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TECHNICAL NOTE ON SUPERVISION AND OVERSIGHT OF FINANCIAL MARKET INFRASTRUCTURES

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TECHNICAL NOTE

SUPERVISION AND OVERSIGHT OF FINANCIAL MARKET INFRASTRUCTURES

Prepared By
Monetary and Capital Markets Department, IMF

This Technical Note was prepared in the context of a joint IMF-World Bank Financial Sector Assessment Program (FSAP) mission in Brazil during November 2017 led by Jodi Scarlata, IMF and Mariano Cortes, World Bank, and overseen by the Monetary and Capital Markets Department. IMF, and the Finance and Private Sector Development Vice Presidency, World Bank. The note contains the technical analysis and detailed information underpinning the FSAP assessment's findings and recommendations. Further information on the FSAP program can be found at http://www.imf.org/external/np/fsap/fssa.aspx

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Glossary

B3	B3 S.A. - Brasil, Bolsa, Balcão (formerly BM&FBOVESPA S.A.)
BCB	*Banco Central do Brasil* (Central Bank of Brazil)
BCP	Business Continuity Plan
CCP	Central Counterparty
CETIP	*Central de Custódia e de Liquidação Financeira de Títulos*
CIP	*Câmara Interbancária de Pagamentos*
CMN	*Conselho Monetário Nacional* (National Monetary Council)
COMPE	*Centralizadora da Compensação de Cheques* (Cheques Clearinghouse)
CORE	Close-out risk evaluation
CPMI	Committee on Payments and Market Infrastructures
CPSS	Committee on Payment and Settlement Systems
CSD	Central Securities Depository
CSP	Critical Service Provider
CVM	*Comissão de Valores Mobiliários* (Brazilian Securities Commission)
DVP	Delivery Versus Payment
EFT	Electronic Fund Transfer
ESMA	European Securities and Markets Authority
FMI	Financial Market Infrastructure
FSAP	Financial Sector Assessment Program
IMF	International Monetary Fund
IOSCO	International Organization of Securities Commissions
ISIN	International Securities Identification Number
IT	Information Technology
MOU	Memorandum of Understanding
MoF	Ministry of Finance
NPS	National Payments System
OTC	Over-the-Counter
PFMI	CPSS-IOSCO Principles for Financial Market Infrastructures
PS	Payment system
RSFN	*Rede do Sistema Financeiro Nacional* (National Financial System Network)
RTGS	Real-Time Gross Settlement
SELIC	*Sistema Especial de Liquidação e de Custódia*
SILOC	*Sistema de Liquidação Diferida deOrdens de Crédito Interbancárias*
SITRAF	*Sistema de Transferência de Fundos*
SPB	*Sistema de Pagamentos Brasileiro* (Brazilian Payments System)
SSS	Securities Settlement System

STN	*Secretaria do Tesouro Nacional* (National Treasure Secretariat)
STR	*Sistema de Transferência de Reservas* (Brazilian RTGS system)
TEC	Special Credit Transfer
TR	Trade Repository

EXECUTIVE SUMMARY[1]

Brazilian FMIs are among the top twenty worldwide. All together there are sixteen financial market infrastructures[2] (FMIs) operating in the Brazilian payment system (SPB), out of which nine[3] are systemically important and four belong to the top twenty FMIs in the world[4]. FMIs play an essential role in the Brazilian financial system and are highly relevant in terms of domestic financial stability. In terms of value of transactions, STR (Reserves Transfer System - Sistema de Transferência de Reservas), the Brazilian Real Time Gross Settlement system (RTGS) is the backbone of the SPB, and belongs to the top ten large value payment systems worldwide. SELIC is among the top ten central securities depository/securities settlement systems (CSD/SSSs), CETIP among the top twenty SSSs, and BM&FBOVESPA Clearinghouse, the largest central counterparty (CCP) in Latin America, belongs to the top ten. These infrastructures facilitate the clearing, settlement, and recording of monetary and other financial transactions, such as payments, securities, and derivatives contracts (including derivatives contracts for commodities). Brazilian post-trading services are integrated. The entities providing securities settlement services also provide other post-trade processing, acting both as a clearing house, and a CSD or as a trade repository (TR).

The main objective of this note is to assess the supervision and oversight of FMIs by relevant authorities in Brazil with a focus on the main CCP. Effective supervision and oversight is a critical factor in ensuring that FMIs operate in a safe and sound manner, and that there is market confidence that FMIs will be able to continue to offer their critical services. The note also analyzes elements of the risk management framework of BM&FBOVESPA Clearinghouse, and how it complies with the Committee on Payments and Market Infrastructures-International Organization of Securities Commissions (CPMI-IOSCO) principles for FMIs, the PFMI. While safe and efficient FMIs contribute to maintaining and promoting financial stability, FMIs also concentrate risk, mainly CCPs, who take on credit and liquidity risks as part of their clearing and settlement service. But CCPs have also the potential to reduce significantly risks to participants through the netting of trades and by imposing more-effective risk controls on all participants. Hence CCPs also can reduce systemic risk in the markets they serve. The effectiveness of a CCP's risk controls and the adequacy of its financial resources are critical to achieving these risk reduction benefits.

FMIs are subject to appropriate and effective supervision and oversight by the Banco Central do Brasil (Central Bank of Brazil -BCB) and the Comissão de Valores Mobiliários (Brazilian Securities Commission—CVM), in compliance with the CPSS-IOSCO Principles for Financial Market

[1] This Technical Note has been prepared by Marguerite Zauberman (IMF expert). The analysis was based on publicly available information, self-assessments, authorities' assessments and other background documentation provided by the Brazilian authorities and B3, as well as discussions with the authorities, B3 and other institutions. Marguerite Zauberman is grateful to the staff of the BCB, the CVM, and B3 and for the comments and guidance they provided.

[2] In this note, FMIs cover payment systems, securities settlement systems, central securities depositories, central counterparties and trade repositories.

[3] Policy Statement Number 30,516, March 14th, 2017 on systems operating in the Brazilian Payments System.

[4] CPMI—Statistics on payment, clearing and settlement systems in the CPMI countries—Figures for 2016–Oct. 2017

Infrastructures (PFMI). FMIs' oversight by the BCB seeks to "maintain the soundness, efficiency, and proper functioning of the National Financial System and of the infrastructure of the financial market", thereby contributing to enhanced financial stability, while the objective of CVM's supervision is to ensure the "efficient and regular functioning of the stock and over-the-counter (OTC) markets, ensure the observance of fair trade practices in the securities market" thereby also contributing to financial stability through market integrity and investor protection in Brazil.

However, some adjustments are recommended. CVM should disclose it has adopted the PFMI, its specific objectives for the supervision of FMIs, and consider producing a supervisory report disclosing its supervisory findings. The BCB should establish separate escalation and reporting lines to the Board of Governors as operator and as overseer of the public-sector owned RTGS, and ensure publication of disclosure frameworks by all systemically important FMIs.

There is evidence that the authorities' supervision and oversight have been effective in enhancing risk management practices at Brazilian FMIs although there is still room for improvement. Significant risk management enhancements have been implemented since the last 2012 FSAP. They range from the definition by BM&FBOVESPA Clearinghouse of critical processes and risk appetite, the introduction of a skin-in-the-game contribution for the CCPs in their default waterfall, the adoption of a new and more efficient risk management model; to the identification of interdependencies between the FMIs operating in the market and the critical service providers, that represent a risk to the business continuity of the entire system. In several areas where risks are identified, authorities should continue to foster action to remedy deficiencies in a timely manner, including for risks resulting from interdependencies, for cyber resilience, for mitigating the risks in case of severe outages at STR, and assessing critical service providers.

The BCB should set an action plan and a schedule with B3, the legal entity operating BM&FBOVESPA Clearinghouse, for finalizing a robust and effective recovery plan, which is still at an early stage, in consistency with CPMI–IOSCO Guidance. The plan should envisage various extreme stress scenarios, whether default or non-default related, while aiming at continuing to ensure critical services and mitigating contagion risks through participants, with the appropriate recovery tools all backed by agreements with relevant decision makers. Ensuring the right conditions for recovery measures to succeed is a key policy objective for CCPs, as their failure is considered to be potentially highly disruptive for the wider financial system.

There is currently no specific regulation in Brazil for orderly resolving a CCP although the authorities are working on a draft resolution bill. For the unlikely situations in which the existing risk management framework and recovery plans of CCPs prove to be insufficient to maintain the continued operation of the FMI, a resolution regime consistent with FSB guidance aiming to safeguard financial stability, ensuring the continuity of critical functions and preventing contagion to counterparties and other market participants is required. The authorities should follow the evolution of the draft resolution bill and subsequent regulation to ensure it takes into account the FMIs specificities, allows for market participant to measure and manage their risks when exposed to the CCP, is compliant with the Key Attributes for an Effective Resolution Regime, and introduces no provision to hinder the indirect access by the CCP to ELA via the conglomerate's bank.

Table 1. Brazil: Main Recommendations

Recommendations	Time[1]
Supervision and Oversight of FMIs	
BCB should require all systemically important FMIs to publish qualitative disclosures in compliance with Principle 23 of PFMI and for CCPs with Public quantitative disclosure standards for central counterparties	ST
CVM should disclose it has adopted the PFMI, its specific objectives for the supervision of FMIs, and consider producing a supervisory report disclosing its findings	ST
BCB should establish separate escalation and reporting lines to the Board of Governors as operator and as overseer of STR	NT
The authorities should follow the evolution of the draft resolution bill and follow up regulation in order to ensure it is appropriate for FMIs, compliant with the FSB Key Attributes for an Effective Resolution Regime and it does not hinder indirect access by CCPs to emergency liquidity assistance (CMN, BCB, CVM)	MT
The BCB should ensure the implementation of action plans resulting from the interdependencies mapping among FMIs and critical service providers.	ST
The authorities should continue fostering the implementation of the CPMI IOSCO Guidance on cyber resilience for FMIs in their supervision and oversight plan (BCB, CVM).	ST
BCB should continue enhancing its oversight framework regarding the Assessment Methodology for the Oversight Expectations of critical service providers to FMIs (Annex F to the PFMI).	ST
BCB should remain diligent on timeframes for operators of FMIs to implement corrective action plans to address identified deficiencies	ST
The authorities should clarify and document how they would coordinate during a (non-resolution) crisis and consider the possibility of establishing a joint crisis management plan.	NT

Table 1. Brazil: Main Recommendations (concluded)

Risk management of B3	
B3 should finalize its Recovery Plan. This should include ensuring continuity of critical services, and comprehensive recovery tools while avoiding contagion to market participants	ST
BM&FBOVESPA Clearinghouse should analyze its model performance and overall margin coverage by conducting sensitivity analysis on its margin model coverage at least monthly	ST
In the stress scenarios for measuring its liquidity risk, including but not limited to the default of the participant and its affiliates that would generate the largest aggregate liquidity obligation, BM&FBOVESPA Clearinghouse should take into account the default of affiliates of the participant who are not customers of this participant	ST
BM&FBOVESPA Clearinghouse should develop dialogue regarding how to implement the transfer of positions in case a large broker and/or clearing member defaults and involve its participants and their customers in the testing and review of its default procedures at least annually	ST
B3 should consider acquiring the ability of testing the upgrades in the application softwares for their data centers regularly in the secondary data centers after implementation in the main data center	NT
B3 should continue enhancing its cyber risk management framework in compliance with the June 2016 CPMI IOSCO Guidance on cyber resilience for FMIs	ST
B3 should continue developing and implementing the action plans resulting from the mapping of interdependencies among itself and other FMIs and critical service providers	ST

[1]"Short-term" is within one year; "near-term" is one to three years; "medium-term" is three to five years.

INTRODUCTION

1. Well-functioning FMIs are crucial for the continued operation of the financial system. FMIs facilitate the clearing and settlement of monetary and other financial transactions, including payments, securities and derivatives contracts. However, FMIs concentrate risks and so, if not properly managed, may be the source of systemic financial shocks, particularly during times of market stress. Recognizing the increasing systemic importance of FMIs, international standard setters have over recent years set more stringent regulatory requirements for these institutions.

2. Recommendations in this note are based on the internationally agreed standards for FMIs, the CPMI-IOSCO Principles for Financial Market Infrastructures (PFMI) which were introduced in 2012. The analysis of the supervision and oversight of FMIs takes the five Responsibilities for authorities of the PFMI as reference (Box 1) and Annex F outlining five oversight expectations for critical service providers, while the analysis of BM&FBOVESPA Clearinghouse is based on relevant Principles in the PFMI. This note is not a comprehensive assessment of BM&FBOVESPA Clearinghouse against the Principles, but focuses on selected issues and risks.

3. The safety and stability of FMIs in Brazil and the oversight[5] and supervision by the Brazilian authorities have also been analyzed in other work. CPMI and IOSCO have assessed the adoption of the PFMI and the Responsibilities by authorities in several jurisdictions, including Brazil. The results of this work are summarized in Appendix I. The 2012 FSAP of Brazil also addressed oversight and supervision of FMIs[6]. These previous assessments have been taken into account where relevant. Because the integrated nature of the Brazilian financial system has recently been reinforced, and significant work at the international level has been going on in relation with the resilience of FMIs and CCPs in particular, this analysis provides an update to the assessment of the Brazilian framework.

[5] As defined in the CPSS report "Central Bank Oversight of Payment and Settlement Systems, "BIS, Basel, 2005, Oversight of payment and settlement system is a central bank function whereby the objectives of safety and efficiency are promoted by monitoring existing and planned systems, assessing them against these objectives and, where necessary, inducing changes.'

[6] The 2013 FSAP assessment team performed detailed assessments with the PFMIs on the following 5 systems: i) Sistema de Transferencia de Reservas (STR), the funds Real Time Gross-Settlement System; ii) Central de Custódia e de Liquidação Financeira de Títulos (CETIP), an OTC clearinghouse for corporate bonds, securities issued by state-owned companies, derivatives and State and Municipal bonds; iii) Sistema Especial de Liquidação e de Custódia (SELIC), the Government central securities depository; iv) BM&FBOVESPA Derivativos, the stock exchange derivatives clearinghouse operating as a CCP; and v) BM&FBOVESPA Cambio, the foreign exchange clearinghouse operating as a CCP.

Box 1. PFMI Responsibility A—E

Responsibility A: Regulation, supervision, and oversight of FMIs
FMIs should be subject to appropriate and effective regulation, supervision, and oversight by a central bank, market regulator, or other relevant authority.

Responsibility B: Regulatory, supervisory, and oversight powers and resources
Central banks, market regulators, and other relevant authorities should have the powers and resources to carry out effectively their responsibilities in regulating, supervising, and overseeing FMIs.

Responsibility C: Disclosure of policies with respect to FMIs
Central banks, market regulators, and other relevant authorities should clearly define and disclose their regulatory, supervisory, and oversight policies with respect to FMIs.

Responsibility D: Application of the principles for FMIs
Central banks, market regulators, and other relevant authorities should adopt the CPSS-IOSCO Principles for financial market infrastructures and apply them consistently.

Responsibility E: Cooperation with other authorities
Central banks, market regulators, and other relevant authorities should cooperate with each other, both domestically and internationally, as appropriate, in promoting the safety and efficiency of FMIs.

Sources: CPSS[1] IOSCO Principles for Financial Market Infrastructures, April 2012.

[1] Committee on Payments and Settlements Systems (CPSS) has changed its name to Committee on Payments and Market Infrastructures (CPMI) in September 2014.

