

Clearstream Banking S.A.

Pillar 3 Disclosure Report 2019

Pillar III Disclosure Report 2019 of Clearstream Banking S.A.

In accordance with Part Eight of Regulation (EU) No. 575/2013 (Capital Requirements Regulation (CRR)) and the EBA Guidelines on disclosure requirements under Part Eight of Regulation (EU) No. 575/2013 of 14 December 2016

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Clearstream Banking S.A. is a Clearstream Holding AG company, which in turn is a Deutsche Börse Group company.

Foreword

The purpose of this document is to fulfil regulatory disclosure requirements based on the revised Basel banking framework commonly known as “Basel III”. Within the European Union (EU), the current disclosure framework covers the “Basel III” requirements and includes 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.

Clearstream Banking S.A. (CBL) is part of Clearstream Holding AG (CH), which is a financial holding company as defined in Art. 4 Paragraph 1.20 CRR and, together with its subordinated companies, forms a financial holding Group under German law.

As of 1 January 2018, CBL is classified as an “Other Systemically Important Institution” (O-SII). This is in line with the EBA Guidelines 2014/10 “*on criteria to determine the conditions of application of Art. 131(3) of Directive 2013/36/EU (CRD) in relation to the assessment of other systemically important institutions (O-SIIs)*” and CSSF Regulation N° 18-06. Due to this classification, CBL is required to comply with the EBA Guidelines 2016/11 “*on disclosure requirements under Part Eight of Regulation (EU) No. 575/2013*”.

CBL has also applied to be recognised as a Central Securities Depository (CSD) under EU Regulation No. 909/2014 “*on improving securities settlement in the European Union and on central securities depositories and amending Directive 98/26/EC and 2014/65/EU and Regulation (EU) No. 236/2012*”.

The supervision of CBL lies with Commission de Surveillance du Secteur Financier (CSSF) and Banque centrale du Luxembourg (BCL).

The financial statements of Clearstream Banking S.A. are prepared in a mixed accounting regime of the Luxembourg Generally Accepted Accounting Principles (Lux GAAP) with IAS options. The relevant IAS options are the following:

- Presentation of the balance sheet and of the income statement;
- Recognition, measurement and impairment of financial instruments as per IFRS 9 as at 1 January 2018;
- Recognition and measurement of leases as per IFRS 16 as at 1 January 2019;
- IAS 19 revised June 2011;
- Application of IFRS 2.43A – 43D to share-based payments.

For regulatory purposes, the figures follow the International Financial Reporting Standards (IFRS).

If not explicitly stated otherwise, all amounts are denominated in € thousands ('000).

Clearstream Banking S.A. fulfils the disclosure requirements detailed in Part Eight CRR and the EBA Guidelines 2016/11, as well as Art. 38 of the Luxembourg Law of 5 April 1993, as amended (in the following: Luxembourg Banking Act), which has transposed the disclosure requirements of Art. 89 and 96 CRD IV into Luxembourg law, as follows:

- A remuneration report that fulfils the requirements of Art. 450 CRR. That report is disclosed by year on the Clearstream Group website. <https://www.clearstream.com/clearstream-en/about-clearstream/regulation-1-/remuneration-information/from-2014-onwards>

- All other disclosure requirements as defined in Part Eight 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. <https://www.clearstream.com/clearstream-en/about-clearstream/regulation-1-pillar-iii-disclosure-report>
- This disclosure report contains information about governance arrangements as stipulated in Art. 38-1 of the Luxembourg Banking Act¹ (implementation of Art. 88 CRD IV into Luxembourg law).
- Information about the return on assets (RoA) according to Art. 38-4 of the Luxembourg Banking Act is disclosed by CBL under Note 9.3 in the notes to its financial statements, which are published in the Luxembourg Trade and Companies Register (Registre de Commerce and des Sociétés).

In the following, if not stated otherwise, we always refer to the respective laws in place during the reporting period – that is, 2019 – and basically valid on 31 December 2019.

How this document is organised

The report is presented over 12 chapters, as follows:

[1. Introduction](#)

[2. Governance arrangements](#)

[3. Risk management overview](#)

[4. Linkages between financial statements and regulatory exposures](#)

[5. Composition of capital](#)

[6. Leverage ratio](#)

[7. Operational risk](#)

[8. Credit risk](#)

[9. Counterparty credit risk](#)

[10. Liquidity risk](#)

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¹ Law of 5 April 1993 as amended

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1. Introduction

1.1 Regulatory framework

In 2004, the Basel Committee on Banking Supervision (“BCBS”) published its standards governing the capital adequacy of internationally active banks (“Basel II”). The Basel framework consists of three mutually reinforcing pillars, as outlined below.

- Pillar 1 concerns the minimum quantitative (capital) requirements related to credit, operational and market risks
- Pillar 2 requires banks to integrate the risks of Pillar 1 and further significant and substantial risks into integrated capital management and risk management considerations. Additionally, the interaction between the banks’ own assessments and the banking supervisors’ review is prescribed
- Pillar 3 promotes market discipline through disclosure and thereby transparency to the public

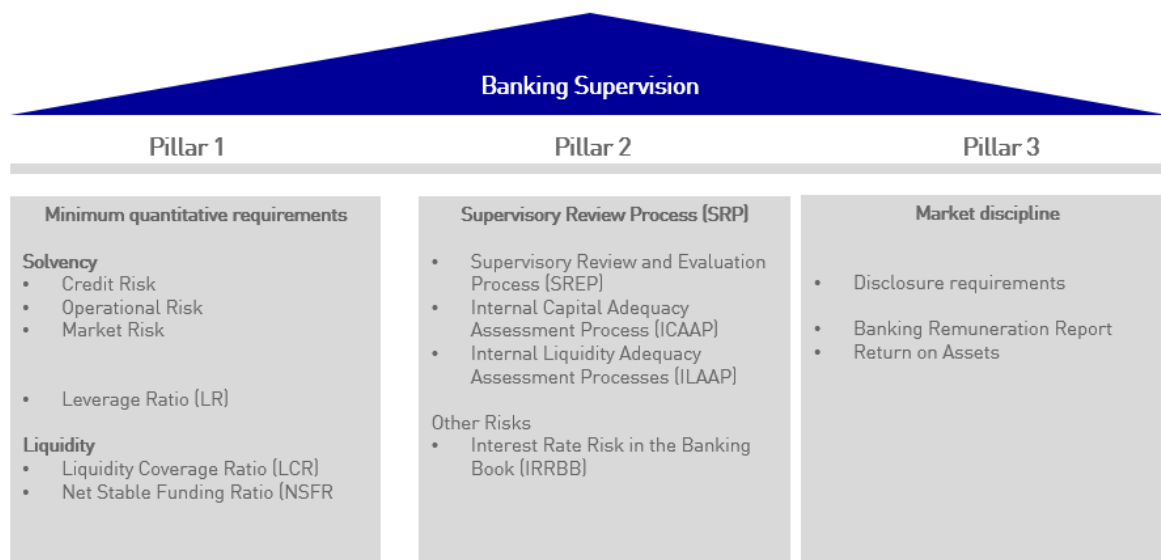


Figure 1 - Overview regulatory framework

In December 2010, BCBS published its revised regulatory banking framework commonly known as “Basel III”², which is an internationally agreed set of measures to strengthen the regulation, supervision and risk management of banks. The Basel III framework is translated into European law through Regulation (EU) No. 575/2013 of the European Parliament and the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms (“CRR”) and Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms (“CRD IV”). Furthermore, the requirements outlined in Art. 89 to 96 CRD IV have been transposed into Luxembourg law in

² 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>, “Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools”: <http://www.bis.org/publ/bcbs238.pdf> and “Basel III: the net stable funding ratio”: <http://www.bis.org/bcbs/publ/d295.pdf>

Art. 38 of the Luxembourg Law of 5 April 1993, as amended (in the following: Luxembourg Banking Act).

Furthermore, modified as well as new disclosure requirements have been outlined in the revised banking package – the amended Capital Requirements Regulation (“CRR II”) and Capital Requirements Directive (“CRD V”) that still need to be transposed into national law. These new disclosure requirements take effect on 28 June 2021.

In addition to the previously mentioned regulation and directive, this report considers the following regulatory publications:

- Commission Implementing Regulation (EU) No. 1423/2013 of 20 December 2013 laying down implementing technical standards with regard to disclosure of own funds requirements for institutions according to Regulation 575/2013 of the European Parliament and Council
- Commission Implementing Regulation (EU) 2016/200 of 15 February 2016 laying down implementing technical standards with regard to disclosure of the leverage ratio for institutions, according to Regulation (EU) No. 575/2013 of the European Parliament and of the Council
- Commission Delegated Regulation (EU) 2015/1555 of 28 May 2015 supplementing Regulation (EU) No. 575/2013 of the European Parliament and of the Council with regard to regulatory technical standards for the disclosure of information in relation to the compliance of institutions with the requirement for a countercyclical capital buffer in accordance with Art. 440
- Commission Delegated Regulation (EU) 2017/2295 of 4 September 2017 supplementing Regulation (EU) No. 575/2013 of the European Parliament and of the Council with regard to regulatory technical standards for disclosure of encumbered and unencumbered assets
- EBA/GL/2014/03 of 27 June 2014: Guidelines on Disclosure on Encumbered Assets
- EBA/GL/2014/14 of 23 December 2014: Guidelines on materiality, proprietary and confidentiality and on disclosure frequency under Art. 432(1), 432(2) and 433 of Regulation (EU) No. 575/2013
- EBA/GL/2016/11 of 14 December 2016: Guidelines on disclosure requirements under Part Eight of Regulation (EU) No. 575/2013
- EBA/GL/2017/01 of 21 June 2017: Guidelines on LCR disclosure to complement the disclosure of liquidity risk management under Art. 435 of Regulation (EU) No. 575/2013
- EBA/GL/2018/01 of 16 January 2018: Guidelines on uniform disclosures under Art. 473a of Regulation (EU) No. 575/2013 as regards the transitional period for mitigating the impact of the introduction of IFRS 9 on own funds
- CSSF Circular 17/673 referring to Guidelines on Disclosure Requirements under part eight of Regulation (EU) of 14 December 2016 as amended on 9 June 2017
- CSSF Circular 18/676 referring to Guidelines on LCR Disclosure to complement the disclosure of Liquidity Risk Management under Art. 435 of Regulation (EU) No. 575/2013 and EBA/GL/2017/01 of 8 March 2017
- CSSF Circular 18/687 Adoption of the EBA Guidelines on uniform disclosures under Art. 473a of Regulation (EU) No. 575/2013 as regards the transitional period for mitigating the impact of the introduction of IFRS 9 on own funds (EBA/GL/2018/01

In the following, we refer to the respective laws in place as of 31 December 2019 if not stated otherwise.

1.1.1 Objective of the report

The objective of this Disclosure Report is to fulfil the disclosure requirements detailed in Part 8 CRR and Art. 38 of the Luxembourg Law of 5 April 1993 (“Luxembourg Banking Act”), at the legal entity level of Clearstream Banking S.A. (“CBL”). More specifically, the report intends to provide a detailed overview on Clearstream Banking S.A.’s

- Legal structure
- Capital structure
- Risk management framework including governance arrangements, risk management methodology and risk reporting
- Risk management in terms of identified risk types

To ensure adequate application of the disclosure requirements a Disclosure Policy has been established, which is reviewed and adapted, where necessary, on a yearly basis. Further, the Disclosure Policy allocates responsibilities and defines processes.

1.1.2 Scope of application (Art. 436 CRR)

CBL has 4 subsidiaries, however, on grounds of no-materiality these are not consolidated for accounting purposes and CBL has also been exempted of consolidation for regulatory reporting purposes.

As such, this Disclosure Report only covers CBL on a stand-alone basis.

All disclosed information is reported in CBL’s accounting and reporting currency, Euro, if not otherwise specified.

1.1.3 Frequency and means of disclosure (Art. 433 & 434 CRR)

In accordance with Art. 434 CRR, CBL publishes its Disclosure Report on its website:

www.clearstream.com/clearstream-en/about-clearstream/regulation-1-/pillar-iii-disclosure-report

The report is updated once a year. In addition to the Pillar 3 report, the following documents are also made available:

- A remuneration report that fulfils the requirements according to Art. 450 CRR. That report is disclosed by year on the website of Clearstream Group: www.clearstream.com/clearstream-en/about-clearstream/regulation-1-/remuneration-information
- Information about the return on assets (RoA) according to Art. 38-4 of the Luxembourg Banking Act is disclosed by CBL under Note 9.3 in the notes to its financial statements, which are published in the Luxembourg Trade and Companies Register (Registre de Commerce and des Sociétés).

1.2 Clearstream Banking S.A. (Art. 436 CRR)

Clearstream Banking S.A. (“CBL”) was founded in 1970 in Luxembourg and has its registered office at 42 Avenue J.F. Kennedy, L-1855 Luxembourg.

CBL is classified as a public limited company (Société Anonyme). It is governed by its Articles of Incorporation and Luxembourg company law.

1.2.1 Corporate structure

As at 31 December 2019, the Bank was directly fully owned by Clearstream Holding AG (2018: by Clearstream International S.A.). Following (i) the merger of Clearstream Participations S.A. into Clearstream Beteiligungs AG and (ii) the merger of Clearstream Holding AG into Clearstream Beteiligungs AG (which was renamed into Clearstream Holding AG), the participations previously held by Clearstream International S.A. have been transferred to Clearstream Holding AG with effective date 12 November 2019. Clearstream Holding AG is itself directly fully owned by Deutsche Börse AG, the ultimate parent of the Bank. The ownership structure of CBL as part of DBG is shown below.

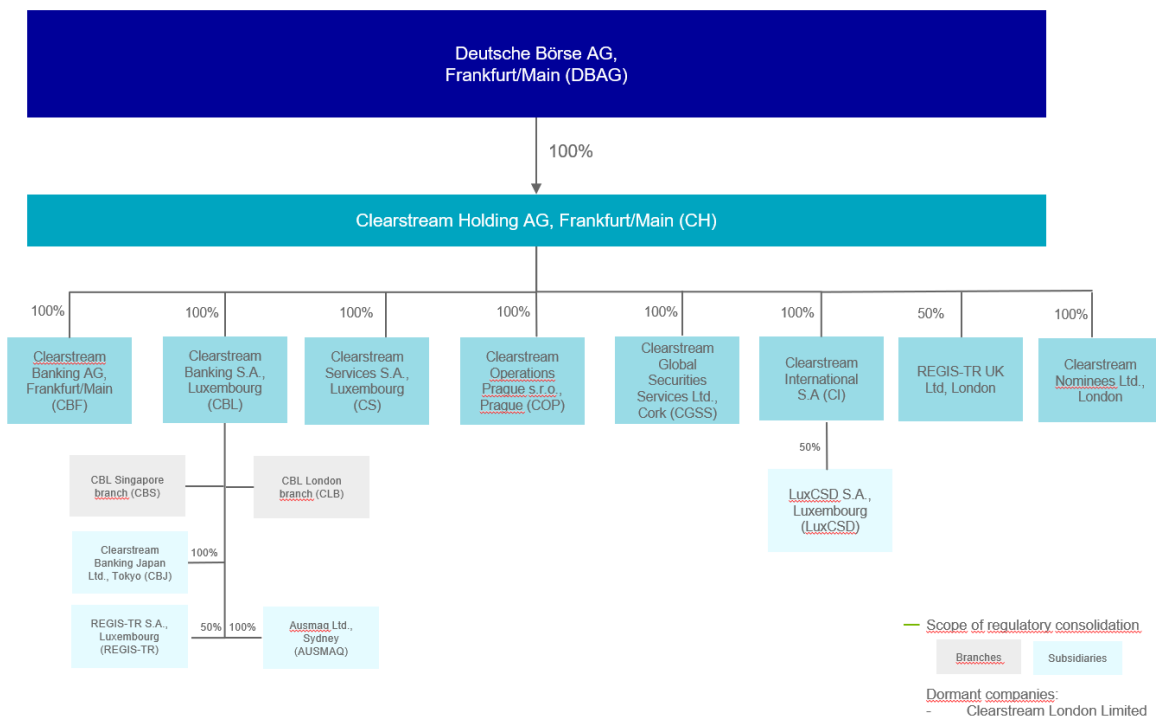


Figure 2 - Overview corporate structure

1.2.2 Business operations

CBL acts as an International Central Securities Depository (ICSD) which provides settlement and custody services for international securities.

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.

Further services offered by CBL include the issuance of securities, Investment Funds Services and Global Securities Financing, consisting of securities lending as well as collateral management services. In addition, CBL provides operative treasury services for CBF as well as for CI and Clearstream Services S.A. ("CS").

Moreover, due to the cross-border merger of Clearstream Fund Centre Ltd (“CFCL”) into Clearstream Banking S.A on 1 March 2019, CFCL’s assets, debts, rights, obligations and liabilities (including contracts) moved by process of law to CBL. The merger was carried out in order to ensure the continued smooth operation of business activities over the period of political uncertainty caused by Brexit and to allow the distribution support services for Investment Funds, that was the principle activity of CFCL, to be offered in association with CBL’s other services. In May 2019, CBL launched an enhanced distribution support service – called Fund Desk – for all its customers.

Additionally, CBL applied for an authorisation as CSD according to Art. 17 including providing banking-type ancillary services according to Art. 54 Paragraph (2) lit. (a) of Regulation (EU) No. 909/2014 (“Central Securities Depositories Regulation”, “CSDR”). The authorisation is expected to be provided in spring 2021.

CBL holds the following branches/participations:

CBL Singapore branch (“CBS”)

CBS is a branch of CBL and its first operational centre outside Europe. In November 2009, CBL obtained a banking licence, which has been updated in October 2017. All of CBL’s products and services, including Global Securities Financing, Investment Funds Services and Issuance and Distribution, are offered locally to customers in the Asia-Pacific region.

CBL London branch

In January 2016, Clearstream transformed its representative office in London into a fully-fledged branch, which took over the activities of the representative office.

Clearstream Banking Japan Ltd, Tokyo (“CBJ”)

In 2009, CBL established a fully owned subsidiary in Tokyo, Japan. The purpose of Clearstream Banking Japan Ltd (“CBJ”) is to engage in marketing, information provision and advertising; holding financial seminars and other education and training courses; support of existing customers of group companies and any other business activities relating to any of the preceding.

Clearstream London Limited (“CLL”)

On 27 December 2018 CBL established a fully owned subsidiary called Clearstream London Limited (“CLL”) in London, UK. CLL is a dormant entity that has submitted an application for an Arranger licence to the Financial Conduct Authority. CLL considers that the Arranger licence is sufficient to cover the full extent of its UK-based activity, which therefore represents a viable contingency path at the conclusion of the temporary permissions regimes under which it intends to operate in the period following exit day.

REGIS-TR S.A., Luxembourg (“REGIS-TR”)

REGIS-TR S.A. is a public limited liability company (“Société Anonyme”) organised and existing under the laws of Luxembourg. The Company was launched on 9 December 2010 by the Spanish Central Securities Depository, Sociedad de Gestión de los Sistemas de Registro, Compensación y Liquidación de Valores, S.A. and Clearstream Banking S.A. as a 50/50 joint venture, and is headquartered in the Grand Duchy of Luxembourg, with a branch in Madrid.

REGIS-TR is a European Trade Repository (TR) for reporting trades and transactions across multiple product classes and jurisdictions. The TR is open to financial and non-financial institutions, and services the major regulatory reporting obligations in Europe.

REGIS-TR has been registered by the European Markets and Securities Authority (ESMA) on 14 November 2013 in accordance with Regulation (EU) No. 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories (European Market Infrastructure Regulation), for the provision of reporting services commonly referred to as “EMIR”.

