clearstream | DEUTSCHE BÖRSE GROUP

Pillar III Disclosure Report of Clearstream Group 2017

Disclosures as of 31 December 2017

September 2018

Pillar III Disclosure Report of Clearstream Group 2017 - According to Part 8 of the Regulation (EU) No. 575/2013 (Capital Requirements Regulation [CRR]) in conjunction with § 26a German Banking Act (Kreditwesengesetz, KWG).

September 2018

Document number: 6475

Foreword

The purpose of the document is to fulfil 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 the CRD IV package as well as subsequent issued level 2 acts and guidelines.

Clearstream Holding AG (CH) has been classified as a financial holding company as defined in Article 4 paragraph 1 number 20 CRR and, together with its subordinated companies, notably Clearstream International, S.A., Luxembourg (CI), Clearstream Banking S.A., Luxembourg (CBL) and Clearstream Banking AG, Frankfurt/Main (CBF), forms a financial holding group under German law.

This Group (hereafter called Clearstream Group, CH-Group or Clearstream) is subject to consolidated supervision by the German Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin).

CH is, according to the German Banking Act (Kreditwesengesetz, KWG), the superordinated company of the regulatory Clearstream Group and therefore responsible for publishing this disclosure report in line with the provisions of Article 13 CRR in combination with further level 2 technical standard and additional EBA guidelines.

The figures for Clearstream Holding group follow the consolidation provisions set out in Article 18 to 24 of CRR in combination with the rules of § 10a (4) KWG and the German Generally Accepted Accounting Principles (German GAAP), based on the German Commercial Code (Handelsgesetzbuch, HGB). As all Clearstream companies - regardless of accounting and/or regulatory consolidation - are included in the consolidated annual accounts/annual report of the ultimate parent company Deutsche Börse AG, Frankfurt/Main (DBAG), CH is, according to § 291 of the HGB, exempted from the obligation to draw up consolidated statutory accounts. Consolidated financial figures are therefore set up for regulatory purposes only.

Clearstream Group fulfils the disclosure requirements detailed in Part 8 CRR and § 26a KWG as well as Art. 38 of the Luxembourg law of 5 April 1993, as amended (in the following Luxembourg Banking Act) which have transposed the disclosure requirements of Articles 89 to 96 CRD IV into German law and Luxembourg law as follows:

- A remuneration report that fulfils the requirements according to Article 450 CRR. That report is disclosed by year on the Clearstream Group website. www.clearstream.com/clearstream-en/about-clearstream/regulation--1-/compensation-information
- 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 Clearstream Group website. www.clearstream.com/clearstream-en/about-clearstream/regulation--1-/pillar-iii-disclosure-report
- 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).
- 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 statement of CH, as published on the German Federal Gazette website. www.bundesanzeiger.de

- Information about the Return on Assets (RoA) according to § 26a (1) sentence 4 KWG (implementation of Article 90 CRD IV) is included in the management report to the financial statement of CBF. CBL disclosed the RoA according to Art 38-4 of the Luxembourg Banking Act under note 9.3 in the notes to its financial statements. The financial statement of CBF is published on the German Federal Gazette website: www.bundesanzeiger.de. The financial statements of CBL are published the Luxembourg Trade and Companies Register (Registre de Commerce et des Sociétés).

In the following, we always refer to the respective laws in place during the reporting period (that is, 2017 and in principle as valid on 31 December 2017 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 Clearstream;
3. Risk management overview;
4. Management of operational risk;
5. Management of credit risk;
6. Management of market risk, including interest rate risk of exposures 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 clearstreamholding@clearstream.com.

Contents

Contents

Contents

Figures

1. Introduction

3. Risk management overview

Tables

8. Capital structure, capital ratio and Leverage Ratio

Contents

This page has intentionally been left blank.

1. Introduction

The information in this chapter is presented in the following sections:

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 CH and its subordinated entities. 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. In addition, "Basel III" includes a definition of regulatory capital, requirements for capital buffers, a 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 have been in force since 1 January 2014. The CRD IV directive itself has been transposed into German and Luxembourg national law.

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 a large number of such standards and the majority 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 the remuneration,

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 of the European Parliament and of the Council: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:176:0001:0337:EN:PDF.
3. Directive 2013/36/EU of the European Parliament and of the Council: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:176:0338:0436:EN:PDF.

strengthened corporate governance rules and, by means of CRR being valid directly in all EU (EEA) countries, a more or less fully 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 implemented, such as the Liquidity Coverage Ratio, the Net Stable Funding ratio and the Leverage Ratio, as well as the Total Loss-Absorbing Capacity (TLAC) issued by the Financial Stability Board (FSB). Some of the amendments, such as those rules on LCR and Leverage Ratio, have already been transposed into EU and national law.

1.1.2 Recent and ongoing developments of the banking framework

In March 2017, the BCBS published its finalised standards on the regulatory treatment of accounting provisions to capture the impact of the implementation of IFRS 9 with an interim approach and transitional arrangements[1]. IFRS 9 and the related regulatory treatment are applicable as of 1 January 2018 for banks using IFRS.

On 23 November 2016, the EU Commission issued a draft package amending mainly the CRD IV[2] and the CRR[3] 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)[4]) including the minimum requirement for own funds and eligible liabilities (MREL) and the Single Resolution Mechanism-Regulation (SRM-R[5]). The proposals are still in the legislative process and are not expected to be in place before 2019, and not applicable before 2021.

At the Basel level, the BCBS has proposed several amendments over the last years aiming to finalise the Basel III framework of 2011. In 2017, the BCBS issued additional standards and consultative documents, that are briefly described below.

The revised standards on Pillar III disclosure requirements were published by the BCBS in March 2017, and were, in general, applicable from 31 December 2017[6]. The standard combines already existing and newly introduced disclosure requirements in a consolidated and enhanced Pillar III framework.

In December 2017, the BCBS issued its package of further changes, which are supposed to finalise the Basel III framework[7]. In general, the finally introduced changes are applicable from 2022.

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

The future regulatory treatment of sovereign exposures is still in discussion. After an internal development of a potential future ruleset, the BCBS issued, in December 2017, a discussion paper on this topic[8]. The current framework treats certain high-quality sovereign exposures as risk-free from a regulatory perspective. The future treatment looks for a more differentiated view to capture at least the theoretical risk of a sovereign default.

1. Standards - Regulatory treatment of accounting provisions - interim approach and transitional arrangements: https://www.bis.org/bcbs/publ/d401.pdf
2. Proposed amendments to Directive 2013/36/EU: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016PC0854&from=EN
3. Proposed amendments to Regulation (EU) No 575/2013: http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52016PC0850&from=EN
4. BRRD: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016PC0852&from=EN
5. SRM-R: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016PC0851&from=EN
6. Pillar 3 disclosure requirements - consolidated and enhanced framework: http://www.bis.org/bcbs/publ/d400.pdf
7. Basel III: Finalising post-crisis reforms: https://www.bis.org/bcbs/publ/d424.pdf
8. Discussion paper on the regulatory treatment of sovereign exposures: https://www.bis.org/bcbs/publ/d425.pdf

In February and March 2018, the Basel Committee issued two consultative documents regarding disclosure requirements. The first consultative document constitutes an update to the current Pillar III framework[1] setting out additional disclosure requirements arising from the finalisation of Basel III (issued in December 2017). The second consultative document gives attention to the disclosure requirements regarding the amended regulatory treatment of accounting provisions[2].

In addition, the BCBS published, in March 2018, a consultative document on the revisions to the minimum capital requirements for market risk[3]. Besides some changes in course of monitoring the implementation and impact of the market risk standards from January 2016[4], the BCBS proposes to recalibrate the Basel II standardised approach for use by banks with less material market risk exposures to determine their capital requirements.

The European Commission regulatory proposal of November 2016 as well as the associated proposals of EU council and EU Parliament issued in May and June 2018 respectively do not include the elements of the December 2017 Basel III finalisation. The European Commission does not plan to implement any of the outstanding Basel III reforms in its current proposal even though it is still in negotiations within the legislative process. It is not currently known exactly when the EU will implement these Basel rules in the EU legislation, most likely as "CRD VI/ CRR III" package.

1. Consultative document: Pillar 3 disclosure requirements - updated framework: http://www.bis.org/bcbs/publ/d432.pdf
2. Consultative document: Pillar 3 disclosure requirements: regulatory treatment of accounting provisions: http://www.bis.org/bcbs/publ/d435.pdf
3. Consultative document: Revisions to the minimum capital requirements for market risk: http://www.bis.org/bcbs/publ/d436.pdf
4. Standards on minimum capital requirements for market risk: https://www.bis.org/bcbs/publ/d352.htm

1.2 The "Three Pillars" framework

1.2.1 Overview

The Basel banking framework contains three main pillars:

- Minimum quantitative (capital) requirements (Pillar I);
- Supervisory Review Process (Pillar II);
- Disclosure requirements to reach market discipline by transparency to the public (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. Figure 1-1 illustrates the "Three Pillars" model.

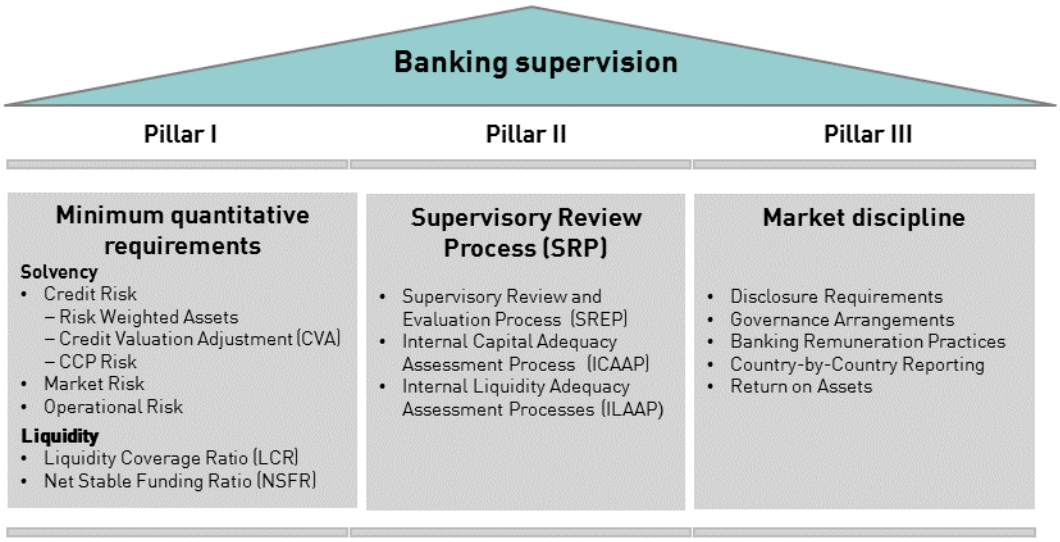


Figure 1-1. Three Pillars" model of Basel III / CRD IV

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, capital requirements for CVA risk and CCP counterparty risk. In addition to capital requirements Pillar I also covers the requirement of liquidity (LCR and NSFR). Furthermore, a mandatory Leverage Ratio (Pillar I ratio) is proposed to be introduced during CRR II, most likely applicable from 2021.

Pillar II, also called the Supervisory Review Process (SRP), comprises the Supervisory Review and Evaluation Process (SREP), the bank 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 are required to 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[1] which requires the calculation of

1. 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

additional capital needs in absence of an official decision of the competent authority during the SREP. As the BaFin is gradually issuing official decisions, 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 of 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 Country-by-Country reporting and the Return on Assets must be disclosed in order to increase transparency. Governance Arrangements including the structure within an institution and information regarding remuneration are further disclosures which must 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 with, amongst other things, the minimum capital requirements. Capital requirements are calculated for credit risk, including CVA charge and CCP counterparty risk, market risk and operational risk. The capital requirement for each risk category is 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 counterparty 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 must be multiplied by the required capital ratio of the related entity representing the total minimum own funds which is currently at least 8% (see Figure 1-2).

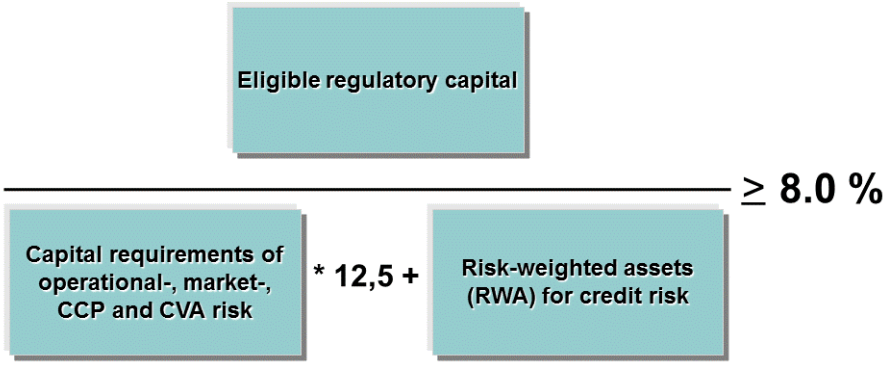


Figure 1-2. Calculation of the minimum capital requirements (capital ratio)

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) must be at least 4.5% of the total risk exposure amount.

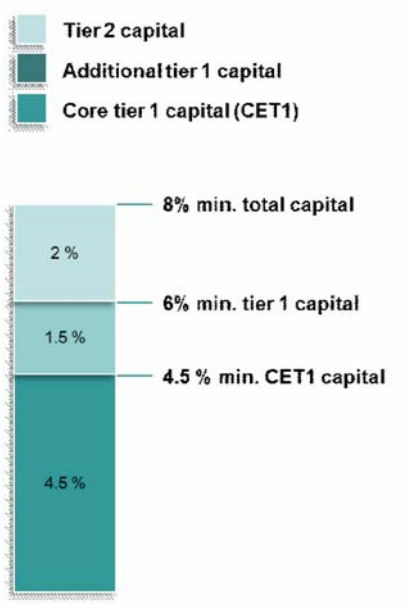


Figure 1-3. Quantitative adjustments in minimum capital requirements

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: G-SIB and O-SIB buffer. In the EU, CRD IV also requires the systemic risk buffer which is non cumulative (the highest applies) to the G-SII and O-SII 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 must be maintained in order to strengthen the capital basis of a bank during profitable times, but allowing for a temporarily underrun in case of an economic downturn of the bank or unexpected/sudden losses.

Similarly, the countercyclical capital buffer must be held available to ensure that banks accumulate a buffer, 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 will be 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 will be phased in. Nonetheless, the value will fluctuate over time depending on the economic situation.

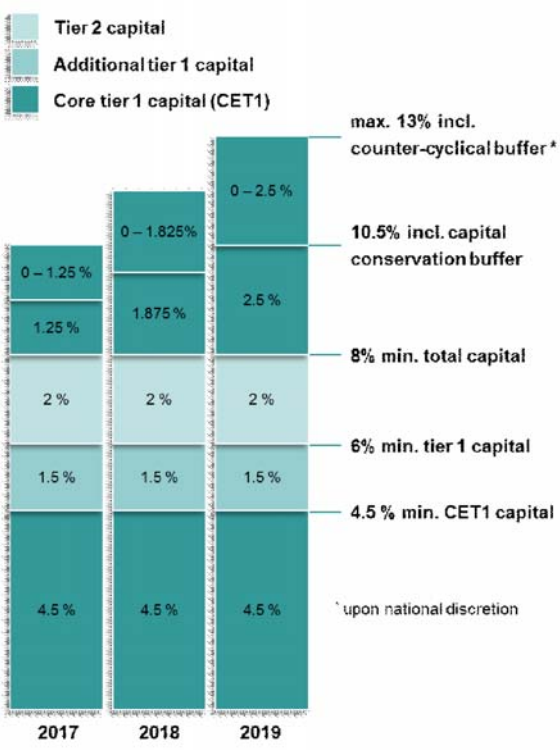


Figure 1-4. Overview of capital requirements and related transitional periods

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. In Luxembourg the capital conservation buffer has been set to 2.5% of the total risk exposure amount applicable as of 1 January 2014 (no phase-in).

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

Additionally, 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) must be maintained in the case that the competent authority requires them. For G-SIBs, the maximum increase is 3.5% of the total risk exposure amount while for O-SIBs the maximum increase is limited to 2.0% of the total risk exposure amount. The systemic risk buffer may also be imposed on isolated exposures 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.

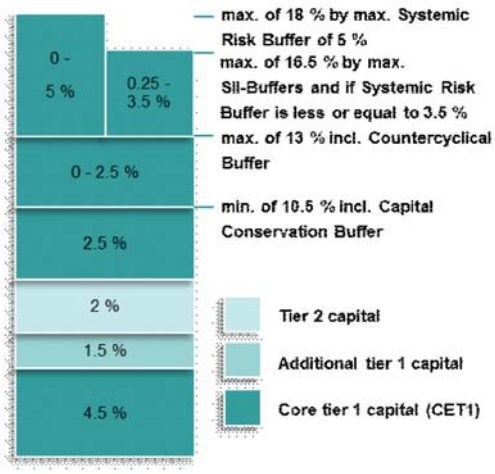


Figure 1-5. Overview of the total own funds requirements feasible as of 1 January 2017.

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 not 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 only.

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

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 Advanced Internal Rating Based Approach (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 approaches also make 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 (see Credit Risk Mitigation (CRM) on page 1-10). The exposure is multiplied by a regulatory risk weight, which in turn is based upon predefined regulatory asset classes and the counterparties' credit risk assessment. The rating used is either from a nominated external credit assessment institution (ECAI) or is 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 requirement decreases and the risk sensitivity increases with the complexity of the approach. Furthermore, the implementation and running efforts and costs also increase with complexity.

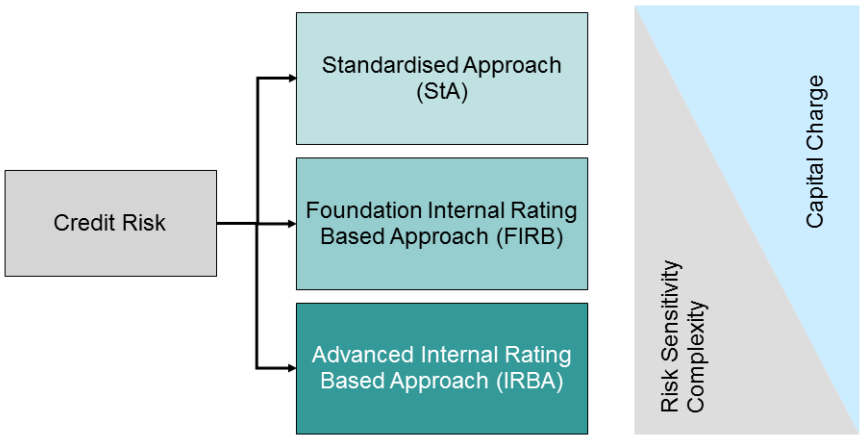


Figure 1-7. Possible calculation methods for the credit risk

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, corporates, institutions, securitisations, covered bonds, participations etc.) are in some cases fixed (for example, 0%, 20%, 50%, 100%.). In other cases they 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 for 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 the countries known as high income states, e.g. Germany, the OECD does not provide country risk classifications anymore).

In the EU, the risk weights for banks are in principle derived from their individual credit assessments (ratings). However, as a fallback solution it is also possible to derive the risk weight from the central government of the country of residence in the case where 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 explicit permission from the respective supervisor, are necessary to be allowed to use one of the Internal Rating Based Approaches for the calculation of the risk-weighted asset amounts.

Further developments of the advanced risk measurement systems must also 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 (PD[1]) estimates (Foundation Internal Rating Based Approach - FIRB); or
- For probability of default estimates, own estimates of loss given default (LGD[2]) 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 credit risk mitigation techniques, the institution must consider various operational and procedural requirements alongside the 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 to the financial collateral received 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 and mark ups, banks are required to 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 denominated in different currencies additional downwards adjustments are 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:

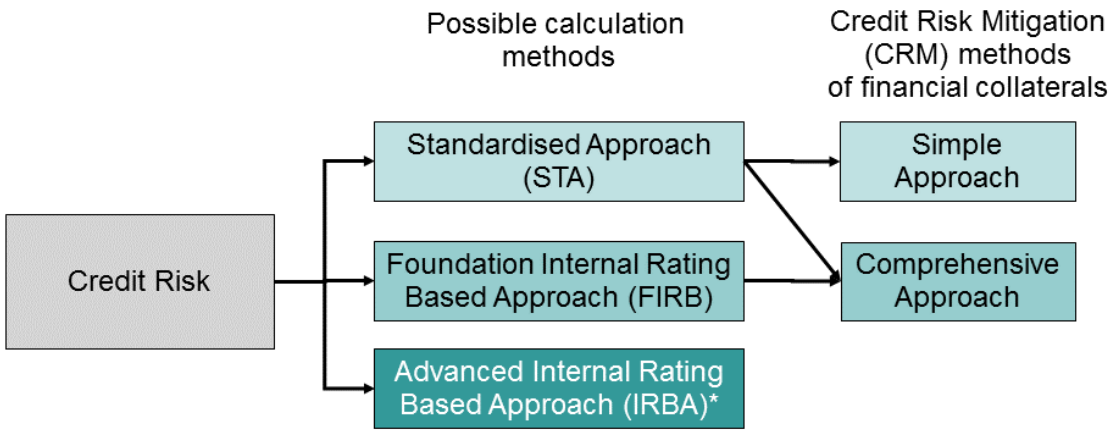
- Standard supervisory haircuts;
- Own-estimate haircuts, using own internal estimates of market price volatility.

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 considers many more financial collateral types with only a slight increase in the complexity of the calculation method.

1. PD: the probability (as a percentage) of default by a counterparty over a one-year period.
2. 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.

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



* Credit Risk Mitigation is considered 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 instituion.

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, other than for 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 if 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 derivatives securities financing and long-settlement transactions. This treatment may only be applied if the CCP in question is classified as a Qualified CCP. Under CRR, a CCP is considered to be a qualified CCP if it is granted an authorisation under EMIR (European Markets Infrastructure Regulation (EU) No 648/2012) 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 concerning client positions of a clearing member related to CCP business. As this is not relevant for our group companies, it is not detailed in this report. 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 recently 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, at some level, still 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.

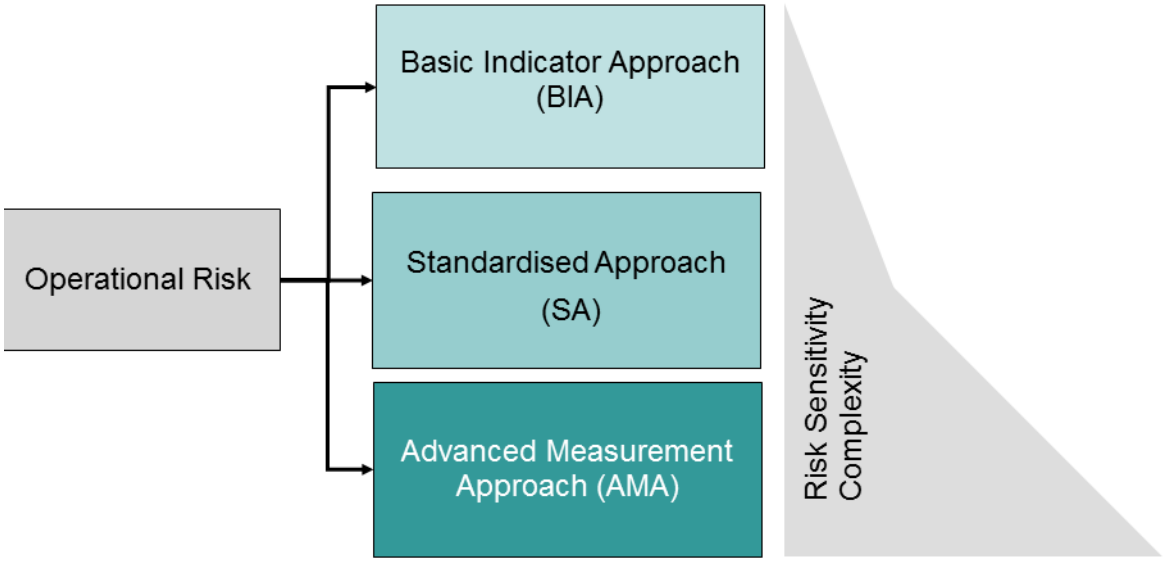


Figure 1-9. Possible calculation methods for the operational risk

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

First, is the **Basic Indicator Approach (BIA)**, in which a bank's operational risk is 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 is 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 Rating Based approaches, explicit permission as well as a detailed review of processes, estimates and documentation by the respective supervisory authority are 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 will 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 short-term trading intent and valued mark-to-market) and the non-trading book (typically held for a longer term or to generate permanent earnings), different requirements are attached accordingly.

Certain positions cannot be allocated by the nature of the position but need dedication to the appropriate book. 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, enhances 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 potential material IRRBB is met with a capital add-on. This resulting capital add-on is announced by official decision of the competent supervisors (BaFin and CSSD). In Germany, in absence of the supervisor's assessment and the official decision BaFin has put a Pillar I capital add-on rule in place that 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

Within the Basel framework, the Leverage Ratio is applicable as of 1 January 2018.

In the EU, the ratio is currently in discussion to be introduced in 2021. It shall be a binding minimum ratio of potentially 3%, as currently proposed by the European Commission in the draft package amending mainly the CRD IV and the CRR issued in November 2016[1].

1.2.2.3 Liquidity

In addition to 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 (LCR)

The LCR requires institutions to hold sufficient liquid assets (that is, 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 30 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 30 days under stressed conditions (inflows are limited to 75% of liquidity outflows). Under the Basel III rules, the LCR phasing-in rules foresee a start with 60% minimum ratio as of 1 January 2015 (after an observation period that started in 2013) and a full

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

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

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

Figure 1-11. Calculation of NSFR

The NSFR is defined by BCBS as the 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 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 from 2021 at the earliest, as it is part of the European Commission proposal amending CRR and CRD IV issued in November 2016.

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 of which risks are to be considered under an integrated risk approach:

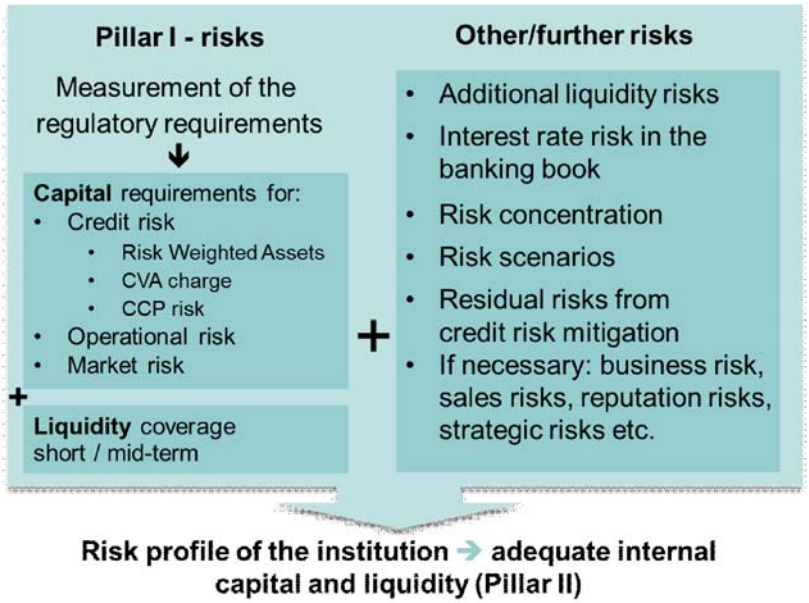


Figure 1-12. Integrated risk consideration (Pillar II) under Basel III

The bank's internal assessment comprises:

- internal procedures and strategies to identify all risks and to assess the necessary internal 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) to assess 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) that 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 and Luxembourg law respectively.

