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Contents

Preface	5
Executive Summary	6
Decisions of the Financial Stability Committee on the Countercyclical Capital Buffer _____	12
Financial System Overview	13
1.1 Liquidity _____	13
1.1.1 Domestic and external funding _____	14
1.1.2 Short-term liquidity _____	16
1.1.3 Long-term liquidity _____	19
1.2 Credit _____	20
1.2.1 Introduction _____	20
1.2.2 Broad credit and long run trend _____	21
1.2.3 Companies _____	21
1.2.4 Households _____	25
1.2.5 Domestic banking credit – By ownership _____	27
1.2.6 Risks and provisioning _____	27
1.3 Profitability _____	29
1.4 Solvency _____	33
1.5 Capital stress tests _____	35
1.5.1 Scenario analysis – Macroeconomic stress tests _____	36
1.5.2 Sensitivity analysis _____	38
1.5.3 Simulation of direct interbank contagion _____	39
1.6 Financial Stability Survey _____	40
1.6.1 Introduction _____	40
1.6.2 Risks to financial stability _____	40
1.6.3 Financial and economic cycles _____	47
1.6.4 Expectations for the Countercyclical Capital _____	49
1.6.5 Resilience and confidence in the financial system _____	49
1.6.6 Final considerations _____	50
1.7 Systemically important FMIs _____	52
Selected Issues	56
2.1 Role of the BCB in ensuring financial stability during the Covid-19 crisis _____	56
2.1.1 Introduction _____	56
2.1.2 Initiatives geared towards maintaining market liquidity _____	57

2.1.3 Initiatives geared towards stimulating the supply of credit	59
2.1.4 The measures adopted in Brazil in international perspective	64
2.1.5 Conclusion	65
2.2 Covid-19 stress test	66
2.3 Investment abroad and overhedge	70
2.3.1 Effects of changes in foreign exchange on Investment Abroad	72
2.3.2 Market and liquidity risk	74
2.3.3 Regulatory framework	76
2.3.4 Conclusion	77
2.4 Information security: cyber incident response and recovery	77
2.4.1 Introduction	77
2.4.2 The functions of the NIST cybersecurity framework	79
2.4.3 SFN Regulatory Framework and Supervisory Practices	79
2.4.4 Implementation of practices, procedures and controls by the Supervised Entities	81
2.4.5 Final considerations	84
2.5 Operational risk in Covid-19 pandemic times	86
2.5.1 The transition to social distancing regime and challenges faced during these process	87
2.5.2 Towards a “new normal”	89
2.5.3 The post-pandemic context	91
2.5.4 Final remarks	92
2.6 BCB's participation in the global sustainability and socio-environmental agenda	93
2.6.1 History of BCB's performance in socio-environmental issues	94
2.6.2 Inclusion of the “sustainability” dimension in the Agenda BC#	95
2.6.3 Cooperation actions for social and environmental sustainability	97
2.6.4 Identification of the exposure of institutions to RSA for supervisory purposes	100

Appendix 103

Annex 108

Concepts and Methodologies	108
Concepts and Methodologies – Capital Stress	111
Working Papers about financial stability	115

Preface

The Financial Stability Report (FSR) is a semiannual publication issued by the Banco Central do Brasil (BCB) that presents an overview of recent developments and the outlook on financial stability in Brazil, focusing on the main risks and on the domestic financial system resilience, as well as conveys the Financial Stability Committee (Comef) view on the policy and measures to preserve financial stability.

The BCB defines financial stability as the regular operation, over time and in any economic scenario, of the system responsible for the financial intermediation among households, non-financial corporations and the government.

The report comprises two chapters. Chapter 1 – Financial system overview – presents an analysis of risks related to liquidity, credit, profitability and solvency, of capital stress tests and their effects on the solvency of financial institutions, of the Financial Stability Survey (FSS) results, and of systemically important financial market infrastructures operation. Chapter 2 – Selected issues – discusses relevant but not necessarily recurring topics that may have implications to financial stability in Brazil.

The Statistical annex shows charts and tables underlying data and can be found on the FSR website, <<https://www.bcb.gov.br/en/publications/financialstabilityreport>>, as well.

Moreover, important time series for financial stability monitoring (e.g. total capital ratio, short-term liquidity ratio, delinquency ratio, and return on equity) can be downloaded from the Time Series Management System (SGS) in <<https://www3.bcb.gov.br/sgspub/localizarseries/localizarSeries.do?method=prepararTelaLocalizarSeries>>.

Executive Summary

The Covid-19 pandemic continues to trigger the biggest global economic downturn since the Great Depression.¹ In the domestic environment, the pandemic interrupted the gradual recovery trend of the economy, with a remarkable retrenchment in GDP (Gross Domestic Product) in the first quarter and an unprecedented decline in the second quarter of 2020. In this context, the Brazilian economy has been operating with the lowest basic interest rate since the Brazilian Real launch, which, in a broad perspective, can lead to increased volatility in asset prices and influence the dynamics of the financial system and of the capital markets.²

As reported on the previous FSR,³ the SFN entered this challenging period well capitalized, well provisioned, and highly liquid. The timely measures taken by the federal government, by the National Monetary Council (CMN) and by the BCB reinforced the SFN's resilience to cope with increased risks to financial stability stemming from Covid-19. Therefore, the financial markets operated adequately and the banking system balance sheet substantially increased in the first semester of 2020, with high funding volumes and supply of credit to the real economy at the fastest pace in the last five years.

The BCB remains attentive to the unfolding of these measures, particularly to the cutback in emergency aids and to the behavior of debt with postponed installments as the grace period ends. Notwithstanding the grace period has been successful in assuaging banking clients' short term liquidity and in maintaining financial institutions' (FIs) solvency, it can have delayed credit risk materialization. To mitigate this risk, the system increased provisions and exhibited, in June 2020, one of the highest problem assets (AP) coverage index (CI) in the series. Additionally, the stress tests results show resilience and ability of the banking system to absorb losses in all simulated scenarios.

The banking credit gained prominence in financing large companies, while capital markets had smaller participation, as predicted in the previous FSR. Credit to Micro, Small, and Medium Enterprises (MSMEs) increased by double digits, which had not taken place since 2013.

- Banking credit to non-financial corporations increased at a faster pace since mid-2014, mostly influenced by the credit to large companies, which sought resources to strengthen liquidity, to finance the productive chain, and to hedge against exchange rate fluctuation. Credit to MSMEs increased again by double digits at the beginning of 2020, before the pandemic, and sustained this pace throughout the semester. This trend is expected to accelerate in the second semester due to the main governmental incentive programs put in place at the end of June 2020.
- Debt renegotiations lengthening terms to debtors have been influencing the APs' index improvement for companies of all sizes without necessarily risk reduction. It is still unclear how these renegotiated debts will perform after the end of the grace period for payment.

1 Inflation Report, available at <https://www.bcb.gov.br/en/publications/inflationreport>.

2 233rd Copom Minutes, available at <https://www.bcb.gov.br/en/publications/copomminutes>.

3 <https://www.bcb.gov.br/en/publications/financialstabilityreport>.

- Regarding risks stemming from large companies, one of the main concerns in recent years, the APs' level showed an improvement, which should be taken with caution due to the significant portfolio increase. APs, *per se*, stay high and increasing. Furthermore, since April 2020, some large companies had their credit ratings worsened to pre-AP levels. As a result, ongoing surveillance by the BCB is warranted.
- The pandemic interrupted the recovery trend of payment capacity and profitability of non-financial corporations but did not raise the risk to the 2016-17 level, which can be seen on listed companies' balance sheets. Requests for judicial recoveries, considering the whole universe of companies, remain on 2019 levels, and are expected to rise from the second semester of 2020 on.
- Foreign currency-denominated debt balance in companies with no exchange hedge identified is restricted to less than 5.0% of the GDP. The 1.8 p.p. increase from December 2019 is mainly due to the Brazilian Real depreciation against the dollar. The BCB continues to monitor these exposures, especially during this period of heightened foreign exchange volatility.

The pandemic induced a retrenchment in the growth rate of household credit, contrasting to the behavior of enterprise credit.

- Covid-19 negatively affected jobs and consumer confidence. Moreover, the debt-to-income ratio rose even higher and approached the maximum level observed in 2015. In this context, there was a significant retrenchment in credit granting to households, mainly in the “vehicle financing” and “credit card” modalities.
- Regarding stock variation, real estate financing was the only modality to expand in the first semester of 2020. Although all the modalities of household credit show recovery signals starting in June 2020, they are expected to grow less than the outlook before the pandemic, due to the postponement of “non-essential” expenditures related to consumption.
- Approximately $\frac{1}{4}$ of the outstanding household credit was renegotiated due to the pandemic and real estate financing corresponded to more than half of that. As well as in the enterprise credit, this significant volume of renegotiations can be deferring the credit risk materialization to the end of 2020 and the beginning of 2021, since part of the borrowers may not be able to honor the terms of renegotiated contracts.
- It should be emphasized that cohort analysis suggests the upward trend in the risk of “vehicles” and “non-payroll-deducted personal credit” modalities, points of concern highlighted on the previous FSR, has dissipated. Accordingly, the reason behind the risk increase in main modalities of household credit in 2020 is more related to isolated consequences of the pandemic, which elevated the risk of real estate financing and credit card to historical highs, than to structural issues related to falling granting standards.

Bank profitability presented a sharp decrease, eminently due to an increase in provision expenses.

- The pandemic erupted when banking profitability had already recovered from the 2015-16 recession effects, which allowed the absorption of provision expenses at a level similar to the recession one, causing no disturbance to the system. The outlook on profitability for the next semester is stable, a scenario that will become clearer as the effects of removing the transitory measures to oppose the pandemic – emergency aids and grace period for payment of credit transactions – become known.
- A drop in funding costs rendered banks the ability to scale back the interest rate of new grantings without losing gross interest margin. This fall in the average interest rate of new grantings also results from the fact that credit

growth is mainly taking place on large companies' portfolio, which is less profitable than the Small and Medium Enterprises (SME) and personal portfolios, often subject to larger spreads.

- The pandemic also induced a relevant retrenchment in services revenues, chiefly on card transactions (debit and credit) and fees, from March to May 2020. It should be noted that, despite most of these revenues should recover as the economic activity recovers, some services lines might continue to be squeezed due to structural changes, e.g., competition growth and the new interest rates level.
- The basic interest rate is at the lowest historical value and its maintenance at low levels for long periods raises questions related to the interest margin behavior and bank profitability. In this sense, the effects are still not obvious.

The measures taken by the federal government, the CMN and the BCB were important to preserve the banking system's solvency and resilience in coping with the adverse effects of Covid-19...

- The solvency indexes stay well above regulatory limits even with the fallback in the first half of 2020. The Capital Ratio (CR) fall stems essentially from credit portfolio increase and the Brazilian Real depreciation, which elevated credit transactions', derivatives', and tax credits' risk-weighted assets.
- There was a meaningful drop in the distribution of net profits in the first semester of 2020 compared to the second semester of 2019. This drop was affected by the outlook and by the restrictions imposed by CMN to preserve bank capital in the 2020 fiscal year.
- It should be emphasized that the provision level to face expected losses from APs is one of the highest since the end of 2014. Notwithstanding temporary allowance to restructure credit transactions exempting new provisions, the FIs elevated provisions without undermining capitalization levels, showing the banking system's resilience.

...and allowed the SFN to go through the acute period of stress resulting from Covid-19 with steady low liquidity risk.

- The outbreak of the pandemic caused a sharp increase in lending, increased market volatility and significant outlays with derivatives adjustments and margin deposits, highlighting outlays related to hedge/overhedge operations of investments abroad and interest rate hedging. This turmoil increased cash outflows, which were offset by the increase in liquid assets generated as a result of regulatory actions and of the SFN dynamics itself, neutralizing the liquidity risk.
- It should be noted that, before the pandemic, the FIs had robust liquidity and balance sheet structures to cope with periods of stress. This robustness, combined with the set of measures adopted, has allowed the SFN to maintain the credit flow to the real sector, upholding short- and long-term liquidity, without risks to financial stability.

The update of the stress test performed to estimate the effects of the Covid-19 shock on real economy agents shows a significant impact, yet less than that published on the previous FSR.

- Stress tests based on scenario analysis with joint variations over time, on variables such as GDP, jobs level, inflation, interest rate, and exchange rate, or based on sensitivity analyses for the main risks evaluated independently (credit, interest, exchange rate, and real estate devaluation), persist indicating that the banking system has adequate loss absorption capacity in all simulated scenarios, with no relevant non-compliances.

- The stress test published on the previous FSR specifically to estimate Covid-19 impacts was improved, adjusting assumptions to take into account events that occurred after the last issue. An important change was the criterion for the selection of companies vulnerable to the effects of the pandemic. In this exercise, the selection was based on the evolution of cash inflows until August 2020. Another change was the addition of workers with vulnerable occupations or situations.
- The debt of the companies most impacted by Covid-19, considering the banking system, capital markets, and internalized foreign debt, adds up to BRL1.1 trillion, commensurate to 30% of the total debt of non-financial companies in the aforementioned funding sources. The debt of vulnerable workers, in turn, amounts to BRL0.2 trillion, representing 11% of household debt to the SFN. The result of this specific stress for Covid-19 denotes that, in an extreme situation, losses related to companies and vulnerable workers would require a BRL35 billion input, commensurate to 3.5% of SFN's regulatory capital, for all institutions to comply with the minimum regulatory limits.
- The result of the current test, based on observed data, demonstrates a 50% lower impact than the result published on the previous FSR, based on theoretical assumptions. Despite the methodological change, the factor that most contributes to this improvement was the recovery of inflows from various sectors of the economy until August 2020, after the sharp drop in April and May. These results substantiate the SFN ability to absorb shocks from the pandemic effects, even under severe hypotheses.

The BCB evaluates that the measures taken have succeeded in safeguarding financial stability from the negative effects of Covid-19, with benefits for households, non-financial enterprises, and the SFN.

- For families and non-financial companies, the measures were successful in providing financial relief to go through the most acute period of the crisis with more time to recover their payment capabilities. For the financial system, the measures were successful in maintaining liquidity and fluidity in the credit market, as well as easing FIs' capital requirements.
- One of the most significant effects of the initial measures was credit renegotiation, with the postponement of obligations payments from economically viable bank customers who had their ability to pay temporarily hit by the pandemic. The renegotiations occurred mostly in credit to persons with monthly income up to five minimum wages and Micro and Small Enterprises, approximately 30% and 35% of the renegotiated portfolio, respectively.
- Among the measures not described on the previous FSR, the National Program to Support Micro and Small Businesses (Pronampe), a credit support program for companies with revenues up to BRL4.8 million, is noteworthy. This measure was so effective that its initial resource allocation was increased by about 75%. Other important measures were the Emergency Credit Access Program (Peac) – aimed at SMEs – and the Program of Working Capital for the Preservation of Firms (CGPE), which encourages the granting of loans to MSMEs.

The FSS shows that the market significantly increased its risk perception with delinquency and the economic activity level but considers appropriate the measures adopted by the BCB to mitigate the economic effects arising from Covid-19.

- The increased risk perception reflects concern about the impact of the duration of the pandemic on business operations and the labor market. The concern grew both relative to the probability of delinquency materialization and to the size of eventual losses caused. FIs have controlled delinquency through massive campaigns to extend and renegotiate debts and through increased selectivity in new operations.
- The perception of political and fiscal risks also grew again as a result of the fiscal effort to finance measures to contend the pandemic effects. Many FIs highlighted the risk of fiscal situation worsening if temporary expenditures related to the pandemic become permanent, threatening the spending ceiling and harming public debt sustainability.

- FIs believe that a lower interest rate environment stimulates economic activity, however, it also creates risk elements. The main consequence would be the stimulus to growth through increased consumption and investment, with benefits in reducing the debt service of companies and families. As risk factors, there might be increased risk appetite and volatility, funding access shrinkage, and a decrease in bank results.
- In August 2020, the market showed a worse perception of economic and financial cycles than in February, but less negative than in May. The vision of an economy in recession or depression is widely shared. On the other hand, confidence in the financial system stability remains high, at one of the best levels since 2012.

Systemically important financial market infrastructures (FMIs) operated efficiently and safely throughout the first half of 2020, despite global scale uncertainties that caused unprecedented volatility, with substantial falls in interest rates and stock and oil prices.

- Need of resources for payments in the system – called Effective Liquidity Need (NEL) – represented, on average, 2.6% of the available liquidity, 8.9% being the maximum percentage observed in the period, lower numbers than those observed in the previous semester.
- Backtesting analyses for the clearing and settlement systems of transactions with bonds, securities, derivatives, and foreign currency, in which there is an entity acting as a central counterparty (CCP), presented results compatible with the Brazilian Payments System standards and with international recommendations.

The need for the BCB-regulated FIs to hire additional hedge (overhedge) when making investments abroad was eliminated with the adjustment in the tax legislation made by Law 14,031 of July 28, 2020.

- The volume of additional derivative contracts (overhedge) for the hedge of foreign investment to be effective is not irrelevant, which could lead to potential pressures in exchange rate determination. The tax structure in force before the new law resulted in the need to overhedge approximately 90% above the amount invested abroad.
- This legal measure will reduce SFN's market and liquidity risks. This reduction stems from a smaller increase in the capital requirement if the Brazilian Real devaluates and a lower need for high liquidity assets to cope with margin calls and daily adjustments due to the maintenance of hedge/overhedge operations.
- After fully implemented, the taxation of the exchange variation of the hedged investment abroad will be identical to the taxation of the exchange variation of the hedging instrument, with zero net effect on the FIs' results. BCB-regulated institutions will be able to reduce overhedge hiring in a phased manner, with 50% in 2021 and the other 50% in 2022. The Law provides for tax treatment related to Corporate Income Tax (IRPJ) and Social Contribution on Net Profit (CSLL). The tax effects related to the Social Integration Program (PIS) and the Social Security Financing Contribution (Cofins), not in the law, are of little relevance.

BCB survey shows that FIs adopt practices, procedures, and controls compatible with the challenges posed by exposure to cyber risk.

- The consolidation of the survey results was based on the main cybersecurity functions established by the cybersecurity framework developed by the National Institute of Standards and Technology (NIST), considered one of the references in tackling cyber incidents, chiefly in the financial sector.

- From the perspective of the functions provided in the NIST framework, FIs have better proficiency in the functions of “protection” and “recovery”. There is great scope for improvement of the functions "identification", "detection" and "response", a situation that can be critical in FIs with high dependence on digital channels to operationalize their business, especially smaller and less complex entities.
- The level of outsourcing of information security services is significant, considering all the functions provided in NIST. The relationship between BCB-regulated institutions and unregulated companies providing IT services is increasingly intense. Therefore, maintenance of the SFN’s operational and cyber resilience also depends on the security standards of these service providers.
- Although smaller FIs present a lower level of implementation of security controls, important initiatives such as structuring security operations centers, secure application development, and the execution of vulnerability analyses are verified. It should be noted that it is plausible to expect these institutions to implement fewer controls compared to larger and more complex institutions, without necessarily meaning greater fragility. The real need for controls should be evaluated based on the operational profile and business models that condition exposure to cyber risk in each FI.

The three main sources of BCB concern related to operational resilience have not presented significant vulnerabilities since the beginning of the pandemic.

- The first source of concern was with the infrastructure to enable remote operation. In this sense, the FIs overcame obstacles and allowed a wide use of remote work and greater use of digital channels by users. Adjustments were expedited to reduce face-to-face interaction and handling of physical documents and to direct demands for services to remote service channels. Digital channels were essential to enable access to emergency aids, in a process of forced bank usage that, in the end, will leave good legacies in terms of financial inclusion.
- The second source of concern is related to cyberattacks and the actions of fraudsters in a more digital operational environment. Overall, so far FIs have not had information security issues above normal operation standards, although they have reported a significant increase in malware, phishing, and spam attack attempts targeting customers and employees.
- Lastly, the third source of concern is the availability of critical FMIs. In this sense, there were events such as postponements of processing grids and delays in the daily closure times of FMIs’ activities, among other events that caused temporary outages of some services, but little affected users in general or the functioning of financial markets.
- It should be emphasized that the pandemic bequeathed valuable inputs to the operational evolution of FIs and showed that operational risk management is increasingly determinant for the survival of a FI. In the post-pandemic, FIs should place particular emphasis on the readjustment of their contingency plans, operational incident management, and management of relationships with third parties, chiefly with critical IT service providers.

In the last two decades, BCB has been expanding the regulatory and supervisory framework to develop the best corporate governance practices for the assessment and management of socio-environmental and climate change-related risks.

- The BCB has been acting on the socio-environmental agenda since the end of the first decade of the 2000s when the CMN began to require the FIs to check compliance with environmental legislation as one of the conditions to provide credit for rural and agro-industrial activities. Regulation has been improved since then and, from 2020, supervision included the assessment of socio-environmental risk in the Risks and Controls Assessment System.

- As an evolution of this work, the dimension "Sustainability" was included in the Agenda BC# in September 2020 with the main objectives of promoting sustainable finance within the SFN, improving the rules of management of social, environmental, and climate risks applicable to FIs and incorporating variables associated with sustainability in the work and decision-making processes at BCB.
- It should be noted the growing interaction of BCB with other central banks and international organizations in the proposition of regulatory guidelines on socio-environmental and climate risks. Recent actions include BCB's partnership with the Climate Bonds Initiative (CBI) and joining the Network for Greening the Financial System (NGFS). The latter discloses non-binding recommendations to assist central banks and supervisors in monitoring and supervising environmental and climate-related risks.
- In the process of evaluating and stimulating practices focused on sustainability, BCB has been developing a methodology to identify socio-environmental and climate change-related risks that covers the adequacy of socio-environmental risk management by FIs and the relevance of credit exposures to this risk. With the launch of the new dimension "Sustainability", this methodology will be improved, allowing better identification of these risks.

Decisions of the Financial Stability Committee on the Countercyclical Capital Buffer

At the regular meetings of June 2 and September 1, 2020, the Comef decided to maintain the Countercyclical Capital Buffer for Brazil ($ACCP_{\text{Brasil}}$) at 0%.⁴ The Comef judges that the financial system presents resilience against risks stemming from the current Covid-19 pandemic. Banks in general voluntarily maintain capital and liquidity at levels above the minimum prudential requirements and their resilience is verified employing analyses and stress tests evaluated at the Comef meetings and published in this Report. Considering current and expected conditions regarding the behavior of the credit market and asset prices, the Comef judges appropriate to maintain the $ACCP_{\text{Brasil}}$ at 0% for at least one year, which means that no $ACCP_{\text{Brasil}}$ amounts will be required for at least two years. These decisions were made by the Comef in the exercise of its attributions provided for in Circular 3,927, of February 11, 2019, and followed the principles and objectives described in Communiqué 30,371, of January 30, 2017.

4 Communiqués 35,761, of June 2, and 36,127, of September 1, 2020.

Financial System Overview⁵

1.1 Liquidity

The crisis arising from the burst of the Covid-19 pandemic posed challenges to the Brazilian banking system in the first half of 2020. The shock in economic activity caused by the pandemic was immediately transmitted to the financial system, in terms of liquidity needs, among which disbursements of daily mark-to-market settlements and margin calls for derivative transactions in [B]³ – due to the market volatility –, drop in the availability of external funding, high withdrawals from open credit lines and households and companies credit operations restructuring and renegotiation process. In response, the BCB implemented a wide range of supportive measures⁶ that have been proven effective in preserving financial institutions liquidity profile, which, added to the increase in traditional sources of funding like demand, saving and term deposits, provided conditions for liquidity risk not being a limiting factor for banking system's operations.

The Covid-19 pandemic impact led, at first, to an increase in the banking system's liquidity risk, both for the short and the long term, although it remained at appropriate levels. The robust growth of liquid assets and funding in all banking systems' segments, as well as the supportive measures taken by the BCB to provide liquidity, enabled a rapid recovery of bank's resilience levels to cope with stress periods. Jointly, both regulatory and monitoring

5 In section 1.1 Liquidity, the scope of the analyses is the banking system, comprised by commercial, multi-purpose, savings, foreign exchange and investment banks, and by financial conglomerates including at least one of these types of institutions. Within sections 1.3 Profitability and 1.4 Solvency, the scope of the analyses is the prudential conglomerates related to the banking system, as defined by Resolution no. 4,280, from October 31, 2013, to which the minimal capital requirements, as stated by Resolution no. 4,193, from March 1, 2013, are applied since January 1, 2015. In section 1.5 Capital stress tests, the scope is the latter including the prudential conglomerates involving development banks. In section 1.2 Credit, the scope is the whole National Financial System (SFN).

6 The above-mentioned set of liquidity supportive measures is detailed in section 2.2 of this FSR.

liquidity risk ratios followed-up by the BCB⁷ ended the semester at low risk levels, with private banks having more relevant changes in their liquidity profiles along the first half of 2020.

1.1.1 Domestic and external funding

The stock of funding instruments increased by 15.8% between December 2019 and June 2020. The most significant variations are concentrated from mid-March, after the World Health Organization declared that the Covid-19 outbreak was a pandemic.

Several events have influenced bank funding in the period. At first, deposits have been made by companies that had withdrawn resources from previously available credit lines, a defensive move to boost their cash position amid growing uncertainty arising from the sanitary crisis. Additionally, customers have withdrawn money from investment funds and placed it into the financial system. Moreover, new regulations issued by the National Monetary Council (CMN) have also contributed to funding growth, such as the reinstatement of Term Deposits with Special Guarantee (DPGE) from the Credit Guarantee Fund (FGC)⁸ without the need of providing collateral in favor of that fund and the creation of the Financial Letter with Guarantee (LFG)⁹ with the purpose of operating the Special Temporary Liquidity Line (LTEL-LFG).¹⁰

Furthermore, some government measures have also contributed to a increase of resources held by the natural persons and companies, such as the payment of a 600 BRL emergency aid to eligible people, the advance payment of the 13th salary of retirees of the National Social Security Institute (INSS), the emergency withdrawals from the Length-of-Service Guarantee Fund (FGTS) and the postponement of some taxes' payment.

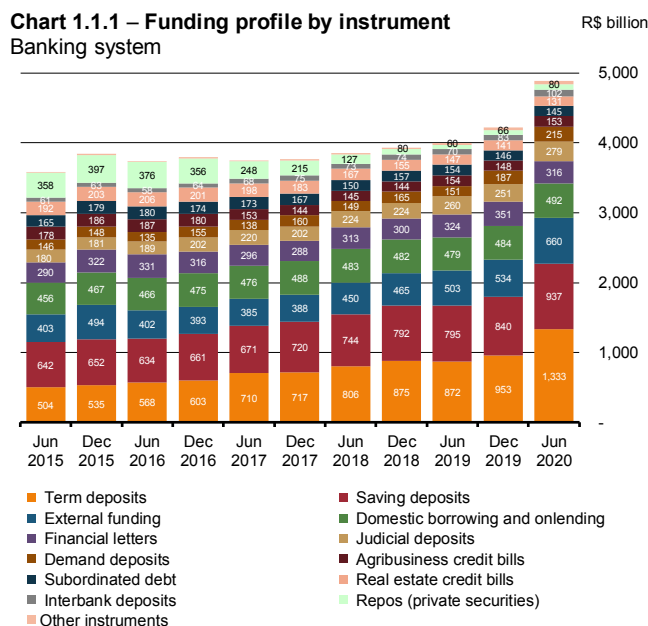
7 In order to monitor the bank's resiliency to liquidity stress scenarios in the short and long terms, BCB mostly uses Basel III standard liquidity ratios – LCR and NSFR – calculated and reported by domestic systemically important financial institutions (S1 Segment), as well as two conceptually similar liquidity ratios – Short-term liquidity ratio (IL) and Structural liquidity ratio (ILE) –, measured internally by BCB to all banks, based on its own liquidity stress scenarios and on data recorded on a daily basis by financial institutions in securities clearings and trade repositories (Selic, [B]³, Cerc, etc.).