DESCRIPTION OF FINANCIAL MARKET INFRASTRUCTURES IN BRAZIL

A. Overview

4. **Among the sixteen FMIs located in Brazil, four systemically important ones belong to the top twenty FMIs in the world.** There are sixteen FMIs in Brazil whose nature and activities are presented in Appendix III, among which nine are qualified by the BCB as systemically important (see below). Appendix II shows the graphical landscape of Brazilian FMIs. The four FMIs which belong to the top twenty in the world are presented here and Key statistics on the value and volume of their activity is shown in Appendix V.

- The Sistema de Transferência de Reservas (STR) is an RTGS system operated by the BCB that constitutes the backbone of the Brazilian payment system (SPB)7.The funds transfers are settled by STR in the accounts held at BCB. STR settles transactions in the monetary, foreign exchange and capital markets between the financial institutions that hold accounts at BCB. In addition to

[7] Several other payments and settlement systems (large value, retail, securities settlement and foreign exchange) are connected to the STR through the *Rede do Sistema Financeiro Nacional* (RSFN – National Financial System Network) for funds settlement purposes. See graphical chart in Appendix II

these financial flows, the net positions of the clearing and settlement systems are settled through the STR.

- SELIC, Sistema Especial de Liquidação e de Custódia, the BCB-operated central securities depository (CSD) and securities settlement system (SSS), settles trades with government securities in real time8.

- In Brazil, the entities that provide securities settlement services usually also provide other post-trade processing, acting both as a clearing house, a CSD, or a trade repository (TR).

- CETIP, Central de Custódia e de Liquidação Financeira de Títulos, privately owned CSD/SSS and TR, records trades with OTC derivatives and private fixed income bonds, and is the CSD of corporate debt securities and some government securities. It has merged with BM&FBOVESPA which kept its CSD operation separate from the CCP operation.

5. BM&FBOVESPA Clearinghouse, the largest CCP in Latin America and one of the top 10 CCPs in the world, is one of the CCPs operated by B3. B3 (Brasil, Bolsa, Balcão) was established in March 2017 when the activities of BM&FBOVESPA were combined with the activities of CETIP through a merge. BM&FBOVESPA itself resulted from the merger of BM&F and BOVESPA in 2008. In the markets for exchange-traded products, B3 operates trading and post-trading (clearing and settlement) systems and services (PS) for equities, financial and commodity derivatives, bonds, federal government debt securities, spot currencies and agricultural commodities. For unlisted products traded bilaterally on the OTC market, such as financial instruments issued by banks and customized derivatives, B3 offers the infrastructure for registration of these trades by market participants. For post-trading services, B3 operates several FMIs: 2 CSDs, 4 SSSs, 3 CCPs, one PS and 4 TRs, which are operational departments under the same legal entity B3, some of which have been integrated.

6. BM&FBOVESPA has developed a post-trade integration project (IPN) to create an integrated clearinghouse. In August 28, 2017, the scope of BM&FBOVESPA Clearinghouse has been extended in migrating the equity and corporate fixed income markets into a new infrastructure integrated with the derivatives and commodities markets. Hence, BM&FBOVESPA Clearinghouse is responsible for clearing and settling practically all trades executed on the markets operated by B3. At the end of the project[9], when the two remaining CCPs, BM&FBOVESPA Cambio (FX) and BM&FBOVESPA Debt Securities Clearinghouse will be integrated, B3's clearing, settlement and CCP services will have a single set of rules, a single participant structure and register, unified processes for position allocation, clearing and control, a single settlement window, a single risk management system, a single collateral pool, and a single safeguard structure. The benefits for participants consists of better liquidity management, more efficient capital allocation, more efficient margin calculation, and lower operational risk.

[8] These securities can also be settled with multilateral netting through the BM&FBOVESPA Debt Securities Clearinghouse, although since June 2013, almost no trades were submitted to the Clearinghouse.

[9] Schedule not finally decided yet

7. Some specificities and general characteristics in the Brazilian framework deserve to be highlighted. Two long existing rules are structuring features for the Brazilian system: post-trade identification of the final beneficial owner is mandatory and enables a consolidated view of the position of each investor. OTC derivatives trades are only valid if registered. They may be with or without central counter-party. Other features are: almost all securities are dematerialized, and the trading, clearing and settlement systems are automated and STP (straight through processing) is widely used. The principle of delivery versus payment (DVP) is observed in all securities settlement systems. Dark pools and order internalization are not allowed which increases transparency on price formation.

B. Overview of the Supervisory and Oversight Framework

8. The authorities responsible for regulation, supervision and oversight of FMIs in Brazil are the National Monetary Council (CMN), Central Bank of Brazil (BCB) and the Brazilian Securities Commission (CVM).

- CMN is a policy committee composed of the Minister of Finance, the Minister of Planning, Budget & Management, and the Governor of the Central Bank. The CMN does not have supervisory powers—it issues general guidelines that apply to the entire financial services sector in Brazil with a focus of promoting the improvement of institutions and financial instruments to ensure higher efficiency of the national payments system.

- Under the CMN general regulation, with focus on the safety and the efficiency of the Brazilian Payment System (SPB) and the stability of the National Financial System, the BCB is empowered to regulate, authorize the functioning and oversee FMIs that involve settlement therefore payment systems (PS), SSS and CCPs. The competences of BCB related to oversight activities are related to risks and include approval of rules, approval of risk models, monitoring, on-site inspection, enforcement of corrective actions.

- Under CMN's regulation, CVM[10], has jurisdiction over market participants who deal with financial assets which are mentioned in the Securities Law 6385/76 for regulation and supervision as regards the integrity of the market and the investors' protection. The BCB and CVM have shared responsibilities over SSSs, CSDs and TRs. Regarding CCPs, because of the vertically integrated structure of B3, CVM is competent for the corporate governance at the company level in addition to its competence mentioned above, while the BCB is competent as regards the whole of PFMI including governance at the CCP level. The authorities are considering enhancing the legal framework through a comprehensive bill that clarifies the

[10] CVM must adhere to CMN's general guidelines and its regulations and interpretations may not conflict with CMN policy.

respective field of competence, of consolidating dispersed legislation and regulations regarding FMIs and of incorporating the internationally accepted classification of FMIs.

9. The regulation, supervision and oversight of the BCB and CVM are based on statutory law, CMN's Resolutions, BCB's Circulars and Policy statements, and CVM Instructions[11] (see Appendix VI). Coordination between BCB and the CVM is established at the policy level on the basis of mandatory consistency with CMN's Resolutions which serve as common guidelines for both authorities. At the operational level coordination is based on a memorandum of understanding (MoU). The MoU in place allows for information sharing and coordinated activities among the BCB and CVM, in order to supervise, regulate, oversee FMIs and avoid overlaps as well as gaps.

10. Organized securities markets, clearinghouses, CSDs and TRs are considered ancillary organs of CVM in performing market surveillance. They exercise the self-regulatory authority delegated to them to supervise the conduct of the intermediaries and other financial institutions that operate in their markets, as well as the transactions involving securities executed in these markets. Entities that manage organized securities markets must issue specific norms that regulate securities trading and registration in their markets, listed companies, as well as clearing, settlement and centralized custody. In B3's case, these norms are embodied mainly in its rulebooks, manuals and circulars after approval by the regulators. To assure the independence of the self-regulation function, on one hand, and segregation from operating activities, on the other, CVM Instruction 461/07 allows operators of organized markets to choose one of the following options:

- Creation of a specific self-regulation structure comprising a department of self-regulation, a chief regulatory officer and a self-regulation board, or
- Incorporation of a special-purpose vehicle, or
- Engagement of an independent third party

11. B3 chose to incorporate a special-purpose vehicle, BSM (see para 18), which performs the required self-regulation activities through on-site inspections and desk audits. In addition, it assesses all applicants to B3 based on BCB, CVM and B3 standards. BSM's independence from B3 is guaranteed, in accordance with CVM Instruction 461/07 Chapter IV, by administrative, financial and budget management autonomy and by an independent Board. The Board should have at least

[11] The regulatory framework for the financial and capital markets in Brazil is based on the following laws: Law 4595/64 – National Financial System Law; Law 4728/65—Financial and Capital Markets Law; Law 6385/76—Securities Law; Law 10214/01—SPB Law; Law 12810/13—CSD and TR Law. CMN was established by Law 4595/64 which defined BCB's responsibilities as regards financial institutions. BCB's competences have further been provided for in Law 10214 which is the main legal instrument that regulates the SPB and the entities operating PSs, CCPs, and SSSs, in Law 12810/13 as regards CSDs and TRs, CMN Resolution 2882, BCB's Circular 3057 and Circular 3743, and BCB's Policy Statement 25097 related to PFMI.
CVM's competence is established by Law 6385/76, CVM Instructions 461 modified by CVM Instruction 4454 for TRs; CVM Instruction 541 for CSD; CVM Instruction 505 for intermediaries.
Off note, government bonds are not included in the legal definition of securities (article 2 of the Securities Law – No. 6.385/76). Therefore, the Central Bank is responsible for regulation of the government debt market, including supervision of sales practices, business conduct and investor protection.

2/3 of independent members and no B3 employee or member. Presently, out of 12 members, 9 are independent. Board members are granted a 3 years fixed term. BSM has a full right of access to information and complete independence as regards the result of investigations.

ANALYSIS OF SUPERVISION AND OVERSIGHT

A. Regulation, Supervision and Transparency (Responsibilities A, C and D)

12. There are clear and publicly disclosed criteria governing which FMIs are subject to regulation and oversight by the BCB. Criteria for qualifying systemically important FMIs are based on BCB's Circular 3057. Following Article 8 of BCB's Circular 3057 (see Box 2), the settlement systems for financial assets, securities, derivatives and foreign exchange, are considered systemically important regardless of the transaction amounts or daily turnover. While systems for interbank funds transfer, and for other obligations are considered systemically important either if their daily turnover[12] is above 4 percent of the STR average turnover, or at BCB's discretion, the likelihood that a participant may default, in a deferred net settlement system, will cause risk to the SPB payments flow.

13. Based on these criteria, BCB published the Policy Statement 30516 that establishes which FMIs are qualified systemically important. In Brazil, there are two systemically important PSs[13], three CSDs/SSSs[14], three TRs/SSSs[15] and one SSS[16].There are three CCPs.[17,18] All of them have been identified to be subject to the PFMI.[19] Regarding the oversight of the systems that are not systemically important, the BCB statement provides that they are subject to oversight however the PFMI related to credit risk and liquidity risk do not apply.

[12] The daily turnover is calculated considering the thirty largest positions taken on the six months prior to the assessment date; the funds transfer through the STR where the sender and beneficiary are the same institutions are not considered in that calculation.

[13] The two PSs are: STR, BM&FBOVESPA FX.

[14] The three CSDs/SSSs are: SELIC, BM&FBOVESPA Central Security Depository (former Equities Clearinghouse) and CETIP

[15] The three TRs/SSSs are: BM&FBOVESPA Clearinghouse, CIP–C3 and CETIP.

[16] The SSS is BM&FBOVESPA Securities.

[17]B3 operates three CCPs: Equities and Derivatives which have been integrated, FX (Cambio) and Securities.

[18] Since August 2017.

[19] Note that FMIs operated by the central bank are not subject to some parts of some Principles as per the PFMI (ie Principle 2 on governance, Principle 4 on credit risk, Principle 5 on collateral, Principle 15 on general business risk, and Principle 18 on access and participation requirements).

Box 2. Criteria for Qualifying Systemically Important FMIs (BCB Circular 3057)

Article 8. *Banco Central do Brasil* considers systemically important*:*

I – the settlement systems for financial assets, securities, derivatives and foreign exchange, regardless of the transaction amounts or daily turnover;
II – systems for interbank funds transfer, and for other obligations not listed above, which fulfill one of the following criteria:

a) daily turnover above 4 percent of the STR average turnover;
b) at *Banco Central do Brasil* discretion, the likelihood that a participant may default, in a deferred net settlement system, will cause risk to the SPB payments flow.

Paragraph 1. Pursuant to the provisions of Letter (a), of Sub-Paragraph II, the daily turnover is calculated as follows*:*

I – considering the thirty largest positions taken on the six months prior to the assessment date;
II – the funds transfer through the STR where the sender and beneficiary are the same institutions are not considered in that calculation;

Paragraph 2. In the situations listed on Sub-paragraph II of the *caput*:

I – the assessment will be performed on a monthly basis; and
II – in case a system becomes systemically important, Banco Central do Brasil *will concede the system a six months period, initiating in the month following the assessment date, to promote the necessary amendments to comply with the new status;*

Paragraph 3. In the situation mentioned on Letter (a), Sub-paragraph II of the *caput*, the daily turnover will be estimated based on the expected turnover for the next two tax base semesters.

14. The FMIs for which CVM is competent concerning their regulation and supervision are defined in statutory laws and regulations. Following the merge between CETIP and B3, only one legal entity, B3, is subject to CVM's supervision and regulation, as the operator of a SSS, a CSD and a TR, all of which deal with securities covered by the Securities Law 6385.

15. The BCB discloses its policies and objectives for the oversight of FMIs. The BCB's policies and practices are disclosed in its Oversight report which has been published annually since 2013. The Report describes the BCB's role and the scope of SPB oversight, the last developments in Brazilian FMIs, the oversight activities undertaken over the year and the oversight policies regarding payment schemes and FMIs. Publication for 2016 is delayed given a change in format, the report being divided in two reports, one on policies which will only change when policies change, and one on the annual oversight activities and the evolutions in the SPB. BCB objectives as overseer and regulator of FMIs are also clearly disclosed on its website and in various public reports. "Oversight intends to foster soundness, efficiency and improvement of SPB, taking into account its importance to the soundness and normal functioning of the National Financial System.", hence contributing to maintain financial stability.

16. CVM should consider defining and disclosing specific objectives for the supervision of FMIs. CVM is responsible for the market functioning, conduct of market participants, and protection of investors and its policies are issued through Instructions and Legal Opinion.

17. The BCB has adopted the PFMI and applies them in the oversight of the FMIs. The BCB issued a policy statement (25,097) in January 2014 committing to apply the PFMI in the authorization process and in the oversight activities of FMIs. While systemically important FMIs must comply with all PFMI, non-systemically important FMIs are also subject to oversight against the PFMI but exempted from complying with the principles related to credit risk and liquidity risk. BCB conducts monitoring of operational risk indicators (availability index, number of failures and capacity utilization in real time settlement systems) and financial risk indicators for CCPs to verify whether resources required from participants and from the CCP, as calculated by the CCP's risk system, will be sufficient in case of participants defaulting. The BCB also performs each year on-site inspections which last up to a month (in 2015, SELIC, CETIP and BM&FBOVESPA among others) resulting in action plans for addressing identified gaps. These plans have schedules monitored by BCB although not always met (see below).

18. CVM requires any FMI subject to its competence to certify its compliance with the PFMI as a condition of their authorization. Through Instructions 461 modified by 544, and 541, CVM requires CSDs and TRs, in order to be authorized, to supply a document by which they certify that they comply with the PFMI. Supervision is executed through (i) cooperation with BCB (ii) review of reports by BSM[20], the B3 self-regulatory organization, (iii) through market surveillance for which CVM has agreements with Issuers Regulation Department (IRD), an independent department within B3, which supervise listed issuers and (iv) through reporting by the B3 compliance and internal control department. BSM's main responsibilities cover (i) the supervision of all trades performed and of all participants authorized to trade in B3's markets, (ii) following the Exchange and OTC activities, (iii) investigating misconducts in compliance with laws and regulations, and (iv)initiating, instructing and conducting administrative proceedings of a disciplinary nature. Both BSM and IRD have delegation from CVM and B3 (from BCB also in case of BSM) to notify warnings and apply sanctions (fines) to market participants[21], which they do effectively. Incidents that would affect the market players have to be reported to CVM. On particular topics, as regards for instance the IPN (integration of BM&FBOVESPA's post trading systems at B3) project which required both BCB and CVM's approval, there are more regular contacts and monitoring of the integration process. In addition, the Office of Market Surveillance receives the self-assessment reports from CETIP and BM&FBOVESPA against the PFMI. CVM should however disclose it has adopted the PFMI for its supervision and consider producing a supervisory report disclosing its supervisory findings regarding FMIs.

