	4.475	25.851.264
Total 2017	27.084.973	4.113	100	27.089.186

Table 4-3 Residual contract maturity

Value adjustments and provisions

In accordance with German GAAP, Eurex Clearing assesses, at each balance sheet date, whether there is objective evidence that a financial asset is impaired. Only indications of impairment incurred at the balance sheet date resulting from past events and current economic conditions can be considered. Losses expected as a result of future events, no matter how likely, are not recognised.

According to the policies of Eurex Clearing and in line with sound banking practices and regulations, Eurex Clearing makes value adjustments and provisions, when necessary and due to individual decisions. Eurex Clearing does not have any value adjustments and provisions for credit risk exposures at present, because it does not have any impaired assets.

Past due items and default or non-performing exposures

Pursuant to the below stated definitions, Eurex Clearing has had no past due item or default or non-performing exposure in its books at the reporting date or during the year under review.

Definition of past due

An exposure is classified by the CRR as “past due” where a counterparty has failed to make a payment when contractually due, when the debtor has exceeded an external limit communicated to him as well as when the debtor has utilised credit without prior consent.

Definition of default or non-performing

According to Article 178 CRR a debtor is in default when either or both of the following conditions apply:

- The institution has material reason to consider that the obligor is unlikely to pay its (credit) obligations in full, without recourse by the institution to actions such as realising collateral (if held);
- The obligor is past due more than 90 successive calendar days on any material part of its overall credit obligation to the institution.

The Eurex Clearing internal definition of “impairment” according to German GAAP (HGB) is compliant with the definition of “default” outlined in Article 178 CRR.

Credit risk mainly arises in the short-term and with credit institutions or governmental counterparties. Treasury counterparties are selected based on a high degree of creditworthiness and operational reliability.

4.3 Credit risk mitigation

The exposure values of Eurex Clearing exist mainly in the investment of cash collateral deposited by clearing members.

Eurex Clearing follows a restrictive investment policy in order to safeguard the clearing house and its participants. As a principle, clearing members’ cash collateral and the CCPs own funds are placed with counterparties of adequate creditworthiness, preferably on a secured basis, or through direct investments in debt instruments, such as Floating Rate Notes and Fixed Coupon Bonds. Uninvested cash is deposited with the central bank of issue, if access has been granted.

Reverse repo is the preferred instrument. In general, repo transactions must be governed by a framework agreement (Global Master Repurchase Agreement or “Deutscher Rahmenvertrag für Finanzgeschäfte”) and are only maintained with authorised credit and financial institutions that have low credit risk based upon an internal assessment by Eurex Clearing.

Repo transactions are, in accordance with EMIR, settled via operators of a securities settlement system that ensures the full protection of those instruments.

Securities accepted as collateral need to fulfil all of the strict conditions of highly liquid financial instruments as required by EMIR. In particular, securities accepted as collateral need to be:

- Debt instruments issued or guaranteed by high quality obligors (mainly 0% risk-weight);
- Issued or guaranteed by governments, central banks, multilateral development banks, the European Financial Stability Facility (EFSF) or the European Stability Mechanism (ESM);
- Freely transferable and without any regulatory constraint or third-party claims that impair liquidation; in addition, subordinated securities are not eligible;
- Have an active outright sale or repurchase agreement market and reliable price data on these instruments are published on a regular basis.

Transactions in which the securities given as collateral are issued by the counterparty or an affiliate of the counterparty are not allowed.

Furthermore, Eurex Clearing applies haircuts on the securities accepted as collateral. According to the underlying repurchase agreement, Eurex Clearing may also issue a margin call that requires the counterparty to post additional collateral in case the market value of the collateral initially provided decreases to predefined levels. Cross currency collateralisation is, in principle, possible in triparty transactions and requires additional haircuts.

In general, Eurex Clearing applies credit risk mitigation (CRM) techniques. Currently, these CRM techniques are only relevant for the exposure class "institutions".

ECAG uses the comprehensive method for financial collateral according to Article 223 CRR for the purposes of credit risk mitigation.

For capital requirements purposes, according to Article 227 CRR the application of zero volatility adjustments is possible. Where the conditions of the regulation stated above are not fulfilled, supervisory haircuts as laid down in Article 224 CRR apply. In cases of FX mismatch, further cross-currency haircuts are to be applied.

The below table shows credit exposures in respect of placements from Eurex Clearing, pre and post collateral. It also shows the associated RWA. Note that the year on year reduction largely reflects a reduction in unsecured placements.

Counterparty Institutions	31 December 2018 (€' 000)	31 December 2017 (€' 000)
Exposure - book value	1,546,763	54,538
Collateral - market value	43,244	11,627
Collateral - adjusted market value	0	0
Exposure - value after CRM	1,503,519	42,911
RWA	300,704	8,582

Table 4-4 Placements from Eurex Clearing

Securities that qualify for direct investments generally need to fulfil the same requirements as in collateralised placements and need to be issued by high quality obligors.

4.4 Monitoring and reporting

Group Credit reports new credit lines on treasury counterparties and changes of credit lines (increases as well as reductions), changes of the internal rating for customers and credit exposures to the Enterprise Risk Management section. Besides that, limit breaches - if any - are reported to the Executive Management and to Enterprise Risk Management.

The reporting approach as described in 3.1.5 Risk monitoring and reporting also applies to the management of credit risk. On this basis, Enterprise Risk Management assesses the credit risk and reports VaR results as well as risk issues to the Executive Management. Besides the assessment of the VaR, Enterprise Risk Management also measures credit risk concentration and performs stress test calculations on credit risk.

4.5 Disclosures on derivative credit risk

EMIR and the complementary EU Commissions Delegated Regulations enable CCPs to execute transactions in derivative instruments only for limited purposes. Consequently, Eurex Clearing uses derivatives only for the following purposes:

- (a) Hedging the portfolio of a defaulted clearing member as part of the CCP's default management procedure;
- (b) Hedging currency risk arising from Eurex Clearing's CCP business;
- (c) Hedging currency risk arising from Eurex Clearing's general corporate business; including outright sales for trust assets (no derivatives).

Derivative transactions are only executed under counterparty limits which are approved either by Group Credit within the authority granted by the Eurex Clearing Executive Board or by the Eurex Clearing Executive Board. Counterparts are reviewed at least annually by Group Credit. In case of a deterioration of counterpart's credit worthiness, Group Credit recommends whether to reduce the limits or replace the counterpart. Treasury Back and Middle Office monitors compliance with counterparty limits daily and reports limit violations ad-hoc to CCP Risk Management and monthly to Eurex Clearing's Executive Board.

As of 31 December 2018, Eurex Clearing did not have any exposure outstanding in derivatives instruments.

4.6 Disclosures on equities in the non-trading book

Equities held in the non-trading book concern strategic participations in companies with business related to the business of Eurex Clearing. Due to the strategic alignment, no participation is held in order to make short-term profits (no trading intent).

Currently, ECAG holds a 100% participation in Eurex Clearing Security Trustee GmbH. The purpose of the company is to hold, enforce and release security interests in the Difference Claims that are granted to it in the form of pledges by UK and/ or Welsh Clearing Members under the Individual Clearing Model (ICM).

4.6.1 Equities in the non-trading book

In the following, the participation in Eurex Clearing Security Trustee GmbH is included in the equities in the non-trading book of ECAG.

	31 December 2018 (€' 000)	31 December 2017 (€' 000)
Fair value of investments	79	79
Balance sheet value	75	75
Total unrealised gains (losses)	4	4
thereof total revaluation gains (losses)	4	4
Amounts included in the original or additional own funds	0	0

Table 4-5 Equities in the non-trading book

4.6.2 Valuation and accounting of equities in the non-trading book

For valuation and accounting purposes German GAAP (HGB) defines equities in the non-trading book as long-term financial assets.

According to § 340e HGB in connection with §§ 252 and 253 HGB, such assets may not be recognised at an amount higher than their purchase price, reduced by depreciation, amortisation and write-downs in accordance with particular requirements for fixed assets. Items of fixed assets may be written down in order to carry them at the lower of cost or market value at the balance-sheet date. Impairment losses shall be recognised if impairment is expected to be permanent.

4.7 Asset encumbrance

The disclosure of information on asset encumbrance pursuant to Article 443 CRR was specified by EBA with the EBA guidelines on the disclosure of encumbered and unencumbered assets on 26 June 2014²². Based on this guideline, the below disclosures are made. The disclosed figures are median values based on the reported quarter-end figures as required.

The overall level of encumbrance is zero as shown below. Unencumbered assets are mainly related to the following positions:

- Investment in Eurex Clearing Security Trustee GmbH (Equity);
- Investments in debt securities (Debt securities);
- Other assets, such as exposures to institutions, corporates and balances at central banks.

	Carrying amount of encumbered assets	Fair value of encumbered assets	Carrying amount of unencumbered assets	Fair value of unencumbered assets
Assets of the reporting institution*	0		25,662,314	
Equity instruments*	0	0	0	0
Debt securities*	0	0	9,463	9,463
Other assets*	0		251,494	

* Figures are median values based on the reported quarter-end figures.

Table 4-6 Encumbered and unencumbered assets

The fair-value of non-encumbered collaterals from collateralised placings is shown below:

	Fair value of encumbered collateral received or own debt securities issued	Fair value of collateral received or own debt securities issued available for encumbrance
Collateral received by the reporting institution*	0	231,583
Equity instruments*	0	0
Debt securities*	0	231,583
Other collateral received*	0	0
Own debt securities issued other than own covered bonds or ABSs*	0	0

* Figures are median values based on the reported quarter-end figures.

Table 4-7 Collateral received

²² Guidelines on disclosure of encumbered and unencumbered assets: <http://www.eba.europa.eu/documents/10180/741903/EBA-GL-2014-03+Guidelines+on+the+disclosure+of+asset+encumbrance.pdf/c65a7f66-9fa5-435b-b843-3476a8b58d66>

As there were no matching liabilities to the only source of encumbrance, no sources can be shown in the following table.