8 Resolution 4,785, of March 23, 2020. The reinstatement of DPGE is covered in Chapter 2 (subsection 2.1.2)

9 The LFGs are part of the financial letters series in Chart 1.1.1.

10 Resolution 4,795, of April 2, 2020. Special temporary liquidity lines are covered in Chapter 2 (subsection 2.1.2).

Chart 1.1.1 – Funding profile by instrument
Banking system

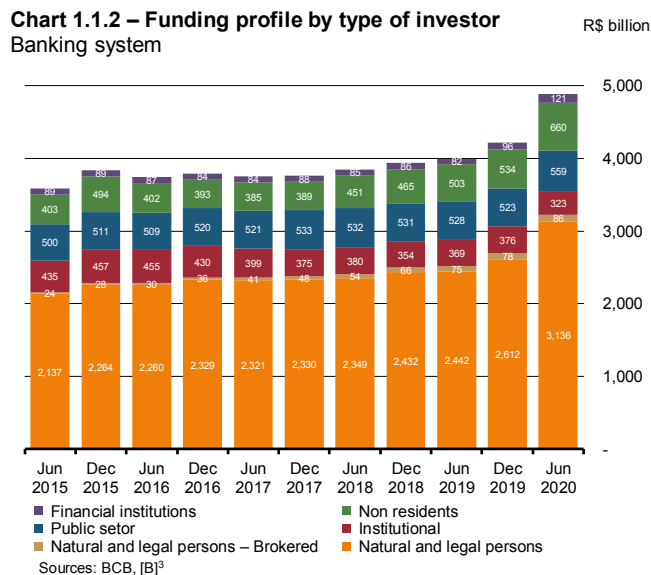


Sources: BCB, [B]³

Term deposits: certificates of deposit, receipts of deposit, time deposits with special guarantee by the Credit Guarantee Fund (Fundo Garantidor de Crédito – FGC). Subordinated debts: subordinated certificates of deposit, subordinated financial letters and other capital instruments. Other instruments: structured notes, bills of exchange, mortgage notes, box spread strategies with options. Repurchase agreements (repo): refers only to repo collateralized by private-issued securities.

Statistical annex

Chart 1.1.2 – Funding profile by type of investor
Banking system



Sources: BCB, [B]³

Statistical annex

Among the funding instruments whose stocks have grown in the first half of 2020, term deposits (39.8%) and savings accounts (11.6%) have stood out; among those that have shrunk, it is worth mentioning financial letters (-9.9%), mainly due to lower demand by investment funds (Chart 1.1.1).

Funding profile by type of investor shows the prevalence of natural and legal persons not classed otherwise,¹¹ whose stock represented 65.9% of the outstanding amount on June 2020 – part of which (1.8% of the outstanding amount) constitutes brokered funding. Funding from the public sector has contracted to 11.4% of the total, whereas that from institutional investors has decreased to 6.6%. It is worth mentioning that funding from the public sector is almost entirely linked to the brokering of government loans or credit lines¹² (Chart 1.1.2).

The domestic funding maturity profile had a significant increase in funding with immediate liquidity (Chart 1.1.3), due to the liquidity demand by depositors, materialized in the rise of term deposits with redemption clauses. On the other hand, although declining its share in total funding, there was an increase, in nominal terms, in term deposits maturing over a year, especially the New Term Deposit with Special Guarantee (NDPGE).¹³

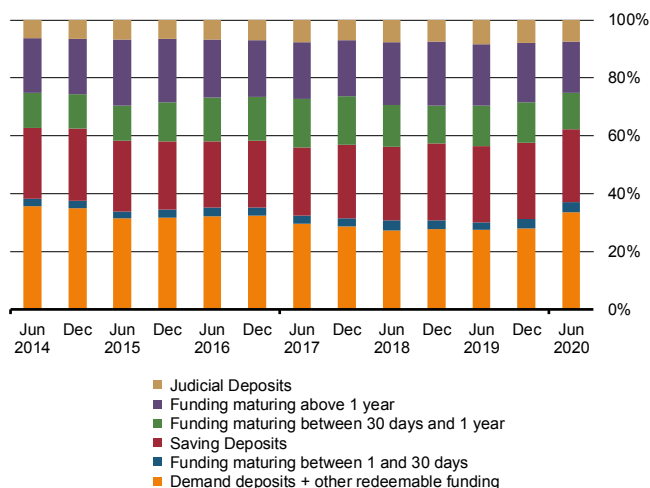
External funding ended the first half at USD191.7 billion, a balance 3.3% lower than the previous semester, but showed an increase in its share of total borrowings due to the 35.9% appreciation of the U.S. dollar against the Real (Charts 1.1.4 and 1.1.5). The reduction in internalized funding, observed since the beginning of the pandemic in Brazil, is mainly due to the early settlement of intra-conglomerate external borrowings by large national banks that reduced their investments in branches/subsidiaries abroad. In the same period, there was also a reduction in extra-group borrowing, both by FIs with domestic control and with foreign control, compensated by the increase in intra-group borrowing, by Brazilian subsidiaries of foreign banks, from their parents or affiliates abroad. Considering the internal and external conjunctures, the volume of external funding should not have relevant changes, although the costs of internal funding are proving competitive, due to a combination

11 Definition comprising not only companies, but other entities (such as non-profit ones) as well.

12 Housing, Agribusiness Credit, Machinery and Equipment, Urbanization, Innovation etc.

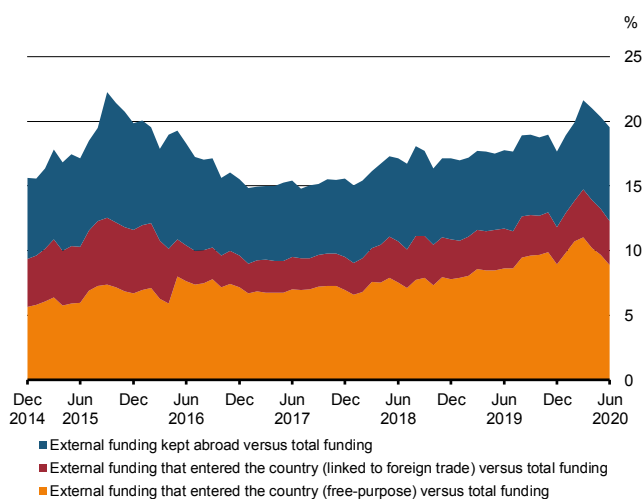
13 For further information, check CMN Resolution 4,785, of March 23, 2020; CMN Resolution 4,789, April 6, 2020; and CMN Resolution 4,805, of April 23, 2020.

Chart 1.1.3 – Domestic funding
Residual maturity profile



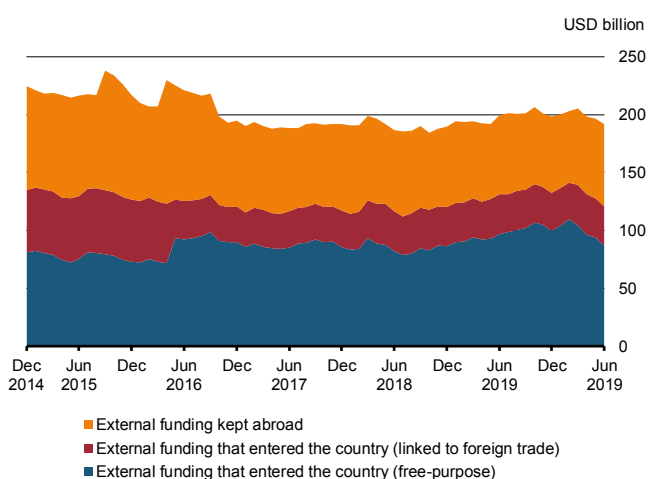
[Statistical annex](#)

Chart 1.1.4 – Profile of external funding
As a percentage of total funding



[Statistical annex](#)

Chart 1.1.5 – Profile of external funding
Absolute amounts in dollars



[Statistical annex](#)

of reducing interest rates and policies aimed at expanding liquidity and lowering the cost of credit operations.

The cost of export-linked external credit lines had a decreasing trajectory, even with an increase in the spread over the international reference rates used in extra-group borrowings (Chart 1.1.6). An important contribution to this cost reduction was the aforementioned increase in the volume of intra-group borrowing by Brazilian subsidiaries of foreign banks, especially in the initial phase of the Covid-19 pandemic.

1.1.2 Short-term liquidity

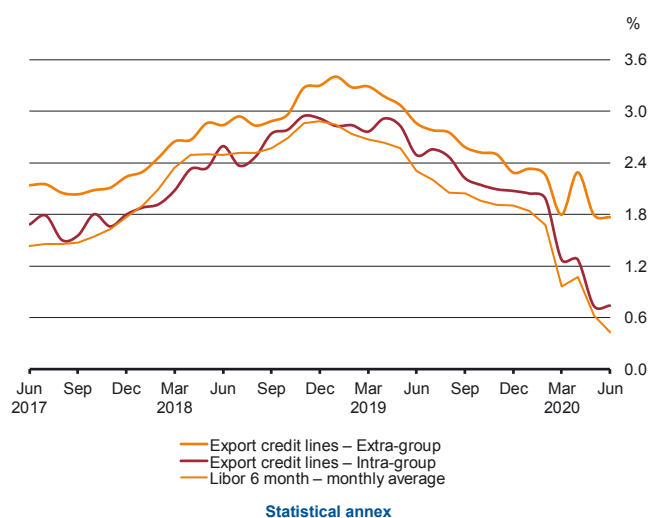
The banking system's short-term liquidity risk ended the first half of 2020 stable, compared to December 2019, with a robust recovery after the drop caused by the Covid-19 pandemic. The bank's liquid assets cushion raised significantly (+30,3%), in nominal terms, especially fixed-rate and inflation-linked domestic sovereign bonds stocks. The strong increase in funding; the additional reduction in reserve requirements on term deposits, which provided liquidity for the largest banks in Brazil, among other supportive measures adopted by the BCB, detailed in section 2.2 of this FSR, are considered the main factors of bank's liquid assets rise in the period.

However, cash requirements in the next 30 days under the BCB stress scenario raised at the same rate in the period (+30,3%), due to the increase both in market volatility and in funding run-offs estimates, the latter reflecting bank's short-term and immediate liquidity funding increase.

Therefore, due to the joint effect of liquid assets expansion and the increase in stressed cash outflows at the same rate in the first half of 2020, the banking system's aggregate short-term liquidity ratio (IL)¹⁴ remained stable when compared to December 2019, at 2.43 in June 2020, which constitutes a strong recovery after the sharp decline observed in the first quarter (Chart 1.1.7).

14 The IL measures whether banks have enough liquid assets to cover their short-term cash-flow needs in a simulated stress scenario (period of 21 business days) defined and calibrated by the BCB. The cash outflows arise from the run-off of maturing or redeemable liabilities, losses from market risk exposures, for instance, margin calls and settlements of derivatives, and others contractual payables over the next month. Institutions with IL above 1 have enough liquid assets to face those cash outflows. For further details about this indicator, please refer to the Concepts and Methodologies appendix, item a.

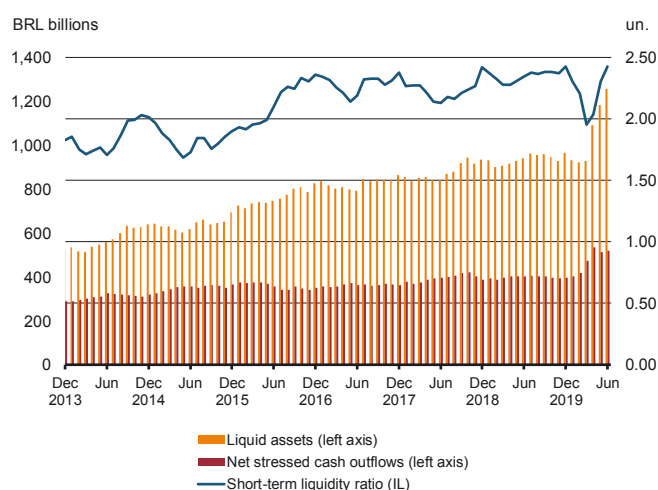
Chart 1.1.6 – External credit lines for export
Interest rates



By type of control, the private banks aggregate stock of liquid assets grew significantly (+58,5%) in the first half of 2020, when compared to December 2019.¹⁵ Funding increase, combined with the additional reduction in reserve requirements on term deposits, more than offset the rise in credit outflows, fostering private and, to a lesser extent, public banks liquid assets growth.

Private banks' cash flows in the first half of 2020¹⁶ highlights credit granting operations for companies and families as the largest cash outflows in the period (Chart 1.1.8). It's worth mentioning daily mark-to-market settlements and margin calls for derivative transactions in [B]³ too, mainly due to cash disbursements related to foreign investments hedge/over hedge contracts. Similarly, purchasing of less liquid assets, investments in foreign securities and increase in foreign currency cash also consumed liquidity in the period.

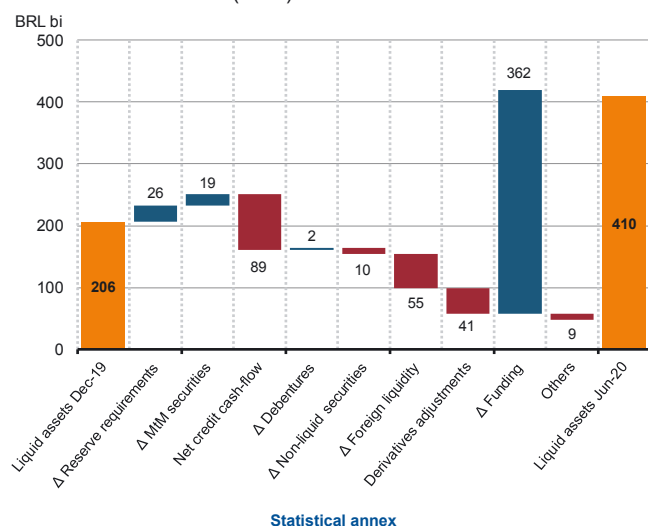
Chart 1.1.7 – Short-term liquidity ratio (IL)



Public banks had a more stable cash flow in the first half of 2020, compared to private ones, highlighting the increase in funding and in the market value of sovereign bonds, due to the shrinkage trend of the yield curve. It's worth mentioning that public banks aggregate stock of liquid assets was already at a higher level than that of private ones, at the beginning of the semester (Chart 1.1.9).

Public banks net credit cash flow had distinct dynamics along the first half of 2020. In January and February there was cash generation, through partial retention of inflows from interest and principal payments of credit portfolios, and from the burst of the Covid-19 pandemic on there was cash consumption with loans. Jointly, net credit cash-flows had little impact on public banks liquidity profile, being worth mentioning the importance of households and companies credit operations restructuring and renegotiation process. Investments in foreign securities and cash increase in foreign currency, as well as daily mark-to-market settlements and margin calls for derivative transactions in [B]³, due to cash disbursements related to hedge contracts – mainly for fixed-rate assets – also consumed public banks liquidity in the semester.

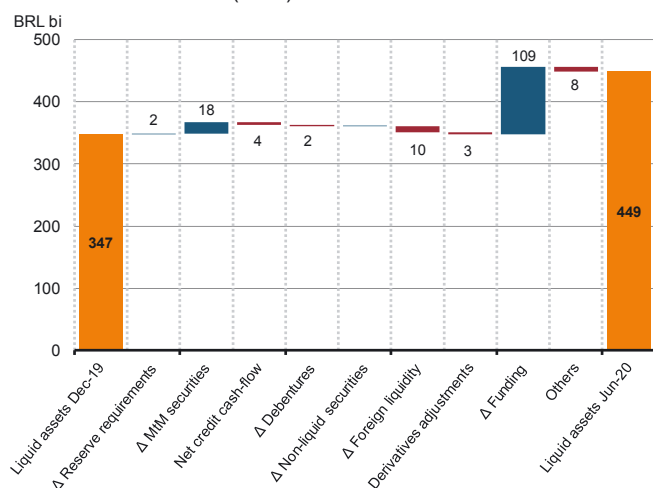
Chart 1.1.8 – Cash Flow Private Banks
S1 – Cumulative 2020 (June)



15 The growth rates mentioned here are calculated using moving averages, corresponding to working days over a period of one month, in order to minimize possible volatility in liquid assets stocks.

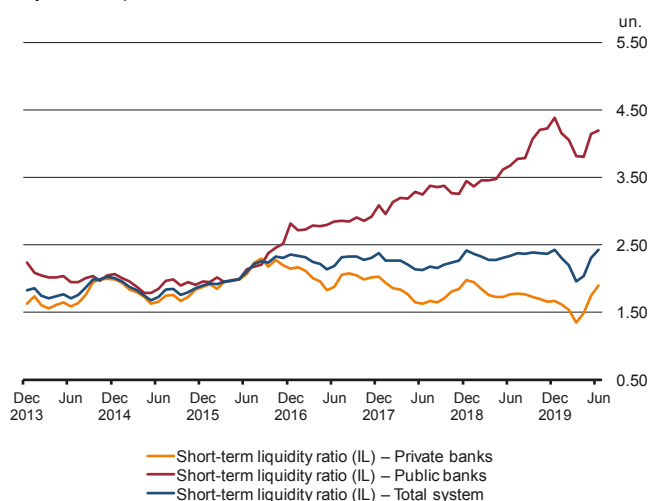
16 Cash flow proxy based on financial statements of banks. Public and private banks cash flows encompass only banks belonging to S1 prudential segment, which constitutes the vast majority of banking system's assets and financial flows. For further information, check CMN Resolution 4,553, of January 30, 2017.

Chart 1.1.9 – Cash Flow Public Banks
S1 – Cumulative 2020 (June)



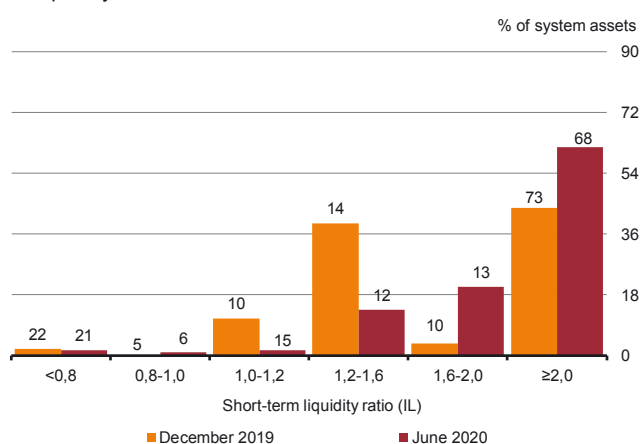
[Statistical annex](#)

Chart 1.1.10 – Short-term liquidity ratio (IL)
By ownership



[Statistical annex](#)

Chart 1.1.11 – Short-term liquidity ratio (IL)
Frequency distribution^{1/}



^{1/} The numbers above bars are the number of financial institutions with IL within the corresponding interval.

[Statistical annex](#)

The sharp increase in funding and in market volatility, particularly at the beginning of the crisis, led private banks projected cash disbursements to rise 37.7% in the first half of 2020. On the other hand, public banks projected cash outflows grew 6.9% in the period, reflecting a decrease in funding run-off estimates in the stress scenario.

Summing up, after the sharp drop in private and public bank's aggregate short-term liquidity ratio (IL) caused by the Covid-19 pandemic, there was a rapid recovery of the financial institutions' liquidity profile. Regarding private banks, their liquidity levels decreasing trend that began in 2016 was interrupted, returning to 2018 levels. Conversely, public banks liquidity levels upward trend that had also been coming since 2016 was ceased. Both trends were related to distinct expansion and reduction credit portfolios strategies (check Chart 1.2.5.1). Regardless of the changes that have occurred, both private and public banks have kept liquidity risk profiles at comfortable levels (Chart 1.1.10).

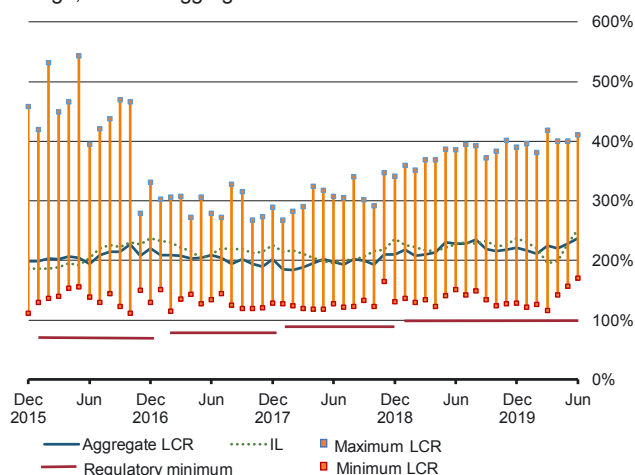
By looking at the liquidity risk individually, the IL of largest banks, in terms of total assets, increased (Chart 1.1.11). At the end of the first half of 2020, 97.4% of the banking system's assets were on banks' balance sheets with enough stock of liquid assets to withstand a liquidity crisis scenario projected by the BCB, i.e., banks that had an IL above 1. In comparison with December 2019, the number of institutions with an IL below 1 remained stable at 27, all banks with low representativeness in the financial system.

The Liquidity Coverage Ratio (LCR)¹⁷ remained more stable than the IL along the first half of 2020, partly due to the additional tranche of reserve requirements considered as liquid assets in the LCR.¹⁸ There was a slight decrease in the indicator at the beginning of the Covid-19 pandemic, and a gradual recovery along the semester, due to the increase in funding and additional reserve requirements release. The aggregate LCR reached 237% at the end of the semester (Chart 1.1.12), with all

¹⁷ The LCR is an index whose compliance is mandatory for all financial institutions in the S1 segment, pursuant to art. 2 of Resolution 4,553, of January 30, 2017, and in accordance with Resolution 4,616, of November 30, 2017. The indicator requires institutions to maintain high liquid assets to support cash outflows in the next 30 days, considering the stress scenario defined by the Basel Committee on Banking Supervision (BCBS) (www.bis.org/publ/C238.htm). Domestic regulation by CMN Resolution 4.401, of February 27, 2015, and by BCB Circular 3,749, of March 5, 2015.

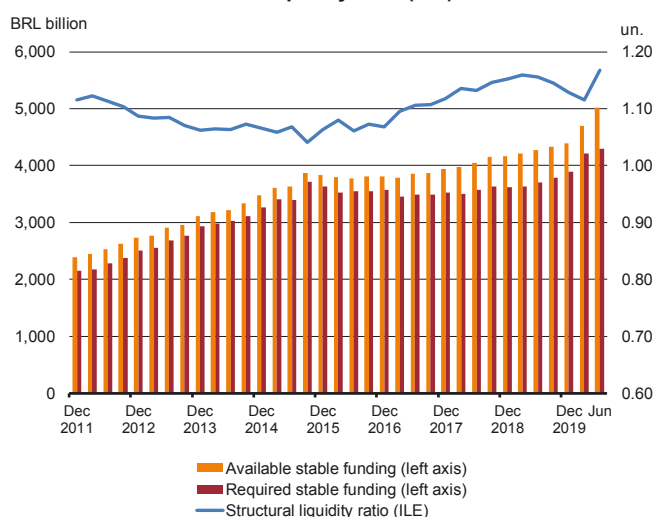
¹⁸ For further information, check BCB Resolution 3,986, of February 20, 2020.

Chart 1.1.12 – LCR
High, low and aggregate^{1/}



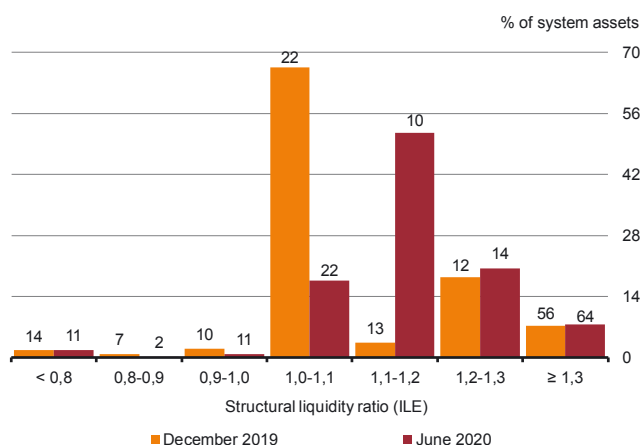
[Statistical annex](#)

Chart 1.1.13 – Structural liquidity ratio (ILE)



[Statistical annex](#)

Chart 1.1.14 – ILE Frequency distribution^{1/}



^{1/} The numbers above bars are the number of financial institutions with ILE within the corresponding interval.

[Statistical annex](#)

banking conglomerates required to comply with LCR having their ratios above regulatory minimum (100%).

1.1.3 Long-term liquidity

Long-term liquidity showed similar dynamics with short-term liquidity in the semester (decline and subsequent recovery), but with smoother movements. The beginning of the Covid-19 pandemic led to a sharp increase in credit granting volumes, putting pressure on liquidity at first, mainly in private banks. However, the restoration of liquidity through high volumes of funding provided a consistent recovery in the remainder of the semester, ensuring that banks' funding structures remained with low susceptibility to medium and long-term liquidity problems.

Even with the increase of funding with immediate liquidity, the Structural Liquidity Ratio (ILE) increased in the semester, given that funding considered more stable such as retail funding – demand deposits, savings and repo operations – also had significant growth, more than offsetting the increase in net credit granting cash flows in the period. This dynamic led the banking aggregate's ILE¹⁹ to close the first half of 2020 at 1.15 (Chart 1.1.13), with a slight increase (+0.02) compared to December 2019.

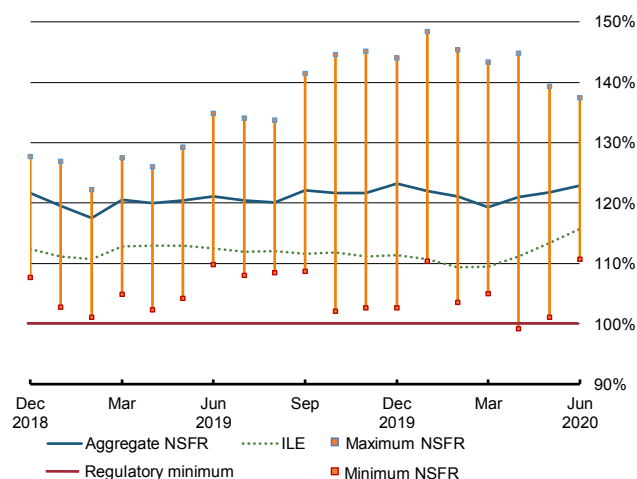
Analyzing the risk individually, there is an increase in the ILE of banks with systemic importance in terms of total assets (Chart 1.1.14), corroborating the increase in the structural liquidity of these institutions. Likewise, NDPGE has been proven to be important for strengthening the liquidity of small and medium-sized institutions. Thus, at the end of the semester, 93.7% of the banking system's assets were on bank's balance sheets with stable resources available at adequate levels to provide long-term liquidity to institutions.