In addition, REGIS-TR was recognised by the Swiss Financial Market Supervisory Authority (FINMA) on 1 April 2017 as a foreign trade repository in accordance with Art. 80 FMIA for the receipt of reports about derivatives transactions from persons subject to reporting requirements in accordance with Art. 104 FMIA and Art. 105 paragraph 2 FMIA in conjunction with Art. 93 FMIO, for the provision of reporting services commonly to as “FinfraG”.

In addition to its existing core services, REGIS-TR is progressing well towards its goal of becoming a one-stop shop for regulatory reporting requirements and has developed its Securities Financing Transaction Reporting service which is expected to enter into force on 13 July 2020. REGIS-TR applied to ESMA for a service extension enabling it to perform Trade Repository services pertaining to the Securities Finance Transaction Reporting regulation 2015/2365 of 25 November 2015 (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.

Ausmaq Limited, Sydney, Australia

Clearstream Banking S.A., successfully completed the acquisition of Ausmaq Limited, Sydney, Australia, during the third quarter of 2019. With this acquisition, Clearstream is further expanding its offering in the investment funds space and has entered the Australian market. Ausmaq Limited has been a wholly owned subsidiary of Clearstream Banking Luxembourg since 31 July 2019. Due to the expansion of its geographical footprint, Clearstream expects the transaction to deliver revenue synergies.

1.2.3 Regulatory supervision

Commission de Surveillance du Secteur Financier (“CSSF”) is the competent authority for the supervision of CBL as a credit institution according to Art. 42 and 43 of the Luxembourg Banking Act. Furthermore, Banque Centrale du Luxembourg (“BCL”) has a shared responsibility for liquidity supervision on the basis of Art. 2 (4) of the Law of 23 December 1998 concerning the monetary status.

Moreover, CBL is subject to regulatory supervision in relation to the securities settlement system (“SSS”) according to Title V of the Luxembourg Law of 10 November 2009 relating to payment services. BCL is responsible for the oversight of SSSs, as per Art. 110 of the Law of 10 November 2009. The oversight focuses on the operational and financial stability of each system individually, the participants in such systems as well as the stability of the financial system as a whole. Furthermore, specific regulations for SSSs must be considered (e.g. circulars BCL 2001/163 and 2001/168). Additionally, being in the scope of Regulation

(EU) No. 909/2014 (CSDR), CBL applied for authorisation as a CSD according to Art. 17 in September 2017 (including providing banking-type ancillary services according to Art. 54 Paragraph (2) lit. a.). CBL does not expect to receive the authorisation before 2020.

As of 1 January 2018, Clearstream Banking S.A. is classified as Other Systemically Important Institution (“O-SII”) as per CSSF Regulation N° 18-06 since the competent authorities comply with the EBA Guidelines 2014/10 on criteria to determine the conditions of application of Art. 131(3) of Directive 2013/36/EU (CRD IV) in relation to the assessment of other systemically important institutions. Due to its classification as an O-SII, CBL must produce a stand-alone Pillar 3 disclosure report.

Clearstream Holding as the superordinate company of the financial holding Group according to §10a (1) KWG, is responsible for fulfilling the regulatory obligations on a consolidated/Group level vis-à-vis the German supervisory authorities and presents a Pillar 3 report in compliance with the disclosure requirements pursuant to Part Eight CRR and § 26a KWG.

2. Governance arrangements (Art. 435 (2) CRR)

2.1 General arrangements

Clearstream Banking S.A. (the “Company”) is incorporated in Luxembourg in the form of a public limited company (Société Anonyme). According to its Articles of Incorporation, Clearstream Banking S.A. has an Executive and a Supervisory Board. The members of the Executive Board and the Supervisory Board conduct the business of the Company in accordance with all applicable laws and regulations, notably the Law of 10 August 1915 on commercial companies, as amended, as well as the Law of 5 April 1993 on the financial sector, as amended, CSSF circulars, notably the CSSF Circular 12/552, as amended, the relevant EU framework, notably the Central Securities Depositories Regulation (CSDR) including its implementing acts, the Articles of Incorporation and these Internal Rules & Regulations.

CBL maintains a comprehensive suitability assessment policy and a corresponding side-letter defining specific job descriptions of Supervisory Board and Executive Board members. The objective of this policy is to ensure that members of the Executive Board of CBL, the members of the Supervisory Board and key function holders of CBL are suitable in terms of reputation, experience and governance criteria, as stipulated in the joint ESMA and EBA “Guidelines on the assessment of the suitability of members of the management body and key function holders under Directive 2013/36/EU and Directive 2014/65/EU” (EBA/GL/2017/12/ESMA71-99-598) as well as in the Luxembourg Banking Act and Central Securities Depositories Regulation (“CSDR”).

In addition to the suitability assessment policy, CBL has defined several diversity principles that govern the selection of Executive Board and Supervisory Board members. The principles, listed below in detail, refer to educational and professional background, gender, age and geographical provenance with the aim to achieve a variety of views and experiences and to facilitate independent opinions within the Executive Board and the Supervisory Board.

- CBL aims to achieve a balanced representation of women and men.
- The age structure of the Boards should be of an appropriately broad range.
- An appropriately broad range of educational and professional backgrounds should be present in the Boards.
- The composition of the Boards should reflect CBL’s international profile.

The suitability assessment is initiated when it is intended to appoint or elect a new member of the Executive Board or the Supervisory Board, if a member resigns from the mandate causing material changes to the composition of the management body, in case of any material changes (e.g. reduction of work time, change regarding the scope or nature of the mandate or negative event with regard to the reputation) and on a regular basis, at least once a year.

To benefit from a balanced gender diversity and to fulfil the requirement of Art. 27 (4) of the Regulation (EU) No. 909/2014 the Supervisory Board of Clearstream Banking S.A. has approved the Gender Diversity Policy as published on Clearstream’s website and decided on a target to increase the number of the under-represented gender in the management body.

The members of the Supervisory Board of Clearstream Banking S.A. agreed on the proposed 20% target quota for the representation of the under-represented gender (currently female) in both the Supervisory Board and the Executive Board until 31 December 2021.

Since 2018, the rules of the limitation of mandates in accordance with Art. 38-2 of the Luxembourg Banking Act must be complied with. Under this definition, and in consideration of the legal permissibility of the aggregation of mandates, on 31 December 2019 all members of the Executive Board and the Supervisory Board of CBL complied with these rules.

In the following paragraphs, the composition of all boards and committees is reflected as at the end of the reporting period, being 31 December 2019.

2.2 Supervisory board

According to the Articles of Incorporation of CBL, the Supervisory Board consists of at least three members. The members of the Supervisory Board are required to fulfil certain criteria, as laid down in the Suitability Assessment Policy, and to comply with regulatory requirements, as set out in the section above. Furthermore, the Supervisory Board in its entirety must have the necessary skills, capabilities and experience to supervise and control the Executive Board of CBL. This requires understanding of the business of a credit institution/central securities depository. Such criteria include but are not limited to: Members of the management body should have an up-to-date understanding of the business of the Company and its risks. The assessment of a member's knowledge, skills and experience should consider both the theoretical experience attained through education and training and the practical experience gained in previous occupations.

A member of the management body should be considered to be of good repute, honesty and integrity if there are no objective and demonstrable grounds to suggest otherwise and no reason to have reasonable doubt about his or her good repute, honesty and integrity.

The Nomination Committee prepares a job description and a candidate profile for a specific position, which is resolved by the Supervisory Board. Subsequently, the Nomination Committee identifies and recommends suitable candidates, who are sent for approval to the General Meeting of Shareholders. Following selection and nomination, Boards and Committees Clearstream prepares the formal decision of the General Meeting of Shareholders to appoint the candidate as new member. The appointments of members to the Supervisory Board require prior express approval by the competent authority (CSSF).

As at 31 December 2019, the Supervisory Board consisted of the persons displayed in Table 1, which also discloses the number of directorships held by each member as required by Art. 435 (2) of CRR.

Name/position	Number of directorships
Stephan Leithner – Chairman	10
Gregor Pottmeyer – Vice Chairman	6
Oliver Engels	4
Marc Robert-Nicoud	2
Ernst Wilhelm Contzen	2
Wolfgang Gaertner	2
Marie-Jeanne Chevremont	7

Table 1 - Number of directorships held per Supervisory Board member

The Supervisory Board typically meets four times per year, with additional meetings possible at the discretion of the Chairman. In these meetings, it is informed about normal business activities as well as all substantial business events. In case of extraordinary incidents, the CBL Supervisory Board is informed immediately.

2.3 Committees

In 2019, the CBL Supervisory Board Committees comprised the Audit Committee, Risk Committee, Nomination Committee and Remuneration Committee. All four committees have three members each and the Audit Committee is chaired by an independent member of the Supervisory Board.

Audit Committee

Members	Tasks and responsibilities
<ul style="list-style-type: none"> ▪ Ernst-Wilhelm Contzen – Chairman ▪ Marc Robert-Nicoud – Vice Chairman ▪ Wolfgang Gaertner ▪ Marie-Jeanne Chevremont (Q4) ▪ Karl van Gestel (Q1-Q2) 	<ul style="list-style-type: none"> ▪ Monitors accounting and financial reporting processes; ▪ Monitors the effectiveness of the risk management process, in particular, the Internal Control System (ICS), the risk management system and internal audit; ▪ Monitors the execution of audits, in particular, in relation to the selection and independence of the auditor and the services provided by the auditor (for example, scope, frequency or reports); ▪ Submits recommendations to the Supervisory Board to ensure the integrity of the reporting and accounting processes.

Nomination Committee

Members	Tasks and responsibilities
<ul style="list-style-type: none"> ▪ Wolfgang Gaertner – Chairman ▪ Stephan Leithner ▪ Ernst Wilhelm Contzen 	<ul style="list-style-type: none"> ▪ Identifies, recommends and promotes, for the approval of the Supervisory Board (SB) and General Meeting of Shareholders, candidates to fill vacancies in the Executive Board (EB) and SB, with the objective to reach a balance and diversity of knowledge, skills and experience, as well as gender diversity amongst the respective members; ▪ Periodically assesses the general structure and performance of EB and SB and provides related recommendations to the SB

Members	Tasks and responsibilities
	<p>for improvements;</p> <ul style="list-style-type: none"> Assesses the knowledge, skills and experience of respective boards, on an individual and collective basis.

Remuneration Committee

Members	Tasks and responsibilities
<ul style="list-style-type: none"> Stephan Leithner – Chairman Gregor Pottmeyer – Vice Chairman Wolfgang Gaertner 	<ul style="list-style-type: none"> Supervises the reasonableness of the remuneration system of executive management members. In particular, it supervises the appropriateness of the compensation of the Head of the risk function and of the compliance function as well as employees having a substantial influence on the overall risk profile of the institution. It also supports the Supervisory Board in monitoring the reasonableness of the remuneration system of employees as well as the institution. At the same time, it assesses the impacts of the remuneration system on the risk, capital and liquidity management; Supports the Supervisory Board in overseeing the internal control system and all other relevant areas in the structuring of the remuneration system

Risk Committee

Members	Tasks and responsibilities
<ul style="list-style-type: none"> Oliver Engels – Chairman Stephan Leithner – Vice Chairman Marc Robert-Nicoud 	<ul style="list-style-type: none"> Advises the Supervisory Board on the institution's overall current and future risk appetite, risk tolerance and risk strategy and assists the Supervisory Board in overseeing the implementation of that strategy; Reviews whether the conditions offered to customers take into account the institution's business model and risk structure. If this is not the case, the Risk Committee submits proposals to the Executive Board, about how the conditions applied to customers in accordance with the business model and the risk structure could be created; Examines whether incentives provided by the remuneration system take into consideration the risk, capital and liquidity structure of the institution and the likelihood and timing of earnings; Takes advice from external experts, if necessary. It determines type, comprehensiveness, format and frequency of information to be provided by the Executive Board with regard to strategy and risk.

User committee

Members	Tasks and responsibilities
<ul style="list-style-type: none">▪ European Investment Bank▪ Bank of New York Mellon▪ CitiBank▪ BNP Paribas Securities Services▪ Union Bank of Switzerland▪ Barclays▪ Northern Trust	<ul style="list-style-type: none">▪ Submits non-binding opinions to the management body;▪ Advises the Executive Board on key arrangements that may affect its members, including the criteria for accepting issuers or customers in their respective securities settlement systems and at the service level and the pricing structure.

2.4 Executive Board

According to CBL's Articles of Incorporation, 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 is chaired by the CEO.

The recruitment process of members of the Executive Board starts with the Nomination Committee to prepare and the Supervisory Board to resolve on a job description and candidate profile for a specific position. Afterwards, the Nomination Committee identifies and recommends suitable members for the approval to the Supervisory Board. After the selection and nomination of a candidate, Boards & Committees Clearstream prepares a formal decision of the Supervisory Board. The appointment of new members of the Executive Board of CBL requires prior approval by the CSSF.

The Executive Board is responsible for managing CBL in accordance with 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, and 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 members of the Executive Board must be professionally suitable and reliable for the management of a credit institution and central securities depository, and they must be able to devote sufficient time to fulfil their tasks. Further, sufficient theoretical and practical knowledge of the business of a central securities depository/credit institution is required from all members of the Executive Board. In addition, the members of the Executive Board must have:

- An understanding of banking and financial markets, especially within the regulatory framework;
- An understanding of managing credit institutions;
- Sufficient experience in managerial positions.

The business distribution scheme regulates the allocation of tasks and responsibilities between the Board members. Nevertheless, the Executive Board remains collectively

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 or more frequently if required.

As at 31 December 2019, the Executive Board consisted of the persons displayed in Table 2, which also discloses the number of directorships held by each member, as required by Art. 435 (2) CRR.

Name/position	Number of directorships
Philippe Seyll – Chief Executive Officer	7
João Amaral	1
Maurice Lamy	4
Mathias Papenfuß	5
Denis Schloremberg	1
Guido Wille	1

Table 2 - Number of directorships held per Executive Board member

3. Risk management overview

3.1 Risk Management Framework (Art. 435 (1) CCR)

Risk management is a fundamental component of Clearstream's management and control framework. Effective and efficient risk management is vital to protect Clearstream's interests and simultaneously enables Clearstream to achieve its corporate goals. Clearstream has therefore established a Group-wide risk management system comprising roles, processes and responsibilities applicable to all employees 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 business strategy and regulates the extent of risks taken throughout the various business activities carried out. This is ensured by determining conditions for risk management, control and limitation. Thus, Clearstream gives considerable attention to its risk mitigation process and ensures that appropriate measures are taken to avoid, reduce and transfer risk or, alternatively, to intentionally accept it. Therefore, timely and adequate control of risk must be ensured. More specifically, information required for controlling risk is assessed using structured and consistent methods and processes. The results are collated and incorporated into a reporting system enabling measurement and control of risks. Consequently, risk reporting is based on reliable information and carried out on a regular basis and ad hoc, if necessary.

All members of the Executive Board of Clearstream are ultimately responsible for the risk strategy, which reflects Clearstream's risk appetite defining the maximum loss the Executive Board is willing to assume in one year, the risk tolerance as well as desired performance levels. It is Clearstream's intention to maintain risk at an appropriate and acceptable level. Moreover, the members of the Executive Board ensures that the 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. The risk strategy is implemented as follows:

3.1.1 Risk statement

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 and sets limits to the Risk-Bearing Capacity 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 2019 for Clearstream was as follows: Operational Risk 51%, Financial Risk 41% and Business Risk 8%.

The risk strategy was approved by the Executive Board of Clearstream in May 2019. The overall risk profile as defined, adopted and approved via the risk strategy links to the business strategy outlined above. The main part consists of the risk strategy statement, the 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 as mentioned above and Value at Risk.

3.1.2 Risk culture

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 employees. The appropriateness of the risk management

and controlling systems is regularly checked. Overall, Clearstream’s risk culture is based on the Financial Stability Board’s four indicators of a sound risk culture: Tone from the top, accountability, effective communication and challenge, and incentives, thereby striving for clear risk ownership and accountability.

3.2 Risk management process

Overall, the risk management process 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);
- Controlled; and
- Reported in a timely manner and consistently, together with suitable recommendations to the respective Executive Board.

These five key processes, as well as adequate quality standards, are defined in the Group Risk Management Policy and are reviewed on an ongoing basis by an independent audit function, which ensures the suitability and effectiveness of the risk management process.

Controlling risks is performed in the decentralised business areas, that is, where the risks occur. Risk control in the Clearstream operational units is ensured by nominating “Operational Risk Representatives” who are responsible for identifying, notifying and controlling any risk in their area. Clearstream Risk Management, a central function within Clearstream, assesses all existing and potential new risks and reports on a quarterly basis and, if necessary, ad hoc to the relevant Executive Board (see **Error! Reference source not found.**).

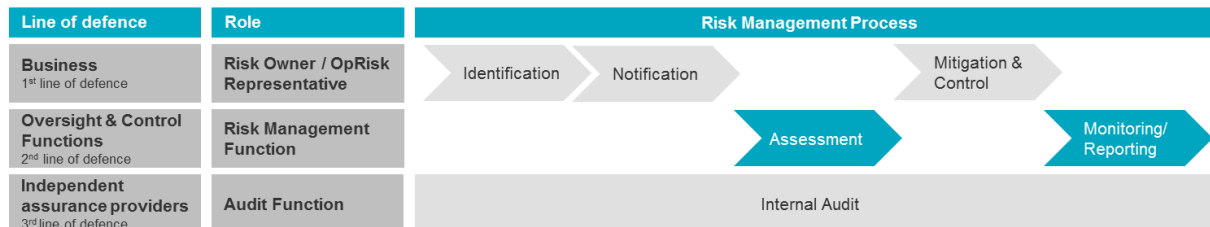


Figure 3 - Five-level risk management system with central and decentralised responsibilities

3.2.1 Risk identification

Risk identification includes the identification of all threats, causes of loss and potential disruptions with regards to existing or new processes as well as internal activities or external factors.

More specifically, the risk identification process is, on the one hand, proactive, based on regular review of processes in order to identify weak areas and points of failure (e.g. manual processes, processes without double keying or four-eyes controls in place, specific procedures subject to high volumes or tight deadlines) or based on scenarios of disruption or failure taking into consideration all sources of issues (e.g. unavailability of systems, human error). For the purpose of properly identifying potential risks for Clearstream, a risk inventory process has been established, which is carried out at least on a yearly basis by

Clearstream Risk Management. On the other hand, the risk identification process is also reactive, as a consequence of an incident.

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

All organisational units and individual employees are obliged to identify and quantify potential risks within their area of responsibility.

3.2.2 Risk notification

The process step of risk notification ensures that risks are centrally recorded. To do so, all organisational units and individual employees must notify Clearstream Risk Management in a timely manner of the risks that they have identified.

3.2.3 Risk assessment

The assessment of an incident or a potential risk development includes not only a quantification of risk using the "Value at Risk" ("VaR") methodology but also a comparison of the result with the available Risk-Bearing Capacity. 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 to and indicates the maximum cumulative loss Clearstream could face if certain independent loss events materialise over a specific time horizon for a given probability. Clearstream's internal models are based on a confidence level of 99.98% and a one-year time horizon.

Clearstream also performs stress test calculations, which consider even more conservative parameters than the regular VaR calculations. Risk-wide stress tests, which incorporate the interaction of all material risk types, are carried out as well and reported to the Executive Board on a quarterly basis.

In addition to classical stress tests that analyse the impacts of predefined stress scenarios, Clearstream calculates reverse stress tests, where stress scenarios that would exceed the Available Risk-Bearing Capacity are identified. The findings of reverse stress tests can give rise to further analyses as well as to implementation of additional measures to reduce risks.

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

3.2.4 Risk mitigation and control

Risk mitigation and control involves the determination and implementation of the most appropriate reaction to the identified risk. It encompasses risk avoidance, risk reduction, risk transfer and intentional risk acceptance, as outlined above.

All organisational units and employees must perform risk control and implement mitigating actions.