	Matching liabilities, contingent liabilities or securities lent	Assets, collateral received and own debt securities issued other than covered bonds and ABSs encumbered
Carrying amount of selected financial liabilities*	0	0

* Figures are median values based on the reported quarter-end figures.

Table 4-8 Encumbered assets/collateral received and associated liabilities

4.8 Stress testing of credit risk

Eurex Clearing performs stress tests and reverse stress test to ensure the adequacy of its financial resources in case of simultaneous default of multiple key market participants, and to identify potentially dangerous market conditions.

The term “stress test” comprises the entirety of qualitative and quantitative analysis methods of rare but plausible events. The following stress tests are performed for credit risk:

- The “Default of the Largest Counterparty Group Stress Test”, where the default of the counterparty group with the largest unsecured exposure is simulated on a monthly basis, after utilisation of all respective collateral and after taking the recovery rate into account;
- The “Economic Deterioration Stress Test”, where the impact of a deterioration of the economic environment on Eurex Clearing is simulated on a monthly basis. To capture the worsening of the economy, certain credit risk model parameters are stressed compared to the standard VaR simulation.

The results of the “Default of the Largest Counterparty Group Stress Test” and the “Economic Deterioration Stress Test” are compared to limits, which are defined as a fraction of the available Risk Bearing Capacity. The stress test results are reported to the Executive Management and to the Supervisory Board on a quarterly basis.

In addition, a credit stress test is performed on a daily basis to check, whether the current default fund is sufficient or not to cover a default of two largest counterparties under market stress. As soon as the potential consumption of the default fund by any clearing member breaches a defined threshold, Eurex Clearing board decides to take risk mitigating actions. Risk mitigating actions include member-specific actions, e.g. extra margin requirements, or member-wide actions, e.g. an increase of the size of the default fund by increasing the default fund contribution by all.

In addition to the stress tests defined above, a “Reverse Credit Stress Test” is performed, aiming at analysing how many clearing members could default before Eurex Clearing becomes insolvent.

In the year under review, the stress tests did not reveal any risks that endanger the going concern of the business of Eurex Clearing.

5. Management of operational risk

5.1 Strategy, process, structure and organisation

Eurex Clearing defines operational risks as the risk of losses that can be attributed to inadequate or non-functional systems or internal processes, human or technical errors and external events. The following risk classes are distinguished here:

- Availability (technical infrastructure, facilities, staff);
- Service deficiency (errors & omissions, supplier deficiencies, product flaws);
- Legal offences and business practice (non-respect of laws & legal practice, contract, corporate governance).

Operational risk represents a major risk class for Eurex Clearing and one that is systematically managed and controlled. Eurex Clearing established a comprehensive framework and set of instruments meeting the requirements from both a regulatory and a business perspective.

Special consideration is given in the risk management activities to the risk of failure of the clearing systems and processes. Eurex Clearing regularly orders and performs Business Continuity Management tests. These tests draw a distinction between three different scenarios: staff, workspace, and system unavailability. While the system unavailability tests are announced to avoid operational risk, tests relating to staff and workspace unavailability are ordered without prior notice and last up to 3 days. The corresponding system failure tests were last carried out in September 2018.

Eurex Clearing's risk strategy, as described in 3.1 Strategy and organisation, also applies to the management of operational risk. In this risk strategy also, the risk capital dedicated to cover losses resulting from operational risk is defined, setting a limit for this risk type.

Operational risk can be differentiated according to the severity and frequency of losses. As operational risk management depends on the risk position of Eurex Clearing, the general principles are as follows:

- All main risks are identified and continuously analysed with regard to the expected or real effect on frequency and severity;
- For risks with low frequency but high severity, risk transfers are considered;
- For risks with high frequency but low severity, risk reduction is considered, for example, by optimising processes.

The ultimate responsibility for operational risk management lies with the members of Executive Management of Eurex Clearing, who are supported by different units and functions. Eurex Clearing has established a segregation of duties into the predominately central operational risk management, the mostly local operational risk control and an independent review function.

The five steps of the risk management process (as described in Chapter 3) need to be taken into account.

It is the responsibility of line management to control operational risk within their area on a day-to-day basis. This includes the identification of suitable measures to mitigate operational risk and to improve the effectiveness and efficiency of the operational risk management. To achieve this target Executive Management appoints "Operational Risk Representatives" for their respective area with a direct reporting line to the respective member of the Executive Management.

The Operational Risk Representative is the key contact for both the employees in the respective organisational unit as well as for Enterprise Risk Management. They also support the Executive Management with all tasks regarding operational risk and are especially responsible for the collection of operational risk event data within their organisational unit. In addition to this, the Operational Risk Representatives take an active role in further developing operational risk tools and instruments. They also coordinate operational risk training for their respective organisational unit.

It is the responsibility of any single employee to support ERM, line management and the Operational Risk Representative of their organisational unit regarding any operational risk matters. Every employee is especially required to participate in the collection of operational risk event data. In addition, individual employees may be asked by line management, their Operational Risk Representative or ERM to take an active role also in the operational risk management process, for example, as experts within scenario analysis.

5.2 Determination of Pillar II capital requirement

Operational risks should be identified and assessed annually in workshops between ERM and Operational Risk (OpRisk) Representatives. To this end, the staff estimates the probability and the degree of financial loss arising from operational risks (loss scenarios). This assessment incorporates various types of information such as the number of claims for damages asserted by customers against Eurex Clearing, the share of transactions processed fully automatically (straight-through processing), faults and interruptions in the system infrastructure as well as audit results from Internal Audit.

In order to avoid operational risks from starting activities in new products or on new markets, Eurex Clearing has implemented a new product process, which aims to ensure that all of the affected units of Eurex Clearing are included at an early stage in the preparation and development process. Eurex Clearing's new product related risk management process is regulated in the "Project Risk Analysis Procedure". Furthermore, Eurex Clearing set up a New Product Committee consisting of representatives of the risk-relevant departments, the task of which is to coordinate between the affected departments when new products are launched.

The risk scenarios defined in the workshops are the key benchmarks for the VaR amounts for operational risks in the calculation of Available Risk Bearing Capacity. A validation of the scenarios is planned at least once a year.

Eurex Clearing conducts an annual validation of the operational risk scenarios. In connection with the annual validation of the underlying scenarios for the VaR calculations, Eurex Clearing performs stress tests in which the loss resulting from the stress scenarios is compared with the risk capital allocated to the operational risks.

ERM calculates a Value at Risk at a given confidence level based on a loss distribution function that is generated by a Monte Carlo Simulation. The predefined confidence level derives from Eurex Clearing's Risk Strategy in order to compare the corresponding Economic Capital with the available Risk Bearing Capacity.

5.2.1 Operational Risk Model

The VaR model for the calculation of Operational Risk (OpRisk) uses internal and external loss data, Key Risk Indicators (KRIs), Risk Indicators (RIs) and scenarios as input. Internal and external loss data as well as KRIs and RIs enter the model indirectly by serving as the foundation of the OpRisk scenario framework. The scenarios, which are subject to permanent validation, are the source of the parameters that determine the aggregate loss distribution

generated by a Monte-Carlo Simulation. The quantile of that distribution represents the Value at Risk at the corresponding confidence level.

Aggregate Loss Distribution

The overall objective of the operational risk model is to simulate a loss distribution for a given time frame, which is one year (for regulatory purposes referred to as holding period in regulatory publications). Combining the loss distributions for all scenarios by Monte Carlo simulation gives the required aggregate loss distribution. From the aggregate loss distribution, the required risk figures are derived:

- **Expected Loss:** The expected loss is generally defined as the statistical mean of the aggregated loss distribution.
- **Value-at-Risk:** The Value-at-Risk (VaR) is defined as the amount that is not exceeded in q% cases of all years. For internal purposes, the 99.98% as well as the 99% percentiles are calculated. Any other percentile can also be derived from the aggregate loss distribution.
- **Unexpected Loss:** The unexpected loss is generally defined as the difference between the 99.9%-VaR and the expected loss.
- **Expected-Shortfall to the q-Percentile:** Defined as the statistical mean of the loss distribution above the q-Percentile. It is used as a proxy for the loss amount the specific unit/entity could face if the q-Percentile is exceeded.

OpRisk scenarios that are clustered in different “cells” or risk classes (see also 5.1):

- Availability (AV)
- Service Deficiency (SD)
- Damage to Physical Assets (PA)
- Legal Offences and Business Practices (LOBP)

The risk class PA is not relevant to Eurex Clearing AG, as it does not possess any physical assets. In addition to its own scenarios that are assigned to the risk classes AV and SD, Eurex Clearing AG shares various scenarios of the risk Class LOBP with its parent company Deutsche Börse AG. Parameters considering frequency and/ or severity of loss events are adjusted to account for size and exposure of those risks.

Each OpRisk scenario exhibits three parameters that are required in the Monte Carlo Simulation:

- λ_i : Frequency of loss occurrence (rate parameter of the Poisson distribution)
- a_i : Minimum loss (lower-bound parameter for the continuous uniform distribution)
- b_i : Maximum loss (upper-bound parameter for the continuous uniform distribution)

Monte Carlo Simulation

The distributions of all operational risk scenarios in a 'cell' need to be convoluted in order to derive the aggregate loss distribution for a 'cell' and based on that the total loss distribution for operational risk. Eurex Clearing AG implemented a Monte Carlo simulation, which allows to numerically determine the loss distribution with high precision.

Assume that there are n operational risk scenarios in a simulation 'cell', where for each scenario i ($1 \leq i \leq n$)

- the frequency distribution follows a Poisson distribution with mean (calculated as 1 / "Frequency estimation")
- the severity distribution follows a continuous Uniform distribution with boundaries $a_i < b_i$ (which are minimum and maximum loss of the scenario)

A single Monte Carlo simulation cycle is carried out in three steps:

- Generate for each operational risk scenario i ($1 \leq i \leq n$) a random number L_i of events for this scenario from a Poisson distribution with mean λ_i .
- Generate for each operational risk scenario i ($1 \leq i \leq n$) L_i number of loss amounts $l_{i,j}$ from a continuous Uniform distribution with boundaries $a_i < b_i$. The loss amounts should be mutually independent.
- Sum all loss amounts $l_{i,j}$ ($1 \leq i \leq n$) in order to calculate the total loss amount of one year.