In addition, EBA has issued guidelines in order to ensure comparable and appropriate SREP methodologies and processes[1]. 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 as well as the above described ICAAP and ILAAP. As result of the SREP judgement, the authorities could impose quantitative capital, liquidity or other supervisory measures. In addition, the SREP is the basis for the annual institution-specific work-plan 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.

1. 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

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

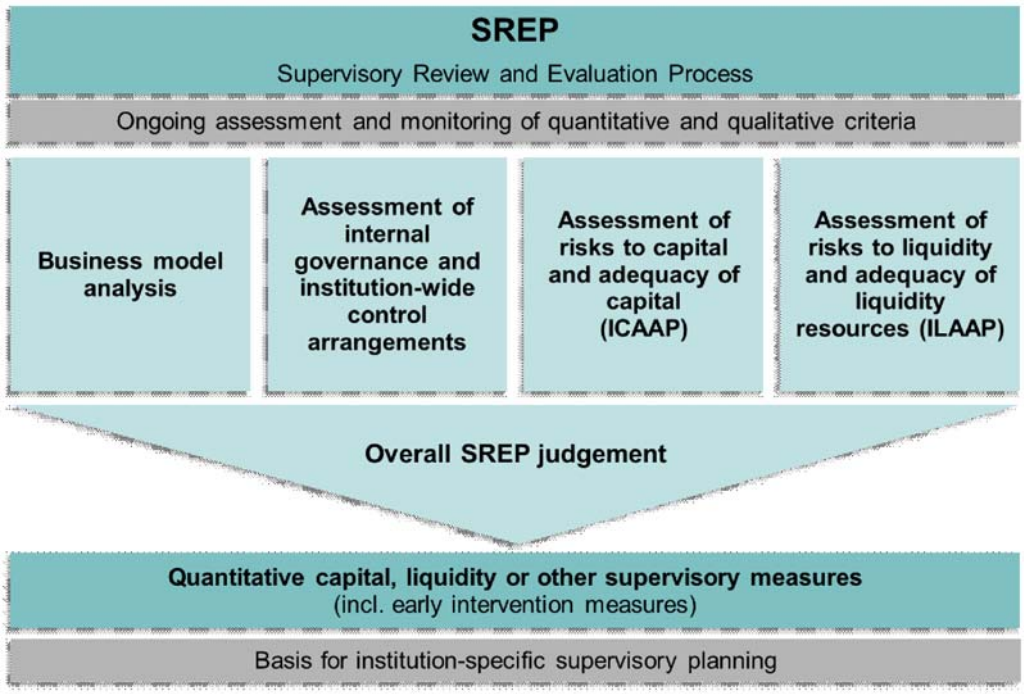


Figure 1-13. SREP methodology according to EBA guidelines

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 must be fulfilled from banks using internal methods.

In addition further information must be disclosed on corporate governance and governance arrangements and 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:

$$RoA = \frac{\text{Net Income}}{\text{Total Assets}}$$

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 Clearstream Group.

1.3 Information about Clearstream Group

1.3.1 Group structure

Clearstream Holding and its subsidiaries are fully owned by Deutsche Börse AG (DBAG) and are highly integrated into Deutsche Börse Group. The ownership and structure of the group at 31 December 2017 is shown in Figure 1-15 below.

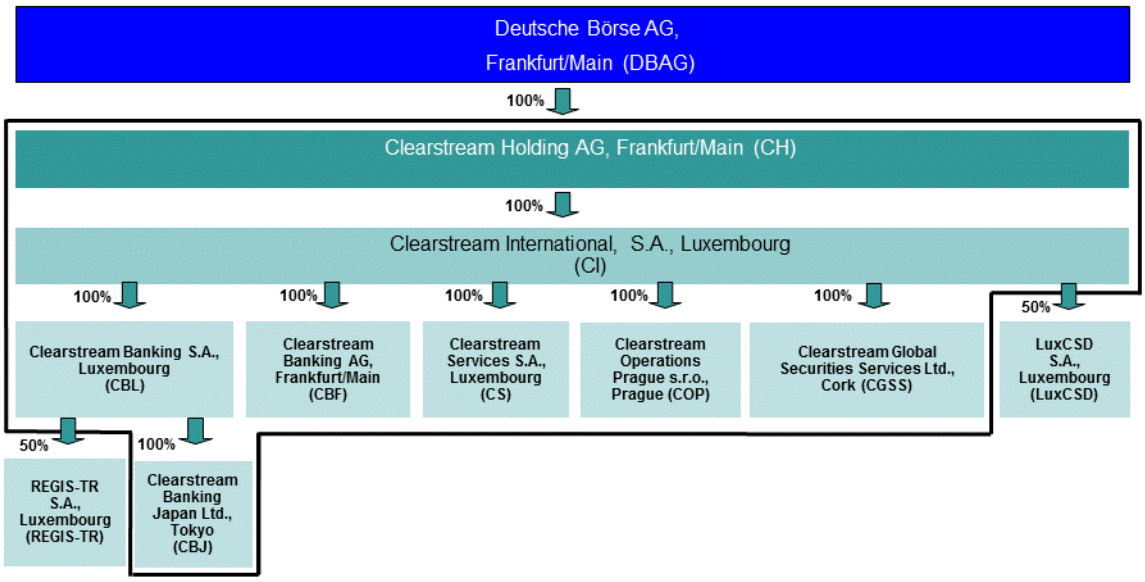


Figure 1-15. Structure and ownership of Clearstream Group

CH acts as a pure holding company for the shareholding in Clearstream International, S.A., Luxembourg (CI) and as a financial holding company under German banking law being recognised by BaFin as the superordinated company according to § 10a (1) sentence 2 KWG.

Among the subsidiaries of CI there are companies which are not included in the regulatory consolidation.

CI and its main subsidiaries act in the securities settlement and custody area. Clearstream Banking S.A., Luxembourg (CBL), acts as an International Central Securities Depository (ICSD) and Clearstream Banking AG, Frankfurt/Main (CBF), as the German Central Securities Depository (CSD).

Clearstream Banking S.A. operates branches in Singapore and London as well as a network of representative offices in Dubai, Hong Kong, New York, Tokyo, and Zurich.

CBL and CBF are both supported by Clearstream Services S.A., Luxembourg (CS), Clearstream Operations Prague s.r.o., Prague (COP), Clearstream Global Securities Services Ltd., Cork (CGSS) and CI, which perform supporting tasks like IT, development and operations, settlement and custody operations, central functions and other services.

Clearstream Banking Japan Ltd, Tokyo (CBJ), provides customer liaison in Japan and supports accessory business activities.

Clearstream International, S.A., Luxembourg, and Banque centrale du Luxembourg (BCL) jointly own LuxCSD S.A., which operates as a central securities depository for Luxembourg securities and connects the Grand Duchy of Luxembourg's financial industry to the TARGET2-Securities (T2S) platform. The company acts under the regulatory status as Professional of the Financial Sector (PSF) and as SSS (Securities Settlement System). It is supervised by the Commission de Surveillance du Secteur Financier (CSSF). LuxCSD S.A. is not classified as subsidiary of Clearstream International S.A. for

accounting and regulatory purposes. It is classified as a joint venture and is not consolidated in the regulatory group.

Clearstream Banking S.A., Luxembourg, and Sociedad de Géstion de los Sistemas de Registro, Compensación y Liquidación de Valores S.A.U., Madrid, Spain (Iberclear) jointly own REGIS-TR S.A., Luxembourg, a trade repository registered by the European Securities and Markets Authority (ESMA) in November 2013 in accordance with EMIR.

The composition of the regulatory Clearstream group is shown in Figure 1-15 within the black frame. REGIS-TR has been classified as an "other undertaking" by BaFin and is therefore not included in regulatory consolidation.

1.3.2 Business operations and supervision

Clearstream Holding AG, Frankfurt/Main (CH):

CH is classified as a financial holding company according to Article 4 paragraph 1 point 20 CRR.

CH acts solely as a holding company for the interest in CI and its subsidiaries and does not have material additional business activities and therefore risk positions. Moreover CH is the superordinated company of the financial holding group according to §10a (1) KWG. CH in its role as superordinated company is responsible to fulfil the regulatory obligations on a consolidated/group level towards the German supervisory authorities and the college of supervisors.

Clearstream International, S.A., Luxembourg (CI):

CI is authorised in Luxembourg as an "other Professional of the Financial Sector" (specific type of PSF) according to Article 26 of the Luxembourg Banking Act on the financial sector.

In addition, CI is defined as a financial holding company in accordance with Article 4 paragraph 1 point 20 CRR.

The purpose of the Company is, among other things, to undertake financial services related to the safekeeping, administration, clearing and settlement of securities, precious metals, derivatives and other financial instruments within the Grand Duchy of Luxembourg and abroad. CI acts mainly as collateral agent and guarantor for securities lending transactions.

In the context of the Clearstream Group, CI delivers support services to its subsidiaries. The main support services relate to finance, human resources, internal control, risk management, internal audit etc.

Clearstream Banking S.A., Luxembourg (CBL):

CBL's mission is to deliver to financial institutions competitive and high-quality settlement, custody and related services across markets.

These services include:

- Delivery versus payment and delivery free of payment settlement transactions;
- Comprehensive custody management;
- Value-added services, such as securities lending, collateral management etc.; and
- Transactional information distribution.

CBL currently accepts over 850,000 securities for custody and settlement, including:

- Debt instruments, such as:
  - Eurobonds (for example, straight, floating rate, convertible);
  - money-market instruments, including short-term and medium-term notes, commercial paper and certificates of deposit;
- Equities, such as bearer shares and registered shares, as well as depository receipts;
- Warrants and certificates;
- Investment fund units;
- Other securities, such as international securities held in collective safe custody, for example, German certificates representing international securities;
- Gold bullion (traded on the Luxembourg Stock Exchange).

The CSSF is the competent authority for the supervision of CBL as credit institution according to Articles 42 and 43 of the Luxembourg Banking Act. Furthermore, BcL has a shared responsibility for liquidity supervision on the basis of Article 2 (4) of the Law of 23 December 1998 concerning the monetary status and the Banque centrale du Luxembourg.

CBL is designated as a securities settlement system (SSS) according to Title V of the Luxembourg Law of 10 November 2009 relating to payment services. The BCL is responsible for the oversight of SSSs (in accordance with Article 110 of the law of 10 November 2009). The focus of the oversight is the operational and financial stability of each system and participants in such a system as well as the stability of the financial system as a whole.

Furthermore, specific regulations for SSSs must be taken into account (for example, Circulars BCL 2001/163 and 2001/168).

Being in scope of Regulation (EU) No 909/2014 (CSDR) CBL has applied for an authorisation as CSD according to Article 17 in September 2017 (including providing banking-type ancillary services according to Article 54 Paragraph (2) lit. a.). CBL does not expect to receive the authorisation before Q4 2018.

CBL maintains relationships with around 2,500 customers in over 110 countries. Its global network extends across 57 domestic markets.

CBL established a branch in Singapore that obtained an offshore banking licence on 23 November 2009. The activities of the branch are supervised by the Monetary Authority of Singapore (MAS). On 2 October 2017, the branch received permission for wholesale banking, The following CBL activities related to the Asian Pacific region are, among others, handled via Singapore: Credit, Treasury, new issues, account administration, securities settlement, certain asset services, the management of the custodian and cash correspondent bank (CCB) network.

CBL London Branch opened in January 2016 after having a representative office in London since 1985. It took over the activities of the representative office. The activities of the branch are supervised by the Prudential Regulation Authority of the Bank of England.

Clearstream Banking AG, Frankfurt/Main (CBF):

CBF offers settlement, custody and related services in both the Collective Safe Custody (CSC, mainly German domestic) and the Non-Collective Safe Custody (NCSC) businesses. The focus of the settlement business is thereby on the settlement of stock exchange transactions.

CBF is the only central securities depository in Germany. It operates a large vault where most of the securities issued in Germany, securities issued elsewhere and even physical gold are stored. Within the frame of individual or collective safe custody, the settlement and asset servicing of domestic and international securities are offered. These services include:

- Delivery versus payment and delivery free of payment settlement transactions;
- Comprehensive custody management;
- Value-added services like securities lending, collateral management etc.; and
- Transactional information distribution.

CBF currently accepts the same securities as CBL in the NCSC business (over 850,000 securities) and 990,000 securities in the CSC business for custody and settlement.

Related to the NCSC business, all instruments eligible in CBL (except Gold bullion) are also eligible in CBF.

Owing to the different customer base (mainly European banks at CBF; many international banks at CBL), the number of different securities held by customers in NCSC is nevertheless lower at CBF.

For the CSC business, the securities eligible include:

- Debt instruments, such as:
  - government bonds (Bunds);
  - corporate bonds;
  - mortgage bonds;
  - international bonds;
  - municipal bonds;
  - convertible bonds;
  - money-market instruments, including short-term and medium-term notes, commercial paper and certificates of deposit;
- Equities, such as bearer shares and registered shares;
- Warrants and certificates;
- Investment fund units.

Beyond that, CBF acts as trustee to cover specific types of asset-backed bonds. With respect to commodity-backed bonds, the commodity (Gold) is stored physically in the vaults of CBF. For bond issues covered by securities, CBF performs safekeeping as Central Securities Depository and, as trustee, offers an increased level of protection for investors by virtue of its significantly low-risk business and operational model. Moreover, CBF offers its customers the Global Securities Financing (GSF) service, through which market participants can lend and grant securities and cash against collateral.

CBF is subject to German supervision and is supervised as credit institution (according to § 1 (1) German Banking Act) by BaFin and the Bundesbank; as securities settlement system (SSS) (according to § 24 b German Banking Act) by the Bundesbank; and as a central securities depository (according to § 1 (3) German Securities Deposit Act) by the competent federal state authorities.

Being in scope of Regulation (EU) No 909/2014 (CSDR) CBF has applied for an authorisation as CSD according to Article 17 in September 2017 (including providing banking-type ancillary services according to Article 54 Paragraph (2) lit. a.). CBF does not expect to receive the authorisation before Q4 2018.

Clearstream Services S.A., Luxembourg (CS):

CS is responsible for IT development and production. It develops and maintains the hardware and software and operates the IT systems for the international business. Furthermore, CS acts as IT operator and offers third-party IT services.

CS offers IT services to non-group financial entities and is supervised in Luxembourg as a "PSF connexe" (specific type of PSF) according to Articles 29-2 to 29-4 of the Luxembourg Banking Act.

The business operations CS provides to CBL, CBF and LuxCSD includes activities in international custody processing, settlement and new issuance business as well as credit operating services.

Clearstream Operations Prague s. r. o., Prague (COP):

COP is not a regulated entity. Since COP insources services directly or indirectly from CBL, based on a memorandum of understanding between the BCL and the Czech National Bank (CNB), the CNB performs local oversight on behalf of the BCL.

COP operates services for the Clearstream Banking units and for LuxCSD. As these arrangements are governed by outsourcing contracts according to Luxembourg and German regulatory standards, the services performed are fully monitored and managed by Clearstream management structures and processes. Therefore, they are an integral part of all required supervision processes.

Furthermore, COP functions as a shared services centre for certain administrative and support functions for major parts of the entire Deutsche Börse Group.

Clearstream Global Securities Services Ltd, Cork (CGSS):

CGSS is not a regulated entity. CGSS is a wholly owned subsidiary of Clearstream International S.A. and is one of Clearstream's servicing centres for mutual and hedge funds, as well as core client services support. CGSS also provides corporate IT support services for DB Group entities.

LuxCSD S.A., Luxembourg (LuxCSD):

LuxCSD was created within the context of the implementation of the Eurosystem's TARGET2- Securities (T2S) initiative. T2S is a single integrated process across Europe for delivery versus payment (DVP) settlement in Euro central bank money. The development of T2S coupled with other significant market and regulatory initiatives were the key drivers for introducing central bank money settlement in Luxembourg and for preparing a national access point to T2S.

In addition, LuxCSD also provides issuing, central settlement and custody services for securities of all types, including shares in investment funds.

LuxCSD is licensed by the CSSF as professional depositary of financial instruments according to Article 26 of the Luxembourg Banking Act and as Securities Settlement System (SSS) by the BCL. In addition, BCL oversees the business activities of LuxCSD.

Being in scope of Regulation (EU) No 909/2014 (CSDR) LuxCSD has applied for an authorisation as CSD according to Article 17 in September 2017. LuxCSD does not expect to receive this authorisation before Q4 2018.

REGIS-TR S.A., Luxembourg (REGIS-TR):

REGIS-TR currently operates a central register of derivatives where all contracts agreed over a wide variety of derivative financial instruments traded, OTC or on-exchange, can be centrally collected and recorded, giving market participants and regulators a consolidated view of positions. REGIS-TR was granted authorisation as a trade repository by the European Securities and Markets Authority (ESMA) in November 2013, enabling REGIS-TR to support customers in registering exchange-traded and OTC derivatives. Since 12 February 2014, the reporting by the market participants of the details of any derivatives contracts has been mandatory under EMIR.

REGIS-TR has been recognised as foreign trade repository for Financial Markets Infrastructure Act (FMIA, in German also known as FinfraG) reporting from the Swiss Market Authority FINMA on 1 April 2017. REGIS-TR offers a full reporting service for all types of derivative transactions (i.e. ETD and OTC). REGIS-TR is therefore the only trade repository offering reporting services for both EMIR and FMIA regulation.

Once the approval process has been opened for Securities Financing Transaction Regulation (SFTR), REGIS-TR will apply for a license extension to become an ESMA approved TR under SFTR. The Transaction Reporting requirements will be phased-in according to the counterparty classification and will start as of Q2/Q3 2019. REGIS-TR will offer a reporting solution for all types of transactions and all market participants that have a reporting obligation under SFTR.

Since 2010, REGIS-TR is fully consolidated in the DB Group financial statements. With regard to the consolidation provisions set out in the CRR/KWG, REGIS-TR has been classified as an "other undertaking" and is therefore not included in regulatory consolidation (see Figure 1-15. on page 1-17).

Clearstream Banking Japan Ltd, Tokyo (CBJ):

CBJ is not a regulated entity. The purpose of CBJ is to engage in marketing, information provision and advertising; holding financial seminars and other education and trainings; support of existing customers of group companies and any other business activities relating to any of the preceding.

2. Implementation of Basel III at Clearstream

The information in this chapter is presented in the following sections:

2.1 Pillar I: Minimum capital requirements

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

Granting loans is not Clearstream's core business. Credit risk mainly arises in the short term and with credit institutions or governmental counterparties. Therefore, Clearstream 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 interbank operational accounts and investments in government or other eligible securities. Treasury counterparties as well as cash correspondent banks for the operational network are selected based on a high degree of creditworthiness and operational reliability. Furthermore, overdrafts to customers are given based on credit assessment and, in general, on a collateralised basis (see also 5. Management of credit risk on page 5-1).

As both investments and overdrafts to customers are collateralised to a high degree, Clearstream has selected the comprehensive approach for credit risk mitigation.

Contrary to credit risk, operational risk is much more material to Clearstream compared to conventional commercial banks.

All of Clearstream's operations rely on a complex IT system that connects a variety of financial markets, instruments and various currencies across different time zones around the world. This needs a continuous, 24 hours a day, 7 days a week operation. Furthermore, due to the huge variety of instruments and volumes of settlement transactions, reconciliation of master data, movements and balances is crucial to the business.

In the year under review, about 139 million settlement transactions were processed. Even with a high degree of straight-through processing, manual interventions are occasionally necessary and need careful management. The potential risks of loss resulting from inadequate or failed internal processes or systems, or from human error or external events, are therefore significant. Clearstream accordingly selected the Advanced Measurement Approach (AMA) to assess and manage its individual scale of operational risk.

Since having received regulatory approvals as of January 2008, Clearstream Banking S.A. and Clearstream Banking AG apply the AMA to calculate their capital requirements for operational risk. In October 2010, Clearstream Holding AG received BaFin's approval to use the approach at group level.

Clearstream 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 Clearstream:

Risk category	Calculation method
Credit risk	Standardised approach
Credit risk mitigation (CRM) of financial collaterals	Comprehensive approach
Operational risk	Advanced measurement approach
Market risk	Standardised approach

Table 2-1. Calculation methods chosen by Clearstream

In December 2017, Clearstream Banking S.A. was appointed by CSSF Regulation 17-04 as Other Systemically Important Bank (O-SIB). Thus, CBL is required to maintain an additional capital buffer of 0.375% as of 1 January 2018 (0.50% as of 2019).

2.2 Pillar II: Supervisory Review Process (SRP)

Clearstream Group 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 that constitute the basis for the Supervisory Review Process (SRP).

The Executive Boards of Clearstream Group are informed at least on a quarterly basis about all significant and substantial risks. If necessary, risks are reported when necessary. This reporting also includes risks that are not in the scope of Pillar I and is included in Clearstream's internal capital planning.

Clearstream's required Economic Capital (EC) is determined using the Value-at-Risk method (VaR, see 3.2 Risk management methodology on page 3-4). 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 12 months will not exceed the calculated EC with a probability of 99.98%. The required Economic Capital considers a correlation of "1" between individual risks types. This is the most conservative approach for this purpose.

With the introduction of Basel III the Pillar II and its SRP were amended by the assessment of an institution's liquidity adequacy.

Basel III requires Clearstream to have in place robust strategies, policies and systems for the identification, measurement, management and monitoring of liquidity risk over appropriate time horizons to ensure that Clearstream maintains adequate levels of liquidity buffers. The design of its ILAAP framework is in the sole responsibility of Clearstream.

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

As part of the SREP, the management of Clearstream Group is in a constant dialogue with all its supervisors.

In 2017, BaFin and CSSF did not issue an official decision in course of its Supervisory Review and Evaluation Process (SREP). As such, Clearstream has not to comply with any additional capital requirements arising from risks not covered via Pillar I, with the exception that in Germany a potential IRRBB capital increase had to be calculated in absence of an official BaFin decision. In 2018, Clearstream has received a SREP notification by BaFin requiring additional capital requirements to capture all risks (including IRRBB) not covered via Pillar I.

2.3 Pillar III: Market discipline

CH is the superordinated company of the financial holding group according to §10a (1) KWG. CH in its role as a superordinated company is responsible to fulfil the regulatory obligations on a consolidated/group 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 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 the Foreword.

Article 6 paragraph 3 CRR exempts CBF and CBL from the requirement to issue a stand-alone disclosure report, as it is included in the consolidated CH Group disclosure report. No other group entity is obliged to disclose a Pillar III disclosure report. In conjunction with this, Article 13 paragraph 2 CRR and EBA Q&A 2014_759 clarify that the consolidated CH report shall contain information on individual level of its significant institutions CBL and CBF, but no individual disclosure by CBL and CBF is required.

In addition, certain requirements do not apply for CH. As Clearstream does not perform any kind of trading, related disclosure requirements are not applicable (Article 439 CRR).

Due to the businesses of Clearstream the following articles are not relevant as the underlying topics do not exist at Clearstream 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); and
- Article 455 CRR (Use of Internal Market Risk Models).

According to Article 433 the applicable disclosures must be published at least on an annual basis in conjunction with the date of publication of the financial statement. In addition, Clearstream companies asses annually the need to publish certain information more frequently to ensure stakeholders' access to a core set of up-to-date information. The related assessment is performed according to EBA Q&A 2014_1379 on group level (CH) as well as on level of significant subsidiaries (CBL and CBF).

The assessment process performed in February 2017, according to EBA Guideline 2014/14[1], was heading to the result that the four-year average of total assets of CBL (FY 2013 - 2016) exceeds 20% of the four-year average of Luxembourg's GDP of the same period. Thus, CBL is in principle required to disclose certain information on semi-annual basis. If appropriate and reasonable institutions have the opportunity to waive more frequently disclosures according to paragraph 29 of the EBA Guideline. CBL's balance sheet volume is highly volatile and is driven by participants' cash deposits used to foster settlement. Thus, this year for the first time the four-year average of total assets of CBL is slightly above the threshold. In addition, the risk to which CBL is being exposed to is not fluctuating in an excessive manner and is in general quite small mainly driven by operational risk. In this line, the additional semi-annual disclosures would add only limited information value. Thus, the Executive Committee of Clearstream Holding AG and Clearstream Banking S.A. decided to waive the disclosure with reference date of 30 June 2017 due to CBL's limited possibility to manage its balance sheet and its related limited additional information value of more frequently disclosures.

All information provided in this report refers in principle to the companies included in the regulatory basis of consolidation. The regulatory consolidated group differs slightly from the consolidated group under accounting rules (see Figure 1-15 and Table 2-2).

As all Clearstream companies - regardless of accounting and/or regulatory consolidation - are included in the consolidated annual accounts/annual report of the ultimate parent company DBAG, Clearstream Holding AG is, according to § 291 German Commercial Code (Handelsgesetzbuch (HGB)), exempted from the obligation to draw up consolidated statutory accounts.

1. 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

The following table shows both the scope of regulatory and accounting consolidation including the description of the type of the enterprise.

Type of enterprise	Company	Regulatory consolidation		Accounting consolidation	
		Consolidation Art. 18 CRR Full Consolidation	Deduction/ Higher Risk Weighting acc. Art. 48 CRR	Full consolidation	At equity
Credit Institutions	Clearstream Banking S.A., Luxembourg (CBL)	x		x	
	Clearstream Banking AG, Frankfurt am Main (CBF)	x		x	
Financial Holding Company	Clearstream Holding AG, Frankfurt am Main (CH)	x		x	
	Clearstream International, S.A., Luxembourg (CI) [a]	x		x	
Financial institution	LuxCSD S.A. Luxembourg (LuxCSD) [a]		x		x
Regulated Ancillary Services Undertaking	Clearstream Services S.A., Luxembourg (CS) [b]	x		x	
Ancillary Services Undertaking	Clearstream Operations Prague s.r.o., Prague (COP)	x		x	
	Clearstream Banking Japan Ltd, Tokyo (CBJ)	x		x	
	Clearstream Global Securities Services Ltd, Cork (CGSS)	x		x	
"Other" Undertaking	REGIS-TR S.A., Luxembourg (REGIS-TR) [c]		x	x	

a. PSF, according to article 26 of the Luxembourg Law of 5 April 1993.
b. PSF according to Articles 29-2 to 29-4 of the Luxembourg Law of 5 April 1993.
c. REGIS-TR is classified as a trade repository according to Article 2 paragraph 2 EMIR.

Table 2-2. Accounting and prudential consolidation

The assignment of the companies to the types of enterprise is mainly based on the definitions contained in § 4 CRR. Clearstream has no company that was consolidated proportionately at the reporting date.