3.2.5 Risk monitoring and reporting

Risk reports are provided by Clearstream Risk Management to the Executive Management and Risk Committee on a regular basis.

Regular risk reports contain risk quantification results in comparison with the limits, risk

related qualitative information, information about stress tests and capital adequacy information.

Clearstream Risk Management may issue ad-hoc reports whenever a new risk situation arises or, alternatively, the development of an existing risk requires reporting to the Executive Management. This is the case when a risk has a material impact on the risk profile.

Ultimately, the internal Audit function as a third line of defence provides further assurance by conducting independent audits which verify that risk control and risk management is performed adequately. The results of these audits are also part of the risk management system.

In the Executive Board meeting on 25 March 2019 the Executive Board concluded that the Risk Management System is effective.

3.3 Risk profile

Clearstream defines risk as a potential negative impact on its financial, revenue and liquidity situation. Clearstream 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. Project risk also exists but is not specifically quantified, as the impact is already reflected in the three traditional risk types. The risk types are illustrated in figure 4 and are described in more detail in the following sections.

The risk profile of Clearstream differs fundamentally from those of other financial services providers. Operational risk is assessed as major risk type within Clearstream. Market risk (as part of financial risk) and business risk are considered non-material.

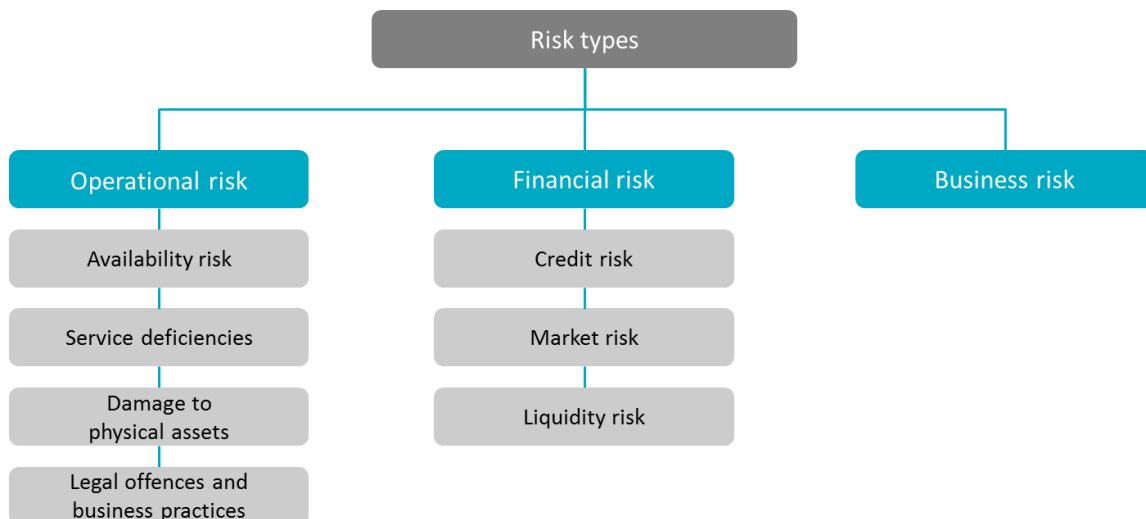


Figure 4 - Risk profile of Clearstream

3.4 Key prudential metrics

The following table provides an overview of the bank's key prudential metrics for 2019 and will be elaborated in detail in the remainder of the report:

		31 December 2019	31 December 2018
	Available capital (amounts)		
1	Common Equity Tier 1 (CET1)	1,149,360	1,111,991
2	Tier 1	1,149,360	1,111,991
3	Total capital	1,149,360	1,111,991
	Risk-weighted assets (amounts)		
4	Total risk-weighted assets (RWA)	4,720,932	5,074,928
	Risk-based capital ratios as a percentage of RWA		
5	Common Equity Tier 1 ratio (%)	24.35	21.91
6	Tier 1 ratio (%)	24.35	21.91
7	Total capital ratio (%)	24.35	21.91
	Own funds requirements as a percentage of RWA		
8	Total capital ratio requirement before Supervisory Review and Evaluation Process ("SREP") (%)	8.00	8.00
9	SREP requirement (%)	1.00	0.00
10	Total SREP capital requirement ratio (row 8 + row 9) (%)	9.00	8.00
11	Capital conservation buffer requirement (%)	2.50	2.50
12	Countercyclical buffer requirement (%)	0.04	0.04
13	Bank G-SIB and/or O-SII additional requirements (%)	0.50	0.38
14	Total of bank CET1 specific buffer requirements (%) (row 11 + row 12 + row 13)	3.04	2.92
15	Overall capital requirement (%) (row 10 + row 14)	12.04	10.92
16	CET1 available after meeting the bank's minimum capital requirements (%) (row 7 – row 15)	12.31	10.99
	Basel III leverage ratio		
17	Total Basel III leverage ratio exposure measure	15,826	18,830
18	Basel III leverage ratio (%) (row 2 / row 17)	7.26	5.91
	Liquidity Coverage Ratio		
19	Total HQLA	14,493	13,753
20	Total net cash outflow	12,207	11,228
21	LCR ratio (%)	118.73	122.49

Table 3 - Key prudential metrics

4. Linkages between financial statements and regulatory exposures

This paragraph specifies the requirements included in Art. 436 of Part Eight CRR regarding the scope of application of Part Eight.

In the application of Art. 436 (b), institutions are required to disclose an outline of the differences in the basis of consolidation for accounting and prudential purposes.

As at 31 December 2019, Clearstream Banking S.A. had four subsidiaries and two branches. In particular, these were the direct subsidiaries:

- Clearstream Banking Japan, Ltd. (created in 2009). Registered office: 27F, Marunouchi Kitaguchi Building, 1-6-5, Marunouchi, Chiyoda-ku, Tokyo, Japan. Clearstream Banking Japan is directly 100% owned by the bank;
- REGIS-TR S.A. (created in 2010). Registered office: 42 Avenue J.F. Kennedy, L-1855 Luxembourg. The bank holds 50% of the subsidiary. Since the bank has the right to appoint the Chairman of the Board of directors, who in turn has a casting vote, there is a presumption of control;
- Clearstream London Limited, incorporated on 27 December 2018. Registered office: 11 Westferry Circus Canary Wharf, London E14 4HE, United Kingdom. Clearstream London Limited is directly 100% owned by the bank;
- Ausmaq Limited incorporated in 1994. Registered office: Level 4, 107 Pitt St, Sydney, New South Wales 2000, Australia. Ausmaq Limited is directly 100% owned by the Bank.

And the two following branches:

- Clearstream Banking S.A., Singapore branch (created in 2009). Registered office: 9 Raffles Place #55-01 Republic Plaza Singapore, 048619 Singapore;
- Clearstream Banking S.A., UK branch (opened on 4 January 2016), which took over the activities of the bank's former representative office. Registered office: Westferry House, 2nd Floor, 11 Westferry Circus, Canary Wharf, London E14 4HE, United Kingdom.

As per Art. 83 of the Law of 17 June 1992, as amended, CBL does not prepare consolidated financial statements because Clearstream Banking S.A. only has subsidiary undertakings that are not material for the purpose of Art. 85(3) of the Law of 17 June 1992, as amended (consolidated accounts shall give a true and fair view of the assets, liabilities, financial position, and profit or loss of the undertakings included therein taken as a whole), both individually and as a whole.

The table below shows a breakdown of the differences in the scope of consolidation along accounting and regulatory lines and allocates the different amounts to the regulatory risk categories, namely, credit risk, counterparty credit risk and market risk, as well as the part that is not subject to capital requirements or subject to deduction from capital.

	Carrying values as reported in published financial statements	Carrying values under scope of regulatory consolidation	Carrying values of items				
			Subject to the credit risk framework	Subject to the CCR framework	Subject to the securitization framework	Subject to the market risk framework	Not subject to capital requirements or subject to deduction from capital
Assets							
Cash, cash balances at central banks and other demand deposits	8,765,759	7,425,574	7,425,574	0	0	7,425,574	0
Financial assets held for trading	8,515	6,240	0	6,240	0	6,240	0
Financial assets at fair value through other comprehensive income	5,558	5,558	5,558	0	0	0	0
Financial assets at amortized cost	6,514,086	7,856,074	7,856,074	0	0	7,856,074	0
Derivatives – hedge accounting	159	159	0	159	0	0	0
Investments in subsidiaries, joint ventures and associates	31,646	31,646	31,646	0	0	31,646	0
Tangible assets	13,081	13,086	13,086	0	0	0	0
Intangible assets	88,790	92,248	92,248	0	0	0	0
Tax assets	1,158	9,677	0	0	0	0	9,677
Other assets	46,018	36,265	36,265	0	0	0	0
Total assets	15,474,770	15,476,527	15,460,451	6,399	0	15,319,534	9,677
Liabilities							
Financial liabilities held for trading	17,056	18,239				18,239	
Financial liabilities measured at amortised cost	13,809,654	13,850,459				13,850,459	
Derivatives – hedge accounting	0	0					
Provisions	32,554	32,969					
Tax liabilities	942	517					
Other liabilities	75,662	33,689				33,689	
Total liabilities	13,935,868	13,935,873				13,902,387	

Table 4 - Differences between accounting and regulatory scopes of consolidation and the mapping of financial statement categories with regulatory risk categories

The main differences between the financial statement and the regulatory scope arise due to the following reasons:

- The difference in demand deposits and loans and advances is caused, in part, by a different classification of overnight repos, i.e. classification of overnight repos as demand deposits in the financial statement and classification as loans and advances in FINREP;
- Another part of the difference in demand deposits is due to a reclassification of interest from cash overdrafts between assets and liabilities;
- Revaluation accounts for derivatives, which are recognised as other assets for regulatory purposes, are responsible for the difference in financial assets held for trading;
- Further minor causes of differences for financial assets at amortized costs and other assets between the financial statement and the regulatory scope arise from the reclassification of fee receivables from other assets to loans and advances, and the reclassification of debtor amounts with assets;
- Minor differences are caused by the use of different foreign exchange rates, i.e. SAP uses Bloomberg rates whilst ECB rates are used for FINREP.

The following table provides information on the main sources of differences (other than those due to different scopes of consolidation):

		Total	Items subject to			
			Credit risk framework	CCR framework	Securitization framework	Market risk framework
1	Assets carrying value amount under the scope of regulatory consolidation (as per template EU L11)	15,476,528	15,460,451	6,399		15,319,534
2	Liabilities carrying value amount under the regulatory scope of consolidation (as per template EU L11)	13,935,873	0	0		13,902,387
3	Total net amount under the regulatory scope of consolidation	15,476,528	15,460,451	6,399		1,417,147
4	Off-balance sheet amounts	58,522,051	58,459,794	0		62,257
5	<i>Differences in valuations</i>	223,812	207,735	-55,858		1,454,750
10	Exposure amounts considered for regulatory purposes	73,774,767	73,712,510	62,257		24,654

Table 5 - Main sources of differences between regulatory exposure amounts and carrying values in financial statements

The differences between the assets carrying amount under regulatory scope and the actual risk exposures used in COREP are caused by the following factors:

- Intangible assets are directly deducted from own funds, hence, they are included in the carrying amount under regulatory scope, but not in the credit risk exposure for risk reporting;
- The difference in the CCR framework is due to the different value in derivatives exposure, since the Current Exposure Method (CEM) in conjunction with the Basel Committee's standard on the "*standardised approach for measuring counterparty credit risk exposures*"³ is used for risk reporting whereas the carrying value is recognised for the purpose of FINREP;
- The difference for the market risk framework exposure arises due to the netting of long and short positions for foreign exchange exposures in the risk reporting.

³ Basel Committee on Banking Supervision: "*The standardised approach for measuring counterparty credit risk exposures*":
<https://www.bis.org/publ/bcbs279.pdf>

The information on the consolidation method applied for each entity within the accounting and regulatory scopes of consolidation is provided in the following table:

Name of the entity	Method of accounting consolidation	Method of regulatory consolidation				Description of the entity
		Full consolidation	Proportional consolidation	Neither consolidated nor deducted	Deducted	
Clearstream Banking Japan Ltd., Tokyo	Fair value through other comprehensive income			X		Ancillary services undertaking
REGIS-TR S.A., Luxembourg	Fair value through other comprehensive income			X		"Other" undertaking
Clearstream London Limited	Fair value through other comprehensive income			X		Ancillary services undertaking
Ausmaq Limited	Fair value through other comprehensive income			X		Ancillary services undertaking

Table 6 - Outline of the differences in the scope of consolidation (entity by entity)

5. Composition of capital

Following the disclosure requirements in Art. 437 CRR, as specified in the Implementing Regulation (EU) No. 1423/2013 of December 2013, institutions are required to provide information concerning the capital composition, including reconciliation with their balance sheet and the main features of the regulatory capital instruments.

Furthermore, Art. 438 of Part Eight CRR requires disclosure of an overview of the total RWA and the related minimum capital requirements. Further breakdowns of RWAs are presented in subsequent parts of this report.

5.1 Capital components

The following table summarises the total amount of Clearstream Banking S.A.'s regulatory capital.

	Amounts	Regulation (EU) No. 575/2013 Article reference
Common Equity Tier 1 capital: instruments and reserves		
Directly issued qualifying common share (and equivalent for non-joint stock companies) capital plus related stock surplus	321,935	26 (1), 27, 28, 29, EBA list 26 (3)
Retained earnings	-512	26 (1) c)
Accumulated other comprehensive income (and other reserves)	937,887	26 (1)
Common Equity Tier 1 capital before regulatory adjustments	1,259,310	
Common Equity Tier 1 capital: regulatory adjustments		
Cash flow hedge reserve	119	
Value adjustments due to the requirements for prudent valuation	-63	
Goodwill (net of related tax liability)	-41,492	
Other intangibles other than mortgage servicing rights (net of related tax liability)	-50,755	36 (1) (b), 37, 472 (4)
Deferred tax assets arising from temporary differences (amount above 10% threshold, net of related tax liability)	-1,239	36 (1) (b), 37
Regulatory adjustments applied to Common Equity Tier 1 due to insufficient Additional Tier 1 and Tier 2 to cover deductions	-16,520	36 (1) (j)
Total regulatory adjustments to Common Equity Tier 1	-109,950	
Common Equity Tier 1 capital (CET1)	1,149,360	
Additional Tier 1 capital (AT1)	0	
Tier 1 capital (T1 = CET1 + AT1)	1,149,360	
Tier 2 capital (T2)	0	
Total regulatory capital (TC = T1 + T2)	1,149,360	
Total risk exposure amount	4,720,932	
Capital ratios and buffers		
Common Equity Tier 1 (as a percentage of risk-weighted assets)	24.35	92 (2) (a)
Tier 1 (as a percentage of risk-weighted assets)	24.35	92 (2) (b)
Total capital (as a percentage of risk-weighted assets)	24.35	92 (2) (c)
Institution-specific buffer requirement (capital conservation buffer plus countercyclical buffer requirements plus higher loss absorbency requirement, expressed as a percentage of risk-weighted assets)	3.0395	CRD 128, 129, 130, 131, 133
Of which: capital conservation buffer requirement	2.5000	
Of which: bank-specific countercyclical buffer requirement	0.0395	
Of which: higher loss absorbency requirement	0.5000	

Common Equity Tier 1 (as a percentage of risk-weighted assets) available after meeting the bank's minimum capital requirements	12.3065	CRD 128
Amounts below the thresholds for deduction (before risk weighting)		
Non-significant investments in the capital and other TLAC liabilities of other financial entities	5,558	36 (1) (h), 46, 45, 56 (c), 59, 60, 66 (c), 69, 70
Significant investments in the common stock of financial entities	31,646	36 (1) (i), 45, 48

Table 7 - Composition of regulatory capital

The total regulatory capital of Clearstream Banking S.A. consists of Common Equity Tier 1 (CET1) capital, which is comprised of subscribed capital, share premium, reserves and retained earnings. Deductions of CET1 arise from intangible assets, deferred tax assets and regulatory adjustments.

5.2 Reconciliation of regulatory capital to balance sheet

In compliance with Art. 437 (1)(a) CRR, a full reconciliation of own funds to financial statements is disclosed in the following table, as laid out in the Implementing Regulation (EU) No. 1423/2013:

Balance Sheet Reconciliation	
Own Funds elements in the Annual Financial Statements	
Subscribed Capital	92,000
Share premium	229,935
Accumulated other comprehensive income	-1,691
Legal Reserve	9,200
Other reserves and retained earnings	930,363
Profits for the financial year and accumulated profits	279,096
Total Own Funds Elements in Audited Financial Statements	1,538,903
Profits allocated to other reserves with the approval of financial statements (i.e. after reporting of Own Funds)	-141
Profits for the financial year and accumulated profits (i.e. after reporting of Own Funds)	-279,096
Eligible Capital (CET1) before regulatory adjustments	1,259,666
Regulatory adjustments	
Goodwill	-41,492
Deduction other intangible assets	-50,755
Other CET 1 capital adjustments	-18,059
Common Equity Tier 1 Capital/Total Eligible Own Funds	1,149,360

Table 8 - Reconciliation of regulatory capital to balance sheet

The own funds of the financial statement of Clearstream Banking S.A. consider profits allocated to retained earnings with the approval of the financial statement and year-end profits, neither of which qualify for the regulatory own funds as at 31 December 2019. The profits allocated to retained earnings do not count as CET1 capital if the financial statement is not approved or if prior permission by the competent authority according to Art. 26 paragraph 2 CRR is not granted.

5.3 Description of the main features of capital instruments

Disclosure under point (b) of Art. 437 CRR is shown in the next table, in line with the disclosure templates set out in the Implementing Regulation (EU) No. 1423/2013.

		Quantitative/qualitative information
1	Issuer	Clearstream Banking S.A.
2	Unique identifier (e.g. CUSIP, ISIN or Bloomberg identifier for private placement)	NA
3	Governing law(s) of the instrument	Luxembourg Company Law: Law of 10th August 1915 on commercial companies
4	Transitional Basel III rules	Common Equity Tier 1
5	Post-transitional Basel III rules	Common Equity Tier 1
6	Eligible at solo/group/group and solo	Solo
7	Instrument type (types to be specified by each jurisdiction)	Ordinary Shares
8	Amount recognised in regulatory capital (currency in millions, as of most recent reporting date)	€ m 229
9	Par value of instrument	€ m 92
10	Accounting classification	Shareholders' equity
11	Original date of issuance	1970
12	Perpetual or dated	perpetual
13	Original maturity date	NA
14	Issuer call subject to prior supervisory approval	No
15	Optional call date, contingent call dates and redemption amount	NA
16	Subsequent call dates, if applicable	NA
	Coupons/dividends	
17	Fixed or floating dividend/coupon	Floating
18	Coupon rate and any related index	NA
19	Existence of a dividend stopper	No
20	Fully discretionary, partially discretionary or mandatory	Fully discretionary
21	Existence of step-up or other incentive to redeem	No
22	Non-cumulative or cumulative	Non-cumulative
23	Convertible or non-convertible	Non-convertible
24	If convertible, conversion trigger(s)	NA
25	If convertible, fully or partially	NA
26	If convertible, conversion rate	NA
27	If convertible, mandatory or optional conversion	NA
28	If convertible, specify instrument type convertible into	NA
29	If convertible, specify issuer of instrument it converts into	NA
30	Write-down feature	No
31	If write-down, write-down trigger(s)	NA
32	If write-down, full or partial	NA
33	If write-down, permanent or temporary	NA
34	If temporary write-down, description of write-up mechanism	NA
35	Position in subordination hierarchy in liquidation (specify instrument type immediately senior to instrument in the insolvency creditor hierarchy of the legal entity concerned).	NA
36	Non-compliant transitioned features	No
37	If yes, specify non-compliant features	NA

Table 9 - Main feature of regulatory capital instruments and other TLAC-eligible instruments

5.4 Regulatory capital requirements

Following Art. 438 (c) to (f) CRR, institutions should disclose an overview of total RWA forming the denominator of the risk-based capital requirements calculated per Art. 92 CRR and summary of the institution's calculation approaches chosen.