19. Systemically important FMIs are subject to appropriate and effective supervision and oversight although implementation of corrective actions should be accelerated. The BCB 2015 Brazilian Payment System Report states that BCB assesses payment and settlement systems it operates against the PFMI in the same way as other systemically important FMIs. This includes STR and SELIC which are owned, operated and overseen by the BCB. The PFMI requirements which are

[20] BSM has a staff of 130 people including 48 auditors who perform on-site inspections and desk-audits at all B3 participants, including clearing members and brokers. See para 10 describing BSM's independence from B3.

[21] But not to the beneficial owners (the power to do this lies with the regulators).

not applicable to FMIs operated by central banks, as published by the Bank for International Settlements, are not applied in the oversight of the systems operated by BCB. Where necessary, the BCB defines action plans to remedy any deficiencies. However, implementation of such measures should be accelerated. Several mitigation measures which have been identified following the 2012 FSAP to address problems which can have a systemic impact in the case of a severe disruption of STR and an analysis of the impact on the other FMIs of a severe outage at STR are still pending implementation. Some measures have a deadline until 2018 due to the need for adjustments to regulation, some are pending FMIs decision. Such timeframe especially when affecting the RTGS which is the backbone of the SPB should be shortened. The BCB should ensure that mitigation measures are implemented as soon as possible when deficiencies are identified. BCB's preferred enforcement tool is through persuasiveness (often referred to as "moral suasion"). Discussions with the system operator and participants play an important part in achieving oversight objectives. A central bank's persuasiveness in such discussions depends in the first instance on the strength of its monitoring and assessment.

20. The BCB as operator and overseer does not have in place separate reporting and escalation lines to the Board of Governors for addressing potential conflict of interest for STR. Within the BCB, the Department of Banking Operations and Payments System (Deban) is in charge of operating and overseeing STR[22]. Potential conflict of interest between the BCB's role as the operator of systems and its role as overseer is addressed through organizational separation of the two functions up to the level of the head of Deban in the case of STR (and up to the level of the Deputy Governor in the case of SELIC). Best practice for many Central banks[23] consists in separate reporting lines and escalation lines to the Deputy Governor for the operators and the overseers to address such case.

21. There is evidence that BCB's and CVM's oversight and supervision have been effective in improving risk management practices at Brazilian FMIs. Improvements in risk management frameworks and practices range from the creation in BM&FBOVESPA's corporate governance of advisory committees for the board and the CEO, the adoption of best practices in compliance and risk management with initiatives such as definition of critical processes and risk appetite, the improvements in information security management, the introduction in 2014 of a skin-in-the-game contribution for the CCPs in their default waterfall, the adoption of a new and more efficient risk management model[24]; to the establishment of a working group to identify the interdependencies between the FMIs operating in the market and the critical service providers that represent a risk to the business continuity of the whole system, continuous improvement of the company's information security structure in order to maintain its resilience, or the improvement in the

[22] Gemon is the division in charge of operating STR. Diesp and Dirog are the divisions which share the responsibility of overseeing STR. The head of Gemon reports to one deputy head of Deban. The heads of Diesp and Dirog report to another deputy head of Deban.

[23] Central banks oversight of payment and settlements systems

[24] CORE (Closeout Risk Evaluation)

management procedures of incidents which are registered with corrective actions monitored and learning lessons processes in place.

22. Nevertheless, there is still room for improvement in inducing compliance with the PFMI or in the implementation of corrective action plans. The BCB should require all systemically important FMIs, in particular, STR, SELIC, and CETIP, to publish a disclosure framework in compliance with key consideration 5 of Principle 23 of PFMI and for BM&FBOVESPA Cambio (FX) a quantitative disclosure in compliance with Public quantitative disclosure standards for central counterparties. For the second point, the BCB has initiated a working group led by B3 identifying the risks resulting from interdependencies between FMIs and critical service providers. The assessment of these risks and their impact on the SPB, and the action plans resulting from the assessment should be accelerated and should be integrated in the oversight framework of BCB.

23. Cyber risk has recently been recognized as a major threat. The authorities should continue fostering the implementation of the CPMI–IOSCO 2016 Guidance on cyber resilience for financial market infrastructures through their oversight and supervision of FMIs against the PFMI in addition to BCB's oversight division continuously evaluating the FMIs' information security framework. While the guidance is directly aimed at FMIs, it is important for FMIs to take on an active role in outreach to their participants, in particular the banks, and other relevant stakeholders to promote understanding and support of resilience objectives and their implementation. Given the extensive interconnections in the financial system, the cyber resilience of an FMI is in part dependent on that of interconnected FMIs, of service providers and not least of the participants. In this context, recently, the FMIs were requested to answer a survey which objective was to reveal their progress in meeting the provisions outlined in the Guidance. Also, the BCB intends to communicate on the Guidance through the FMI Forum it has created as a channel to communicate with stakeholders in FMIs, emphasizing with the market the importance of cyber resilience.

B. Powers and Resources (Responsibility B)

24. Both the BCB and CVM have powers to obtain information from the FMIs that are subject to their supervision and oversight. These powers are based in relevant laws (see Appendix VI). Both authorities are entitled to request information they believe necessary. FMIs are also required to provide their competent authorities with information regarding planned changes to their systems or operations, and other significant matters, as well as statistical information to BCB[25]. Any change on their internal rules related to risk and efficiency must be approved by the BCB, and other minor changes must be informed in order to be assessed. The same applies to CVM for the FMIs under their jurisdiction (SSS/CSD and TR). Both the BCB and CVM have authority to apply penalties if FMI refuses to give access to the requested information.

[25] Quantitative data are provided on daily and monthly basis. Qualitative data are provided regularly, through self-assessments. Examples of data: 1. Volume of transaction, 2. Value of transaction, 3. Settlement figures, 4. Operational availability, 5. Available resources regarding the General Business Risk

25. Both the BCB and CVM have the authority to induce change and enforce corrective action at supervised FMIs although implementation of changes may take time. Both authorities may issue specific regulation, consistent with CMN's general regulation, applicable to FMIs, and require changes in the authorization process and then in the approval process required for material changes in the systems, rules and operations. Perceived deficiencies with a specific FMI are discussed and notified through a letter of recommendations with action plans. Implementation of actions may take time and BCB should continue to encourage FMIs to improve timeframes for corrective action plans, especially recommendations to the FMIs following on-site inspection. Both BCB and CVM have stated that they have found this to be an effective mechanism for inducing change. Both may rely on moral suasion, but also have the power to impose FMIs sanctions or penalties[26] which they haven't used up to now for FMIs. As stated earlier, persuasiveness in such discussions depends in the first instance on the strength of the monitoring and assessment.

26. Resourcing of the FMI supervision and oversight functions within the BCB and CVM are adequate and kept under review although CVM could benefit from increased resources (staff) in particular if the market has new entrants. The Department of Banking operations and Payment Systems (DEBAN) at the BCB is in charge of the oversight of FMIs. Its staff comprises approximately 27 qualified persons. CVM is a much smaller entity in number of staff and budget. The Office of Market Surveillance employs approximately 12 qualified persons partially dedicated to FMI supervision in a total staff of 37. It should be noted that by law, part of the supervisory tasks is delegated to the self-regulatory organization of B3, BSM, and to IRD through agreements (see paragraph 17). Both the BCB and CVM state that their resources in personnel are adequate in number and in qualification and kept under review, as are their budgets. However, it seems that CVM may need increased staff if new FMIs enter the market.

C. Cooperation Among Authorities in Normal and Stressed Circumstances (Responsibility E)

Cooperation and Coordination in Oversight and Supervision

27. The cooperation between the BCB and CVM covers TRs, CSDs and SSSs that settle securities (other than government securities and corporate bonds issued by financial institutions). CMN has by law a coordination role in the common activities performed by the BCB and CVM. An MoU was also signed by the two authorities to formalize cooperation, to organize the consultation of the other agency for prior opinion on any regulation to be published which might affect the entities subject to its competence, and also covers exchange of information. Self-assessment reports produced by FMIs are shared by the two authorities. The Financial Stability Committee of the BCB, CVM, PREVIC (Superintendence of Complementary Pensions) and SUSEP (Superintendence

[26] Article 44 of Law 4,595/64 establishes the following types of sanctions which can be imposed by BCB: warning, fine, suspension of managers and directors and, in the case of crimes against the financial system, notification to prosecutor for criminal investigation. Article 11 of Law 6,385/76 establishes the sanctions which can be imposed by the CVM: warnings, fines, suspensions, temporary prohibition from performing activities under the competence of the CVM and, in case of crimes, notification to the Prosecutor for criminal investigation.

of private Insurances) participate in COREMEC (Committee for the Regulation and Supervision of Financial, Securities, Insurance, and Complementary Pensions) within the Ministry of Finance which has an advisory role and aims at promoting coordination among the four regulators.

28. BM&FBOVESPA Clearinghouse, the sole Brazilian CCP, is not a systemically important CCP in other jurisdictions. Thus, the BCB does not participate in any cross-border Crisis Management Group. Although the BCB has adopted a circular to regulate the recognition of a foreign CCP in Brazil, there has been no entrant in the market as of now and there are no links with foreign FMIs. There is therefore no cooperation required with foreign authorities. However, the BCB exchanges information related to foreign banks participating in B3 through 30 MoU agreements with their respective supervisory authorities. CVM has signed the IOSCO multilateral memorandum of understanding covering exchange of information among market regulators. Of note, BM&FBOVESPA's clearinghouses are recognized by the European Securities and Markets Authority (ESMA) and therefore classified as qualifying central counterparties (QCCP).

Crisis Management

29. No FMI-specific (non resolution) crisis management arrangements have yet been developed between the BCB and CVM describing supervisory or oversight responsibilities in case of market wide financial or operational crisis. Threats to financial stability are discussed and contingency plans defined at COREMEC. However, the authorities should develop a framework for coordination during a crisis which outlines primary responsibilities including FMIs and their stakeholders, decision trees, key people and contacts, etc., and consider the possibility of establishing a joint crisis management plan.

30. Ensuring the right conditions for recovery measures to succeed is a key policy objective for CCPs, as their failure is considered to be potentially highly disruptive for the wider financial system. B3 has in the rulebooks of BM&FBOVESPA Clearinghouse some tools similar to recovery tools. However, in consideration of the PFMI requirements and CPMI IOSCO guidance, the oversight framework should be further enhanced by requiring B3 to finalize a robust and effective recovery plan, which is still at an early stage, consistent with the PFMI, envisaging various extreme stress scenarios, whether the losses result from a default or a non-default event, while aiming at continuing to ensure critical services and mitigating contagion risks through participants. The plan should include the appropriate recovery tools all backed by the approval of relevant decisions makers and agreements of stakeholders, and subject to an explicit deadline.

31. There is currently no specific regulation in Brazil for orderly resolving a CCP although the authorities are working on a draft resolution bill. FMIs including CCPs are subject to the Bankruptcy Code (Law 11,101/05) in case of insolvency, which means neither the BCB, nor CVM are able to intervene. Based on the Key Attributes of Effective Resolution Regimes for Financial Institutions, BCB, CVM and the Private Insurance Superintendence (SUSEP) prepared a draft Resolution bill for financial institutions, FMIs, exchanges, insurance companies and pension funds. The BCB is the resolution authority but the BCB and CVM must cooperate when the FMI involves securities and derivative markets. By being granted the enforcement powers to place CCPs in resolution, authorities would be well placed to safeguard financial stability, ensure the continuity of critical functions and avoid contagion to counterparties and other market participants. In addition, if extreme circumstances in which the CCP's liquid resources turn out to be insufficient or unavailable materialize but the CCP is solvent, access to lender of last resort support may need to be considered, at the discretion of the Central Bank, in order to avoid spillover disturbances to the stability of the financial system. The BCB has the power to supply emergency liquidity assistance (ELA) to the BM&FBOVESPA Settlement Bank, a subsidiary of B3, the operator of the CCPs. A limited purpose bank with no commercial ancillary activity, it provides access to the BCB for immediate settlement of transactions involving government bonds pledged as collateral to B3. Emergency liquidity provision via such subsidiary bank can be a solid alternative to direct access by BM&FBOVESPA Clearinghouse to central bank liquidity in extreme circumstances provided (i) arrangements are in place to make sure that the central bank liquidity would be directed to the CCP in trouble via the bank (ii) the decision to grant the CCP ELA through the bank only lies with the discretionary power of the BCB.

32. An orderly resolution regime consistent with international guidance for CCPs should thus be introduced in the relevant legislation. The authorities should follow the evolution of the draft resolution bill and subsequent regulation in order to ensure it takes into account the FMIs specificities, allows for market participants to measure and manage their risks when exposed to the CCP, is compliant with the Key Attributes of Effective Resolution Regimes for Financial Institutions and introduces no provision to hinder the indirect access of the CCP to ELA via the conglomerate's bank.

D. Oversight Expectations Applicable to Critical Service Providers (CSP) (Annex F)

33. The BCB should continue enhancing its oversight framework regarding the Assessment Methodology for the Oversight Expectations of CSPs to FMIs (Annex F of the PFMI). The operational reliability of an FMI may be dependent on the continuous and adequate functioning of third-party service providers that are critical to an FMI's operations, such as information technology and messaging providers. Annex F outlines five oversight expectations that help ensure that the operations of a CSP are held to the same standards as the FMI would be if it provided the same: (i) ensuring strong risk identification and management; (ii) robust information security management; (iii) reliability and resilience of system; (iv) effective technology planning; and (v) strong communications with users. The BCB has the authority to establish such expectations for CSPs of FMIs based on Circular 3057, article 25[27]. Currently, the monitoring process of critical service providers is being conducted through principle 17 on operational risk. At this stage, the main critical service providers identified in the working group led by B3 on interdependencies and

[27] "Supervision may be extended to third parties if they carry out, at the discretion of the Central Bank of Brazil, important steps related to the final activities of the entities covered by the caput, a hypothesis in which the extension should be included in the contracts between them and third parties."

impact of unavailability of service, are for the CCP (i) other FMIs (the RTGS STR and the SSS/CSD SELIC), (ii) RTM (information technology supplier) and (iii) the Brazilian messaging system RSFN (see appendix II in the TN), mostly used instead of SWIFT in Brazil. With regard to the assessment methodology for the oversight expectations, the BCB has indicated that it plans to require FMIs to assess their critical service providers following the methodology and establish action plans to address eventual gaps.

ANALYSIS OF KEY ELEMENTS OF THE RISK MANAGEMENT FRAMEWORK OF BM&FBOVESPA CLEARINGHOUSE

34. CCPs have the potential to reduce significantly risks to participants through the netting of trades and by imposing more-effective risk controls on all participants. For example, CCPs typically require participants to provide collateral (in the form of initial margin and other financial resources) to cover current and potential future exposures. CCPs may also mutualize certain risks through devices such as default funds. However, CCPs also concentrate risks which can threaten their viability if not properly managed. Therefore, they should have strong and comprehensive risk management practices in compliance with the PFMI in order to prevent them to fail. Maintaining the continued provision of their critical services is particularly important where there is only one FMI providing those services. The analysis focuses on the financial risks which have been considered by CPMI-IOSCO in the guidance published on CCP resilience in July 2017 and the operational risk.