2.4 Regulatory environment

The Clearstream Group fulfils the "Basel III" regulatory equity requirements based on the EU implemented Directive and Regulation CRD IV and CRR in Germany (on a consolidated level as well as, for CBF, on a stand-alone level) and in Luxembourg (for CBL on a stand-alone basis).

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 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.

In June 2014, after a comprehensive assessment the ECB decided to classify CBL which was the only Clearstream entity under inspection as LSI. The decision reflects the dedicated role of Clearstream outside the core banking business that is the focus of the SSM. Although CBL and the whole Clearstream Group continue to be systemically important as a Financial Market Infrastructure (FMI), CBL (and CBF and CH) is not classified as an SI for the purposes of the SSM. As such, CBL remains under the supervision of the CSSF on a stand-alone basis and Clearstream Group continues to be supervised at a consolidated level by BaFin.

ECB confirmed the classification of the Clearstream entities based on its annual review for 2018. In December 2017 the CSSF designated CBL as O-SII, effective 1 January 2018, in accordance with CSSF Regulation N° 17-04.The supervision of CBL remains with CSSF.

Once the CSD Regulation comes into effect, the organisational setup and responsibilities for the supervision of the Clearstream entities will have to be reviewed.

This page has intentionally been left blank.

3. Risk management overview

The information in this chapter is presented in the following sections:

3.1 Strategy and organisation

Risk management is a fundamental component of the management and control of Clearstream. Effective and efficient risk management is vital to protecting Clearstream's interests and it enables Clearstream to achieve its corporate goals and safeguards its continued existence. Clearstream has therefore established a group-wide risk management system comprising roles, processes and responsibilities applicable to all staff and organisational units of Clearstream. This ensures that emerging risks are identified and managed as early as possible.

Clearstream's risk strategy is based upon the group's business strategy and regulates the extent of risk taken within the various business activities carried out by Clearstream. The risk strategy does this by determining conditions for risk management, control and limitation. Clearstream 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.

Clearstream'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.

All members of Executive Boards of Clearstream are ultimately responsible for the risk strategy of Clearstream. The group risk strategy reflects Clearstream's risk appetite that defines the maximum loss that Executive Boards are willing to assume in one year, the tolerance considering the risk as well as the desired performance levels. It is Clearstream's intention to maintain risk at an appropriate and acceptable level (see also 3.4 Risk management approach on page 3-9).

The members of Executive Boards ensure that the group risk strategy is integrated into the business activities throughout the entire group 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.

Risks are openly and fully reported to the responsible level of management. The responsible Executive Board 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 external reporting, that is, interim and annual reports.

Clearstream has developed its own corporate risk structure and distinguishes between operational, financial and business risks (see also 3.3 Risk structuring on page 3-5).

The members of Executive Boards of Clearstream are responsible for the management of all risks. Clearstream's risk management organisation is decentralised. The various operational units are responsible for identifying risks and for reporting them promptly to Clearstream Risk Management, a central function with Clearstream group-wide responsibilities.

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

Risk control in the Clearstream operational units is ensured by nominating "Operational Risk Representatives", who are responsible, as mentioned above, for identifying, notifying and controlling any risk in their area whereas Clearstream Risk Management is responsible for the assessment and reporting of risks.

The risk management framework of Clearstream, as stated in the Group 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 in a timely manner and consistently, together with suitable recommendations to the respective Executive Board; and
- controlled.

These five key processes, as well as adequate quality standards, have been established in the Group Risk Management Policy and are reviewed on an ongoing basis.

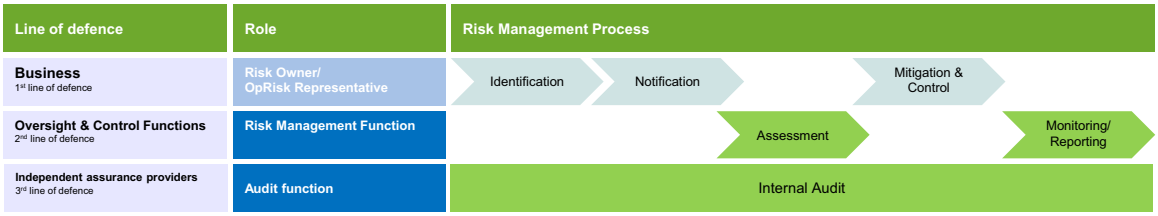


Figure 3-1. Five-level risk management system with central and decentralised responsibilities

Adequacy of risk management arrangements

In 2017, Clearstream's risk profile has not significantly changed. The risk management controls and mitigating actions put in place by the Executive Boards throughout the Clearstream entities are considered adequate. The tasks performed by the Clearstream Risk Management function are executed in compliance with recognised standards. We have identified areas for improvement and recommended measures to further strengthen Clearstream's risk management capabilities. This includes strengthening the Business Continuity and Recovery Planning of Clearstream. In addition, changes are implemented in risk management activities to ensure compliance with CSDR.

Risk statement

In addition, based on its business strategy Clearstream has adopted a corresponding Risk Strategy which describes the overall risk profile. The risk strategy includes statements concerning risk appetite (see 8.2). It further sets limits to the risk bearing capacities per risk type. Required Economic Capital is compared with the available risk bearing capacity which is defined as regulatory own funds. The allocation of risk bearing capacity for 2017 for Clearstream Holding was as follows: Operational Risk 51%, Financial Risk 41% and Business Risk 8%.

The risk strategy was approved by the Executive Board of Clearstream Holding in May 2017.The overall risk profile as defined, adopted and approved via the risk strategy links to the business strategy in the introduction part. The main part consists of the risk strategy statement and risk management approach and risk types which are quantified in the risk appetite framework based on tools and concepts used to manage risk. Those tools and concepts are, inter alia, Risk Bearing Capacity and VaR. Lastly, approval and regular reports and updates are specified in 3.1.5 Risk reporting.

3.1.1 Risk identification

Risk identification consists of the identification of all threats to Clearstream, as well as causes of loss and potential disruptions. Risks may arise because of internal activities or external factors and the risk examination must be performed for existing or new processes, when concluding new business or entering new service areas.

The risk identification process is proactive, based on regular review of processes 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.). It also considers scenarios of disruption or failure taking into consideration all sources of issues (unavailability of systems, human error etc.). The risk identification process is also informed by empirical evidence, based on lessons learnt from reported incidents.

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 (first line of defence) including individual employees must notify Clearstream Risk Management (second line of defence), 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 considers mitigation measures currently in place, such as business continuity measures, insurance policies etc. (see also 3.2 Risk management methodology on page 3-4 and 3.3 Risk structuring on page 3-5).

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

The risk assessment phase is carried out by Clearstream 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 Clearstream Risk Management.

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

3.1.4 Risk 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 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 to take appropriate action. Clearstream Risk Management is responsible for providing this information to the relevant boards and committees (see also 3.5 Group-wide risk reporting and monitoring on page 3-9). Moreover, upon request of the relevant boards, Clearstream Risk Management issues reports to external parties.

3.2 Risk management methodology

Clearstream has implemented a standardised approach for measuring and reporting all operational, financial and business 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 Clearstream could face if certain independent loss events materialise over a specific time horizon for a given probability. Clearstream's models are based, in line with the Basel III framework, on a one-year time horizon and correlations between individual risk estimates are recognised when calculating the capital requirement for operational risk.

The VaR is calculated at a confidence level of 99.98% (required Economic Capital). Clearstream also performs VaR calculations in order to detect potential risk concentrations, as well as stress test calculations, which consider even more conservative model parameters than the regular VaR calculations.

In addition to classical stress tests, that analyse the impacts of predefined stress scenarios, Clearstream 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.

Clearstream also calculates VaR at 99% confidence level for the determination of the Earnings at Risk (EaR).

3.3 Risk structuring

Clearstream defines risk as a potential negative impact on its financial, revenue and liquidity situation. CH differentiates between three major risk types that are managed and controlled with distinct methods. These risk types are operational risk, financial risk and business risk which are illustrated in the following figure:

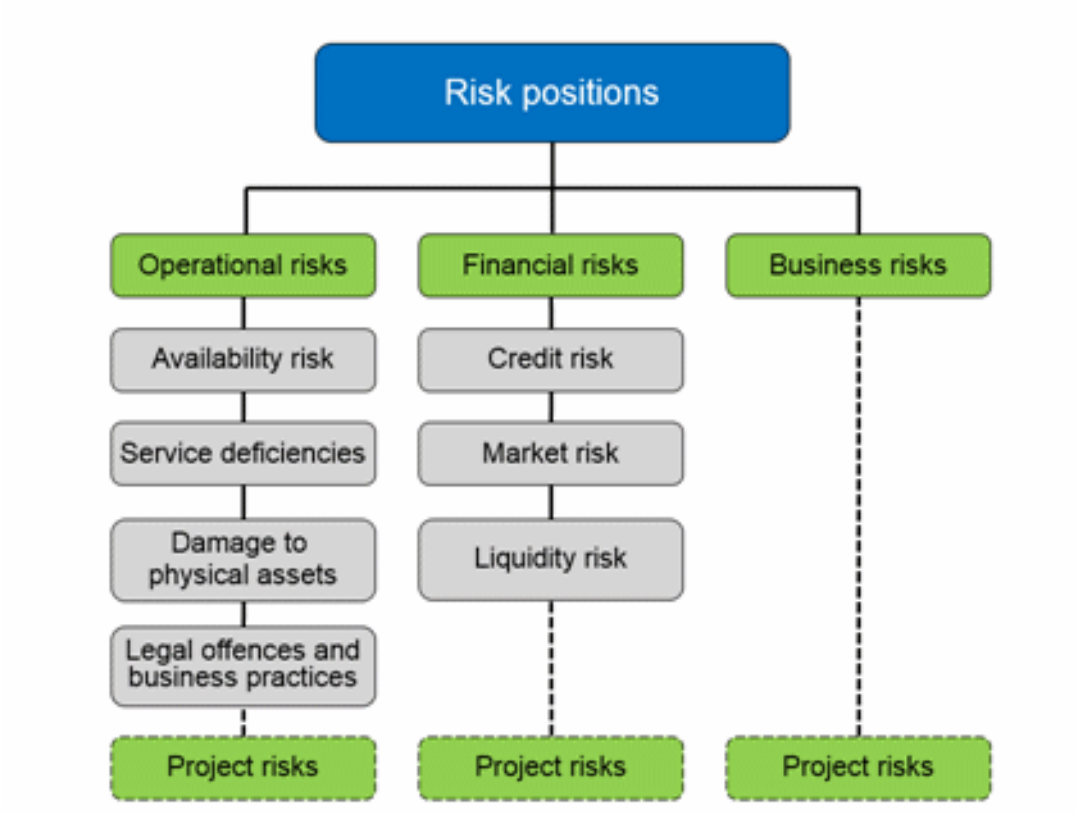


Figure 3-2. Risk structure of Clearstream

The following sections describe the relevant individual risks in more detail.

3.3.1 Operational risks

Operational risk encompasses all existing and newly arising risks in the context of the ongoing provision of services by Clearstream. In accordance with the Basel II framework[1], 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 as well as from legal risks[2] and risks associated with business practices.

Operational risks that Clearstream does not want to run and that can be insured against at reasonable cost are transferred by closing insurance policies. All insurance policies are coordinated centrally for the entire Deutsche Börse Group, thereby ensuring uniform risk/cost benefit insurance cover.

1. No. 644 "International Convergence of Capital Measurement and Capital Standards" (see http://www.bis.org/publ/bcbs128.htm).
2. Legal risk includes, but is not limited to, exposure to fines, penalties or punitive damages resulting from supervisory actions, as well as private settlements.

3.3.1.1 Availability risk

Availability risk results from the fact that resources essential to Clearstream's service offering could fail, thereby making it impossible to deliver services in a timely manner or at all. Possible root causes include hardware and software failures, operator and security errors, physical damage to the data centres, loss of buildings and non-availability of staff.

In particular, Clearstream manages availability risk through intensive activities in the field of business continuity management (BCM). BCM encompasses all the processes that ensure that business continues as normal, even if a crisis occurs, and therefore substantially reduces availability risk. BCM relates to arrangements to ensure the availability of all key resources (systems, workspace, staff, suppliers), including the redundant design of all critical IT systems and technical infrastructure, as well as workspaces and staff unavailability plans for mission-critical functions in each of the main operational centres (see also 4.3.2 Business Continuity Management on page 4-6).

No significant losses occurred as a result of unavailability of resources in the year under review.

3.3.1.2 Service deficiencies

In contrast to availability risk, the occurrence of service deficiencies does not prevent Clearstream from providing services to its customers. However, errors or omissions may occur that relate mainly to manual input and suppliers' errors.

Despite all the automated systems and efforts aimed at delivering straight-through processing (STP), there is still a requirement for manual activity. In addition, manual intervention in market and system management is, in special cases, necessary.

In previous years, sustained improvements were made on an ongoing basis to reduce the potential risk of processing errors, either through a reduction in the amount of necessary manual intervention or through better protection.

Nevertheless, it should be noted that risk mitigation measures do not guarantee that incidents, claims and resulting loss will not occur, nor can they predict the specific occurrence of particular risk events. Despite all the risk mitigation measures deployed, Clearstream remains exposed to the risk of inadequate handling of customer instructions, which could, in extreme circumstances, result in significant losses.

There was one significant loss of EUR 969,309 which occurred in 2017 in relation to an Internal Human Error and Omission. Following the implementation of the T2S project there have been some billing errors for CBL customers.

3.3.1.3 Damage to physical assets

This category includes risks due to accident and natural hazard, as well as to terrorism and sabotage.

In the year under review, no significant losses occurred as a result of damage to physical assets.

3.3.1.4 Legal offences and business practices

Risk from legal offences include losses that could arise as a result of non-compliance or inappropriate compliance with new or existing laws, losses from inadequate contract terms or from court decisions not adequately observed in customary business practice, as well as risks from fraud.

Risks associated with business practices include losses resulting from money laundering, violations of competition regulations or breaches of banking secrecy. Clearstream has established a Compliance function that seeks to protect Clearstream from any prejudice that may result from failures to comply with applicable laws, regulations and standards of good practice, with a particular focus on the following topics:

- Prevention of money laundering and terrorist financing;
- Compliance with professional and banking secrecy;
- Prevention of insider dealing;

- Prevention of market manipulation;
- Prevention of fraud;
- Prevention of conflicts of interest and corruption;
- Data protection.

Losses can also result from ongoing legal proceedings. Clearstream judges the probability that this operational risk will occur to be medium, although damage can be substantial. As a result, Clearstream Risk Management continually monitors ongoing legal proceedings. These can occur if Clearstream breaches laws or requirements, enters into inadequate contractual agreements, or fails to observe case law to a sufficient degree. Legal risks also include losses due to fraud and labour law issues.

There was one significant loss of EUR 32,500,000 which occurred in 2017 in relation to Business Practices. The amount results from the Luxembourg Tax authorities not allowing a tax deduction on a settlement payment that was made in previous years to the U.S. Treasury Department's Office of Foreign Assets Control (OFAC).

3.3.2 Financial risks

Clearstream is exposed to financial risks in the form of credit and liquidity risk. Exposure to the above-mentioned risks is mitigated through the existence of effective control measures.

3.3.2.1 Credit risk

Credit risk refers to the risk that a counterparty may default and be unable to meet its liabilities against Clearstream in full or at all.

CBL and CBF within Clearstream Group grant loans to their customers in order to increase the efficiency of securities transaction settlement. However, these lending operations cannot be compared with those of other credit institutions. Firstly, the loans are extended solely on an extremely short-term basis. Secondly, they are extended solely for the purposes of increasing the efficiency of securities settlement and are largely collateralised and granted to creditworthy customers with very good credit ratings. Furthermore, credit lines granted are uncommitted and can be revoked at any time. The main credit product offered is the "Technical Overdraft Facility" (TOF). This overdraft facility is an intraday credit arrangement to facilitate the settlement of securities transactions even when cash balances in the relevant currency are, for one reason or another, (technically) unavailable at the right time.

Clearstream is also exposed to credit risk arising from its strategic securities lending activity (ASLplus - CBL's automated securities lending programme). Only selected banks are approved as counterparties. All lending transactions are fully collateralised and only selected securities are permitted as collateral. The minimum country and issue rating permitted for selected bonds is A+. Short-term bonds and equities without an issue rating are allowed as collateral in cases where the issuer has a short-term rating of at least A-1.

The creditworthiness of potential customers is assessed before entering into a business relationship. CBL and CBF within Clearstream Group establish customer-specific credit lines on the basis of both regular reviews of the customer's creditworthiness and ad hoc analyses as required.

Additional credit risks are associated with cash investments and cash holdings at CCBs. Clearstream reduces this risk by spreading placements in the money market across a number of counterparties with very good credit ratings, by defining credit limits for each counterparty and by largely making short-term, collateralised placements. Clearstream establishes credit limits based on annual credit assessments and ad hoc analyses as required. The creditworthiness of Clearstream's CCBs is also assessed on an annual or, if necessary, ad hoc basis.

3.3.2.2 Market risk

Market risk may arise in the form of interest rate risk (as a result of fluctuations in interest rates in connection with cash investments or borrowing) or currency risk (in the operating business, when recognising net revenues denominated in foreign currencies).

Clearstream is exposed to interest rate risk in connection with cash investments. Interest rate risk is mitigated using a limit system that only permits maturity transformation to a small extent.

CI and CBF have entered into a Contractual Trust Agreement (CTA), shared within Deutsche Börse Group, that serves to cover pension plans of employees. The funds put into the CTA are invested into a special investment fund that is exposed to interest rate risk, currency risk and equity price risk.

3.3.2.3 Liquidity risk

Clearstream is exposed to liquidity risk in that it may lack sufficient liquidity to meet its daily payment obligations or incur increased refinancing costs in the event of liquidity bottlenecks. Daily and intraday liquidity is monitored closely by the Treasury and Credit departments and managed with the help of a limit system. Sufficient credit lines are available to provide cover in extreme situations
(see also 7. Management of liquidity risk on page 7-1).

In addition, Clearstream performs three classic liquidity stress tests and two reverse liquidity stress tests. The aim of the classic liquidity stress tests is to check for possible liquidity shortfalls under different stress scenarios (base scenario, market disruption scenario, and market disruption and idiosyncratic scenario).

The reverse liquidity stress tests are based on the market disruption and idiosyncratic scenario. Their aim is to determine what would need to happen to customer cash balances, for Clearstream to suffer a liquidity shortfall.

In the year under review, Clearstream had excess liquidity at all times as a result of which no liquidity bottlenecks occurred.

In 2017, Clearstream performed a "Fire Drill" that focussed on liquidity risk management, Credit Event governance, information flows and decision making in a time of crisis. The results of the "Fire Drill" helped to enhance existing processes and procedures.

3.3.3 Business risks

The Business risk reflects the sensitivity of Clearstream to macroeconomic developments and its vulnerability to event risks arising from other external threats. It is translated in EBIT[1] terms, reflecting both a potential revenue decrease and a potential increase of its cost base.

Clearstream's financial performance is directly or indirectly subject to the evolution of a number of macroeconomic factors and the related effects. Revenues are directly or indirectly impacted, for example, by the level of interest rates, economic growth, equity market valuations and trading volumes, the level of issuance of securities, but also investor confidence in the economic environment.

Clearstream could be affected by other external threats, like changes in the competitive or regulatory environment. Scenarios are established around the most significant risk events and quantitatively assessed. The respective departments monitor developments closely in order to take early mitigation actions if possible.

European and national regulatory evolutions are continuously monitored by Clearstream. Potential changes are analysed and appropriate measures are initiated in due time to fulfil all current and prospective regulations (see also 2.4 Regulatory environment on page 2-5).

1. EBIT: Earnings Before the deduction of Interest and Tax.

3.3.4 Project risks

While project risk can be a key risk driver, it will materialise as operational, financial or business risk and its relevant sub-risks. The impact of project risk is therefore quantified and limited as part of operational risk, financial risk and business risk.

3.4 Risk management approach

It is Clearstream'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 Clearstream, several mechanisms are used to reduce both the frequency and impact of incidents according to the type of risk.

3.5 Group-wide risk reporting and monitoring

Monitoring and reporting are essential parts of Clearstream's risk management, designed to give Executive Boards and the Supervisory Boards timely, consistent and accurate information about the material risks that Clearstream Holding and its subsidiaries may encounter or have encountered.

All relevant data and information is collected and assessed by Clearstream 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 on page 3-1).

3.5.1 Regular reports

Risk reports are issued to the relevant Executive Board of Clearstream 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

Clearstream Risk Management may issue ad hoc reports when a new risk situation or the development of an existing risk requires to be reported to the relevant Executive Board of Clearstream, 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.

This page has intentionally been left blank.

4. Management of operational risk

The information in this chapter is presented in the following sections:

4.1 Strategy, process, structure and organisation

Operational risk represents a major risk class for Clearstream and one that is systematically managed and controlled. Clearstream decided to cover business needs and regulatory requirements through the same approach to the largest extent possible. Therefore, Clearstream follows an Advanced Measurement Approach (AMA) for calculating the regulatory capital requirement for operational risk. Thus, Clearstream established a comprehensive framework and set of instruments meeting the requirements from both a regulatory and a business perspective.

Since having received regulatory approvals as of January 2008, CBL and CBF apply the AMA to calculate their capital requirements for operational risk. In October 2010, CH received BaFin's approval to use the approach at group level in the course of the introduction of the supervision on CH group level. CH has used the Direct VaR model for AMA purposes since regulatory approval in Q1 2017.

Clearstream's risk strategy, as described in 3.1 Strategy and organisation on page 3-1, 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 Clearstream, 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 example, through insurance contracts.
- 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 the Executive Boards of Clearstream, who are supported by different units and functions.

The five steps of the risk management process (as described in 3.1 Strategy and organisation on page 3-1) are required 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 Boards appoint "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 Clearstream Risk Management. They also support their line 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 Clearstream Risk Management, 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. Furthermore, individual employees may be asked by line management, their Operational Risk Representative or Clearstream Risk Management to take an active role in the operational risk management process, for example, as experts within scenario analysis.

4.2 Measurement

Operational risk capital is intended to represent the required risk capital for unexpected operational risk losses. As part of the AMA within Clearstream, a model for calculating operational risk capital requirements has been developed, based on the individual risk profile of the bank.

In line with common practice in other risk areas, capital requirements are calculated using the Value at Risk (VaR) concept. Based on a statistical analysis of relevant data, a loss distribution is determined, which enables calculation of the required figures.

The model has been designed to have the following properties:

- Capital requirements reflect the risk profile of Clearstream Group and individual group entities.
- Confidence levels can be adjusted according to the risk appetite of the bank.
- Incentives for proper risk management can be included into the model.
- Major risk drivers can be identified.
- Risk mitigation effects can be taken into account.

Input data for the model are internal loss data, results of a structured scenario analysis or external loss data as indirect factors. If loss data is sufficiently available, the application of a statistical model gives a reliable estimate of the underlying risk represented by the data. However, operational risk losses are very rare and not sufficiently available for all risk drivers. Additionally, internal loss data usually does not cover extreme events as such cases have not occurred in the bank so far.

It is assumed that banks doing similar business have also a similar risk profile. If this assumption holds, publicly available losses or losses from a banking consortium could be used to fill the gap of missing internal loss information.

However, Clearstream has a unique business model that, as of today, is not sufficiently represented in any bank consortium or public database. Therefore, Clearstream decided to use external loss data only where appropriate. Furthermore, in cases where appropriate internal or external loss data is available, Clearstream decided to apply a statistical model to scenario losses that are created in a structured process by business experts.

During this process, experts from all areas of the bank estimate the potential impact and the likelihood of a scenario loss. These losses are modelled in a similar way as the internal loss data. Where the loss data history for a particular risk class becomes sufficiently large, the basis for modelling this risk class can be switched from scenario losses to internal losses without changing the operational risk model.

4.2.1 General concept

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.

4.2.2 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 actual monthly statistical mean of the aggregated loss distribution (it indicates which annual loss has to face on average over a long period of time).
- 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% percentile 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 distri-bution 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.

Modelling structure

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

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)

The distributions of all operational risk scenarios in a "cell" need to be combined to derive the aggregate loss distribution for a "cell" and based on that the total loss distribution for operational risk. Clearstream 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 $i(1 \le i \le n)$

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

4.2.3 Monte Carlo simulation

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 considered 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 considered, including the losses that are generated in other areas of the bank because of the scenario event. These subsequent losses are estimated and documented within the Risk scenario template as "Related effects" and taken into consideration when estimating the severity of a risk scenario. During 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 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 leads 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 that the individual risk classes are independent and is essential for the zero-correlation assumption amongst different risk classes.

This means, from a statistical point of view, that neither linear nor higher order dependencies exist. 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 must be investigated to ensure the correctness of the figure. Explanation of any variation above the safeguards is included in the quarterly Risk Report.

4.2.4 Stress testing of operational risks

To achieve a better understanding of the largest risks and to adequately model capital requirements, Clearstream Risk Management runs - once the capital figures are worked out and calculated - an ex-post stress test. The 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 must be neglected if they are no 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 the Clearstream 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.

This stress test is carried out when validating the outcome of the scenario analysis review and documented in a separate document called "OpRisk Scenario Analysis, Model Results and Validation". In case the specific stress tests defined above exceed 80% of the Available Risk Bearing Capacity the Executive Board is informed. In addition to the stress test defined above Risk Management might test other combinations of scenarios to obtain a better understanding of 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

4.3 Operational risk mitigation

As laid out in its risk strategy, Clearstream 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 Clearstream's operations have sufficient controls to prevent any fraud or operational service deficiency. If an event of this kind occurs in Clearstream's operations, a thorough analysis is performed to be in the 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 many measures that will take effect at the time or after an incident, such as business continuity management (BCM) and insurance programmes.

4.3.1 Internal Control System

The Executive Boards of Clearstream have 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. Clearstream'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 carries out risk-oriented and process-independent controls to assess the effectiveness and appropriateness of the internal control system.

4.3.2 Business Continuity Management

Because the unavailability of core processes and resources represents a substantial risk for Clearstream, and a potential systemic risk to the markets, Clearstream has implemented a comprehensive Business Continuity Management (BCM) approach as a key mitigator of availability risk. Related tests are performed throughout the year. An IT disaster recovery test took place in September 2017.

BCM organisation at Clearstream

The respective Executive Boards are responsible for ensuring the continuity of business at Clearstream. This responsibility is delegated to the various organisational units, which are directly responsible for the operational resilience and disaster tolerance of the respective business areas. Reporting to Executive Management, Clearstream Risk Management is responsible for the overall coordination, monitoring and assessment of Clearstream's preparedness to deal with incidents and crises.

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 and address the unavailability of systems, workspace, staff and suppliers in order to ensure the continuity of the most critical operations even in cases of catastrophic events. Thereby, Clearstream is making use of its operational locations at Cork, Eschborn, London, Luxembourg, Prague and Singapore to maintain the continuity of its services.

Systems unavailability

Data centres are geographically 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 facilities provide backup office space for mission critical functions 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 Clearstream'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 catastrophic scenarios and such as terrorist attacks and 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 Clearstream's different operations locations are in place so that, if one of these locations is impacted, mission critical activities can be continued by staff in other locations.