Repeating the Monte Carlo cycles several times gives a loss distribution for a 'cell' with the required accuracy. The current implementation of the model uses 25 million simulation trials, subject to the yearly validation.

Modelling Structure

The underlying assumption that justifies this procedure is the independence of OpRisk Scenarios, which describe concrete loss events. The severity of an event depends on its direct financial impact and on subsequent losses that are caused by this event. In principle, two reasons of dependence between individual events exist. At first, events triggered by preceding events could be captured separately. These events obviously depend on each other, which needs to be taken into account in the model. Secondly, different events could have the same underlying cause. Any change for the cause would affect all events, however, not necessarily to the same extent. These two types of dependence need to be treated separately.

As part of the loss data collection and the scenario analysis the total impact of an event is taken into account, including the losses that are generated in other areas of the bank as a result of the scenario event. These subsequent losses are estimated and documented within the Risk scenario template as "Related effects" (see 6.3.1.c and taken into consideration when estimating the severity of a risk scenario. By definition of the scenario analysis process, the events are not captured separately. Therefore, none of the scenarios depend on each other and can be treated in the model accordingly.

On the one hand, scenarios can be triggered by a variety of root causes. On the other hand, different scenarios can have root causes that are similar in nature and fall in the same root cause categories. To fulfil the criterion of independence, root causes must be assigned uniquely to a single scenario. As an example, a terrorist attack might lead to a damage of physical assets (respective risk class is "Damage to physical assets") and subsequently also

causes a business interruption with consequential claims from customers and loss of revenues (respective risk class would be "Availability"). Also stress situations like a long-lasting system interruption ("Availability" risk) could cause human errors & omissions leading to additional subsequent losses. However, these cross-driver events are captured within a loss scenario. This approach ensures an independency of the individual risk classes and is essential for the zero-correlation assumption amongst different risk classes.

An appropriate model for this situation is a zero-correlation model, in which the occurrence and the size of losses belonging to different risk types are generated completely randomly.

Risk Management carries out a regular monthly check of the reasonability of the quantified required capital. Therefore, monthly and yearly safeguards have been defined as follows. Whenever the total 99.9% VaR moves up or down by

- at least 3% of its previous month value or
- at least 10% of its previous year value,

the input data and the result have to be investigated to ensure the correctness of the figure. Explanation of any variation above the safeguards is included in the quarterly risk report.

5.2.2 Stress Testing

In order to achieve a better understanding of the largest risks and to adequately model capital requirements, Enterprise Risk Management runs - once the capital figures are worked out and calculated - an ex post stress test. Aim of the stress testing is to gauge the capital potential vulnerability to exceptional but plausible events. The stress test process is defined as follows:

- All scenarios agreed during the scenario analysis are in general considered when performing the stress test. When a stress test is not passed, it is repeated while excluding the scenario which caused the breach to identify all scenarios which lead to a failure to pass the corresponding stress test. However, unrealistic scenarios with a frequency rarer than one loss in 1,000 years should be neglected to avoid artificial spin-off scenarios.
- The risk scenario with the biggest maximum loss is benchmarked with 80% of the Available Risk Bearing Capacity (RBC) as defined in Eurex Clearing's risk strategy.
- A combined occurrence of several risk scenarios within one particular year is considered. In principle any combination of existing risk scenarios is possible. However, the focus is on plausible events, considering the respective frequency of occurrence per risk scenario. The approach is to combine the two extreme scenarios with the biggest maximum loss and a frequency not lower than one loss in 100 years.
- In order not to focus only on extreme scenarios, also the combination of non-extreme scenarios (scenario that are only used when modelling the body distribution, but not considered when modelling the tail) is assessed. In this respect three non-extreme risk scenarios with the biggest maximum loss are combined, and the total loss amount is benchmarked with 80% of the RBC.

These stress tests are carried out and reported to the Executive Board in the quarterly basis. In addition to the stress test defined above Risk Management might test other combinations of scenarios in order to acquaint a better understanding the appropriateness of the calculated capital requirements.

In addition, ad-hoc stress test is performed, if the outcome of the regular or the ad-hoc scenario analysis changes the OpRisk stress test according to the above explained methodology. These changes comprise of altering a scenario already included in OpRisk stress test or a changed composition of the stress test, i.e. including a new scenario and excluding one scenario.

In addition, a reverse stress test for operational risk is performed. It assumes that several operational risk scenarios (frequency not rarer than one loss in 1,000 years) materialize. As many operational risk scenarios as needed are chosen so that the losses would exceed the total RBC. Scenarios that already exceeded the RBC in the first stress test are not considered.

5.3 Operational risk mitigation

As laid out in its risk strategy, Eurex Clearing gives considerable attention to its risk mitigation process. The aim is to reduce the frequency and the severity of potential operational risk events. The process comprises several quality and control initiatives whose objective is to ensure that Eurex Clearing's operations have sufficient controls to prevent any fraud or operational service deficiency. If an event of this kind occurs in Eurex Clearing's operations, a thorough analysis is performed in order to be in a position to define measures to reduce the probability of recurrence.

The key preventive measures of risk mitigation consist of strong internal control processes and ongoing initiatives to further reduce errors and omissions. This is supported by a number of measures that will take effect at the time or after an incident, such as Business Continuity Management (BCM) and insurance programs.

5.3.1 Internal Control System

The Executive Management of Eurex Clearing has implemented an internal control system, designed to ensure the effectiveness and profitability of the business operations, prevent or detect financial loss and thus protect all its business assets. Eurex Clearing's internal control system, an integral part of the risk management system, continuously developed and adjusted to reflect changing conditions, comprises both integrated and independent control and safety measures.

Internal Audit ECAG carries out risk-oriented and process-independent controls to assess the effectiveness and appropriateness of the internal control system.

5.3.2 Business Continuity Management

Because the unavailability of core processes and resources represents a substantial risk for Eurex Clearing, and a potential systemic risk to the markets as a whole, Eurex Clearing has implemented a comprehensive Business Continuity Management (BCM) approach as a key mitigating factor for availability risk.

BCM organisation at Eurex Clearing

The business continuity function is responsible for the overall monitoring of Eurex Clearing's preparedness to deal with incidents and crises. Business continuity plans are developed by the organizational units, who are responsible for the continuity and operational resilience of their respective business activities.

The organisational roles and responsibilities, and the guiding principles to ensure operational resilience, are documented in a formal BCM policy.

BCM arrangements

The implemented BCM arrangements aim to minimise the impact of the unavailability of key resources, addressing not only the unavailability of systems, workspace and suppliers, but also the loss of significant numbers of staff in order to ensure the continuity of the most critical operations even in cases of catastrophe.

Systems unavailability

Data centres in the main operating locations are distributed to form active centres, acting as backups of each other. Data is mirrored in real time across the data centres. The infrastructure is designed to ensure the online availability and integrity of all transactions at the time of a disruption.

Workspace unavailability

Exclusively dedicated work backup facilities provide office space for mission critical staff in the event that an office location becomes unavailable. These backup facilities are fully equipped and networked to the distributed data centres and are operational at all times. In addition, business transfer plans between Eurex Clearing's different operations locations can be used to mitigate workspace unavailability.

Staff unavailability

Business continuity measures address the loss of significant numbers of staff, covering catastrophe scenarios and potential pandemics. Solutions are designed to ensure that the minimum staff and skills required are available outside the impacted location. Staff dispersal and business transfer plans between Eurex Clearing's different operations locations are employed such that, if one of these locations is impacted, mission critical activities can be continued by staff in other locations.

Supplier unavailability

Eurex Clearing assures itself of the continuous provision of critical supplier services by a number of means, such as regular due diligence review of suppliers' BCM arrangements, provision of services by alternative suppliers if possible and service level agreements, describing the minimum service levels expected from suppliers, and contingency procedure requirements.

Incident and crisis management process

Eurex Clearing has implemented an incident and crisis management process that facilitates coordinated response and rapid reaction to an incident or crisis in a controlled and effective manner. The process aims to minimise business and market impact, as well as enable the speedy return to regular business activity. Incident Managers have been appointed in their respective business areas in case of incidents and crises. They will also ensure the appropriate escalation up to the Executive Management and notification to customers.

“Real-life” simulation testing

Eurex Clearing adopts a comprehensive and ambitious business continuity testing approach that simulates scenarios as close as possible to real-life situations while reducing associated risks and avoiding customer impacts. BCM plans are tested on a regular basis, at least annually and mostly unannounced.

Three criteria are applied to validate the BCM test results:

- Functional effectiveness: validating all technical functionalities.
- Execution ability: ensuring that members of staff are familiar with and knowledgeable in the execution of BCM procedures.
- Recovery time: confirming that BCM plans can be executed within a defined recovery time objective.

Findings are reported to Executive Management.

5.3.3 Insurance

An additional tool used by Eurex Clearing to mitigate the impact of operational risk is the transfer of risks above a certain threshold to third parties through a comprehensive insurance programme.

In order to achieve the optimum risk/benefit versus premium ratio, insurance policies are negotiated either through insurance brokers or directly with the insurers to purchase tailor-made policies reflecting the specificities of our business.

Each major insurance cover is reviewed annually following the evolution of Eurex Clearing’s operational risk profile.

5.4 Monitoring and reporting

The reporting approach laid out in 3.1.5 Risk monitoring and reporting and 3.5 Risk reporting and monitoring also applies to the management of operational risk. A supplementary risk report is also produced annually with the aim of providing the management with additional background information pertaining to Eurex Clearing’s risk management.