35. BM&FBOVESPA Clearinghouse is the main CCP operated by B3 who is the sole operator of CCPs in Brazil, and the largest in Latin America. Because of the vertically integrated structure of B3, which operates several other FMIs, corporate governance lies with the decision-making bodies of the legal entity B3 and has defined a risk management framework for all its activities including BM&FBOVESPA Clearinghouse. The order of the sections follows the order in the PFMI.

A. Governance and Corporate Structure

36. B3 is a vertically integrated multi-asset multi-market legal entity and listed company which operates BM&FBOVESPA. All the FMIs it operates are operational departments and not subsidiaries. There is therefore a spill-over risk in case one FMI fails. It uses the individual customer segregation model[28] for all stages of the trading, registration and post-trading cycles[29]. B3 is a public company listed on the Novo Mercado premium listing segment[30] with no single shareholder

[28] Law 9613 and CVM Instructions 301 and 505

[29] from participant registration, order insertion in the trading system, pre-trading risk control, registration of transactions in the TR, control of positions in clearinghouses, and balances in the CSD, risk and collateral management, to the treatment of default in CCPs and disclosure of information to participants and regulators.

[30] Segment for companies committed to the highest standards of corporate governance

or organized shareholder group having voting rights equivalent to more than 7 percent of the total number of shares (see Table 2 for ownership structure). It publishes quarterly reports. B3 has 6 subsidiaries: the BM&FBOVESPA Settlement Bank, created for facilitating the clearing and settlement of transactions, two local representative offices in the US and in UK, one inactive stock exchange in Rio, one civil society for social projects, and BSM, the not-for-profit association organized as a self-regulatory and market surveillance organization.

37. The Board of Directors oversees the FMIs' activities pursuing the objectives of safety, efficiency and transparency and explicitly support financial stability. These priorities are explicit in the presentation of B3 on its website[31]. The Board is composed of 11 members. Six are independent[32] members including the Chairman (it is a regulatory requirement) and the other five are shareholders representatives and/or are linked to market participants but not connected to controlling group or to management[33]. Their profile is available on B3's website. They are proposed by the nomination committee and are elected by the shareholder's meeting.

Table 2. Brazil: Ownership Structure

Ownership Structure

The table below shows the number of common shares held by B3's major shareholders. The Company does not have a direct and/or indirect controlling shareholder or group of controlling shareholders. (Last updated on 09/22/2017)

Shareholder	**Number of Common shares**	**% of shares outstanding Last**	**Last changed**
Capital World Investors	198,618,595	9.65%	4/4/2017
Funds managed by OppenheimerFunds, Inc.	133,741,768	6.50%	10/8/2015
Funds Managed by BlackRock, Inc.	92,434,646	4.49%	8/11/2015
Other	1,614,054,476	78.38%	8/31/2017
Treasury stock	20,289,005	0.98%	8/31/2017
Total	2,059,138,490	100.00%	-

Source: B3 website

38. The Board of Directors' duties and responsibilities are clearly established in the by-laws[34]. It is the Board's duty and authority to approve policies, define guidelines in pursuit of its

[31] The article 1 of the BM&FBOVESPA Clearinghouse rules state: "In performing its activities, the clearinghouse prioritizes the security, efficiency, integrity and maintenance of stability in the financial system."

[32] Independent means according to B3 by-laws (art. 22, §5): a) all of the independence standards established in the Novo Mercado Listing Rules and in CVM Ruling No. 461/07—Art. 25 & 26, cumulatively; and (b) not holding, and not having ties with any shareholder that holds, whether directly or indirectly, ownership interest in 7 percent or more of the issued and outstanding shares of stock, or voting stock of the Company.

[33] Due to the recent merger between BM&FBOVESPA and CETIP, B3 by-laws have been changed. Therefore, temporally the board is composed of 14 members, among which 8 are independent members.

[34] By-laws Articles 29-30

strategic objectives, key plans and targets, overall budgets, internal control framework, risk appetite and risk management framework, financial reporting and compliance. It nominates the directors in charge of executing the activities and supervises their performance. Corporate governance arrangements are documented in order to provide clear and direct lines of responsibility and accountability. The performance of the Board of Directors as a group is assessed yearly with the support of the Corporate Governance Committee. The performance of each individual member is assessed under the authority of the Chairman[35]. The Board is accountable to the shareholders meeting whose authority is clearly defined in the by-laws which are available on B3's website. Corporate governance documents are disclosed to its shareholders, competent authorities, participants and the general public through the website. The Board of Directors is assisted by advisory Committees[36] which have clearly defined activities in the by-laws.

39. B3 is managed by an Executive Board appointed by the Board of Directors in accordance with the by-laws[37]. The Executive Board is composed of six directors, one of whom is a President and five Vice-Presidents. Management compensation is aligned with the Company's performance and strategic objectives, and shareholders long term interests. There are 11 advisory committees to the Executive Board among which a corporate risk advisory committee, a credit risk technical committee, a business continuity committee and an information security management committee (Table 3).

40. The Board has established a Finance and Risk Committee to assess and monitor the risk framework. The Committee has presently 6 members, two of which are independent. Its duties[38] include to assess and monitor exposure to risks inherent in the different business activities of B3, with particular focus on structural and strategic risk management; to periodically make recommendations to the Board about guidelines related to the management of risks and propose specific limits; with regard to CCP Risk, to present to the Board periodic reports providing combined information regarding exposures to typical risk factors, the quality of collateral taken, and the outcomes of liquidity stress tests; and to monitor and analyze liquidity, cash flow, the indebtedness policy, and the capital structure. It has established two risk management frameworks, one for managing central counterparty risk and one for managing corporate risk.

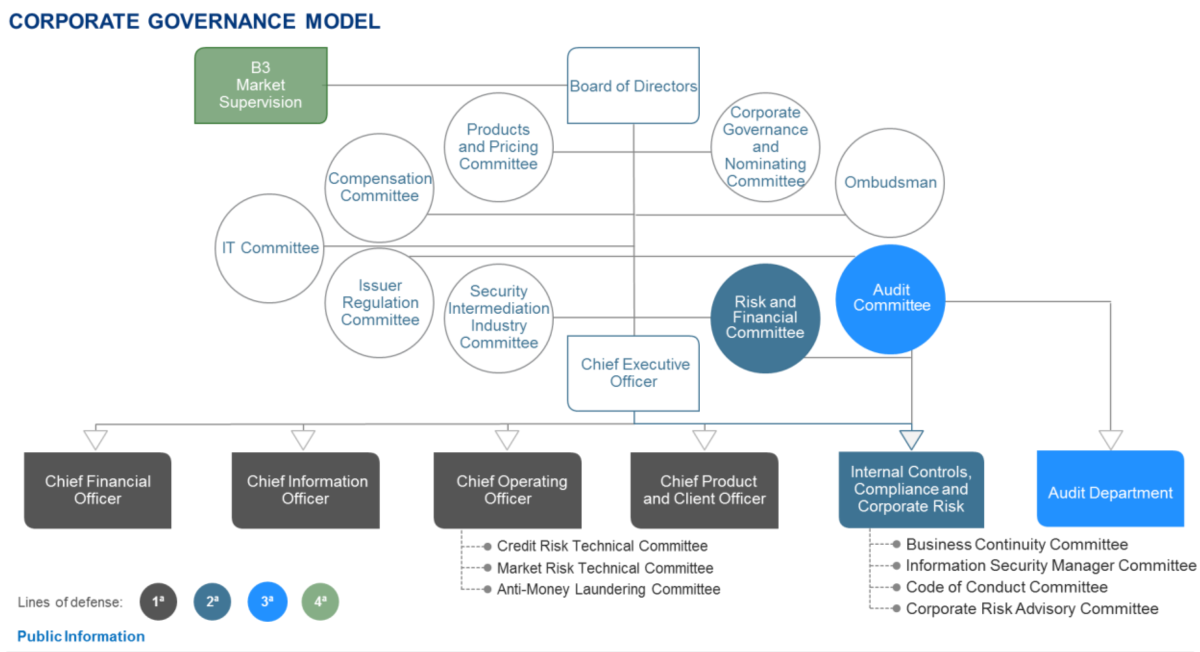
[35] By-laws Art 49 (f)

[36] The following committees are made mandatory in the by-laws (Article 45): Audit Committee; Nominations and Corporate Governance Committee; Intermediation Industry Committee (representing the financial intermediaries of all sizes and fields of activity); Pricing and Products Committee; Compensation Committee; Finance and Risk Committee; and FMIs Services Management Committees (one per FMI). Their responsibility and the requirements for becoming a Director are precisely defined. Three Committees have been additionally created: the integration committee, the IT Committee, and the issuer Regulation Committee.

[37] By-laws articles 36 and 37.

[38] By-laws article 53

Table 3. Brazil: Corporate Governance



Sources: BM&FBOVESPA PFMI Information Disclosure_March 2017

41. The Board has established a solid risk management and internal control structures and policies. The corporate risk methodology follows a top-down and bottom-up approach to identify, measure, control and mitigate the material risks inherent in B3's activities including BM&FBOVESPA. The approach is based on 4 principles which are shown in table 4 (lower image). It aligns risk management with the company's strategy and follows the risk appetite and the risk tolerance defined at the Board level. The corporate governance framework is structured along four lines of defense shown in table 4 (upper image):

- The Business Areas are mainly responsible for the management of business risks and internal controls. They report to the Risk Technical Committee and the Market Risk Committee of the Executive Committee, which must approve any change to the procedures, criteria, parameters or systems.

- The Internal Controls, Compliance and Corporate Risk Department (DCR) evaluates the conceptual soundness of the models used, analyses the outcomes, and monitors the processes (for financial risks, business continuity, etc.), reporting to the Risk and Financial Committee at Board level

- The Internal Audit Department performs an independent evaluation of the internal controls reporting to the Audit Committee. The external auditors review how the financial impact of risks are taken into account in the financial statements, and BCB approves the CCP rules and models.

These corporate governance arrangements enable the DCR, recently created with appropriate resources (staff), to have authority because their processes are audited by the Internal Audit Department (which reports to the Audit Committee) and independence through their direct access to the Risk and Financial Committee at the Board level.

42. The Board has defined a low appetite for CCP risk. The main risks associated with BM&FBOVESPA clearinghouse are credit, liquidity and market risks. The Board has defined low appetite for CCP risks, and that financial resources ("safeguard structure" in B3's terms) and qualified liquid resources should be sufficient to cover credit and liquidity risks under multiple stress scenarios (as required by the PFMI- see below) with a 99,96 percent market risk confidence level. Policies and procedures are described in the rulebooks and manuals available on B3's website. Any change to the rulebooks must be approved by the Board and by BCB.

43. The legal basis for clearing arrangements lies in Law 10214/01 and BCB Circular 3057. When the trade is entered through the exchange[39], it is contracted with the CCP as a counterparty (after control at pre-trade stage) and not with the buyer or the seller. So, the contract with the CCP occurs at the moment where the trade is accepted and registered. Hence the unconditional and irrevocable nature of settlement is achieved. The assets pledged as collateral to the CCP cannot be apprehended in case of default.

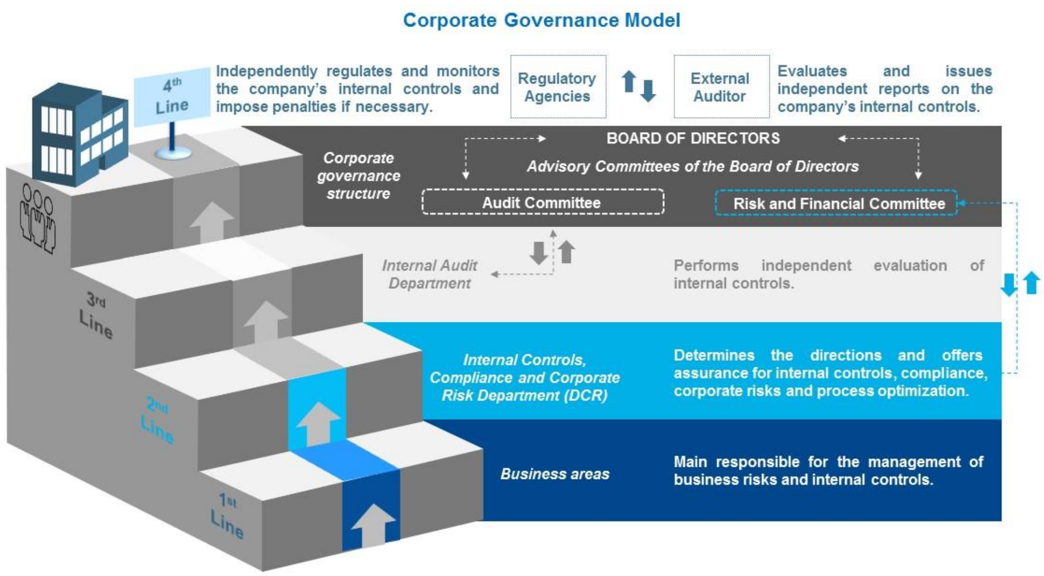
Mechanisms for Considering Stakeholder Interests

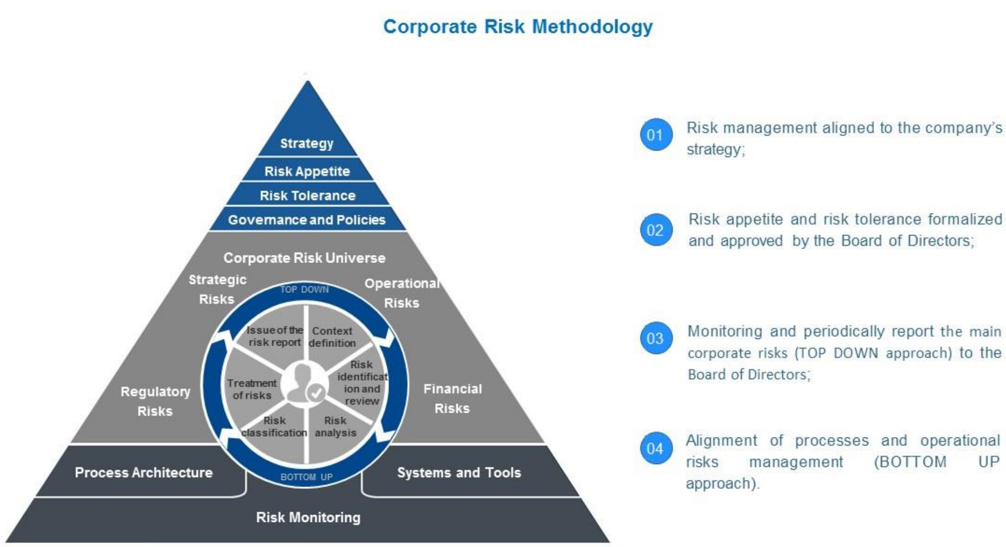
44. Transparency regarding BM&FBOVESPA Clearinghouse's operations is the basis of BM&FBOVESPA's relation with its stakeholders. In 2017 the CCP has published information in accordance with CPMI-IOSCO qualitative and quantitative disclosure requirements. It also makes other disclosures on its website including, among other things, a presentation on how margins are calculated, collateral is valued, information on individual limits and exposure to risks, risk factors, settlements, summaries of its default waterfall. The main decisions of the Board of directors are disclosed on B3's website, as well as the monthly reports for investors, the company's financial statements and annual report. BM&FBOVESPA Clearinghouse also provides a simulation system to allow margining for hypothetical portfolios based on the CORE methodology[40] it uses, offered to intermediaries and clearing members to assist them in their risk management activities, especially intraday risk monitoring.