Supplier unavailability

Clearstream assures itself of the continuous provision of critical supplier services by a number of means, such as regular due diligence reviews of suppliers' BCM arrangements, provision of services by alternative suppliers if possible and service level agreements, describing minimum service levels and contingency procedures.

Incident and crisis management process

Clearstream has implemented a group-wide incident and crisis management process that facilitates a 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 enabling a swift return to regular business activity.

Incident Managers have been appointed in the respective business areas as points of contact in case of incidents and crises to ensure the appropriate response including escalation up to the Executive Boards and notification to customers and other relevant external parties.

"Real-life" simulation testing

Clearstream 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.

BCM test results are validated against the following objectives:

- Functional effectiveness: validating all technical functionalities.
- Execution ability: staff must be familiar with and knowledgeable in the execution of BCM procedures.
- Recovery time: the functions in the scope of the BCM plans must be operational within the defined recovery time objective.

Test results are reported to the respective Executive Boards. Customers are regularly invited to participate in Clearstream's BCM tests to provide them with direct assurance of Clearstream's BCM preparedness.

4.3.3 Insurance

An additional tool used by Clearstream 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 highly reputable brokers or directly with prime rated insurers to purchase tailor-made policies reflecting the specificities of our business.

Each major insurance cover is reviewed regularly against Clearstream's operational risk profile. This review involves all relevant parties and is coordinated by Clearstream Risk Management.

4.4 Monitoring and reporting

The reporting approach laid out in 3.1.5 Risk reporting on page 3-4 and 3.5 Group-wide risk reporting and monitoring on page 3-9 also applies to the management of operational risk. A Supplementary Risk Report is also produced annually with the aim of providing the management body with additional background information pertaining to Clearstream'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. Management of credit risk

The information in this chapter is presented in the following sections:

In all of the tables shown in this chapter, the data for CH and CBF is based on the German GAAP according to the German Commercial Code (HGB). The data for CBL is based on International Financial Reporting Standards (IFRS).

5.1 Strategy, process, structure and organisation

Clearstream's general risk management structure, organisation and process, as well as the risk strategy, is specified in 3. Risk management overview on page 3-1. The present status and the business direction for credit risk are stated in a credit risk strategy. The Executive Boards periodically examine and adjust the credit risk strategy as necessary.

The credit risk strategy is set in accordance with the Risk Management Policy and is reported annually to the responsible Supervisory Boards. The credit risk strategy represents the framework and defines, amongst others, the principles, credit risk appetite, the credit authorities, possible collaterals, the basic counterparty quality as well as the fundamental country and currency risk categories.

With regard to credit risk, the credit risk strategy is translated into a limit system, which is also monitored on a regular basis and ad hoc.

Clearstream may grant credit limits that serve to facilitate the settlement of securities transactions as well as to support the securities financing business. Credit is primarily granted on a collateralised basis. Borrowers in Clearstream are central banks, banks and financial institutions. Furthermore, credit limits are set for the placement of funds with counterparties. The credit processing is arranged in guidelines and work instructions.

Credit limits are set in accordance with the customer's financial standing, as indicated by factors such as the customer's credit rating and net worth, as well as having regard for the level of activity on the customer's accounts and the level of collateralisation.

The evaluation of counterparties and the credit risk classification takes place within the "credit assessment", which is performed by the Credit section. Internal ratings are systematically compared with external ratings from Moody's, Standard & Poor's and Fitch and are adjusted where applicable.

Credit lines must be collateralised to the maximum extent possible. The monitoring of recoverability of collateral is also operated by the Credit section.

The sovereign risk of each country is reviewed and allocated to one of three categories according to country risk level (high, medium, low). Credit limit concentration thresholds relating to country group, customer internal ratings and collateralisation levels are established and reported to the Executive Boards on a monthly basis. Currency limits are established to cover currency exposure.

Any exception to the Credit Risk Policy must be approved by the respective Executive Board.

All credit risk exposures are regularly reviewed and monitored. Clearstream also conducts special reviews where information is received from external and internal sources indicating a negative change in the risk assessment of the exposure or of the collateral.

The above-mentioned exposure limits are set to ensure that Clearstream does not take too large an exposure, and therefore risk, on too few participants or counterparties. German and Luxembourg banking regulations also impose risk concentration limits that have to be respected for each applicable exposure.

In principle, exposures after risk weighting and credit risk mitigation techniques towards an individual customer or group of connected customers above 25% of own funds is reported as a breach under the large exposures regulation.

Credit risk control is performed by the Credit section, an independent function. The Credit section is responsible for issuing the monthly credit reporting to the Executive Board and to Group Risk Monitoring, as well as for the credit exposure reporting to Group Risk Monitoring, which forms the basis of the Credit VaR calculations.

5.2 Credit risk exposures

5.2.1 Application of the standardised approach

Clearstream uses the credit assessments by OECD[1] for the central governments and central banks exposure class. In addition, Clearstream 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 and Luxembourg supervisors.

The exposures of Clearstream belong mainly to the exposure classes of central governments and central banks and to institutions. The current exposures to central governments and central banks are mainly risk-weighted by 0%. The exposures to institutions have generally a short original maturity of less than or equal to three months, therefore, pursuant to Article 120 paragraph 2 CRR the risk weight is 20%.

The risk weighting for multilateral development banks is in most cases 0%.

Covered bonds obtain a risk weighting on the basis of the risk weightings assigned to senior unsecured claims on the credit institution that issues them.

All other exposures in the different exposure classes mostly achieve the prescribed risk weighting of an unrated position ("unrated" implies that no credit rating by an eligible ECAI exists) or no ECAI for that purpose has been nominated irrespective a rating exists.

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

1. Country Risk Classification: http://www.oecd.org/tad/xcred/crc.htm.

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.

		Average Exposure value of the reporting year			Exposure value 31 December 2017 (€'000)			Exposure value after CRM 31 December 2017 (€'000)			Exposure value after considering Conversion Factor (CF) 31 December 2017 (€'000)		
Exposure class	Risk weight class	CH-Group (*)	CBL(*)	CBF (*)	CH-Group (*)	CBL(*)	CBF (*)	CH-Group (*)	CBL (*)	CBF (*)	CH-Group (*)	CBL (*)	CBF (*)
Central governments or central banks	0%	7,668,210	7,602,465	852,959	6,377,196	5,583,406	882,185	6,377,196	5,583,406	882,185	6,377,196	5,517,579	882,185
	20%	3,895	-		2,355	-	-	2,355	-	-	2,355	-	-
	50%	268	-		170	-	-	170	-	-	170	-	-
	100%	449	9,891		406	6,738	-	406	6,738	-	406	6,738	-
	150%	33	-	41	7	-	35	7	-	35	7	-	35
	Total	7,672,855	7,612,356	853,000	6,380,134	5,590,144	882,220	6,380,134	5,590,144	882,220	6,380,134	5,524,317	882,220
Regional governments or local authorities	0%	423,886	247,482	55,445	376,965	443,445	54,125	376,965	443,445	54,125	376,965	443,445	54,125
	20%	-	1		-	1	-		1	-		1	-
	50%	-	-		-	-	-		-	-		-	-
	100%	-	84,410		-	-	-		-	-		-	-
	150%	-	82		-	-	-		-	-		-	-
	Total	423,886	206,735	55,445	376,965	443,446	54,125	376,965	443,446	54,125	376,965	443,446	54,125
Public sector	0%	872,078	275,972	45,229	801,197	641,987	45,230	801,197	641,987	45,230	801,197	641,987	45,230
	20%	9	-		20	-	-	20	-	-	20	-	-
	50%	-	-		-	-	-	-	-	-	-	-	-
	100%	-	-		-	-	-	-	-	-	-	-	-
	150%	-	-		-	-	-	-	-	-	-	-	-
	Total	872,087	206,979	45,229	801,217	641,987	45,230	801,217	641,987	45,230	801,217	641,987	45,230
Multilateral development banks	0%	516,173	348,962	14,998	558,100	544,132	15,000	558,100	544,132	15,000	558,100	544,132	15,000
	Total	518,880	348,962	14,998	558,100	544,132	15,000	558,100	544,132	15,000	558,100	544,132	15,000
International organisations	0%	77,473	178,163	35,900	77,446	40,827	35,760	77,446	40,827	35,760	77,446	62	35,760
	20%	-	-		-	-	-	-	-	-	-	-	-
	50%	-	-		-	-	-	-	-	-	-	-	-
	100%	-	-		-	-	-	-	-	-	-	-	-
	150%	-	-		-	-	-	-	-	-	-	-	-
	Total	77,473	178,163	35,900	77,446	40,827	35,760	77,446	40,827	35,760	77,446	40,827	35,760
Institutions	0%	-	1,099,665		-	-	-	-	-	-	-	-	-
	2%	-	497,200		-	497,200	-	-	22,430	-	-	22,430	-
	20%	60,388,398	60,933,067	941,698	58,383,643	59,225,681	723,554	58,383,654	2,300,257	723,554	2,681,294	2,300,257	202,422
	50%	-	-	-	-	-	-	-	-	-	-	-	-
	100%	1,359,294	33,115		1,702,637	114	-	1,702,637	114	-	32,621	114	-
	150%	-	-	-	-	-	-	-	-	-	-	-	-
	Total	61,747,692	61,632,036	941,698	60,086,280	59,722,995	723,554	60,086,290	2,322,801	723,554	2,713,915	2,322,801	202,422
Corporates	20%	-	-	-	-	-	-	-	-	-	-	-	-
	50%	-	-	-	-	-	-	-	-	-	-	-	-
	100%	555,236	102,287	2,479	388,145	56,363	3,019	388,135	55,018	3,019	136,779	55,018	3,019
	150%	56	131	1	15	254	1	15	254	1	15	254	1
	Total	555,291	102,418	2,480	388,160	56,617	3,020	388,150	55,272	3,020	136,794	55,272	3,020
Undertakings for collective	100%	-	-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-	-	-
Equity	100%	9,574	4,678	1,201	9,221	4,236	1,201	9,221	4,236	1,201	9,221	4,236	1,201
	Total	9,574	7,745	1,201	9,221	4,236	1,201	9,221	4,236	1,201	9,221	4,236	1,201
Other items	0%	5	129		4	2	-	4	2	-	4	2	-
	100%	48,221	6,893	663	47,324	6,288	369	47,324	6,288	369	47,324	6,288	369
	Total	48,226	7,022	663	47,329	6,290	369	47,329	6,290	369	47,329	6,290	369
Total 2017		**71,925,964**	**70,302,416**	**1,950,613**	**68,724,850**	**67,050,674**	**1,760,478**	**68,724,850**	**9,649,135**	**1,760,478**	**11,101,120**	**9,583,308**	**1,239,347**
				Total 2016	**63,187,258**	**61,751,394**	**1,890,014**	**13,383,551**	**11,952,797**	**1,727,837**	**12,155,015**	**11,102,158**	**1,348,367**

* CRM (Credit Risk Mitigation techniques) is described in detail in 5.3 Credit risk mitigation on page 5-7.

Table 5-1. Total credit risk exposure values

Note: Investments in pension-linked fund shares and similar obligations in line with International Accounting Standards (IAS) 19/HGB §246 (2). The treatment is in line with point 109 of Article 4 CRR that states that "defined benefit pension fund assets" shall be calculated as the assets after the reduction of obligations under the same fund or plan. This is in line with the treatment under § 246 (2) HGB.

Collateral for specific securities lending products (for example, see "ASLplus" on page 5–11) are kept en bloc for various single loans (collateral pool). The necessary regulatory allocation of this collateral to the individual loans is performed by the reporting software. The collateral effectiveness varies according to different algorithms incorporated in the tools used for Germany and Luxembourg respectively. In addition, differences occur due to usage of differing FX rates. This leads mainly to deviations between CBL and CH Group in the figures for the "institutions" exposure class for the same loans.

In the tables that follow in this chapter, the credit exposures shown/used are always after consideration of CRM and Credit Conversion Factors (CCFs).

5.2.2 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.

At 31 December 2017, the geographical allocation of credit risk exposures was as shown in the following table. Most of the exposures of the Clearstream entities are in the European Union.

31 December 2017 (€'000)		Geographical areas				
Exposure class	Companies	European Union	Rest of Europe	North America	Rest of World	Total
Central governments or central banks	CH-Group	6,371,704	1,637	83	6,696	6,380,120
	CBL	5,516,070	67,402	117	6,541	5,590,130
	CBF	882,219	0	1	0	882,220
Regional governments or local authorities	CH-Group	376,965	0	0	0	376,965
	CBL	443,445	0	0	0	443,446
	CBF	54,125	0	0	0	54,125
Public sector entities	CH-Group	801,217	0	0	0	801,217
	CBL	641,987	0	0	0	641,987
	CBF	45,230	0	0	0	45,230
Multilateral development banks	CH-Group	0	311,153	0	246,947	558,100
	CBL	267	0	247,692	29,400	544,132
	CBF	0	0	0	15,000	15,000
International organisations	CH-Group	0	77,446	0	0	77,446
	CBL	40,694	133	0	0	40,827
	CBF	0	35,760	0	0	35,760
Institutions	CH-Group	31,374,064	26,018,687	843,332	1,850,197	60,086,280
	CBL	29,076,616	28,000,306	631,398	2,014,674	59,722,995
	CBF	720,048	3,458	47	1	723,554
Corporates	CH-Group	116,117	6,727	251,094	14,222	388,160
	CBL	25,189	6,997	3,891	20,540	56,617
	CBF	2,450	265	301	3	3,020
Undertakings for collective investment (Investment shares)	CH-Group	0	0	0	0	0
	CBL	0	0	0	0	0
	CBF	0	0	0	0	0
Equity	CH-Group	9,220	0	0	1	9,221
	CBL	3,500	0	0	736	4,236
	CBF	1,201	0	0	0	1,201
Other items	CH-Group	47,303	26	0	0	47,329
	CBL	6,290	0	0	0	6,290
	CBF	261	26	83	0	369
Total 2017	**CH-Group**	**39,096,589**	**26,415,674**	**1,094,510**	**2,118,063**	**68,724,836**
	CBL	**35,754,058**	**28,074,838**	**883,097**	**2,071,892**	**67,050,660**
	CBF	**1,705,534**	**39,508**	**432**	**15,004**	**1,760,478**
Total 2016	CH-Group	10,739,366	852,853	71,419	491,376	12,155,015
	CBL	10,236,246	78,520	323,170	464,222	11,102,158
	CBF	1,295,631	52,402	328	5	1,348,367

Table 5-2. Geographical allocation of credit risk exposures

Note: Differences occur due to use of differing FX rates.
Related to shifts in the exposure class allocation and different collateral valuations between CBL and CH Group, please refer to the Note under Table 5-1 on page 5–3.

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 intraday exposures.

31 December 2017 (€'000)		Maturity			
Exposure class	Companies	Not more than 3 months	Up to one year	Over one year	Total
Central governments or central banks	CH-Group	6,380,134	0	0	6,380,134
	CBL	5,590,144	0	0	5,590,144
	CBF	882,220	0	0	882,220
Regional governments or local authorities	CH-Group	50,001	10,001	316,962	376,965
	CBL	50,050	26,058	367,338	443,446
	CBF	0	10,001	44,124	54,125
Public sector entities	CH-Group	384	114,111	686,722	801,217
	CBL	0	87,828	554,159	641,987
	CBF	226	0	45,004	45,230
Multilateral development banks	CH-Group	15,596	0	542,504	558,100
	CBL	442	0	543,690	544,132
	CBF	15,000	0	0	15,000
International organisations	CH-Group	222	66,769	10,455	77,446
	CBL	220	40,607	0	40,827
	CBF	0	25,305	10,455	35,760
Institutions	CH-Group	60,084,779	1,188	313	60,086,280
	CBL	59,722,995	0	0	59,722,995
	CBF	723,554	0	0	723,554
Corporates	CH-Group	388,160	0	0	388,160
	CBL	56,617	8	2	56,627
	CBF	3,020	0	0	3,020
Undertakings for collective investment (Investment shares)	CH-Group	0	0	0	0
	CBL	0	0	0	0
	CBF	0	0	0	0
Covered Bonds	CH-Group	0	0	0	0
	CBL	0	0	0	0
	CBF	0	0	0	0
Equity	CH-Group	0	0	9,220	9,220
	CBL	0	0	4,236	4,236
	CBF	0	0	1,201	1,201
Other items	CH-Group	47,329	0	0	47,329
	CBL	0	0	6,290	6,290
	CBF	369	0	0	369
Total 2017	**CH-Group**	**66,966,606**	**192,069**	**1,566,175**	**68,724,850**
	CBL	**65,420,468**	**154,501**	**1,475,715**	**67,050,684**
	CBF	**1,624,388**	**35,306**	**100,784**	**1,760,478**
Total 2016	CH-Group	10,305,600	237,051	1,612,364	12,155,015
	CBL	9,371,966	231,900	1,498,292	11,102,158
	CBF	1,187,902	5,146	155,318	1,348,367

Table 5-3. Residual contract maturity

Note: Related to shifts in the exposure class allocation and different collateral valuations between CBL and CH Group, please refer to the Note under Table 5-1 on page 5–3.

Value adjustments and provisions:

Clearstream assesses, at each balance sheet date, whether there is objective evidence that a financial asset or group of financial assets are impaired applying the expected loss model as introduced by IFRS 9 Financial Instruments if applicable.

Clearstream does not have material amounts of value adjustments and provisions for credit risk exposures at present, mainly because of its business model which is focused on short term lending activities to enable efficient settlement processes and the possibility to directly collect the trade receivables within a couple of days.

Past due items and default or non-performing exposures:

Pursuant to the below-stated definitions, Clearstream 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 of the 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 Clearstream internal definition of "impairment" according to the German Commercial Code (HGB) as well as International Financial Reporting Standards (IFRS) 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 as well as CCBs for the operational network are selected based on a high degree of creditworthiness and operational reliability. Due to the short-term nature of the business performed by Clearstream, strict internal guidelines and a close monitoring of business, there were no credit losses within Clearstream since 1949.

5.2.3 Stress testing of credit risk

The term "stress test" comprises the entirety of qualitative and quantitative analysis methods of rare but plausible events. There are four stress tests 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 Clearstream is simulated on a monthly basis. To capture the worsening of the economy, certain credit risk model parameters are adjusted compared to the standard VaR simulation.
- The "Multiple Failures Stress Test", whose purpose is to assess the impact of the simultaneous default of two or more large customers on Clearstream's solvency and liquidity position.
- The "Bridge Stress Test", where the test assumes an insolvency of our Bridge[1] counterparty.

1. The "Bridge" is the electronic communications platform that facilitates the efficient settlement of securities transactions between counterparties in Clearstream Banking S.A. and Euroclear Bank. Transactions between a Clearstream customer and counterparties in Euroclear Bank settle across the Bridge.

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 Boards on a quarterly basis and to the Supervisory Board on a half-yearly basis.

In addition to the stress tests defined above, a "Reverse Credit Stress Test" is being performed, whose aim is to identify the number of unsecured credit lines that exceed the available risk bearing capacity.

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

5.3 Credit risk mitigation

Credit risk mitigation techniques, used by Clearstream for solvency purposes, are composed of hedging and collateralisation. Furthermore, a variety of account relation is maintained on a current account basis and therefore just net positions are relevant.

The companies of Deutsche Börse Group are highly integrated and perform a variety of services for each other. Therefore, respective fees are invoiced and, as a result, payables and receivables arise. To optimise cash flows and to reduce payment efforts in such cases where cash flows in both directions are material, positions are held on current accounts based on netting agreements. Debits and credits are netted immediately and net positions are settled once a month.

The accounts with customers or CCBs are, in general, maintained on a current account basis. Therefore, all movements per account and currency are immediately netted to a single account balance.

For credit purposes, except as otherwise agreed between the customer and Clearstream, all accounts of the customer with Clearstream, in whatever currency they are held, are deemed to form the elements of a single, indivisible current account and Clearstream may at any time set off, in whole or in part, credit and debit balances standing to any accounts held by the customer with Clearstream.

Despite these netting possibilities, no netting takes place for regulatory and risk management purposes. For credit purposes, cash credit positions out of these arrangements are taken as cash collateral. For solvency purposes this collateral is not considered (see 5.3.1 Collateral on page 5-7).

CBL acts as principal in the securities lending business within the ASLplus product, which is operated on a matched principal broking basis. Lending is performed if the ultimate lender as well as the borrower are both willing and able to close the deal and the collateral is available.

5.3.1 Collateral

5.3.1.1 Settlement credit limits

The purpose of the settlement credit limit is to facilitate the clearance of securities transactions against payment. Two types of credit limits are currently available, the Technical Overdraft Facility (TOF) and the Unconfirmed Funds Facility (UCF). Under the terms and conditions of the TOF and the UCF contracts, CBF/CBL has a pledge on all the customer's assets held on the customer's account(s) defined as pledge account(s) to secure obligations towards CBF/CBL by the customer for the services rendered by CBF/CBL to this customer. These contracts are complemented by netting provisions permitting the offset of credit and debit balances standing to customer accounts.

Collateral eligibility is defined and approved by the Credit section within the boundaries of the Credit Policy as approved by the Executive Boards. Eligibility and haircut are dependent on the security's credit, market, liquidity and legal risks.

Eligible collateral securities are subject to a margin deduction from their market value; haircuts range from 2% to 100% depending on the issue type and credit quality. The following instruments are eligible as collateral to support cash Financing facilities and the ASL Programme:

- Fixed income securities with a minimum S&P, Fitch or Moody's rating of BBB-/Baa3, issued by sovereigns and central banks; local and regional governments; government agencies and supranational institutions; corporate and credit institutions;
- European covered bonds.
- Selected Equities included in STOXX Europe 50 and STOXX North America 50 indices.

The following instruments are not eligible:

- Investment funds;
- Warrants;
- Structured securities, for example CDO, CLO, CLN, MBS;
- Own paper;
- Subordinated securities.

Collateral haircuts are automatically recalculated on a daily basis; collateral policy is reviewed at least once a year.

Customers' collateral positions are evaluated daily, based on prices received from various data vendors. Any transaction on a given account that would exceed the available collateral is automatically blocked by the system.

In some instances where no collateral can be provided by the customer, Clearstream may grant an overdraft facility based on third-party bank guarantees.

		31 December (€ '000)	
		2017	2016
TOF (Technical Overdraft Facilities)			
CBL		101,521,640	114,393,470
CBF		9,285,838	10,485,763
Consolidated		110,807,478	124,879,233
Utilised lines	**Unsecured**		
	CBL	0	11,869
	CBF	0	0
	Consolidated	0	11,869
	Secured		
	CBL	2,333,739	1,182,583
	CBF	616,044	788,289
	Consolidated	2,949,783	1,970,872
Collaterals (available)	**Cash**		
	CBL	x	x
	CBF	x	x
	Consolidated	2,820,995	1,139,168
	Securities		
	CBL	x	x
	CBF	x	x
	Consolidated	107,251,466	131,290,721
Over-collateralisation (difference between utilised lines and available collaterals)	**CBL**	x	x
	CBF	x	x
	Consolidated	107,122,678	130,459,017

Table 5-4. External credit lines and utilisation

Like the cash credit positions, received securities collateral and guarantees are also not considered for solvency purposes as the average outstanding debit amount, especially after weighting with the respective risk weighting, is, in general and on average, low and additional cost for CRM usage does not give a positive cost-to- benefit ratio.

New Technical Overdraft Facility lines for CBL are granted on an intraday basis only (iTOF). Remaining TOF lines for CBL and all TOF lines for CBF are in the process of being changed to intraday basis.

5.3.1.2 Collateralised placing

CBL places a major part of the group's liquidity on the basis of reverse repo agreements with a maximum maturity of one year, but usually with maturities of three months or less. Repo transactions must be governed by a Global Master Repurchase Agreement (GMRA) and are only closed with banking counterparties fulfilling minimum rating criteria.

Repo transactions are settled via Clearstream's settlement system or the Euroclear system via the "Bridge" or the domestic settlement systems of Clearstream's depositories. All settlement systems used are proven for that type of transaction.

Securities for placings taken as collateral have to fulfil specific requirements:

- Only the most liquid, least volatile and daily priced debt instruments with a defined credit rating (minimum long-term credit rating of Moody's [Aa3] or Standard & Poor's [AA-] or Fitch [AA-]; in the absence of a rating for the issue, the issuer rating (lowest available is relevant) are eligible as collateral for repo transactions.
- Issuers are limited to sovereigns, local governments, government agencies that are explicitly guaranteed by national governments, supranational banks and all issuers with an explicit sovereign or local government guaranty.
- Not acceptable as collateral are: ABS, MBS (RMBS and CMBS) and other forms of non-standard collateral (such as CDOs, derivative bonds, credit-linked bonds, callable bonds, perpetual bonds, warrants).
- All collateral must have an active market and must be liquid.
- Subordinated securities are not eligible.
- Transactions in which the securities given as collateral are issued by either the counterparty ("own assets") or an affiliate of the counterparty are not allowed. For this reason, specific wrong way risk does not play a role in Clearstream.
- The maximum remaining life to maturity of the accepted securities is 10 years.

Cross-currency collateralisation is in general possible. It was not used for bilateral transactions but in the context of triparty repos. Bilateral transactions must be "plain vanilla" on a single fixed-income security. In triparty transactions (including Eurex Repo GC Pooling transactions), multiple fixed-income securities may be taken as collateral. Structured transactions are not allowed.

Haircuts on the securities are applied within triparty repo transactions (including Eurex Repo GC Pooling transactions). All collaterals are valued daily. To secure the cash lent through reverse repurchase agreements, CBL agrees margin calls with the repo counterparty on a daily basis to keep cash and collateral in balance.

For solvency purposes, according to Article 227 CRR the application of zero volatility adjustments is possible in most cases. 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.

Counterparty/ Exposure Class Institutions (banks)	31 December (€' 000) 2017		31 December (€' 000) 2016	
	CH-Group	CBL	CH-Group	CBL
Exposure - book value	5,084,223	5,344,982	4,330,819	4,433,174
Collateral - market value	5,132,237	5,399,910	4,334,056	4,458,648
RWA	85,734	27,367	16,411	3,117

Counterparty/ Exposure Class Corporates	31 December (€' 000) 2017		31 December (€' 000) 2016	
	CH-Group	CBL	CH-Group	CBL
Exposure - book value	250,178	0	94,870	0
Collateral - market value	250,086	0	95,001	0
RWA	92	0	2	0

Table 5-5. Placements

5.3.1.3 ASLplus

The ASLplus Programme is a Securities Lending programme that enables customers to enhance the revenues that can be realised as a lender by offering access to the wholesale trading market. CBL acts as principal to the lenders in ASLplus and lends on securities to market participants through various counterparties.

The Credit section defines collateralised securities borrowing limits for each borrower and credit limits are agreed on the basis of standard framework agreements between CBL and each borrower. Only securities rated A+[1] and above are eligible for collateral with haircuts ranging from 2% to 15% depending on the issuer type. Furthermore, both the exposure and the collateral are subject to daily valuation and remargining; the exposure and the collateral may be denominated in a different currency.

Mortgage-backed and other structured securities are not eligible as collateral.

To mitigate cross-currency risk in ASLplus, additional coverage is requested where there is a currency mismatch between a customer's loan and collateral portfolios. The add-on haircut ranges from 0.5% (if the currency mismatch represents more than 20% of the exposure amount) to 2% (if it exceeds 80%) for three business days.