This report includes additional summary statistics and trend analyses of operational risk events, but also a summary of major changes to the operational risk model, concept and methodology, and quality improvements in operational risk management.

5.5 Determination of Pillar I capital requirement

In order to determine the capital requirement for operational risk under Pillar I the Basic Indicator Approach based on the gross revenues is applied.

6. Management of market risk, including interest rate risk of exposures on positions not included in the trading book

6.1 Strategy, process, structure and organisation

Eurex Clearing's general structure, organisation and process of risk management as well as the risk strategy is described in Chapter 3. Risk Management overview. With regard to market risk, risk control measures are applied to protect the clearing house from financial risks. The risk strategy is translated into a limit system, which is monitored on a daily basis.

As regards to the non-trading book, Eurex Clearing treasury activities are governed by the Treasury Policy including limits and responsibilities.

In general, Eurex Clearing is not involved in proprietary trading activities and hence is not required to maintain a trading book according to prudential banking regulation. Thus, Eurex Clearing's investment activities, i.e. the placement of clearing members' cash collateral and the investment of Eurex Clearing's own liquidity, are allocated to the non-trading book in accordance with the CRR.

6.1.1 Investment Policy

6.1.1.1 Investment of clearing members' cash collateral

Eurex Clearing Follows a restrictive investment policy in order to safeguard the clearing house and its participants. As a principle, clearing members' cash collateral is placed with counterparties of adequate creditworthiness, preferably on a secured basis via reverse repo, or through direct investments in debt instruments, such as Floating Rate Notes and Fixed Coupon Bonds. Uninvested cash is deposited with the central bank of issue, if access has been granted.

In secured transactions and in direct investments eligible securities must meet very high eligibility criteria. Accordingly, highly liquid financial instruments need to be issued or guaranteed by a government, a central bank, a multilateral development bank, the EFSF or the ESM. In addition, they need to be freely transferable and without any regulatory constraint or third-party claims that impair liquidation. Investments are subject to a strict limit system, e.g. secured investments are subject to mismatch and interest rate risk limits, which constrain the maximum tenor and the maximum market risk ECAG is willing to take.

In currencies where Eurex Clearing holds an account with the national central bank (EUR, CHF and GBP), un-invested cash is deposited with the central bank. Where Eurex Clearing deposits cash other than with a central bank, cash is deposited with authorised credit institutions, as defined under Regulation (EU) 648/2012 of the European Parliament and of the Council of 4 July 2012 (EMIR) in conjunction with Directive 2006/48/EC of the European Parliament and of the council (EU Banking Directive), that have low credit risk based upon an internal assessment by the CCP. Deposits are limited to overnight only.

6.1.1.2 Investment of Eurex Clearing's own liquidity

As a principle, Eurex Clearing's liquidity not resulting from clearing member's cash collateral is invested applying the same mechanisms as the placement of clearing member funds.

6.1.2 Market risk measurement

Market risks mainly arise from cash investments through interest rate, currency and equity prices fluctuations.

- Assets and liabilities mainly have matching terms. Eurex Clearing only engages in limited maturity transformation. Hence, the interest rate risk (IRR) is generally low in relation to Eurex Clearing's regulatory capital.

In 2018, Eurex Clearing introduced a benchmark related compensation system for placements of clearing members' cash collateral to improve the level of transparency. Therefore, customer interest rates are in principle calculated based on a pre-defined benchmark rate per currency, reduced/complemented by a cash handling fee, while ECAG obtains the realised interest rate on the cash collateral. However, in a negative interest rate environment, ECAG doesn't apply above-mentioned benchmark calculations if it's unfavourable for the clearing members and forwards the actually realized interest rates.

In order to limit essential IRR arising from the benchmark related compensation system, in exceptional cases in a positive interest rate environment such as, but not limited to, market disruptions, Eurex Clearing reserves the right to calculate customer interest rates on the basis of interest earned through the placement of funds instead of predefined benchmark rates if necessary.

- Additionally, IRR arises from ECAG's pension liabilities and the share in the CTA (Contractual Trust Arrangement), which invests in assets that are sensitive to changes in interest rates, e.g. debt instruments.
- Currency risks may occur through placements in foreign currencies, which mainly have been in CHF, USD and GBP in 2018. The placed funds primarily consist of cash collateral, where Eurex Clearing is obliged to repay in the same currency. Thus, the foreign exchange exposure is limited to the net interest earned in the respective currency. At the same time, Eurex Clearing has to a limited extent operating expenses in the mentioned currencies, which partially offset currency risk. Moreover, placements in nostro accounts in other foreign currencies create additional, but limited, currency risk. As for credit and interest rate risk, the CTA, also to a limited extent, bears currency risk. Despite the limited materiality, FX risks are regularly monitored and managed.

In addition to interest rate and currency risk, equity price risk arises from the CTA investments in futures.

The portfolio is marked-to-market on a daily basis and controlled against predefined limits, among which interest rate risk, country risk and issuer risk are considered, that are in line with Eurex Clearing's overall risk strategy and the principles of capital preservation and liquidity maximisation.

With regards to the interest rate risk, besides the overall risk appetite calculated via VaR (see 3.2 Risk management methodology), Eurex Clearing's investments are constrained by an interest rate risk and stop-loss limit system. When calculating interest rate risk, Eurex Clearing applies a parallel shift of the yield curve of min. 1% and assesses the resulting effect on the net present value of the portfolio on a daily basis (see 6.4.2 for details).

The stop-loss limit defines the negative fair value of a portfolio upon which a prompt review of the portfolio shall be conducted and actions shall be implemented to reduce the interest rate risk position to cut further losses. The unrealised loss is calculated daily based on the yield difference between position yield and market yield over the remaining life to maturity.

6.2 Monitoring and reporting

Eurex Clearing controls its liquidity via the liquidity management function. Trades are executed by Treasury Front Office, if required with the assistance of a third party.

Settlement and market risk control is performed by Treasury Back/ Middle Office, a function independent of the Treasury Front Office department. Treasury Back/ Middle Office is responsible for monitoring compliance with limits and issues monthly reports to Executive Management and to Enterprise Risk Management. Limit excesses are monitored daily and are reported immediately to Executive Management, ERM and Treasury.

6.3 Specific disclosures for market risk

Market risk stemming from foreign exchange transactions

Eurex Clearing places cash in the same currency in which clearing members cash contributions are denominated, restricting FX risk to the net interest earned. In addition, Eurex Clearing may enter into FX transactions to hedge or close out open positions stemming from its corporate business (other than EUR).

Despite the limited materiality, FX risks are regularly monitored and managed.

Eurex Clearing may enter into FX transactions to hedge or close out open positions stemming from its CCP business, including the physical delivery of FX Futures and Options in its FX Continuous Linked Settlement (FX CLS) service offering. If Eurex Clearing holds a FX position because a clearing member has not fulfilled its obligation to settle a CCP transaction, Treasury may enter into FX transactions to close that position.

Foreign exchange risk measurement

As member cash deposits in foreign currencies are in principle placed in the same currency, open positions in non-EUR currencies may exist to a small extent due to interest margin earned as well as expenses or income in foreign currencies. These small positions are captured in the general ledger and reported to Treasury.

6.4 Specific disclosures on interest rate risk on positions not included in the trading book

6.4.1 Allocation of interest rate risk positions

Eurex Clearing allocates all interest rate risk sensitive positions to the non-trading book. The same is true in the exceptional case of derivative contracts.

6.4.2 Interest rate risk situation of Eurex Clearing

Eurex Clearing identifies and measures interest rate risk on a regular basis.

Quarterly, starting from 2018-Q4 in accordance with the BaFin circular 09/2018 (BA)²³ Eurex Clearing computes and reports to BaFin the level of interest rate risk in its banking book (IRRBB) and demonstrates that its regulatory capital is sufficient to withstand an unexpected parallel shift in the interest rate yield curve of ± 200 basis points. If this standard shock results in a potential decline of the net present value of its interest rate sensitive positions by more than 20% of the regulatory capital, the Supervisory Authority will take appropriate actions. As of 31 December 2018 Eurex Clearing has not reached this threshold by far.

Interest rate risk on positions not included in the trading book	31 December 2018	31 December 2017
IRR as percentage of own funds	0,75%	0,08%
Threshold of reporting to BaFin	20,00%	20,00%

Table 6-1 Interest rate risk on positions in the banking book as percentage of own funds

According to the BaFin General Administrative Act²⁴ as of the 31 December 2016 Eurex Clearing calculates the IRRBB capital requirement. Basis for this is the IRRBB in relation to the total risk exposure amount. If the highest negative change in the net present value of the exposures held in the banking book exceeds 0.75% of the total risk exposure amount an additional capital add-on has to be considered.

In the following table the interest risk in the banking book (IRRBB) as percentage of the total risk exposure amount is shown:

Interest rate risk in the banking book (IRRBB)	31 December 2018 (€' 000)	31 December 2017 (€' 000)
IRRBB	3,848	358
Total risk exposure amount	1,266,679	934,917
IRRBB as percentage of total risk exposure amount	0.30%	0.04%

Table 6-2 Interest rate risk on positions in the banking book as percentage of total risk exposure amount

Additionally, Eurex Clearing has established an internal interest rate risk limit system (IRR). IRR is calculated on the basis of the net present value of a predefined yield change which depends on the remaining time to next re-pricing (for floaters) and maturity (for fixed rate). For positions with a remaining time to maturity or coupon reset (re-pricing) of less than or equal to a year a 1% yield parameter is used, for securities with maturities of one year onwards a 2% yield parameter is used.