The dynamics of the regulatory indicator Net Stable Funding Ratio (NSFR)²⁰ was very similar to the ILE,

¹⁹ ILE aims to measure whether banks have enough stable funding resources (numerator) to finance their long-term activities (denominator). Thus, institutions with ILE equal to or greater than 1 are less susceptible to future liquidity problems. For details, see appendix Concepts and Methodologies, item b.

²⁰ The NSFR was introduced in Brazil by CMN Resolution 4,616, of November 30, 2017, with the methodology given by Circular 3,869, of December 19, 2017, having started its effects from October 1, 2018. It is a ratio that has a minimum regulatory amount of 100% and the compliance is mandatory for all financial institutions in the S1 segment, according to art. 2 of Resolution 4.553, of January 30, 2017.

Chart 1.1.15 – NSFR
High, low and aggregate^{1/}



1/ NSFR and ILE series comprise FIs in the Segment S1 (nowadays: 6 banks).

[Statistical annex](#)

with a decline immediately after the Covid-19 pandemic crisis, and a consistent recovery throughout the semester (Chart 1.1.15). At the end of the period, all banking conglomerates required to comply with NSFR maintained the metric at levels above 100%, a regulatory minimum. Therefore, both the ILE and the NSFR²¹ indicate that the largest institutions have kept solid asset and liability structures, which reduce their susceptibility to future liquidity problems.

The full implementation of the Basel III prudential framework in Brazil ensured that financial institutions have adequate liquidity levels and balance sheet structures to cope with periods of stress, such as the current one triggered by the pandemic. Based on these appropriate pre-crisis levels, and with the set of measures adopted by the BCB, the conditions for the financial system to keep the flow of credit to the real sector were maintained, with the preservation of liquidity and without compromising financial stability.

1.2 Credit

1.2.1 Introduction

Credit market was affected by the strong impacts of Covid-19 pandemic, either for the economic consequences or for the reaction of SFN to the shock and the measures to face the Covid-19 crisis adopted by BCB. The growth in bank credit, which previously occurred mainly in household credit facilities, was explained by credit to corporates in the first semester of 2020, specially for large companies and in non-earmarked loans; for micro, small and medium-sized enterprises (MSMEs), annual growth accelerated during the first semester and it reached 11.7% growth in June 2020.

In line with the recent reduction in the basic interest rate of the economy, average interest rates of new credit operations fell throughout the first semester of 2020 (average interest rates were 22.6% PY in December 2019 and 19.5% PY in June 2020); this interest rate drop occurred for both household and company loans. Total loan portfolio increased 4.3% between December 2019 and June 2020, however with different levels for households (1.2%) and companies (8.6%).

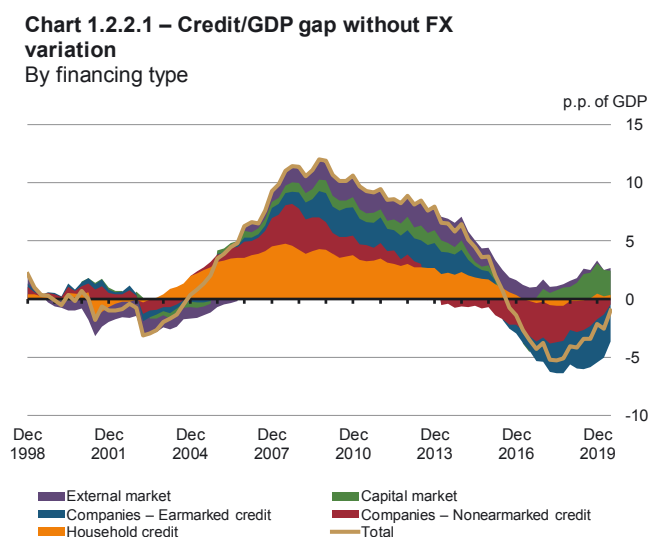
21 The ILE, despite being based on the NSFR methodology, has some parameters and definitions adapted by the BCB to better fit the available monitoring data, resulting in a more conservative number than the regulatory indicator.

The uncertainty brought by Covid-19 pandemic changed the recent evolution of the credit growth and the quality of the credit assets, leading to a raise in the problem assets level for some facilities. Besides that, it is still unclear how part of modified loans will behave when they have to return to due payments. However, with the increase occurred in the first semester, the current level of credit provisioning is an important defense to support losses in future periods.

1.2.2 Broad credit and long run trend

BCBS and the international literature²² use the credit-to-gross domestic product (GDP) gap to assess whether the growth of the credit outstanding in a country is sound regarding its long-term trend. This gap could signal an excessive increase in credit granted to companies and households, which could result in sudden adjustments. Therefore, BCBS suggests that countries with the aforementioned gap above 2.0 pp should consider adopting measures to reduce credit growth.

Currently, the credit-to-GDP gap is negative at 1.0% of GDP.²³ Despite the indicator improvement throughout last semester, the gap trend is expected to remain negative in the short run: the main contributions for this figure to remain below the long-term trend come from bank credit, especially earmarked loans to companies. Positive contributions come from the capital market (Chart 1.2.2.1), and also from lower nominal GDP growth rates.



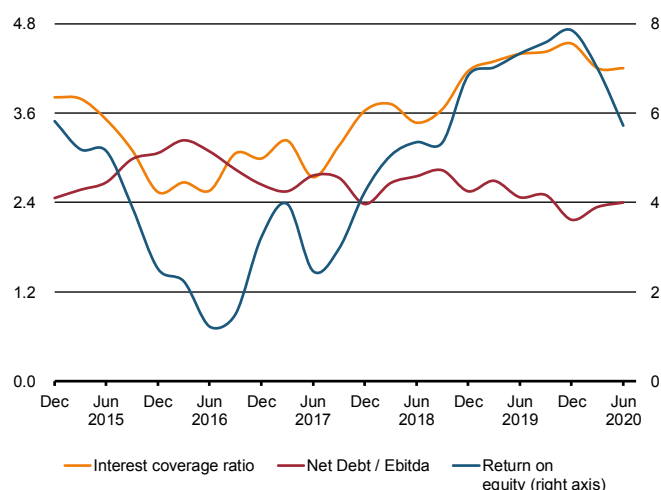
[Statistical annex](#)

1.2.3 Companies²⁴

The gradual pace of Brazilian economy recovery was interrupted by Covid-19 pandemic, which affected payment capacity and profitability of companies, as seen in balances sheets of listed non-financial companies.

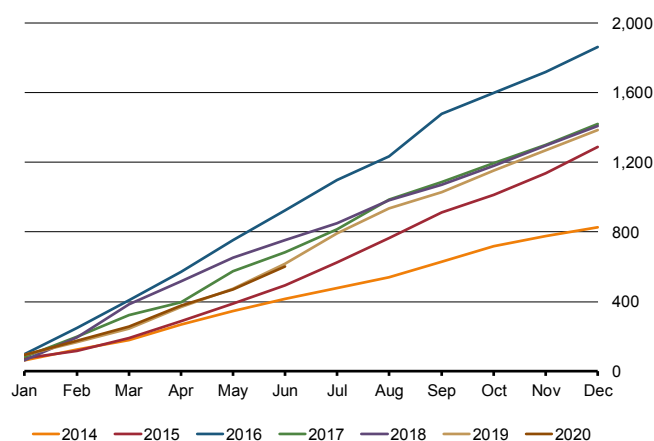
- 22 Drehmann, M., Borio, C., and K. Tsatsaronis (2011): “Anchoring countercyclical capital buffers: the role of credit aggregates”, BIS Working Papers, no 355. Drehmann, M., and Juselius, M. (2011): “Evaluating early warning indicators of banking crises: Satisfying policy requirements”, BIS Working Papers, no. 421.
- 23 Since December 2018, broad credit growth rates have been higher than GDP growth rates, leading to less negative broad credit-to-GDP ratios. In 2020Q2, both numbers – broad credit and GDP – showed lower growth rates, but broad credit decelerated less, thus contributing to an increase in the broad credit-to-GDP ratio. In other words, the recent broad credit-to-GDP gap improvement is related to broad credit growth, but also to lower GDP growth rates.
- 24 As of the present FSR edition, the companies size definition was determined by a different methodology that was used in the previous editions. For further information, please see Concepts and Methodologies Annex, item j.

Chart 1.2.3.1 – Economic and financial indicators



[Statistical annex](#)

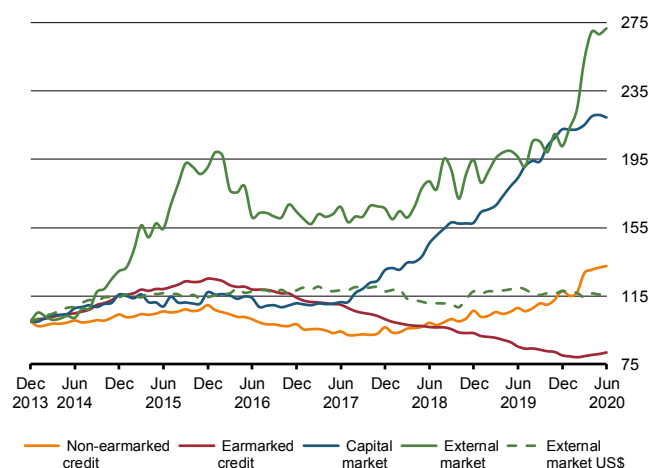
Chart 1.2.3.2 – Corporations in judicial recovery
Cumulative requests by year



Source: Serasa Experian

[Statistical annex](#)

Chart 1.2.3.3 – Corporate indebtedness
Dec/2013 = 100



[Statistical annex](#)

Although these ratios remained in an upper level than 2016 and 2017, a reversal in its uptrend was recorded in the first half of 2020, with the worsening of the profitability ratio (Chart 1.2.3.1). Regarding judicial recovery requirements, which embraces all companies, even though the numbers continued at the same level of 2019, it is expected an increase of requests from second half of 2020 on, due to crises impacts (Chart 1.2.3.2).

During pandemic, there was a significant devaluation of the Brazilian Real relative to U.S Dollars.²⁵ Considering that a relevant share of companies' debt is in the external market, total corporate indebtedness closed first half of 2020 with an increase of 18.1%, mainly due to the exchange rate variation. Once external market debt remained almost stable in USD²⁶ (Chart 1.2.3.3), corporate indebtedness growth was 4.0% in the semester, disregarding exchange variations. However, when financial²⁷ and operational²⁸ hedges are considered, the balance of foreign currency debt of the companies for which have not been identified any source of foreign exchange protection is restricted to only 4.9% of GDP, an increase of 1.8 p.p. since December of 2019. This rise was strongly influenced by devaluation of local currency mentioned above: maintaining exchange rate of December of 2019, there would have been a rise of 0.5 p.p. (Chart 1.2.3.4).

The capital market,²⁹ that has been an outstanding source of funding to companies since 2017, demonstrated a slowdown in growth pace in the semester, with reduction of bond issuance. Short-term funding by commercial papers, less relevant considering the whole market, increased 34.3%, but not enough to support capital market growth as seen in the past. Additionally, the balance of bonds kept in the portfolio of the financial institutions continued to grow. This movement, however, was concentrated in a few financial institutions and issuers.³⁰ Despite the Selic rate is in its minimum historical level, fixed-income bonds issuances are not expected to repeat their performances already seen in the past in the capital market, due to uncertainties in economic recovery pace in the pandemic context.

25 Devaluation of 35.9%, from 4.03 BRL/USD in 12/31/2019 to 5.48 BRL/USD in 6/30/2020.

26 Drop of 1.3% in the semester.

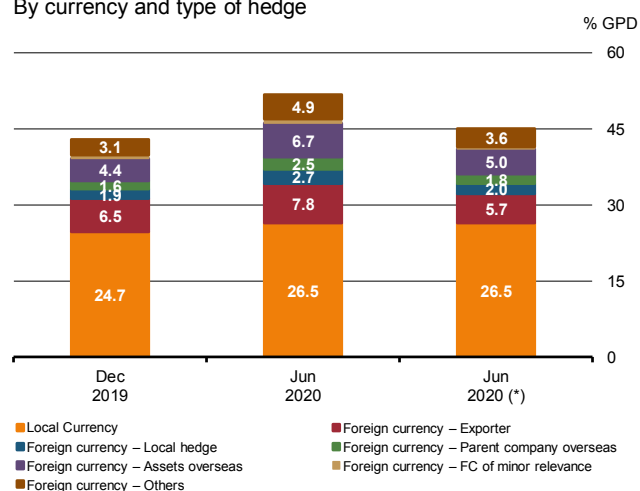
27 Long positions in dollar options and forward contracts.

28 Exporting, financial aid from parent company and foreign assets.

29 Bonds and commercial papers.

30 SFN share in capital market was 44.7% in June of 2020, 41.4% in December of 2019 and 38.2% in June of 2019.

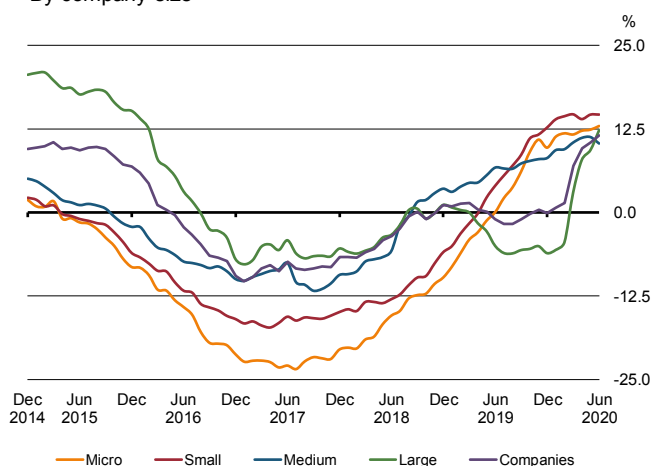
Chart 1.2.3.4 – Company debt
By currency and type of hedge



(*) Considers exchange rate of Dec/19

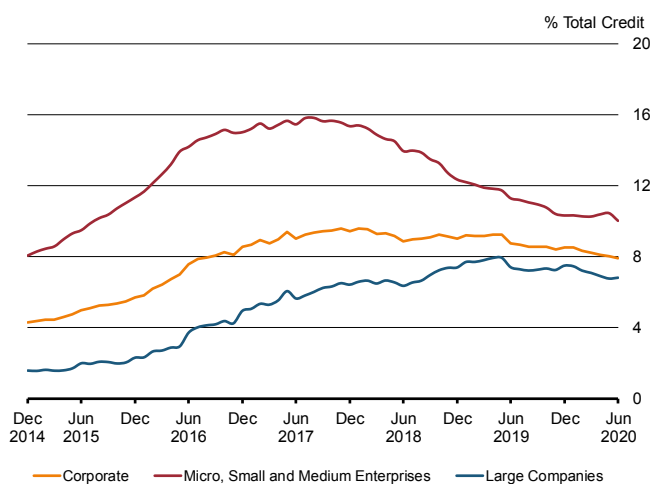
[Statistical annex](#)

Chart 1.2.3.5 – YoY credit growth
By company size



[Statistical annex](#)

Chart 1.2.3.6 – Problem Assets



[Statistical annex](#)

Regarding the domestic bank credit, the portfolio increased 8.4% in the semester and 11.5% in the twelve-month period (Chart 1.2.3.5), mainly due to non-earmarked credit to large companies.³¹ After World Health Organization (WHO) declared COVID-19 pandemic, the resources obtained by these companies in the banking system were used to compose liquidity, support production lines and financial hedge, in case of exporting companies.³² The micro, small and medium-sized enterprises, that had been growing at an expressive pace since the last quarter of 2019, maintained portfolio expansions during the first semester, reaching the highest level of annual growth rates since 2012. The governmental programs to abet credit launched in the first half of 2020 (Emergency Employment Support Program – Pese, National Program to Support Micro and Small Businesses – Pronampe and Emergency Credit Access Program – Peac), and the capital requirement reduction by BCB³³ regarding credit operations to small and medium-sized companies have positively influenced credit granting and must have their effects intensified in the second semester of 2020.

In relation to the risk of the banking credit portfolio, the percentage of problem assets decreased in the first half of 2020 and ended the semester in 7.9% for the total of non-financial companies, in comparison to 8.5% in December of 2019 (Chart 1.2.3.6). However, this decrease occurred due to the growth of the portfolio (denominator effect), given that the credit portfolio grew in a greater pace than the amount of problem assets to all sizes of companies (Charts 1.2.3.7 and 1.2.3.8). The slow growth of problem assets should be analyzed carefully, once there were a postponement of due dates of obligations and loan

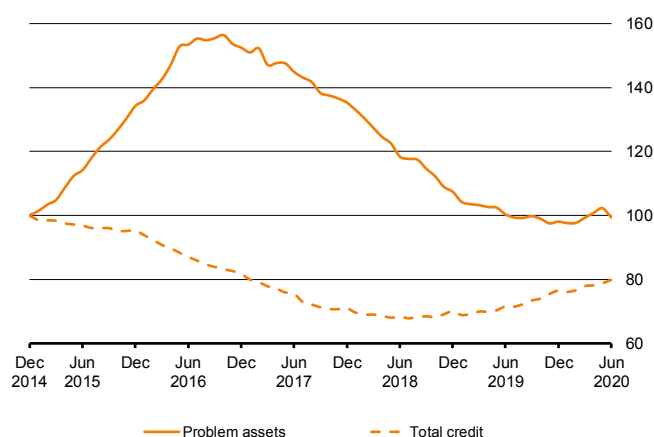
31 Despite the effect of devaluation of Brazilian Real has increased non-earmarked credit to large companies (21.9% in the semester and 28.7% in the twelve-month period), disregarding the exchange variation, credit growth also was significant (15.6% in semester and 20.5% in the twelve-month period).

32 When occurs a great devaluation of Brazilian Real in a short period of time, exporting companies are more likely to freeze the exchange rate of their sales in external market.

33 BCB Circular 3,998, of April 9th of 2020, decreased the regulatory capital requirement to credit operations to small and medium-sized enterprises. The risk weighting factor applicable to these operations goes from 100% to 85%, and it is accountable for new operations and modified loans between April 1st 2020 and December 31st 2020. The regulation embraces companies with gross annual revenue from BRL 15 millions to BRL 300 millions.

Chart 1.2.3.7 – Problem Assets

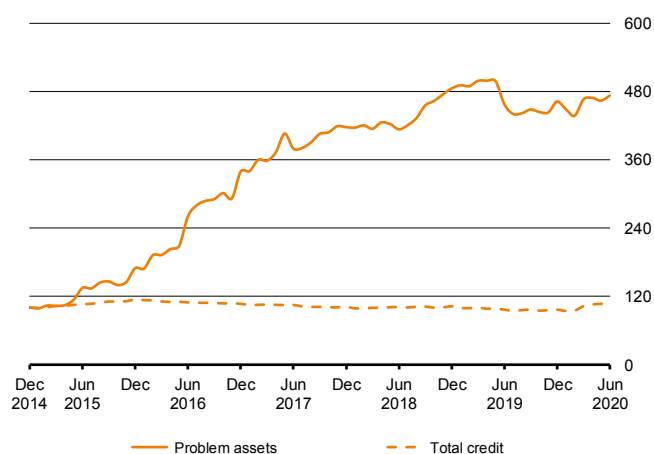
Micro, small and medium enterprises (Dec/2014 = 100)



[Statistical annex](#)

Chart 1.2.3.8 – Problem Assets

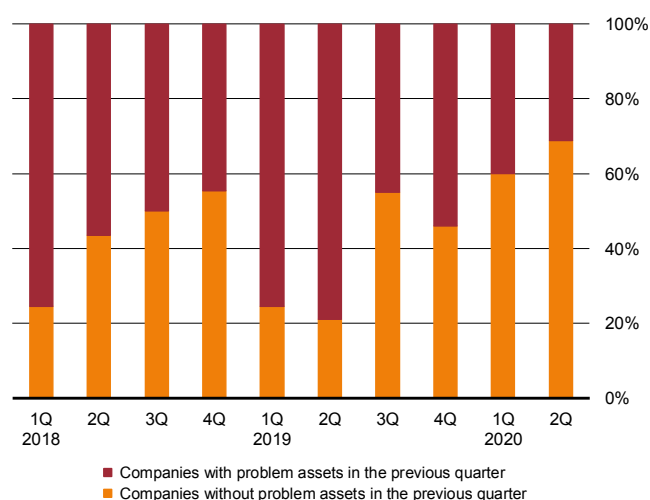
Large Companies (Dec/2014 = 100)



[Statistical annex](#)

Chart 1.2.3.9 – Problem assets inflow

Large companies



[Statistical annex](#)

modifications of debts by banks,³⁴ beyond the fact that default events require 90 days of delinquency to become problem assets.³⁵ In large companies, problem assets inflow in the two last quarters has an uptrend of problem assets arising from companies that do not had problematic operations in the previous quarter (Chart 1.2.3.9).³⁶

Still in relation to credit portfolio risk, considering that the pandemic effects have initiated in March, the pre-problem assets ratio,³⁷ more perceptible to recent events, showed deterioration since April of 2020. For the total of companies, the ratio increased from 2.3% to 3.9%, though still under the peak of 2017. The deterioration move was more relevant to large companies, mainly due to reclassifications to risk level “D” (Chart 1.2.3.10). Considering the increase of this ratio, it is expected that a fraction of these operations continues a deteriorating path, pressuring problem assets ratio.

Summing up, the highlight for corporates financing was non-earmarked credit to large companies. Governmental programs³⁸ contributed to the earmarked credit resumption and should keep its uptrend in the next months. The capital market, which has been a highlight as a funding alternative to companies, is not expected to grow as high rates as it was in the past, due to uncertainty of economic recovery pace. Regarding credit risk, it is expected that part of its materialization begins to take place during second semester of 2020, for all sizes of companies.

34 BCB Resolution 4,803, of April 9th of 2020, authorizes financial institutions to reclassify to the risk level of February 29th of 2020, operations that have been modified between March 1st and September 30th of 2020, since these operations haven't been with more than 15 days past due in February 29th of 2020 neither presents signs of incapacity of the borrower to honor the new credits conditions. For further information, see section 2.1 – Role of the BCB in ensuring financial stability during the Covid-19 crisis and subsection 2.1.3. For modified loans, see subsection 2.1.3.

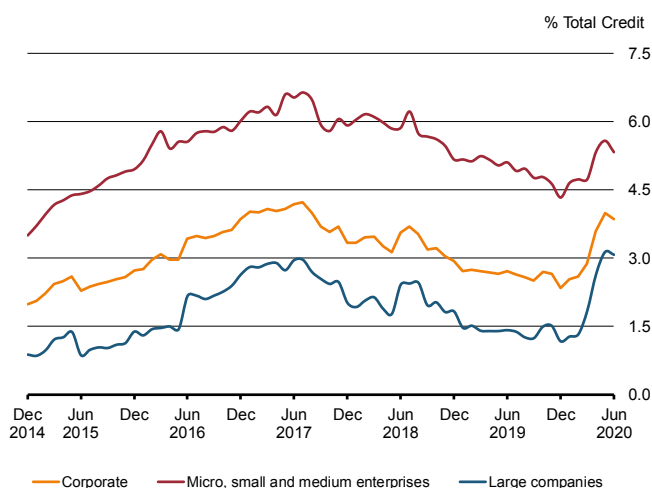
35 As published in FSR of April of 2017, problem assets encompasses credit operations (i) over 90 days of default (ii) that have been restructured, (iii) classified by financial institutions as “E” or “H” risk level, according to Resolution 2,682, of December 21st of 1999.

36 Includes companies for which the percentage of problem assets in the SFN was greater than or equal to 1% in the previous quarter.

37 Pre-problem assets are a previous stage of problem assets. It encompasses credit operations (i) with 31 to 90 days past due (ii) restructured, with a previous overdue of 31 to 60 days, (iii) classified by financial institutions as “D” risk level, according to Resolution 2,682, of December 21st of 1999.

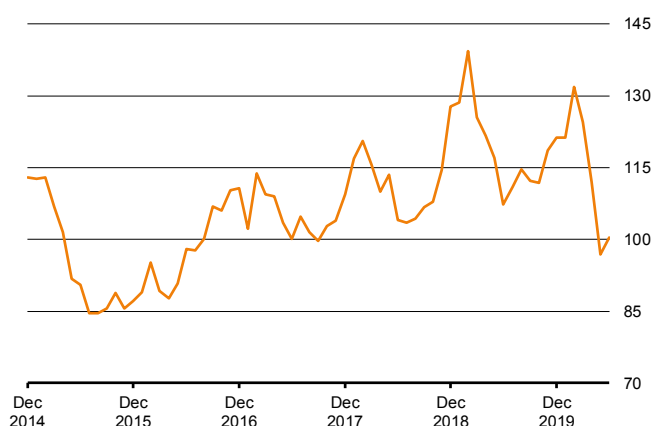
38 For further information, see section 2.1 – Role of the BCB in ensuring financial stability during the Covid-19 crisis.

Chart 1.2.3.10 – Pre-problem assets



[Statistical annex](#)

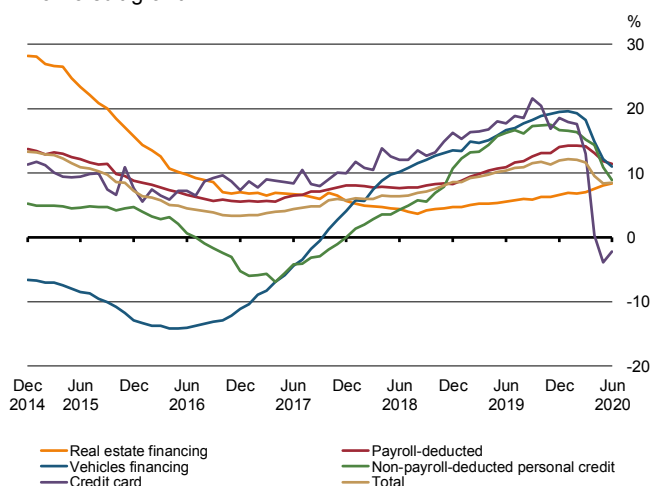
Chart 1.2.4.1 – Consumer confidence index



Source: Fecomercio

[Statistical annex](#)

Chart 1.2.4.2 – Household credit facilities
YoY credit growth



[Statistical annex](#)

1.2.4 Households

Household credit in the first half of 2020 was impacted by the consequences of the Covid-19 pandemic. Even though interest³⁹ and inflation rates⁴⁰ remained at historical low levels, the unemployment rate⁴¹ and the consumer confidence index (Chart 1.2.4.1) were affected by the economic effects of the pandemic. Furthermore, the household debt service-to-income ratio⁴² kept growing since the beginning of 2019, approaching the historical maximum seen in 2015.

Non earmarked credit outstanding decreased by 0.5% in the semester, credit card operations being the highlight (-16.9%); the major cause for this drop were credit card purchases, which had a reduction of 21.7% in the semester, strongly affected by the economic effects of the crisis. Conversely, earmarked credit increased by 3.4% in the semester, with emphasis on real estate credit (4.8%). The non earmarked credit to households is expected to show lower growth in 2020 than expected before the Covid-19 pandemic, due to the postponement of non-essential expenditures or of consumption decisions (Chart 1.2.4.2).⁴³

Except for non-payroll-deducted personal credit, credit granting for the main household facilities decreased since March 2020, with marginal recovery only in June 2020. In comparison with December 2019, the greatest decreases in monthly lending were observed in April – vehicles financing granting dropped by 52.4% and credit card by 19.7% – and May 2020 – real estate credit lending decreased by 14.8% and payroll-deducted personal credit by 21.4% – (Chart 1.2.4.3).