The additional haircut requirement may be increased to the following marks if the foreign exchange mismatch amount exceeds the indicated thresholds:

- 3% for FX mismatch amount between EUR 2 billion and EUR 2.75 billion;
- 4% for FX mismatch amount between EUR 2.75 billion and EUR 3.5 billion;
- 6% for FX mismatch amount above EUR 3.5 billion.

Collateral for ASLplus business is delivered in a collateral pool serving several loans. Out of the pool, collateral valued at least to the requested collateral value based on internal credit rules is blocked for the total of the associated loans. No allocation on a loan by loan basis is done for credit purposes.

1. Securities rated below A+ are accepted with restrictive concentration limits for certain collateral schedules.

As for the collateralised placing, a zero weighting by the application of Article 227 CRR is, in general, possible. As the lending business is covering a wider scope of securities that do not fulfil the criteria as laid down in Article 227 CRR, while the collateral given by the ultimate lender only partially fulfils these criteria, only a portion is zero weighted. For the remainder, the supervisory haircuts are applied. As there is a notable portion of cross-currency collateralisation, additional FX haircuts are applied

Counterparty Institutions (banks)	31 December (€' 000) 2017		31 December (€' 000) 2016	
	CH-Group	CBL	CH-Group	CBL
Exposure - book value	52,121,910	52,142,172	44,766,972	44,862,508
Collateral - market value	52,602,967	54,440,063	47,035,046	46,476,823
RWA	111,544	101,496	141,441	763,982

Table 5-6. Exposures on the ASLplus Programme

Note: The necessary regulatory allocation of this collateral to the loans is performed by the reporting software. The collateral effectiveness varies according to different algorithms incorporated in the tools used for Germany and Luxembourg respectively. In addition, differences occur due to usage of differing FX rates. This leads to deviations between CBL and CH Group in the figures for the "institutions" exposure class for the same loans.

5.4 ASL

5.4.1 Business description

The Automated Securities Lending (ASL) Programme is a fails lending product that is integrated into CBL's settlement engine and is designed to maximise customer settlement efficiency.

CBL acts as:

- Lending Agent, offering:
  - Automatic detection of loan requirements to cover a failed trade;
  - Automatic identification of loan supply from ASL lenders;
  - Anonymous transfer of securities to the ASL borrower (undisclosed relationship between lender and borrower);
  - Administration of the loan.
- Collateral Agent, monitoring the quality and sufficiency of collateral regarding:
  - Eligibility;
  - Collateral value;
  - Concentration limits;
  - Fluctuations in the market values of positions pledged as collateral (mark-to-market of the loan and the collateral);
  - Securities prices, reviewed several times a day depending on the closing time of the market;
  - Automatic collateral substitution.
- Guarantor for the collateralised loans:
  - Underwriting the risk involved if the borrower defaults on its obligations;

– Managing collateral securities pledged by the borrower to CBL;
– Assigning loan limits to borrowers to avoid any new loan opening if the limit is reached.

5.4.2 Risk guarantee

In the ASL Programme, each lent position is guaranteed by CBL. The guarantee is backed by securities pledged by the borrower, as follows:

- Collateral securities are pledged by the borrower to CBL under a first ranking Luxembourg law pledge. Collateral quality and sufficiency are monitored by CBL daily.
- Second ranking pledge on collateral in favour of the lender - in the unlikely event of a simultaneous default by CBL and the borrower, the right to the collateral passes to the lender.

5.4.3 Coverage value

The coverage value of the guarantee related to an ASL loan is equal to the market value of the securities plus an additional margin. Standard margins, varying from 0% to 15%, are applied depending on the securities lent.

5.4.4 Collateral eligibility

The collateral eligibility criteria of the ASL Programme are the same as those for Clearstream's settlement engine.

Collateral eligibility is defined and approved by the Credit section. Eligibility and haircut are dependent on the credit, market, liquidity and legal risks of the security.

Securities that are eligible are subject to a margin deduction from their market value; haircuts range from 2% to 100% depending on the issue type and credit quality.

Securities issued by or correlated to the customer are not eligible as collateral.

Collateral haircuts are automatically recalculated daily; collateral policy is reviewed at least once a year.

Customers' collateral positions are evaluated daily, based on prices received from various data vendors. Any transaction on a given account that would exceed the available collateral is automatically blocked by the system.

5.5 Monitoring and reporting

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

The reporting approach as described under 3.1.5 Risk reporting on page 3-4 and 3.5 Group-wide risk reporting and monitoring on page 3-9 also applies to the management of credit risk. On this basis, Group Risk Monitoring assesses the credit risk and reports VaR results as well as risk issues to the Executive Boards. Besides the assessment of the VaR, Group Risk Monitoring also measures credit risk concentration and performs stress test calculations on credit risk (see 5.2.3 Stress testing of credit risk on page 5-6).

5.6 Disclosures on derivative credit risk

Clearstream is, in general, not involved in the derivatives business. In particular, at the end of 2017, there were limited derivatives positions in the books of Clearstream entities.

These are, to a small extent, used to hedge interest rate or foreign exchange risk. Such instruments can only be used in established and regularly tested operational procedures.Hedging documentation is maintained to IAS39 standards. The dealings with interest rate or foreign exchange risks (measurement, assignment of internal capital and limits etc.) are described in detail in 6. Management of market risk, including interest rate risk of exposures not included in the trading book on page 6-1.

In cases where a certain level of foreign exchange exposure, and therefore risk, is exceeded, the risk of each individual currency exposure should be hedged. For Clearstream, the level of materiality is expressed as 10% of consolidated EBIT of the budget year to be hedged for each individual currency exposure. For the protection of Clearstream's budgeted interest income, the Treasury section may hedge the budgeted interest income for up to 50% of the customer credit balances for the upcoming budget period(s) through approved hedging instruments.

Foreign exchange outright contracts hedging the foreign exchange risk are settled via Continuous Linked Settlement (CLS)[1], to minimise settlement risk, and executed with counterparties only where a Credit Support Annex (CSA) is signed to mitigate credit risk resulting from market movement.

The Standardised Method pursuant to Article 276 CRR is used by Clearstream to calculate the exposure value for OTC derivative instruments and long settlement transactions. The original exposure thus obtained is the exposure value.

FX swaps are considered as funding or an investment vehicle for currencies where no or limited deposit market exists (overnight swaps) or to convert USD liquidity (overnight and/or term FX swaps) into EUR used to purchase/repo against highly liquid paper delivered to BCL serving as liquidity buffer.

Exposure Value	Currency	31 December 2017 (mn)	31 December 2016 (mn)
Cross-currency swaps	EUR	49.4	62.8
Forward Foreign Exchange Contracts	EUR	1.6	0.0
Gross positive Fair Value	**Currency**	**31 December 2017 (mn)**	**31 December 2016 (mn)**
Cross-currency swaps	EUR	2.0	72.4
Forward Foreign Exchange Contracts	EUR	0.7	0.1
Notional/Trade Value	**Currency**	**31 December 2017 (mn)**	**31 December 2016 (mn)**
Cross-currency swaps	EUR	2,471.3	3,137.5
Forward Foreign Exchange Contracts	EUR	77.7	2.1

Table 5-7. Exposures in derivatives of CH

1. CLS (Continuous Linked Settlement): CLS is a global multi-currency settlement system that aims to eliminate foreign exchange (FX) settlement risk due to time-zone differences by settling both legs of an FX transaction simultaneously (payment vs. payment).

Exposure Value	Currency	31 December 2017 (mn)	31 December 2016 (mn)
Cross-currency swaps	EUR	49.6	60.8
Forward Foreign Exchange Contracts	EUR	1.5	0.0

Gross positive Fair Value	Currency	31 December 2017 (mn)	31 December 2016 (mn)
Cross-currency swaps	EUR	2.0	72.4
Forward Foreign Exchange Contracts	EUR	0.7	0.1

Notional/Trade Value	Currency	31 December 2017 (mn)	31 December 2016 (mn)
Cross-currency swaps	EUR	2,480.7	3,071.7
Forward Foreign Exchange Contracts	EUR	77.1	2.1

Table 5-8. Exposures in derivatives of CBL

5.7 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 Clearstream and a mandatory participation in the Society for Worldwide Interbank Financial Telecommunication (SWIFT), as CBL and CBF are some of the largest users of SWIFT. Due to the strategic alignment, no participation is held in order to make short-term profits (no trading intent).

5.7.1 Equities in the non-trading book

As described in Chapter 1.3.1, at 31 December 2015, LuxCSD S.A. is no longer classified as subsidiary of CBL for accounting and regulatory purposes. LuxCSD S.A. is now classified as joint venture and due to its low size regarding the balance sheet volume, it is not consolidated in the regulatory group any longer. Therefore the participation in LuxCSD is held as equity in the non-trading book.

Owing to the SWIFT constitution, CBL and CBF must hold a participation in SWIFT. In addition, the 50% participation of CBL in the trade repository REGIS-TR is held as equity in the non-trading book as well.

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

For valuation and accounting purposes the German GAAP according to the German Commercial Code (HGB) is relevant for CH Group on a consolidated level and for CBF's equities in the non-trading book. According to the specifications of HGB, equities in the non-trading book are defined 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 requirements for fixed assets. Items of fixed assets may be written down to carry them at the lower of cost or market value at the balance-sheet date. Impairment losses are recognised if impairment is expected to be permanent.

The valuation and accounting specifications of International Financial Reporting Standards (IFRS) are relevant for CBL's participations. In accordance with IAS 39.9, the participations of CBL are treated as available-for-sale financial assets.

The initial measurement is based on its fair value. For the purposes of subsequent measurement, the fair value without deduction for transaction costs that the financial asset may incur on sale or other disposal has to be taken into account. Fair value is defined as the amount for which an asset could be exchanged between knowledgeable willing parties in an arm's length transaction.

The following table considers in particular the participations in LuxCSD, SWIFT and REGIS-TR that are held as equities in the non-trading book:

	31 December 2017 (€' 000)			31 December 2016 (€' 000)		
	CH-Group	CBL	CBF	CH-Group	CBL	CBF
Fair value of investments	12,503	9,172	1,579	12,677	9,148	1,565
Balance sheet value	9,220	9,172	1,201	9,783	9,148	1,201
Total unrealised gains (losses)	3,283	2,905	378	2,894	2,530	364
thereof total revaluation gains (losses)	3,283	2,095	378	2,894	2,530	364
Amounts included in the original or additional own funds	0	0	0	0	0	0

Table 5-9. Equities in the non-trading book

Note: None of the participations is listed on any exchange.

5.8 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 2014[1]. 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 information is disclosed at the consolidated level of CH group.

Main source of encumbrance is a security from the portfolio of CBL that was partially used as a default fund contribution to a CCP. However, the overall level of encumbrance is very low as shown in Table 5-10 on page 5–17. Unencumbered assets in column 60 are mainly related to the following positions:

- Collateralised Placings: As described in 5.3.1 Collateral on page 5-7, CBL enters into (reverse) repo transactions which account for around 76% of the unencumbered assets in column 60;
- Placings: Customer liquidity that is mainly placed overnight amounts to around 15% of the unencumbered assets;
- Own Securities: Approximately 11% of unencumbered assets are investments of both CBL and CBF in debt securities;

Other assets: The remaining unencumbered assets are mainly other receivables and intangible assets. The amount of other assets shown in row 120 of the following Table 5-10 on page 5–17 is not a residual value, it is a subitem as are the other rows 030 and 040.

Row 010 column 60 shows the aggregated median of 18,243,560 billion EUR which consists of loans on demand, equity instruments, debt securities and other assets which are all unencumbered.

1. 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.

31 December 2017 (€' 000) CH-Group					
		Carrying amount of encumbered assets	Fair value of encumbered assets	Carrying amount of unencumbered assets	Fair value of unencumbered assets
		010	40	60	90
010	**Assets of the reporting institution**	**4,079**	**0**	**18,243,560**	**0**
030	Equity instruments	0	0	9,606	0
040	Debt securities	4,079	4,079	1,865,167	1,869,166
120	Other assets	0	0	197,502	0

Table 5-10. Encumbered and unencumbered assets

In table 5-11 the fair value of the non-encumbered collaterals from collateralised placings is shown.

31 December 2017 (€' 000) CH-Group			
		Fair value of encumbered collateral received or own debt securities issued	Fair value of collateral received or own debt securities issued available for encumbrance
		010	040
130	**Collateral received by the reporting institution**	-	**6,216,436**
160	Debt securities	-	6,216,436

Table 5-11. Collateral received

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

31 December 2017 (€' 000) CH-Group			
		Matching liabilities, contingent liabilities or securities lent	Assets, collateral received and own debt securities issued other than covered bonds and ABSs encumbered
		010	030
010	**Carrying amount of selected financial liabilities**	**0**	**0**

Table 5-12. Encumbered assets/collateral received and associated liabilities

This page has intentionally been left blank.

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

The information in this chapter is presented in the following sections:

In all the tables shown in this chapter, the data for CH and CBF is based on the German GAAP according to the German Commercial Code (HGB). The data for CBL is based on International Financial Reporting Standards (IFRS).

6.1 Strategy, process, structure and organisation

Clearstream is not involved in proprietary trading activities and does not maintain a trading book. Market risks arise as currency risk in net positions in foreign currencies. Money market activities (mostly secured) and investments in securities as part of the investment or short-term portfolios that are purchased with the intention to "buy and hold" lead to interest rate risk in the non-trading book. Treasury Investment Policy defines the limits set for money market activities and securities purchase transactions. Furthermore, market risks arise in Clearstream's portion of the Deutsche Börse group-wide CTA and in the Clearstream Pension Fund.

Clearstream's general structure, organisation and process of risk management as well as the risk strategy is described in 3. Risk management overview on page 3-1.

The Treasury Investment Policy sets the frame for hedging future currency risk and interest income. It includes the approved hedging instruments and the delegation of power for hedging of interest income and foreign exchange risk. For Deutsche Börse Group, the level of materiality of future currency risk is expressed as 10% of consolidated EBIT of the budget year to be hedged for each individual foreign currency exposure. For the protection of Clearstream's budgeted interest income, the Treasury section may hedge the budgeted interest income for up to 50% of the customer credit balances for the upcoming budget period(s) through approved hedging instruments.

Regarding market risk, the risk strategy is translated into a limit system, which is monitored on a regular basis. The Treasury Investment Policy defines limits and responsibilities.

Management of market risk, including interest rate risk of exposures not included in the trading book

6.2 Measurement

Besides the overall risk appetite calculated via VaR (see 3.2 Risk management methodology on page 3-4), interest rate risk is calculated on all positions under Treasury management, applying a predefined parallel shift on the yield curve (see 6.6.2 Interest rate risk situation on page 6-4). On a daily basis, interest rate risk on all positions under Treasury management is computed by applying a 1% parallel shift for the money market portfolio and a 2% parallel shift for the investment portfolio to the respective yield curve and assessing the resulting effect on the net present value (NPV) of this portfolio.

In cases where Clearstream's budgeted interest income should be hedged, the effectiveness of potential hedges is measured and the credit rating of the trade counterparties is controlled on a regular basis.

Foreign exchange risk is controlled using a limit system. As Clearstream has payables and receivables in foreign currencies, only the net exposure is relevant for the exposure calculation. In cases where a certain level of foreign exchange exposure is exceeded in a currency, the risk of this currency exposure should be hedged. For Clearstream, the level of materiality is expressed as 10% of consolidated EBIT of the budget year to be hedged for each individual currency exposure. The effectiveness of potential foreign exchange risk hedges is measured and the credit rating of the trade counterparties is controlled on a regular basis.

6.3 Market risk mitigation

Market price risk can arise in connection with cash investments or borrowing because of fluctuations in interest rates, foreign exchange rates and other prices, as well as through corporate transactions. In the year under review, no foreign exchange hedge was undertaken.

If a foreign exchange hedge is undertaken, testing of the effectiveness of hedging transactions is performed on a regular basis in compliance with IAS 39.

6.4 Monitoring and reporting

Market risk control is performed by Treasury Middle Office. Treasury Middle Office is responsible for monitoring compliance with limits and issues monthly reports to the relevant Executive Management and to Group Risk Monitoring. Treasury Middle Office monitors exposures against limits on a daily basis and immediately reports excesses to Executive Management, Group Risk Monitoring and Treasury. This function is independent from the Treasury Front Office department that controls liquidity and executes transactions (liquidity management function).

6.5 Specific disclosures for market risk

Foreign exchange risk:

CBL and CBF transact settlement and custody services business in more than 40 different currencies.

Customers maintain cash and securities accounts with CBL or CBF in those currencies in which they transact their business. Amounts in currency transmitted to CBL or CBF by customers are registered on the respective customers' account(s) in that currency. The same is true for any withdrawal of funds by customers (for example, for settlement purposes or for custody payments).

Debits and credits of all customers in the same currency are held by the respective Clearstream legal entity (CBL or CBF) at its cash correspondent banks (CCBs). For most of the business, CBL is the CCB for CBF and CBF's net customer position is therefore included in CBL's position. Treasury analyses balances per currency as a basis for placings. Where there is a requirement to fund net currency credit

facilities, such takings are always made in the relevant currency. Therefore, with respect to multicurrency settlement, CBL or CBF bear no material currency risk.

A limited amount of local currency is held in each location, at CBL representative offices, to cover expenses. In addition, interest earned on currency placings above interest payable to customers on currency balances will cause small (generally long) currency positions.

Additionally, Clearstream provides foreign exchange service to its customers. Foreign exchange risk resulting from the execution of customer foreign exchange requests is covered daily in the foreign exchange market to remain within the approved limits set in the Clearstream Treasury Investment Policy. Treasury Middle Office monitors, on a daily basis, residual foreign exchange positions against approved limits and reports to Senior Management in case of limit violations. In 2017, no limit violations were reported.

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

6.6.1 Interest rate risk nature

Customer liquidity of CBL and CBF is placed and refinanced primarily through overnight secured reverse repos, placings with Banque centrale du Luxembourg and Deutsche Bundesbank in EUR currency and overnight foreign exchange swaps. In addition, CBL and CBF primarily purchase highly liquid and low risk-weighted investments for capital ratio purposes. The investment portfolio of CBL and CBF is aimed at providing core capital investment. Consequently, these portfolios are constructed to contain both market and credit risks and consist mainly of zero risk-weighted debt securities.

Derivative instruments are not offered to customers. The use of derivative instruments is restricted to:

- Interest rate swaps and forward foreign exchange contracts that hedge or eliminate structural foreign exchange and interest rate exposures.
- FX swap contracts to avoid large unsecured exposures with commercial banks and/or to convert available funds in a currency into another currency where funds are required to support the securities settlement efficiency.

Clearstream monitors currency and interest rate exposures daily by means of reporting generated by the general ledger accounting system and its customer cash ledgers or the Treasury ledger.

Management of market risk, including interest rate risk of exposures not included in the trading book

6.6.2 Interest rate risk situation

Clearstream's assets and liabilities are managed to contain interest rate risk (IRR) within the limits established by the Treasury Investment Policy. Liabilities usually determine the structure of its assets. The close matching of investments and customer deposits ensures that Clearstream can control its IRR.

The Treasury Investment Policy defines the maturity mismatch limits, the IRR sensitivity limits and the maximum tenor for each currency or group of currencies. Limits are based on IRR, the concept of duration and gap. Duration means the remaining maturity of every deal on the asset and liability side. Gap means the IRR on the asset side minus the IRR on the liability side. The IRR is calculated daily based on the net present value (NPV) of a 1% interest rate change for trades/instruments with a remaining life to maturity less than one year and 2% otherwise.

	31 December 2017 (€' 000)				31 December 2016 (€' 000)			
	Mismatch/Portfolio limit		Interest Rate Risk (IRR)		Mismatch/Portfolio limit		Interest Rate Risk (IRR)	
	Exposure	Limit	Exposure	Limit	Exposure	Limit	Exposure	Limit
CBL Investment portfolio (Fixed and FRN)	1,714,569	2,500,000	44,193	92,000	2,003,305	2,500,000	53,524	72,000
CBF Investment portfolio (Fixed and FRN)	149,000	175,000	2,963	8,000	154,000	175,000	4,859	8,000
CBL MM portfolio	2,962,090	7,300,000	4,982	26,000	3,260,545	7,300,000	4,964	24,000
CBF MM portfolio	114	300,000	114	1,000	114	300,000	119	1,000

Table 6-1. Limits for Clearstream Group according to the Treasury Policy

Based on BaFin and CSSF requirements[1], Clearstream calculates also the IRR of the non-trading book as a percentage of own funds. The IRR is measured as a 2% parallel shift of the yield curve. The non-trading book includes the investment portfolio and related fair value hedges, cash flow hedges and the short- term portfolio.

Clearstream Banking S.A., Luxembourg		31 December 2017	31 December 2016
Interest Rate Risk - Banking Book (IRRBB) as per circular CSSF 08/338			
Net Asset position (in EUR equivalent)	(€' 000)	3,299,043	3,541,752
IRRBB based on parallel shift of the yieldcurve of 200 bps	(€' 000)	15,728	19,632
Base Capital*	(€' 000)	1,061,530	1,010,512
IRRBB as percentage of own funds		1%	2%
Threshold for reporting to CSSF		20%	20%
Clearstream Banking AG, Frankfurt			
Interest Rate Risk - Banking Book (IRRBB) as per BaFin circular 11/2011 (BA)			
Net Asset position (in EUR equivalent)	(€' 000)	150,780	155,557
IRRBB based on parallel shift of the yield curve of 200 bps	(€' 000)	1,218	2,000
Own funds**	(€' 000)	308,889	288,283
IRRBB as percentage of own funds		0%	1%
Threshold for reporting to BaFin and Deutsche Bundesbank		20%	20%

Table 6-2. Investment portfolio limits and interest rate risks

* The Base Capital for CBL is based on International Financial Reporting Standards (IFRS) and consists of eligible own funds plus the profit of the year minus interim dividends (not considering deductions).

** The own funds for CBF are based on German Commercial Code (HGB) modified by the own funds rules for solvency purposes by the German Banking Act (KWG).
The regulatory prescribed threshold has never been reached within the year under review.

1. http://www.cssf.lu/en/supervision/banks/regulation/circulars/info/article/1719/
https://www.bafin.de/SharedDocs/Veroeffentlichungen/DE/Rundschreiben/rs_1111_ba_zinsaenderungsrisiken_anlagebuch.html

Management of market risk, including interest rate risk of exposures not included in the trading book

According to the BaFin General Administrative Act[1], as of the 31 December 2017, CBF 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 must be considered.

In the following 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 2017 (€' 000)
IRRBB	1,218
Total risk exposure amount	1,587,446
IRRBB as percentage of total risk exposure amount	0.08%

Table 6-3. Interest rate in the banking book of CBF

6.6.3 Foreign exchange risk measurement

Foreign exchange currency positions stemming from corporate activities and customer foreign exchange transactions are covered via spot foreign exchange transactions. The Treasury Investment Policy defines the maximum open foreign exchange position allowed for all currencies. A report showing the foreign exchange positions in all currencies is produced daily. Treasury Back-Office unit (hierarchically independent from Treasury) controls the report and reports any overstepping against the limit to Executive Boards. No overstepping was reported in 2017.

Forward foreign exchange transactions may be undertaken in anticipation of expected future exposures in foreign currencies as was the case in November 2017 to hedge the expected foreign exchange exposure resulting from CBL's budgeted USD based net interest income (NII) for the year 2018. On 31 December 2017, the reported foreign exchange hedging exposure was USD 75 mn.

1. 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

Management of market risk, including interest rate risk of exposures not included in the trading book

This page has intentionally been left blank.

7. Management of liquidity risk

The information in this chapter is presented in the following sections:

7.1 Governance

Liquidity Risk Management is incorporated into Clearstream's governance set-up. Treasury performs the day-to-day liquidity risk management for CBL and CBF on a consolidated basis. Clearstream Risk Management and Treasury Middle Office are regularly reporting on the liquidity risk of Clearstream and the results of stress tests.

Clearstream Risk Management oversees the liquidity risk exposure from the second-line of defence perspective and supports Treasury with assessment, monitoring and reporting activities.

In addition, the Clearstream Compliance and Risk Committee (CRCC) monitors and oversees those activities and makes recommendations to the relevant executive boards.

Clearstream's liquidity risk appetite represents the level of liquidity risk that Clearstream accepts to pursue its business objectives and in meeting its regulatory obligations.

The risk acceptance criteria are translated into a limit system and liquidity stress test scenarios are defined in accordance with appetite.

Regarding the limit systems and in addition to regulatory ratios, Clearstream has defined prudent internal liquidity limits to ensure conservative assumptions about a changing liquidity situation. These limits prohibit the creation of mismatch positions if there is a sudden or temporary decrease of available cash until the liquidity risk exposure allows it again. Liquid assets should amount at least to a minimum percentage (depending on the currency or group of currencies) of the last 30-day average net customer cash balances.

Treasury Middle Office is responsible for issuing daily and monthly reports to Executive Management and to Clearstream Risk Management. Treasury Middle Office monitors daily limit observances and routinely reports breaches to Executive Management and Clearstream Risk Management.

A variety of stress tests are used as a main control tool for liquidity risk. A liquidity stress test is always described by identifying the liquidity needs in case of a certain event and to analyse whether enough liquidity sources are available to cover those needs within a certain timeframe. The design of a stress test scenario is such that the assumptions have to be extreme, but plausible. The stress tests are calculated and reported on a regular basis by Risk Management. Where the liquidity stress tests result in breaches, Clearstream Risk Management (CRM) will report to the CRCC and the relevant Executive Boards of Clearstream. Jointly with CRM, Treasury will review and adjust its contingency plan, and/or funding plan, and inform the relevant Boards. CRM and Treasury will evaluate and adjust the adequacy of its liquidity risk management framework and liquidity providers in accordance with the results and analysis of the stress tests.

In terms of the liquidity management strategy the liquidity management policy proposed by Treasury is approved by the Executive Management of CBF, CBL, CH, CI and the Supervisory Boards of CBL and CI. With reference to the approval process of the liquidity management strategy, Clearstream's liquidity management strategy and limits are approved within the annual update of the Clearstream Treasury Liquidity Management policy proposed by Treasury. Additional day-to-day implementation is under the Head of Treasury Luxembourg/Singapore, reporting to the Head of Treasury and the Chief Financial Officer of Deutsche Börse AG.