²³ BaFin Circular (BA) -Interest rate risk in the Banking book: https://www.bafin.de/SharedDocs/Veroeffentlichungen/DE/Rundschreiben/2018/rs_1809_zinsaenderungsrisiken_anlagebuch

²⁴ BaFin General Administrative Act BA 55-FR 2232-2016/0001: Capital requirements resulting from the interest rate in the banking book: https://www.bafin.de/SharedDocs/Veroeffentlichungen/DE/Aufsichtsrecht/Verfuegung/vf_161223_allgvfg_zinsaenderungsrisiko.html

7. Management of liquidity risk

7.1 Strategy, process, structure and organisation

Eurex Clearing measures, monitors, and manages liquidity risk in accordance and compliance with CRR Articles 411 et seq. as well as Articles 43 (Other financial resources) and 44 (Liquidity risk controls) EMIR and Articles 32 to 34 (Liquidity risk controls) of Delegated Regulation (EU) No 153/2013. Eurex Clearing implemented aforementioned regulatory standards in its Liquidity Risk Management Framework. The robust framework is documented in Eurex Clearing's Liquidity Risk Management Policy. The Eurex Clearing Executive Board and Eurex Clearing Supervisory Board approve the "Liquidity Risk Management Policy" after consultation of the Risk Committee on a regular basis, at least annually.

Eurex Clearing's Liquidity Risk Management Framework is designed to ensure that Eurex Clearing is able to effect payment and settlement obligations in all relevant currencies as they fall due. Specifically, the Liquidity Risk Management Framework addresses:

- Liquidity risk management and methodology;
- Liquidity risk concentration;
- Liquidity stress testing;
- Monitoring of liquidity risk;
- Contingency Funding Plan;
- Reporting.

Liquidity risk is defined as the risk of loss arising from the inability to meet all legitimate demands for funds from external parties. In Eurex Clearing's Liquidity Risk Management Framework, the three main sources of liquidity risk have been identified:

- Repayment of member cash deposits
CMs are able to swap cash collateral for non-cash collateral at any time. Liquidity risk arises if cash to be repaid exceeds the amount of available liquidity.
- Pre-financing activities
In its capacity as a clearing house, Eurex Clearing conducts pre-financing activities in order to ensure settlement efficiency of CCP transactions. In this context, securities purchases, cash settlement, variation margin and option premium payments may be pre-financed by the CCP. In principle, pre-financing is only performed intraday. In case a clearing member temporarily fails to pay, e.g. due to technical problems, pre-financed amounts would not return intraday.
- Payment obligations related to clearing member default
Financing needs may arise in case of the default of one or multiple clearing members.

Within Eurex Clearing, the liquidity management function is performed by Treasury. Treasury controls the liquid assets and ensures 1) to have access to and control over Eurex Clearing's liquid assets at all times, 2) diversification of the liquidity buffer and 3) the avoidance of an excessive currency mismatch. Moreover, Treasury monitors the Liquidity Coverage Ratio on

a daily basis and takes action if needed, i.e. maximising the amount of high quality liquid assets, to keep the ratio in compliance with the regulatory requirements.

7.2 Measurement

Eurex Clearing measures liquidity risk in order to maintain sufficient liquid resources to meet payment obligations on time, with a high degree of confidence and under extreme but plausible market conditions. In line with industry standards and regulatory requirements, Eurex Clearing applies a range of market scenarios including both market disruption and idiosyncratic components. Eurex Clearing aims to ensure sufficient liquid resources at all times in each of the described liquidity stress test scenarios.

7.2.1 “Cover-2”

In line with the so-called “Cover-2” requirement in EMIR, Eurex Clearing maintains sufficient financial resources to cover the liquidity risk generated by the default of the two clearing members to which it has the largest exposures. Additionally, Eurex Clearing monitors the “Cover-2” requirement from the default of entities in the same corporate group as well as settlement institutions.

7.2.2 Late funding

A member may face difficulties to provide funding to Eurex Clearing due to technical errors. In such an event, the fulfilment of the respective payment obligations by Eurex Clearing ensures smooth settlement processing without impairing the wider market. The scenario assumes a member not functional for a limited period of time. The resulting short-term liquidity requirement of the largest clearing member, corporate group as well as settlement institution is monitored.

7.2.3 Idiosyncratic stress tests

In this scenario, it is assumed that the stress event is Deutsche Börse Group specific. This could lead to a downgrade of Deutsche Börse AG and, thus, to increased financing costs. It is assumed that the downgrade is more than two notches in severity, leading to a reduction in member cash deposits and delays in cash inflows.

7.2.4 Market disruption stress tests

The scenario focuses on turmoil on the markets, resulting in a member default. Additionally, it is assumed that marketable securities cannot be sold on time and only at lower prices than the fair value due to high volatility or fire sales of securities.

7.2.5 Market disruption / idiosyncratic stress tests

In order to detect potential liquidity shortfalls at an early state, Eurex Clearing combines all risk components in one scenarios such that all aspects of liquidity risk are taken into account. The combined scenario is more conservative and leads to higher liquidity requirements.

7.2.6 Reverse stress tests

In classical stress testing, scenarios are simulated and their impact on risk measures is analysed. In contrast, reverse stress testing is used to analyse the severity of scenarios that would consume Eurex Clearing’s entire liquidity. The reverse stress test scenario, hence ap-

plies ultimate stress levels as in the market disruption / idiosyncratic scenario and additionally assumes a reduction in member cash deposits such that Eurex Clearing's liquid financial resources are fully consumed.

The Liquidity Risk Management Framework of Eurex Clearing covers all currencies used by Eurex Clearing, however, for Eurex Clearing Euro is the most important currency. The liquidity requirement in the "Cover-2" and Late Funding scenario is determined for all trading- and settlement currencies Eurex Clearing provides services in. All additional risk components are calculated in clearing currencies, i.e. EUR, CHF and GBP as well as USD based on historical data.

Liquidity risks in non-clearing currencies can be considered immaterial due to lower settlement volumes and since collateral is invested in the currency in which it was posted by the Clearing Members. However, if the volumes of the currencies settled by Eurex Clearing will become more material, Eurex Clearing may convert available liquidity into a required currency through foreign exchange transactions. The currencies settled by Eurex Clearing are major trading currencies with high market liquidity. In case of a disruption in the FX market. Eurex Clearing has furthermore the right to settle payment obligations in an alternative currency.

As of 31 December 2018 sufficient liquidity was available to cover all stress tests scenarios. In particular, Eurex Clearing's available liquidity sources exceeded the potential liquidity need caused by the simultaneous default of the two largest clearing members significantly.

All liquidity stress test results are regularly submitted to the Executive Board. The stress test model is reviewed regularly and revised if needed, taking into account changed macroeconomic and company specific conditions. Major enhancements or changes of the stress test models are subject to Supervisory Board approval and consultation of the Risk Committee.

7.3 Liquidity risk mitigation

7.3.1 Key Liquidity Indicators

7.3.1.1 Liquidity indicators for liquidity risk monitoring stemming from business-as-usual

Eurex Clearing monitors and manages a liquidity buffer in order to face potential liquidity risks stemming from pre-financing activities in the day-to-day business.

In reference to CEBS "Guidelines on Liquidity Buffers & Survival Periods" (9 December 2009) a liquidity buffer is defined as the excess liquidity available to be used in liquidity stress situations within a given short-term period.

The liquidity buffer is based on Eurex Clearing's daily pre-financing activities in order to ensure the smooth operation of settlement processes at all times. The size of the liquidity buffer shall not fall below the historically experienced pre-financing obligations and is to be reassessed at least quarterly.

For Eurex Clearing, a contingency situation could be caused by high intraday cash outflows not being refunded during the day, potentially resulting in an overnight liquidity shortage. A limit of 10% remaining buffer capacity shall be maintained as stipulated in the Liquidity Risk Management Policy. In order to detect critical trends in advance, an early warning trigger (remaining buffer capacity of 40%) has been established to detect potential liquidity shortfalls in advance. Daily, Eurex Clearing Treasury compares the available liquidity buffer to the defined limits. If the early warning trigger for the liquidity buffer is breached, the Head of Treasury as well as the Chief Risk Officer are informed on a daily basis until the indicator returns to a level above the defined threshold. A usage of 90% of the liquidity buffer needs

to be reported daily to the Executive Board.

7.3.1.2 Liquidity Indicators for liquidity risk monitoring stemming from a clearing member default

In compliance with EMIR (Article 44), Eurex Clearing needs to maintain sufficient financial resources taking into account the liquidity risk generated by the default of the two CMs including all affiliates to which it has the largest exposures. The “Cover-2” liquidity indicator is defined as a recovery indicator in Eurex Clearing’s recovery plan. As to prevent a breach in the threshold and identify potential liquidity shortfalls in advance, Eurex Clearing has introduced an early warning trigger (liquidity required to cover default of two largest CMs +40%) as well as a recovery limit (liquidity required to cover default of two largest CMs +10%).

Both limits are monitored by Eurex Clearing Treasury on a daily basis. In the case of a limit breach, the communication process as stipulated in Eurex Clearing’s recovery plan is initiated. Depending on the severity of the breach, measures to improve the liquidity profile of ECAG as described in the next chapter are taken.

7.3.2 Options to strengthen the liquidity position

Eurex Clearing has a wide range of measures in place which may be initiated in case of a deterioration in the CCP’s liquidity profile. The indicators described in chapter **Fehler! Verweisquelle konnte nicht gefunden werden.** are monitored on a daily basis. In case of a limit breach, one or several measures to strengthen the liquidity position will be invoked. Measures identified include:

- Intragroup funding;
- Increase of committed standby facilities;
- Lock-in or replacement of eligible margin assets
- Mobilisation of Eurex Clearing’s securities from Treasury activities;

and are defined in detail in Eurex Clearing’s recovery plan.

7.4 Monitoring and reporting

Eurex Clearing’s liquidity risk exposure and breaches of limits are monitored and reported by the Treasury Back-/Middle Office as well as CCP Risk Management. Reports are performed daily, weekly and monthly to Eurex Clearing’s Executive Board, the Chief Risk Officer and Head of Treasury.

7.5 Liquidity Coverage Ratio

With the implementation of the CRR the Liquidity Coverage Ratio (LCR) was introduced in 2014. As of 1st January 2017 the LCR has reached its full implementation and the minimum ratio has been set to 100%.