Regarding the credit risk of credit outstanding, the percentage of problem assets increased significantly in the first half of 2020 (0.8 pp), especially in the credit card (2.6 pp), real estate (1.1 pp) and vehicle financing (1.6 pp). In the first two credit facilities, the figures observed in May 2020 were the highest in the historical series; in the case of vehicle financing, the figure for June 2020

39 BCB Time Series no. 4,390 – Interest rate – Selic accumulated in the month.

40 BCB Time Series no. 433 – Extended National Consumer Price Index (IPCA) – Brazilian Institute of Geography and Statistics (IBGE).

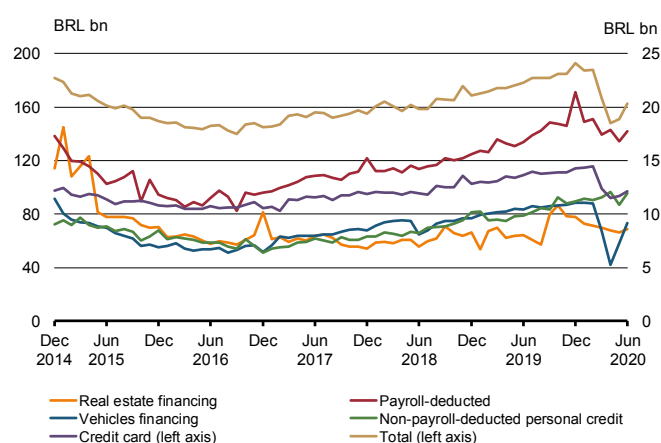
41 BCB Time Series no. 24,369 – Unemployment rate – Continuous National Household Sample Survey (PNADC).

42 BCB Time Series no. 19,881 – Household debt service ratio – Seasonally adjusted data. The calculus of this time series does not consider the stimulus aid established by Law 13,982, of April 2nd, 2020.

43 Inflation Report, June 2020 issue, box “Revision of credit projections”, p. 49.

Chart 1.2.4.3 – Deflated and seasonally adjusted credit grants

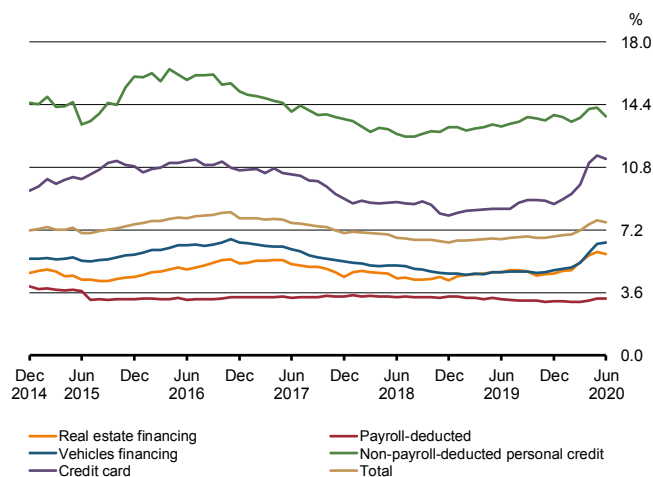
Main household credit facilities



[Statistical annex](#)

Chart 1.2.4.4 – Problem assets

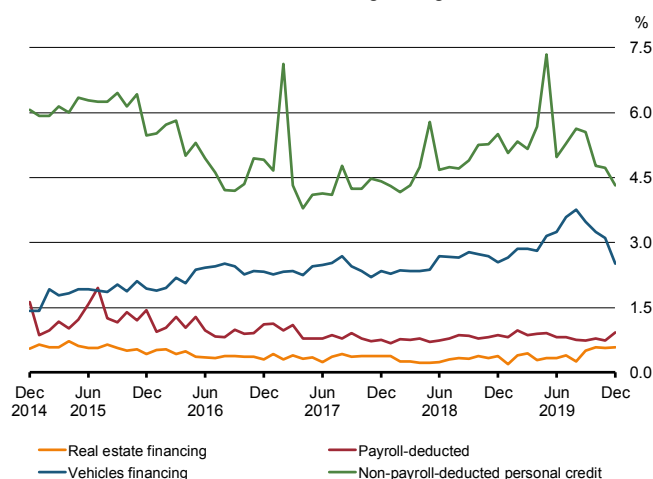
Main household credit facilities



[Statistical annex](#)

Chart 1.2.4.5 – Problem assets by cohort

Households – 6 months after credit granting



[Statistical annex](#)

is the highest since the end of 2016 (Chart 1.2.4.4). The credit facility that most contributed to the increase in the indicator's numerator in the first half of 2020 was real estate financing, followed by vehicle financing. Therefore, the previously mentioned trend of problem assets growth was exacerbated in the first half of 2020. This, summed with the reduction in the growth pace of credit and combined with the increase in risk, may bring figures to the historical peak observed in 2016.

Regarding the quality of monthly credit granting, the upward trend observed in non-payroll loans and vehicles financing cohorts during the first half of 2019⁴⁴ (shown in the previous FSR) reversed during the second half of the same year, as observed in the analysis of problem assets by cohort for the main credit facilities. The real estate financing and payroll-deducted loans cohorts presented relative stability (Chart 1.2.4.5).

Despite the increase in the level of problem assets, this movement may not reflect the entire risk of the portfolio, due to loan modifications⁴⁵ carried out since March 2020, when a significant part of households adjusted their financial obligations to the new conditions due to the Covid-19 pandemic. Approximately 25.8% of the household credit outstanding in June 2020 has been modified since the beginning of the Covid-19 pandemic. The major modified facility in the period is real estate credit, reaching 61.1% of total modified loans by households, followed by payroll-deducted personal credit – 10.6% – and vehicle financing – 9.3% – (Chart 1.2.4.6). This relevant amount of modifications should further pressure the problem assets indicator of the credit portfolio for households in the future, as part of the modified credit may not return to the normal course after the end of the pandemic. Such impact is still uncertain and will ultimately depend on the extent and effects of the crisis, as well as on the economic conditions when emergency measures to support families leave the scene.

In accordance with the decrease in payment capacity noted in the beginning of this subsection, the analysis of individuals corroborates this understanding – when comparing June 2020 and June 2019, the average problem assets-to-credit outstanding ratio given a DSTI ratio bracket⁴⁶ increased for almost all brackets (Chart 1.2.4.7).

44 Refer to FSR, April 2020 issue, subsection 1.2.4, p. 23.

45 Refer to subsection 2.1.3 for further details about loan modifications.

46 The DSTI ratio presented here is calculated at an individual level, for each debtor in SFN. For details about this metric, refer to annex Concepts and Methodologies, item g.

Chart 1.2.4.6 – Loan modifications
Main household credit facilities

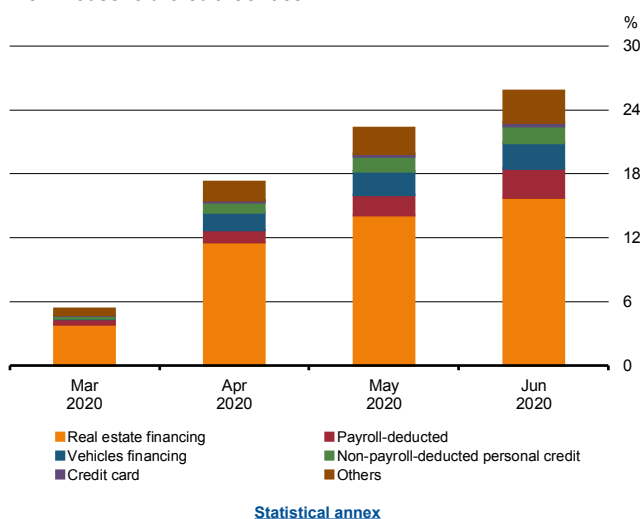


Chart 1.2.4.7 – Problem assets
By debt service-to-income ratio bracket

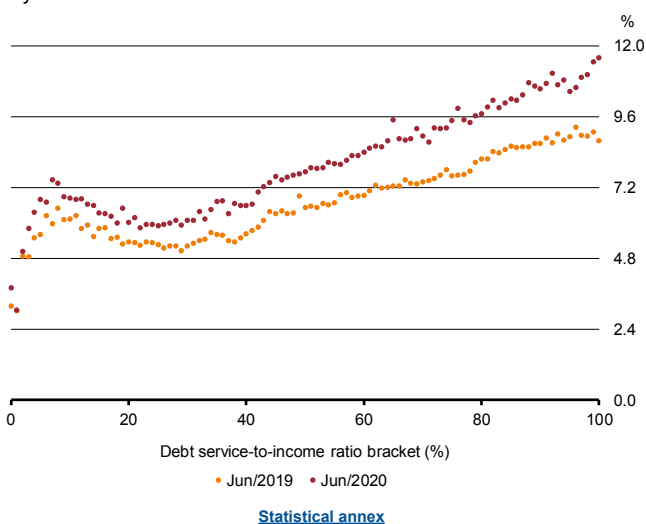
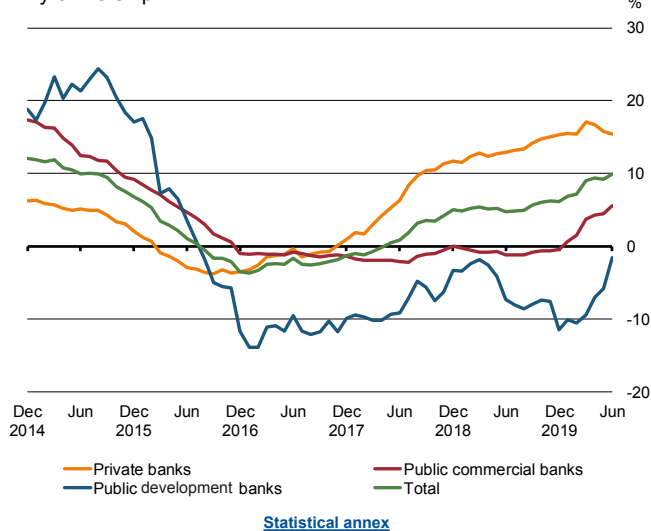


Chart 1.2.5.1 – Year over year credit growth
By ownership



In summary, the credit portfolio for households was impacted by the Covid-19 pandemic and had its growth pace reduced in the second half of 2019, especially in consumption-related facilities, with emphasis on credit card and vehicles financing. The percentage of problem assets increased during the first half of 2020, especially in the credit card, vehicles financing and real estate financing facilities. Problem assets increased in the semester and should maintain the upward trend, as part of the modified loans may not return to the normal course after the end of the pandemic, depending on the extent and effects of the crisis, as well as on the economic conditions when emergency measures to support families end.

1.2.5 Domestic banking credit – By ownership

The nominal year over year credit growth reached 9.9% at the end of the first semester of 2020⁴⁷ and continues to be positively influenced by the private banks, whose portfolio maintained the growth trend at year over year rates above 10% since the end of 2018, reaching 15.4% at the end of this semester (Chart 1.2.5.1). After three years of the relative stability of outstanding credit levels, public commercial banks presented a positive year over year growth in this semester. Public development banks interrupted the sequence of reductions in the credit portfolio levels that had been in place since 2016 and reached the end of the semester with an outstanding credit level close to that presented at the end of June 2019.

Credit-lending was reduced in the second quarter of 2020 due to the Covid-19 pandemic. The decline was more significant in private banks, especially in April and May (Chart 1.2.5.2). Despite this downward movement, the volume of credit-lending (deflated and seasonally adjusted) in the last semester was like that of the previous semester. In June, credit-lending levels increased marginally.

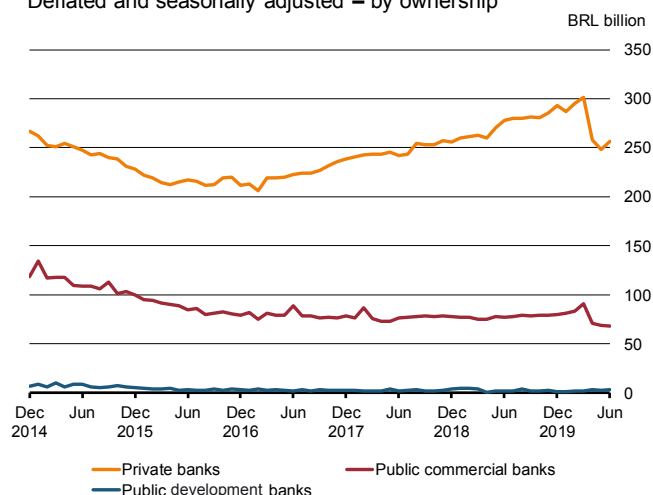
1.2.6 Risks and provisioning

As a consequence of the economic effects of the Covid-19 pandemic on borrowers' payment capacity, there was a worsening in the risk of the domestic credit portfolio

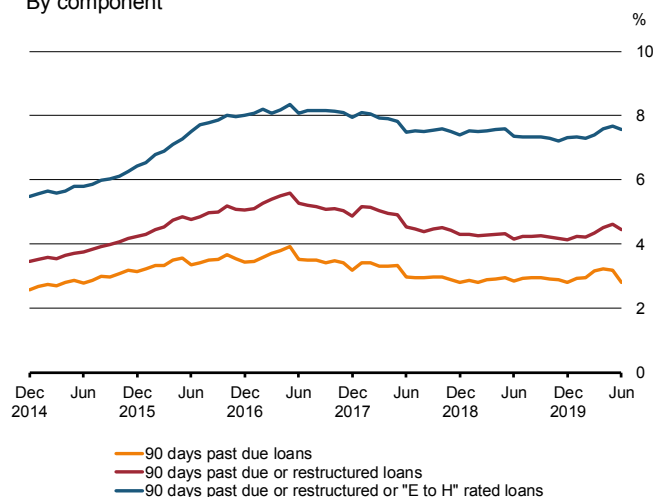
⁴⁷ The numbers reported in this subsection are based on the 3040 document and may be different from other BCB publications. Information on the document can be found at <https://www.bcb.gov.br/estabilidade financeira/srdoc3040> (in Portuguese).

Chart 1.2.5.2 – Credit lending

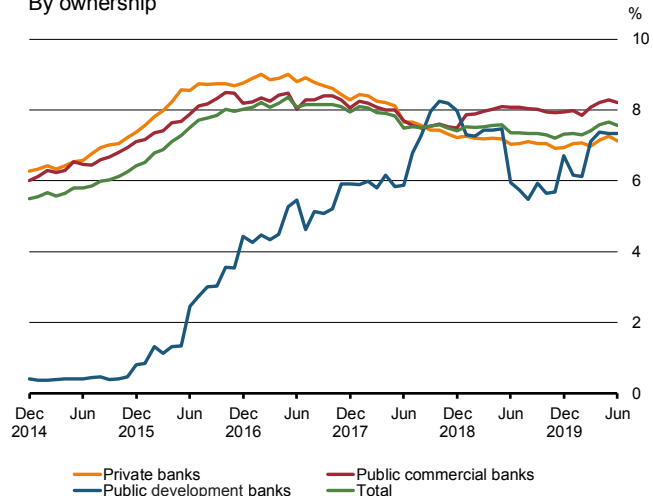
Deflated and seasonally adjusted – by ownership

[Statistical annex](#)**Chart 1.2.6.1 – Problem assets**

By component

[Statistical annex](#)**Chart 1.2.6.2 – Problem assets**

By ownership

[Statistical annex](#)

in the first semester of 2020. The portfolio quality deterioration tends to be accentuated in the next semester, as payment deferral allowed by the banks in the modified loans ends, and the repayments of the installments begin again.

The worsening of the portfolio's risk is evidenced by the increase of 0.26 pp in the level of problem assets ratio compared to December 2019, reaching 7.6% in June (Chart 1.2.6.1). It is important to note that this effect was mitigated by the strong growth of the credit portfolio in the period. The evolution of the problem assets ratio in the semester was mainly influenced by the growth in loan restructuring carried out since March in response to the effects of Covid-19 on the economy.

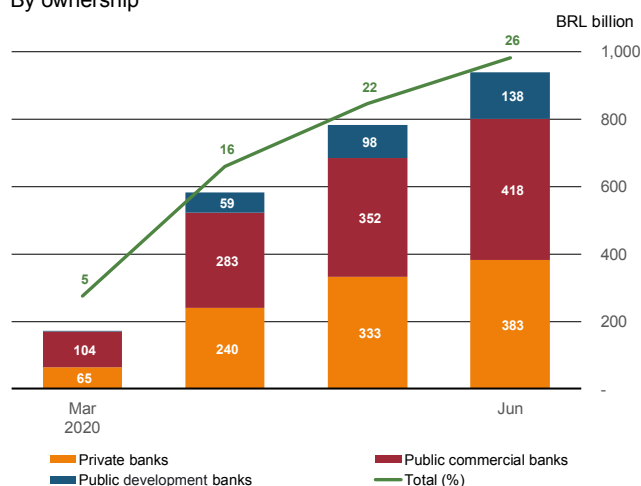
The worsening of the portfolio's risk throughout the semester was observed in all types of ownership, especially in public development banks. The problem asset ratio of private and public commercial banks increased by 0.20 pp and 0.27 pp, respectively. This impact was mitigated by the growth in the level of the credit portfolio in the period. Despite presenting an increase in the loan portfolio at levels similar to the other segments, public development banks showed a more significant increase in the level of problem asset ratio (0.62 pp) due to downgrading of credit operations (Chart 1.2.6.2).

To adjust the payment schedule of credit operations from borrowers whose financial situation was temporarily affected by the pandemic, the banks renegotiated a significant credit volume, mainly through the temporary suspension of installments' payments. In June 2020, the level of accumulated loan modifications since March represented around 26% of the domestic banking credit portfolio (Chart 1.2.6.3).⁴⁸ This movement of loan modifications occurred in all types of ownership.

Although the loan modifications allow a financial relief for the borrowers impacted by the pandemic, it is expected that part of them will not be able to honor the terms of the modified loans when the payment deferral structure ends, depending on the extent and the effects of the crisis. As a result, a further deterioration in the credit portfolio quality should materialize in the second semester of 2020 and at the beginning of the next year, increasing the level of the problem asset ratio.

⁴⁸ Loan modifications are identified with a methodology applied in the SCR data and may differ from other BCB publications.

Chart 1.2.6.3 – Modified loans
By ownership



[Statistical annex](#)

Chart 1.2.6.4 – Coverage index of problem assets



[Statistical annex](#)

To cope with this forecast of deterioration in credit portfolio quality, some banks have incremented their loan loss provisions. As a result, the coverage index (CI) of problem assets⁴⁹ increased in the first half of 2020, approaching 90% (Chart 1.2.6.4). The high level of provisioning maintained by the banks will be an important mitigating factor of the effects generated by the Covid-19 pandemic on the credit assets quality over the next semesters.

1.3 Profitability

The first half of 2020 saw the banking system's profitability growth come to a halt due to the unfavourable economic scenario associated with the Covid-19 pandemic. The main factor that contributed to the halt in profitability was the significant increase in loan-loss provisions (LLP) in response to the adverse effects of the pandemic on economic activity and credit quality. Service revenues were also affected but had a less significant effect on earnings.

Despite the decline, profitability remains at levels that do not represent a significant risk to financial stability. The Covid-19 pandemic struck the Brazilian economy when the system's profitability levels had already recovered from the 2015-16 recession. As a result, banks can absorb a significant increase in LLP. Current profitability remains at levels that allow banks to maintain adequate capital ratios⁵⁰ and the credit supply to the economy.

The outlook for the second half of 2020 is that banks' profitability will stabilize thanks to lower provisioning needs, lower funding costs and to a gradual recovery in economic activity. However, uncertainty regarding the scenario for 2021 remains high. The outlook for next year should become clearer with the unwinding of temporary measures to counter the crisis (such as grace periods for payments of credit contracts granted by banks and the government emergency aid payments), which will allow a more precise view of the impacts of the Covid-19 pandemic on the system's default rates.

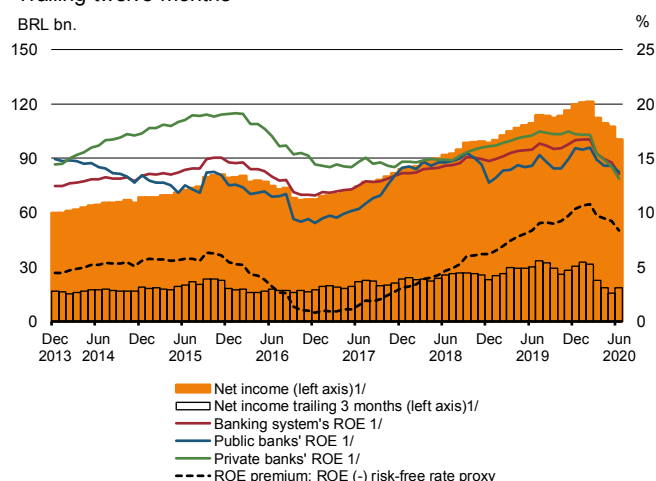
The effects associated with the Covid-19 pandemic on the net income and on the return on equity (ROE) of the banking system became apparent from March 2020

⁴⁹ CI of problem assets is the ratio between the provisions to the credit of doubtful settlement made by financial institutions for their credit portfolio, according to Resolution 2,682, December 22nd, 1999, and the volume of problem assets estimated by the Banco Central do Brasil.

⁵⁰ For more details, see item 1.4 of this Report.

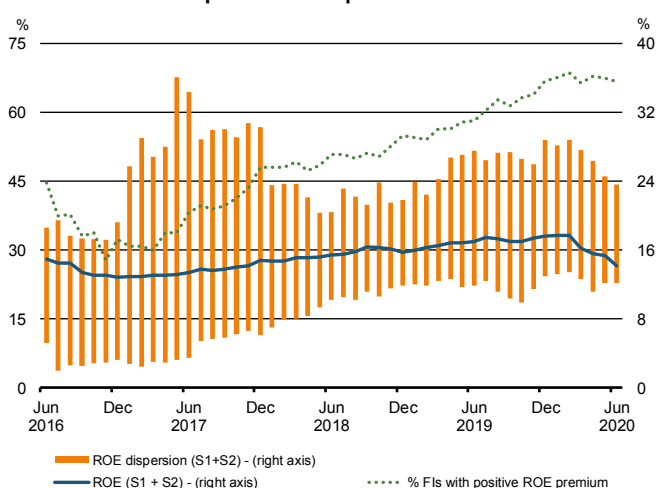
Chart 1.3.1 – Return on equity (ROE)^{1/}

Trailing twelve months



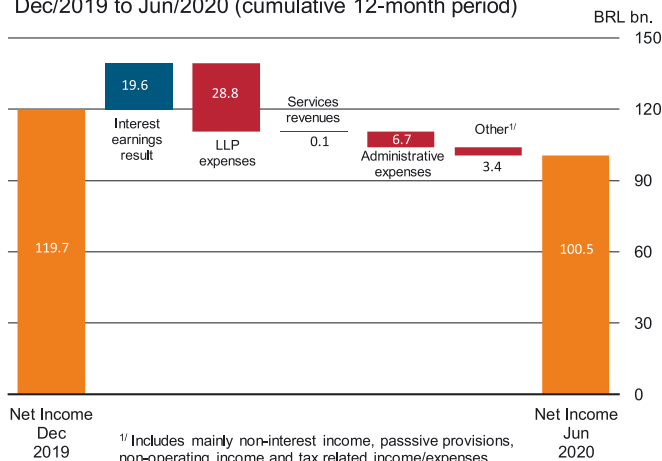
[Statistical annex](#)

Chart 1.3.2 – ROE dispersion (S1+S2) and institutions with positive ROE premium



[Statistical annex](#)

Chart 1.3.3 – Net income – Cumulative effect by component
Dec/2019 to Jun/2020 (cumulative 12-month period)



[Statistical annex](#)

onwards. The system recorded adjusted net income⁵¹ of BRL 40.8 billion in the first half of 2020 (BRL 22.4 billion in the first quarter and BRL 18.4 billion in the second), a drop of 31.9% when compared to the same period of the previous year. Reflecting the drop in net income, the system's ROE for the first half of 2020 decreased to 11.2%, compared to 17.8% for the same period last year (-6.6 p.p.).

The adjusted net income in the twelve months ended in June 2020 also decreased, which led the banking system's ROE in this period of analysis to 13.6%, compared to 16.7% in the twelve-month period ended in December 2019, down 3.1 p.p. The ROE premium⁵² over the risk-free rate proxy followed the downward trend seen in ROE, despite a significant decline in the Selic rate in the first half of 2020. It is important to highlight that the ROE reduction was similar for both private and public banks (Chart 1.3.1).

Moreover, when compared to the pre-pandemic period, there was no change in the ROE dispersion among institutions⁵³ that are more systemically important, which indicates a relatively homogeneous movement in profitability among these institutions in the period. It is also worth mentioning that the share of institutions with a positive ROE premium remained practically unchanged, which reflects, on the one hand, the reduction of the risk-free rate proxy itself and, on the other hand, the ability of banks' profitability to absorb the first impacts of the pandemic scenario (Chart 1.3.2).

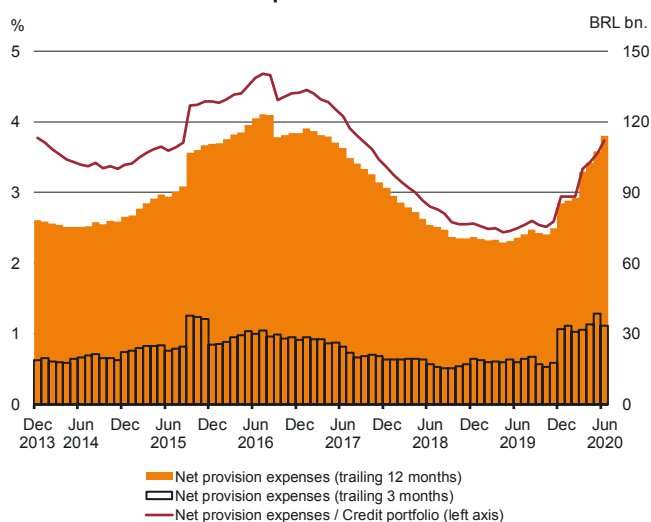
The main factor that caused the drop in the banking system's net income and ROE was the boost in LLP associated with the adverse effects of the Covid-19 pandemic on credit quality (Chart 1.3.3). LLP expenses totalled BRL 65.0 billion in the first half of 2020 (BRL 31.6 billion in the first quarter and BRL 33.4 billion in the second), an increase of 80% when compared to the same period last year. As a result, LLP levels became close to those observed in the 2015-16 recessionary period.

51 References to net income and ROE in this section refer to recurring amounts, that is, adjusted for extraordinary (non-recurring) income or expenses. Non-recurring results include, for example, the disposal of assets that do not relate to the institutions' core activity.

52 As a benchmark to compare ROE levels, this report uses a risk-free rate proxy that represents the Selic rate annual average in the past thirty-six months multiplied by 0.85 to discount tax effects. The 36-month period represents the average duration of the credit portfolio, the main source of revenues for the banking system.

53 Institutions considered as more systemically important in this Report are those classified in Segment 1 (S1) or Segment 2 (S2), according to Resolution 4,553, of January 30, 2017.