The following table summarises the capital requirements of Clearstream Banking S.A. for the different types of risks and the relevant calculation method:

			RWAs		Minimum capital requirements
			31 December 2019	31 December 2018	31 December 2019
	1	Credit risk (excluding CCR)	625,894	1,153,983	50,072
Art. 438 (c) (d)	2	Of which the standardised approach	625,894	1,153,983	50,072
Art. 438 (c) (d)	3	Of which the foundation IRB (FIRB) approach			
Art. 438 (c) (d)	4	Of which the advanced IRB (AIRB) approach			
Art. 438 (d)	5	Of which equity IRB under the simple risk-weighted approach or the IMA			
Art. 107 Art. 438 (c) (d)	6	CCR	14,519	14,744	1,162
Art. 438 (c) (d)	7	Of which mark to market			
Art. 438 (c) (d)	8	Of which original exposure	12,451	13,559	996
	9	Of which the standardised approach			
	10	Of which internal model method (IMM)			
Art. 438 (c) (d)	11	Of which risk exposure amount for contributions to the default fund of a CCP	331	314	27
Art. 438 (c) (d)	12	Of which CVA	1,736	871	139
Art. 438 (e)	13	Settlement risk	0	0	0
Art. 449 (o) (i)	14	Securitisation exposures in the banking book (after the cap)			
Art. 438 (e)	19	Market risk	24,654	0	1,972
	20	Of which the standardised approach	24,654	0	1,972
	21	Of which IMA			
Art. 438 (e)	22	Large exposures	0	0	0
Art. 438 (f)	23	Operational risk	4,055,865	3,906,201	324,469
	24	Of which basic indicator approach			
	25	Of which standardised approach			
	26	Of which advanced measurement approach	4,055,865	3,906,201	324,469
	29	Total	4,720,932	5,074,928	377,675

Table 10 - Overview of RWAs

5.5 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 concerning the compliance of institutions with the requirement for a countercyclical buffer, which implements Art. 440 CRR, institutions need to disclose the following tables:

	General credit exposures		Trading book exposure		Securitisati n exposure		Own funds requirements				Own funds requirement weights	Countercyclical capital buffer rate	
	Exposure value for SA	Exposure value IRB	Sum of long and short position of trading book	Value of trading book exposure	Exposure value for SA	Exposure value for IRB	Of which: General credit exposures	Of which: Trading book exposures	Of which: Securitisation exposures	Total			
													010
Breakdown by country													
Andorra	5	0	0	0	0	0	0	0	0	0	0	0.000	0.000
United Arab Emirates	861	0	0	0	0	0	69	0	0	69	0.005	0.000	
Armenia	7	0	0	0	0	0	1	0	0	1	0.000	0.000	
Argentina	20	0	0	0	0	0	2	0	0	2	0.000	0.000	
Austria	307	0	0	0	0	0	12	0	0	12	0.001	0.000	
Australia	27,680	0	0	0	0	0	5,504	0	0	5,504	0.374	0.000	
Aruba	2	0	0	0	0	0	0	0	0	0	0.000	0.000	
Bosnia and Herzegovina	2	0	0	0	0	0	0	0	0	0	0.000	0.000	
Belgium	5,603	0	0	0	0	0	448	0	0	448	0.030	0.000	
Bulgaria	1	0	0	0	0	0	0	0	0	0	0.000	0.500	
Bahrain	50	0	0	0	0	0	4	0	0	4	0.000	0.000	
Bermuda	119	0	0	0	0	0	9	0	0	9	0.001	0.000	
Brunei Darussalam	3	0	0	0	0	0	0	0	0	0	0.000	0.000	
Brazil	65	0	0	0	0	0	8	0	0	8	0.001	0.000	
Bahamas	1	0	0	0	0	0	0	0	0	0	0.000	0.000	
Canada	101	0	0	0	0	0	8	0	0	8	0.001	0.000	
Switzerland	6,119	0	0	0	0	0	679	0	0	679	0.046	0.000	
Chile	40	0	0	0	0	0	3	0	0	3	0.000	0.000	
Cameroon	765	0	0	0	0	0	12	0	0	12	0.001	0.000	
China	3	0	0	0	0	0	0	0	0	0	0.000	0.000	
Colombia	74	0	0	0	0	0	6	0	0	6	0.000	0.000	
Costa Rica	33	0	0	0	0	0	3	0	0	3	0.000	0.000	
Curaçao	23	0	0	0	0	0	2	0	0	2	0.000	0.000	
Cyprus	9	0	0	0	0	0	1	0	0	1	0.000	0.000	
Czech Republic	1,507	0	0	0	0	0	121	0	0	121	0.008	1.500	
Germany	21,274	0	0	0	0	0	1,718	0	0	1,718	0.117	0.000	
Denmark	0	0	0	0	0	0	0	0	0	0	0.000	0.000	
Dominican Republic	10	0	0	0	0	0	1	0	0	1	0.000	0.000	
Ecuador	9	0	0	0	0	0	1	0	0	1	0.000	0.000	

Egypt	53	0	0	0	0	0	4	0	0	4	0.000	0.000
Spain	306	0	0	0	0	0	5	0	0	5	0.000	0.000
Finland	0	0	0	0	0	0	0	0	0	0	0.000	0.000
France	1,091	0	0	0	0	0	21	0	0	21	0.001	0.250
United Kingdom	2,996	0	0	0	0	0	244	0	0	244	0.017	1.000
Georgia	7	0	0	0	0	0	1	0	0	1	0.000	0.000
Guernsey	168	0	0	0	0	0	17	0	0	17	0.001	0.000
Gibraltar	2	0	0	0	0	0	0	0	0	0	0.000	0.000
Greece	6	0	0	0	0	0	1	0	0	1	0.000	0.000
Guatemala	13	0	0	0	0	0	1	0	0	1	0.000	0.000
Hong Kong	454	0	0	0	0	0	37	0	0	37	0.002	2.000
Indonesia	17	0	0	0	0	0	1	0	0	1	0.000	0.000
Ireland	1,174	0	0	0	0	0	98	0	0	98	0.007	1.000
Israel	0	0	0	0	0	0	0	0	0	0	0.000	0.000
Isle of Man	29	0	0	0	0	0	2	0	0	2	0.000	0.000
India	7	0	0	0	0	0	1	0	0	1	0.000	0.000
Iran, Islamic Republic of	28	0	0	0	0	0	3	0	0	3	0.000	0.000
Italy	1,449	0	0	0	0	0	33	0	0	33	0.002	0.000
Jersey	30	0	0	0	0	0	3	0	0	3	0.000	0.000
Japan	2,910	0	0	0	0	0	311	0	0	311	0.021	0.000
Kenya	4	0	0	0	0	0	0	0	0	0	0.000	0.000
Korea, Republic of	326	0	0	0	0	0	26	0	0	26	0.002	0.000
Kuwait	45	0	0	0	0	0	4	0	0	4	0.000	0.000
Cayman Islands	527	0	0	0	0	0	9	0	0	9	0.001	0.000
Kazakhstan	49	0	0	0	0	0	4	0	0	4	0.000	0.000
Lebanon	139	0	0	0	0	0	17	0	0	17	0.001	0.000
Liechtenstein	23	0	0	0	0	0	3	0	0	3	0.000	0.000
Luxembourg	50,134	0	0	0	0	0	4,402	0	0	4,402	0.299	0.000
Latvia	13	0	0	0	0	0	1	0	0	1	0.000	0.000
Libya	16	0	0	0	0	0	2	0	0	2	0.000	0.000
Morocco	5	0	0	0	0	0	0	0	0	0	0.000	0.000
Monaco	1	0	0	0	0	0	0	0	0	0	0.000	0.000
Macedonia, the Former Yugoslav Republic of	5	0	0	0	0	0	0	0	0	0	0.000	0.000
Macao	48	0	0	0	0	0	4	0	0	4	0.000	0.000
Malta	12	0	0	0	0	0	1	0	0	1	0.000	0.000
Mauritius	0	0	0	0	0	0	0	0	0	0	0.000	0.000
Mexico	276	0	0	0	0	0	5	0	0	5	0.000	0.000
Malaysia	3,037	0	0	0	0	0	243	0	0	243	0.017	0.000
Nigeria	285	0	0	0	0	0	5	0	0	5	0.000	0.000
Netherlands	1,647	0	0	0	0	0	35	0	0	35	0.002	0.000
Norway	34	0	0	0	0	0	3	0	0	3	0.000	2.500

Oman	2,744	0	0	0	0	0	219	0	0	219	0.015	0.000
Panama	58	0	0	0	0	0	5	0	0	5	0.000	0.000
Peru	201	0	0	0	0	0	4	0	0	4	0.000	0.000
Philippines	302	0	0	0	0	0	24	0	0	24	0.002	0.000
Poland	21	0	0	0	0	0	2	0	0	2	0.000	0.000
Puerto Rico	36	0	0	0	0	0	4	0	0	4	0.000	0.000
Qatar	76	0	0	0	0	0	6	0	0	6	0.000	0.000
Romania	23	0	0	0	0	0	2	0	0	2	0.000	0.000
Russian Federation	175	0	0	0	0	0	14	0	0	14	0.001	0.000
Saudi Arabia	1	0	0	0	0	0	0	0	0	0	0.000	0.000
Sweden	474	0	0	0	0	0	8	0	0	8	0.001	0.000
Singapore	566	0	0	0	0	0	45	0	0	45	0.003	0.000
Slovenia	720	0	0	0	0	0	12	0	0	12	0.001	0.000
San Marino	23	0	0	0	0	0	2	0	0	2	0.000	0.000
Suriname	143	0	0	0	0	0	2	0	0	2	0.000	0.000
El Salvador	6	0	0	0	0	0	0	0	0	0	0.000	0.000
Thailand	83	0	0	0	0	0	7	0	0	7	0.000	0.000
Turkey	60	0	0	0	0	0	5	0	0	5	0.000	0.000
Trinidad and Tobago	9	0	0	0	0	0	1	0	0	1	0.000	0.000
Taiwan, Province of China	989	0	0	0	0	0	79	0	0	79	0.005	0.000
Ukraine	130	0	0	0	0	0	16	0	0	16	0.001	0.000
United States	1,182	0	0	0	0	0	43	0	0	43	0.003	0.000
Uruguay	129	0	0	0	0	0	10	0	0	10	0.001	0.000
Venezuela, Bolivarian Republic of	276	0	0	0	0	0	33	0	0	33	0.002	0.000
Virgin Islands, British	87	0	0	0	0	0	2	0	0	2	0.000	0.000
Vietnam	4	0	0	0	0	0	1	0	0	1	0.000	0.000
South Africa	107	0	0	0	0	0	9	0	0	9	0.001	0.000
Total	140,684	0	0	0	0	0	14,714	0	0	14,714	1	0.040

Table 11 - Geographical distribution of credit exposures relevant to the calculation of the countercyclical capital buffer

Row		Column
010	Total risk exposure amount	4,720,932
020	Institution specific countercyclical buffer rate	0.04
030	Institution specific countercyclical buffer requirement	1,865

Table 12 - Amount of institution-specific countercyclical capital buffer

6. Leverage ratio

The disclosure requirements concerning the leverage ratio are laid out in Art. 451 of the CRR and specified in the Commission Implementing Regulation (EU) No. 2016/200 of 15 February 2016.

In the following table, Clearstream Banking S.A. shows the reconciliation of the leverage ratio total exposure with the relevant information in the published financial statements as at 31 December 2019, including any adjustments made in compliance with Art. (1) (b) CRR:

1	Total consolidated assets as per published financial statements	15,474,770
2	Adjustment for investments in banking, financial, insurance or commercial entities that are consolidated for accounting purposes but outside the scope of regulatory consolidation	0
3	Adjustment for fiduciary assets recognised on the balance sheet pursuant to the operative accounting framework but excluded from the leverage ratio exposure measure	0
4	Adjustments for derivative financial instruments	55,858
5	Adjustment for securities financing transactions (i.e. repos and similar secured lending)	175,861
6	Adjustment for off-balance sheet items (i.e. conversion to credit equivalent amounts of off-balance sheet exposures)	304,479
7	Other adjustments	-184,826
8	Leverage ratio exposure measure	15,826,142

Table 13 - Summary comparison of accounting assets vs. leverage ratio exposure measure

The table below shows the leverage ratio common disclosure template in accordance with Commission Implementing Regulation (EU) No. 575/2013, which lays down implementation technical standards with regard to disclosure of the leverage ratio for institutions. 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 derivatives as well as SFT exposures are considered to determine the leverage ratio exposure measure as well as the leverage ratio itself.

		2019	2018
On-balance sheet exposures			
1	On-balance sheet exposures (excluding derivatives and securities financing transactions (SFTs), but including collateral)	8,860,574	11,733,296
2	(Asset amounts deducted in determining Basel III Tier 1 capital)	-93,430	-13,379
3	Total on-balance sheet exposures (excluding derivatives and SFTs) (sum of rows 1 and 2)	8,767,144	11,719,917
Derivative exposures			
4	Replacement cost associated with all derivatives transactions (where applicable net of eligible cash variation margin and/or with bilateral netting)	62,257	67,794
5	Add-on amounts for PFE associated with all derivatives transactions	0	0
6	Gross-up for derivatives collateral provided where deducted from the balance sheet assets pursuant to the operative accounting framework	0	0
7	(Deductions of receivables assets for cash variation margin provided in derivatives transactions)	0	0
8	(Exempted CCP leg of client-cleared trade exposures)	0	0

9	Adjusted effective notional amount of written credit derivatives	0	0
10	(Adjusted effective notional offsets and add-on deductions for written credit derivatives)	0	0
11	Total derivative exposures (sum of rows 4 to 10)	62,257	67,794
Securities financing transactions exposures			
12	Gross SFT assets (with no recognition of netting), after adjusting for sale accounting transactions	6,516,401	6,517,499
13	(Netted amounts of cash payables and cash receivables of gross SFT assets)	0	0
14	CCR exposure for SFT assets	175,861	86,229
15	Agent transaction exposures	15,841	26,257
16	Total securities financing transaction exposures (sum of rows 12 to 15)	6,708,103	6,629,985
Other off-balance sheet exposures			
17	Off-balance sheet exposure at gross notional amount	288,638	413,162
18	(Adjustments for conversion to credit equivalent amounts)	0	0
19	Off-balance sheet items (sum of rows 17 and 18)	288,638	413,162
Capital and total exposure			
20	Tier 1 capital	1,149,360	1,111,991
21	Total exposures (sum of rows 3, 11, 16 and 19)	15,826,142	18,830,858
Leverage ratio			
22	Basel III leverage ratio	7.26%	5.91%

Table 14 - Leverage ratio common disclosure template

In accordance with Art. 451 (1) (d) and (e) in conjunction with Art. 6 of Regulation (EU) No. 2016/200, Clearstream Banking S.A. provides the following descriptions for processes used to manage the risk of excessive leverage:

Clearstream processes large daily volumes of client transactions, which are collateralised by either cash or pledged securities. Cash collateral received is reinvested in short maturity transactions with low credit and market risk. This increases the total leverage exposure of Clearstream. The resulting leverage ratio therefore reflects both transaction volume at the reporting date and client use of cash (rather than pledged securities) as collateral. Clearstream is able to manage its leverage ratio relative to prudential norms through balance sheet and client collateral allocation strategies. CBL continues to monitor CRD V developments as part of its medium-term planning.

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.

7. Operational risk

The following chapter discloses the requirements laid down in Art. 446 CRR concerning the approach for the assessment of own-funds requirements for operational risk and Art. 454 CRR on the use of the Advanced Measurement Approach to operational risk.

7.1 Governance

Operational risk represents a significant risk class for Clearstream and one that is systemically managed and controlled. 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 receiving regulatory approval in January 2008, CBL applies the AMA to calculate the capital requirements for operational risk.

Clearstream's risk strategy, as described in [3. Risk management overview](#), also applies to the management of operational risk and the other two risk categories, financial risk and business risk. Defined in this risk strategy is the risk capital dedicated to cover losses resulting from operational risk, 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 analysed regarding the expected or real effect on frequency and severity.
- For risks with a 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 Board of Clearstream Banking S.A., who are supported by different units and functions.

The five steps of the risk management process are key to the framework.

It is the responsibility of line management units 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 operational risk management. To achieve this target, the Executive Board appoints "operational risk representatives" for their respective area with a direct reporting line to the ultimate risk owner on the Executive Board.

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 the employees to support Clearstream Risk Management, line management, and the operational risk representative of their organisational unit regarding any operational risk matters. Every employee is 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 the scenario analysis process.

7.2 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 features:

- Capital requirements reflect the risk profile of Clearstream Banking S.A.
- Confidence levels can be adjusted according to the risk appetite of the bank.
- Incentives for proper risk management can be included in the model.
- Major risk drivers can be identified.
- Risk mitigation effects can be considered.

Input data for the model are results of structured scenario analysis, as well as internal/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, some operational risk losses are not sufficiently available for all risk drivers. Additionally, internal loss data usually does not cover extreme events as so far such cases have not occurred in the bank.

It is often assumed that banks doing similar business also have similar risk profiles. 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.

7.2.1 General concept

The VaR model for the calculation of the operational risk capital 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 Operational Risk 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.

7.2.2 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 the Company 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 percentile cases of all years. For internal purposes, 99.98 percentile, 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 for regulatory purposes is defined as the difference between the 99.9 percentile VaR and the expected loss. The unexpected loss determines the regulatory capital requirements of CBL for operational risk
- Expected shortfall to the q-percentile: defined as the statistical mean of the loss distribution above the q-percentile. It is used as a proxy for the loss amount the specific unit/entity could face if the q-percentile is exceeded.

For effective day-to-day management of OpRisk, Clearstream differentiates OpRisk into four risk classes (“cells”), which have been found best suited for Clearstream’s business model:

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

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 enables the highly precise numerical determination of the loss distribution.

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

- The frequency distribution follows a Poisson distribution with mean λ_i (calculated as $1 / \text{“frequency estimation”}$), and
- The severity distribution follows a continuous uniform distribution with boundaries $a_i < b_i$ (which are a minimum and maximum loss of the scenario).

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

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

Repeating the Monte Carlo cycles numerous times gives a loss distribution for a “cell” with the required accuracy. The current implementation of the model uses 25 million simulation trials.

7.2.3 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 for dependence between individual events exist. One, events triggered by preceding events could be captured separately. These events depend on each other, which needs to be considered in the model. Two, different events could have the same underlying cause. Any change for the cause would affect all events, but not necessarily to the same extent. These two types of dependence need to be treated separately.

As part of the loss data collection and scenario analysis, the total impact of an event is considered, including the losses 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 scenarios are not captured separately. Therefore, none of the scenarios depend on each other and can be treated in the model accordingly.

On the one hand, scenarios can be triggered by a variety of root causes. On the other, different scenarios can have root causes that are similar in nature and fall in the same root cause categories. To meet the criterion of independence, root causes must be assigned uniquely to a single scenario. As an example, a terrorist attack leads to 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 and 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 examined to ensure the correctness of the figure. Explanation of any variation above the safeguards is included in the quarterly risk report.

7.2.4 Stress testing of operational risk

To achieve a better understanding of the most significant risks and to adequately model capital requirements, Clearstream Risk Management runs stress tests every quarter. The stress testing aims to gauge the potential capital vulnerability to exceptional but plausible events. The stress test process is defined as follows:

- All scenarios agreed during the scenario analysis are generally considered when performing the stress test. When a stress test is not passed, it is repeated whilst excluding the scenario that caused the breach, to identify all scenarios that lead to a failure to pass the corresponding stress test. In general, quite unlikely scenarios with a frequency rarer than one loss in 1,000 years are disregarded.
- 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 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, the combination of non-extreme scenarios (high frequency/low severity) is also assessed. In this respect, three non-extreme risk scenarios with the biggest maximum loss are combined, and the total loss amount is benchmarked with 80% of the RBC.