Institutions need to hold a liquidity buffer of high quality liquid assets (HQLA) to cover their net cash outflows in stressed conditions over a thirty-day period. The HQLA at Eurex Clearing consists of deposits held with central banks, securities received in reverse repo transactions and the investment portfolio. As at 31 December 2018 Eurex Clearing had a LCR of 102% (2017: 101%).

	31 December 2018	31 December 2017
Liquidity Coverage Ratio	101.71%	101.17%

Table 7-1 Liquidity Coverage Ratio

8. Capital structure, Capital Ratio and Leverage Ratio

8.1 Capital components

8.1.1 Overview

The following table summarises the total amount of Eurex Clearing regulatory capital:

		31 December 2018 (€' 000)	31 December 2017 (€' 000)
Tier 1	Eligible Capital		
	Paid up capital	25,000	25,000
	Share premium	0	0
	Eligible Reserves		
	Reserves	489,813	439,813
	Interim profits	0	0
	Deductions	0	0
Tier 2	Core additional own funds		
	Revaluation reserves	0	0
	Subordinated Loan Capital	0	0
	Fixed-term cumulative	0	0
	Deductions	0	0
Eligible own funds		514,813	464,813

Table 8-1 Regulatory capital components

Tier 1 capital represents the eligible own funds of Eurex Clearing and consists only of subscribed capital and reserves.

The following subsections disclose the information as required by Article 437 paragraph 1 CRR and details set out in Commission Implementing Regulation (EU) No 1423/2013²⁵.

²⁵ Implementing Regulation (EU) No 1423/2013:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:355:0060:0088:EN:PDF>

8.1.2 Reconciliation of own funds items to audited financial statements

A full reconciliation of own funds to audited financial statements pursuant to point (a) of Article 437 paragraph 1 CRR has to be applied by institutions as laid out in the Implementing Regulation (EU) No 1423/2013. The balance sheet reconciliation for Eurex Clearing is shown in Table 8-2.

Balance Sheet Reconciliation	31 December 2018 (€' 000)	31 December 2017 (€' 000)
Own Funds elements in the Annual Financial Statements		
Subscribed Capital	25,000	25,000
Share premium	0	0
Capital Reserve	480,313	430,313
Legal Reserve	2,500	2,500
Other reserves and retained earnings	7,000	7,000
Total Own Funds Elements in Audited Financial Statements	514,813	464,813
Profits allocated to legal or other reserves with the approval of financial statements (i.e. after reporting of Own Funds)	0	0
Eligible Capital (CET1) before regulatory adjustments	514,813	464,813
Regulatory adjustments	0	0
Deduction other intangible assets	0	0
Other CET 1 capital adjustments	0	0
Common Equity Tier 1 Capital/Total Eligible Own Funds	514,813	464,813

Table 8-2 Balance Sheet Reconciliation

8.1.3 Description of the main features of capital instruments

Disclosures under point (b) of Article 437 CRR are shown in the next tables for Eurex Clearing in line with the disclosure templates set out in the Implementing Regulation (EU) No 1423/2013.

Capital Instruments' main features ¹	
Features	Instrument
1 Issuer	Eurex Clearing AG
2 Unique identifier (e.g. ISIN, etc.)	N/A
3 Governing law(s) of the instrument	German Stock Corporation Act (AktG)
Regulatory treatment	
4 Transitional CRR rules	Common Equity Tier 1
5 Post-transitional CRR rules	Common Equity Tier 1
6 Eligible at solo/ (sub-)consolidated/ solo & (sub-)consolidated	Solo
7 Instrument type (types to be specified by each jurisdiction)	Ordinary Shares
8 Amount recognised in regulatory capital (currency in million, as of most recent reporting date)	€ 25 Mn
9 Nominal amount of instrument (in million, in currency of issuance)	€ 25 Mn
9a Issue price	€ 25 Mn
9b Redemption price	N/A
10 Accounting classification	Shareholders' equity
11 Original date of issuance	09/03/1998
12 Perpetual or dated	perpetual
13 Original maturity date	N/A
14 Issuer call subject to prior supervisory approval	No
15 Optional call date, contingent call dates and redemption amount	N/A
16 Subsequent call dates, if applicable	N/A
Coupons/dividends	
17 Fixed or floating dividend/coupon	N/A
18 Coupon rate and any related index	N/A
19 Existence of a dividend stopper	N/A
20a Fully discretionary, partially discretionary or mandatory (in terms of timing)	N/A
20b Fully discretionary, partially discretionary or mandatory (in terms of amount)	N/A
21 Existence of step up or other incentive to redeem	No
22 Noncumulative or cumulative	Noncumulative
23 Convertible or non-convertible	Nonconvertible
24 If convertible, conversion trigger(s)	N/A
25 If convertible, fully or partially	N/A
26 If convertible, conversion rate	N/A
27 If convertible, mandatory or optional conversion	N/A
28 If convertible, specify instrument type convertible into	N/A
29 If convertible, specify issuer of instrument it converts into	N/A
30 Write-down features	No
31 If write-down, write-down trigger(s)	N/A
32 If write-down, full or partial	N/A
33 If write-down, permanent or temporary	N/A
34 If temporary write-down, description of write-up mechanism	N/A
35 Position in subordination hierarchy in liquidation (specify instrument type immediately senior to instrument)	N/A
36 Non-compliant transitioned features	No
37 If yes, specify non-compliant features	N/A

⁽¹⁾ 'N/A' inserted if the question is not applicable

Table 8-3 Capital Instruments of Eurex Clearing

8.1.4 Disclosure of additional information during the transitional period

	(A) Amounts at 31.12.2018 (I'000)	Regulation (EU) No. 575/2013 Article reference	(C) Amounts subject to pre-regulation (EU) No. 575/2013 treatment or prescribed residual amount of Regulation (EU) No. 575/2013 (I'000)
Common Equity Tier 1 capital: instruments and reserves			
1 Capital Instruments and Share premium	25,000	26 (1), 27, 28, 29, EBA list 26 (3)	
of which: Subscribed capital	25,000	EBA list 26 (3)	
of which: Share premium	0	EBA list 26 (3)	
2 Retained Earnings	9,500	26 (1) (c)	
3 Accumulated other comprehensive income (and other reserves, to include unrealised gains and losses under the applicable accounting standards)	480,313	26 (1)	
3a Funds for general banking risk	0	26 (1) (f)	
4 Amount of qualifying items referred to in Article 484 (3) and the related share premium accounts subject to phase out from CET1	0	486 (2)	
Public sector capital injections grandfathered until 1 January 2018	0	483 (2)	
5 Minority interests (amount allowed in consolidated CET1)	0	84, 479, 480	
5a Independently reviewed interim profits net of any foreseeable charge or dividend	0	26 (2)	
6 Common Equity Tier 1 (CET1) capital before regulatory adjustments	514,813		
Common Equity Tier 1 (CET1) capital: regulatory adjustments			
8 Intangible assets (net of related tax liability) (negative amount)	0	36 (1) (b), 37, 472 (4)	
26 Regulatory adjustments applied to Common Equity Tier 1 in respect of amounts subject to pre-CRR treatment	0		
26b Amount to be deducted from or added to Common Equity Tier 1 capital with regard to additional filters and deductions required pre-CRR	0	481	
of which: Intangible assets	0		
27 Qualifying AT1 deductions that exceeds the AT1 capital of the institution (negative amount)	0	36 (1) (i)	
28 Total regulatory adjustments to Common Equity Tier 1 (CET1)	0		
29 Common Equity Tier 1 (CET1) capital	514,813		
Additional Tier 1 (AT1) capital: instruments			
36 Additional Tier 1 (AT1) capital before regulatory adjustments	0		
Additional Tier 1 Capital (CET1) capital: regulatory adjustments			
41 Regulatory adjustments applied to additional tier 1 capital in respect of amounts subject to pre-CRR treatment subject to phase out as prescribed in Regulation (EU) No 575/2013 (i.e. CRR residual amounts)	0		
41a Residual amounts deducted from Additional Tier 1 capital with regard to deduction from Common Equity Tier 1 capital during the transitional period pursuant to article 472 of Regulation (EU) No 575/2013	0	472, 472(3)(a), 472 (4), 472 (6), 472 (8) (a), 472 (9), 472 (10) (a), 472 (11) (a)	
of which: Intangible assets	0		
Excess of deduction from AT1 items over AT1 Capital (deducted in CET1)	0		
43 Total regulatory adjustments to Additional Tier 1 (AT1) capital	0		
44 Additional Tier 1 (AT1) capital	0		
45 Tier 1 capital (T1 = CET1 + AT1)	514,813		

Table 8-4 Own Funds details

8.2 Internal management of capital (Risk Bearing Capacity)

Available Risk Bearing Capacity (RBC) serves as a buffer to absorb potential (unexpected) losses resulting from the risks Eurex Clearing faces in its various activities. It is the internal view on the amount of capital and, therefore, the maximum loss that the Executive Management is willing to assume in one year, the tolerance in the light of the risk as well as the desired performance levels (risk appetite is determined in the risk strategy).

The concept regarding RBC is to ensure that emerging risks can be absorbed and thus to safeguard the continued existence (as going concerns) of Eurex Clearing.

The risk appetite corresponds to the amount of risk that Eurex Clearing is prepared to run to carry out its business. The risk appetite is set by the Executive Management per risk confidence level and risk type:

- For the 99% risk confidence level, the RBC is 10% of the planned EBITDA of the Eurex Clearing segment for the current business year;
- For the 99.98% risk confidence level, the RBC is defined as the regulatory own funds, which are updated according to the regulatory reporting frequency;
- The RBC for individual risk types (operational, financial, and business) is defined as a fraction of the overall RBC. Through this allocation, the members of the Executive Management ensure that risk is limited regarding each risk type.

The risk limits as defined above are monitored all in parallel and on a monthly basis. Eurex Clearing must comply with the regulations regarding the adequacy of regulatory own funds, the capital ratio is monitored in parallel.