[39] OTC transactions may be concluded bilaterally, outside of the exchange. All have to be registered for validity. Some can be sent for clearing to the CCP.

[40] CORE: Close-Out Risk Evaluation (see paragraph 40).

Table 4. Brazil: Corporate Risk Governance—Corporate Risk Model





Source: B3 presentation

45. While BM&FBOVESPA Clearinghouse holds open and constructive dialogue with stakeholders and takes their interests into account into its decision-making process, the dialogue could be further enhanced on default procedures and portability in case of broker's or clearing member's default. In addition to the committees to the Board and the CEO, several advisory committees were created as channels for B3's efforts to work more closely with the participants in its market (clearing members, brokers, investors, custody agents). They include risk advisory committees, products (commodities) and services committees (for instance post-trade committee). Proposed new risk management policies, and amendments to existing ones are discussed. Market participants can require changes which will be considered and evaluated. However, there has been limited dialogue on default procedures and portability. Given the number of customers for derivatives clearing, and the size and limited number of clearing members, this issue requires some advance consideration as it cannot be assumed that porting will be possible for all positions, in particular for those who are not in-the-money.

Model Testing and Validation

46. BM&FBOVESPA conducts model testing and validation. BM&FBOVESPA uses several models to quantify, aggregate and manage its risks regarding credit, margin, collateral and liquidity risks. Prior to implementing a model, the Internal Controls, Compliance and Corporate Risk Department (DCR) analyses logical aspects of the model, conceptual soundness, background theory; consistency between data characteristics and model assumptions, implementation issues, validation and monitoring accuracy, hypothesis testing and sensitivity to parameters. The validation process is independent of the development, implementation, and operation of the models to ensure an unbiased evaluation. DCR further analyses the outcomes through backtests reports, and monitors the processes, reporting to the Finance and Risk Committee at Board level. The models are subject to authorization by BCB. Daily back testing of initial margin and stress testing of pre-funded financial resources are performed to monitor the sufficiency of the overall financial resources.

47. Concerning the margining system CORE (see below), the Market Risk Technical Committee re-examines every fortnight or whenever deemed necessary the parameters of the margining methodology and credit stress test, such as the scenarios for risk factors, independently from the margin backtesting procedure. Liquidity stress testing following six scenarios and backtesting is performed daily while monthly tests are conducted to check the timely access to liquidity facilities. The scenarios for the liquidity stress test are being updated to adapt for the newly integrated clearinghouse. Some scenarios were reviewed monthly and some bi-annually. The results are reported to the Board.

B. Recovery and Wind-Down Planning

48. Ensuring the right conditions for recovery measures to succeed is a key policy objective for CCPs, as their failure is considered to be potentially highly disruptive for the wider financial system. A CCP's viability may be threatened by significant losses or liquidity shortfalls that may arise from the default of one or more participants, or in case of an extraordinary loss resulting from a non-default situation, for example, losses that could arise from financial impacts of operational risks such as terrorist attack, natural disaster, cyber-attacks; or potential litigation. BM&FBOVESPA has identified four scenarios which might constitute a threat to its business continuity and viability. B3 has in the rulebooks of BM&FBOVESPA Clearinghouse some tools similar to recovery tools, however they do not meet the requirements set in the guidance for recovery of FMIs in that they are not comprehensive and effective (in terms of reliability, timeliness and legal basis). BM&FBOVESPA should finalize a recovery plan, which is still at a very early stage, compliant with the PFMI, aiming at continuing to ensure critical services and mitigating contagion risks through participants, with the appropriate set of recovery tools all backed by agreements with relevant decision makers.

Table 5. Brazil: Default Waterfall

B3 other assets	
B3 dedicated cash position to the CCP	Stress test 2: CORE 99.99% + N largest customers
Non-defaulting CMs' contributions to default fund	
B3's contribution to default fund	
Defaulting CM's contribution to default fund	
Defaulting CM's collateral	Stress test 1: CORE 99.96%
Defaulting broker's collateral	
Defaulting customer's excess collateral under other brokers and CMs	
Defaulting customer's collateral under defaulting broker and CM	

Source: B3 website.

C. Margin Arrangements and Pro-Cyclicality

49. BM&FBOVESPA has established an effective margin system based on the calculation of portfolio risk at the individual customer level. The margin calculation methodology (CORE) measures the worst cash flow requirement accumulated during the process of closing out the portfolio of a defaulting customer, given adverse price movements defined in the risk factor variation scenarios for the portfolio in question, i.e. for the customer's positions and collateral. The close-out period is defined as between 1 and 10 days. CORE uses the full valuation method to value all positions, including positions in non-linear instruments, under 10,000 scenarios for each risk factor. The confidence level used in the calculation is at least 99.96 percent. CORE is used for all products.

50. The 10,000 scenarios comprise historical scenarios which use a sample look-back period from 2002 to 2016, quantitative scenarios that are extreme but plausible and did not necessarily occur in the period covered by the sample, and prospective scenarios ("what if"). BM&FBOVESPA use marked-to market values to update margin requirement, collateral and margin calls, and for calculating daily settlement values. The clearinghouse requires additional margin for positions that exceed the concentration limits for open positions, and may require intermediaries and clearing members to post collateral on an intraday basis if justified by the monitoring of intraday risk as the intermediary's balance should be kept positive at all times. The Risk Management Department monitors the adequacy of the margining model's parameters and assumptions every day[41] using (i) a daily margin backtesting procedure for all portfolios, and (ii) daily monitoring of the market risk scenarios, which are compared with the observed variations in market prices.

51. However, the sensitivity of its margin model coverage should be tested using a wide range of parameters and assumptions at least monthly. It should use the results of these sensitivity tests to analyze the potential losses it could suffer and evaluate the potential losses in individual customers' positions. Rigorous sensitivity analysis of margin requirements may take on increased importance in case markets become illiquid or volatile.

52. BM&FBOVESPA's margin model also addresses procyclicality as it is designed to prevent sudden changes in required margin amounts by including stress scenarios in the margin calculations, which combine price fluctuations incorporating fat tails and volatility fluctuations. Because the parameters of the risk model are not based on conditional volatility, but instead, are based on the unconditional distribution of shock returns, an increase in market volatility does not imply an automatic change in the required margin. Procyclicality in the model is also limited because its parameters (daily liquidity and scenarios for risk factors) are determined *ex ante*, unconditionally and exogenously to the model. The CORE methodology takes the average daily liquidity of each contract into account to determine the maximum number of contracts the CCP can closeout (or auction) at any given day of the holding period when defining the closeout strategy. Thus, the presence of positions in contracts with low liquidity may result in a higher margin requirement. Regarding collateral, the need for procyclical adjustments is low considering that (i) collateral valuation is an integral part of the CORE methodology for calculating risks, and (ii) more than 95 percent of the collateral posted to BM&FBOVESPA consists of Brazilian government bonds, the most liquid asset in the Brazilian market, for which the average haircut is less than 1 percent. The methodology prevents wrong-way risk by not accepting securities issued by a clearing participant or its group affiliates as collateral and imposes limits to prevent concentration risk in order to mitigate adverse price movements impacting the collateral it receives.

D. Credit Risk

53. BM&FBOVESPA has identified three main types of credit risk: (i) the risk of financial losses resulting from the failure of providers of infrastructure for settlement processes; (ii) the risk of losses due to default by one or more participants, associated with the market and liquidity risks inherent in closeout of positions and collateral execution; and (iii) the credit risk associated with

[41] Results of margin back testing in Appendix VII PFMI Quantitative disclosure.

issuers of assets used in the clearinghouse' financial resources that the CCP calls "safeguard structures". Sources of credit risk are identified by the Risk Management Department and the Credit Risk Technical Committee.

54. BM&FBOVESPA Clearinghouse monitors credit exposures every day and intraday using credit stress tests and has tools to manage and control them. Credit stress tests assume default by two participants and their affiliates[42]. The financial impact of such defaults is simulated using the CORE methodology, assuming market risk scenarios of greater severity than those used to calculate margin requirement. The credit quality of participants, collateral issuers and infrastructure suppliers is assessed using external metrics and internal metrics (daily settlement volumes, margin requirements and collateral posted, for example). If a participant's credit quality deteriorates, BM&FBOVESPA Clearinghouse can take steps to reduce its exposure, such as lowering the limits assigned to the participant and requiring additional collateral. If a participant becomes insolvent, BM&FBOVESPA can also prohibit new transactions that cause an increase in exposure, impose position closeout, and revoke the participant's access authorization.

55. The financial resources to cover current exposures[43] and potential future exposures[44] consists of collateral posted by participants (margin requirement including additional margin by customers, and intermediary collateral posted by an intermediary to meet his access requirement and/or to raise the intraday risk limit) and a settlement fund replenished by the clearing members and by the CCP (currently 50 percent of the fund). A credit stress test is used to assess that the level of protection granted by the financial resources is sufficient to cover the default of the two participants and their affiliates with the largest exposures to the CCP with a higher confidence level for market risk than the level used to calculate margin requirements. It provides for the replenishment of the default fund only to cover future defaults and is capped, in any 20-day period, to three times the value of the non-defaulting clearing member's contribution.

56. The Clearinghouse is not exposed to credit risk arising from the potential default of a settlement bank since it uses its own account with BCB in the STR to receive and make payments from and to its clearing members.

E. Liquidity Risk

57. The monitoring and management of liquidity risk has two main components: analysis of settlement values and analysis of collateral. The first component analyzes potential liquidity

[42] Results of credit risk stress tests in Appendix VII PFMI Quantitative disclosure.

[43] Current exposure is technically defined as the larger of zero or the market value (or replacement cost) of a transaction or portfolio of transactions within a netting set with a counterparty that would be lost upon the default of the counterparty.

[44] Potential future exposure is technically defined as the maximum exposure estimated to occur at a future point in time at a high level of statistical confidence. Potential future exposure arises from potential fluctuations in the market value of a participant's open positions between the time they are incurred or reset to the current market price and the time they are liquidated or effectively hedged.

needs that may arise due to failures in settlement by one or more participants during the clearing process. The liquidity analysis of the collateral seeks to ensure that the collateral is adequate and can be monetized promptly in the event of a default of a participant and subsequent close out of positions. Independently, the aggregate liquidity risk is evaluated based on stress scenarios simulations that consider the failure of financial conglomerates that owe the largest settlement amount to BM&FBOVESPA Clearinghouse, including the performance of the group entities as liquidity providers and issuers of collateral (Bank Certificate of Deposit (CDBs) and letters of bank guarantee). BM&FBOVESPA calculates settlement obligations, including collateral requirements, due by all participants at all levels (final beneficiary, intermediary and clearing member), and monitors settlements and flows in real time. These tools are also made available to participants (intermediaries and clearing members) to assist them in managing their liquidity risks intraday.

58. Stress testing is used to estimate liquidity requirements in the event of members' default. To meet its liquidity requirements, the following qualifying liquid resources are available to BM&FBOVESPA: dedicated credit lines from top-tier banks; liquidity assistance from BM&FBOVESPA Bank; cash dedicated by the CCP; Brazilian Government bonds in the Settlement Fund and BM&FBOVESPA Clearinghouse free cash flow. The stress tests results show that these liquid resources are sufficient to cover the default of the clearing member that owes the largest settlement obligation to the CCP. No liquidity breaches have been reported against "cover 1" by BCB in its Financial Stability Report. The CCP also stress tests the liquidity requirement against the simultaneous default of two clearing members[45]. It is worth highlighting that in the individual customer segregated model followed by BM&FBOVESPA Clearinghouse, each affiliate that clears through his parent clearing member is taken into account as any customer for calculating the largest exposure to the CCP. Where an affiliate clears through a clearing member other than his parent and has a standing payment obligation to the CCP, BM&FBOVESPA should consider this payment obligation in the clearing members' exposure if not covered by the first clearing member.

F. Operational Risk

59. Operational risk management framework is designed to mitigate and manage sources of operational risk in compliance with BM&FBOVESPA Clearinghouse's risk management policy. The Corporate Risk Management, Operational Risk and Internal Control Policies of BM&FBOVESPA establish guidelines, functions and responsibilities to identify, monitor and manage operational risks. The Board of Directors of BM & FBOVESPA has established and revised, at least annually, Corporate Risk Management, Operational Risk and Internal Control Policies, which determine the functions and responsibilities related to operational risk management. The operational risk management structure is subject to internal and external auditing.

60. BM&FBOVESPA has comprehensive physical and information security policies that are based on international and national standards, such as the ISO 27000 family of standards, which it should enhance in implementing the 2016 CPMI IOSCO Guidance on cyber resilience

[45] Results of liquidity stress test in Appendix VII PFMI Quantitative Disclosure.

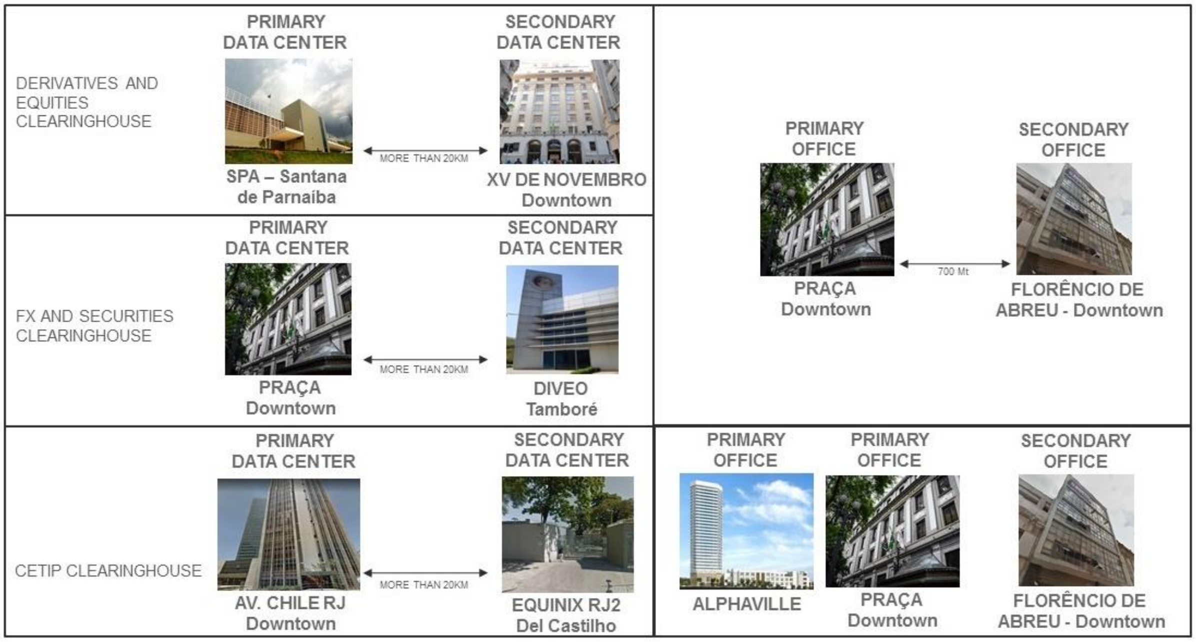
recognizing cyber risk as a major threat. BM&FBOVESPA has a Security Operations Centre (SOC) which operates around the clock seven days a week. The SOC is responsible for security monitoring and treatment of IT incidents (detecting and responding to invasion attempts), ethical hacking, and internal and external audits that continuously assess information security controls.