7.2 Regulatory framework

The overall liquidity management regulatory framework established considers the following applicable laws and regulations:

BCL	2012/299	U.S. Dollar denominated funding of credit institutions
CSSF	09/403	Sound liquidity risk management
CSSF	12/537	U.S. Dollar denominated funding of credit institutions
CSSF	12/552	Central administration, internal governance, and risk management
CSSF	Regulation N° 14-01	Regulation on the implementation of certain discretions of Regulation (EU) No 575/2013
CSSF	15/620	Law of 23 July 2015. Transposition under Luxembourg law of directive 2013/36/EU on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms (CRD IV)
EU	575/2013	Prudential requirements for credit institutions and investment firms (CRR)
EU	2015/61 909/2014	Commission delegated regulation supplementing CRR with regard to liquidity coverage for credit institutions
EU	2017/390	Regulation on improving securities settlement in the EU and on central securities depositories (CSDR)
MaRisk	10/2012	Central administration, internal governance, and risk management
CPSS IOSCO	04/2012	Principles for financial market infrastructures

7.3 Relationships between group entities

The liquidity management strategy is executed by Treasury Luxembourg/Singapore on a centralised basis combining liquidity from CBL, CBF and other Clearstream entities for which cash pooling between the entity and CBL or CBF is in place. In this regard CBF maintains a cash account with CBL where it can withdraw funds same day and Clearstream Holding acts as a holding company without an operating business. As such, its main earnings source is dividend income from Clearstream International. Available liquidity is largely lent to Deutsche Börse AG in a cash pool with daily availability of funds. Besides that, Clearstream Holding holds limited balances in a current account with a commercial bank. As a holding company, Clearstream Holding does not conduct customer business, and is therefore not subject to the associated liquidity risks.

7.4 Strategy

For Clearstream, the target for the liquidity management is the ability to respond to daily, including intraday, changing customer net long/short cash balances. Customers maintain cash balances with Clearstream and draw on credit facilities as a result of their securities settlement activities.

Treasury's investment strategy is driven by the cash amounts customers leave on their settlement accounts with Clearstream Banking and strict mismatch limits are established to limit liquidity risk that may arise from Treasury investments. Consequently, Treasury must invest funds with the objective:

i) to have sufficient liquid resources such as highly liquid collateral or investments readily available and convertible into cash to sustain liquidity risks under a wide range of potential stress scenarios including intraday and

ii) to have a maximum of liquidity available within one business day including intraday via overnight secured / unsecured placements and overnight foreign exchange swaps with creditworthy financial institutions mostly executed after the customer deadline towards the respective currency.

Due to the very short-term nature (mainly intraday) of Clearstream obligations arising from its core settlement activities, there is no need for long term funding. Clearstream liquidity requirements are intraday and overnight. However, to keep a sufficient market presence for potential contingency situations, Clearstream has a multi-currency EUR 1 bn Euro Commercial Paper (ECP) programme in place under which it permanently issues, mostly in USD and EUR currencies, with an issuance target of 250 mn EUR equivalent with an initial tenor over 30 days outstanding at all times.

Mismatch limits are allocated to acquire highly liquid securities (collateral via reverse repo trades or assets via direct investments) which can be utilised for liquidity generation in the repo market or via ECB standing facilities in the EUR currency and to ensure a permanent liquidity buffer readily available and convertible into cash. These highly liquid assets forming the liquidity buffer are placed in separate accounts under the direct management of Treasury in its liquidity function with the sole intent of using them as a source of contingent funds, including during stress periods, for overnight funding transactions.

7.5 Objectives

For Clearstream the target for the liquidity management is the ability to

- Manage changing customer net long/short cash balances on an intraday basis and overnight by currency to meet all payment obligations, and
- Support the securities settlement efficiency of its customers intraday.

7.5.1 Meet payment obligations

Customers maintain cash balances with Clearstream and may additionally draw on credit facilities (unconfirmed funds facility (UCF) and intraday technical overdraft facilities (i-TOFs)) as a result of their securities settlement activities. For EUR, USD, GBP, AUD and JPY, Treasury analyses the historical net customer cash balance development to determine the minimum balance that is available for investments with a tenor exceeding overnight (Treasury mismatch limits). Customer requests to pay out customer long balances and payments related to trades initiated by Treasury are addressed in the established liquidity stress scenarios.

7.6 Measurement

As defined in the Clearstream Liquidity Management Policy, liquidity usage and sources are shared between both entities, while prudent concentration limits ensure that intercompany liquidity exposures are contained within approved limits.

To ensure that Clearstream has its liquidity risk under control, Treasury permanently measures and monitors the expected and actual cash flows stemming from cash and securities settlement activities per currency and per agent.

In order to ensure that there is sufficient liquidity (including intraday) to honour its liquidity management objective, Clearstream has ex ante liquidity risk mitigating measures[1] in place. Ex post, Clearstream verifies that all obligations have been met and all buffer and ratio requirements comply as set in the policies.

In addition, Clearstream performs the following types of stress tests:

- Daily liquidity stress tests;
- Classic liquidity stress tests (quarterly);
- Reverse liquidity stress tests.

The aim of the daily and classic liquidity stress tests is to check for possible liquidity shortfalls under different stress scenarios (base scenario, market disruption scenario, market disruption/idiosyncratic scenario and cover 2 scenario simulating the default of the two major customers).

The reverse liquidity stress tests are based on the market disruption and idiosyncratic scenario. Their aim is to determine what would need to happen to customer cash balances, for Clearstream to suffer a liquidity shortfall.

For CBF and CBL, regulatory ratios have been defined by national law. Reporting duties are on a monthly basis. The minimum ratio for both CBF and CBL is 100%.

With the implementation of the CRR, the Liquidity Coverage Ratio (LCR) was introduced in 2014, initially as a reporting measure. The implementation as a minimum ratio started with a minimum ratio of 60% as of 1 October 2015 reaching its full implementation at 100% from 1 January 2018.

The 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 CBF and CBL consist of cash held

1. Among others, permanent liquidity buffers, overdraft facilities with its cash correspondent banks, prioritisation of payment obligations, committed facilities, ECP program, intraday procedures to anticipate potential intraday liquidity shortfalls, etc.

with central banks, own securities and securities received in reverse repo transactions. As at 31 December 2017, CBF had an LCR of 144% , CBL an LCR of 122% and CH an LCR of 123%.

	31 December 2017			31 December 2016		
	CH group	CBL	CBF	CH group	CBL	CBF
Liquidity Coverage Ratio	122.56%	122.43%	143.63%	117.42%	116.87%	131.92%

Table 7-1. Liquidity Coverage Ration

To complement the regulatory ratios, the Treasury Policy has defined the following two internal liquidity ratios.

7.6.1 Internal liquidity ratio I (Liquid assets / Net customer cash)

The objective of the internal liquidity ratio I limit is to ensure a more dynamic adaptation to a changing liquidity situation. These limits prevent the new creation of mismatch positions by traders in cases of a sudden/temporary decrease of net customer cash balances until the liquidity risk exposure allows it again.

The basis for the calculation of the Liquid Assets and Net Customer Cash is the Treasury operating system, in which all Treasury transactions are recorded. Liquidity is calculated for EUR, USD, GBP, AUD and JPY and combined EUR and USD.

The ratio is calculated daily and reported on a monthly basis by Treasury Middle Office to Executive Management. During 2016, no oversteppings were reported, except on 31 December 2016 in GBP due to exceptional measures taken to avoid large exposure over year end combined with a reduced market accessibility (2 hours). The internal liquidity ratios I on 31 December 2016 were as follows:

Currencies	Ratio (%)		Limits (%)	
	31 December 2017	31 December 2016	31 December 2017	31 December 2016
EUR and USD	116	114	50	50
EUR	171	165	50	50
USD	78	74	60	60
GBP	91	49	90	90
AUD	97		90	
JPY	100		90	

Table 7-2. Internal liquidity ratio I

7.6.2 Internal liquidity ratio II (Liquid sources / Customer credit usage)

The objective of the internal liquidity ratio II is that liquidity sources provide sufficient liquidity to cover peak customer end-of-day overdraft balances observed over the preceding two years.

During 2017, the liquidity sources / customer credit usage were comfortably above the limits set in the Treasury Investment Policy. The internal ratios II on 31 December 2017 were as follows:

Currencies	Ratio (%)		Limits (%)	
	31 December 2017	31 December 2016	31 December 2017	31 December 2016
EUR and USD	741	907	200	200
EUR	714	559	100	100
USD	571	387	100	100

Table 7-3. Internal liquidity ratio II

7.7 Liquidity risk mitigation

Liquidity management guidelines are defined in the Clearstream Liquidity Management Policy. The objective of liquidity management is the ability to respond to daily changing customer net long/short cash balances. Customers maintain cash balances with Clearstream and draw on credit facilities (TOFs) as a result of their securities settlement activities.

To meet its objective, CBL maintains several liquidity sources, including

- Liquidity buffers in EUR, USD and GBP currencies. The estimated size of the minimum required liquidity buffers in EUR, USD and GBP currencies is determined by the stress test results. The EUR liquidity buffer is the sum of cash held at the central bank, cash held with creditworthy financial institutions, and unencumbered assets/collateral readily available and convertible into cash. The USD and GBP liquidity buffers are composed of cash held with creditworthy financial institutions, and unencumbered assets/collateral readily available and convertible into cash.

Minimum required liquidity buffers and additionally target buffers have been determined. Target buffers indicate the EUR equivalent liquidity amount which should constantly be available in each of the relevant currencies.

According to the Clearstream Treasury Liquidity Management Policy the minimum target liquidity buffers are set at:

Currency	Minimum required liquidity buffer
EUR	EUR 1.47 bn
USD	EUR 0 equivalent
GBP	EUR 0 equivalent

Actual end of day liquidity buffers on 31 December 2017

Currency	Target liquidity buffer (EUR equivalent)	Actual end of day liquidity buffer (EUR equivalent)
EUR	4 bn	7.2 bn
USD	1 bn	4.4 bn
GBP	200 mn	93 mn

To complement the permanent liquidity buffers, Clearstream has among others the following arrangements and measures in place to mitigate liquidity risks:

- Committed repo funding lines with three major commercial banks (USD 250 million each).
- A EUR 1 billion multicurrency euro commercial paper programme.
- A network of cash correspondent banks and depositories to support the funding requirements in relation to CBL's settlement operations in more than 40 currencies via uncommitted unsecured credit lines.
- A broad range of money market counterparties via highly reliable funding arrangements (GMRAs) and via uncommitted unsecured credit lines granted to CBL;
- Prioritisation of payment obligations;
- Intraday procedures to anticipate potential intraday liquidity shortfalls.

To ensure that the overall risk exposure related to the Treasury investment activity remains within acceptable concentration limits, Group Credit in accordance with the Credit policy allocates credit limits for all approved investments per counterparty and at the corresponding counterparty group level.

In addition, to avoid excessive intraday cash concentration on its cash correspondent network intraday, overnight cash concentration limits are set and constantly monitored. Intraday oversteppings of cash concentration limits result in alerts to Treasury, as responsible for day-to-day liquidity management, and requires immediate action to reduce the current cash concentration.

7.8 Scenarios

Clearstream uses scenario analysis as part of its regular stress testing in reference to the BaFin minimum requirements for risk management as defined in the MaRisk of 14 December 2012 (BaFin Circular 10/2012) and CSSF Circular 09/403 requiring that institutions conduct liquidity stress tests that enable them to assess the potential impact of extreme but plausible stress scenarios on their liquidity positions and their current contemplated risk mitigation.

7.8.1 Scenarios for the overnight liquidity

Clearstream has defined three scenarios to stress liquidity risk:

Scenario 1 - Base scenario

The Base scenario takes into account the lowest net cash balances by currency in the most recent five-year time horizon.

Scenario 1 result:

In this scenario, based on the lowest net cash balances in past five years, Clearstream is able to cope with expected outflows in cash balances for all currencies.

Scenario 2 - Market Disruption scenario

The market disruption scenario considers a disruption in the macro economic environment. The assumption is that customer cash balances would drop by 10% (from their lowest historical five-year level), money market funding lines would decline by 50% and overdraft lines at CCBs/Depositories by 20%.

Scenario 2 result:

The scenario is based on net customer cash balances dropping by 10% (from their lowest historical five-year level), money market funding lines would decline by 50% and overdraft lines at CCBs/Depositories by 20%. Despite the reduced availability of funding sources, Clearstream is able to fund the short positions in most currencies. Remaining short balances can be covered through FX swaps.

Scenario 3 - Market Disruption / Idiosyncratic scenario

The market disruption / idiosyncratic scenario considers a disruption in the macro economic environment and a downgrade of Clearstream's credit rating. The assumption is that customer cash balances would drop by 30% (from their lowest historical five year level), money market funding lines would no longer be accessible, and overdraft lines at CCBs/Depositories would decline by 60%.

Scenario 3 result:

The scenario is based on net customer cash balances dropping by 30% (from their lowest historical five-year level), money market funding lines would no longer be accessible, and overdraft lines at CCBs/Depositories would decline by 60%. In this scenario, USD currency short balances can be covered through uncommitted CCBs/depositories overdraft lines. The excess funding capacity can be used to cover short balances in other currencies through FX swaps. In this scenario, exceptional overnight credit usage could also be restricted to be in line with available liquidity and CCBs/depositories overdraft lines since credit facilities in Clearstream are allocated on an unconditionally revocable basis and primarily for intraday usage in support of customer settlement activities.

Scenario 4 - Market Disruption scenario

The market disruption scenario considers a disruption in the macro economic environment. The assumption is that customer cash balances would drop by 10% (from their lowest historical five-year level), money market funding lines would decline by 50% and overdraft lines at CCBs/depositories by 20%.

Scenario 4 result:

The scenario is based on net customer cash balances dropping by 10% (from their lowest historical five-year level), money market funding lines would decline by 50% and overdraft lines at CCBs/depositories by 20%. Despite the reduced availability of funding sources, Clearstream can fund the short positions in most currencies. Remaining short balances can be covered through FX swaps.

Scenario 5 - Market Disruption / Idiosyncratic scenario

The market disruption / idiosyncratic scenario considers a disruption in the macro economic environment and a downgrade of Clearstream's credit rating. The assumption is that customer cash balances would drop by 30% (from their lowest historical five-year level), money market funding lines would no longer be accessible and overdraft lines at CCBs/depositories would decline by 60%.

Scenario 5 result:

The scenario is based on net customer cash balances dropping by 30% (from their lowest historical five-year level), money market funding lines would no longer be accessible and overdraft lines at CCBs/depositories would decline by 60%. In this scenario, USD currency short balances can be covered through uncommitted CCBs/depositories overdraft lines. The excess funding capacity can be used to cover short balances in other currencies through FX swaps. In this scenario, exceptional overnight credit usage could also be restricted to be in line with available liquidity and CCBs/depositories overdraft lines since credit facilities in Clearstream are allocated on an unconditionally revocable basis and primarily for intraday usage in support of customer settlement activities.

7.8.2 Medium-term liquidity sources

Despite the very short-term nature of Clearstream's liquidity risk because of its core settlement activities, situations might arise where funding requirements exceed the usual maximum of 48 hours.

The following instruments are available for funding:

- EUR 1 billion multi-currency Euro Commercial Programme;
- BCL tender participation in EUR and USD;
- Repurchase Agreements and committed repo funding lines (USD 750mn; can be drawn in EUR, USD and GBP);
- Foreign exchange swaps;
- Revolving credit facility (EUR 750mn; can be drawn in EUR and USD).

7.8.3 Permanent available liquidity

Permanent available liquidity consists of the own funds of all Clearstream entities managed by CBL Treasury and the stable part of the net customer cash in EUR and USD currencies based on historical data, as follows:

- Based on historical data over the most recent two-year horizon (with a 99% confidence level), the permanent available liquidity must be sufficient to cover all term investments (fixed and variable coupon bonds, CBL reversed repos and structured products) in EUR and USD.
- Based on historical data over the most recent five-year horizon (with a 99% confidence level), the permanent available liquidity must be sufficient to cover all long-term investments.

At year-end 2017, the own funds amounted to EUR 1.849 billion.

Figures for the stable part of the net customer cash in EUR and USD currency, based on historical data, were as follows:

- Based on historical data over the most recent two-year horizon (with a 99% confidence level), the stable part of the net customer cash (EUR and USD combined) amounted to EUR equivalent 9.183 billion. Together with the own funds, the sum of permanent available liquidity is EUR equivalent 11.032 billion, which is sufficient to cover the size of all term investments of EUR equivalent 3.409 billion.
- Based on historical data over the most recent five-year horizon (with a 99% confidence level), the stable part of the net customer cash (EUR and USD combined) amounted to EUR equivalent 9.365 billion. Together with the own funds, the sum of permanent available liquidity is EUR equivalent 9.127 billion, which is sufficient to cover the size of long-term investments of EUR equivalent 1.863 billion.

7.8.4 Contingency funding plan

Additional liquidity generation capabilities are available to face a contingency situation. They are not included in the three stress scenarios, which only include liquidity instruments used in the day-to-day liquidity management by Treasury. These additional contingency funding capabilities and actions are listed below.

- Contingency liquidity generation capabilities:
  - EUR 750 million revolving credit facility (including a EUR 400 million intraday swing line);
  - Sale of customer collateral (in the event of customer's default);
  - Liquidation/Buy-in of securities for Clearstream Treasury repo transactions;
  - Intra-group funding;
- Other actions:
  - Cancellation of customer UCF/TOF lines;
  - Flagging income and redemption proceeds 'Upon Receipt of Funds' (URF);
  - Sale or repo out of proprietary fixed-coupon and/or FRN portfolio.

7.9 Governance, Approval and Validation

In accordance with the MaRisk of 14 December 2014 and CSSF Circular 09/403, Clearstream has formulated its Treasury Liquidity Policy. The liquidity parameters stated in the liquidity policy are reviewed on a quarterly basis.

This Policy contains specific requirements to implement a liquidity risk strategy that includes contingency planning, governance and the definition of senior management responsibilities. Required changes are proposed to Executive Management within the annual update for approval.

Day-to-day implementation of the liquidity management strategy is under the responsibility of the Head of Treasury Luxembourg/Singapore.

7.10 Monitoring and reporting

Clearstream's liquidity risk exposure and breaches of limits are controlled and reported by the Treasury Middle Office. Reports are performed daily, weekly and monthly to Executive Management, Clearstream Risk Management and Treasury. Limit excesses occurring within the Treasury activity are reported by Treasury Middle Office to Executive Management.

8. Capital structure, capital ratio and Leverage Ratio

The information in this chapter is presented in the following sections:

In all the tables shown in this chapter, the data for CH and CBF is based on the German GAAP according to the German Commercial Code (HGB). The data for CBL is based on International Financial Reporting Standards (IFRS).

8.1 Capital components

8.1.1 Overview

The following table summarises the total amount of Clearstream's regulatory capital. "Tier 1" capital in 2017 corresponds to Core Equity Tier 1 (CET1) capital according to Article 26 CRR.

			31 December 2017 (€' 000)			31 December 2016 (€' 000)		
			CH-Group	CBL	CBF	CH-Group	CBL	CBF
Tier 1:	Eligible Capital	Paid up capital	101,000	92,000	25,000	101,000	92,000	25,000
		Share premium	2,014,314	136,836	1,108	2,014,314	136,836	1,108
	Eligible Reserves	Reserves	-785,278	877,310	283,275	-811,961	857,576	272,508
		Interim profits	-	-	-	-	-	-
	Deductions:		-40,292	-44,841	-504	-43,075	-43,993	-722
Tier 2:	Core additional own funds	Revaluation reserves	-	-	-	-	-	-
		Subordinated Loan Capital	-	-	-	-	-	-
	Deductions:		-	-	-	-	-	-
Eligible own funds:			1,289,744	1,061,305	308,880	1,260,278	1,042,419	297,894

Table 8-1. Regulatory capital components

Tier 1 capital of CH, CBL and CBF consists mainly of subscribed capital, share premium, reserves and retained earnings. Deductions of core capital arise from intangible assets. Different from the IFRS treatment, own work capitalised is not included at CH and CBF level as the relevant choice under German GAAP is not taken.

The following subsections disclose the information as required by Article 437 paragraph 1 CRR and details set out in Commission Implementing Regulation (EU) No 1423/2013.

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 must be applied by institutions as laid out in the Implementing Regulation (EU) No 1423/2013. As CH is exempted from the preparation of consolidated annual accounts in line with § 291 (1) HGB a reconciliation with consolidated own funds is not possible. The balance sheet reconciliation for CBL and CBF is shown in Table 8-2.

Balance Sheet Reconciliation	31 December 2017 (€' 000) CBL	31 December 2017 (€' 000) CBF	31 December 2016 (€' 000) CBL	31 December 2016 (€' 000) CBF
Own Funds elements in the Annual Financial Statements				
Subscribed Capital	92,000	25,000	92,000	25,000
Share premium	136,836	1,108	136,836	1,108
Legal Reserve	9,200	0	9,200	1,392
Other reserves and retained earnings	868,110	283,275	848,376	281,883
Profits for the financial year and accumulated profits	0	0	107,086	36,750
Total Own Funds Elements in Audited Financial Statements	1,106,146	309,383	1,193,498	346,133
Profits allocated to other reserves with the approval of financial statements (i.e. after reporting of Own Funds)	-	0	-	-10,767
Profits for the financial year and accumulated profits (i.e. after reporting of Own Funds)	-120,696	0	-107,086	-36,750
Eligible Capital (CET1) before regulatory adjustments	985,450	309,383	1,086,412	298,616
Regulatory adjustments				
Deduction other intangible assets	-13,214	-504	-14,052	-722
Other CET 1 capital adjustments	-31,627	0	-29,941	-
Common Equity Tier 1 Capital/Total Eligible Own Funds	940,609	308,880	1,042,419	297,894

Table 8-2. Balance Sheet Reconciliation

The own funds of the financial statements of the Clearstream entities consider profits allocated to retained earnings with the approval of the financial statements and year-end profits which both do not qualify for the regulatory own funds as of 31 December 2017. The profits allocated to retained earnings do not count as CET1 capital if the financial statements are not approved or a prior permission by the competent authority according to Article 26 paragraph 2 CRR is granted.

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 CH, CBL and CBF 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	Clearstream Holding AG
2	Unique identifier (e.g. ISIN, etc.)	DE000A0TGKK3
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	Consolidated
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)	€ m 101
9	Nominal amount of instrument (in million, in currency of issuance)	€ m 101
9a	Issue price	€ m 2,115
9b	Redemption price	N/A
10	Accounting classification	Shareholders' equity
11	Original date of issuance	04/06/2007
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	Floating
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)	Mandatory
20b	Fully discretionary, partially discretionary or mandatory (in terms of amount)	Mandatory
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 CH

	Capital Instruments' main features [1]	
	Features	**Instrument**
1	Issuer	Clearstream Banking SA
2	Unique identifier (e.g. ISIN, etc.)	N/A
3	Governing law(s) of the instrument	Luxembourg Company Law : Law of 10th August 1915 on commercial companies
	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)	€ m 229
9	Nominal amount of instrument (in million, in currency of issuance)	€ m 92
9a	Issue price	€ m 229
9b	Redemption price	N/A
10	Accounting classification	Shareholders' equity
11	Original date of issuance	1970
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	Floating
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)	Fully discretionary
20b	Fully discretionary, partially discretionary or mandatory (in terms of amount)	Fully discretionary
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 8-4. Capital Instruments of CBL

Capital Instruments' main features [1]		
	Features	**Instrument**
1	Issuer	Clearstream Banking Aktiengesellschaft
2	Unique identifier (e.g. ISIN, etc.)	DE0008053604
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)	€ m 26
9	Nominal amount of instrument (in million, in currency of issuance)	€ m 25
9a	Issue price	€ m 26
9b	Redemption price	N/A
10	Accounting classification	Shareholders' equity
11	Original date of issuance	12/07/1949
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	Floating
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)	Fully discretionary
20b	Fully discretionary, partially discretionary or mandatory (in terms of amount)	Fully discretionary
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 8-5. Capital Instruments of CBF

8.1.4 Disclosure of additional information during the transitional period

	Common Equity Tier 1 capital: instruments and reserves	(A) Amounts at 31.12.2017 (€'000)	(B) 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) 575/2013 (€'000)
1	Capital Instruments and Share premium	2,115,314	26 (1), 27, 28, 29, EBA list 26 (3)	
	of which: Subscribed capital	101,000	EBA list 26 (3)	
	of which: Share premium	2,014,314	EBA list 26 (3)	
2	Retained Earnings	-84,400	26 (1) (c)	
3	Accumulated other comprehensive income (and other reserves, to include unrealised gains and losses under the applicable accounting standards)	-870,186	26 (1)	
3a	Funds for general banking risk	169,309	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**	**1,330,036**		
Common Equity Tier 1 (CET1) capital: regulatory adjustments				
8	Intangible assets (net of related tax liability) (negative amount)	-40,292	36 (1) (b), 37, 472 (4)	-17,230
26	Regulatory adjustments applied to Common Equity Tier 1 in respect of amounts subject to pre-CRR treatment	8,058		17,230
26b	Amount to be deducted from or added to Common Equity Tier 1 capital with regard to additional filters and deductions required pre CRR	8,058	481	17,230
	of which: Intangible assets	8,058		17,230
27	Qualifying AT1 deductions that exceeds the AT1 capital of the institution (negative amount)	-8,058	36 (1) (j)	
28	**Total regulatory adjustments to Common Equity Tier 1 (CET1)**	**-40,292**		
29	**Common Equity Tier 1 (CET1) capital**	**1,289,744**		
Additional Tier 1 (AT1) capital: instruments				
36	**Additional Tier 1 (AT 1) capital before regulatory adjustments**			
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)	-8,058		
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	-8,058	472, 472(3)(a), 472 (4), 472 (6), 472 (8) (a), 472 (9), 472 (10) (a), 472 (11) (a)	
	of which: Intangible assets	-8,058		
	Excess of deduction from AT1 items over AT1 Capital (deducted in CET1)	8,058		
43	**Total regulatory adjustments to Additional Tier 1 (AT1) capital**	**0**		
44	**Additional Tier 1 (AT 1) capital**	**0**		
45	**Tier 1 capital (T1 = CET1 + AT1)**	**1,289,744**		

Table 8-6. Own funds details CH

58	**Tier 2 (T2) capital**	**0**		
59	**Total capital (TC = T1 + T2)**	**1,289,744**		
60	**Total risk-weighted assets**	**6,097,326**		
Capital ratios and buffers				
61	**Common Equity Tier 1 capital ratio (as a percentage of risk exposure amount)**	**21.15**		
62	**Tier 1 capital ratio (as a percentage of risk exposure amount)**	**21.15**		
63	**Total capital ratio (as a percentage of risk exposure amount)**	**21.15**		
64	Institution specific buffer requirement (CET 1 requirement in accordance with Art. 92 (1) (a) plus capital conservation and countercyclical buffer requirements, plus systemic risk buffer, plus systemically important institution buffer expressed as a percentage of risk exposure amount)			
65	of which: capital conservation buffer requirement	1.25		
66	of which: countercyclical buffer requirement	0.01		
67	of which: systemic risk buffer requirement	0		
67a	of which: Global Systemically Important Institution (G-SII) or Other Systemically Important Institution (O-SII) buffer	0		
68	Common Equity Tier 1 capital available to meet buffers (as a percentage of risk-exposure amount)	16.65		
Amounts below the thresholds for deduction (before risk weighting)				
72	Direct, indirect and synthetic holdings of the capital of financial sector entities where the institution does not have a significant investment in those entities (amount below 10 % threshold and net of eligible short positions)	0		
73	Direct, indirect and synthetic holdings by the institution of the CET 1 instruments of financial sector entities where the institution has a significant investment in those entities (amount below 10 % threshold and net of	0		
75	Deferred tax assets arising from temporary differences (amount below 10 % threshold, net of related tax liability where the conditions in Art. 38 (3) CRR are met)	0		
Applicable caps on the inclusion of provisions in Tier 2 capital				
76	Credit risk adjustments included in T2 in respect of exposures subject to standardized approach (prior to the application of the cap)	0		
77	Cap on inclusion of credit risk adjustments in T2 under standardized approach	9,540		
78	Credit risk adjustments included in T2 in respect of exposures subject to internal ratings-based approach (prior to the application of the cap)	0		
79	Cap for inclusion of credit risk adjustments in T2 under internal ratings-based approach	0		
Capital instruments subject to phase-out arrangements (only applicable between 1 Jan 2014 and 1 Jan 2022)				
80	- Current cap on CET 1 instruments subject to phase out arrangements	0		
81	- Amount excluded from CET 1 due to cap (excess over cap after redemptions and maturities)	0		
82	- Current cap on AT1 instruments subject to phase out arrangements	0		
83	- Amount excluded from AT1 due to cap (excess over cap after redemptions and maturities)	0		
84	- Current cap on T2 instruments subject to phase out arrangements	0		
85	- Amount excluded from T2 due to cap (excess over cap after redemptions and maturities)	0		