8.3 Capital levels

8.3.1 Regulatory capital levels

Capital requirements for credit risk positions

The following table shows the capital requirements for credit risk exposures. Eurex Clearing uses the Standardised Approach to calculate the capital requirements. The reduction in Credit RWA largely reflects a reduction in unsecured placements.

Capital requirements for counterparty risk for portfolios calculated using the Credit Risk Standardised Approach (CRSA)		
	31 December 2018 (€' 000)	31 December 2017 (€' 000)
Central governments and central banks	0	0
Regional governments, local authorities and other public bodies	0	0
Institutions (banks)	300,704	687
Corporates	1,873	505
Other (including equity holding)	7,195	1,791
Total	309,772	2,982

Table 8-5 Capital requirements for credit risk

Capital requirements for market risk positions

To calculate the capital requirements for market risk exposures Eurex Clearing uses the standardised approach. The capital charge for interest rate risk in the banking book is calculated in accordance with the BaFin General Administrative Act²⁶, and is zero. The FX calculated capital amounts are showing in the following table:

Capital requirements for market risk		
	31 December 2018 (€' 000)	31 December 2017 (€' 000)
Foreign Exchange risk (total)	1,322	942

Table 8-6 Capital requirements for market risk

Capital requirements for operational risk positions

The capital requirements for operational risk according to the Basic Indicator Approach amounted to a capital requirement as follows. They are calculated via the relevant risk indicator. The relevant risk indicator is the average of gross income of the last three audited financial years plus an additional portion of the collected fees. As such, the average income of 2015 – 2017 is relevant for the capital requirement as of 31 December 2018, whereas the average income of 2014 – 2016 was relevant for the capital requirement as at 31 December 2017.

Capital requirements for operational risk calculated using the Basic Indicator Approach		
Basis of calculation	2015 - 2017	2014 - 2016
Relevant risk indicator according to Regulation (EU) No 575/2013 (as of 1 January 2014)	501,538	472,458
	31 December 2018 (€' 000)	31 December 2017 (€' 000)
Resulting capital requirement for the subsequent year (relevant as of the final approval of the last year of the underlying three year period)	75,231	70,869

Table 8-7 Capital requirements for operational risk

²⁶ BaFin General Administrative Act BA 55-FR 2232-2016/0001: Capital requirements resulting from the interest rate in the banking book: https://www.bafin.de/SharedDocs/Veroeffentlichungen/DE/Aufsichtsrecht/Verfuegung/vf_161223_allgvfg_zinsaenderungsrisiko.html

Total Capital

The above information may be summarised thus:

	31 December 2018 (€' 000)	31 December 2017 (€' 000)
Credit risk	24,782	2,982
Market risk	1,322	942
Operational risk	75,231	70,869
Total capital requirements	101,334	74,793

Table 8-8 Total Required Capital

8.3.2 Capital Ratio

On the basis of the above tables describing available and required capital, one can compute the capital ratio for Eurex Clearing. The ratio is given below. Note that the capital of Eurex Clearing consists exclusively of Core Tier One capital, and thus the CET1 ratio is the same as the total capital ratio.

Capital ratio		
Basis of calculation	31 December 2017	31 December 2017
Regulation (EU) No 575/2013	40.64%	35.96%

Table 8-9 Capital Ratios

8.4 Countercyclical capital buffer

The countercyclical capital buffer aims to ensure that banking sector capital requirements take account of the macro-financial environment in which banks operate. According to Delegated Regulation (EU) 2015/1555 on the disclosure of information in relation to the compliance of institutions with the requirement for a countercyclical buffer, institutions need to disclose the following tables:

31 December 2018 (€'000)		General credit exposures		Trading book exposure		Securitisation exposure		Own funds requirements				Own funds requirement weights	Countercyclical capital buffer rate
		Exposure value for SA	Exposure value for IRB	Sum of long and short position of trading book	Value of trading book exposure for internal models	Exposure value for SA	Exposure value for IRB	Of which: General credit exposures	Of which: Trading book exposures	Of which: Securitisation exposures	Total		
		010	020	030	040	050	060	070	080	090	100	110	120
010	Breakdown by country												
	Country: Germany	7,938	0	0	0	0	0	644	0	0	644	88.78	0
	Country: Belgium	10	0	0	0	0	0	1	0	0	1	0.12	0
	Country: Switzerland	15	0	0	0	0	0	1	0	0	1	0.16	0
	Country: Czech Republic	0	0	0	0	0	0	0	0	0	0	0.00	0
	Country: Great Britain	829	0	0	0	0	0	66	0	0	66	9.15	0
	Country: Korea, Rep.	163	0	0	0	0	0	13	0	0	13	1.80	0
	Total	8,956	0	0	0	0	0	725	0	0	725	100.00	0

Table 8-10 Geographical distribution of credit exposures relevant for the calculation of the countercyclical capital buffer

		31 December 2018 (€'000)
010	Total risk exposure	1,266,679
020	Institution specific countercyclical buffer rate	0.0915
030	Institution specific countercyclical buffer requirement	1,159

Table 8-11 Amount of institution-specific countercyclical capital buffer

8.5 Leverage Ratio

The Leverage Ratio as a binding minimum ratio could become potentially mandatory as of 2021 or later. Nevertheless, Delegated Regulation on disclosure of the Leverage Ratio (EU) No 1423/2013 requires disclosure of detailed information, which is shown in the following tables:

	31 December 2018 (€' 000)	31 December 2017 (€' 000)
Total consolidated assets as per published financial statements	26,090,332	27,272,381
Adjustment for investments in banking, financial, insurance or commercial entities that are consolidated for accounting purposes but outside the scope of regulatory consolidation	0	0
Adjustment for fiduciary assets recognised on the balance sheet pursuant to the operative accounting framework but excluded from the Leverage Ratio exposure measure	-107,951	-77,124
Adjustments for derivative financial instruments	0	0
Adjustment for securities financing transactions (ie repos and similar secured lending)	0	0
Adjustment for off-balance sheet items (ie conversion to credit equivalent amounts of off-balance sheet exposures)	2,000	4,000
(Adjustment for intragroup exposures excluded from the Leverage Ratio total exposure measure in accordance with Article 429 (7) CRR)		0
(Adjustment for exposures excluded from the Leverage Ratio total exposure measure in accordance with Article 429 (14) CRR)		0
Other adjustments	-133,117	-110,071
Leverage Ratio exposure	25,851,264	27,089,186

Table 8-12 Summary reconciliation of accounting assets and Leverage Ratio exposures (LRSum)

CRR Leverage Ratio exposures	31 December 2018 (t' 000)	31 December 2017 (t' 000)
On-balance sheet exposures		
On-balance sheet items (excluding derivatives, SFTs and fiduciary assets, but including collateral)	25,849,264	27,085,186
(Asset amounts deducted in determining Tier 1 capital)	0	0
On-balance sheet exposures	25,849,264	27,085,186
Replacement cost associated with all derivatives transactions (ie net of eligible cash variation margin)	0	0
Add-on amounts for PFE associated with all derivatives transactions (mark-to-market method)	0	0
Gross-up for derivatives collateral provided where deducted from the balance sheet assets pursuant to the applicable accounting framework	0	0
(Deductions of receivables assets for cash variation margin provided in derivatives transactions)	0	0
(Exempted CCP leg of client-cleared trade exposures)	0	0
Adjusted effective notional amount of written credit derivatives	0	0
(Adjusted effective notional offsets and add-on deductions for written credit derivatives)	0	0
Total derivative exposures	0	0
Gross SFT assets (with no recognition of netting), after adjusting for sale accounting transactions	0	0
(Netted amounts of cash payables and cash receivables of gross SFT assets)	0	0
Counterparty credit risk exposure for SFT assets	0	0
Derogation for SFTs: Counterparty credit risk exposure in accordance with Articles 429b (4) and 222 CRR	0	0
Agent transaction exposures	0	0
(Exempted CCP leg of client-cleared SFT exposure)	0	0
Total securities financing transaction exposures	0	0
Off-balance sheet exposure at gross notional amount	2,000	4,000
(Adjustments for conversion to credit equivalent amounts)	0	0
Off-balance sheet items	2,000	4,000
(Intragroup exposures (solo basis) exempted in accordance with Article 429 (7) CRR (on and off balance sheet))	0	0
(Exposures exempted in accordance with Article 429 (14) CRR (on and off balance sheet))	0	0
Tier 1 capital	514,813	364,813
Total exposures (sum of on-balance, derivative, SFT and off-balance exposures)	25,851,264	27,089,186
Leverage Ratio	1.99%	1.35%
Choice on transitional arrangements for the definition of the capital measure	Fully phased-in according to Article 493 (1)(a) CRR	Fully phased-in according to Article 493 (1)(a) CRR
Amount of derecognised fiduciary items in accordance with Article 429 (11) of Regulation (EU) No 575/2013	107,951	77,124

Table 8-13 Leverage Ratio common disclosure template (LRCom)

CRR Leverage Ratio exposures	31 December 2018 (€' 000)
Total on-balance sheet exposures (excluding derivatives, SFTs, and exempted exposures), of which:	25,849,264
Trading book exposures	0
Banking book exposures, of which:	25,849,264
Covered bonds	0
Exposures treated as sovereigns	24,294,545
Exposures to regional governments, MDB, international organisations and PSE not treated as sovereigns	0
Institutions	1,546,763
Secured by mortgages of immovable properties	0
Retail exposures	0
Corporate	873
Exposures in default	0
Other exposures (eg equity, securitisations, and other non-credit obligation assets)	7,082
	0

Table 8-14 Split-up of on balance sheet exposures (excluding derivatives, SFTs and exempted exposures; LRSpl)

31 December 2018	
Description of processes used to manage the risk of excessive leverage	ECAG as CCP has a highly volatile balance sheet volume depending on the clients' cash behaviour. The balance sheet varies sharply within short timeframes depending on the cash collateral supply. The cash received is reinvested in line with EMIR. Although this investment restriction leads to a short term investment tenor with low levels of credit and market risk this position affects the Leverage Ratio exposure measure to a high degree. Thus, a direct management of leverage is only feasible in a limited nature.
Description of the factors that had an impact on the Leverage Ratio during the period to which the disclosed Leverage Ratio refers	Beside the highly volatile Leverage Ratio exposure measure described above the Leverage ratio exposure measure at year-end shown in Table 8-12 was adjusted by 133,117 k€ due to different FX rates used for accounting and reporting purposes at year-end.