These stress tests are carried out when validating the outcome of the scenario analysis review. If the specific stress tests defined above exceed 85% of the available Risk-Bearing Capacity reporting threshold, the Executive Board is informed. In addition to the stress tests defined above, Clearstream Risk Management might test other combinations of scenarios to obtain a better understanding of the appropriateness of the calculated capital requirements.

If the outcome of the regular or the ad hoc scenario review changes the OpRisk stress test according to the above-explained methodology, then ad hoc stress tests are performed as well. These changes involve altering a scenario already included in OpRisk stress tests or changing the composition of the stress tests, i.e. including a new scenario and excluding one scenario.

A reverse stress test for operational risk is performed as well. It assumes the materialisation of several operational risk scenarios (frequency not rarer than one loss in 1,000 years). A sufficient number of operational risk scenarios 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.

7.3 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 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 robust 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 programs.

7.3.1 Internal control system

The Executive Board of CBL has implemented an internal control system, designed to ensure the effectiveness and profitability of the business operations, prevent or detect financial loss and thus protect all its business assets. Clearstream's internal control system, an integral part of the risk management system, is continuously developed and adjusted to reflect changing conditions. It comprises both integrated and independent control and safety measures. In 2018, Clearstream established the Control Assurance & Monitoring (CAM) function to further enhance the documentation and monitoring of the internal control system.

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

7.3.2 Business continuity management

Because the unavailability of core processes and resources represents a substantial risk for Clearstream and potential systemic risk to the markets, Clearstream has implemented a comprehensive Business Continuity Management (BCM) approach as key mitigation of availability risk. Related tests are performed throughout the year.

BCM organisation at Clearstream

The Executive Board is responsible for ensuring the continuity of business at Clearstream Banking S.A. This responsibility is delegated to the various organisational units, which are directly responsible for the operational resilience and disaster tolerance of their respective business areas. Reporting to executive management, the Business Continuity Management function 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 to ensure the continuity of the most critical operations even in cases of catastrophic events.

Clearstream thereby makes use of its operational locations in Cork, Eschborn, London, Luxembourg, Prague and Singapore to maintain the continuity of its services.

Systems unavailability

Data centres are geographically 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 disruption.

Workspace unavailability

Exclusively dedicated work facilities provide backup office space for mission-critical functions if an office location becomes unavailable. These backup facilities are fully equipped and networked with the distributed data centres and always operational. Also, business transfer plans between Clearstream's different operations locations can be used to mitigate workspace unavailability.

Staff unavailability

Business continuity solutions also cover the significant unavailability of staff, e.g. during a pandemic-related incident or terrorist attacks. 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 ensures the continuous provision of critical supplier services by several means, such as regular due diligence reviews of suppliers' BCM arrangements, provision of services by alternative suppliers where 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, in a controlled and effective manner, facilitates a coordinated response and rapid reaction to an incident or crisis. The process aims to minimise business and market impact, enabling a swift return to regular business activity.

Incident managers have been appointed in their respective business areas as single points of contact in case of incidents and crises to ensure the appropriate response, including escalation up to the Executive Board and the notification of 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 whilst reducing associated risks and avoiding customer impacts. BCM plans are tested regularly, 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 Executive Board. Customers are regularly invited to participate in Clearstream's BCM tests to provide them with the direct assurance of Clearstream's BCM preparedness.

7.3.3 Insurance

Insurance is an additional tool used by Clearstream to mitigate the impact of operational risk by transferring risks above a certain threshold to third parties through a comprehensive insurance programme.

To achieve the optimum risk/benefit versus premium ratio, insurance policies are negotiated either through insurance brokers or directly with highly rated insurers to purchase tailor-made policies reflecting the specificities of CBL's business.

Although the risk mitigating effect of insurance policies is not considered in the OpRisk capital model, the insurance programme is an important measure for mitigation management purposes.

7.4 Monitoring and reporting

The reporting approach laid out in [3.2.5 Risk monitoring and reporting](#) also applies to the management of operational risk. Furthermore, Clearstream produces a summary report on the Internal Capital Adequacy Assessment Process (ICAAP) on an annual basis, which is reviewed by Compliance and Internal Audit.

This report includes not only 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, as well as quality improvements in operational risk management.

8. Credit risk

In accordance with Art. 435(1), 442 and 453 CRR, the following paragraph will provide required information on credit risk and credit risk mitigation as laid down in section 4.8 – Credit risk and general information on CRM in the EBA Guidelines on disclosure requirements under Part Eight of Regulation (EU) No. 575/2013.

8.1 Governance

Clearstream's general risk management structure, organisation and process, as well as its risk strategy, are specified in Chapter 3 ([Risk management overview](#)). The present status and the business direction for credit risk are stated in a credit risk strategy. The Executive Board periodically examines and adjusts the credit risk strategy as necessary.

The credit risk strategy is set in accordance with the Risk Management Policy and reported annually to the supervisory board. The credit risk strategy represents the framework and defines, amongst other things, the principles, credit risk appetite, the credit authorities, collateral eligibility, the basic counterparty quality, as well as the fundamental country and currency risk categories.

Regarding credit risk, the credit risk strategy is translated into a limit system, which is also monitored regularly and ad hoc.

Clearstream may grant credit limits used to facilitate the settlement of securities transactions and support the securities financing business. Credit is granted exclusively on a collateralised basis where prudent haircuts are applied to the pertinent collateral, apart from certain unsecured settlement limits granted to sovereign and supranational institutions (as per the exemption provided for in Art. 23.2 CSDR (EU) No. 2017/390). Borrowers with respect to Clearstream are principally central banks, banks and financial institutions. Furthermore, credit limits are set for the placement of funds with counterparties. 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 taking into account the level of activity in the customer's accounts and 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. A quarterly benchmarking exercise with regard to external sources is performed, and internal ratings are adjusted when deemed necessary.

Collateral recoverability is also part of the tests performed by the Credit Default Management Team.

The credit section manages country risk by setting limits for each country based on the country's internal credit rating. Exceptions are reported to the Executive Board monthly. Currency limits are established for non-major currencies to cover currency exposure.

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

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

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

In principle, exposures after credit risk mitigation techniques to an individual customer or group of connected customers above 25% of own funds are 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 report to the Executive Board and Group Risk Monitoring, as well as for credit exposure reporting to Group Risk Monitoring, which forms the basis of the credit VaR calculations.

8.2 Credit risk exposures

8.2.1 Application of the standardised approach

For the exposure class pertaining to central governments and central banks, Clearstream uses the credit assessments by the OECD⁴. Clearstream also nominated the external credit assessment institution (ECAI) Standard & Poor's for the same exposure class, because OECD stopped assessing so-called "high-income countries" in 2013. For the "regional governments or local authorities" and "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 domicile. The use of these credit assessments by the OECD and Standard & Poor's ratings has been reported to the Luxembourg supervisor.

The exposures of Clearstream belong mainly to the exposure classes of central governments, central banks and institutions. The current exposures to central governments and central banks are mainly risk-weighted at 0%. Exposures to institutions generally have a short original maturity of less than or equal to three months; therefore, under Art. 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 based on 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 has been nominated for that purpose).

Clearstream complies with the risk weighting as defined in Section 2, Chapter 2 of Part 3, Title II CRR.

⁴ Country risk classification: <http://www.oecd.org/tad/xcred/crc.htm>.

The table below shows the applied risk weights for each exposure class:

Exposure classes	Risk weight								Total
	0%	2%	20%	50%	100%	150%	250%	Others	
Central governments or central banks	6,156,704	0	1,600	4,273	859	0	0	0	6,163,436
Regional government or local authorities	261,843	0	0	0	0	0	0	0	261,843
Public sector entities	234,795	0	0	0	0	0	0	0	234,795
Multilateral development banks	708,842	0	0	0	0	0	0	0	708,842
International organisations	20,392	0	0	0	0	0	0	0	20,392
Institutions	0	125,038	62,782,955	0	24,576	0	0	0	62,932,569
Corporates	0	0	3,321,462	0	72,895	647	0	0	3,395,004
Exposures in default	0	0	0	0	0	6,849	0	0	6,849
Equity	0	0	0	0	5,558	0	31,646	0	37,204
Other items	5	0	0	0	13,086	0	0	0	13,091
Total	7,382,581	125,038	66,106,017	4,273	116,974	7,496	31,646	0	73,774,025

Table 15 - Standardised approach - risk weights

8.2.2 Detailed information and distribution of credit risk exposure

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 is impaired, where appropriate applying the expected loss model as introduced by IFRS 9 Financial Instruments.

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 trade receivables within a couple of days.

Past due items and default or non-performing exposures

According to the definitions stated below, Clearstream had no material past due items or defaulted exposures on its books on the reporting date or during the year under review.

Definition of past due:

The CRR classifies an exposure as “past due” if a counterparty has failed to make a payment when contractually due, when the debtor has exceeded an external limit communicated to it, as well as when the debtor has utilised credit without prior consent.

Definition of default or non-performing:

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

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

Clearstream’s internal definition of “impairment” according to the International Financial Reporting Standards (IFRS) is compliant with the definition of “default” outlined in Art. 178 CRR. I have

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 close monitoring of business, there have been no material credit losses at Clearstream since 1970.

Distribution of credit risk exposures

In the following, the distribution of the credit risk exposures is broken down by exposure classes (Art. 442 (c) CRR), geographical area (Art. 442 (d) CRR), industry (Art. 442 (e) CRR), and residual maturity (Art. 442 (f) CRR).

As at 31 December 2019, the allocation per exposure class was as shown in the following table. Most of the exposures held by Clearstream are with central governments and institutions, which account for more than 93% of exposures. Compared with the year-end amount, the table also shows the average exposure during the year under review.

		The net value of exposures at the end of the period	Average net exposures over the period
15	Total IRB approach		
16	Central governments or central banks	6,163,438	7,118,016
17	Regional governments or local authorities	261,843	271,299
18	Public sector entities	234,795	338,976
19	Multilateral development banks	708,842	615,407
20	International organisations	20,392	5,226
21	Institutions	62,932,568	57,682,200
22	Corporates	3,395,005	1,377,487
23	<i>Of which: SMEs</i>	0	0
24	Retail	0	0
25	<i>Of which: SMEs</i>	0	0
26	Secured by mortgages on immovable property	0	0
27	<i>Of which: SMEs</i>	0	0
28	Exposures in default	6,849	3,057
29	Items associated with particularly high risk	0	0
30	Covered bonds	0	0
31	Claims on institutions and corporates with a short-term credit assessment	0	0

32	Collective investments undertakings	0	0
33	Equity exposures	37,203	22,650
34	Other exposures	13,092	20,913
35	Total standardised approach	73,774,027	67,455,231
36	Total	73,774,027	67,455,231

Table 16 - Total and average net amount of exposure

As shown in the table, CBL holds most of its exposures with central and regional governments, central banks, PSEs, MDBs and institutions. No retail or SME exposure was held during the year under review. In accordance with IFRS 9, CBL recognised exposures in default.

The following table provides information about the geographical allocation of credit risk exposures broken down by exposure classes. As shown below, most exposures of Clearstream are in the European Union.

		Net value				
		European Union	Rest of Europe	North America	Rest of world	Total
6	Total IRB approach					
7	Central governments or central banks	6,121,116	34,053	1,918	6,351	6,163,438
8	Regional governments or local authorities	261,843	0	0	0	261,843
9	Public sector entities	234,795	0	0	0	234,795
10	Multilateral development banks	335,870	0	372,918	54	708,842
11	International organisations	20,281	111	0	0	20,392
12	Institutions	59,161,156	1,290,634	514,481	1,966,298	62,932,568
13	Corporates	3,379,421	1,718	668	13,197	3,395,005
16	Exposures in default	1,884	4,858	19	88	6,849
21	Equity exposures	9,057	0	0	28,146	37,203
22	Other exposures	13,088	0	0	3	13,092
23	Total standardised approach	69,538,511	1,331,374	890,004	2,014,137	73,774,026
24	Total	69,538,511	1,331,374	890,004	2,014,137	73,774,026

Table 17 - Geographical breakdown of exposures

The next table shows a breakdown of exposures by industry or counterparty type and exposure classes. The financial industry is the most important for Clearstream Banking S.A., as most of the exposures consist of securities financing transactions with large financial institutions. Finance and banking amounts to 98% of the total exposure of Clearstream Banking S.A.

	Finance and banking	Other	Public administration and defence, compulsory social security	Real estate activities	Construction	Wholesale and retail trade	Information and communication	Administrative and support service activities	Human health services and social work activities	Manufacturing	Transport and storage	Electricity, gas, steam and air conditioning supply	Total
Total IRB approach													
Central governments or central banks	6,135,412	0	23,514	0	0	0	0	4,512	0	0	0	0	6,163,438
Regional governments or local authorities	261,803	0	40	0	0	0	0	0	0	0	0	0	261,843
Public sector entities	234,795	0	0	0	0	0	0	0	0	0	0	0	234,795
Multilateral development banks	708,842	0	0	0	0	0	0	0	0	0	0	0	708,842
International organisations	20,392	0	0	0	0	0	0	0	0	0	0	0	20,392
Institutions	62,932,568	0	0	0	0	0	0	0	0	0	0	0	62,932,568
Corporates	3,387,360	7,314	0	0	0	0	96	175	7	11	40	2	3,395,004
Exposures in default	6,619	211	0	0	0	0	1	0	0	0	16	0	6,847.00
Equity exposures	0	37,203	0	0	0	0	0	0	0	0	0	0	37,203
Other exposures	13,092	0	0	0	0	0	0	0	0	0	0	0	13,092
Total standardised approach	73,700,883	44,728	23,554	0	0	0	97	4,686	7	11	56	2	73,774,025

Table 18 - Concentration of exposures by industry or counterparty types

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.

		Net exposure value			
		≤ 3 months	Between 3 months and 1 year	> 1 year	Total
6	Total IRB approach				
7	Central governments or central banks	86,676	0	6,076,761	6,163,437
8	Regional governments or local authorities	1	0	261,842	261,843
9	Public sector entities	0	0	234,795	234,795
10	Multilateral development banks	0	0	708,842	708,842
11	International organisations	0	0	20,392	20,392
12	Institutions	1,278,159	0	61,654,409	62,932,568
13	Corporates	5,968	0	3,389,036	3,395,004
16	Exposures in default	6,849	0	0	6,849
21	Equity exposures	37,203	0	0	37,203
22	Other exposures	0	0	13,092	13,092
23	Total standardised approach	1,414,856	0	72,359,169	73,774,025
24	Total	1,414,856	0	72,359,169	73,774,025

Table 19 - Maturity of exposures

The next seven tables provide a closer view on the quality of the exposures and more specifically to the exposures in default. The first table shows the defaulted exposures next to the ones not defaulted per exposure class.

	Gross carrying values of		Specific credit risk adjustment	General credit risk adjustment	Accumulated write-offs	Credit risk adjustment charges of the period	Net values
	Defaulted exposures	Non-defaulted exposures					
Central governments or central banks	0	6,163,438	0	0	0	0	6,163,438
Regional governments or local authorities	0	261,843	0	0	0	0	261,843
Public sector entities	0	234,824	-29	0	0	-29	234,795
Multilateral development banks	0	708,842	0	0	0	0	708,842
International organisations	0	20,392	0	0	0	0	20,392
Institutions	0	62,932,568	0	0	0	0	62,932,568
Corporates	0	3,395,005	0	0	0	0	3,395,005
Retail	0	0	0	0	0	0	0
Secured by mortgages on immovable property	0	0	0	0	0	0	0

Exposures in default	7,538	0	-689	0	0	-689	6,849
Items associated with particularly high risk	0	0	0	0	0	0	0
Covered bonds	0	0	0	0	0	0	0
Claims on institutions and corporates with a short-term credit assessment	0	0	0	0	0	0	0
Collective investments undertakings	0	0	0	0	0	0	0
Equity exposures	0	37,203	0	0	0	0	37,203
Other exposures	0	13,092	0	0	0	0	13,092
Total standardised approach	7,538	73,767,207	-718	0	0	-718	73,774,027
Total	7,538	73,767,207	-718	0	0	-718	73,774,027

Table 20 - Credit quality of exposures by exposure class and instrument

The next table shows the split of the defaulted and non-defaulted exposure per economic sector of the counterparty. As the largest part of exposures is vis-à-vis counterparties of the “Finance and banking” sector, it follows that also the largest part of the defaulted exposures is vis-à-vis counterparties of the same industry.

	Gross carrying values of		Specific credit risk adjustment	General credit risk adjustment	Accumulated write-offs	Credit risk adjustment charges of the period	Net values
	Defaulted exposures	Non-defaulted exposures					
Finance and banking	7,096	73,694,294	-506			-506	73,700,884
Other	442	44,499	-212			-212	44,729
Public administration and defence, compulsory social security	0	23,554	0	0	0	0	23,554
Real estate activities	0	0	0	0	0	0	0
Construction	0	0	0	0	0	0	0
Wholesale and retail trade	0	0	0	0	0	0	0
Information and communication	0	97	0	0	0	0	97
Administrative and support service activities	0	4,687	0	0	0	0	4,687

Human health services and social work activities	0	7	0	0	0	0	7
Manufacturing	0	11	0	0	0	0	11
Transport and storage	0	57	0	0	0	0	57
Electricity, gas, steam and air conditioning supply	0	2	0	0	0	0	2
Total	7,538	73,767,208	-718	0	0	-718	73,774,028

Table 21 - Credit quality of exposures by industry or counterparty types

Just like above the next table also shows the breakdown of exposure in default and exposures non-defaulted, but this time per geographical area, and here the European Union is the most important region in terms of exposures, but the rest of Europe represents a bigger share in terms of defaulted exposures.

	Gross carrying values of		Specific credit risk adjustment	General credit risk adjustment	Accumulated write-offs	Credit risk adjustment charges of the period	Net values
	Defaulted exposures	Non-defaulted exposures					
European Union	2,275	69,536,653	-407	0	0	-407	69,538,521
Rest of Europe	5,131	1,326,516	-279	0	0	-279	1,331,368
North America	33	889,986	-14	0	0	-14	890,005
Rest of world	99	2,014,049	-18	0	0	-18	2,014,130
Total	7,538	73,767,204	-718	0	0	-718	73,774,024

Table 22 - Credit quality of exposures by geography

The following table illustrates the aging of past-due exposures.

	Gross carrying values				
	≤ 30 days	> 30 days ≤ 90 day	> 90 days ≤ 180 days	> 180 days ≤ 1 year	> 1 year
Debt securities	1,225,362	0	0	0	0
Loans and advances	14,048,979	503,711	961	5,697	880
Off-balance-sheet exposures	337,597	0	0	0	0

Table 23 - Ageing of past-due exposures

The following table provides information about the non-performing and the forborne.

The vast majority of the exposures has been performing.

Gross carrying values of performing and non-performing exposures	Accumulated impairment and provisions and negative fair value adjustments due to credit risk	Collaterals and financial guarantees received
--	--	---

			Of which performing but past due > 30 days and ≤ 90 days	Of which performing forborne	Of which non-performing			On performing exposures		On non-performing exposures		On performing exposures	Of which forborne exposures
					Of which defaulted	Of which impaired	Of which forborne		Of which forborne		Of which forborne		
10	Debt securities	1,225,362	0	0	0	0	0	-30	0	0	0	0	0
20	Loans and advances	14,057,021	504	0	7,538	0	0	-21,701	0	-689,040	0	0	0
30	Off-balance sheet exposures	337,596,951	0	0	0	0	0	0	0	0	0	0	0

Table 244 - Non-performing and forborne exposures

The following table provides information about the specific and general credit adjustments.