Table 8-6b. Own funds details CH

	Common Equity Tier 1 capital: instruments and reserves	(A) Amounts at 31.12.2017 (€'000)	(B) 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) 575/2013 (€'000)
1	Capital Instruments and Share premium	228,836	26 (1), 27, 28, 29, EBA list 26 (3)	
	of which: Subscribed capital	92,000	EBA list 26 (3)	
	of which: Share premium	136,836	EBA list 26 (3)	
2	Retained Earnings	562,966	26 (1) (c)	
3	Accumulated other comprehensive income (and other reserves, to include unrealised gains and losses under the applicable accounting standards)	314,344	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**	**1,106,146**		
Common Equity Tier 1 (CET1) capital: regulatory adjustments				
8	Intangible assets (net of related tax liability) (negative amount)	-13,214	36 (1) (b), 37, 472 (4)	
26	Regulatory adjustments applied to Common Equity Tier 1 in respect of amounts subject to pre-CRR treatment	-24,151		
26b	Amount to be deducted from or added to Common Equity Tier 1 capital with regard to additional filters and deductions required pre CRR	-7,476	481	
	of which: Intangible assets	0		
27	Qualifying AT1 deductions that exceeds the AT1 capital of the institution (negative amount)	0	36 (1) (j)	
28	**Total regulatory adjustments to Common Equity Tier 1 (CET1)**	**-44,841**		
29	**Common Equity Tier 1 (CET1) capital**	**1,061,305**		
Additional Tier 1 (AT1) capital: instruments				
36	**Additional Tier 1 (AT 1) 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 (AT 1) capital**	**0**		
45	**Tier 1 capital (T1 = CET1 + AT1)**	**1,061,305**		

Table 8-7. Own funds details CBL

58	**Tier 2 (T2) capital**	**0**		
59	**Total capital (TC = T1 + T2)**	**1,061,305**		
60	**Total risk-weighted assets**	**4,451,809**		
Capital ratios and buffers				
61	**Common Equity Tier 1 capital ratio (as a percentage of risk exposure amount)**	**23.84**		
62	**Tier 1 capital ratio (as a percentage of risk exposure amount)**	**23.84**		
63	**Total capital ratio (as a percentage of risk exposure amount)**	**23.84**		
64	Institution specific buffer requirement (CET 1 requirement in accordance with Art. 92 (1) (a) plus capital conservation and countercyclical buffer requirements, plus systemic risk buffer, plus systemically important institution buffer expressed as a percentage of risk exposure amount)	2.513		
65	of which: capital conservation buffer requirement	2.500		
66	of which: countercyclical buffer requirement	0.013		
67	of which: systemic risk buffer requirement	0		
67a	of which: Global Systemically Important Institution (G-SII) or Other Systemically Important Institution (O-SII) buffer	0		
68	Common Equity Tier 1 capital available to meet buffers (as a percentage of risk-exposure amount)	15.84		
Amounts below the thresholds for deduction (before risk weighting)				
72	Direct, indirect and synthetic holdings of the capital of financial sector entities where the institution does not have a significant investment in those entities (amount below 10 % threshold and net of eligible short positions)			
73	Direct, indirect and synthetic holdings by the institution of the CET 1 instruments of financial sector entities where the institution has a significant investment in those entities (amount below 10 % threshold and net of eligible	4,236		
75	Deferred tax assets arising from temporary differences (amount below 10 % threshold, net of related tax liability where the conditions in Art. 38 (3) CRR are met)	0		
Applicable caps on the inclusion of provisions in Tier 2 capital				
76	Credit risk adjustments included in T2 in respect of exposures subject to standardized approach (prior to the application of the cap)	0		
77	Cap on inclusion of credit risk adjustments in T2 under standardized approach	0		
78	Credit risk adjustments included in T2 in respect of exposures subject to internal ratings-based approach (prior to the application of the cap)	0		
79	Cap for inclusion of credit risk adjustments in T2 under internal ratings-based approach	0		
Capital instruments subject to phase-out arrangements (only applicable between 1 Jan 2014 and 1 Jan 2022)				
80	- Current cap on CET 1 instruments subject to phase out arrangements	0		
81	- Amount excluded from CET 1 due to cap (excess over cap after redemptions and maturities)	0		
82	- Current cap on AT1 instruments subject to phase out arrangements	0		
83	- Amount excluded from AT1 due to cap (excess over cap after redemptions and maturities)	0		
84	- Current cap on T2 instruments subject to phase out arrangements	0		
85	- Amount excluded from T2 due to cap (excess over cap after redemptions and maturities)	0		

Table 8-7b. Own funds details CBL

	Common Equity Tier 1 capital: instruments and reserves	(A) Amounts at 31.12.2017 (€'000)	(B) 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) 575/2013 (€'000)
1	Capital Instruments and Share premium	26,108	26 (1), 27, 28, 29, EBA list 26 (3)	
	of which: Subscribed capital	25,000	EBA list 26 (3)	
	of which: Share premium	1,108	EBA list 26 (3)	
2	Retained Earnings	77,383	26 (1) (c)	
3	Accumulated other comprehensive income (and other reserves, to include unrealised gains and losses under the applicable accounting standards)	205,892	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**	**309,383**		
Common Equity Tier 1 (CET1) capital: regulatory adjustments				
8	Intangible assets (net of related tax liability) (negative amount)	-504	36 (1) (b), 37, 472 (4)	-289
26	Regulatory adjustments applied to Common Equity Tier 1 in respect of amounts subject to pre-CRR treatment	101		289
26b	Amount to be deducted from or added to Common Equity Tier 1 capital with regard to additional filters and deductions required pre CRR	101	481	289
	of which: Intangible assets	101		289
27	Qualifying AT1 deductions that exceeds the AT1 capital of the institution (negative amount)	-101	36 (1) (j)	
28	**Total regulatory adjustments to Common Equity Tier 1 (CET1)**	**-504**		
29	**Common Equity Tier 1 (CET1) capital**	**308,880**		
Additional Tier 1 (AT1) capital: instruments				
36	**Additional Tier 1 (AT 1) 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)	-101		
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	-101	472, 472(3)(a), 472 (4), 472 (6), 472 (8) (a), 472 (9), 472 (10) (a), 472 (11) (a)	
	of which: Intangible assets	-101		
	Excess of deduction from AT1 items over AT1 Capital (deducted in CET1)	101		
43	**Total regulatory adjustments to Additional Tier 1 (AT1) capital**	**0**		
44	**Additional Tier 1 (AT 1) capital**	**0**		
45	**Tier 1 capital (T1 = CET1 + AT1)**	**308,880**		

Table 8-8. Own funds details CBF

58	**Tier 2 (T2) capital**	**0**		
59	**Total capital (TC = T1 + T2)**	**308,880**		
60	**Total risk-weighted assets**	**1,468,080**		
Capital ratios and buffers				
61	**Common Equity Tier 1 capital ratio (as a percentage of risk exposure amount)**	**21.04**		
62	**Tier 1 capital ratio (as a percentage of risk exposure amount)**	**21.04**		
63	**Total capital ratio (as a percentage of risk exposure amount)**	**21.04**		
64	Institution specific buffer requirement (CET 1 requirement in accordance with Art. 92 (1) (a) plus capital conservation and countercyclical buffer requirements, plus systemic risk buffer, plus systemically important institution buffer expressed as a percentage of risk exposure amount)	5.77		
65	of which: capital conservation buffer requirement	1.25		
66	of which: countercyclical buffer requirement	0.02		
67	of which: systemic risk buffer requirement	0		
67a	of which: Global Systemically Important Institution (G-SII) or Other Systemically Important Institution (O-SII) buffer	0		
68	Common Equity Tier 1 capital available to meet buffers (as a percentage of risk-exposure amount)	16.54		
Amounts below the thresholds for deduction (before risk weighting)				
72	Direct, indirect and synthetic holdings of the capital of financial sector entities where the institution does not have a significant investment in those entities (amount below 10 % threshold and net of eligible short positions)	0		
73	Direct, indirect and synthetic holdings by the institution of the CET 1 instruments of financial sector entities where the institution has a significant investment in those entities (amount below 10 % threshold and net of eligible	0		
75	Deferred tax assets arising from temporary differences (amount below 10 % threshold, net of related tax liability where the conditions in Art. 38 (3) CRR are met)	0		
Applicable caps on the inclusion of provisions in Tier 2 capital				
76	Credit risk adjustments included in T2 in respect of exposures subject to standardized approach (prior to the application of the cap)	0		
77	Cap on inclusion of credit risk adjustments in T2 under standardized approach	564		
78	Credit risk adjustments included in T2 in respect of exposures subject to internal ratings-based approach (prior to the application of the cap)	0		
79	Cap for inclusion of credit risk adjustments in T2 under internal ratings-based approach	0		
Capital instruments subject to phase-out arrangements (only applicable between 1 Jan 2014 and 1 Jan 2022)				
80	- Current cap on CET 1 instruments subject to phase out arrangements	0		
81	- Amount excluded from CET 1 due to cap (excess over cap after redemptions and maturities)	0		
82	- Current cap on AT1 instruments subject to phase out arrangements	0		
83	- Amount excluded from AT1 due to cap (excess over cap after redemptions and maturities)	0		
84	- Current cap on T2 instruments subject to phase out arrangements	0		
85	- Amount excluded from T2 due to cap (excess over cap after redemptions and maturities)	0		

Table 8-8b. Own funds details CBF

8.2 Internal management of capital (Risk-Bearing Capacity)

Risk-Bearing Capacity serves as a buffer to absorb potential (unexpected) losses resulting from the risks Clearstream faces in its various activities. It is the internal view on the amount of capital and, therefore, the maximum loss that the Executive Boards are 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 - see also 3.1 Strategy and organisation on page 3-1).

The concept regarding Risk-Bearing Capacity is to ensure that emerging risks can be absorbed and thus to safeguard the continued existence (as going concerns) of Clearstream's affiliated companies.

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

- For the 99% risk confidence level, the Risk-Bearing Capacity is the planned EBIT for the current business year.
- For the 99.9% and 99.98% risk confidence levels, the Risk-Bearing Capacity is defined as the regulatory own funds, which are updated according to the regulatory reporting frequency of the respective Clearstream entities.
- The Risk-Bearing Capacity for individual risk types (operational, financial, business) is defined as a fraction of the overall Risk-Bearing Capacity. Through this allocation, the members of the Executive Boards ensure that risk is limited regarding each risk type.

The risk limits as defined above are monitored all in parallel and monthly. For CH as well as for all individual affiliated companies that 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 requirements

Capital requirements for credit risk positions

Clearstream uses the Standardised Approach to calculate the capital requirements. The following table shows the capital requirements for credit risk exposures:

Capital requirements for credit risk calculated using the Credit Risk Standardised Approach (CRSA)						
	31 December 2017 (€' 000)			31 December 2016 (€' 000)		
	CH-Group	CBL	CBF	CH-Group	CBL	CBF
Central governments and central banks	78	539	4	115	354	7
Regional governments, local authorities and other public bodies	0	0	0	0	0	0
Institutions (banks)	45,510	36,849	3,239	32,952	81,338	6,786
Corporates	10,944	4,432	242	20,433	4,886	313
Undertakings for collective investment (Investment shares)		0	0	7	0	0
Other (including equity holding)	4,524	1,350	126	4,259	1,423	137
Capital requirements from contributions to the default fund of a CCP	23	23	0	17	17	0
Total	**61,079**	**43,193**	**3,610**	**57,783**	**88,018**	**7,243**

Table 8-9. Capital requirements for credit risk

Note: Differences in the capital usage for institutions derive mainly from different allocation algorithms related to collateral, as described in the Note under Table 5-1 on page 5–3.

Capital requirements for credit valuation adjustment

Clearstream uses the Standardised Method to calculate the capital requirements for CVA risk which arises from CBL transactions only. The following table shows the resulting capital requirements:

	Capital requirements for Credit Valuation Adjustment					
	31 December 2017 (€' 000)			31 December 2016 (€' 000)		
	CH-Group	CBL	CBF	CH-Group	CBL	CBF
Standardised Method	**84**	**90**	**0**	**78**	**106**	**0**

Table 8-10. Credit valuation adjustment

Note: The data for CH and CBF is based on German GAAP according to the German Commercial Code (HGB). The data for CBL is based on International Financial Reporting Standards (IFRS).

In addition, different FX rates are used which can also cause a discrepancy.

Capital requirements for market risk positions

Clearstream uses the Standardised Approach to calculate the capital requirements for market risk positions. On 31 December 2016, as described in 6.6.3 Foreign exchange risk measurement on page 6-5, a foreign exchange exposure was reported on CH level that resulted in a capital requirement. In addition, the capital charge for interest rate risk in the banking book is determined in accordance with the BaFin General Administrative Act[1]. The calculated capital amounts are shown in the following table:

	Capital requirements for market risk					
	31 December 2017 (€' 000)			31 December 2016 (€' 000)		
	CH-Group	CBL	CBF	CH-Group	CBL	CBF
Foreign Exchange risk (total)	6,550	6,625	82	18,581	0	0
Interest rate risk in the banking book (IRRBB)	n/a	n/a	n/a	0	n/a	0

Table 8-11. Market price risk

Capital requirements for operational risk

The capital requirements for backing operational risk according to the Advanced Measurement Approach (AMA) amounted to a capital requirement as follows:

	Due to group internal allocation mechanism assigned capital requirements for operational risk					
	31 December 2017 (€' 000)			31 December 2016 (€' 000)		
	CH-Group	CBL	CBF	CH-Group	CBL	CBF
Operational risk (AMA)	420,073	306,237	113,836	387,073	283,309	103,764

Table 8-12. Operational risk

The capital figure calculated as described above and in 4. Management of operational risk on page 4-1 applies for Clearstream Group. It covers the risk of all legal entities of the group and is allocated to CBL and CBF afterwards. The allocation key is defined as the ratio between the net operating income of the entity and the sum of the net operating income of CBF and CBL.

As described in 4.2 Measurement on page 4-2, the defined scenarios are reviewed on an ongoing basis and are, if necessary, adjusted.

In July 2015 the Clearstream entities were requested by BaFin to increase required capital by 10% for their operational risks. Occasion for the sanction was an audit by the Bundesbank in December 2014 regarding the AMA. The capital increase was repealed in Q2 2017.

1. 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 requirements

The following table summarises the capital requirements of the Clearstream entities:

	31 December 2017			31 December 2016		
	CH-Group	CBL	CBF	CH-Group	CBL	CBF
Credit risk	61,079	43,193	3,610	64,233	88,018	19,696
CVA risk	84	90	0	60.00	106.00	0
Market risk	6,550	6,625	82	0	0	0
Operational risk	420,073	306,237	113,836	396,080	283,309	93,909
Total capital requirements	487,786	356,145	117,528	460,374	371,433	113,605

Table 8-13. Total capital requirements

8.3.2 Capital ratio

The capital requirements of CH and CBL rose in the reporting period. While CH's capital requirements were mainly driven by an increase in market risk capital, CBL's capital requirements resulted from a significant increase of credit risk. In contrast, the capital requirements for operational risk declined on CH and CBL level.

The capital requirements of CBF slightly decreased in total due to declined capital requirements for credit risk. The capital requirement for operational risk increased but in a smaller portion than the decreasing capital requirements for credit risk.

CH already responded to the increased own funds requirements in the past by launching a programme to strengthen its capital base; this programme continued in 2017. Further measures are planned for the coming years in the context of medium-term capital planning. As such, the eligible own funds of all Clearstream entities to meet the capital requirements rose in 2017.

Note: Clearstream entities do not issue T1 or T2 securities, the eligible own funds consist entirely of CET1 capital. Therefore, the Capital Ratio in the table below is both the CET1 ratio and the total capital ratio.

	31 December 2017			31 December 2016		
	CH-Group	CBL	CBF	CH-Group	CBL	CBF
Total capital requirements	487,786	356,145	117,528	463,515	371,433	111,007
Eligible own funds	1,289,744	1,061,305	308,880	1,260,278	1,042,419	297,894
Capital ratio	21.15%	23.84%	21.03%	21.75%	22.45%	21.47%

Table 8-14. Capital ratios of 2016 and 2017

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:

CH-Group 31 December 2017 (€'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 exposurefor 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												
	Germany	158,448	0	0	0	0	0	12,675	0	0	12,675	81.95	0.000
	France	120	0	0	0	0	0	10	0	0	10	0.06	0.000
	Netherlands	260	0	0	0	0	0	21	0	0	21	0.13	0.000
	Italy	360	0	0	0	0	0	29	0	0	29	0.19	0.000
	Ireland	321	0	0	0	0	0	26	0	0	26	0.17	0.000
	Denmark	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Greece	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Spain	186	0	0	0	0	0	15	0	0	15	0.10	0.000
	Belgium	4,225	0	0	0	0	0	338	0	0	338	2.19	0.000
	Luxembourg	8,859	0	0	0	0	0	709	0	0	709	4.58	0.000
	Iceland	0	0	0	0	0	0	0	0	0	0	0.00	1.250
	Norway	61	0	0	0	0	0	5	0	0	5	0.03	2.000
	Sweden	138	0	0	0	0	0	11	0	0	11	0.07	2.000
	Finland	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Austria	9	0	0	0	0	0	1	0	0	1	0.00	0.000
	Switzerland	1,875	0	0	0	0	0	150	0	0	150	0.97	0.000
	Andorra	24	0	0	0	0	0	2	0	0	2	0.01	0.000
	Malta	13	0	0	0	0	0	1	0	0	1	0.01	0.000
	San Marino	21	0	0	0	0	0	2	0	0	2	0.01	0.000
	Turkey	15	0	0	0	0	0	1	0	0	1	0.01	0.000
	Latvia	16	0	0	0	0	0	1	0	0	1	0.01	0.000
	Poland	22	0	0	0	0	0	2	0	0	2	0.01	0.000
	Czechia	2	0	0	0	0	0	0	0	0	0	0.00	0.500
	Bulgaria	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Ukraine	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Russian Federation	90	0	0	0	0	0	7	0	0	7	0.05	0.000
	Georgia	15	0	0	0	0	0	1	0	0	1	0.01	0.000
	Armenia	685	0	0	0	0	0	55	0	0	55	0.35	0.000
	Kazakhstan	20	0	0	0	0	0	2	0	0	2	0.01	0.000
	Bosnia and Herzegovina	2	0	0	0	0	0	0	0	0	0	0.00	0.000
	Macedonia, the former Yugoslav Republic	4	0	0	0	0	0	0	0	0	0	0.00	0.000
	United Kingdom	3,221	0	0	0	0	0	258	0	0	258	1.67	0.500
	Guernsey	98	0	0	0	0	0	8	0	0	8	0.05	0.000
	Jersey	13	0	0	0	0	0	1	0	0	1	0.01	0.000
	Isle of Man	24	0	0	0	0	0	2	0	0	2	0.01	0.000
	Morocco	4	0	0	0	0	0	0	0	0	0	0.00	0.000
	Libya	15	0	0	0	0	0	2	0	0	2	0.01	0.000
	Egypt	29	0	0	0	0	0	2	0	0	2	0.02	0.000
	Cameroon	0	0	0	0	0	0	0	0	0	0	0.00	0.000
	Kenyan	5	0	0	0	0	0	0	0	0	0	0.00	0.000
	Mauritius	0	0	0	0	0	0	0	0	0	0	0.00	0.000
	South Africa	38	0	0	0	0	0	3	0	0	3	0.02	0.000
	Puerto Rico	631	0	0	0	0	0	51	0	0	51	0.33	0.000
	Canada	157	0	0	0	0	0	13	0	0	13	0.08	0.000
	Mexico	28	0	0	0	0	0	2	0	0	2	0.01	0.000
	Bermuda	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Guatamala	8	0	0	0	0	0	1	0	0	1	0.00	0.000
	El Salvador	3	0	0	0	0	0	0	0	0	0	0.00	0.000
	Costa Rica	25	0	0	0	0	0	2	0	0	2	0.01	0.000
	Panama	41	0	0	0	0	0	3	0	0	3	0.02	0.000
	Bahamas	29	0	0	0	0	0	2	0	0	2	0.02	0.000

	Dominican Republic	2	0	0	0	0	0	0	0	0	0	0.00	0.000
	Cayman Islands	71	0	0	0	0	0	6	0	0	6	0.04	0.000
	Virgin Islands, British	5	0	0	0	0	0	0	0	0	0	0.00	0.000
	Trinidad and Tobago	4	0	0	0	0	0	0	0	0	0	0.00	0.000
	Aruba	2	0	0	0	0	0	0	0	0	0	0.00	0.000
	Curaçao	24	0	0	0	0	0	2	0	0	2	0.01	0.000
	Colombia	67	0	0	0	0	0	5	0	0	5	0.03	0.000
	Venezuela, Bolivarian Republic	37	0	0	0	0	0	3	0	0	3	0.02	0.000
	Ecuador	5	0	0	0	0	0	0	0	0	0	0.00	0.000
	Peru	6	0	0	0	0	0	0	0	0	0	0.00	0.000
	Chile	2	0	0	0	0	0	0	0	0	0	0.00	0.000
	Uruguay	98	0	0	0	0	0	8	0	0	8	0.05	0.000
	Argentina	37	0	0	0	0	0	3	0	0	3	0.02	0.000
	Cyprus	8	0	0	0	0	0	1	0	0	1	0.00	0.000
	Lebanon	144	0	0	0	0	0	11	0	0	11	0.07	0.000
	Iran	21	0	0	0	0	0	2	0	0	2	0.01	0.000
	Israel	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Jordan	2	0	0	0	0	0	0	0	0	0	0.00	0.000
	Saudi Arabia	0	0	0	0	0	0	0	0	0	0	0.00	0.000
	Kuwait	31	0	0	0	0	0	2	0	0	2	0.02	0.000
	Bahrain	54	0	0	0	0	0	4	0	0	4	0.03	0.000
	Qatar	90	0	0	0	0	0	7	0	0	7	0.05	0.000
	United Arab Emirates	1,310	0	0	0	0	0	105	0	0	105	0.68	0.000
	Oman	3,780	0	0	0	0	0	302	0	0	302	1.96	0.000
	India	3	0	0	0	0	0	0	0	0	0	0.00	0.000
	Thailand	72	0	0	0	0	0	6	0	0	6	0.04	0.000
	Laos People's Democratic Republic	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Vietnam	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Indonesia	11	0	0	0	0	0	1	0	0	1	0.01	0.000
	Borneo	4,741						379			379	2.45	0.000
	Brunei Darussalam	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Singapore	244	0	0	0	0	0	20	0	0	20	0.13	0.000
	Philippines	271	0	0	0	0	0	22	0	0	22	0.14	0.000
	Korea (the Republic of)	296	0	0	0	0	0	24	0	0	24	0.15	0.000
	Japan	98	0	0	0	0	0	8	0	0	8	0.05	0.000
	Taiwan, Province of China	1,174	0	0	0	0	0	94	0	0	94	0.61	0.000
	Hong Kong	372	0	0	0	0	0	30	0	0	30	0.19	1.250
	Macao	45	0	0	0	0	0	4	0	0	4	0.02	0.000
	Tasmanien	36	0	0	0	0	0	3	0	0	3	0.02	0.000
	Fiji	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Inter-Americ. Investment.Corp (IIC)	11	0	0	0	0	0	1	0	0	1	0.01	0.000
	The International Bank for Economic Cooperation Moscow	3	0	0	0	0	0	0	0	0	0	0.00	0.000
020	**Total**	**193,344**	**0**	**0**	**0**	**0**	**0**	**15,467**	**0**	**0**	**15,467**	**100.00**	**7.500**

Table 8-15. Geographical distribution of credit exposures relevant for the calculation of the countercyclical capital buffer (CH)

CH-Group		**31 December 2017 (€'000)**
010	Total risk exposure	6,097,326
020	Institution specific countercyclical buffer rate	0.013%
030	Institution specific countercyclical buffer requirement	780

Table 8-16. Amount of institution-specific countercyclical capital buffer (CH)