Chart 1.3.4 – Provision expenses



[Statistical annex](#)

Chart 1.3.5 – Ibovespa, IFNC and Brazilian banks' price-to-book ratio

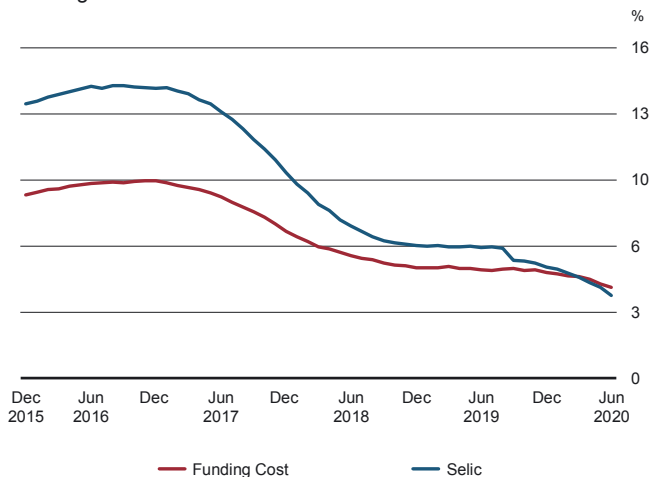
Base jun/15 = 100



1/ Market-value-weighted average price-to-book ratio of the 5 Brazilian banks most actively traded at B3.
2/ Financials sector performance indicator, which gauges the stock performance specific to the financials sector, with a significant share of banks in its composition.

[Statistical annex](#)

Chart 1.3.6 – Funding Cost
Trailing twelve months



[Statistical annex](#)

The percentage of LLP expenses in relation to the credit portfolio remained on its upward trend initiated at the end of 2019, but ended the period at a level still lower than the historical peak recorded in mid-2016 (Chart 1.3.4).

Due to the uncertainty around the magnitude and the duration of the Covid-19 pandemic, some banks have suspended their financial guidance disclosures for the year 2020. The low predictability regarding the scenario for economic activity and for banks' performance in the coming periods was reflected in the pricing of bank's assets traded in the market⁵⁴ (Chart 1.3.5).

Net interest income (NII), which represents the difference between interest income and interest expense of the banking system, continued to grow throughout the first half of 2020. This was mainly due to the reduction in funding expenses and the growth of the credit portfolio. These effects were enough to offset a change in the credit portfolio towards a less profitable mix, which resulted from an increase in the share of large companies as opposed to those of SMEs and individuals (which have relatively higher spreads). The continued growth in NII will depend, mainly, on how sustainable the demand for credit will be in the coming periods.

The downward cycle of the Selic rate and, consequently, of the system's funding costs (Chart 1.3.6), has favoured a reduction in the average interest rates on new credit concessions.⁵⁵ This dynamic has contributed to the falling trend in the system's gross interest return (credit and securities)⁵⁶ as assets, especially credit operations, are renewed at lower rates. Nevertheless, the combined effect of the reduction in the gross interest return (credit and securities) and in the funding cost made the system's net interest margin⁵⁷ to remain practically stable throughout the first half of 2020. Such stability has been observed

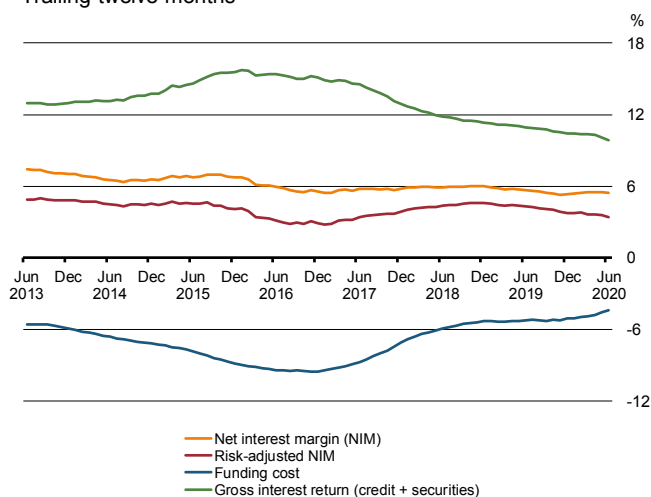
54 The price-to-book ratio (P/B) of Brazilian banks reached levels close to those observed in the recessionary period of 2015-16. Despite the recovery in prices of financial assets since the lows observed in March 2020, stock prices and the P/B of Brazilian banks remain below the levels observed in the pre-crisis period, which reflects the market's caution regarding banks' performance prospects for the coming periods.

55 For further details on the reduction of the average interest rates in new credit concessions during the first half of 2020, see item 1.2 of this Report.

56 For the purposes of this Report, gross interest return (credit and securities) corresponds to the percentage ratio of the income from credits and securities over the last twelve months to the average balance of credit assets and securities in the system over the last thirteen months.

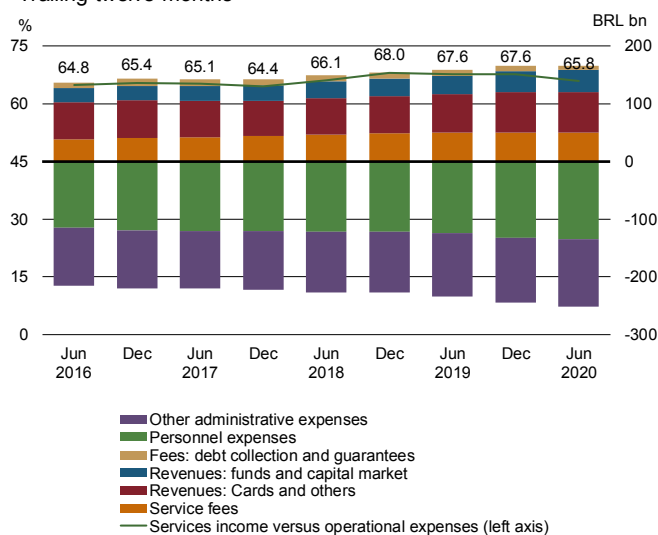
57 For the purposes of this Report, net interest margin refers to the percentage difference between: (i) the system's gross interest return (credit and securities) and (ii) the system's funding cost.

Chart 1.3.7 – Interest margins
Trailing twelve months



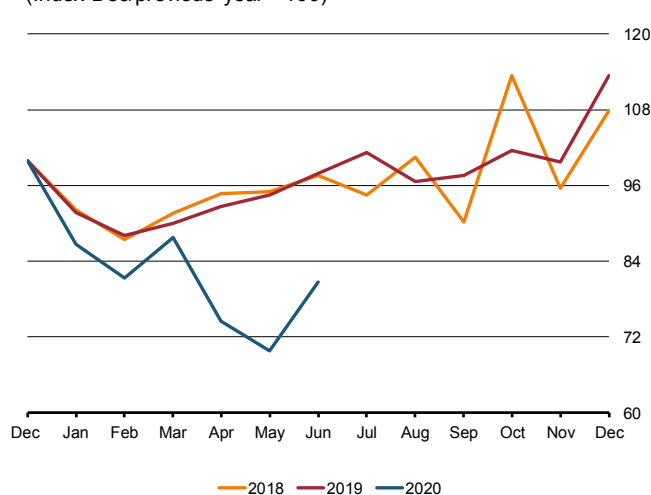
[Statistical annex](#)

Chart 1.3.8 – Evolution of administrative expenses and services income
Trailing twelve months



[Statistical annex](#)

Chart 1.3.9 – Services Income
(Index Dec/previous year = 100)



[Statistical annex](#)

since 2013, in downward or upward interest rate cycles (Chart 1.3.7).

The stability seen in the net interest margin may be affected if the benchmark rate remains relatively low for an extended period, as the credit portfolio would continue to be renewed at lower rates without the offsetting effect of the decline in funding costs recently seen. Thus, the persistence of lower interest rates may negatively affect financial institutions' profitability. On the other hand, lower interest rates tend to stimulate lending (by reducing the cost of credit) and reduce credit losses (as the share of borrowers' income used for interest payments reduces), which is positive for banks' profitability. Therefore, the ability of the system to sustain its current levels of profitability will depend on how the institutions will adjust their business models to this new low-interest rate reality.⁵⁸

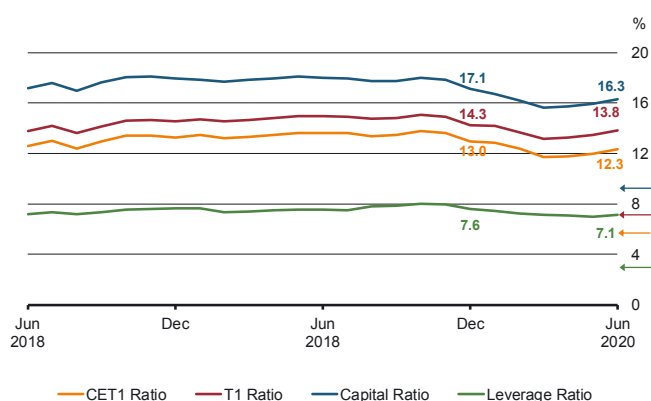
The balance between service revenues and administrative expenses was also affected by the pandemic crisis and social distancing measures. The ratio of administrative expenses to service revenues decreased in the first half of 2020, reflecting the effects of the adverse scenario on the demand for banking services. When compared to the twelve-month period ended in December 2019, administrative expenses grew 2.7%, while revenues from services grew 0.1% (Chart 1.3.8).

The Covid-19 pandemic had a clear impact on service revenues from March 2020 (Chart 1.3.9) onwards. The lines of service revenues affected by the pandemic scenario that had the greatest impact on profitability were related to card transactions (debit and credit) and to current account services, both resulting from the lower economic activity observed since the second half of March 2020.

A rebound in services revenues should follow the recovery in economic activity. It should be noted, however, that some lines of service revenues may continue under pressure in the coming periods due to structural changes

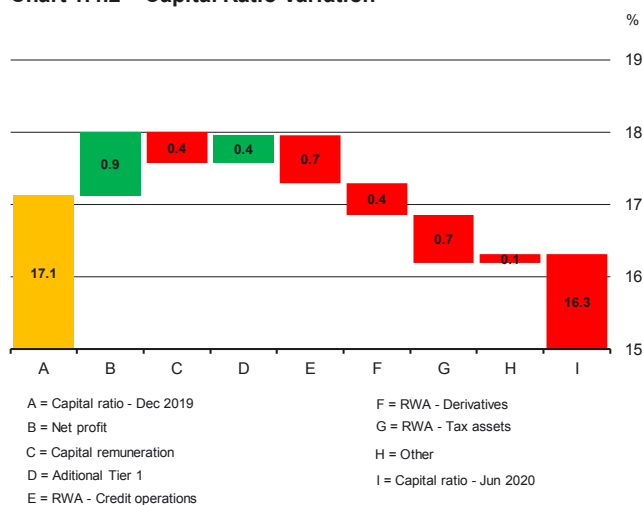
⁵⁸ Regarding the new low interest rate reality, it is worth mentioning the forward guidance contained in the minutes of the 233rd meeting of the Monetary Policy Committee, held in September 15 and 16, 2020, which indicated that the Monetary Policy Committee (Copom) does not intend to reduce the degree of monetary stimulus, unless inflation expectations, as well as the inflation projections' baseline scenario, are sufficiently close to the inflation target for the relevant monetary policy horizon, which currently includes 2021 and, to a lesser extent, 2022. This intention, as indicated by the Copom, is conditional on maintaining the current fiscal regime and the anchoring of long-term inflation expectations.

Chart 1.4.1 – Capital ratios and regulatory requirements



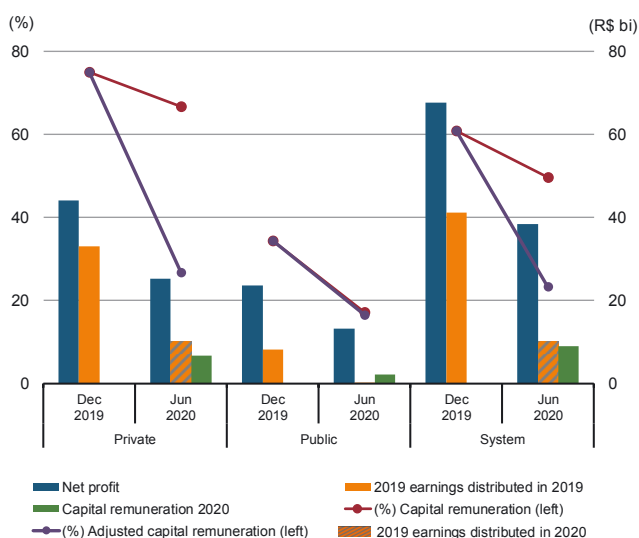
[Statistical annex](#)

Chart 1.4.2 – Capital Ratio Variation



[Statistical annex](#)

Chart 1.4.3 – Dividends and interest on equity distribution^{1,2,3}



¹ Net profit and distributed values cumulated in the semester

² Hatched columns correspond to 2019 dividends distributed in 2020, which are not under the restrictions imposed by resolutions n° 4,797 e 4,820.

³ (%) Capital remuneration consists of all dividends and interest on equity distributed in the semester divided by the net profit of the period. (%) Adjusted capital remuneration considers only dividends and interest on equity of profit generated in the semester.

[Statistical annex](#)

taking place in the market, such as increased competition and the new level of interest rates.

Regarding administrative expenses, the system's structural cost should continue under control with potential improvements in operational efficiency in the medium term. This view is in line with the accelerated trend in the digitalization of banking services and the more intensive use of technology by banks and their customers. For these reasons, the number of brick-and-mortar branches and bank employees should continue declining as has been observed since 2014.

1.4 Solvency

The banking system solvency showed resilience facing the unfavorable economic scenario of the first half of 2020. Although capital ratios have dropped, they remain significantly above the minimum regulatory requirements (Chart 1.4.1). Policy measures adopted by the CMN and BCB have played an important role to lessen the adverse effects of the Covid-19 pandemic and to maintain the soundness, stability and regular functioning of the financial system.

Due to the credit portfolio growth, which increased risk-weighted assets (RWA), and currency depreciation, which increased RWA related to derivatives, tax assets and credit operations, the system RWA presented a 11.1% increment, resulting in a 0.8 p.p. capital ratio drop, despite the 5.8% growth of total capital (Chart 1.4.2).

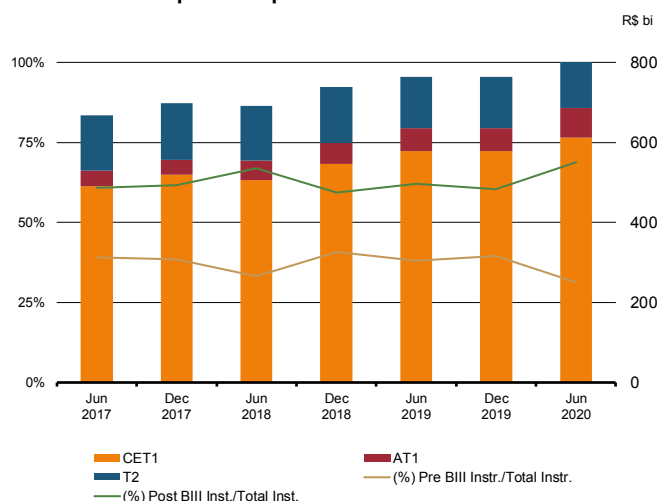
The system common equity tier 1 (CET1) presented a 5.7% increase, reaching BRL611.6 billion, driven by retained earnings (BRL19.3 billion). Although the net profit was 43.3% lower compared to the second semester of 2019, dividends distribution to shareholders (BRL19 billion) was 53.7% lower (Chart 1.4.3). As a result, the retained earnings ratio increased from 39.2% to 50.4%⁵⁹.

Due to new emissions and appreciation of instruments issued in foreign currencies,⁶⁰ additional tier 1 (AT1)

⁵⁹ The payout decrease in the first semester of 2020 was influenced by future prospects and by restrictions imposed by Resolutions 4,797 and 4,820 of April 7th and June 2nd, 2020, respectively, which constrained capital remuneration to the minimum defined by art. 202, Law 6.404, of September 15th, 1976 or the specified in the articles of incorporation.

⁶⁰ The appreciation of instruments issued in foreign currencies is balanced by expenses which lowers CET1. As a result, total capital remains almost the same, changing only its composition (higher AT1, lower CET1). In case of full exchange hedge, there will be a financial gain which will offset the CET1 loss, keeping only the AT1 increase.

Chart 1.4.4 – Capital composition



[Statistical annex](#)

share in total capital rose from 7.5% to 9.2%. Tier 2 capital, for instance, declined 4.5%, representing now 15.2% of total capital (Chart 1.4.4), because of phase-out of constitutional funds and capital instruments issued prior to the implementation of the Basel III framework, according to Resolutions 4,679/2018 and 4,192/2013.

The RWA increase (BRL476,4 billion) was more intense in private banks (BRL405,0 billion) and stems essentially from credit operations, tax assets and derivatives (Table 1.4.1). These events are related to new credit concessions, Real depreciation⁶¹ and tax assets arising from tax losses – overhedge.⁶²

Table 1.4.1 – RWA Composition

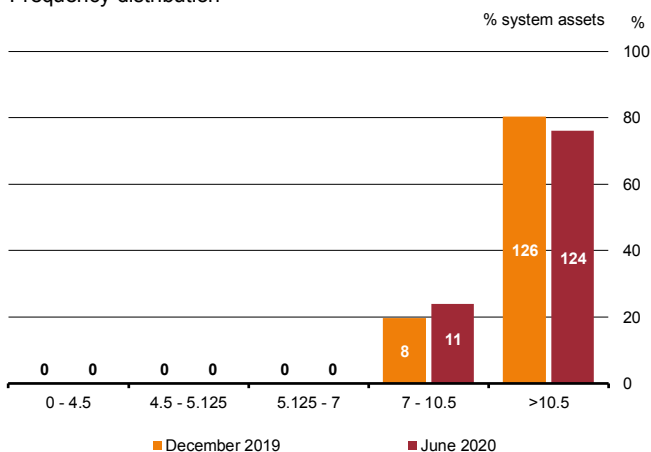
R\$ billions	System			Var. (%) Dec/Jun	
	Dec/19	Jun/20	Var. (%)	Public	Private
Total RWA	4,462	4,938	10.7%	6.6%	13.1%
Credit RWA	3,716	4,217	13.5%	7.0%	16.5%
Credit operations	1,828	2,009	9.9%	-10.0%	9.1%
<i>Financiamento Imobiliário</i> Mortgages	283	302	6.9%	7.8%	33.9%
Leasing	17	18	8.9%	-0.4%	-2.9%
Interbank investments	118	149	25.5%	17.2%	92.8%
Securities	244	260	6.6%	241.2%	102.6%
Derivatives	108	227	110.1%	5.9%	9.4%
Fixed Assets	197	189	-4.1%	12.4%	7.2%
Non-cancellable credit commitments	140	136	-2.5%	5.7%	12.7%
Guarantees provided	235	254	8.3%	-4.1%	-7.3%
Tax assets	270	453	67.6%	6.2%	-6.9%
Other	558	521	-6.6%	11.2%	5.7%
Market RWA	266	218	-18.1%	3.4%	-14.7%
Operational RWA	480	504	4.9%	4.0%	5.8%

[Statistical annex](#)

61 The Real depreciation did not result in a significant change in market RWA since most of the derivatives protect against exchange rate volatility. Regarding credit risk, however, the increase in notional and replacement cost raised the exposition. For further information on the effects of the currency depreciation in the credit operations amounts, see section 1.2.

62 After Resolution 4,784, of March 18th, 2020, tax assets due to overhedge of overseas investments originated from January 2020 on were no longer deducted from regular capital and received a 300% risk weight in credit RWA. They account for BRL144,8 billion of the credit RWA increase (BRL500,8 billion). For further information, see Chapter 2, section 2.3.

Chart 1.4.5 – CET1 Ratio
Frequency distribution^{1/}



1/ Inside the bars are the number of financial institutions in the correspondent CET1 ratio range

[Statistical annex](#)

The effect of the significant increase in credit exposures was mitigated by several changes in the standardized approach of the credit risk framework in the first semester of 2020.⁶³ In the absence of changes in the capital definition and RWA measurement, it is estimated that the total capital ratio would be 15.6%, instead of 16.3%.

The CET1 frequency distribution showed increasing in the number of institutions in the 7.0% – 10.5% range (Chart 1.4.5). All institutions comply with the minimum CET1, which decreased from 7.0% to 5.75% due to the temporary reduction in the conservation buffer to 1.25%.⁶⁴ Furthermore, it should be noted that 91% of the institutions fulfill all capital requirements exclusively with CET1, the core capital.

Prospectively, considering the earnings evolution with lower credit provisions⁶⁵ and given the capital surplus (currently BRL233 billion), there are favorable conditions to the sustainable credit portfolio⁶⁶ expansion. With the support of the measures to face the Covid-19 pandemic, the banking system is prepared to secure the regular market functioning, keeping its soundness and the credit availability.

1.5 Capital stress tests

Capital stress tests are financial stability tools that assess the resilience of the banking system related to its ability to absorb losses in adverse macroeconomic scenarios. The tests simulate effects on the banking system's capital adequacy ratios, stemming from extreme shocks in the main economic-financial variables. In addition,

63 Circular 3,998 of April 9th, reduced from 100% to 85% the risk weight (RWF) applied to credit exposures to small or medium enterprises not qualified as retail, granted or restructured between March 6th and December 31th, 2020.

Circular 4,026, of June 10th, established a 12% RWF to exposures under the Pronampe, instituted by Law 13.999, of May 18th.

Circular 4,030, of 23th June, reduced from 50% to 35% the RWF applied to Term Deposits with Special Guarantee (DPGE) when the deposit holder is an institution associated to the Deposit Insurance Fund (FGC).

Circular 4,034, of June 29th, reduced the RWF for exposures to credit operations granted under the Emergency Credit Access Program (Peac), instituted by Provisional Measure 975, of June 1st, 2020, subsequently converted to Law 14,042, of August 19th. For further information, see Chapter 2, section 2.1.

64 Resolution 4,783, of March 16th, 2020, established the conservation buffer in 1.25% until March 2021, 1.625% between April and September 2021, 2.0% between October 2021 and March 2022 and 2.5% afterwards.

65 For further information, see subsection 1.2.6.

66 Current credit portfolio is BRL3.6 trillion and the potential growth is BRL4.0 trillion, considering the framework in course at June 2020. Credit growth potential is obtained dividing the RWA margin by the average RWF and does not assume loan losses provisions for operations to be generated.

simulations of sensitivity analysis to the main risk factors undertaken individually and contagion among financial institutions⁶⁷ complement the analysis.

Stress tests results indicate that the banking system maintains its loss absorbing capacity against all simulated shocks, with no relevant capital shortfalls due to noncompliance⁶⁸ or insolvency events. The results are the consequence of the appropriate capitalization cushion, as well as the resilience of banks' profitability even under extreme scenarios.

The FX sensitivity analysis indicates low materiality of sudden FX rates shocks, a direct result of hedging policies adopted by the institutions. Regarding interest rate risk, shocks point to some risks arising from abrupt increases in rates. On credit risk, the system showed a decrease in capital shortfalls compared to the previous simulation, as of December, 2019. The sensitivity to residential real estate prices also demonstrated slightly reduced capital shortfalls with respect to previous simulation, albeit not reflecting any relevant risks from exposures to mortgages on banks – balance sheets.

1.5.1 Scenario analysis – Macroeconomic stress tests⁶⁹

Table 1.5.1.1 displays the economic variables for the different stress test scenarios: Baseline, Structural Break and Worst Historical. Each scenario brings different stressed values in each of the twelve quarters of the test horizon, and only the values of the last quarter are presented.

The Structural Break scenario is obtained by applying the observed changes of economic variables in previous periods on the current levels by means of a quarterly rolling window. The financial system's most unfavourable historic path within an eight-quarter horizon is chosen, for each variable independently. The Worst Historical scenario simulates the historical behaviour of each variable by choosing the patterns observed in a twelve-quarter rolling window since July, 2003, which would result in the banking system's highest capitalization needed to replenish capital ratios to original status.

67 The scope of the contagion simulation embraces all authorized institutions to operate by the BCB, except consortiums. The scope of macroeconomic stress tests comprehends only banks.

68 A financial institution is deemed non-compliant if it does not comply to at least one of the capital requirement ratios: total capital ratio, tier 1 and common equity tier 1.

69 The stress test assumptions are in accordance with the Resolution no 4,680, of July 30th, 2018.

Table 1.5.1.1 – Macroeconomic Stressed Scenarios (June, 2023)

Variables	Scenarios			
	Jun./19	Base Scenario ^{1/}	Structural Break	Worst Historical
Output (IBC-Br)	-3.1%	2.5%	1.2%	1.5%
Domestic Interest Rates (Selic)	4.6%	5.5%	8.3%	1.7%
Exchange Rate (BRL/USD)	5.39	4.80	7.77	6.32
Inflation (annual IPCA)	2.1%	3.5%	3.4%	-0.8%
Unemployment (PNAD-C IBGE)	13.3%	13.3%	16.2%	19.9%
Country Risk (Brazil EMBI+) ^{2/}	398	398	1,179	634
Foreign Int. Rates (US G. Bonds Yield 10yr) ^{4/}	0.7%	1.9%	0.9%	0.9%

1/ Forecasts for GDP, Selic, FX and inflation rates collected from the Focus survey published in June 30th, 2020. Both unemployment and country risk remain constant.

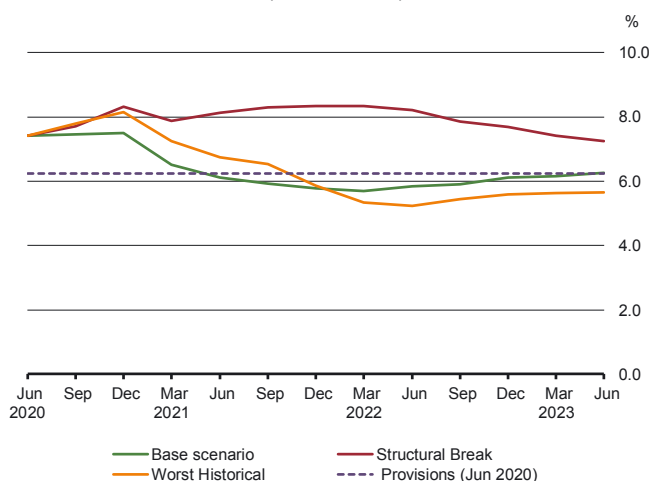
2/ The table shows the maximum values for the EMBI+Brazil in each scenario. For Structural Break scenario, the EMBI+Brazil peak of 1,179 is reached in December, 2021. For the Worst Historical scenario, peak is reached in March, 2021.

3/ The method employed for building each scenario can be found in the annex Concepts and methodologies – Capital stress.

4/ For the Baseline scenario, the trajectory of the US G. Bonds Yield 10yr was extracted from the Federal Reserve (FED) Adverse Scenario in Dodd-Frank Act Stress Testing (DFAST) 2019 (<https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20190213a1.pdf>). For the Structural Break and Worst Historical scenarios, forecasts are based on historical behavior of the variable.