61. BM&FBOVESPA has a strong business continuity management framework and should assess the risks identified from interdependencies with other FMIs and critical service providers and implement corrective actions promptly. BM&FBOVESPA has business continuity rules and a business continuity policy, a business continuity committee, and a business continuity management system designed to minimize the financial, operational, legal and regulatory impacts of a lack or shortage of human, material and technological resources essential to the secure functioning of its operations. Following an initiative by the BCB, BM&FBOVESPA has lead a working group on the identification of interdependencies among FMIs and critical service providers, that represent a risk to the business continuity of the entire system. BM&FBOVESPA with other FMIs and critical service providers should assess the risks arising from the identified interdependencies, coordinate continuity plans, and/or carry out joint contingency tests.

62. For its mission-critical processes a recovery time objectives (a two-hour RTO) and recovery point objectives (an RPO of 0) are defined. BM&FBOVESPA's business continuity plans consist of operational contingency plans, which establish alternative procedures to be executed in the event of critical process interruptions. The plans are updated and tested at least annually. Participants and suppliers of critical services are invited to take part in testing at least once a year. BM&FBOVESPA has an annual calendar for testing its business continuity plans to check their capacity to achieve the recovery objectives set, among other things, considering large-scale material disruption scenarios, such as total loss of technological resources and/or the workplace. The continuity plan testing results show that the RTO is achieved within 2 hours in 2017 for all B3 clearing houses. The PFMI quantitative disclosure for the second quarter of 2017 shows the actual availability of the core system over the previous 12 months as 99,994 percent.

63. BM&FBOVESPA should consider acquiring the ability of testing regularly the upgrades in the application softwares in the prime and secondary data center to avoid divergences between the main site and the contingency site, which have occurred in the past. The architecture of the technology that supports the processing of settlement is designed to eliminate single points of failure. Data replication between the primary and secondary (contingency) data centers, which are 20 kms apart, occurs in synchronous mode, and the technological environment is characterized by high availability (if a specific IT resource presents a problem, another resource on the same site can replace it) and disaster recovery (if resources on the same site present problems, resources on the backup site can replace them). Business areas have procedures to verify data integrity if processes are interrupted. These procedures can be run on the primary site or on the secondary site after execution of recovery procedures.

Table 6. Brazil: B3 Sites (Data Centers and Offices)

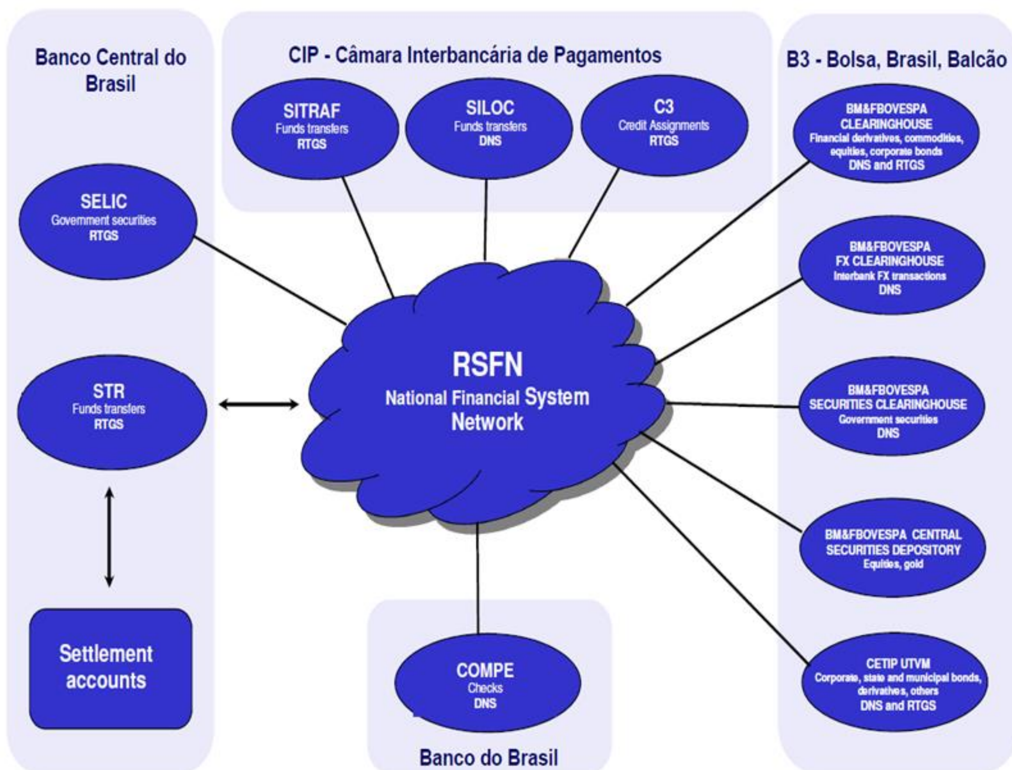


Source: B3 presentation

Appendix I. IMSG Results

CPMI-IOSCO Implementation	Assessment Results	Publication
Level 1 - Assessment of the status of implementation process.	**Principles:** Highest rating of four for CCPs, PSs, CDSs/SSSs, and TRs, indicating that measures are in force. **Responsibilities:** Highest rating of four for CCPs, PSs, CSDs/SSSs and TRs, indicating that BCB and CVM have a legal capacity to implement the responsibilities.	CPMI-IOSCO "Implementation Monitoring of PFMI: Second Update to Level 1 Assessment Report" June 2015.
Level 2 - Assessment of the completeness of the implemented framework and its consistency with the PFMI.	No assessment.	
Level 2/3 - Assessment whether the content of new legislation and policies are complete and consistent with the Responsibilities and implemented by the authorities.	The BCB and the CVM are assessed to observe all Responsibilities for all FMI types.	CPMI-IOSCO "Assessment and Review of Application of Responsibilities for Authorities" November 2015.
Source: CPMI-IOSCO Implementation Monitoring of PFMI.		

Appendix II. Clearing and Settlement Infrastructures



Source: BCB

Appendix III. Classification of the Brazilian Payments System Financial Market Infrastructures

Name	Classified as	Activity
STR – Reserves Transfer System (*Sistema de Transferência de Reservas)*	PS	Real-time settlement of Selic and other clearinghouses' operations, Eletronic Funds Transfers (TED), and other critical payments[3/] directly from participants' accounts held in BCB.
Sitraf – Funds Transfer System (*Sistema de Transferência de Fundos*), by the Interbank Payments Clearinghouse (*Câmara Interbancária de Pagamentos* – CIP)	PS	Settlement of Client-to-client Electronic Funds Transfers (TED) below R$1 million.
Siloc – Deferred Settlement System for Interbank Credit Orders (*Sistema de Liquidação Diferida das Transferências Interbancárias de Ordens de Crédito*), by the Interbank Payments Clearinghouse (*Câmara Interbancária de Pagamentos* – CIP)	PS	Clearing and settlement of electronic bills up to R$250 thousand, card transactions, and credit transfer documents (DOC).
Compe – Checks Clearinghouse (*Centralizadora da Compensação de Cheques)*	PS	Clearing and settlement of checks up to R$250 thousand.
Cielo – Multicard Clearing System (*Sistema de Liquidação Financeira Multibandeiras*)	PS	Clearing and settlement of Visa card transactions and other card schemes' transactions in which Cielo is the acquirer.
Rede – Domestic Clearing System (*Sistema de Liquidação Doméstica*)	PS	Clearing and settlement of card transactions in which Rede is the acquirer.
Selic – Special System for Settlement and Custody (*Sistema Especial de Liquidação e de Custódia*)	CSD, SSS	Clearing and settlement of government security transactions.
BM&FBOVESPA Clearinghouse (*Câmara BM&FBovespa*)	CCP, SSS, TR	Registration, clearing, and settlement of financial derivatives, commodities, equities and corporate bonds transactions.
BM&FBovespa Foreign Exchange Clearinghouse (*BM&FBovespa – Câmbio*)	CCP, PS	Clearing and settlement of interbank foreign exchange transactions.
BM&FBovespa – Securities Clearinghouse (*BM&FBovespa – Ativos*)	CCP, SSS	Clearing and settlement of government security transactions.
BM&FBovespa Central Security Depository (Central Depositária da BM&FBovespa)	CSD, SSS	CSD and settlement of equity.
BM&FBovespa – Registration System (*BM&FBovespa – Registro*)	TR	Registration of securities and over-the-counter market operations.[4/]
Cetip – Organized Over-the-Counter Market for Securities and Derivatives, by *Cetip S.A. Mercados Organizados*	CSD, SSS, TR	Registration, clearing and settlement of transactions involving corporate, state and municipal bonds, derivatives and others.
C3 – Credit Assignment Central (*Central de Cessão de Crédito*), by the Interbank Payments Clearinghouse (*Câmara Interbancária de Pagamentos* – CIP)	SSS, TR	Recording of all information regarding credit assignment transactions.
Serasa Trade Repository (Sistema de Registro da Serasa)	TR	Registration of information regarding guarantees on real estate
UFIN Trade Repository (Sistema de Registro de Ativos Financeiros – Unidade de Financiamentos – Sistema UFIN) by Cetip S.A. Mercados Organizados	TR	Registration of information regarding guarantees on real estate and vehicles

Source: BCB Brazilian Payment Systems Oversight Report 2015, updated by BCB

Appendix IV. CPMI—Statistics: Top Twenty FMIs

Transactions cleared by selected central counterparties and clearing houses: value of transactions (total for the year)

System	Value of transactions (USD billions)[1]					Average value per transaction (USD thousands)[1]				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
Australia										
ASX Clear	nav	nav	nav	nav	nav	nav	nav	nav	nav	nav
ASX Clear (Futures)	nav	nav	nav	nav	nav	nav	nav	nav	nav	nav
Brazil										
BmfBovespa-Equities	1 329,8	1 339,8	1 087,3	724,0	758,0	6,89	6,07	4,77	2,96	2,91
BmfBovespa-Derivatives	24 822,1	25 359,8	20 157,5	18 048,6	16 915,4	34,85	36,06	31,62	25,74	21,30
BmfBovespa-Securities	20,53	1,78	0,01	0,00	0,00	87 724	34 308	8 494	nav	nav
CETIP	8 981,4	9 391,5	9 105,0	8 267,2	6 656,9	294,7	109,1	77,9	26,6	16,4
Canada										
CDCC	nav	nav	nav	nav	nav	nav	nav	nav	nav	nav
NGX	51,5	77,5	83,1	38,4	34,9	70,1	111,6	119,6	56,5	46,3
ICE	57,60	58,47	44,73	41,55	46,59	11,39	10,18	7,82	7,19	7,21
China										
SD&C	nav	nav	nav	nav	nav	nav	nav	nav	nav	nav
France										
LCH.Clearnet SA	85 893,2	104 208,4	107 450,6	96 043,5	96 281,5	118,93	158,29	156,06	126,28	132,36
Germany										
Eurex Clearing AG	247 156	274 867	288 551	272 489	261 287	70,32	82,95	90,99	76,08	70,83
Hong Kong SAR										
HKSCC	3 122,7	3 614,7	4 083,9	6 157,9	3 953,5	222,3	217,4	219,7	283,9	230,4
India										
CCIL	2 926,9	3 426,3	5 533,6	5 551,9	7 450,6	3 803,0	3 646,2	4 583,3	4 888,6	4 536,8
NSCCL	7 029,7	7 345,2	9 886,2	11 087,5	15 029,8	2,04	2,17	2,37	2,38	3,66
BOISL	31,50	nav	nav	nav	nav	0,10	nav	nav	nav	nav
ICCL	1 370,62	1 602,81	3 705,64	1 261,94	640,47	2,25	2,26	3,05	1,27	0,74
MCX-SXCCL	0,65	0,44	0,26	0,18	0,09	0,00	0,00	0,00	0,00	0,00
Italy										
CCG	33 206,4	46 205,8	46 496,9	42 856,8	43 073,9	157,32	231,97	201,78	169,15	159,23
Japan										
JSCC	30 548,2	23 024,9	27 233,5	29 030,4	35 170,6	nav	nav	nav	nav	nav
JDCC[2]	328,3	448,6	485,2	530,1	623,3	nav	nav	nav	nav	nav
JGBCC	nap	nap	nap	nap	nap	nav	nav	nav	nav	nav
TFX	0,50	0,49	0,16	0,13	0,31	nav	nav	nav	nav	nav
OSE	36,78	74,45	nap	nap	nap	nav	nav	nav	nav	nav
Korea										
Korea Exchange (KRX)	400,0	423,4	467,3	460,3	450,7	nav	nav	nav	nav	nav
Korea Securities Depository (KSD)	172,3	155,4	156,4	151,1	135,9	6	6	5,98	5,23	4,84
Mexico										
CCV	253,0	313,7	241,0	210,5	202,9	12,12	8,77	6,02	4,18	2,75
Asigna	368,7	262,6	294,9	160,5	169,2	8,65	9,60	9,86	9,41	8,30
Netherlands										
EuroCCP N.V.	5 017,3	4 953,1	9 432,6	12 326,8	11 819,7	6,15	7,36	7,40	7,01	6,03
Russia										
NCC	5 964,0	11 913,5	10 960,5	8 288,2	9 839,1	34,25	51,20	37,88	19,22	21,54
NSD	nav	898,7	3 073,2	1 585,8	1 484,4	nap	10 323,1	24 861,5	14 655,5	12 381,1
Saudi Arabia										
Saudi Arabia clearing house	514,7	365,4	572,5	443,6	308,8	12,22	12,61	16,01	14,57	11,32
Singapore										
CDP	257,3	283,6	209,8	203,6	196,9	1,06	0,99	0,94	8,44	9,00
South Africa			nap					nap		
Sweden										
SE Nasdaq OMXDM	5 944,9	5 650,2	3 933,6	3 674,6	3 014,3	56,66	57,43	42,60	34,10	30,82
Switzerland										
SIX x-clear	2 081,6	2 482,7	3 144,7	3 456,5	3 293,9	11,37	10,27	9,97	8,65	7,66
Turkey										
Takasbank	4 133,9	4 067,2	3 920,9	4 207,5	4 266,4	26,49	30,66	27,30	22,40	20,08
United Kingdom										
LCH.Clearnet Ltd[3]	nav	nav	nav	nav	786	nav	nav	nav	nav	838
ICE Clear Europe[3]	nav	131,9	130,5	96,0	102,4	nav	99,3	98,5	84,5	85,2
LME Clear Limited[3]	nav	nav	10,3	27,5	0,0	nav	nav	104,1	80,3	0,0
CME Clearing Europe Limited[3]	nav	nav	0,0	0,1	0,1	nav	nav	139,2	95,5	97,7
United States										
NSCC[3]	185,7	207,2	232,2	243,3	nav	10,8	11,7	11,5	10,9	nav
FICC/GSD[3]	1 116,2	1 076,5	1 008,4	917,1	917,0	31 982,8	29 574,2	27 253,9	22 869,5	22 697,5
FICC/MBSD[3]	102,9	78,7	65,1	68,2	74,4	24 500,0	20 710,5	17 593,5	17 482,1	19 579,5

Notes: 1. Converted at yearly average exchange rates. 2. Data refer to total transactions during the fiscal year ending March of the following year (see Japan). As a consequence, they are converted at average fiscal-year exchange rates. 3. For value of transactions, trillions.