CBL 31 December 2017 (i'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 exposurefor 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												
	Austria	9	0	0	0	0	0	1	0	0	1	0.01	0.000
	Belgium	5,913	0	0	0	0	0	473	0	0	473	8.18	0.000
	Bulgaria	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Cyprus	7	0	0	0	0	0	1	0	0	1	0.01	0.000
	Czech Republic	2	0	0	0	0	0	0	0	0	0	0.00	0.500
	Denmark	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Finland	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	France	23	0	0	0	0	0	2	0	0	2	0.03	0.000
	Germany	8,010	0	0	0	0	0	641	0	0	641	11.08	0.000
	Ireland	318	0	0	0	0	0	25	0	0	25	0.44	0.000
	Italy	310	0	0	0	0	0	25	0	0	25	0.43	0.000
	Latvia	16	0	0	0	0	0	1	0	0	1	0.02	0.000
	Luxembourg	20,270	0	0	0	0	0	2,046	0	0	2,046	35.34	0.000
	Malta	7	0	0	0	0	0	1	0	0	1	0.01	0.000
	Netherlands	48	0	0	0	0	0	4	0	0	4	0.07	0.000
	Poland	22	0	0	0	0	0	2	0	0	2	0.03	0.000
	Spain	27	0	0	0	0	0	2	0	0	2	0.04	0.000
	Sweden	138	0	0	0	0	0	11	0	0	11	0.19	2.000
	United Kingdom	11,022	0	0	0	0	0	798	0	0	798	13.80	0.000
	Bahamas	28	0	0	0	0	0	2	0	0	2	0.04	0.000
	Canada	465	0	0	0	0	0	14	0	0	14	0.23	0.000
	Cayman Islands	69	0	0	0	0	0	6	0	0	6	0.10	0.000
	Costa Rica	25	0	0	0	0	0	2	0	0	2	0.03	0.000
	Curaçao	24	0	0	0	0	0	2	0	0	2	0.03	0.000
	Dominican Republic	2	0	0	0	0	0	0	0	0	0	0.00	0.000
	Guatemala	8	0	0	0	0	0	1	0	0	1	0.01	0.000
	Mexico	28	0	0	0	0	0	2	0	0	2	0.04	0.000
	Panama	42	0	0	0	0	0	3	0	0	3	0.06	0.000
	Trinidad and Tobago	4	0	0	0	0	0	0	0	0	0	0.01	0.000
	United States	3,426	0	0	0	0	0	274	0	0	274	4.74	0.000
	Virgin Islands, British	5	0	0	0	0	0	0	0	0	0	0.01	0.000
	Andorra	23	0	0	0	0	0	2	0	0	2	0.03	0.000
	Bosnia and Herzegovina	2	0	0	0	0	0	0	0	0	0	0.00	0.000
	Georgia	15	0	0	0	0	0	1	0	0	1	0.02	0.000
	Gibraltar	3	0	0	0	0	0	0	0	0	0	0.00	0.000
	Guernsey	98	0	0	0	0	0	8	0	0	8	0.14	0.000
	Isle of Man	24	0	0	0	0	0	2	0	0	2	0.03	0.000
	Jersey	13	0	0	0	0	0	1	0	0	1	0.02	0.000
	Macedonia, the Former Yugoslav Republic of	4	0	0	0	0	0	0	0	0	0	0.01	0.000
	Norway	59	0	0	0	0	0	5	0	0	5	0.08	2.000
	San Marino	20	0	0	0	0	0	2	0	0	2	0.03	0.000
	Switzerland	1,576	0	0	0	0	0	126	0	0	126	2.18	0.000
	Ukraine	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Argentina	36	0	0	0	0	0	4	0	0	4	0.08	0.000
	Armenia	692	0	0	0	0	0	55	0	0	55	0.96	0.000
	Aruba	2	0	0	0	0	0	0	0	0	0	0.00	0.000
	Australia	33	0	0	0	0	0	3	0	0	3	0.05	0.000
	Bahrain	54	0	0	0	0	0	4	0	0	4	0.07	0.000
	Bermuda	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Brunei Darussalam	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Chile	2	0	0	0	0	0	0	0	0	0	0.00	0.000
	China	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Colombia	67	0	0	0	0	0	5	0	0	5	0.09	0.000
	Ecuador	5	0	0	0	0	0	0	0	0	0	0.01	0.000
	Egypt	31	0	0	0	0	0	2	0	0	2	0.04	0.000
	El Salvador	3	0	0	0	0	0	0	0	0	0	0.00	0.000
	Fiji	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Hong Kong	453	0	0	0	0	0	36	0	0	36	0.63	1.250
	India	3	0	0	0	0	0	0	0	0	0	0.00	0.000
	Indonesia	11	0	0	0	0	0	1	0	0	1	0.01	0.000
	Iran, Islamic Republic of	21	0	0	0	0	0	2	0	0	2	0.04	0.000
	Israel	1	0	0	0	0	0	0	0	0	0	0.00	0.000
	Japan	1,174	0	0	0	0	0	182	0	0	182	3.15	0.000

Table 8-17. Geographical distribution of credit exposures relevant for the calculation of the countercyclical capital buffer (CBL)

CBL		31 December 2017 (€'000)
010	Total risk exposure	4,451,809
020	Institution specific countercyclical buffer rate	0.013%
030	Institution specific countercyclical buffer requirement	592

Table 8-18. Amount of institution-specific countercyclical capital buffer (CBL)

CBF 31 December 2017 (€'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												
	Germany	871	0	0	0	0	0	70	0	0	70	18.97	0.000
	France	25	0	0	0	0	0	2	0	0	2	0.54	0.000
	Netherlands	24	0	0	0	0	0	2	0	0	2	0.53	0.000
	Italy	43	0	0	0	0	0	3	0	0	3	0.94	0.000
	Greece	1	0	0	0	0	0	0	0	0	0	0.03	0.000
	Spanien	33	0	0	0	0	0	3	0	0	3	0.71	0.000
	Belgium	1,201	0	0	0	0	0	96	0	0	96	26.17	0.000
	Luxembourg	1,747	0	0	0	0	0	140	0	0	140	38.06	0.000
	Austria	0	0	0	0	0	0	0	0	0	0	0.01	0.000
	Switzerland	99	0	0	0	0	0	8	0	0	8	2.15	0.000
	Kazakhstan	3	0	0	0	0	0	0	0	0	0	0.07	0.000
	United Kingdom	159	0	0	0	0	0	13	0	0	13	3.47	0.500
	United States	384	0	0	0	0	0	31	0	0	31	8.36	0.000
020	**Total**	**4,590**	**0**	**0**	**0**	**0**	**0**	**367**	**0**	**0**	**367**	**100.00**	**0.000**

Table 8-19. Geographical distribution of credit exposures relevant for the calculation of the countercyclical capital buffer (CBF)

CBF		31 December 2017 (€'000)
010	Total risk exposure	1,468,080
020	Institution specific countercyclical buffer rate	0.017%
030	Institution specific countercyclical buffer requirement	254

Table 8-20. Amount of institution-specific countercyclical capital buffer (CBF)

8.5 Leverage ratio

Within the Basel framework, the Leverage Ratio is a binding minimum ratio as of 2018. While this is not implemented within the EU, the delegated regulation on disclosure of the leverage ratio (EU) No 1423/2013 requires disclosure of detailed information.

Clearstream shows in the following table the reconciliation of the Leverage Ratio total exposure measure to the relevant information in the published financial statements as of 31 December 2017 including any adjustments made:

Summary comparison of accounting assets vs Leverage Ratio exposure measure	31 December 2017 (€' 000)		31 December 2016 (€' 000)	
	CBL	CBF	CBL	CBF
Total consolidated assets as per published financial statements	14,200,315	1,768,717	14,684,926	1,513,678
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	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	0	0	0	0
Adjustments for derivative financial instruments	48,541	0	-11,693	0
Adjustment for securities financing transactions (ie repos and similar secured lending)	211,948	0	15,584	0
Adjustment for off-balance sheet items (ie conversion to credit equivalent amounts of off-balance sheet exposures)	663,309	0	927,173	37,947
Other adjustments	-24,875	-8,239	-94,710	-3,857
only for info: of which FX-differences	0	-1,181	*0*	*-722*
only for info: of which year-end adjustements after period	9,550	-7,058	*-94,710*	*-3,135*
Leverage Ratio exposure	**15,099,238**	**1,760,478**	**15,521,280**	**1,547,768**

Table 8-21. Summary reconciliation of accounting assets and Leverage Ratio exposures (LRSum)

The following table shows that the on-balance sheet exposures are the biggest part of the Leverage Ratio total exposure measure. In addition to the on-balance sheet items, off-balance sheet items and derivative as well as SFT exposures are considered to determine the Leverage Ratio exposure measure as well as the Leverage Ratio itself.

Leverage ratio common disclosure template	31 December 2017 (€' 000)			31 December 2016 (€' 000)		
	CH-Group	CBL	CBF	CH-Group	CBL	CBF
On-balance sheet items (excluding derivatives and SFTs, but including collateral)	10,067,306	8,849,055	1,230,246	11,300,578	10,098,561	1,344,857
(Asset amounts deducted in determining Basel III Tier 1 capital)	-40,292	-13,736	-504	-43,075	-14,052	-722
On-balance sheet exposures	**10,027,014**	**8,835,319**	**1,229,742**	**11,257,503**	**10,084,509**	**1,344,135**
Replacement cost associated with all derivatives transactions (ie net of eligible cash variation margin)	0	51,155	0	0	60,840	0
Add-on amounts for PFE associated with all derivatives transactions	0	0	0	0	0	0
Gross-up for derivatives collateral provided where deducted from the balance sheet assets pursuant to the operative accounting framework	51,214	0	0	62,653	0	0
(Deductions of receivables assets for cash variation margin provided in derivatives transactions)	0	0	0	0	0	0
(Exempted CCP leg of client-cleared trade exposures)	0	0	0	0	0	0
Adjusted effective notional amount of written credit derivatives	0	0	0	0	0	0
(Adjusted effective notional offsets and add-on deductions for written credit derivatives)	0	0	0	0	0	0
Total derivative exposures	**51,214**	**51,155**	**0**	**62,653**	**60,840**	**0**
Gross SFT assets with no recognition of netting, after adjusting for sale accounting transactions	5,334,401	5,556,930	530,233	4,425,688	4,448,758	165,686
(Netted amounts of cash payables and cash receivables of gross SFT assets)	0	0	0	0	0	0
CCR exposure for SFT assets	355,358	0	0	39,699	0	0
Agent transaction exposures	0	0	0	0	0	0
Total securities financing transaction exposures	**5,689,759**	**5,556,930**	**530,233**	**4,465,387**	**4,448,758**	**165,686**
Off-balance sheet exposure at gross notional amount	643,252		0	2,631,367	927,173	379,471
(Adjustments for conversion to credit equivalent amounts)	-41,274	0	0	-1,105,683	0	-341,524
Off-balance sheet items	**601,978**	**0**	**0**	**1,525,684**	**927,173**	**37,947**
Tier 1 capital	1,289,744	1,061,305	308,880	1,260,278	1,042,421	297,894
Total exposures (sum of on-balance, derivative, SFT and off-balance exposures)	16,369,965	15,106,713	1,759,975	17,311,227	15,521,280	1,547,768
Basel III Leverage Ratio	**7.88%**	**7.03%**	**17.55%**	**7.28%**	**6.72%**	**19.25%**
Choice on transitional arrangements for the definition of the capital measure	0	0	0	0	0	0
Amount of derecognised fiduciary items in accordance with Article 429 (11) of Regulation (EU) No 575/2013	0	0	0	0	0	0

Table 8-22. Leverage Ratio common disclosure template (LRCom)

As the on-balance sheet items are the main part of the Leverage Ratio total exposure measure a sufficiently granular breakdown of the related components to identify the main composition of the leverage ratio is provided in Table 3-23. As Clearstream has no trading book the total on-balance sheet exposures are banking book exposures.

CRR leverage ratio exposures	31 December 2017 (€' 000) CH-Group	31 December 2016 (€' 000) CH-Group
Total on-balance sheet exposures (excluding derivatives, SFTs, and exempted exposures), of which:	10,067,306	11,300,578
Trading book exposures	0	0
Banking book exposures, of which:	10,067,306	11,300,578
Covered bonds	0	0
Exposures treated as sovereigns	8,193,841	9,786,828
Exposures to regional governments, MDB, international organisations and PSE NOT treated as sovereigns	20	0
Institutions	1,680,193	1,205,054
Secured by mortgages of immovable properties	0	0
Retail exposures	0	0
Corporate	136,703	255,374
Exposures in default	0	0
Other exposures (eg equity, securitisations, and other non-credit obligation assets)	56,549	53,322

Table 8-23. Split-up of on balance sheet exposures (excluding derivatives, SFTs and exempted exposures; LRSpl)

CRR leverage ratio exposures	CH-Group	CBL	CBF
Desciption of processes used to manage the risk of excessive leverage	Clearstream as CSD has a volatile balance sheet volume depending on customers' short term cash deposits used to foster settlement. The balance sheet varies sharply within short timeframes and the cash received is reinvested with low 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 to a limited extent.		
Desciption of the factors that had an impact on the leverage ratio during the period to which the disclosed leverage ratio refers	The leverage exposure, and therefore ratio, is primarily influenced by the volume of client deposits and the corresponding actions taken by Clearstream to place these funds in the market in as low-risk a way as possible, through on-balance sheet placements and securities financing transactions.		

Table 8-24. Description of qualitative items (LRQua)

9. Governance arrangements

9.1 Clearstream Holding AG

9.1.1 General arrangements

Clearstream Holding AG (CH) is a stock corporation incorporated in Germany. The German Stock Corporation Act (AktG) requires such a company to set up an Executive Board (§§ 76 et seq. AktG) and a Supervisory Board (§§ 95-116 AktG).

Clearstream Holding AG maintains a comprehensive suitability policy. The objective of this policy is to ensure that the members of the Executive Board, the members of the Supervisory Board and key function holders of CH (as well as of the subsidiaries of CH that are to be qualified as credit institutions) are suitable in terms of reputation, experience and governance criteria, as stipulated in the "EBA Guidelines on the assessment of the suitability of members of the management body and key function holders" (EBA/GL/2012/06) and BaFin guidance notice BA 53-FR 1903-2012/0003 as amended. CH follows a stringent recruitment policy for the selection of members of the Supervisory Board and Executive Board as described below. The suitability assessment is initiated when it is intended to appoint or elect a new member of the Executive Board or the Supervisory Board and on a regular basis, at least once a year.

9.1.2 Supervisory Board

CH has established a Supervisory Board to supervise the Executive Board, in accordance with the mandatory provision of the German Stock Corporation Act (AktG). The members of the Supervisory Board of CH are elected by the shareholders. This in principle takes place during the annual general meeting of shareholders. The members are elected for a period of five years. If there is the need of a replacement, this is done by an extraordinary shareholder's meeting.

According to the Articles of Incorporation of CH, the Supervisory Board consists of three members. The Supervisory Board in its entirety must have the necessary skills, capabilities and experience to supervise and control the Executive Board of CH. This requires understanding of the business of a Financial Holding Company. In addition, the Supervisory Board must have:

- At least one member with expertise of accounting and auditing; and
- At least one member with expertise of risk management and risk controlling.

The rules of the limitation of mandates in accordance with § 25d (3) KWG must be complied with. Under this definition, and in consideration of the legal permissibility of the aggregation of mandates, on 31 December 2017 all members of the Supervisory Board of CH complied with these rules.

The Supervisory Board meets as often as business requires, but at least two meetings are scheduled each year, that generally take place around May and December each year.

Due to the small size of the Supervisory Board (three members), it is not necessary to set up any committees. However, the Supervisory Board in its entirety takes over the responsibilities stipulated for committees in § 25d (8) -(12) KWG.

9.1.3 Executive Board

According to § 25a KWG and MaRisk certain functions and duties in several business areas must be segregated up to the level of the Executive Board. In addition, all tasks must 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. To fulfil the above-mentioned organisational requirements and in the light of the systemic importance of CH the Executive Board currently consists of seven members.

The Executive Board is inter alia responsible for the proper business organisation (in accordance with § 25c (3) number 1 in connection with § 25a KWG). The Executive Board is also responsible for the adoption of the business distribution plan, which regulates the allocation of tasks between the board members in order to enable a more efficient management of the company. Nevertheless, the Executive Board as a whole remains responsible for the fulfilment of the duties as defined by law and set out in the Articles of Incorporation (overall responsibility).

Meetings of the Executive Board are held monthly; further details are determined by the chairperson. Additional meetings take place, if required for the well-being of CH.

The members of the Executive Board must be professionally suitable and reliable for the management of a Financial Holding Company 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 Financial Holding Company.

Members of the Executive Board must have, in particular:

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

The rules of the limitation of mandates in accordance with § 25c (2) KWG must be complied with. Under this definition, and in consideration of the legal permissibility of the aggregation of mandates, on 31 December 2017, all members of the Executive Board of CH complied with these rules.

9.2 Clearstream Banking S.A.

9.2.1 General arrangements

Clearstream Banking S.A. is a Luxembourg company incorporated in Luxembourg under the form of a public limited company (société anonyme). It is governed by the Articles of Incorporation, by the law of 10 August 1915 on commercial companies, as amended (the "Companies' Act"), the law of 5 April 1993 on the financial sector, as amended (Luxembourg Banking Act) and by the applicable CSSF circulars and regulations.

CBL maintains a comprehensive suitability policy. The objective of this policy is to ensure that members of the Executive Board of CBL, the members of the Supervisory Board of CBL and key function holders of CBL are suitable in terms of reputation, experience and governance criteria, as stipulated in article 7 of the Luxembourg Banking Act, Circular CSSF 12/552, as amended,, the 'EBA Guidelines on the assessment of the suitability of members of the management body and key function holders' (EBA/GL/2012/06) and article 27 (4) of Regulation (EU) No. 909/2014 of the European Parliament and of the Council of 23 July 2014 on improving securities settlement in the European Union and on central securities depositories and amending Directives 98/26/EC and 2014/65/EU and Regulation (EU) No 236/2012 ("CSDR"). CBL follows a stringent recruitment policy for the selection of members of the Supervisory Board and the Executive Board as described below.

9.2.2 Supervisory Board

In 2016, CBL established a Supervisory Board to supervise the Executive Board, in accordance with the provisions of the Luxembourg Companies' Act.

According to the articles of incorporation of CBL, the Supervisory Board consists of at least three members. The members of the Supervisory Board have to fulfil certain criteria and in order to be compliant with regulatory requirements.

The Supervisory Board meets regularly; further details shall be determined by its chairman. In fact, the Supervisory Board usually meets four times per year.

In 2017, the Supervisory Board was supported by an Audit, Compliance and Risk Management Committee composed of three members of the Supervisory Board. With effect as of 1 January 2018, the Audit, Risk and Compliance Committee was replaced by three separate risk-monitoring committees, that is, the Audit Committee, the Risk Committee and the Remuneration Committee. All three committees consist of three members; the Audit Committee is chaired by an independent member of the Supervisory Board. According to article 52 of the law of 23 July 2016 concerning the audit profession, the Audit Committee, among other matters, examines CBL's financial statements and prepares the Supervisory Board's report on the financial statements. It monitors the adequacy and effectiveness of the internal audit system and deliberates on the work of the internal audit function. Moreover, it assesses and monitors the independence of and work carried out by the external auditor and makes recommendations on the appointment, renewal, revocation and remuneration of the external auditor. The Risk Committee advises the Supervisory Board on the risk tolerance, the risk strategy, and deliberates on the adequacy and effectiveness of the risk management function and the risks incurred. The Remuneration Committee advises the Supervisory Board on the remuneration policy and assists the Supervisory Board with the fulfilment of its supervisory mission.

9.2.3 Executive Board

According to the articles of incorporation of CBL, the Executive Board shall be composed of at least three members who are appointed by the Supervisory Board of CBL for a period of four years. The Executive Board of CBL is chaired by two Co-CEOs.

The Executive Board is responsible for managing CBL in accordance within the applicable laws, the articles of association and its internal rules and regulations with the objective of creating sustainable value in the interest of the company, taking into consideration the interests of the shareholders, employees and other stakeholders. The Executive Board is responsible for establishing a proper business organisation, encompassing appropriate and effective risk management.

The business distribution plan regulates the allocation of tasks between the board members in order to enable a more efficient management. Nevertheless, the Executive Board as a whole remains responsible for the fulfilment of the duties as defined by law and set out in the articles of incorporation (overall responsibility).

The Executive Board is supported by the Clearstream Risk and Compliance Committee ("CRCC") as the central managerial forum for review of material risk and compliance topics.

Meetings of the Executive Board are held monthly, or more frequently if required.

9.3 Clearstream Banking AG

9.3.1 General Arrangements

Clearstream Banking AG (CBF) is a stock corporation incorporated in Germany. The German Stock Corporation Act (AktG) requires such a company to set up an Executive Board (§§ 76 et seq. AktG) and a Supervisory Board (§§ 95-116 AktG).

Clearstream Banking AG maintains a comprehensive suitability policy. The objective of this policy is to ensure that members of the Executive Board, members of the Supervisory Board and key function holders of CBF are suitable in terms of reputation, experience and governance criteria, as stipulated in the "EBA Guidelines on the assessment of the suitability of members of the management body and key function holders' (EBA/GL/2012/06) and BaFin guidance notice BA 53-FR 1903-2012/0003 as amended. CBF follows a stringent recruitment policy for the selection of members of the Supervisory Board and Executive Board as described below. A suitability assessment is initiated about each appointment or election of a new board member and on a regular basis, at least annually.

9.3.2 Supervisory Board

CBF has established a Supervisory Board to supervise the Executive Board, in accordance with the mandatory provisions of the German Stock Corporation Act (AktG) in connection with the German One-Third Participation Act (Drittelbeteiligungsgesetz - DrittelbG). According to the DrittelbG, one third of the members of the Supervisory Board (two out of six) are employee representatives. The shareholders representatives of the Supervisory Board of CBF are elected by the shareholders in the annual general meeting of shareholders or, if there is the need of a replacement, in an extraordinary shareholders' meeting. The employee representatives are elected by the employees of CBF prior to that shareholders' meeting to elect an entirely new Supervisory Board. All members are elected for a period of five years.

According to the Articles of Incorporation, the Supervisory Board consists of six members. The Supervisory Board in its entirety must have the necessary skills, capabilities and experience to supervise and control the Executive Board of CBF. This requires understanding of the business of a credit institution. In addition, the Supervisory Board must have:

- At least one member with expertise in the area of accounting and auditing; and
- At least one member with expertise in the area of risk management and risk controlling.

The rules of the limitation of mandates in accordance with § 25d (3) KWG must be complied with. Under this definition and in consideration of the legal permissibility of the aggregation of mandates, on 31 December 2017 all members of the Supervisory Board of CBF complied with these rules.

The Supervisory Board meets as often as business requires, but at least two meetings are scheduled each year, which generally take place around May and December.

Due to the small size of the Supervisory Board (six members), it was not necessary to set up any committees. In the past, the Supervisory Board in its entirety took over the responsibilities stipulated for committees in § 25d (8) -(12) KWG. In particular, due to the risk profile of CBF no separate risk committee has been established. However, risk reports are provided by Clearstream Risk Management to the Supervisory Board of CBF on a regular, at least quarterly, basis.

In connection with the implementation of the requirements of the Central Securities Depository Regulation (CSDR), the Supervisory Board of CBF has established three committees with effect of 1 January 2018 - an Audit Committee, a Risk Committee and a Remuneration Committee. Each committee consists of three members and is chaired by different chairpersons. With effect as of the same date, also the requirement of independent members of the supervisory board is fulfilled through the election of two new independent members of the Supervisory Board.

They also agreed to support and make use of the existing Female Executive Mentoring (FEM) programme which is a part of the gender diversity initiative of Deutsche Börse Group as well as the Deutsche Börse Group's Women's Network; both programmes promote the underrepresented gender on different levels.

9.3.3 Executive Board

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 CBF, the articles of incorporation of CBF stipulate that the Executive Board consists of at least two members.

The Executive Board is inter alia responsible for the proper business organisation (in accordance with § 25c (3) number 1 in connection with § 25a of the German Banking Act). The Executive Board is also responsible for the business distribution plan which regulates the allocation of tasks between the board members in order to enable a more efficient management. Nevertheless, the Executive Board as a whole remains responsible for the fulfilment of the duties as defined by law and set out in the Articles of Incorporation (overall responsibility).

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 CBF. In fact, the Executive Board meets monthly

The members of the Executive Board must be professionally suitable and reliable for the management of a credit institution 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 credit institution.

Members of the Executive Board must have:

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

The rules of the limitation of mandates in accordance with § 25c (2) KWG must be complied with. Under this definition and in consideration of the legal permissibility of the aggregation of mandates, on 31 December 2015 all members of the Executive Board of CBF complied with these rules.

This page has intentionally been left blank.

Appendix A. Abbreviations used in this document

ABS	Asset Backed Securities
AMA	Advanced Measurement Approach
ASL	Automated Securities Lending Programme
BaFin	Bundesanstalt für Finanzdienstleistungsaufsicht (Federal Financial Supervisory Authority)
BCBS	Basel Committee on Banking Supervision
BCL	Banque centrale du Luxembourg
BCM	Business Continuity Management
BIA	Basis Indicator Approach
CBF	Clearstream Banking AG
CBJ	Clearstream Banking Japan Ltd
CBL	Clearstream Banking S.A.
CCB	Cash Correspondent Bank
CCP	Central Counterparty
CDO	Collateralised Debt Obligation
CET1	Common Equity Tier 1
CF	Conversion Factor
CFO	Chief Financial Officer
CFSI	Clearstream Fund Services Ireland Ltd
CH	Clearstream Holding AG
CGSS	Clearstream Global Securities Services Ltd
CI	Clearstream International, S.A.
CLS	Continuous Linked Settlement
CMBS	Commercial Mortgage-Backed Security
CNB	Czech National Bank
COP	Clearstream Operations Prague s.r.o.
CRD	Capital Requirements Directive
CRD IV	Capital Requirements Directive IV
CRM	Credit Risk Mitigation
CRR	Capital Requirements Regulation
CS	Clearstream Services S.A.
CSA	Credit Support Annex
CSC	Collective Safe Custody
CSD	Central Securities Depository
CSSF	Commission de Surveillance du Secteur Financier
CVA	Credit Valuation Adjustment
DBAG	Deutsche Börse AG
DVP	Delivery Versus Payment
EB	Euroclear Bank SA/NV
EBA	European Banking Authority
EBIT	Earnings Before Interest and Tax
EC	European Commission
ECAI	External Credit Assessment Institution
ECB	European Central Bank
EEA	European Economic Area
EMIR	European Market Infrastructure Regulation
ESMA	European Securities and Markets Authority

Abbreviations

EU	European Union
FIRB	Foundation Internal Rating Based Approach
FRN	Floating Rate Note
FX	Foreign Exchange
GAAP	Generally Accepted Accounting Principles
GMRA	Global Master Repurchase Agreement
GSF	Global Securities Financing
G-SIB	Global Systemically Important Bank
G-SII	Global Systemically Important Institution
HF-LI	High-Frequency, Low-Impact
HGB	Handelsgesetzbuch (German Commercial Code)
HQLA	High Quality Liquid Assets
IAS	International Accounting Standards
ICAAP	Internal Capital Adequacy Assessment Process
ICSD	International Central Securities Depository
IFRS	International Financial Reporting Standards
ILAAP	Internal Liquidity Adequacy Assessment Process
IRB	Internal Rating Based Approaches
IRBA	Advanced Internal Rating Based Approach
IRR	Interest Rate Risk
iTOF	Intraday Technical Overdraft Facility
KWG	Gesetz über das Kreditwesen (German Banking Act)
LCR	Liquidity Coverage Ratio
LDA	Loss Distribution Approach Models
LF-HI	Low-Frequency, High-Impact
LGD	Loss Given Default
LSI	Less Significant Institution
MaRisk	Mindestanforderungen an das Risikomanagement (Minimum Requirements for Risk Management)
MBS	Mortgage-Backed Securities
MEIP	Minimum Export Insurance Premium
NCSC	Non-Collective Safe Custody
NPV	Net Present Value
NSFR	Net Stable Funding Ratio
OECD	Organisation for Economic Cooperation and Development
O-SIB	Other Systemically Important Bank
O-SII	Other Systemically Important Institution
OTC	Over-The-Counter
PD	Probability of Default
PSF	Professional of the Financial Sector
RBC	Risk Bearing Capacity
RMBS	Residential Mortgage-Backed Security
RWA	Risk-weighted asset
SA	Standardised Approach (in connection with operational risk)
SFT	Securities Financing Transaction
SI	Significant Institution
SIB	Systematically Important Bank
SREP	Supervisory Review and Evaluation Process
SRP	Supervisory Review Process
SSM	Single Supervisory Mechanism
SSS	Securities Settlement System
STA	Standardised Approach (in connection with credit risk)
STP	Straight-Through Processing
SWIFT	Society for Worldwide Interbank Financial Telecommunication
T2S	TARGET2-securities
TLAC	Total Loss Absorbing Capacity
TOF	Technical Overdraft Facility
VaR	Value at Risk

Contact
www.clearstream.com

Published by
Clearstream Holding AG

Address
Clearstream Holding AG
60485 Frankfurt/Main
Germany

September 2018

Document number: 6475