[Statistical annex](#)

Chart 1.5.1.1 – Macroeconomic stress test
Problem assets forecast (% total credit)



[Statistical annex](#)

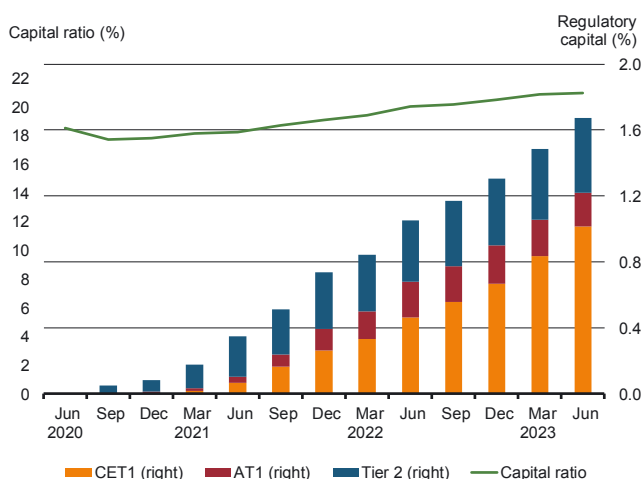
Chart 1.5.1.1 shows that under the worst-case scenario problem assets would reach 8.3% of the total loan portfolio.

The estimated additional⁷⁰ capital to avoid both noncompliance as well as dividends distribution limitations amounts to 1.7% of the current regulatory total capital as shown in Chart 1.5.1.2. The capital shortfall of the financial system shows a downtrend when compared to the results of the three previous semesters. (Chart 1.5.1.3).

The dispersion analysis of the total capital adequacy ratio demonstrates that most of the institutions would keep ratios above the minimum regulatory requirements (10.5%). This group represents about 95% of the total assets of the banking system (Chart 1.5.1.4).

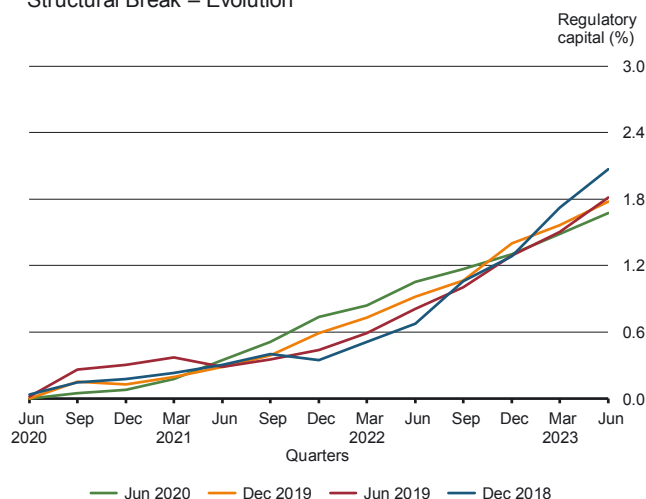
70 The concept of capital shortfall encompasses the amount necessary to avoid both minimum capital non-compliances as well as limitations on profits distributions imposed by Resolution no. 4,193, of March 1st, 2013, in which systemically important financial institutions are subject to the systemic buffer requirement (ACP^{Sistêmico}).

Chart 1.5.1.2 – Capital requirement gap and Capital ratio
Structural Break



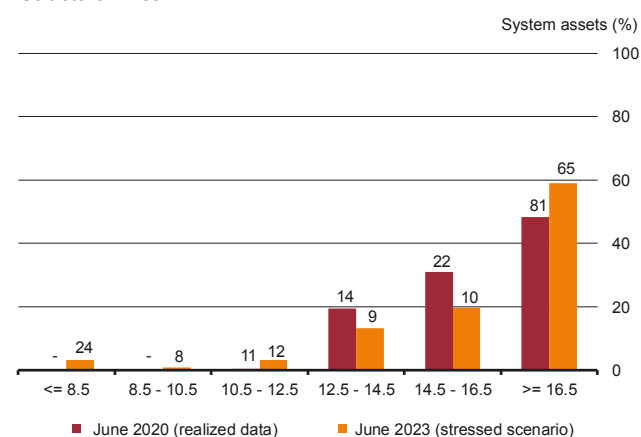
[Statistical annex](#)

Chart 1.5.1.3 – Capital requirement gap
Structural Break – Evolution



[Statistical annex](#)

Chart 1.5.1.4 – Macroeconomic Stress Test
Frequency distribution of system assets by Capital ratio band – Structural Break^{1/}



^{1/} The value above each bar represents the number of institutions per band.

[Statistical annex](#)

1.5.2 Sensitivity analysis

Sensitivity analysis measures impacts on the banking system's capital arising from incremental changes in interest rates, foreign exchange rates, problem assets and residential real estate prices, all of them independently. In the case of problem assets, only increases are considered; for mortgage prices, only decreases are analysed. For interest rates and FX (foreign exchange), both increases and decreases are simulated.

Shocks alter both interest rates and FX (foreign exchange) individually and in steps of 10%, over a range of values with lower and upper bounds corresponding to 10% and 200% of the original values, respectively. Within this range, additional non-compliance occurrences reach 0.4% of total assets of the banking system are observed, if the exchange rate equals 200% of the original FX rate at June, 2020.

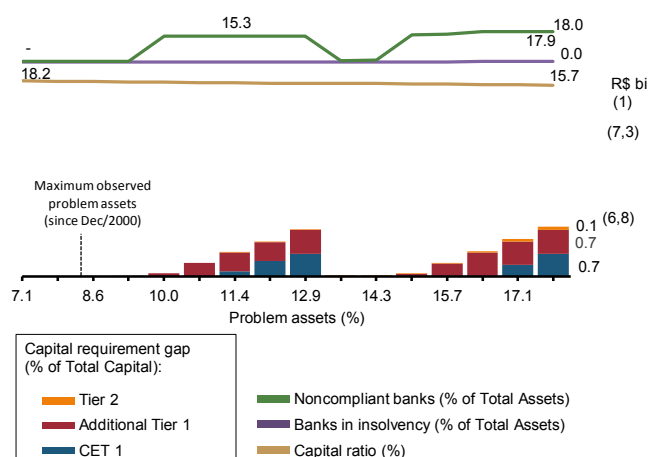
In the case of interest rate risk, rates variations have been applied to all vertices of the term structure. If rates were twice the original values (a six-month rate of 4.1% instead of 2.1% for instance), the additional capital needed in order to avoid non-compliance would amount to 1.5% of total regulatory capital. If the multiplier were to be set to 4, then the capital shortfall would be 8.2% and the affected banks would represent 15.2% of total assets of the financial system.

Results of the sensitivity test to incremental credit risk shocks (Chart 1.5.2.1) indicate that problem assets would need to reach 10.0% of total loans portfolio so that the system required an additional 0.1% of total regulatory capital. This is a higher level than the maximum historical problem assets level of 8.55% seen in May, 2017.⁷¹ Under extreme conditions, if problem assets reached 17.9% of total loans, there would be a capital shortfall equivalent to 1.5% of the total regulatory capital of the system, stemming from institutions that represent 18% of banks total assets.

The assessment of reductions in residential property prices indicates that there is no regulatory breaching or dividend distribution limitation for nominal price drops of up to 35%, a stronger drop than S&P Case-Shiller's observed fall during the 2008 subprime crisis in the US market. Only price slumps of 45% or more

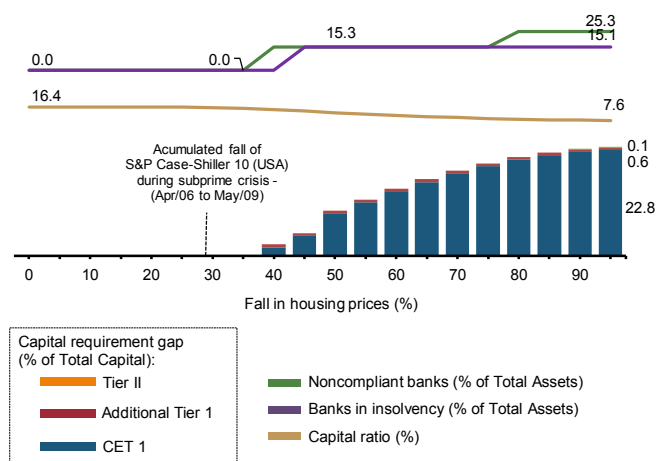
⁷¹ Prior to January, 2012, comparisons consider the weight of E- through H-rated loans to total loans.

Chart 1.5.2.1 – Sensitivity analysis
Credit risk



[Statistical annex](#)

Chart 1.5.2.2 – Sensitivity analysis
Housing prices risk



[Statistical annex](#)

would lead to insolvency, represented by negative CET1 (Chart 1.5.2.2).

In June 2020, the average loan-to-value (LTV) on mortgages outstanding balance was 60%, when revaluing collateral prices by the Residential Mortgage Collateral Value Index (IVG-R).⁷² Credit granted with low LTV, in addition to the utilization of the Constant Amortization System that reduces LTV during the lifetime of the loan, are healthy features for the mortgage loans and contribute to improving the system's loss absorbing capacity under extreme scenarios.

Therefore, sensitivity analyses confirm that the Brazilian banking system continuously presents sound loss absorbing capacity since relevant capital shortfalls would only happen under extremely adverse situations. The results of the stress tests simulations suggest that the banking system has an adequate capital cushion to withstand severe shocks stemming from the hypothetical worsening of economic fundamentals.

1.5.3 Simulation of direct interbank contagion

In addition to the macroeconomic and sensitivity stress tests, direct inter-financial contagion simulations take place, comprising all financial entities authorized by the Central Bank, except for consortiums. In this exercise, all direct national inter-financial exposures are considered, although second-order effects such as fire sales or liquidity are not considered.

In the assessment of direct inter-financial contagion, the individual failure of each financial institution is simulated, one at a time, and the impact on its counterparties is evaluated. If the failure of one institution leads to a breach on its counterparties, additional rounds are run until a new equilibrium is found (domino effect). The impacts stem from the write-off of exposures to different instruments, such as interbank deposits, granting of guarantees, OTC (over the counter) derivatives, or any other entailing credit risk, in which there are neither third-party guarantees nor collateral. With the bankruptcy simulation, the exposures identified cause losses to creditors, and the effects are evaluated from the perspective of the amount of capital required to prevent contagion to spread.

⁷² The IVG-R is calculated and disclosed by the BCB based on the values of realty used as real estate financing collateral.

Results show a low capital shortfall in case of default of each institution separately. In the worst scenario, the figure is less than 1% of the regulatory capital of the entire system. Two points help explain this result. Firstly, there is a regulatory cap of 25% on exposures to any single counterparty, as a proportion of the creditor institution's capital. Secondly, the great majority of inter-financial transactions occurs through repurchase agreements collateralized by federal bonds, which don't propagate contagion. The remaining operations, although small in aggregate volume in the financial system, may be relevant in specific cases, thus explain the above zero regulatory capital shortfall measured.

1.6 Financial Stability Survey

1.6.1 Introduction

This section presents the latest results from the Financial Stability Survey (FSS), carried out quarterly by the BCB with the FIs. The survey aims to identify and monitor risks to financial stability according to the perception of regulated entities. The survey is answered by executives responsible for the strategic risk management of these entities.

The FSS sample comprises 55 financial institutions, which together hold 93.1% of the national financial system's assets as of June 2020. There are public banks, foreign banks, and private Brazilian banks with and without foreign shareholders in the sample. It encompasses institutions in the prudential regulation segments S1, S2, S3, and S4.

Since the last edition of the FSR, two FSS have been carried out: from May 4th to 14th, 2020, and from August 3rd to August 12th, 2020, both with 100% response rates. This section compares the results of these last two surveys with the FSS carried out between January 27th and February 3rd, 2020, published in the April 2020 FSR.

1.6.2 Risks to financial stability

Respondents described their perception of the main risks⁷³ to financial stability over a three-year horizon, considering the probability of occurrence and impact

73 Each institution describes three risks in a textual form, sorted by importance in terms of the probability of occurrence of the risk and its impact in the case of materialization. These textual descriptions are then classified by the BCB into risk categories with the purpose of performing a systematic analysis.

on SFN.⁷⁴ The frequency of the four most cited risk categories in the last FSS is shown in Table 1.6.2.1.⁷⁵

Table 1.6.2.1 – FSS – Average frequency of the most cited risks

Risk	Average frequency (citations/financial institution)			Probability	Impact
	Feb 2020	May 2020	Aug 2020	Aug 2020	
Delinquency and Economic Activity	0.40	0.95	1.02	Mid-High	High
Political-Fiscal Risks	0.67	0.56	0.75	Mid-High	High
Foreign Scenario	1.27	0.65	0.67	Mid-High	High
Exclusively Political Risks	0.31	0.36	0.20	Mid-High	High

[Statistical annex](#)

With the Covid-19 pandemic crisis, the risks associated with delinquency and economic activity showed strong growth. The average citation frequency reached 1.02 per institution, compared to 0.40 and 0.95 in February and May 2020, respectively. This result reflects both the impact and the duration of the pandemic on firm operations and the labor market.

As a result of the fiscal effort to finance measures to combat the Covid-19 crisis, political-fiscal risks started to grow again. The average citation frequency per institution reached 0.75 in this latest survey, compared to 0.67 and 0.56 in the February and May 2020 surveys, respectively. Many financial institutions highlighted the risk that the fiscal situation could worsen if temporary pandemic-related fiscal expenditures became permanent, threatening the fiscal expenditure cap and jeopardizing public debt sustainability.

Risks related to the foreign scenario fell from the first to the third position. In August 2020, the average citation frequency was 0.67 per institution, compared to 1.27 and 0.65 in February and May 2020, respectively. Respondents pointed as central concerns the occurrence of a possible second wave of contamination by the new coronavirus and the worsening of trade disputes between the United States and China, impacting emerging economies. Such risk factors could jeopardize the recovery of the Brazilian economy due to increased uncertainties and volatility in asset prices, as well as effects on foreign trade.

74 Question: “In the next three years, what are the risks to the financial stability that your institution considers most relevant considering probability and impact on the SFN? Describe the three risks in order of importance (the most important first, considering the combination of probability of occurrence of the event and the magnitude of the impact in terms of losses measured as a fraction of the total assets of the SFN)”.

75 Since the same institution can describe two or more risks that could later be classified into the same risk category (for example monetary policy in the US and trade war are classified as foreign-scenario risks), the average frequency of citations/financial institution can vary between zero and three.

In the last survey, there was a significant reduction in the number of citations of exclusively political risks (related to governance), whose average frequency was 0.20 per institution, compared to 0.31 and 0.36 in February and May 2020, respectively.

Table 1.6.2.2 – FSS – Citation frequency of the most important risk

Risk	Frequency (%)			Probability	Impact
	Feb 2020	May 2020	Aug 2020	Aug 2020	
Delinquency and Economic Activity	7	64	60	Mid-High	High
Political-Fiscal Risks	25	5	22	Mid-High	High
Foreign Scenario	53	25	15	Mid-High	High
Liquidity Risk	0	2	4	Mid-High	High

Statistical annex

When considering only the risk that each financial institution classified as the most relevant, the risks of delinquency and economic activity became the reasons of greatest concern (Table 1.6.2.2). The number of citations of these risks as the most important had decreased during the economic recovery prior to the pandemic period, but increased again significantly with the outbreak of the pandemic (from 7% in the survey in February, to 60% and 64% in the following surveys). In turn, the frequency of citations of political-fiscal risks, after falling in the survey in May, returned to values similar to those of February, reaching 22%. In contrast, the concern of financial institutions with the risks associated with the foreign scenario decreased significantly.

Chart 1.6.2.1 – FSS – Word cloud describing the most important risk



Note: The visual disposition of words may differ from the Portuguese version as sometimes there is not a one-to-one correspondence between terms in both languages. Notwithstanding, the message conveyed by both remains unchanged.

The “word cloud”⁷⁶ compiled from the textual analysis of the most important risk descriptions obtained in the last survey, complements the risk categorization presented above by facilitating the identification of scenarios that are most often the object of attention and concern by respondents (Chart 1.6.2.1). In this chart, the font size of the words is proportional to their usage frequency.

76 The “word cloud” presented in Chart 1.6.2.1 was constructed considering the 100 most frequent words written by respondents in the August 2020 survey to describe the most relevant source of risk to financial stability. In the chart, each word's size is proportional to its relative frequency, i.e., the larger the size, the more often it appears in respondents' textual descriptions of risks. The following treatments were performed for individual words and groups of 2 and 3 adjacent words (2-grams and 3-grams): all letters were transformed into lowercase; numbers, symbols, hyphens, accentuation, punctuation, and stop words (words not relevant to the cloud compilation) were removed; for synonymous words, a single representative word was used; finally, it was used a word stemming procedure, avoiding considering as different words verb conjugations or changes due to plural or singular forms. For visualization, the most frequent complete word of each stemmed word was plotted. Words beginning with capital letters and acronyms were rewritten, respecting their correct spelling (example: Brazil, USA instead of brazil, usa).

Note: The visual disposition of words may differ from the Portuguese version as sometimes there is not a one-to-one correspondence between terms in both languages. Notwithstanding, the message conveyed by both remains unchanged.

The presence and prominence of the words “Covid-19”, “unemployment”, “government”, “recession”, “uncertainty”, “contagion”, “debt” and “recovery” represent concerns with the effects of the Covid-19 crisis in Brazil and with its economic consequences on the level of activity, defaults, increased uncertainty and the country's fiscal conditions in the following months. This result contrasts with the message passed in February 2020, when the words “EUA”, “China”, “global”, “economies” and “flow” stood out, in addition to “Covid-19”,⁷⁷ anticipating risks of the health crisis associated with the foreign scenario.

The comparative cloud addresses the evolution of perceptions of risks to financial stability in the last three surveys (Chart 1.6.2.2⁷⁸). This chart is useful for representing concerns that have gained or lost importance over time and highlight whether their temporal variations have been sudden. The colors of each word indicate the FSS in which that word had its most significant relative importance in the three compared surveys. Words plotted with a larger font indicate that the variation in the importance attributed to the theme was more significant than that which occurred in themes represented by words with a smaller font.⁷⁹ Concerns that had little or no variation do not appear, whether they are individually relevant or not.

This chart suggests a sudden change in concerns by respondents between the February 2020 survey and

77 In the February survey, the term used was “coronavirus” instead of
“Covid-19”.

78 To build this “word cloud,” the terms of the most important risk source in the last three FSS were extracted. These texts received the same data treatment discussed in Chart 1.6.2.1. After this initial treatment, a survey-specific frequency table of each word is constructed, which gives the number of occurrences of each word in each FSS. Then, the following calculations are performed:

- 1) For each FSS, the number of occurrences of all words is calculated;
- 2) The relative participation of each word occurrence in each FSS is calculated:

3) For each word, the average of the relative participation in the FSS obtained in the previous item is calculated:

4) For each word, the maximum (positive) deviation of their relative shares against the overall average is obtained, as well as the FSS to which this maximum refers;

5) Words are classified in decreasing order in terms of deviation, as calculated in the previous item;

6) The “word cloud” is then assembled with the first 110 words from the above classification. The word is plotted in the area corresponding to the FSS with greatest relative importance among all surveys. The font size of the words is proportional to the maximum value calculated in item 4 for the word.

The words plotted in the 2020-Q1 (February 2020) and 2020-Q2 (May 2020) survey areas are related to concerns that have lost importance, whereas those plotted in the 2020-Q3 (August 2020) survey area represent those that have become more important or have emerged in the last survey.

the following two surveys. This is corroborated by the most prominent concerns (words) plotted for the FSS 2020-Q1, as well as by their much larger font size when compared to other surveys. The concerns registered in the May and August 2020 surveys showed a more thematic similarity, evidenced by the smaller font sizes of the most prominent words.

In the 2020-Q1 survey, concerns related to the foreign scenario – indicated by the words “China”, “USA”, “USA_Iran”, and “global_downturn” – were dominant, highlighting the trade tensions between the United States and China, as well as tensions in the Middle East.

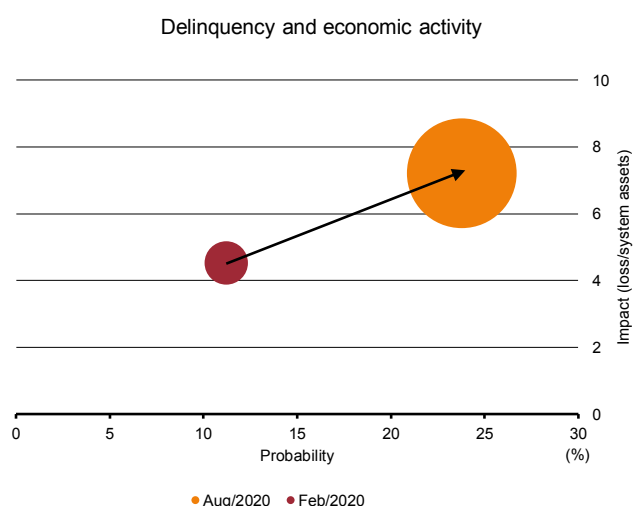
In the 2020-Q2 survey, the main concern referred to the effect of the Covid-19 pandemic in Brazil regarding its impacts on domestic activity. The words “Covid-19”, “social_distancing”, “Covid-19_wave”, “recession”, “downturn”, “unemployment”, “lockdown”, “health” and “credit_retraction” stood out.

In the 2020-Q3 survey, the words “fight_against_covid-19”, “extension”, “Brazil”, “debt”, “expenditures”, “reopening”, “employability”, “stimulus” and “recovery” were highlighted, suggesting that respondents were concerned about the extension of the Covid-19 crisis and the high fiscal cost of measures to fight against the Covid-19.

Concerning the evolution of the probability and impact of the three most important risks pointed out by respondents between the February 2020 and August 2020 surveys, the substantial increase in the perceived probability of materialization and the impact of the risks associated with delinquency and economic activity stand out, which accompanied the significant increase in their average citation frequency⁸⁰ (Chart 1.6.2.3).

The most frequent risks cited as the most difficult to mitigate with the adoption of internal strategies⁸¹ are those arising from delinquency and economic activity (45% of citations), political-fiscal (45% of citations) and

Chart 1.6.2.3 – FSS – Cited risks: probability, impact and frequency



Note: The size of the circle represents the frequency of the risk. The x and y coordinates represent the midpoint of the probability and impact, respectively.

[Statistical annex](#)








⁸⁰ Question: “For each of the three mentioned risks, indicate the probability and impact, considering the following classes: i) probability: low (<1%), medium-low (1% -10%), medium-high (10 % -30%), high (> 30%); ii) impact (volume of SFN assets): very low (<0.1%), low (0.1% -1%), medium (1% -5%), high (5% -10%), very high (> 10%).”.

⁸¹ Question: “Which of the risks listed above does your institution consider to be more difficult to mitigate with the adoption of internal risk management strategies by financial institutions without the assistance of measures of the BCB and/or the Federal Government?” The response may involve more than one risk, so that the frequency of citation can reach values from zero to three.

the foreign scenario (38%). According to responses⁸² collected in the May 2020 survey (2020-Q2), institutions have been controlling delinquency through substantial debt extension and renegotiation campaigns and through greater selectivity in new operations.

The most relevant channels of shock transmission in the SFN pointed out by respondents, in their majority, had a significant increase in probability in the last survey in relation to the February 2020 survey, with emphasis on the channels “Increase in risk aversion and uncertainty, affecting consumption and investment decisions,” as well as “Capital flight or strong currency depreciation” (Table 1.6.2.3).⁸³ It is also worth mentioning the increased probability in the channels “Widespread credit rating downgrade, including sovereign ratings” and “Decline in depositors’ confidence, including flight-to-safety.” The assessment on the “Liquidity squeeze, including interbank markets and foreign credit” channel worsened in the May survey but returned in the August survey, reflecting the effectiveness of the BCB economic measures as a response to the Covid-19 crisis.

Table 1.6.2.3 – FSS – Transmission channels of high-impact events

Transmission channel	Feb 2020 (median)	May 2020 (median)	Aug 2020 (median)	Distribution (last survey)
Contagion between markets and domestic institutions	4	4	4	
Liquidity squeeze, including interbank markets and foreign credit	3	4	3	
Sharp decline in domestic financial asset prices, including collateral prices	4	4	4	
Increase in risk aversion and uncertainty, affecting consumption and investment decisions	4	5	5	
Decline in depositors confidence, including flight-to-safety	3	4	4	
Capital flight or strong currency depreciation	4	4	5	
Widespread credit rating downgrade, including sovereign ratings	3	4	4	

Probability

Very low

1	2	3	4	5	6
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Very high

[Statistical annex](#)

82 Question: “From the point of view of financial stability, what are the most important impacts of the Covid-19 crisis on your institution, and what measures are being taken to mitigate these impacts?”

83 Question: “In the case of the occurrence of the most relevant event of high impact, what is the probability that this shock will be transmitted by the following channels?” The reported numbers represent the median of the answers. The last column shows the distribution of responses from the last survey.

Chart 1.6.2.4 – FSS – Covid-19: emergency measures that should be adopted or intensified by the BCB

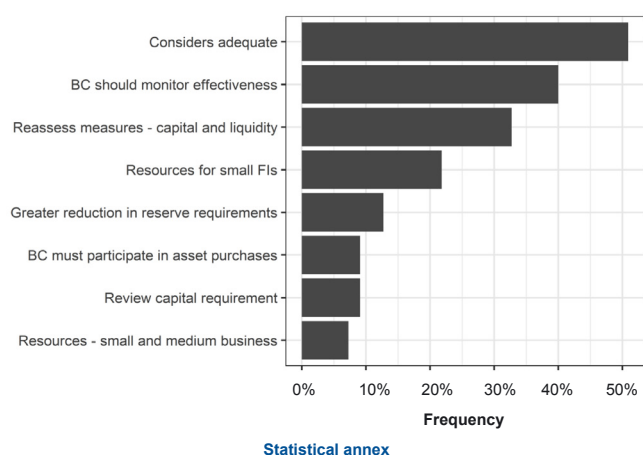


Chart 1.6.2.5. FSS – Impact of the Covid-19 on business models



Note: The visual disposition of words may differ from the Portuguese version as sometimes there is not a one-to-one correspondence between terms in both languages. Notwithstanding, the message conveyed by both remains unchanged.

To maintain the well-functioning of financial markets and support the real economy during the Covid-19 crisis, the BCB adopted a broad set of measures to mitigate the economic effects of the Covid-19 pandemic. These actions aimed to ensure an adequate level of liquidity for the SFN to prevent a substantial reduction of the credit channel. In this way, banks could have readily available resources to lend and to refinance debts of families and firms most affected by the crisis.

In the May survey, institutions were asked to indicate their perception about emergency measures that should be adopted or intensified by the BCB to preserve the stability of the financial system.⁸⁴

Most respondents considered that the measures adopted by the BCB to cope with the crisis were adequate to mitigate the economic effects of the pandemic (Chart 1.6.2.4). They also emphasized that the BCB should monitor the implementation of these measures to guarantee their effectiveness. In general, suggestions for additional measures included: reviews on capital requirement rules and changes in the mechanisms for supplying market liquidity so that the resources could reach smaller FIs and the medium and small firms.

In the May survey, participants were also asked about their medium and long-term reactions to their business models brought about by the Covid-19 pandemic.⁸⁵ A word cloud was compiled from the textual analysis of the responses received (Chart 1.6.2.5). Respondents believed that the economic crisis caused by the Covid-19 pandemic showed the need to accelerate the process of expanding the use of banks' digital channels and platforms. The most frequent words associated with the need for changes in the FIs' business model in this direction were: “digitalization”, “customer_services”, “technology”, “digital_channels”, “internet”, “increase_communication” and “communication”. Respondents also pointed out changes related to increased remote work, redesign of risk analysis tools, e-commerce, and development of new financial products.