Table 8-15 Description of qualitative items (LRQua)

Due to ECAG's dedicated status authorised as CCP under EMIR the standard calculation rules for Leverage Ratio do not lead to useful information. If at all, a more adequate ratio can be calculated by (a) deducting ECAG's own contribution to the CCP default fund from Tier 1 capital and (b) deducting cash collaterals placed by clearing members (member cash deposits) from the Leverage Ratio exposure measure. The modified Leverage Ratio on this basis is derived as follows:

CRR Leverage Ratio exposures	31 December 2018 (€' 000)	
	Standard calculation	Modified calculation
Tier 1 capital	514,813	514,813
(a) contribution to the CCP default fund	-	-150,000
Adjusted Tier 1 capital	514,813	364,813
Leverage Ratio exposure	25,851,264	25,851,264
(b) member cash deposits	-	-23,673,926
Adjusted Leverage Ratio exposure	25,851,264	2,177,338
Leverage Ratio / Adjusted Leverage Ratio	1.99%	16.76%

Table 8-16 Leverage Ratio standard calculation and CCP modified calculation

9. Governance Arrangements

General Arrangements

Eurex Clearing AG is a stock corporation incorporated in Germany. The German Stock Corporation Act (Aktengesetz – AktG) requires such a company to set up an Executive Board and a Supervisory Board (§§ 76 et seq. AktG).

Eurex Clearing maintains a comprehensive suitability policy. The objective of this policy is to ensure that members of the Executive Board, the members of the Supervisory Board and key function holders of the company are suitable in terms of reputation, experience and governance criteria, as stipulated in the joint ESMA and EBA 'Guidelines on the assessment of the suitability of members of the management body and key function holders under Directive 2013/36/EU and Directive 2014/65/EU' (EBA/GL/2017/12/ESMA71-99-598). Eurex Clearing follows a stringent recruitment policy for the selection of members of the Supervisory Board and the Executive Board as described below.

Supervisory Board

Eurex Clearing has established a Supervisory Board to supervise the Executive Board, in accordance with the mandatory provisions of AktG. The members of the Supervisory Board of Eurex Clearing are elected by the shareholders. This in principle takes place during the annual meeting of shareholders. The members are generally elected for a term of five years.

In general, the Supervisory Board consists of twelve members. According to EMIR (Article 27 paragraph 2), at least one third of the members of that Supervisory Board are independent (in the meaning of Article 2 paragraph 28 EMIR). As of 31 December 2018, the Supervisory Board consists of twelve members.

The Supervisory Board in its entirety must have the necessary skills, capabilities and experience to supervise and control the Executive Board of Eurex Clearing. In addition, the Supervisory Board must have:

- At least one member (i.e. the chairman of the audit committee) with expertise in the area of accounting and auditing;
- At least one member (i.e. one member of the compensation review committee) with expertise in the area of risk management and risk controlling in particular regarding the mechanism of the orientation of the remuneration system towards the overall readiness to assume risk and risk strategy (Gesamtrisikobereitschaft und -strategie) as well as towards the own funds (Eigenmittelausstattung) of Eurex Clearing.

According to § 25d (11) number 2 KWG the under-represented gender in the Supervisory Board has to be considered and the rules of limitation of mandates in accordance with § 25d (3) KWG have to be complied with. Under this definition, as of 31 December 2018, all members of the Supervisory Board complied with the rules regarding the limitation of mandates.

The Supervisory Board meets as often as business requires, but at least four meetings are scheduled each year, which generally take place every quarter.

The Supervisory Board has installed several committees composed of members of Supervisory Board. In the following the committees of Eurex Clearing are described:

According to § 25d (8) (9) KWG and following § 25d (10) KWG Eurex Clearing has installed an Audit and Risk Committee (ARC) which supports the Supervisory Board in its function to supervise in particular the adequacy and effectiveness of the risk management system, the compliance system as well as the internal control and auditing system, the reporting and accounting process and examination of the annual financial statements and the management

report. The ARC consists of three members of the Supervisory Board and meets at least four times a year.

In accordance to § 25d (12) KWG Eurex Clearing has established a Compensation Review Committee (CRC). The CRC supervises the integrity and the reasonableness of the remuneration system of the members of the Executive Board and of the employees, and in particular the appropriateness of the compensation of the head of the risk control function and of the compliance function as well as of such employees having a substantial influence on the overall risk profile of the enterprise with respect to the risk-, capital- and liquidity management.

In addition, the Supervisory Board of ECAG has installed a nomination committee according to § 25d (11) KWG. It supports the Supervisory Board in its duty to establish a policy on diversity and to assess the current and future members of the Executive Board and the Supervisory Board and the composition of both boards as a whole. Beside this the nomination committee promotes the underrepresented gender. The Supervisory Board has therefore agreed to have an adequate representation of women within the Board, i.e. 25 % of female representatives in relation to seven members¹ of the Supervisory Board until 2020. This target was met in 2018.

Executive Board

According to § 33 KWG the Executive Board must consist of at least two members. According to § 25a KWG and MaRisk certain functions and duties in several business areas have to be segregated up to the level of the Executive Board. In addition, all tasks have to be allocated in a clear manner to the responsible areas. Furthermore, the four-eyes principle as well as the role of a deputy should be determined. In order to fulfil the above mentioned organisational requirements and in the light of the systemic importance of Eurex Clearing the Executive Board is assumed to consist of not less than four members.

The Executive Board is inter alia responsible for the proper business organisation (in accordance with § 25c sentence 3 number 1 in connection with § 25a KWG). Provided that consensus is reached between all members of the Executive Board, the Executive Board establishes a business distribution plan which regulates the allocation of tasks between the board members in order to enable a more efficient management of the company.

Meetings of the Executive Board shall be held regularly; further details, including but not limited to the interval between the meetings, shall be determined by the chairperson. Meetings must take place if required for the well-being of Eurex Clearing. In fact, the Executive Board meets biweekly.

The members of the Executive Board must be professionally suitable and reliable for the management of Eurex Clearing and must be able to devote sufficient time to fulfil their tasks. Their professional competence requires sufficient theoretical and practical knowledge of the business of a CCP/ credit institution. In addition, the members of the Executive Board must have:

- An understanding of financial markets, especially within the regulatory framework;
- Experience with credit institutions;
- Sufficient practical and professional experience in managerial positions.

Beside these skills the rules of limitation of mandates in accordance with § 25c (2) KWG have to be complied with. Under this definition, as per 31 December 2018 all members of Eurex Clearing's Executive Board complied with the rules regarding the limitation of mandates.

¹ The five representatives of the Eurex Clearing Partnership Program are nominated at the discretion of the program banks and therefore not included in the gender diversity aspect.

Other bodies of the company

In 2013, Eurex Clearing established the EMIR Risk Committee in accordance with Article 28 EMIR. It is composed of two members of the Supervisory Board, and an equal number of representatives of clearing members and representatives of clients. It meets at least four times a year. The task of the committee is to advise the Supervisory Board and the Executive Board of Eurex Clearing on any arrangements that may impact the risk management of the CCP, such as significant changes in its risk model, the default procedures, the criteria for accepting clearing members, the clearing of new classes of instruments, or the outsourcing of functions.

Membership

The members of the above mentioned Boards and Committees are listed on the Eurex Clearing website at <http://www.eurexclearing.com/clearing-en/about-us/corporate-overview>

Appendix A. Abbreviations used in this document

AMA	Advanced Measurement Approach
BaFin	Bundesanstalt für Finanzdienstleistungsaufsicht (Federal Financial Supervisory Authority)
BCBS	Basel Committee on Banking Supervision
BIA	Basis Indicator Approach
CCP	Central Counterparty
CRD	Capital Requirements Directive
CRD IV	Capital Requirements Directive IV
CRM	Credit Risk Mitigation
CRR	Capital Requirements Regulation
CVA	Credit Valuation Adjustment
EBA	European Banking Authority
ECAI	External Credit Assessment Institution
ECAG	Eurex Clearing AG
ECB	European Central Bank
EEA	European Economic Area
EFSF	European Financial Stability Facility
EMIR	European Market Infrastructure Regulation
ESM	European Stability Mechanism
EU	European Union
FCB	Fixed Coupon Bonds
FIRB	Foundation Internal Rating Based Approach
FRN	Floating Rate Note
FX	Foreign Exchange
HGB	Handelsgesetzbuch (German Commercial Code)
HQLA	High quality liquid assets
ICAAP	Internal Capital Adequacy Assessment Process
ILAAP	Internal Liquidity Adequacy Assessment Process
IRB	Internal Rating Based Approaches
IRBA	Advanced Internal Rating Based Approach
IRR	Interest Rate Risk
KWG	Gesetz über das Kreditwesen (German Banking Act)
LGD	Loss Given Default
LSI	Less Significant Institution
MEIP	Minimum Export Insurance Premium
OECD	Organisation for Economic Cooperation and Development
PD	Probability of Default
RBC	Risk Bearing Capacity
RWA	Risk-weighted asset
SA	Standardised Approach (in connection with operational risk)
SI	Significant Institution
SIB	Systematically Important Bank
SREP	Supervisory Review and Evaluation Process

SRP	Supervisory Review Process
SSM	Single Supervisory Mechanism
STA	Standardised approach (in connection with credit risk)
VaR	Value-at-Risk



Contact

www.eurexclearing.com

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Address

Eurex Clearing AG
Mergenthalerallee 61
65760 Eschborn
Germany

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