	Accumulated specific credit risk adjustment	Accumulated general credit risk adjustment
Opening balance	362	0
Increases due to amounts set aside for estimated loan losses during the period	466	0
Decreases due to amounts reversed for estimated loan losses during the period	-88	0
Decreases due to amounts taken against accumulated credit risk adjustments	0	0
Transfers between credit risk adjustments	0	0
Impact of exchange rate differences	0	0
Business combinations, including acquisitions and disposals of subsidiaries	0	0
Other adjustments	0	0
Closing balance	740	0
Recoveries on credit risk adjustments recorded directly to the statement of profit or loss	88	0
Specific credit risk adjustments directly recorded to the statement of profit or loss	466	0

Table 25 - Changes in the stock of general and specific credit risk adjustments

The following table provides information about the changes in the stock of defaulted and impaired loans and debt securities.

	Gross carrying value defaulted exposures
Opening balance	527
Loans and debt securities that have defaulted or impaired since the last reporting period	7,021
Returned to non-defaulted status	-10
Amounts written off	0
Other changes	0
Closing balance	7,538

Table 26 - Changes in the stock of defaulted and impaired loans and debt securities

8.2.3 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 two 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 monthly, after utilisation of all respective collateral and after taking the recovery rate into account.
- The “Economic Deterioration Stress Test”, where the impact on Clearstream of a deterioration of the economic environment is simulated monthly. To capture the worsening of the economy, certain credit risk model parameters are adjusted compared to the standard VaR simulation.

The results of the “Default of the Largest Counterparty Group Stress Test” and the “Economic Deterioration Stress Test” are compared to limits, which are defined as a fraction of the available Risk-Bearing Capacity. The stress test results are reported to the Executive Board every quarter and semi-annually to the supervisory board.

In addition to the stress tests defined above, a “Reverse Credit Stress Test” is also performed, which aims 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 endangering the going concern of Clearstream’s business.

8.3 Credit risk mitigation

Disclosure requirements concerning credit risk mitigation are laid down in Section C EBA Guidelines on disclosure requirements under Part Eight of Regulation (EU) No. 575/2013 in conjunction with Art. 453 CRR.

The credit risk mitigation technique used by Clearstream Banking S.A. for solvency purposes is collateralisation. Furthermore, a variety of account relation is maintained on a current account basis, and therefore only 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, resulting in payables and

receivables. To optimise cash flows and reduce payment efforts in situations with material cash flows in both directions, positions are held in current accounts based on netting agreements. Debits and credits are netted immediately, and net positions are settled once a month.

Accounts with customers or CCBs are generally maintained on a current account basis. Therefore, all movements in these accounts and currencies are immediately netted to single account balances.

For credit purposes, except as otherwise agreed between the customer and Clearstream, all customer accounts with Clearstream, in whatever currency they are held, are deemed to form 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 options, no netting takes place for regulatory and risk management purposes. For credit purposes, cash credit positions from these arrangements are taken as cash collateral. For solvency purposes, this collateral is not considered (see [9.3.1 Collateral](#)).

The following table shows the respective total credit risk exposure for on-balance, and off-balance sheet amounts in the standardised approach, before and after applying credit risk mitigation techniques and CCF, as well as the RWA applied for each relevant exposure class:

	Exposure classes	Exposures before CCF and CRM		Exposures post CCF and CRM		RWAs and RWA density	
		On-balance sheet amount	Off-balance sheet amount	On-balance sheet amount	Off-balance sheet amount	RWAs	RWA density
1	Central governments or central banks	6,114,479	48,959	6,114,479	0	3,316	0.05%
2	Regional government or local authorities	261,843	0	261,843	0	0	0.00%
3	Public sector entities	234,825	0	234,795	0	0	0.00%
4	Multilateral development banks	708,842	0	708,842	0	0	0.00%
5	International organisations	20,392	0	20,392	0	0	0.00%
6	Institutions	1,389,537	61,543,032	1,389,536	864,398	451,133	20.02%
7	Corporates	73,563	3,321,462	73,542	9,995	75,865	90.82%
8	Retail	0	0	0	0	0	0.00%
9	Secured by mortgages on immovable property	0	0	0	0	0	0.00%
10	Exposures in default	7,538	0	6,849	0	10,273	149.99%
11	Exposures associated with particularly high risk	0	0	0	0	0	0.00%
12	Covered bonds	0	0	0	0	0	0.00%
13	Institutions and corporates with a short-term credit assessment	0	0	0	0	0	0.00%

14	Collective investment undertakings	0	0	0	0	0	0.00%
15	Equity	37,203	0	37,203	0	84,672	227.59%
16	Other items	13,092	0	13,092	0	13,086	99.95%
17	Total	8,861,314	64,913,453	8,860,574	874,393	638,345	6.56%

Table 277 - Standardised approach - credit risk exposures and CRM effect

8.3.1 Collateral

8.3.1.1 Settlement credit limits

The purpose of the settlement credit limit is to facilitate the clearance of securities transactions against payment. Two types of credit limit are currently available, the Technical Overdraft Facility (TOF) and the Unconfirmed Funds Facility (UCF). Under the terms and conditions of the TOF contract and the General Terms and Conditions, Clearstream Banking S.A. has a pledge on all customer assets held in the customer account(s) defined as pledge account(s) to secure customer obligations to CBL for the services rendered by 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 Board. 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:

- 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;
- Select equities included in STOXX Europe 50 and STOXX North America 50 indices.

In general, all securities not classified as eligible are ineligible as collateral, including the following:

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

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. The system automatically blocks any transaction on a given account whose settlement requires more than the available collateral.

In the application of Art. 453(f) and (g), information on exposure value covered by financial collateral, other collateral, guarantees and credit derivatives is to be understood as

information on outstanding secured exposures and the secured amount within those exposures. Please find the required information in the two tables here below:

		Exposures unsecured – carrying amount	Exposures secured – carrying amount	Exposures secured by collateral	Exposures secured by financial guarantees	Exposures secured by credit derivatives
1	Total loans	114,177	0	0	0	0
2	Total debt securities	1,225,333	0	0	0	0
3	Total exposures	1,339,510	0	0	0	0
4	Of which, defaulted	0	0	0	0	0

Table 288 - CRM techniques - on-balance sheet

		Exposures unsecured – carrying amount	Exposures secured – carrying amount	Exposures secured by collateral	Exposures secured by financial guarantees	Exposures secured by credit derivatives
1	Guarantees and commitments	64,799	272,798	272,798	0	0
2	Total exposures	64,799	272,798	272,798	0	0
3	Of which, defaulted	0	0	0	0	0

Table 299- CRM techniques - off-balance sheet

As explained above, for loans provided to customers, exposures are secured by pledges on customers' accounts and all assets held with Clearstream Banking S.A. and not with guarantees or credit derivatives. The debt instruments are of high quality, issued by central and regional governments, PSE, MDBs or large credit institutions. As shown in the second table, the major part of the off-balance sheet guarantees and commitments are secured by eligible financial collateral.

8.4 Repurchase agreements

Clearstream Banking S.A. bases a significant part of the Group's liquidity on 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 concluded 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 taken as collateral in repo-style transactions must 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 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 is not a factor for Clearstream;
- The maximum remaining life to maturity of the accepted securities is ten years.

Cross-currency collateralisation is generally possible. It was not used for bilateral transactions but in the context of tri-party repos. Bilateral transactions must be “plain vanilla” on a single fixed-income security. In tri-party 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 tri-party repo transactions (including Eurex Repo GC Pooling transactions). All collateral is valued daily. To secure the cash lent through reverse repurchase agreements, CBL agrees on margin calls with the repo counterparty daily to keep cash and collateral in balance.

For solvency purposes, according to Art. 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 Art. 224 CRR apply. In cases of FX mismatch, further cross-currency haircuts are to be applied.

8.5 ASL

ASL (Automated Securities Lending) is a lending programme that allows customers who are short of securities due to settlement failure to borrow securities from other Clearstream customers (lenders).

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 (the 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.

8.5.1 Risk guarantee

In the ASL programme, each loan 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 pledge under Luxembourg law. Collateral quality and sufficiency are monitored by CBL daily;
- A 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.

8.5.2 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.

8.5.3 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.

Eligible 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.

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. The system automatically blocks any transaction on a given account whose settlement requires more than the available collateral.

8.6 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. Clearstream Banking S.A. acts as a 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 based on standard framework agreements between CBL and each borrower. Generally, apart from limited exceptions, only securities rated A+⁵ and above are eligible for collateral with haircuts ranging from 2% to 15% depending on the issuer type.

⁵ Securities rated below A+ are accepted with restrictive concentration limits for certain collateral schedules.

Furthermore, both the exposure and the collateral are subject to daily valuation and re-margining; 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 levels 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 with a value of at least 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.

As for the collateralised placing, a zero weighting as per the application of Art. 227 CRR is generally possible. As the lending business covers a broader range of securities that do not fulfil the criteria laid down in Art. 227 CRR, and 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. Since there is a notable portion of cross-currency collateralisation, additional FX haircuts are applied.

8.7 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 Group Risk Monitoring. Besides that, limit breaches – if any – are reported to the Executive Board and Group Risk Monitoring.

The reporting approach described under [3.3.5 Risk monitoring and reporting](#) 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 Board. Besides the assessment of the VaR, Group Risk Monitoring also measures credit risk concentration and performs stress test calculations on credit risk (see [9.2.3 Stress testing of credit risk](#)).

8.8 Asset encumbrance

The EBA specified the disclosure of information on asset encumbrance under Art. 443 CRR with the EBA Guidelines on the disclosure of encumbered and unencumbered assets on 26 June 2014⁶. The disclosures described below are made on the basis of this guideline.

The following table discloses the amount of encumbered and unencumbered assets according to the EBA regulatory technical standards on the disclosure of encumbered and unencumbered assets under Art. 443 CRR⁷ (EBA/RTS/2017/03):

⁶ 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> .

		Carrying amount of encumbered assets		The fair value of encumbered assets		Carrying amount of unencumbered assets		The fair value of unencumbered assets	
		010	Of which, notionally eligible EHQLA and HQLA	040	Of which, notionally eligible EHQLA and HQLA	060	Of which, EHQLA and HQLA	090	Of which, EHQLA and HQLA
			030		050		080		100
010	Assets of the reporting institution	361,288	0			15,115,241	781,438		
020	Loans on demand	357,404	0			7,068,165	0		
030	Equity instruments	0	0			5,558	0		
040	Debt securities	0	0	0	0	1,225,333	781,438	1,226,711	781,959
050	of which: covered bonds	0	0	0	0	0	0	0	0
060	of which: asset-backed securities	0	0	0	0	0	0	0	0
070	of which: issued by general governments	0	0	0	0	496,598	282,084	327,653	282,697
080	of which: issued by financial corporations	0	0	0	0	728,735	499,354	899,058	499,261
090	of which: issued by non-financial corporations	0	0	0	0	0	0	0	0
100	Loans and advances other than loans on demand	0	0	0	0	6,630,741	0	0	0
110	of which: mortgage loans	0	0	0	0	0	0	0	0
120	Other assets	3,884	0			185,444	0		

Table 30 - Encumbered and unencumbered assets

The primary sources of encumbrance are blocked accounts (Argentinean and Iranian nostro accounts and cash overdrafts) and the reserve amount at the BCL.

However, as shown in the table above, the overall level of encumbrance is low. Unencumbered assets are mainly related to the following positions:

- Loans on-demand account for around 54%, which mainly consists of customer liquidity that is placed overnight;
- Other loans and advances that are mainly made up of repurchase agreements as described in [10.5 Repurchase agreements](#) account for 37% of unencumbered assets;
- 8% of unencumbered assets consist of debt securities, mostly high-quality liquid assets;
- The remaining minor part is mainly other receivables and intangible assets.

The next table shows the fair value of encumbered or unencumbered collateral received:

⁷ Regulatory technical standards on disclosure of encumbered and unencumbered assets under Art. 443 of the CCR: <https://eba.europa.eu/documents/10180/1771929/Final+draft+RTS+on+Encumbered+and+Unencumbered+Assets+%28EBA-RTS-2017-03%29.pdf/8b3f847a-4f7c-4ad9-a058-92f1209b0e3d>

		The fair value of encumbered collateral received or own debt securities issued		Unencumbered	
		010	Of which, notionally eligible EHQLA and HQLA 030	040	Of which, EHQLA and HQLA 060
130	Collateral received by the reporting institution	946,420	943,536	5,575,983	912,481
140	Loans on demand	0	0	0	0
150	Equity instruments	0	0	0	0
160	Debt securities	946,420	943,536	5,575,983	912,481
170	of which: covered bonds	0	0	0	0
180	of which: asset-backed securities	0	0	0	0
190	of which: issued by general governments	511,760	508,876	3,976,475	620,155
200	of which: issued by financial corporations	399,642	399,642	1,593,479	292,326
210	of which: issued by non-financial corporations	35,018	35,018	6,028	0
220	Loans and advances other than loans on demand	0	0	0	0
230	Other collateral received	0	0	0	0
240	Own debt securities issued other than own covered bonds or asset-backed securities	0	0	0	0
250	TOTAL ASSETS, COLLATERAL RECEIVED, AND OWN DEBT SECURITIES ISSUED	1,307,707	943,536		

Table 31 - Collateral received

The sources of encumbrance are shown in the following table:

		Matching liabilities, contingent liabilities or securities lent	Assets, collateral received and owned debt securities issued other than covered bonds and ABSs encumbered
		010	030
010	Carrying amount of selected financial liabilities	892,404	954,449
020	Derivatives	14,440	8,029
030	of which: over-the-counter	14,440	8,029
040	Deposits	877,964	946,420
050	Repurchase agreements	877,964	946,420
060	of which: central banks	0	0
070	Collateralised deposits other than repurchase agreements	0	0
080	of which: central banks	0	0
090	Debt securities issued	0	0
100	of which: covered bonds issued	0	0
110	of which: asset-backed securities issued	0	0
120	Other sources of encumbrance	58,128	353,258
130	Nominal of loan commitments received	0	0
140	Nominal of financial guarantees received	0	0
150	The fair value of securities borrowed with non-cash-collateral	0	0
160	Other	58,128	353,258
170	TOTAL SOURCES OF ENCUMBRANCE	950,532	1,307,707

Table 32 - Sources of encumbrance

9. Counterparty credit risk

As per Art. 439, 444 and 452 CRR, banks are required to disclose the counterparty credit risk regarding instruments referred to in Part Three, Title II, Chapter 6 CRR.

9.1 Governance

In Clearstream Banking S.A., exposure to CCR arises from both over-the-counter (OTC) and centrally cleared derivatives.

As previously mentioned, the general risk management structure, organisation and process, and the risk strategy are described in [3. Risk management overview](#). As with credit risk, business directives for counterparty credit risk are stated in the credit risk strategy, which is set in accordance with the Risk Management Policy and reported annually to the supervisory board. The credit risk strategy sets the operating limits for counterparty credit exposure, which are regularly monitored as per the Credit Policy. Moreover, the Credit Policy defines the risk controlling (incl. wrong-way risk) and risk mitigation techniques.

Clearstream Banking S.A. is not generally involved in the derivatives business. CBL has modest derivatives positions to hedge interest rate or foreign exchange risk. There were limited positions in place at the end of 2019.

9.2 Measurement and mitigation

Following points 114, 115, 116 and 117 of the guidelines on disclosure requirements, institutions are supposed to disclose information regarding the methods used to measure the exposure value of instruments subject to capital requirements for CCR and a comprehensive picture of the institution's exposure to CCPs.

The following table discloses a comprehensive view of the methods used to calculate CCR regulatory requirements and the main parameters used within each method.

		Notional	Replacement cost/current market value	Potential future credit exposure	EEPE	Multiplier	EAD post CRM	RWAs
1	Mark to market		0	0			0	0
2	Original exposure	2,192,274					62,257	12,451
3	Standardised approach		0			0	0	0
4	IMM (for derivatives and SFTs)				0	0	0	0
5	<i>Of which securities financing transactions</i>				0	0	0	0
6	<i>Of which derivatives and long settlement transactions</i>				0	0	0	0
7	<i>Of which from contractual cross-product netting</i>				0	0	0	0

8	Financial collateral simple method (for SFTs)						0	0
9	Financial collateral comprehensive method (for SFTs)						0	0
10	VaR for SFTs						0	0
11	Total							12,451

Table 33 - Analysis of CCR exposure by approach

The next table provides a summary of the CVA regulatory calculations.

		Exposure value	RWAs
1	Total portfolios subject to the advanced method	0	0
2	(i) VaR component (including the 3× multiplier)		0
3	(ii) SVaR component (including the 3× multiplier)		0
4	All portfolios subject to the standardised method	67,794	871
EU4	Based on the original exposure method	0	0
5	Total subject to the CVA capital charge	67,794	871

Table 34 - CVA capital charge

As per point 117 of the EBA Guidelines on the disclosure requirements for this report, the following table discloses a breakdown of CCR exposures by exposure class and by risk weight (riskiness attributed):

	Exposure classes	Risk weight	Total
		20%	
1	Central governments or central banks	0	0
2	Regional government or local authorities	0	0
		0	0
3	Public sector entities	0	0
4	Multilateral development banks	0	0
5	International organisations	0	0
6	Institutions	62,257	62,257
7	Corporates	0	0
8	Retail	0	0
9	Institutions and corporates with a short-term credit assessment	0	0
10	Other items	0	0
11	Total	62,257	62,257

Table 35 - Standardised approach - CCR exposures by regulatory portfolio and risk

As at 31 December 2019, CBL did not hold any exposure to central counterparties. Hence, the table as per Part Three, Title II, Chapter 6, Section 9 CRR is not disclosed.

In addition to the overall information on counterparty credit risk, Art. 439 CRR also requires disclosure of risk mitigation concerning CCR as laid out in points 120 and 121 of EBA Guidelines on disclosure requirements under Part Eight of Regulation (EU) No. 575/2013.

The following table provides an overview of the impact of netting and collateral held on exposures:

		Gross positive fair value or net carrying amount	Netting benefits	Netted current credit exposure	Collateral held	Net credit exposure
1	Derivatives	62,257	0	62,257	0	62,257
4	Total	62,257	0	62,257	0	62,257

Table 36 - Impact of netting and collateral held on exposure values

Collateral received should then be disaggregated by types of instruments. But as no collateral is held in derivatives, the table is not disclosed.

9.3 Derivatives CCR

At Clearstream, derivative instruments are only used to a small extent, primarily for hedging purposes. Such instruments can only be used in established and regularly tested operational procedures. Hedging documentation is maintained to IAS 39 standards. The dealings with interest rate or foreign exchange risks (measurement, assignment of internal capital and limits, etc.) are described in detail in [12. Market risk](#).

In cases where a certain level of foreign exchange exposure, and therefore risk, is exceeded, the risk of each currency exposure should be hedged. For Clearstream, the level of materiality is expressed as 10% of consolidated EBITDA of the budget year to be hedged for each 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)⁸ to minimise settlement risk and executed with counterparties only where a Credit Support Annex (CSA) is signed to mitigate credit risk resulting from market movements.

The original exposure method under Art. 275 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 a funding or an investment vehicle for currencies where no or limited deposit market exists (overnight swaps) or for the conversion of USD liquidity (overnight and/or term FX swaps) into EUR used to purchase/repo against highly liquid paper delivered to BCL serving as a liquidity buffer.

As at 31 December 2019, Clearstream Banking S.A. did not hold any credit derivatives on its books. Hence, the report does not include a table containing information in conjunction with Art. 439 (g) and (h) CRR concerning credit derivatives.

⁸ 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).

10. Liquidity risk

According to point 55 of the EBA Guidelines on disclosure requirements under Part Eight of Regulation (EU) No. 575/2013, for liquidity risk, institutions should refer to the EBA Guidelines 2017/01 on LCR disclosure to complement the disclosure of liquidity risk management.