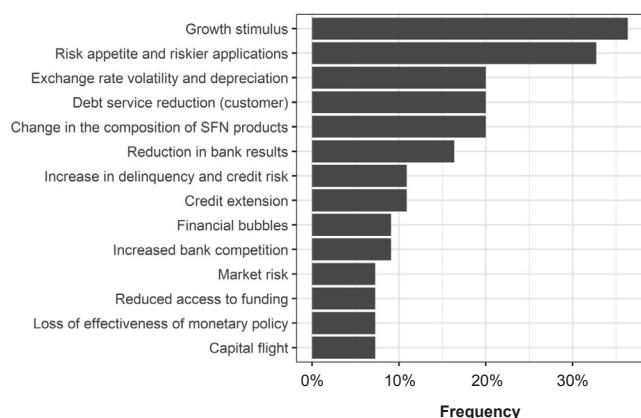
In the August survey, the institutions also answered a specific question about the consequences for the SFN of a low interest rate environment⁸⁶ The answers were

84 Question: “What emergency measures could be adopted or intensified by the BCB to ensure financial stability during and after the Covid-19 crisis?”

85 Question: “What effects will the Covid-19 crisis have on the business models of SFN institutions?”.

86 Question: “What are the consequences for SFN and its stability in the
low interest rate environment due to Covid-19?”.

Chart 1.6.2.6 – FSS – Covid-19: low interest rates environment



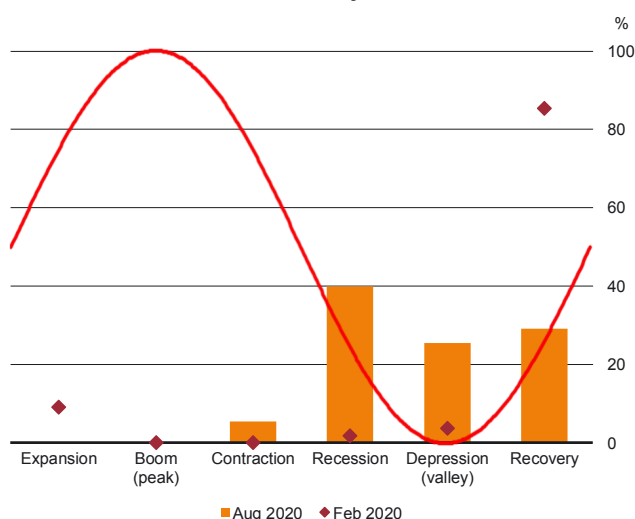
[Statistical annex](#)

textual and similar answers were manually analyzed and grouped together. The results are shown in Chart 1.6.2.6 for those topics with a frequency higher than 7%. A significant portion of the respondents believed that lower interest rates would stimulate growth, mainly due to increased consumption and investment. In the same sense, the benefits of debt service reduction by companies and families were pointed out. Effects related to risk factors were also pointed out, such as the increased risk appetite of a portion of investors, who would seek more risky investments and a higher expected return. Some institutions even mentioned the formation of financial bubbles. In the same vein, higher exchange rate volatility, exchange rate depreciation, and capital flight were pointed out. Respondents also pointed that some SFN products would lose their attractiveness (demand), resulting in a new composition of market equilibrium. Some institutions also mentioned that there would be an increase in banking competition, a reduction in access to funding and bank results.

1.6.3 Financial and economic cycles

As consequences of the Covid-19 crisis in the Brazilian economy, respondents showed a more negative perception of the financial and economic cycles in the August survey compared to the February survey and a less negative perception concerning the May survey.

Chart 1.6.3.1 – FSS – Economic cycle



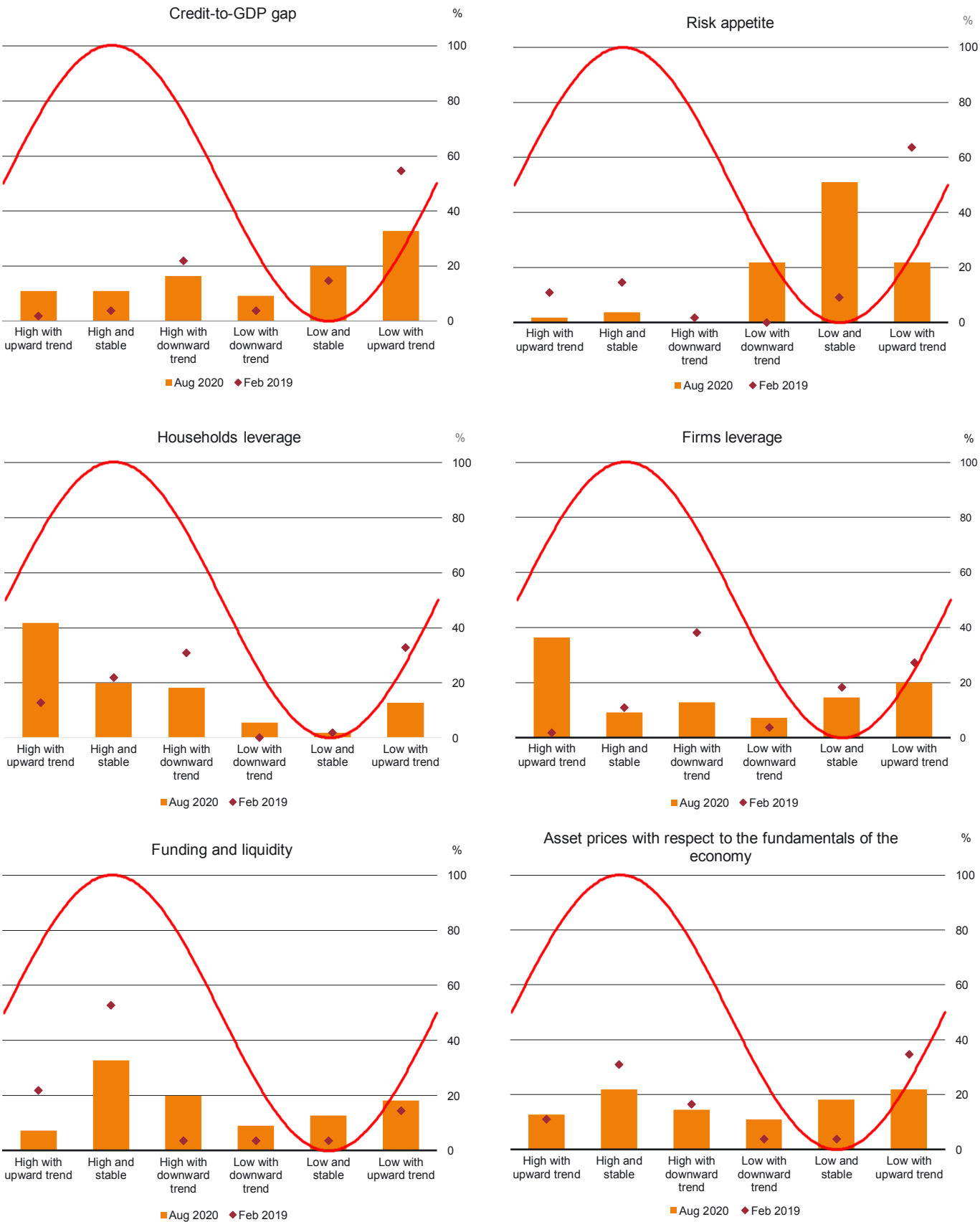
[Statistical annex](#)

Regarding the economic cycle in the last survey, most respondents believed that the economy is in recession (40%) or depression (25%). About 29% of respondents believed the economy is in the recovery phase compared to 85% in the February 2020 survey (Chart 1.6.3.1).

Regarding the credit-to-GDP gap (Chart 1.6.3.2), the prevailing view remained that its level is low (62% of respondents, considering the three corresponding categories). The perception of an upward trend has lost strength, falling from 56% of respondents in February to 44% in August 2020.

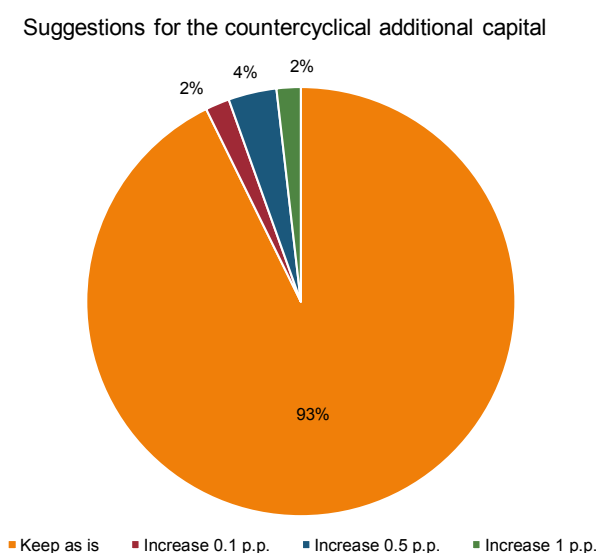
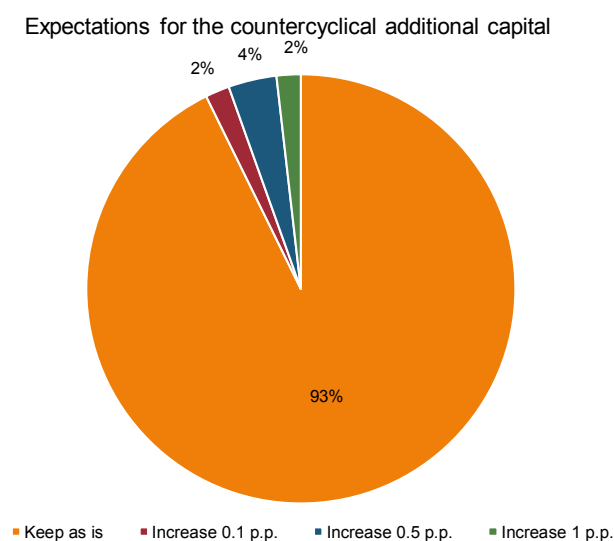
According to the last survey, the willingness of financial institutions to take risks has become more negative. The share of institutions that considered the risk appetite to be low increased from 73% in the February survey to 95% in August 2020.

Chart 1.6.3.2 – FSS – Financial cycles



[Statistical annex](#)

Chart 1.6.4.1 – FSS – Expectations for the countercyclical additional capital



[Statistical annex](#)

The share of respondents with perception that the household leverage is high increased from 65% in February survey to 80% in August survey. Most FIs believed that there is an upward trend for household leverage (55% in August survey compared to 45% in February survey). Regarding firms leverage, 58% of respondents classified it as high in August survey. The view of upward trend became predominant (56% of FIs in August survey compared to 29% in February survey). This change reflected the decline in economic activity, the deterioration of labor market conditions, and the increased firm debt arising from the Covid-19 crisis in Brazil.

Most respondents believed that the access to funding and liquidity remained high, albeit with a reduction compared to February survey (60% of respondents in August, compared to 78% in February survey). Regarding the asset prices with respect to the fundamentals of the economy, there is a wide dispersion among answers. However, the share of respondents that believed that prices were in the high phase of the cycle decreased (49% in August 2020 compared to 58% in February 2020).

1.6.4 Expectations for the Countercyclical Capital

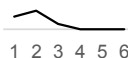




In line with the Basel Committee for Banking Supervision recommendations, known as Basel III, Brazil has a committee responsible for defining and communicating the value of the Countercyclical Capital Buffer to be used by the banking system in the country (Comef). In the August survey, most financial institutions expected (93% of answers) and recommended (93% of answers) that the value of ACCP_{Brasil} were maintained at 0% (Chart 1.6.4.1). The decision of the Comef meeting on September 1st, 2020, was to maintain the value at zero percent.

1.6.5 Resilience and confidence in the financial system

The perception of resilience⁸⁷ of the SFN remains positive (Table 1.6.5.1). The results showed a high degree of agreement between the institutions on the adequacy and sufficiency of the instruments available to face a severe financial crisis scenario in case of materialization. It should

⁸⁷ Question: “How does your institution evaluate the responsiveness of the financial system to the event described in field 1.1? (Scale the degree of satisfaction from 1 to 6, with 1 being very satisfactory and 6 being very unsatisfactory).”

Table 1.6.4.1 – FSS – Financial system capacity of reacting to high-impact events

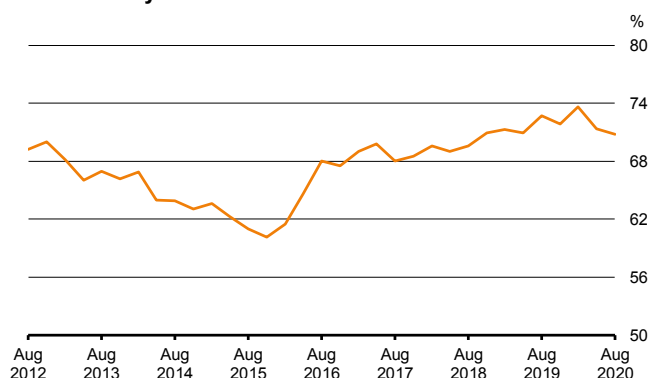
Financial system resilience factors	Feb 2020 (median)	May 2020 (median)	Aug 2020 (median)	Distribution (last survey)
Financial system capital adequacy	2	2	2	
Financial system liquidity adequacy	2	2	2	
Financial institutions monitoring and attention	2	2	2	
Government and Regulatory Agencies monitoring and attention	2	2	2	
Instrumental availability for risk prevention and mitigation by the BCB	2	2	2	

Median of the distribution of reaction capacities

Satisfactory  Unsatisfactory

[Statistical annex](#)

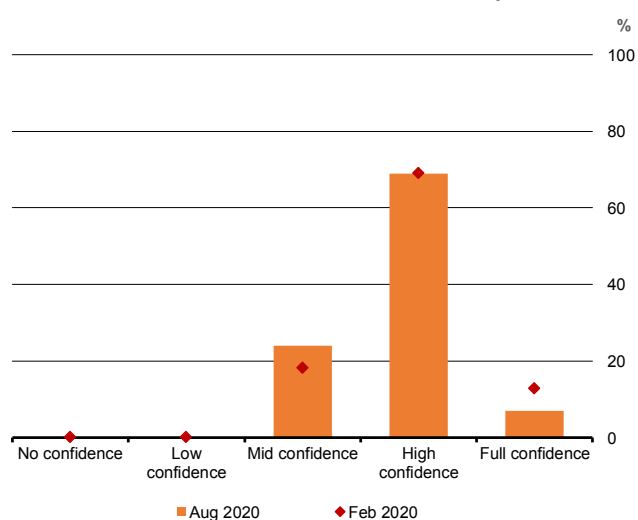
Chart 1.6.5.1 – FSS – Confidence in the stability of the Financial System



be noted that the perception of Brazilian financial system resilience remained stable despite the outbreak of the Covid-19 crisis.

The aggregate confidence index in the stability of the financial system⁸⁸ remained high, despite the strong impact of the Covid-19 crisis on the Brazilian economy. The index lowered slightly from 74% in February to 71% in August 2020 (Chart 1.6.5.1). The share of respondents that stated full confidence in the financial system reduced by 6 p.p. in August 2020, due to migration to the “mid confidence” class. There have been no records of negative assessments (“no confidence” and “low confidence” classes) since the 2016-Q3 survey.

Relative Distribution of Confidence Perceptions



Therefore, although institutions perceived an increase in the domestic scenario's risks and more negative assessments regarding the economy, the surveyed institutions continued to trust the Brazilian financial system's resilience and stability.

1.6.6 Final considerations

As a result of the economic effects of the Covid-19 crisis, delinquency and economic activity gained prominence as the most cited financial stability risks, with a significant

⁸⁸ Question: “What is the degree of confidence in the stability of the SFN in the next three years?” The confidence index is calculated by weighing the responses according to the following weights (multiplied by 100): full confidence (1); high confidence (0.75); mid confidence (0.5); low confidence (0.25), and lack of confidence (0).

[Statistical annex](#)

increase in their probability of occurrence and their impact on the financial system, according to respondents. Also, because of fiscal policies implemented as a response to the Covid-19 pandemic, the respondents' concerns about fiscal risks increased. They highlighted the risks related to temporary aid programs, the fiscal expenditure cap, and gross debt dynamics in the medium and long terms. The risks associated with the foreign scenario had a substantial reduction in the number of citations.

Respondents considered adequate the measures adopted by the BCB to mitigate the economic effects of the Covid-19 crisis and recognized the need to accelerate changes in banks' business models, increasing the supply of digital channels and the use of remote work.

Financial institutions understand that a lower interest environment will stimulate economic activity and create elements of risk. The increase in risk appetite and the increase in volatility and exchange rate depreciation were highlighted, in addition to the loss of attractiveness of Brazilian assets (capital flight). Changes in SFN products' composition, increased competition in the banking industry, reduced access to funding, and a drop in bank results were also cited.

Due to the Covid-19 crisis, respondents' perception of economic and financial cycles has become negative. The view of the economy in recession or depression prevails. The perception of the credit gap in relation to GDP became more negative, and the expectation of an upward trend lost strength. The willingness of FIs to take risks also decreased.

The perception of asset prices has a significant dispersion in responses, given the increase in uncertainties. The leverage of households and firms is considered high, reflecting the reduction in economic activity. Access to funding and liquidity is considered high for most institutions, although to a lesser extent than in the previous survey.

Most institutions believed and recommended that the value of ACCP_{Brasil} should not be changed, which was indeed the case, suggesting the alignment of expectations regarding the capital buffer needed to ensure the financial system's stability.

Confidence in financial stability remains high, and the financial system's ability to respond to relevant events is rated as satisfactory.

1.7 Systemically important FMI

In the first half of 2020, the systemically important FMIs performed safely and efficiently, although the higher uncertainty generated by the Covid-19 pandemic and by the trade dispute between Russia and Opec+ countries have led to substantial falls of interest rates, oil and stock prices globally, causing an unprecedented level of volatility.

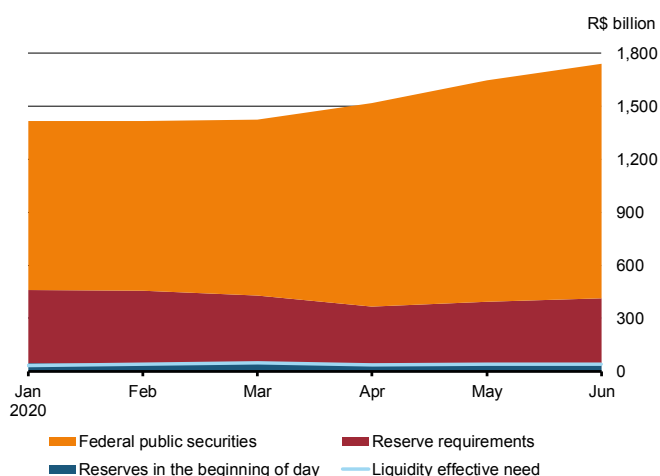
In the Reserves Transfer System (STR), the sole systemically important funds transfer system according to BCB,⁸⁹ the aggregate balance of funds available for payments and interbank transfers – named intraday liquidity – remained above the effective needs of participating financial institutions, assuring the smooth functioning of settlement operations. During the semester, on average, the need for funds – effective liquidity needs – of the system was 2.6% of the available liquidity, with a peak of 8.9% in the period.

Federal public securities (TPF) held by financial institutions in their portfolios and reserve requirements held at BCB contribute to the system's high liquidity level (Chart 1.7.1).⁹⁰ A high and stable level of intraday liquidity allows an uninterrupted flow of payments, removing incentives for liquidity retention and reducing the risk of insufficient resources for the settlement of obligations throughout the day.

The settlement systems that perform the activity of central counterparty (CCP), the BM&FBOVESPA-FX Clearinghouse and BM&FBOVESPA Clearinghouse, both operated by B3 S.A., demonstrated consistency in the risk management models used, minimizing procyclical responses during the period with greater operating volumes and high price volatility. In this way, they were able to offer a safe and stable risk management environment to market participants.

The BM&FBOVESPA Clearinghouse risk management methodology employs stress testing to estimate the risk of its participants' portfolio, which is an important factor to mitigate procyclical elements in the model. The

Chart 1.7.1 – Liquidity potential and effective liquidity needs



[Statistical annex](#)

⁸⁹ Articles 8 and 9 of the Regulation Annexed to Circular 3057, of 8/31/2001, as amended by Circulars 3437, of 2/13/2009, and 3539, of 6/2/2011, set forth the conditions in which the systems are considered systemically important by BCB.

⁹⁰ Reserve requirements balances can be transferred to the reserves accounts and TPFs can be converted into central bank money by way of intraday repo operations, both with no intraday financial cost to the financial institutions.

Table 1.7.1 – BM&FBOVESPA Clearinghouse

Primitive Risk Factors (PRF)

Discrimination	Low ^{1/}	High ^{1/}
Ibovespa spot	142%	119%
USD spot	49%	55%
Fixed rate 42	73%	38%
Fixed rate 126	83%	53%
Fixed rate 252	83%	66%
Fixed rate 756	76%	88%
DDI ^{2/} 180	37%	20%
DDI 360	59%	27%
DDI 1080	55%	34%

Sources: B3 and BCB

1/ Highest observed percentage in the first half of 2020 for the ratio between two-day accumulated return and the respective high or low scenario.

2/ Foreign exchange coupon.

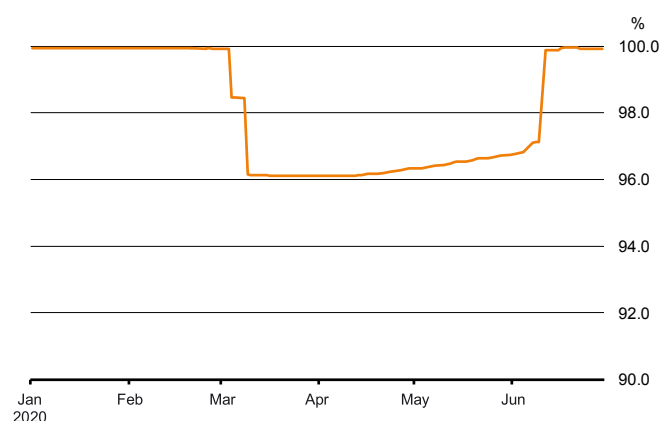
[Statistical annex](#)

model projects the worst accumulated cash flow for a hypothetical closeout of the portfolio over the horizon of up to ten business days, with a confidence level of 99.5% for commodities and 99.96% for the other Primitive Risk Factors (PRF)⁹¹. In this regard, B3 acts in line with the recommendation of the PFMI that advocates that the initial margin should meet an established single-tailed confidence level of at least 99% with respect to the estimated distribution of future exposure.

The accumulated variations of two business days in the value of the main PRFs remained within the limits established in their stress scenarios (envelopes) during the first half of 2020, with the exception of Ibovespa spot, as shown in Table 1.7.1, which presents the highest percentage observed in the period for the ratio between the accumulated return in two days and the respective high or low scenario. Variations greater than 100% regarding some stress scenario mean that it was exceeded.

There were two dates when the Ibovespa spot low stress scenarios were exceeded: on March 9, when the accumulated variation in two days calculated for the index in question in relation to the respective envelope was 142%, as represented in Table 1.7.1; and on March 12, the day with the second largest excess of the low stress scenario, on which the variation was 105%. On the other hand, the Ibovespa spot high stress scenario was exceeded on March 25, when the accumulated variation in two days calculated for the index in question in relation to the respective envelope was 119%, as represented in Table 1.7.1.

BCB performs monthly tests of accuracy of the model used in determining the risk levels of the participants portfolios by the BM&FBOVESPA Clearinghouse, as shown on Chart 1.7.2. Simply put, the accuracy index is defined as an average, over a 63-business-day moving horizon, of the proportion of hits in the risk management model employed by B3 within the scope of the BM&FBOVESPA Clearinghouse. This proportion of hits is a relation between the number of portfolios whose collateral required as a function of the risk calculated *ex ante* was higher than the risk verified *ex post* by the CCP using the actual data that occurred and the total count of portfolios whose risk exposure was verified. The calculation of the accuracy does not take into account the financial value of non-hits, so that abrupt falls do not mean necessarily that the financial risks

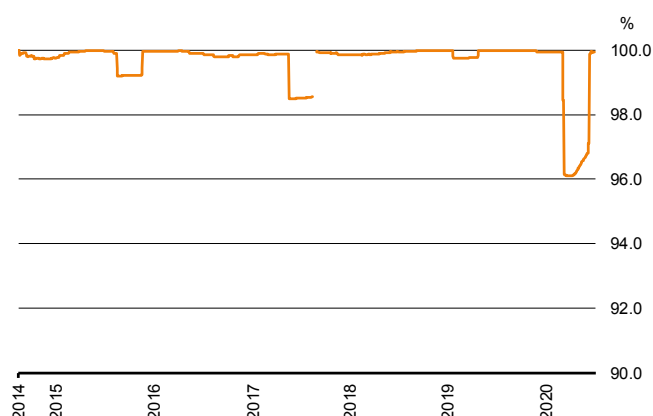
Chart 1.7.2 – BM&FBOVESPA Clearinghouse
Credit risk*

* Accuracy estimates from the model for individual margin evaluation with a rolling window of the last three months (63 days).

[Statistical annex](#)

91 The PRF associated with a derivative contract is the name given to the financial variables that are relevant to the formation of the contract price.

Chart 1.7.3 – BM&FBOVESPA Clearinghouse
Credit risk*



* Accuracy estimates from the model for individual margin evaluation with a rolling window of the last three months (63 days).

[Statistical annex](#)

exceed the safeguard structures of the BM&FBOVESPA Clearinghouse. An increase in errors in the estimation of the risk management model was observed for the portfolios with regards to March 5th and 10th, due to the volatility of the markets on the subsequent days, reflecting a decrease of the accuracy to 96%. With respect to the 4% of portfolios whose risks were underestimated by the CCP, in the event of default by the participants responsible for them, the deficit between the respective risk verified by the CCP and the respective collateral required would have been completely covered by other collateral layers that are part of the CCP safeguard structure.

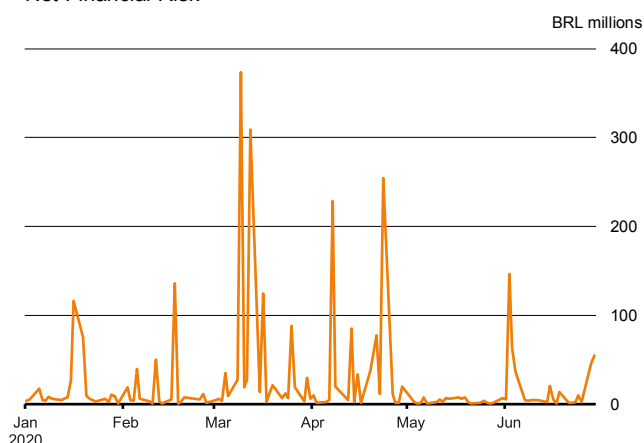
The dimensions of the counts of errors observed in March 2020 mentioned above were unprecedented throughout the BM&FBOVESPA Clearinghouse operation period. It can be observed on Chart 1.7.3 that the accuracy value decreased to 99.2% in August 2015, due to an operational failure associated with the pricing of a specific asset, and to 98.5% in May 2017, on an occasion marked by strong volatility in the markets, although the heterogeneity in the configuration of the clearinghouse interferes in the direct comparability of events.⁹²

Other analyses carried out monthly by BCB are backtesting analyses for the BM&FBOVESPA-FX Clearinghouse and the BM&FBOVESPA Clearinghouse. The purpose of these analyses is to assess, a posteriori, regarding each day of the period, the credit and liquidity risks incurred by CCP. To assess the credit risk, the two participants who jointly cause the highest Net Financial Risk (NFR)⁹³ to the CCP are identified and the percentage of additional safeguards constituted by CCP resources and mutual resources that would have been required to be used in case of default of the two mentioned participants. In order to assess the liquidity risk, the existence of liquid resources sufficient to ensure the timely settlement of the obligations assumed by the two participants who jointly had the largest financial obligations to the CCP is verified.