Appendix IV. CPMI—Statistics: Top Twenty FMIs

Payments processed by selected interbank funds transfer systems: value of transactions (total for the year)

System	Value of transactions (USD billions except as noted)[1]					Average value per transaction (USD thousands)[1]				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
Australia										
RITS	40 359,2	37 940,5	36 614,4	30 794,3	30 801,1	4 284,4	3 703,7	3 445,1	2 756,6	2 719,7
Belgium										
TARGET2-BE	24 026,0	21 477,2	21 550,7	17 327,2	18 761,0	9 649,0	9 297,5	8 551,9	7 599,7	8 338,2
Clearing house	nav	nav	nav	nav	nav	nav	nav	nav	nav	nav
CEC	1 167,3	1 210,3	1 154,8	979,5	1 018,5	0,9	0,9	0,9	0,7	0,7
Brazil										
STR	86 348	109 422	113 277	83 546	89 879	3 749,4	3 597,9	3 103,3	1 964,0	1 291,6
SITRAF	nav	nav	nav	1 237,6	1 247,8	nav	nav	nav	4,2	3,0
BmfBovespa-FX	510,7	523,7	352,6	326,0	302,6	12 768,7	14 963,3	12 160,1	10 187,5	12 607,8
COMPE	574,2	519,7	469,1	311,8	299,9	0,6	0,6	0,6	0,4	0,4
SILOC	763,0	1 104,5	1 403,0	1 032,8	1 036,4	0,2	0,2	0,2	0,2	0,1
Canada										
LVTS	38 187,0	36 517,0	34 996,8	33 648,1	33 334,3	5 432,0	4 820,7	4 421,0	4 158,7	3 891,0
ACSS	5 800,4	5 808,7	5 644,0	5 036,9	4 596,4	0,9	0,9	0,8	0,7	0,6
Interac e-Transfer	13,5	19,8	28,0	34,9	47,6	0,4	0,4	0,4	0,3	0,3
China										
HVPS	280 690	332 757	382 044	473 998	544 459	596,8	558,8	536,2	600,9	659,4
BEPS	2 938,03	3 280,38	3 593,54	4 004,54	4 654,19	3,9	3,2	2,5	2,2	2,0
France										
TARGET2-BDF[2]	141 546	116 252	115 099	87 808	82 460	16 344,9	12 751,1	12 268,0	9 823,1	10 373,7
CORE (FR)[3]	6 940,6	7 138,1	7 127,3	6 143,7	6 099,2	0,5	0,5	0,5	0,4	0,4
Germany										
TARGET2-BBk	353 929	297 821	224 348	227 138	222 495	8 078,7	6 707,7	5 432,2	5 081,4	4 999,9
RPS	3 224,1	3 639,5	4 359,6	3 313,0	3 182,3	1,1	1,2	1,1	0,9	0,8
Hong Kong SAR										
HKD CHATS	15 805,0	15 724,9	17 383,7	19 560,0	18 742,5	2 781,1	2 582,1	2 709,9	2 841,1	2 672,2
USD CHATS	4 047,9	4 255,7	5 245,9	5 879,6	6 490,6	1 060,5	980,1	1 122,1	1 192,9	1 178,0
EUR CHATS	184,7	182,9	190,8	100,1	87,9	1 710,5	1 550,3	1 461,2	709,8	602,3
RMB CHATS	7 866,1	14 606,4	27 601,5	34 980,0	30 190,8	7 236,5	9 363,1	9 287,2	8 226,7	7 915,8
India										
RTGS	12 652,5	12 519,9	12 356,5	12 857,4	14 608,8	184,7	154,4	133,2	130,8	135,5
Cheque Clearing	1 872,8	1 593,2	1 400,1	1 276,4	1 204,5	1,426	1,267	1,171	1,164	0,998
ECS / NECS	53,36	64,12	61,60	42,27	2,73	0,179	0,186	0,180	0,160	0,145
NACH	nav	3,7	20,0	61,8	117,8	nav	0,042	0,059	0,043	0,057
UPI	nav	nav	nav	nav	1,03	nav	nav	nav	nav	0,058
NEFT	542,53	746,60	980,02	1 298,45	1 785,95	1,377	1,129	1,057	1,036	1,101
Italy										
TARGET2-BDI	41 938,0	49 739,1	54 938,4	35 712,1	20 374,8	4 702,6	4 791,4	4 787,7	3 484,1	2 521,6
BI-COMP	3 584,8	3 393,4	1 960,3	1 652,6	1 682,6	1,6	1,5	1,0	0,9	0,8
Japan										
BOJ-NET	341 479	292 331	288 490	273 339	309 620	22 326,2	17 960,9	17 289,3	16 170,1	18 770,6
FXYCS	30 847,9	29 840,2	28 870,5	31 722,5	36 203,0	4 907,4	4 455,8	4 449,2	4 688,5	5 232,4
Zengin System	33 251,6	29 253,4	27 397,1	24 631,3	26 740,2	22,8	19,8	18,1	15,9	17,0
Tokyo Clearing House	3 415,7	2 763,4	2 253,0	1 732,6	1 496,3	136,8	117,7	102,2	84,1	78,7
Korea										
BOK-Wire+	49 967,2	52 704,7	56 971,1	59 914,6	63 623,7	15 128,0	15 369,1	16 206,3	16 840,1	16 882,3
Check Clearing System	3 798,7	3 389,2	2 933,9	2 237,1	1 931,5	12,3	14,1	14,4	13,6	14,9
Interbank Shared Networks	11 676,2	12 673,4	14 513,2	15 603,9	15 797,4	3,1	3,1	3,3	3,3	3,1
Mexico										
SPEI	15 126,2	16 259,8	16 796,9	15 457,6	14 041,4	88,1	74,7	63,9	46,2	35,5
CECOBAN	290,1	280,6	253,2	207,3	177,5	1,9	2,0	1,8	1,6	1,4
Netherlands										
TARGET2-NL	135 881	91 841	78 165	66 801	77 341	15 946,6	11 507,4	12 245,8	11 633,7	13 806,0
Equens	2 736,4	2 675,3	2 101,3	1 678,1	1 804,4	1,0	1,0	1,1	1,0	1,1
Russia										
BESP System	14 396,5	15 841,9	12 525,3	8 830,6	8 373,1	12 108,1	7 525,8	4 280,7	2 713,8	2 483,9
NSD	nap	nap	nav	2 279,4	2 227,0	nap	nap	nav	3 126,7	3 172,4
VER	19 288,1	18 991,9	16 006,3	11 424,8	9 644,6	20,9	20,3	17,4	12,8	11,5
MER	3 332,6	3 655,9	3 210,9	2 107,4	2 014,0	10,0	9,0	7,2	4,2	3,4
Payments using letters of advice	15,33	3,03	0,06	0,04	0,04	30,1	23,5	10,0	10,0	22,0
Saudi Arabia										
SARIE	17 439,4	14 568,6	14 513,6	13 024,6	10 591,2	324,8	257,8	230,6	164,5	118,6

Appendix IV. CPMI—Statistics: Top Twenty FMIs

Payments processed by selected interbank funds transfer systems: value of transactions (total for the year)

System	Value of transactions (USD billions except as noted)[1] 2012	2013	2014	2015	2016	Average value per transaction (USD thousands)[1] 2012	2013	2014	2015	2016
Singapore										
MEPS+(IFT)	14 150,6	13 293,1	12 027,3	11 674,1	12 459,7	2 991,7	2 618,8	2 308,4	2 193,8	2 290,5
SGDCCS	506,0	526,8	500,4	453,3	426,6	6,9	7,4	7,3	7,0	7,0
USDCCS	49,06	52,17	52,46	50,19	47,06	53,3	55,9	56,1	55,6	55,2
IBG	234,14	253,41	264,32	258,67	269,17	2,4	2,5	2,7	2,6	2,6
South Africa										
SAMOS - large	10 146,4	9 108,5	9 712,3	9 188,2	8 936,2	2 022,2	1 571,6	1 511,8	1 306,0	1 188,3
SAMOS - retail	970,4	905,2	865,6	793,7	735,9	nav	nav	nav	nav	nav
Sweden										
RIX	18 363,6	17 189,2	17 124,7	15 843,4	18 533,0	5 072,8	4 511,6	4 217,9	3 634,6	4 081,3
Bankgirot	1 278,8	1 388,2	1 368,7	1 574,6	1 641,1	1,6	1,6	1,5	1,3	1,3
Dataclearing	397,5	417,5	428,1	383,4	385,7	2,9	3,0	3,0	2,6	2,7
Switzerland										
SIC	32 219	34 450	32 497	40 390	39 544	78,5	82,0	75,8	91,6	88,2
Turkey										
EFT1 - large	18 239,5	18 178,0	18 314,7	15 709,4	14 914,8	100,12	6 162,02	6 426,21	5 379,94	5 965,93
EFT - retail	213,4	2 993,1	3 030,1	2 795,3	3 739,4	14,29	13,04	11,37	8,87	9,98
Garanti Payment Systems	4,7	6,9	7,8	7,6	7,8	0,08	0,10	0,09	0,08	0,07
Interbank Card Center	94,14	99,40	99,92	89,12	87,30	0,06	0,06	0,05	0,04	0,04
Interbank Clearing House	176,66	184,04	184,60	162,77	150,26	9,56	10,71	10,61	9,61	9,75
United Kingdom										
CHAPS Sterling	113 607	109 637	111 894	104 553	102 001	3 347,7	3 134,6	3 063,8	2 784,5	2 617,8
Cheque/credit	1 023,3	900,5	884,6	754,6	587,9	1,5	1,5	1,7	1,7	1,6
BACS	6 514,2	6 594,3	7 278,3	7 015,2	6 446,9	1,2	1,2	1,2	1,2	1,0
Faster Payment Service	978,8	1 205,7	1 488,1	1 590,5	1 604,8	1,2	1,2	1,4	1,3	1,1
United States										
CHIPS	364 819	379 985	390 695	375 862	364 331	3 757,1	3 685,6	3 571,3	3 404,5	3 288,2
Fedwire	599 201	713 310	884 552	834 630	766 962	4 553,2	5 315,3	6 552,2	5 844,8	5 178,7
European Union										
TARGET	912 920	743 057	661 493	564 347	537 468	10 186,2	8 134,9	7 537,6	6 370,0	6 041,7
EURO1 / STEP1	74 350	64 625	54 712	48 944	45 474	1 116,5	1 007,6	948,6	885,7	852,5
STEP2 XCT Service[5]	nav	nav	nav	nav	nav	nav	nav	nav	nav	nav
STEP2 ICT Service[6]	1 340,4	1 220,8	89,6	nav	nav	4,3	4,4	3,8	nav	nav
STEP2 SCT Service	3 140,0	4 861,3	12 368,9	11 635,3	12 509,4	4,9	4,5	3,3	2,9	3,0
STEP2 SDD B2B Service	14,2	125,1	769,6	670,8	748,3	8,7	24,0	9,8	8,1	8,9
STEP2 SDD CORE Service	14,3	97,3	1 458,4	1 240,2	1 311,9	0,2	0,2	0,3	0,2	0,2
Memo:										
CLS[4]	1 221,0	1 290,6	1 274,9	1 232,2	1 255,8	5 902,6	7 307,0	6 219,9	6 019,8	5 730,8

Notes: 1. Converted at yearly average exchange rates. 2 - 6. For the footnotes regarding the systems, see after Comparative Table PS4.

Appendix IV. CPMI—Statistics: Top Twenty FMIs

Transactions processed by selected central securities depositories: value of transactions (total for the year)										
System	Value of transactions (USD billions except as noted)[1]					Average value per transaction (USD thousands)[1]				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
Australia										
ASX Settlement	nav	nav	nav	nav	nav	nav	nav	nav	nav	nav
Austraclear	nav	nav	nav	nav	nav	nav	nav	nav	nav	nav
Belgium										
NBB SSS	13 160,5	10 969,5	14 375,7	8 901,5	9 640,9	22 573,8	19 908,4	15 148,3	17 874,5	18 647,8
Euroclear Belgium	709,9	1 039,9	1 108,2	1 035,1	1 060,2	394,1	545,0	523,2	419,6	446,0
Euroclear Bank	396 680	454 350	515 293	487 810	493 401	6 116,1	6 481,8	6 806,3	5 826,3	5 835,6
Brazil										
SELIC	184 246	241 468	265 076	209 131	209 574	50 644,0	60 883,5	67 112,8	50 516,6	49 688,7
BMFBOVESPA-Equities	2 723,1	2 692,2	2 378,8	1 496,4	1 312,7	144,18	128,62	124,15	83,13	73,75
CETIP	8 981,4	9 391,5	9 105,0	7 752,7	6 178,6	294,7	109,2	77,9	25,0	15,2
Canada										
CDS	92 762	112 771	110 681	97 985	96 446	257,4	319,9	257,6	219,5	202,9
China										
SD&C	16 619	27 684	40 961	82 892	88 864	8,07	9,69	10,53	7,98	13,47
CDC Depository and Settlement System	11 221,7	5 970,5	5 044,3	9 721,0	11 974,7	19,11	13,05	10,82	14,35	11,88
France										
Euroclear France	157 791	174 214	145 776	102 138	114 268	6 680,4	7 145,2	6 000,0	3 987,9	4 470,2
Germany										
Clearstream Banking AG	71 623	79 240	105 764	73 982	51 531	1 356,6	1 300,4	1 911,4	1 209,4	919,4
Hong Kong SAR										
CCASS	5 646,1	6 768,1	6 475,9	8 021,7	5 746,0	313,2	335,1	297,6	324,0	281,0
CMU	834,2	744,8	694,4	497,5	483,7	9 419	8 054	7 095	5 774	6 593
India										
RBI (SSS)[2]	22,8	23,4	23,0	23,5	28,8	9,9	8,9	7,6	7,5	7,8
NSDL	2 841,4	2 730,9	3 091,9	2 936,0	3 330,6	26,38	27,44	20,99	22,24	21,81
CDSL	115,21	140,41	215,17	179,28	293,26	1,68	2,03	2,06	1,88	2,66
Italy										
Monte Titoli	75 055	82 775	100 731	73 633	73 772	3 525,1	3 942,2	4 084,3	3 104,5	3 318,1
Japan										
BOJ	258 516	226 658	233 540	204 829	196 049	61 393,9	52 032,7	50 175,7	45 969,9	44 458,7
JASDEC[3]	15 837,5	13 640,7	16 008,9	14 043,1	7 224,9	179,3	127,1	144,2	118,8	61,1
Korea										
KSD	5 529,7	5 741,1	7 182,8	6 922,2	6 631,5	716,7	744,7	919,1	803,6	742,0
Mexico										
Indeval	92 361,1	96 720,1	97 524,6	81 617,7	73 262,1	19 344,2	18 082,3	18 693,0	14 785,8	12 628,2
Netherlands										
Euroclear Netherlands	5 763,4	5 843,9	5 790,6	5 421,0	5 194,3	1 153,1	1 092,7	1 014,7	868,5	881,3
Russia										
NSD	4 329,7	5 370,5	5 350,9	4 194,4	4 863,3	1 848,8	2 059,0	2 145,5	1 712,5	1 826,5
DCC	107,4	2,2	nav	nap	nap	942,7	5 766,9	nav	nap	nap
Saudi Arabia										
Tadawul	514,7	365,3	572,5	443,4	308,9	12,22	8,45	11,73	14,56	11,33
Singapore										
MEPS+(SGS)	1 116,3	1 187,4	1 114,0	938,2	1 003,5	12 403,0	11 670,4	11 339,4	8 159,1	8 187,9
DCSS	nav	nav	nav	nav	nav	nav	nav	nav	nav	nav
CDP	257,3	283,6	209,8	203,6	196,9	49,2	56,9	35,4	32,4	29,6
South Africa										
SAFIRES	3 995,8	3 108,7	2 733,2	2 601,6	2 566,3	640,3	471,0	383,6	326,0	310,9
Sweden										
Euroclear Sweden	13 808,1	14 266,7	12 428,6	11 023,7	11 250,9	1 212,9	1 134,8	880,8	830,0	811,2
Switzerland										
SECOM	5 735,2	4 191,1	4 504,3	6 678,7	5 655,7	115,1	78,4	81,8	99,8	96,8
Turkey										
Takasbank	2 755,6	2 981,2	2 604,6	2 141,7	1 880,6	25,9	16,5	10,6	7,2	5,8
Central Securities Depository	989,4	1 301,2	962,3	744,4	726,6	345,9	365,6	278,6	233,3	248,4
ESTS	4 215,0	5 437,3	4 250,4	4 120,0	4 098,6	22 890,1	20 138,3	16 333,6	14 459,7	14 489,7
United Kingdom										
CREST	183 955	437 115	377 795	410 743	262 243	3 843,1	7 688,9	6 551,0	6 858,8	4 383,2
United States										
NBES	284 402	295 186	287 104	295 756	286 672	15 599,7	15 505,8	16 848,7	16 935,6	17 305,3
DTC	110 300	106 400	113 700	112 300	111 100	368,5	333,0	352,0	325,3	312,1

Notes: 1. Converted at yearly average exchange rates. 2. For value of transactions, trillions. 3. Data refer to total transactions during the fiscal year ending March of the following year (see Japan). As a consequence, they are converted at average fiscal-year exchange rates.