10.1 Governance

Liquidity risk management is incorporated into Clearstream's governance set-up. Treasury performs the day-to-day liquidity risk management for Clearstream Banking S.A. (CBL) and Clearstream Banking AG (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.

CBL's Risk Committee monitors and oversees those activities and makes recommendations to the Executive Board.

Clearstream's liquidity risk appetite represents the level of liquidity risk that Clearstream accepts in order 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 the risk 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 this is permitted again by the liquidity risk exposure. Liquid assets should amount to at least 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 CBL Executive Management and Clearstream Risk Management. Treasury Middle Office monitors daily limit observances and routinely reports breaches to CBL Executive Management and Clearstream Risk Management.

A variety of stress tests are used as the 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 analysing whether enough liquidity sources are available to cover those needs within a certain time frame. The design of a stress test scenario is such that the assumptions are extreme, but plausible. The stress tests are calculated and reported regularly by Risk Management. Where the liquidity stress tests result in breaches, Clearstream Risk Management (CRM) will report to CBL's Risk Committee and the Executive Board of Clearstream Banking S.A. Jointly with CRM, Treasury will review and adjust its contingency plan, and/or funding plan, and inform the Executive Board of CBL. CRM and Treasury will evaluate and adjust the adequacy of its liquidity risk management framework and liquidity providers per the results and analysis of the stress tests.

Following CSSF Circular 09/403, Clearstream has formulated its Clearstream Banking Treasury Liquidity Management Policy, approved by the Executive Boards of Clearstream Banking S.A. and Clearstream Banking AG. The liquidity parameters stated in the liquidity policy are reviewed every quarter.

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 CBL Executive Management within the annual update for approval.

Day-to-day implementation of the liquidity management strategy is the responsibility of the Head of Treasury, reporting to the member of the CBL Executive Board responsible for Treasury.

10.2 Strategy

For Clearstream, the target for 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 because of their securities settlement activities.

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

- 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 maintain 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.

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 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.

10.3 Objectives

For CBL the target for liquidity management is the ability to

- Manage CBL's varying cash position because of customer and own activity with the aim of having sufficient liquidity available in all currencies for a timely provision of domestic and cross-border settlement and payment services as they fall due, including liquidity management of cross-currency exposure where relevant;
- Keep intraday cash balances with nostro banks within the boundaries set by the liquidity risk tolerance and established concentration limits; and
- Have in place measures to deal with unexpected disruptions to its cash flows.

This is ensured by a permanent measurement, monitoring and control of the expected and actual cash flows.

Meet payment obligations

Customers maintain cash balances with CBL 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.

10.4 Measurement

As defined in the Clearstream Bank Treasury Liquidity Management Policy, liquidity usage and sources are shared between CBL and CBF, whilst prudent concentration limits ensure that inter-company liquidity exposures are contained within approved limits.

To ensure that Clearstream has its liquidity risk (including intraday) under control, Treasury permanently measures and monitors the expected and actual cash flows mainly stemming from cash and securities settlement activities for each currency and agent.

To ensure that there is sufficient liquidity (including intraday) to honour its liquidity management objective, Clearstream has ex ante liquidity risk mitigating measures⁹ in place. Ex post, Clearstream verifies that all obligations have been met and all buffer and ratio requirements comply as described in the policies.

Clearstream also performs the following types of stress tests, which are explained in detail in [11.6 Stress tests](#):

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

Regulatory liquidity ratio

For Clearstream Banking S.A., regulatory ratios have been defined by national law. Reporting duties are monthly. The minimum ratio for CBL is 100%.

⁹ Amongst others, permanent liquidity buffers, overdraft facilities with Clearstream's cash correspondent banks, prioritisation of payment obligations, committed facilities, ECP programme, intraday procedures to anticipate potential intraday liquidity shortfalls, etc.

CBL needs to hold a liquidity buffer of high-quality liquid assets (HQLA) to cover the net cash outflows in stressed conditions over thirty days. The HQLA at CBL consist of cash held with central banks, own securities and securities received in reverse repo transactions. For the last three months of 2019, CBL had an average LCR of 118.73%.

	Total unweighted value (average) Q4	Total unweighted value (average) Q3	Total unweighted value (average) Q2	Total unweighted value (average) Q1
High quality liquid assets				
Total HQLA				
Cash outflows				
Retail deposits and deposits from small business customers, of which:				
Stable deposits	0	0	0	0
Less stable deposits	0	0	0	0
Unsecured wholesale funding, of which:	14,439,829	15,937,534	18,197,166	16,158,029
Operational deposits (all counterparties) and deposits in networks of cooperative banks	0	0	0	0
Non-operational deposits (all counterparties)	14,397,848	15,868,960	18,081,460	16,059,147
Unsecured debt	41,981	68,574	115,706	98,882
Secured wholesale funding				
Additional requirements, of which:	120,847	121,372	121,275	124,648
Outflows related to derivative exposures and other collateral requirements	71,397	71,482	72,381	76,312
Outflows related to loss of funding on debt products	0	0	0	0
Credit and liquidity facilities	49,450	49,890	48,894	48,336
Other contractual funding obligations	132,790	123,164	122,507	87,917
Other contingent funding obligations	575,599	1,083,970	855,103	900,570
TOTAL CASH OUTFLOWS				
Cash inflows				
Secured lending (e.g. reverse repos)	62,123,349	54,310,733	46,272,591	44,636,096
Inflows from fully performing exposures	1,178,955	1,994,186	2,761,327	1,813,127
Other cash inflows	326,195	259,366	57,879	58,022
TOTAL CASH INFLOWS	63,628,499	56,564,285	49,091,797	46,507,245
Total HQLA				
Total net cash outflows				
Liquidity Coverage Ratio (%)				

Table 37 A - Liquidity Coverage Ratio (LCR)

	Total weighted value (average)Q4	Total weighted value (average)Q3	Total weighted value (average)Q2	Total weighted value (average)Q1
High quality liquid assets				
Total HQLA	14,493,357	15,176,126	16,775,216	15,873,742
Cash outflows				
Retail deposits and deposits from small business customers, of which:	0	0	0	0
Stable deposits	0	0	0	0
Less stable deposits	0	0	0	0
Unsecured wholesale funding, of which:	13,388,657	14,686,819	16,484,015	14,556,358
Operational deposits (all counterparties) and deposits in networks of cooperative banks	0	0	0	0
Non-operational deposits (all counterparties)	13,346,676	14,618,245	16,368,309	14,457,476
Unsecured debt	41,981	68,574	115,706	98,882
Secured wholesale funding	91,509	25,604	14,153	5,273
Additional requirements, of which:	76,342	76,471	77,270	81,146
Outflows related to derivative exposures and other collateral requirements	71,397	71,482	72,381	76,312
Outflows related to loss of funding on debt products	0	0	0	0
Credit and liquidity facilities	4,945	4,989	4,889	4,834
Other contractual funding obligations	107,894	93,995	96,009	60,495
Other contingent funding obligations	0	0	0	0
TOTAL CASH OUTFLOWS	13,664,402	14,882,889	16,671,447	14,703,273
Cash inflows				
Secured lending (e.g. reverse repos)	182,686	208,978	183,720	85,923
Inflows from fully performing exposures	1,173,828	1,987,952	2,757,097	1,801,584
Other cash inflows	101,239	89,346	57,879	58,022
TOTAL CASH INFLOWS	1,457,753	2,286,276	2,998,696	1,945,529
Total adjusted value	Total adjusted value			
Total HQLA	14,493,357	15,176,126	16,775,216	15,873,742
Total net cash outflows	12,206,649	12,596,613	13,672,751	12,757,743
Liquidity Coverage Ratio (%)	118.73%	120.48%	122.69%	124.42%

Table 38 B - Liquidity Coverage Ratio (LCR)

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

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 this is permitted again by the liquidity risk exposure.

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 monitored daily by the Treasury Middle Office, an independent unit, and reported monthly to CBL Executive Management, Risk Management, and the Head of Treasury. The ratio is the responsibility of the Head of Treasury, who acts as the secondary controlling body. No breach of the liquidity ratio occurred in 2019.

As at 31 December 2019, the internal liquidity ratio I was as follows:

Currencies	Ratio	Limits
EUR + USD	113%	>50%
EUR	165%	>50%
USD	77%	>60%
GBP	97%	>90%
AUD	98%	>90%
JPY	100%	>90%

Table 39 - Internal liquidity ratio I

Internal liquidity ratio II (liquidity sources/customer credit usage)

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

During 2019, the ratios were comfortably above the limits set in the Clearstream Banking Treasury Liquidity Management Policy. The internal ratios II on 31 December 2019 were reported as follows:

Currencies	Ratio	Limits
EUR + USD	596%	>200%
EUR	533%	>100%
USD	540%	>100%

Table 40 - Internal liquidity ratio II

10.5 Liquidity risk mitigation

Liquidity management guidelines are defined in the Clearstream Liquidity Management Policy. The objective of liquidity management is to ensure 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) because of their securities settlement activities.

To meet its objective, Clearstream Banking S.A. 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.

During 2019, the liquidity buffer was comfortably above the limits and targets as set in the Clearstream Banking Treasury Liquidity Management Policy.

As at 31 December 2019, the liquidity buffer was reported as follows:

Currency	Actual buffer (in EUR '000,000)	Minimum required liquidity buffer (in EUR '000,000)	Target liquidity buffer (in EUR '000,000)	Liquidity recovery option indicator (amber)	Liquidity recovery option indicator (red)
EUR	6,537	1,700	4,000	4,000	1,700
USD	4,321	1,000	1,900	1,900	1,000
GBP	560	200	250	250	200

Table 41 - Liquidity buffer

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

- A network of cash correspondent banks and depositories to support the funding requirements for CBL's settlement operations in more than 40 currencies via uncommitted, unsecured overdraft lines;
- A broad range of money market counterparties for both secured and unsecured funding;
- A variety of committed liquidity facilities (can be drawn in multiple currencies);
- Multi-currency revolving credit facility (including a swing line for intraday credit drawing right);
- A multi-currency Euro Commercial paper programme (can be drawn in EUR, USD and GBP);
- By pledging eligible securities with their respective central banks, CBL and CBF are granted credit lines and can participate in the regular tender operations conducted by the BCL and in the ECB's marginal lending facility in a contingency scenario;
- Procedures of prioritisation of payment obligations;
- Intraday procedures and tools to anticipate and forecast potential intraday liquidity shortfalls;
- Escalation and contingency funding procedures.

To ensure that the overall risk exposure related to treasury investment activity remains within acceptable concentration limits, Group Credit as per the Credit Policy allocates credit limits for all approved investments for each counterparty and at the corresponding counterparty Group level.

Also, to avoid excessive intraday cash concentration on its cash correspondent network intraday, overnight cash concentration limits are set and constantly monitored. Intraday overstepping of cash concentration limits results in alerts to Treasury, which is responsible for day-to-day liquidity management, and requires immediate action to reduce the current cash concentration.

Treasury ensures diversification of liquidity sources by arranging multiple types of committed funding arrangements and ensuring a minimum number of liquidity providers for each main currency. Treasury Back Office controls the concentration of liquidity providers via daily reporting and reports breaches to the CBL Executive Board.

10.6 Stress tests

Clearstream uses scenario analysis as part of its regular stress testing as per CSSF Circular 09/403, which requires 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.

Clearstream Risk Management handles the liquidity stress tests process. The stress test framework includes clearly defined objectives, well-designed scenarios tailored to Clearstream's liquidity risk strategy, well-documented assumptions, informative management reports, ongoing and effective reviews of the stress testing process, and recommended actions based on stress test results. The general scope of these tests is to determine whether Clearstream has sufficient liquidity to meet various types of future liquidity demands under stressful conditions.

Clearstream Risk Management performs two daily liquidity stress tests, three quarterly classical liquidity stress tests and three quarterly reverse stress tests considering idiosyncratic, market disruption and combined scenarios.

Scenarios for the overnight liquidity

Clearstream has defined three classical scenarios to stress liquidity risk quarterly:

Scenario 1 – base scenario/quarterly

The base scenario considers 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 the past five years, Clearstream can manage expected outflows in cash balances for all currencies.

Scenario 2 – market disruption scenario/quarterly

The market disruption scenario considers a disruption in the macroeconomic 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:

Despite the reduced availability of funding sources, Clearstream can fund short positions in most currencies. Remaining short balances can be covered through FX swaps.

Scenario 3 – market disruptions and idiosyncratic scenario/quarterly

The market disruption/idiosyncratic scenario considers a disruption in the macroeconomic 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:

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. 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 – cover 2

The cover 2 scenario simulates the default of the two customers with the largest intraday liquidity exposure, including their parent enterprises and subsidiaries, as well as a market disruption and a downgrade of CBL's external credit rating.

Scenario 4 result:

In this scenario, the results show that Clearstream could generate sufficient liquidity. In most cases, Clearstream had a liquidity surplus or could generate sufficient liquidity using FX swaps.

Scenario 5 – cover 1 + CSD-banking service provider

The cover 1 + CSD-banking provider scenario simulates the default of the customer with the largest intraday liquidity exposure including its parent enterprises and subsidiaries, the default of a major service provider of Clearstream, a market disruption and a downgrade of CBL's external rating.

Scenario 5 results:

In this scenario, test results show that Clearstream could generate sufficient liquidity. In most cases, Clearstream had a liquidity surplus or could generate sufficient liquidity using FX swaps.

Please note that liquidity stress tests are currently under review to comply with CSDR.

10.7 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 Paper Programme;
- BCL tender participation in EUR and USD;
- Repurchase agreements and committed repo funding lines (can be drawn in multiple currencies);
- Foreign exchange swaps and committed foreign exchange swap facilities (can be drawn in multiple currencies);
- Revolving credit facility (can be drawn in EUR and USD).

10.8 Permanently available liquidity

Permanently available liquidity consists of the own funds of all Clearstream entities managed by Clearstream Banking Treasury and the stable part of 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 permanently 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 permanently available liquidity must be sufficient to cover all long-term investments.

At year-end 2019, the own funds amounted to EUR 1.396 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 the EUR equivalent of 12.573 billion. Together with own funds, the sum of permanently available liquidity is the EUR equivalent of 14.891 billion, which is sufficient to cover the size of all term investments, which is the EUR equivalent of 4.125 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 the EUR equivalent of 12.382 billion. Together with own funds, the sum of permanently available liquidity is the EUR equivalent of 14.590 billion, which is sufficient to cover the size of long-term investments, which is the EUR equivalent of 1.229 billion.

10.9 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 a customer's default);
 - Liquidation/buy-in of securities for Clearstream Treasury repo transactions;
 - Sale and repo out of proprietary fixed coupon and/or FRN portfolio
 - Intra-Group funding;
- Other actions:
 - Cancellation of customer UCF/TOF lines;
 - Flagging income and redemption proceeds "Upon Receipt of Funds" (URF);
 - Timed payments/prioritised payments.

Clearstream Risk Management is responsible for the timely reporting of liquidity stress tests results to CRO of Clearstream, Head of Treasury, Head of Group Credit, and the respective boards and committees based on the outcome. If any breaches occur, Treasury, Credit, Product, Risk and the responsible Risk Committee evaluate the result of the liquidity stress tests and agree on subsequent mitigating actions, including adjustments to the liquidity framework and updates of the contingency liquidity funding plan if needed.

10.10 Monitoring and reporting

CBL's liquidity risk exposure and breaches of limits are controlled and reported daily by Treasury Middle Office. Treasury Middle Office reports any limit excesses occurring within Treasury activity to CBL Executive Management.

11. Market risk

Required information concerning market risk is laid out in paragraph 4.13 of the EBA Guidelines on disclosure requirements under Part Eight of Regulation (EU) No. 575/2013, specifying the requirements provided following Art. 445 and Art. 455 CRR.

11.1 Governance

As per Clearstream Banking Treasury Investment Policy, Clearstream is not involved in proprietary trading activities and does not maintain a trading book. Within Treasury, market risks arise as currency risk in net positions in foreign currencies. It also arises as an interest-rate risk in the banking book, particularly from money market activities (mostly secured) and investments in securities as part of investment or short-term portfolios that are purchased with the intention to “buy and hold”. The Clearstream Banking Treasury Investment Policy defines the limits set for money market activities and securities purchase transactions.

Clearstream’s general structure, organisation and process of risk management and its risk strategy are described in [3. Risk management overview](#).

The Clearstream Banking Treasury Investment Policy sets the framework for hedging future currency risk and interest income. It includes the approved hedging instruments and the delegation of power for hedging interest income and foreign exchange risk. For Deutsche Börse Group, the level of materiality of future currency risk is expressed as 10% of the budget year’s consolidated EBITDA to be hedged for each 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 regularly. The Treasury Investment Policy defines limits and responsibilities.

11.2 Measurement

Besides the overall risk appetite calculated via VaR, interest rate risk is calculated on all positions under Treasury management, applying a predefined parallel shift on the yield curve. Interest rate risk on all positions under Treasury management is computed daily 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 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 regularly controlled.

Foreign exchange risk is controlled using a limit system. Since 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 the budget year’s consolidated EBITDA to be hedged for each currency exposure. The effectiveness of potential foreign exchange risk hedges is measured and the credit rating of the trade counterparties is regularly controlled.

Since Clearstream Banking S.A. calculates its market risk exposure for regulatory purposes according to the standardised approach, it is required to disclose its capital requirements according to point 127 of the EBA Guidelines in conjunction with Art. 445 CRR. However, as previously mentioned, CBL does not maintain a trading book. Hence, CBL's only risk exposure – which is addressed in this chapter – is the foreign exchange risk in the banking book. Also, the FX risk net exposure subject to capital charge does not exceed the threshold of 2% of own funds as per Art. 351 CRR. Thus, the required table would only be filled with zeros and would not provide any additional value to the reader. Hence CBL decided not to disclose it. Instead, CBL provides information on the open currency position as per Art. 351 and 352 CRR in the following table:

	ALL POSITIONS		NET POSITIONS		Positions subject to capital charge			Total risk exposure amount	Own fund requirements
	LONG	SHORT	LONG	SHORT	LONG	SHORT	MATCHED		
Reporting currency and currencies closely correlated	7,657,770	6,094,526	1,563,244	0	0	0	0	0	0
All other currencies (including CIUs)	10,907,339	10,931,318	675	24,654	0	24,654	0	1,972	1,972
Gold	0	0	0	0	0	0	0	0	0

Table 42 - Open currency positions

11.3 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, the expected foreign exchange exposure resulting from CBL's budgeted USD-based net interest income (NII) was hedged against a change in foreign exchange rate.

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

11.4 Monitoring and reporting

The Treasury Middle Office performs market risk control. Treasury Middle Office is responsible for monitoring compliance with limits and issues monthly reports to the relevant executive management and Group Risk Monitoring. Treasury Middle Office monitors exposures against limits daily and immediately reports excesses to executive management, Group Risk Monitoring and Treasury. This function is independent of the Treasury Front Office, which controls liquidity and executes transactions (liquidity management function).

11.5 Specific disclosures per market risk type

11.5.1 Foreign exchange risk

Clearstream Banking S.A. transacts settlement and custody services business in more than 40 different currencies.

Customers maintain cash and securities accounts with CBL in those currencies in which they transact their business. Amounts in currency transmitted to CBL by customers are registered in 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 custody payments).

Debits and credits of all customers in the same currency are held by CBL at its cash correspondent banks (CCBs). Clearstream Banking AG's net customer positions are centrally reflected in CBL's overall position. Treasury analyses balances for each 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, concerning multi-currency settlement, CBL bears no material currency risk.

A limited amount of local currency is held at CBL representative offices in each location to cover expenses. Also, 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 services to its customers. To remain within the approved limits set in the Clearstream Banking Treasury Investment Policy, foreign exchange risk resulting from the execution of customer foreign exchange requests is covered daily in the foreign exchange market. Treasury Middle Office monitors residual foreign exchange positions against approved limits on a daily basis and reports to senior management in case of limit violations. In 2019, no limit violations were reported.