Appendix V. Key Statistics on Systematically Important FMIs in Brazil

	STR (Reserves Transfer System)				Selic (Special System for Settlement and Custody)				Cetip - Organized Over-the-Counter Market for Securities and Derivatives					
									Gross Transactions				Settlement Value (BRL millions)	
	Value (BRL millions)		Volume		Value (BRL millions)		Volume		Value (BRL millions)		Volume			
	Average Daily	Peak	Average Daily	Peak	Average Daily	Peak	Average Daily	Peak	Average Daily	Peak	Average Daily	Peak	Average Daily	Peak
1S/2014	1,106,454	2,218,923	140,711	254,907	607,551	1,618,518	5,661	13,107	37,835	110,385	5,384	17,415	9,884	21,718
2S/2014	1,419,144	2,626,721	154,971	308,587	855,221	2,029,607	5,540	14,982	41,636	199,886	4,983	11,850	8,804	24,494
1S/2015	1,291,876	2,659,660	162,860	264,782	718,412	2,031,470	5,999	13,257	50,695	163,796	5,162	10,472	9,571	28,285
2S/2015	1,425,212	2,656,180	183,731	299,729	830,490	1,965,843	5,903	14,626	54,312	252,451	5,241	27,358	8,974	30,904
1S/2016	1,611,966	3,146,611	263,471	507,369	978,035	2,389,919	5,884	14,225	46,689	140,881	5,128	11,057	10,204	29,506
2S/2016	1,469,537	3,347,540	297,000	707,491	864,258	2,670,774	6,153	16,741	43,505	152,603	5,485	13,602	8,428	21,180
1S/2017	1,409,048	3,528,353	320,796	527,220	815,856	2,739,494	6,128	15,492	40,832	141,991	5,634	10,951	7,906	20,800

	BM&FBOVESPA Clearinghouse					BM&FBOVESPA Foreign Exchange Clearinghouse				
	Gross Transactions				Settlement Value (BRL millions)	Gross Transactions				Settlement Value (BRL millions)
	Value (BRL millions)		Volume			Value (BRL millions)		Volume		
	Average Daily	Peak	Average Daily	Peak	Average Daily	Average Daily	Peak	Average Daily	Peak	Average Daily
1S/2014	2,881	10,894	146,562	234,121	983	3,303	6,996	116	197	2,010
2S/2014	6,816	26,156	189,586	334,362	1,926	3,577	10,070	127	208	2,106
1S/2015	10,633	31,213	220,340	312,159	3,349	4,055	8,378	121	217	2,416
2S/2015	14,647	40,544	293,218	517,042	4,373	4,840	11,172	142	270	2,870
1S/2016	13,493	51,037	385,200	664,404	3,804	4,613	11,534	97	151	2,809
2S/2016	7,305	40,104	434,805	946,563	1,613	4,106	10,707	102	201	2,448
1S/2017	6,337	80,542	448,493	886,157	1,288	4,112	11,574	107	214	2,528

	BM&FBOVESPA - Securities Clearinghouse					BM&FBOVESPA - Equities Clearinghouse				
	Gross Transactions				Settlement Value (BRL millions)	Gross Transactions				Settlement Value (BRL millions)
	Value (BRL millions)		Volume			Value (BRL millions)		Volume		
	Average Daily	Peak	Average Daily	Peak	Average Daily	Average Daily	Peak	Average Daily	Peak	Average Daily
1S/2014	0	0	0	0	0	6,815	16,126	888,263	1,733,110	525
2S/2014	0	0	0	0	0	8,137	45,105	962,016	2,582,844	697
1S/2015	0	0	0	0	0	7,332	25,007	917,291	1,221,733	569
2S/2015	0	0	0	0	0	7,101	22,628	991,587	1,698,453	577
1S/2016	0	0	0	0	0	7,811	25,468	1,093,115	2,221,593	586
2S/2016	0	0	0	0	0	8,167	31,312	968,513	2,310,430	608
1S/2017	0	0	0	0	0	8,590	24,872	1,002,899	3,107,887	674

Source: BCB statistics (5 semesters up to 1semester 2017).

Notes: Assignment: Legal instrument by which one participant (assignor) transfers to another (assignee) some of his receivables. One credit assignment operation may contain many installments of different credit operation contracts.

Appendix VI. Key Laws for FMIs

Relevant aspect	Legislation	BM&FBOVESPA Clearinghouse Rulebook	Foreign Exchange Clearinghouse Rulebook
Classification as a systemically important system	Law 10214 CMN Resolution 2882 BCB Circular 3057	-	-
Multilateral netting	Law 10214 BCB Circular 3057	Tit. II, Chap. III, Section V	Chap. VII
Settlement	Law 10214 CMN Resolution 2882 BCB Circular 3057	Tit. II, Chap. III, Sections VI, VII & VIII	Chap. VIII
Individual customer segregation model	Law 9613 ICVM 301 ICVM 505	Tit. II, Chap. III, Section IV	-
Novation	Law 10214 BCB Circular 3057	Tit. II, Chap. III, Section I	Art. 11
Irrevocable and unconditional settlement of obligations	Law 10214 BCB Circular 3057	Tit. II, Chap. I, Sole Section, Art.10	Art. 21
Closeout of positions in the event of default	BCB Circular 3057	Tit. II, Chap. V	Chap. VIII, Section III
Safeguards and collateral	Law 10214 BCB Circular 3057	Tit. II, Chap. IV	Chap. IX
Chain of responsibilities	-	Tit. II, Chap. II	Chap. III
Confidentiality	Supplementary Law 105	-	-

Appendix VI. Key Laws for FMIs

Relevant aspects	Legislation	BM&FBOVESPA Central Depository Rulebook
CSD	Law 4728 Law 6385 Law 12810 ICVM 541 BCB Circular 3743	Title II
Individual customer segregation model	Law 9613 ICVM 301 ICVM 541	Art. 2, sole paragraph, item III Art. 5, item II & first paragraph Art. 15 and ff.
Fiduciary ownership	Law 4728 Law 6404 Law 6385 Law 12810 ICVM 541 BCB Circular 3743	Art. 2, sole paragraph, items I, II, III, V, VI, X and XI, and first paragraph Art. 18 Art. 19 Art. 23
Confidentiality	Supplementary Law 105	Art. 39, item XLIII

Relevant aspects	Legislation	BM&FBOVESPA Clearinghouse Rulebook	Foreign Exchange Clearinghouse Rulebook	iBalcão Rulebook*
Derivatives TR	Law 10214 CMN Resolution 2882 BCB Circular 3057 Law 6385 Law 12810 BCB Circular 3.743 ICVM 461	Tit. I, Sole Chap. Tit. II, Chap. III, Section IV	Chap. I, item 44 Chap. IV	Chaps. I, II and IV
Individual customer segregation model	Law 9613 ICVM 301	Tit. II, Chap. III, Section IV	Chap. III, art. 5 Chap. IV, art. 8, §2, §3 and §9	-
Confidentiality	LC 105	-	-	-

* BM&FBOVESPA OTC Trade Repository Rulebook

Appendix VI. Key Laws for FMIs

Relevant aspects	Legislation	BM&FBOVESPA Central Depository Rulebook
CSD	Law 4728 Law 6385 Law 12810 ICVM 541 BCB Circular 3743	Title II
Individual customer segregation model	Law 9613 ICVM 301 ICVM 541	Art. 2, sole paragraph, item III Art. 5, item II & first paragraph Art. 15 and ff.
Fiduciary ownership	Law 4728 Law 6404 Law 6385 Law 12810 ICVM 541 BCB Circular 3743	Art. 2, sole paragraph, items I, II, III, V, VI, X and XI, and first paragraph Art. 18 Art. 19 Art. 23
Confidentiality	Supplementary Law 105	Art. 39, item XLIII
Sources: BM&FBOVESPA PFMI Information Disclosure _March 2017, reviewed by CVM		

Appendix VII. Quantitative Disclosure: Results of Credit and Liquidity Stress Tests for Credit Risk, Margins Backtesting, and about Availability for Operational Risk

Credit Risk			
1.1	Minimum requirement the CCP is subject to in relation to total pre-funded default resources ("Cover 1" or "Cover 2")		Cover 2
1.2	Number of business days within which the CCP assumes it will close out the default when calculating credit exposures that would potentially need to be covered by the default fund		Up to 10, for details per contract type and liquidity constraints please refer to note 1
1.3	The estimated largest aggregate stress loss (in excess of initial margin) that would be caused by the default of any single participant and its affiliates (including transactions cleared for indirect participants) in extreme but plausible market conditions	Peak Day Amount In Previous 12 Months	1.155.000.000, please refer to note 2
		Mean Average Over Previous 12 Months	299.000.000
1.4	Number of business days, if any, on which the above amount (1.3) exceeded actual pre- funded default resources (in excess of initial margin)		-
1.5	The amount in 1.3 which exceeded actual pre-funded default resources (in excess of initial margin)	Amount Exceeded (on each day)	-
1.6	The actual largest aggregate credit exposure (in excess of initial margin) to any single participant and its affiliates (including transactions cleared for indirect participants)	Peak Day Amount In Previous 12 Months	1.893.289.604
		Mean Average Over Previous 12 Months	51.307.262
1.7	The estimated largest aggregate stress loss (in excess of initial margin) that would be caused by the default of any two participants and their affiliates (including transactions cleared for indirect participants) in extreme but plausible market conditions	Peak Day Amount In Previous 12 Months	1.308.000.000, please refer to note 2
		Mean Average Over Previous 12 Months	468.000.000, please refer to note 2
1.8	Number of business days, if any, on which the above amount (1.7) exceeded actual pre- funded default resources (in excess of initial margin)		-
1.9	The amount in 1.7 which exceeded actual pre-funded default resources (in excess of initial margin)	Amount Exceeded	-
1.10	The actual largest aggregate credit exposure (in excess of initial margin) to any two participants and their affiliates (including transactions cleared for indirect participants)	Peak Day Amount In Previous 12 Months	1.893.649.278
		Mean Average Over Previous 12 Months	75.411.122
1.11	Value of pre-funded default resources (excluding initial and retained variation margin) held in total	Pre-haircut	3.828.254.819
		Post-haircut	3.799.440.678

Margins			
2.1	Number of times over the past 12 months that margin coverage held against any account fell below the actual marked-to-market exposure of that member account - based on daily back-testing results		316 (the back testing applies at the individual client account)
2.2	Frequency of daily back-testing result measurements		Once a day
2.3	Time of daily back-testing result if measured once a day		End of day
2.4	Number of observations		7.428 (average of observations per day, an observation means an individual client's portfolio)
2.5	Achieved coverage level		99,98%
2.6	Where breaches of initial margin coverage have occurred, size of uncovered exposure - peak size		13.776.335
2.7	Where breaches of initial margin coverage have occurred, size of uncovered exposure - average size		28.93
2.8	Total initial margin held	HouseIM_PreHaircut	See note 3
		HouseIM_PostHaircut	
		ClientIM_PreHaircut	194.319.215.295
		ClientIM_PostHaircut	192.566.819.854

Appendix VII. Quantitative Disclosure: Results of Credit and Liquidity Stress Tests for Credit Risk, Margins Backtesting, and about Availability for Operational Risk

Liquidity Risk			
3.1	Estimated largest same-day and, where relevant, intraday and multiday payment obligation in total that would be caused by the default of any single participant and its affiliates in extreme but plausible market conditions, forward looking measure reported quarterly	Same Day Payment_Total	8.202.000.000
		Same Day Payment	8.202.000.000
		Intra Day Payment	Not applicable
		Multi Day Payment	Not applicable
3.2	Report the number of business days, if any, on which the above amount exceeded its qualifying liquid resources and by how much	No. of days in quarter	-
		Amount Exceeded	-
3.3	Actual largest intraday and multiday payment obligation of a single participant and its affiliates (including transactions cleared for indirect participants) over the past twelve months, peak day amount in previous twelve months	Same Day Payment_Total	2.807.892.046
		Same Day Payment	2.807.892.046
		Intra Day Payment	Not applicable
		Multi Day Payment	Not applicable
3.4	Sufficiency of liquid resources maintained by the clearing service: 'Cover 1' or 'Cover 2'		Cover 2
3.5	Secured committed lines of credit (those for which collateral/security will be provided by the CCP if drawn) including committed foreign exchange swaps and committed repos		11.250.000.000
3.6	Unsecured committed lines of credit (which the CCP may draw without providing collateral/security)		2.790.000.000
3.7	Highly marketable collateral held in custody and investments that are readily available and convertible into cash with prearranged and highly reliable funding arrangements even in extreme but plausible market conditions		584.000.000
3.8	Other		1.200.000.000
3.9	CCP routine access to central bank liquidity or facilities		Yes, via BM & FBOVESPA BANK

Operational Risk			
4.1	Operational availability target for the core system(s) involved in clearing (whether or not outsourced) over specified period for the system (e.g. 99.99% over a twelve-month period)		99.8%
4.2	Actual availability of the core system(s) over the previous twelve month period		99.994%
4.3	Total number of failures and duration affecting the core system(s) involved in clearing over the previous twelve month period	Duration of Failure	Number of failures is not available, 19:49:00
4.4	Recovery time objective(s) (e.g. within two hours)		Two hours

Notes: 1. CORE, or Closeout Risk Evaluation (proprietary model): The CORE methodology consists in a portfolio (positions and collateral) stress test model where market, liquidity and cash flow risks are modeled so as to provide a measure for collateral deficit as the worst financial outcome of the portfolio closeout process, if negative. The stress test is based on a set of 10,000 scenarios for the price variations of risk factors, among prospective, historical and quantitative scenarios. Positions and collateral are jointly valued across the scenarios. 2. In mid-December 2016, the CCP implemented methodological changes to its credit stress test, adding new stress testing scenario and increasing the frequency of stress testing. Considering that data under the new methodology are not available before mid-December 2016, it was decided to report the available data. Therefore, note that data have not been reported over the previous 12 months, but over the period from mid-December 2016 to the end of the reference period of this Quantitative Disclosure. 3. BM&FBOVESPA adopts an individual client segregation model, meaning that positions and collateral are registered in individually segregated accounts and margins are calculated at individual client level ("client gross" margin model). A clearing member's proprietary portfolio (house) is deemed as an individual customer's portfolio, since it corresponds to a CM acting as a customer, and therefore the individual margin requirement applies.

Sources: IMF staff, PFMI Quantitative Disclosure BM&FBOVESPA Clearinghouse - 2nd Quarter 2017, Clearing BM&FBOVESPA (http://www.bmfbovespa.com.br/pt_br/servicos/clearing/clearing-bm-fbovespa/)