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 Clearstream Banking 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. The Treasury Middle Office unit (hierarchically independent from Treasury) controls the reporting and reports any overstepping of the limit to the Executive Board. No overstepping was reported in 2019.

Forward foreign exchange transactions may be undertaken in anticipation of expected future exposures in foreign currencies to hedge the expected foreign exchange exposure resulting from CBL's budgeted USD based net interest income (NII). In 2019, an amount of USD 120 million was hedged since a material part of the net interest was denominated in USD.

11.5.2 Interest rate risk in the banking book

Customer liquidity of Clearstream Banking S.A. is placed and refinanced primarily through overnight secured reverse repos and placings with Banque Centrale du Luxembourg in EUR currency and overnight foreign exchange swaps. In addition, CBL primarily purchases highly liquid and low-risk-weighted investments for capital ratio purposes. The investment portfolio of CBL aims 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:

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

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

Clearstream's assets and liabilities are managed to contain interest rate risk (IRR) within limits established by the Clearstream Banking 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 Clearstream Banking 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 the IRR and the concepts 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 of less than one year and otherwise a 2% interest rate change.

	31 December 2019				31 December 2018			
	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)	1,228,613	2,500,000	26,977	72,000	1,526,807	2,500,000	26,639	92,000
CBL MM portfolio	3,898,606	7,300,000	11,936	24,000	3,036,605	7,300,000	4,319	26,000

Table 43 - Limits for CBL in line with Treasury Policy

Based on CSSF requirements¹⁰, Clearstream also calculates the IRRBB 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.

¹⁰ <http://www.cssf.lu/en/supervision/banks/regulation/circulars/info/article/1719/>

<u>Interest Rate Risk - Banking Book (IRRBB) as per circular CSSF 16/642 as of</u> Clearstream Banking S.A., Luxembourg	31 Dec 2019		
	Currency	Scenario result	Scenario as percentage of own funds
Base EVE (in EUR equivalent)	EUR	1,465,058,681	-
(a) Standard shock: +200bps shift up	EUR	-18,822,193	-1.35%
(b) Standard shock: -200bps shift down	EUR	20,164,725	1.44%
(c) Scenario 1: Parallel shift up	EUR	-19,167,387	-1.37%
(d) Scenario 2: Parallel shift down	EUR	20,164,725	1.44%
(e) Scenario 3: Steepened curve	EUR	13,273,173	0.95%
(f) Scenario 4: Flattened curve	EUR	-15,382,492	-1.10%
(g) Scenario 5: Short rate up	EUR	-21,576,575	-1.55%
(h) Scenario 6: Short rate down	EUR	12,546,526	0.90%
Eligible own funds (source: Finance - December 2019)	EUR	1,396,197,076	
(a) IRRBB standard shock (+200bps) as percentage of own funds			-1.35%
(b) IRRBB standard shock (-200bps) as percentage of own funds			1.44%
Early warning trigger			15%
Threshold set by CSSF			20%
Weighted Average Maturity in days			
Assets			36
Liabilities			20

Table 44 - Interest rate risk in the banking book – Clearstream Banking S.A.

12. Remuneration

The Remuneration Policy (“Policy”) is a central element for the implementation of the remuneration systems within the organisation. It is composed in particular according to Regulation (EU) No. 575/2013 (“CRR”), Directive 2013/36/EU (“CRD IV”), the EBA Guidelines 2015/22 on sound remuneration policies, Law of 5 April 1993 on the financial section (as amended) (“Luxembourg Law”), and related CSSF circulars. The Policy is regularly reviewed to ensure compliance with the latest regulations; the last review took place in February 2019.

As the CRR disclosure requirements are fulfilled in the Remuneration Policy and annual Group Remuneration Report, this report only provides a summary of the key points and features of the Policy. For more detailed information, interested persons can refer to the Clearstream Remuneration Policy¹¹ or the Clearstream Group Remuneration Report¹².

12.1 Governance

The Executive Board of Clearstream Holding AG as a superordinate company according to the German Banking Act (KWG) is responsible for the implementation of a Clearstream Group-wide policy. The Clearstream Group remuneration system including remuneration schemes and the respective Terms & Conditions of instruments, which apply to the respective categories of staff, is implemented according to a cascading process from Clearstream Holding AG at Group level down to entity level of inter alia Clearstream Banking S.A., especially taking into account the regulatory requirements of Luxembourg.

Within Clearstream Banking S.A., the supervisory board decides on the remuneration system for the members of the Executive Board. The Executive Board decides on the remuneration system of all employee groups except for members of the supervisory board and members of the Executive Board.

The remuneration system has been elaborated in cooperation with the Clearstream Group’s relevant control units (i.e. Risk Management, Compliance, Internal Audit, Human Resources and the Group Compensation Officer, in the following “Compensation Officer” and Deputy Group Compensation Officer, in the following “Deputy Compensation Officer”), taking into account Luxembourg specificities. Within the Group, the competent functions of the consolidating institution and subsidiaries, including CBL, are supposed to interact and exchange information as appropriate.

Clearstream Banking S.A. has set up a Remuneration Committee on a solo entity basis. It is set up by the Supervisory Board of Clearstream Banking S.A. This Remuneration Committee (“CBLRC”) is responsible for advising the supervisory board on the Policy. The CBLRC deals with remuneration-related matters within Clearstream Banking S.A. and directly oversees the remuneration of the officers in charge of the internal control units in accordance with the regulatory requirements. Further details regarding to the CBLRC, in particular its composition and tasks/responsibilities, are stipulated in the Clearstream Banking S.A. Supervisory Board Internal Rules & Regulations.

¹¹<https://www.clearstream.com/resource/blob/1318802/cd5840704d2d00b540db7c7f80817085/clearstream-group-remuneration-policy-ch-cbf-data.pdf>

¹² <https://www.clearstream.com/clearstream-en/about-clearstream/regulation-1-/remuneration-information/from-2014-onwards/from-2014-onwards-1278076>

12.2 Remuneration systems

Members of the Executive Board, risk takers and other employees (including staff employed in risk management, compliance and internal control, internal audit and technology functions) shall receive fixed and variable remuneration. The fixed remuneration shall be a substantial proportion of the total annual remuneration. The variable remuneration is aligned with the rules of the Remuneration Policy and is not guaranteed.

Fixed remuneration consists of basic fixed remuneration and other fixed remuneration as classified by regulatory requirements (such as payments mandatory for employees in the collective agreement).

Variable remuneration is remuneration such as discretionary performance bonus or payments in instruments (as long-term sustainable instruments, stock bonus plan) and should reflect:

- Sustainable and risk adjusted performance, as well as
- Performance in excess of that required to fulfil the employee's job description as part of the terms of employment.

The remuneration shall be designed such that incentives for incurring disproportionately high-risk positions are avoided. There should not be a significant dependency on variable remuneration.

12.2.1 Appropriateness of remuneration

The remuneration shall be designed appropriately. This means that:

- 1) The remuneration shall not incentivise the assumption of disproportionately high risks;
- 2) The remuneration shall be commensurate with the respective tasks and the performance as well as the situation of the Group and the respective entity and shall not exceed the usual remuneration without cause;
- 3) Guidelines for variable remuneration shall take due account of possible mismatches of performance and risk periods. Payments of variable remuneration shall be deferred as appropriate. Variable remuneration is not guaranteed, i.e. all variable remuneration is based on a performance measurement and can be zero;
- 4) There shall be an appropriate ratio between the fixed and the variable remuneration. The variable remuneration may amount up to a maximum of 100% of the fixed remuneration. In case national regulatory requirements allow the shareholders, owners or members of the institution to approve a ratio of 1:2 between the Fixed and Variable Remuneration components; the Variable Remuneration may amount up to a maximum of 200% of the Fixed Remuneration.
- 5) Guaranteed variable remuneration is exceptional and is only allowed in connection with the hiring of new staff, is limited to a maximum period of one year and subject to appropriate equity and liquid resources as well as sufficient capital in order to ensure the Company's Risk-Bearing Capacity;
- 6) As a rule, the Company shall not provide discretionary pension benefits. The terms of the Group's pension scheme include pension benefits that are not based on performance and that are consistently granted to a category of staff;

- 7) In general, severance payments are variable remuneration. Payments in connection with premature termination shall take due account of the performance over time and shall not reward falling short of performance expectations or misconduct following art. 38-6(h) Luxembourg Law;
- 8) Payments made as compensation for forfeited remuneration in previous service and/or employment relationships shall be in line with the long-term interests of the Group and its respective companies and take into account individual performance and the deferral requirements stipulated in the respective remuneration scheme as applicable from time to time in case the beneficiary is identified as a risk taker or is a member of the Executive Board;
- 9) The remuneration of risk takers and other employees in control units shall be designed with respect to their function;
- 10) In the case of overlapping regulatory requirements on remuneration on the national implementation level, the stricter requirements shall be applied;

Avoidance of conflicts of interest

Conflicts of interest with relevance for remuneration can arise in situations in which the interests of one party interfere with (or appear to interfere with) the interests of another party, impairing its ability to act fairly and ethically. The Company is subject to a framework aimed at preventing and dealing with conflicts of interest. All employees have to respect the related "Policy on Conflicts of Interest" at all times.

In order to avoid or to mitigate potential or actual conflicts of interest, the Company shall ensure the implementation of the following mitigating measures (non-exhaustive):

- A sufficient level of transparency (e.g. information on relevant parameters of the remuneration systems in the respective service contracts, terms and conditions of instruments, bonus letters),
- A sufficient level of objectivity, e.g.
 - review of target achievements in performance panels,
 - the use of qualitative and quantitative targets,
- Technical support of remuneration related processes, e.g.
 - usage of control steps via merit tools, e.g. budget approval and reading rights of bonus proposals of line managers above,
 - implementation of check-boxes for regulatory requirements on target setting in the appraisal system,
 - calculation of bonus amounts and check of compliance with remuneration rules (e.g. bonus cap or maximum amounts) via merit tool,
- Involvement of neutral third person/party, e.g.
 - Compensation Officer involvement in the determination of the final bonus amounts,
 - Remuneration Advisory Board involvement regarding the design and implementation of the remuneration systems,
 - Remuneration Committee involvement (where relevant) with regard to the assessment of the appropriateness of the remuneration systems, derivation of the total amount of variable remuneration, monitoring the remuneration of the officer in charge of control units, especially Risk Management and Compliance as well as risk takers,

- Four-eyes principle during the operation of the bonus process.

12.2.2 Total amount of variable remuneration

The variable remuneration must not limit the Group's or CBL's ability to sustainably maintain or recover an appropriate capital base. If the Group's or CBL's ability to sustainably maintain or recover an appropriate suitable capital base is limited, no variable remuneration is to be granted.

The total amount of the variable remuneration shall be determined in a formal, transparent and comprehensible process. Representatives of the relevant control units (for the determination of the bonus pool, performance criteria and remuneration awards) shall be involved within their scope of duties.

The total amount of the variable remuneration is based on a combination of the assessment of the performance of the overall result of the Group as well as individual targets including the area of responsibility. Details are stipulated in the respective remuneration scheme and the documentation of the determination of the total amount of variable remuneration.

12.2.3 Individual performance

In case individual performance is determined, this shall be based on the achievement of a mix of quantitative/financial and qualitative/non-financial agreed targets, which shall be challenging and ambitious. Targets shall be consistent with the business and risk strategies, corporate values, risk appetite, long-term interests, as well as the cost of capital and the liquidity of the Group/Company.

The full amount of variable remuneration is subject to an ex ante risk adjustment in case of negative performance contributions, breach of duty and unconscionable conduct; it can be reduced to zero before the bonus award is made. The reduction shall not be compensated by positive performance contributions.

The performance of members of the Executive Board, risk takers and other employees is measured annually and documented and tracked in the respective appraisal systems. The performance assessment is executed by the respective line manager or, for members of the Executive Board, by the supervisory board.

The individual performance measurement is ensured through the respective appraisal systems.

12.3 Rules on remuneration systems for members of the Executive Board, risk takers and employees in charge of a control unit

12.3.1 Risk analysis

Clearstream Banking S.A. shall conduct an annual risk analysis to identify categories of staff whose professional activities have a material impact on the institution's risk profile ("risk takers") and to whom specific requirements apply according to the respective regulatory specifications, unless exemptions apply.

Staff members are deemed to be identified as risk takers particularly if one of the criteria below is met. The qualitative and appropriate quantitative criteria on the identification of risk takers are set out in Regulation (EU) No. 604/2014 and Commission Delegated Regulation (EU) 2016/861 of 18 February 2016, e.g.:

- Member of the Executive Board or supervisory board,
- Member of the senior management,
- Staff responsible and accountable to the management body for control activities of the independent risk management function, compliance function or internal audit function,
- Staff heading or having managerial responsibility for a material business unit,
- Staff leading a (control) function responsible for legal affairs, finance including taxation and budgeting, human resources, remuneration policy, information technology or economic analysis,
- Staff identified via quantitative criteria, e.g. staff with remuneration exceeding criteria set out by regulation and deemed to have a material impact on the institution's risk profile.

12.3.2 Criteria in determining variable remuneration

The variable remuneration shall consider the overall performance of the Clearstream Group and, respectively, the institution, the performance of the areas of responsibility and individual performance contributions, with each measurement level generally equally weighted. The allocation of the variable remuneration components within the Company shall also consider all types of current and future risks. When assessing individual performance, financial and non-financial criteria are considered. Further, the assessment of the performance is set in a multi-year framework. The criteria for determining the variable remuneration shall be consistent with the objective of long-term sustainable performance. Details are stipulated in the remuneration scheme.

12.3.3 Deferral of variable remuneration

The pay-out schedules shall be sensitive to the time horizon of risks. In particular in case variable remuneration is paid, due account shall be taken of possible mismatches of performance and risk periods, and it shall be ensured that payments are deferred as appropriate. At least 40% or, respectively, 60% (depending on the category of risk taker or in case of a variable remuneration of a high amount) of the variable remuneration component shall be deferred over a period that is no less than three to five years. Remuneration payable shall vest no faster than on a pro rata basis. Further, a substantial portion – at least 50% – of any variable remuneration shall be in shares or equivalent share-linked instruments. Instruments shall be applied to both the deferred and non-deferred (upfront) portion of variable remuneration. Before vesting, there is only an entitlement to an accurate determination of the respective part of the variable remuneration. Details, in particular the pay-out schedule, are stipulated in the remuneration scheme and the terms and conditions of instruments, in each case as applicable from time to time. Exemption limits in line with regulatory requirements of the Company and the Group may apply. As there could be cases where the activity of one staff member, given the individual's job function or individual risk assessment, may have a higher material impact on the institution's risk profile, even though the remuneration is not material, the exemption limit shall not be applied automatically and generally. This neutralisation on the level of the individual relates to the pay-out of parts of variable remuneration in instruments, the deferral of parts of the variable remuneration and the ex-post incorporation of risk (malus and clawback); it also takes into consideration the individual's job function.

12.3.4 Link to the Group's long-term performance

At least 50% of the deferred and non-deferred parts of the variable remuneration shall be linked to the Group's long-term performance. For this purpose, the corresponding parts of the variable remuneration shall be granted in the form of Deutsche Börse AG share-based remuneration (instruments). Exemption limits in accordance with regulatory requirements of the Company and the Group may apply.

Appendix A – Abbreviations used in this document

ABS	Asset-Backed Security
AG	Aktiengesellschaft (German: stock company)
A-IRB	Advanced Internal Rating Based Approach
AMA	Advanced Measurement Approach
ASL	Automated Securities Lending Programme
AV	Availability
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
BRRD	Banking Recovery and Resolution Directive
CAM	Control Assurance & Monitoring
CBJ	Clearstream banking Japan Ltd.
CBL	Clearstream Banking S.A.
CBLRC	Clearstream Banking S.A. Remuneration Committee
CCB	Cash Correspondent Bank
CCF	Credit Conversion Factor
CCP	Central Counterparty
CCR	Counterparty Credit Risk
CDO	Collateralised Debt Obligation
CEM	Current Exposure Method
CEO	Chief Executive Officer
CET 1	Common Equity Tier 1
CGSS	Clearstream Global Securities Services Ltd.
CH	Clearstream Holding AG
CLN	Credit-Linked Note
CLO	Credit-linked Obligation
CLS	Continuous Linked Settlement
CMBS	Commercial Mortgage-Backed Security
COP	Clearstream Operations Prague s.r.o.
CRD IV	Capital Requirements Directive IV
CRD V	Capital Requirements Directive V
CRD VI	Capital Requirements Directive VI
CRM	Clearstream Risk Management
CRO	Chief Risk Officer
CRR	Capital Requirements Regulation
CRR II	Capital Requirements Regulation II
CRR III	Capital Requirements Regulation III
CS	Clearstream Services S.A.
CSA	Credit Support Annex
CSD	Central Securities Depository
CSDR	Central Securities Depository Regulation
CSSF	Commission de Surveillance du Secteur Financier
CVA	Credit Valuation Adjustment

DBAG	Deutsche Börse AG
EaR	Earnings at Risk
EBA	European Banking Authority
EBITDA	Earnings before Interest, Tax, Depreciation, and Amortization
ECAI	External Credit Assessment Institution
ECB	European Central Bank
ECL	Expected Credit Loss
ECON	European Parliament's Economic & Monetary Affairs Committee
EC	European Commission
ECP	Euro Commercial Paper
EEA	European Economic Area
EMIR	European Market Infrastructure Regulation
ESMA	European Securities and Markets Authority
EU	European Union
F-IRB	Foundation Internal Rating Based Approach
FRN	Floating Rate Note
FRTB	Fundamental Review of the Trading Book
FSB	Financial Stability Board
FX	Foreign Exchange
GMRA	Global Master Repurchase Agreement
G-SIB	Global Systemically Important Bank
G-SII	Global Systemically Important Institution
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
IMM	Internal Model Method
IRR	Interest Rate Risk
IRRBB	Interest Rate Risk in the Banking Book
KRI	Key Risk Indicators
KWG	Kreditwesengesetz (German Banking Act)
LCR	Liquidity Coverage Ratio
LGD	Loss Given Default
LOBP	Legal Offences and Business Practices
LSI	Less Significant Institution
Ltd.	Limited
MAS	Monetary Authority of Singapore
MBS	Mortgage-Backed Security
MEIP	Minimum Export Insurance Premiums
MREL	Minimum Requirement for own funds and Eligible Liabilities
NII	Net Interest Income
NPV	Net Present Value
NSFR	Net Stable Funding Ratio
OECD	Organisation for Economic Cooperation and Development
OpRisk	Operational Risk
O-SIB	Other Systemically Important Bank

O-SII	Other Systemically Important Institution
OTC	Over-the-Counter
P2G	Pillar II Capital Guidance
PA	Damage to Physical Assets
PD	Probability of Default
PROFIL	Fédération des Professionnels du Secteur Financier
RBC	Risk-Bearing Capacity
REC	Required Economic Capital
RI	Risk Indicator
RMBS	Residential Mortgage-Backed Securities
RTS	Regulatory Technical Standards
RWA	Risk-Weighted Assets
S&P	Standard & Poor's
S.A.	Société Anonyme
SA	Standardised Approach
SD	Service Deficiency
SFT	Securities Financing Transactions
SI	Significant Institution
SREP	Supervisory Review and Evaluation Process
SRM-R	Single Resolution Mechanism-Regulation
SRP	Supervisory Review Process
SSM	Single Supervisory Mechanism
SSS	Securities Settlement System
STP	Straight-Through Processing
TLAC	Total Loss Absorbing Capacity
TOF	Technical Overdraft Facility
UCF	Unconfirmed Funds Facility
URF	Upon Receipt of Funds
VaR	Value at Risk

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