92 The BM&FBOVESPA Clearinghouse operation, supported by risk management systems and model resulting from the IPN project, started in August 2014 and adopted a configuration more similar to the current one in August 2017, with the incorporation of the equity spot and derivatives markets.

93 The NFR is calculated by comparing the financial result of the simulation of the closeout of the participant's positions and the value of the participant's collateral, in case the participant was declared defaulter. The closeout of the participant's positions is calculated by CCP based on the closeout strategy and the real variations in the prices of the assets, calculated in the following days.

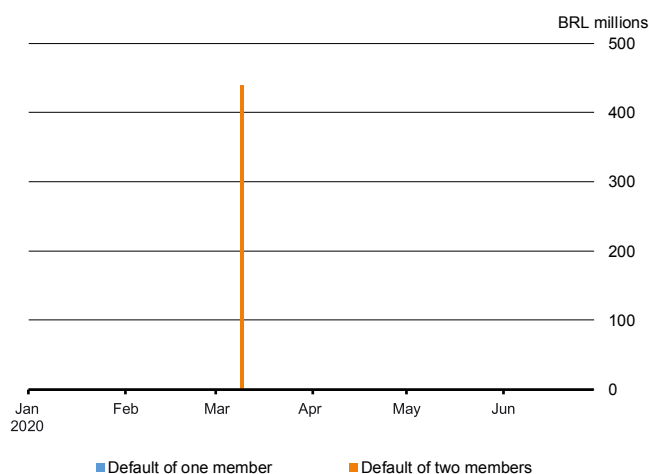
Chart 1.7.4 – BM&FBOVESPA Clearinghouse
Net Financial Risk



Sources: B3 and BCB

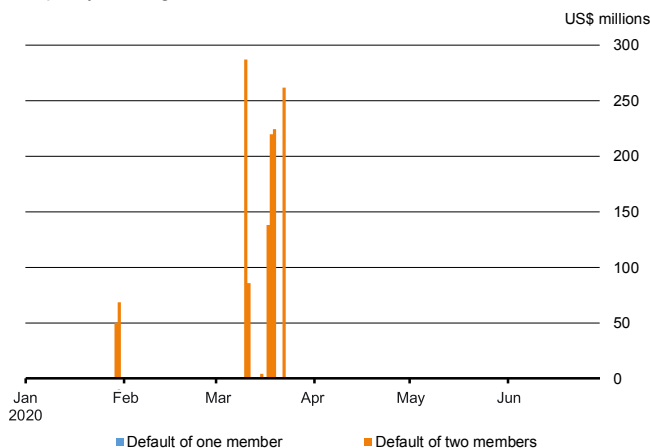
[Statistical annex](#)

Chart 1.7.5 – B3 – FX Clearinghouse
Liquidity shortage BRL



[Statistical annex](#)

Chart 1.7.6 – B3 – FX Clearinghouse
Liquidity shortage US\$



[Statistical annex](#)

Considering the two participants with the largest exposures, the NFR for the BM&FBOVESPA Clearinghouse corresponded to 26.6% of the additional safeguards available on the day it reached its maximum value in the first half of 2020 (Chart 1.7.4). For the BM&FBOVESPA-FX Clearinghouse, the NFR was null on all days of the period. This result is in accordance with the national rules of the Brazilian Payment System (SPB) and with the PFMI, which establish international standards.

With regards to the liquidity risk, B3 maintained, for all days of the first semester of 2020, sufficient liquid resources to ensure the timely settlement of obligations of the two participants with the highest net debtor positions in the BM&FBOVESPA Clearinghouse and of the participant with the largest net debtor position in the BM&FBOVESPA-FX Clearinghouse, in accordance with SPB rules.⁹⁴ The BM&FBOVESPA-FX Clearinghouse maintained sufficient liquid resources to guarantee the timely settlement of the two largest debtor positions, with the exception of one day for settlement in reais (Chart 1.7.5) and nine days for settlement in dollars (Chart 1.7.6).⁹⁵

Principle 7 of the PFMI determines the coverage of the two largest liquidity risks for CCPs that are considered systemically important in more than one jurisdiction, or that have a complex risk profile, and the highest liquidity risk for the others. As the BM&FBOVESPA-FX Clearinghouse is systemically important only in Brazil, and does not have a complex risk profile, settling only US dollar FX spot contracts, the events represented in Charts 1.7.5 and 1.7.6 are compatible with the international recommendations.

⁹⁴ Pursuant to item V of Article 3 of Resolution 2,882, of 8/30/2001.

⁹⁵ By way of comparison, in the second half of 2019, the BM&FBOVESPA-FX Clearinghouse maintained sufficient liquid resources to guarantee the timely settlement of the two largest debtor positions, with the exception of four days for the settlement in reais (maximum amount of approximately BRL 918 million) and three days for the settlement in dollars (maximum amount of US\$ 47 million). Also, the liquid resources considered in this assessment do not include non-collateralized committed lines of credit provided by financial institutions in accordance to contracts with B3, as well as B3's financial resources dedicated to the systems in which it operates as a CCP.

2.1 Role of the BCB in ensuring financial stability during the Covid-19 crisis

2.1.1 Introduction

The main implications of the covid-19 crisis for the SFN were the sudden and disseminated increase of household and business demand for liquidity and larger risk aversion by investors and financial intermediaries. In this context, the BCB, in coordination with the Executive and Legislative branches, adopted a series of measures fundamental to ensure proper functioning of the financial market and to contribute to safeguard the stability of the SFN. When the shock hit, the SFN has comfortable liquidity and capital levels⁹⁶ but, to allow these resources to be employed to dampen the crisis' impact, the BCB acted on multiple fronts.⁹⁷

The first action front sought to ensure proper employment of liquidity already within the system via i) easing regulatory liquidity requirements, ii) opening liquidity facilities, and iii) intervening in currency and interest rates markets.

Nevertheless, the availability of liquidity for financial intermediaries is necessary but insufficient for the credit channel to function adequately. It was necessary that financial institutions perceive that their balance sheets would be able to accommodate the risk of credit operations during the crisis. To this end, a second action front aimed at encouraging institutions to supply credit to households and firms. This front consisted of two types of measures. With the first type, the BCB worked to alleviate

⁹⁶ See Chapter 1 of this Report.

⁹⁷ The scope of measures in this section is more comprehensive than that in the April 2020 Report.

requirements of prudential regulation to release resource buffers in the balance-sheets of financial institutions to fund lending. The second type consisted of initiatives beyond the purview of the BCB whereby the government reduced the risk of credit operations by funding them (partially or entirely). Measures were adopted also to ensure the normal functioning of the currency market and easy monetary conditions.⁹⁸

2.1.2 Initiatives geared towards maintaining market liquidity

The investment fund industry was the first to be affected by the sharp increase in the demand for liquidity by households and companies. Many funds had to sell considerable amounts of their assets in a narrow time window in order to deal with the large number of redemptions since mid-March. This situation led to a loss of reference parameters for trading in the secondary market. The FIs, in their turn, were also unwilling to enter on the buying side, fearing to face the same liquidity shock that had reached the investment funds.

In order to preserve the secondary market for securities and credit, BCB focused first on allowing that liquid assets already held to meet regulatory requirements were made available to FIs. In this context, the temporary reduction in required reserves on term deposits, from 25% to 17%⁹⁹ stands out, together with the permission for the systemically important FIs to operate with the LCR below the regulatory level of 100%.¹⁰⁰ In addition to these measures, the Special Temporary Liquidity Facility (LTEL – Debentures)¹⁰¹ and the incentives for repurchasing their own long-term Financial Letters (own FL)¹⁰² sought to increase the demand by banks for fixed-income assets issued by the private sector, thereby reducing the deleterious effects caused by the sales cycle of these assets by investment funds.

After the implementation of the LTEL-debentures and the own FL repurchase program, both the spread and the trading value of private securities in the secondary market

98 The currency and monetary measures, essential for financial stability, are described in other BCB publications.

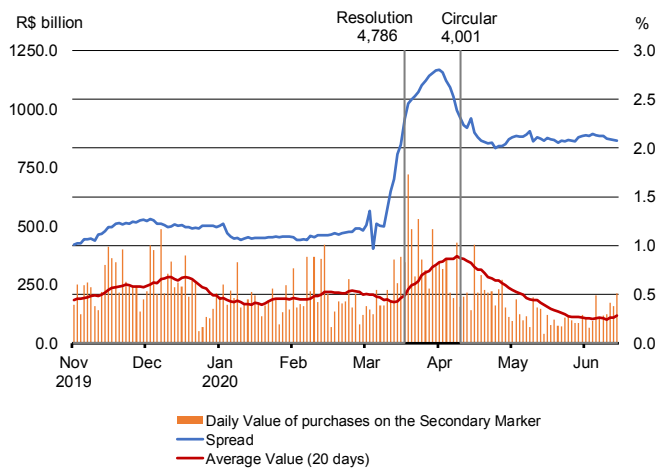
99 Circular 3,993, of March 23, 2020.

100 Basel III allows for the possibility of operating under the LCR minimum standard in stress situations, in order to release liquidity and maintain the access to credit from the FIs to households and companies.

101 Resolution 4,786, of March 23, 2020.

102 Resolution 4,788, of March 23, 2020, and Circular 4,001, of April 13, 2020.

Chart 2.1.2.1 – Volume and Spread of Debentures with rating AA-A traded on the Secondary Market



[Statistical annex](#)

stabilized, compared to the sharp increase observed in early stage of the crisis (Chart 2.1.2.1).

To secure liquidity also in foreign currency, the BCB carried out repo transactions with Brazilian sovereign bonds denominated in dollars during the most critical period of the crisis.¹⁰³ This action made easier for Brazilian banks to hold these bonds in their portfolios, providing an alternative to financing these positions with foreign FIs, which also were short on liquidity. In total, around US\$ 9.3 billion were released for financing in foreign currency.

In order to reduce volatility in the foreign exchange market, the BCB intervened directly in this market and also exempted banks from deducting the tax effects of foreign exchange hedge on their foreign investments,¹⁰⁴ which helped to reduce the pressure of adjustments and margin calls related to the FIs exchange risk exposure in the [B]³. This action was complemented by legislative measure eliminating the asymmetry of tax treatment, permanently ending the need for over-hedging and generating of tax effects after 2021.¹⁰⁵

To address the difficulty of FIs in accessing liquid funds with longer terms, the BCB also started to supply funds through repos backed by government securities. The mere start of those operations, in parallel to the repurchase of long-term government securities by the National Treasury Secretariat, eased the pressure on the long end of the yield curve.

Through a second set of measures, the BCB sought to expand the liquidity facilities to FIs that were not systemically important. In this sense, the introduction of the Special Temporary Liquidity Facility for the acquisition of a Financial Letters backed by financial assets and securities (LTEL-LFG)¹⁰⁶ and the permission to raise funds through DPGEs¹⁰⁷ stand out. These measures

¹⁰³ Circular 3,990, of March 18, 2020. These transactions were carried out from March 20 to June 8, with FIs selling government bonds to BCB with the commitment to repurchase bonds with the same characteristics at a future date.

¹⁰⁴ Resolution 4,784, of March 18, 2020. More details in section 2.3 of this Report.

¹⁰⁵ Provisional Measure (MP) 930, of March 30, 2020, converted into Law 14,031, of July 28, 2020.

¹⁰⁶ Resolution 4,795, of April 2, 2020 and Circular 3,996, of April 6, 2020.

¹⁰⁷ Resolution 4,785, of March 23, 2020. FGC-guaranteed deposits up to the limit of BRL 40 million by investor. This limit was initially BRL 20 million, changed later to BRL 40 million by Resolution 4,799, of April 6, 2020. FIs associated with the FGC were also authorized to invest in DPGE and were benefited with the reduction from 50% to 35% in the risk-weighting factor (FPR) used to calculate the capital requirement of their exposures.

made additional liquid assets available for FIs in the S3 and S4 segments.

The BCB also allowed that investments in DPGE as well as the balance of credit operations for financing working capital of small businesses to be deducted from the saving deposits reserve requirements.¹⁰⁸ The main intention was to reduce frictions, encouraging liquidity flows from reserve requirements to smaller FIs and businesses.

With the new funding instruments, there was an increase in the balance of liquid assets of medium and small size FIs, from the S3 and S4 segments, leading to a recovery in the LI of these intuitions, which was down since the beginning of the pandemic due to an increase of the “stressed cash flow”, the LI denominator (Chart 2.1.2.2).¹⁰⁹

2.1.3 Initiatives geared towards stimulating the supply of credit

Countercyclical prudential regulation

Prudential regulation acted in a countercyclical manner so that the resources gathered before the crisis were released temporarily in order to give more capacity to financial institutions’ balance sheets to supply credit.

In early March, already with the first signs of financial shock, the Financial Stability Committee (Comef) kept the countercyclical capital buffer rate at zero.¹¹⁰ This decision was reiterated in Comef’s meeting of June and September¹¹¹ when the Comef signaled via the communiqués the intention to hold this capital buffer requirement at zero for a prolonged period. The decision

108 This deduction, set by the Circular 4,033, of June 24, 2020, can only occur for credit operations carried out between June 22 and December 31, 2020, with a minimum term of 365 days up to 3 years and grace period for principal payments of 180 days. In order to deduct the balance, operations in DPGE must be issued by FIs of S3, S4 and S5 and with a minimum share of 30% in FIs from S4 and S5. Furthermore, in order to keep the level of reserve requirements on saving deposits adequate, taking into account the existing policies of earmarking these deposits to credit, the total deduction figure was limited to 30%.

109 To complement these measures, there were other actions to provide funding to smaller FIs. The authorization for Fintechs (Direct Credit Society and Peer-to-Peer Loan Company) to finance themselves using credit cards with resources from the Brazilian Development Bank (BNDES) – Resolution 4,792, of March 26, 2020 – and for the Credit, Finance and Investment Companies to issue Term Deposit Certificates – Resolution 4.812, of April 30, 2020 is noteworthy. Similar purposes led BCB to ease rules for issuing LCA, exempting credit unions and smaller FIs from the mandatory direction of credit to agricultural activities in issues of up to BRL 500 million (Resolution 4787, of March 23, 2020).

110 Communiqué BCB 35,259, of March 3, 2020.

111 Communiqués BCB 35,761, of June 2, 2020, and 35,761, of September 1, 2020.

and the disclosure of Comef's vision sought to inform the financial system that there will not be additional capital requirement in the short term.

To release the prudential regulatory requirements accumulated before the crisis, the CMN reduced the capital conservation buffer temporarily and set a period to reestablish the original requirement of one additional year.¹¹² The reduction aimed at eliminating the stigma and reluctance associated with using this buffer to maintain the flow of credit.^{113 114} Further, the risk-weight factor was reduced from 100% to 85% for loans granted until end-year to certain SME.¹¹⁵

To encourage that the capital released by these measures be held to absorb losses and to maintain the credit flow, and not be channeled to other destinations, it was imposed in early April a temporary restriction on discretionary capital payouts, such as dividend payments, interests on equity capital, share repurchases, and raises in management compensation.¹¹⁶

In addition, the CMN adopted measures to abet financial intuitions to postpone the due date of obligations of viable debtors whose payment capacity was temporarily affected by the pandemics. The measures neutralized the negative effect on capital in case of loan modifications with postponement of due dates, as financial institutions are temporarily exempt from making additional loan-loss provisions for loan modifications from March to December.¹¹⁷

The amount of loans modified by financial institutions during March to June 2020 suggests that the measures adopted by the BCB met the proposed objectives, allowing firms and households affected by the pandemic to have their loan repayment due dates postponed and to receive the financial relief to bridge the most acute moment of

112 Resolution 4,783, of March 16, 2020.

113 The CET1 buffer in its three components (conservation, countercyclical, and systemic) was already usable by banks, especially under stress, as its use would not cause harsh penalties, only restrictions on discretionary capital payouts. Nevertheless, banks are reluctant to use it to maintain credit.

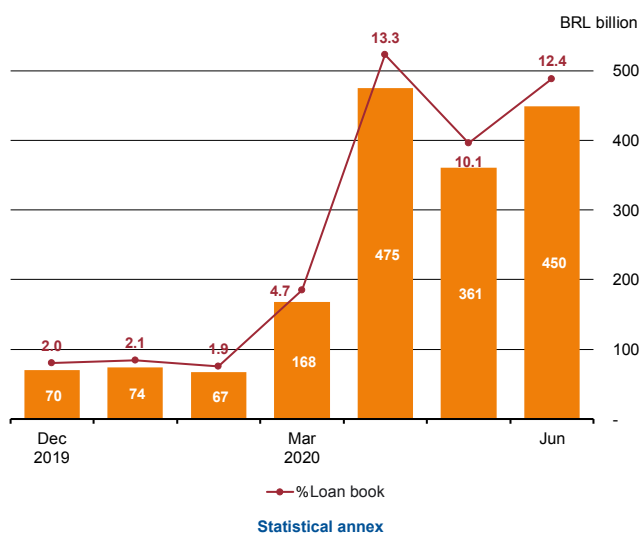
114 The reduction of required capital was subsequently extended to smaller institutions, segment S5 (Resolution 4,813, of April 30, 2020).

115 Circular 3,998, of April 9, 2020.

116 Resolution 4,797, of April 6, 2020, replaced by Resolution 4,820, of May 29, 2020 (with a FAQ available at https://www.bcb.gov.br/estabilidadefinanceira/faq_resolucao4820).

117 Resolution 4,782, of March 16, 2020, extended by Resolution 4,856, of September 24, 2020; Resolution 4,791, of March 26, 2020; Resolution 4,803, of April 9, 2020; and Resolution 4,801, of April 9, 2020, extended by Resolution 4,840, of July 30, 2020.

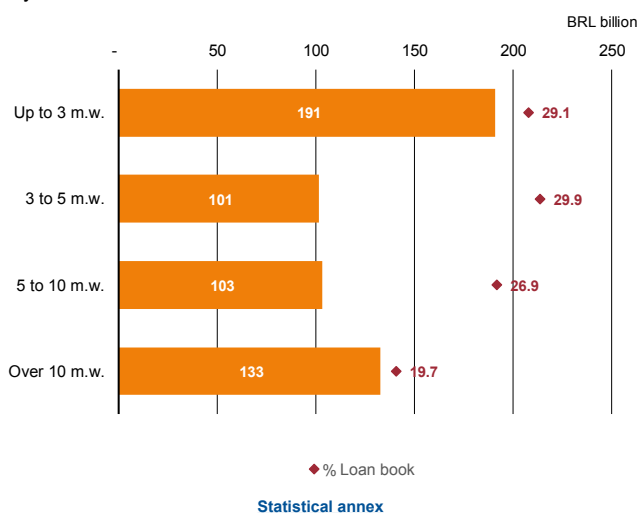
Chart 2.1.3.1 – Loan modification flow



the crisis and to recover their payment capacity. The amount of modified loans increased significantly since March 2020, compared to the months before the measures adopted by the CMN. In April, for instance, the modified loans amounted to BRL 475 billion, compared to BRL 67 billion in February 2020 (Chart 2.1.3.1).¹¹⁸

Households as well as businesses benefited from the modification of loans by financial institutions. In the portfolio of loans to households, loans were modified to borrowers in all income brackets, but with higher intensity to borrowers with monthly income under 3 minimum wages and between 3 to 5 minimum wages, with 29.1% and 29.9% of the loan portfolio modified, respectively (Chart 2.1.3.2).

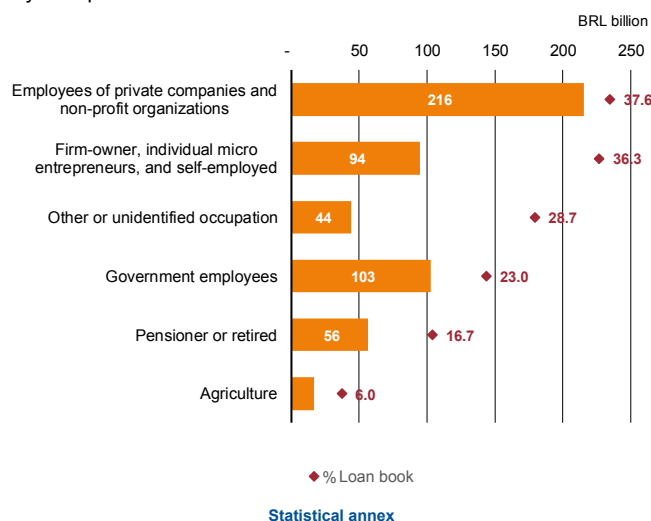
Chart 2.1.3.2 – Modified loans
By income bracket – Households



Loans were modified with more intensity for households with occupations more susceptible to income loss, such as employees of private sector companies and non-profit entities, with 37.6% of the portfolio, and entrepreneurs, individual microentrepreneurs and the self-employed, with 36.3% of the portfolio (Chart 2.1.3.3).

In the portfolio of loans to businesses, loan modifications reached firms of all sizes, but with higher vigor in the micro and small firms, usually more vulnerable to economic crises. Between March and June 2020, financial institutions modified 34.2% and 35.4% of the outstanding amount of credit operations granted to micro and small firms, respectively (Chart 2.1.3.4).

Chart 2.1.3.3 – Modified loans
By occupation – Households



The economic sectors of firms that resorted more frequently to loan modifications from financial institutions are transportation (42.2% of the portfolio), media and entertainment (40.6%), textile and leather (35.5%), construction, lumber and furniture (33.1%), public administration and NGOs (32.4%) and energy (31.2%), segments whose income was strongly impacted by the pandemics (Chart 2.1.3.5). The modified loans of firms from these sectors in June amounted to BRL 257 billion, representing 63% of the modified loans of businesses.

Changing risk perceptions of financial institutions

Several measures funding credit in its entirety or sharing credit risk were implemented. Without them, the unfavorable economic environment would tend to dominate individual decisions of financial institutions and thereby restrict the supply of credit, especially to

¹¹⁸ The amount of modified loans takes into consideration potential consecutive repeated modifications of the same operation.

Chart 2.1.3.4 – Modified loans
By firm size – Companies

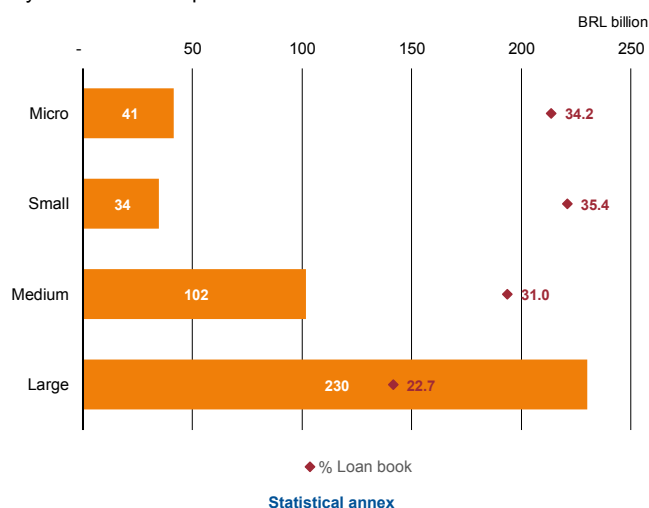
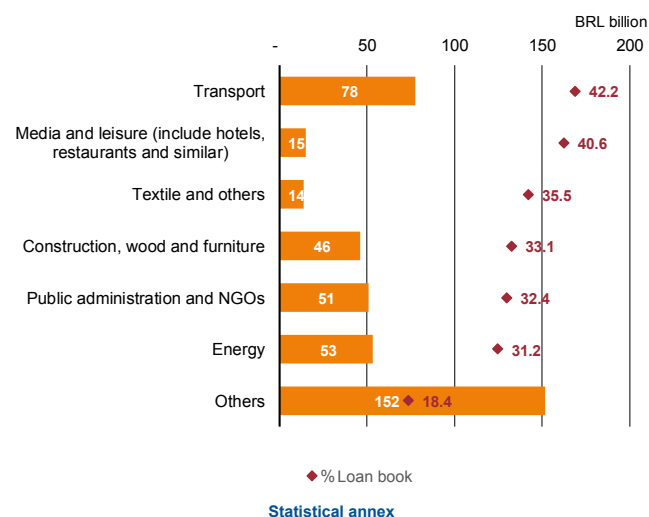


Chart 2.1.3.5 – Modified loans
By sector – Companies



smaller firms. These individual decisions, while sensible from the standpoint of each financial institution, would be harmful the collective of financial institutions as they would amplify the aggregate shock in the financial sector with negative repercussions to the own financial sector. Further, measures to strengthen the social safety net¹¹⁹ had positive effects on financial stability and on agents' perceptions.

In early April, credit facilities were opened from Constitutional Funds in favorable maturities and terms¹²⁰ and the "Pese" program.¹²¹ To grant the proper treatment to Pese in the current context, of high demand for liquidity, the BCB authorized that the part of funds applied by financial institutions to finance the wage bill be deducted from their required reserves on term deposits up to BRL 6 billion.¹²² Until July 2020, over BRL 600 million, of a total amount of BRL 4.5 billion, had already been made available for the program.

In May, the "Pronampe" program was established, geared towards even smaller companies, with revenues up to BRL 4.8 million.¹²³ Contrary to Pese, the Pronampe does not impose conditionalities on the entrepreneur, having a take up amount much larger. With the strong demand for loans with official guarantees, the initial budget envelope of Pronampe, of BRL 15.9 billion, was used in little time. This led to the reallocation of part of Pese's unused resource to Pronampe, adding BRL 12 billion to this program.¹²⁴

In addition, with the slow down of lending to SMEs with unearmarked funds, in June it was established the "Peac" program¹²⁵ geared towards SMEs and, in July, the "Program of Working Capital for the Preservation of Firms" ("CGPE") geared towards medium, small and micro enterprises (Table 2.1.3.1).¹²⁶

119 One of the most notable measures was the emergency aid (BRL 600 per month) to almost 60 million households during five months, extended for four months (BRL 300 per month, Law 13,982, of April 2, 2020, regulated by Decree 10,316, of April 7, 2020, and extended by Decree 10,412, of June 30, 2020 and Provisory Measure 1,000, of September 2, 2020).

120 Resolution 4,798, of April 6, 2020.

121 Provisory Measure 944, of April 3, 2020, converted into Law 14,043, of August 19, 2020.

122 The implementation of Pese was regulated by Resolution 4,800, of April 6, 2020, and its prudential treatment was set by Circular 3,997, of April 6, 2020.

123 Bill 1,282, of April 14, 2020, subsequently approved into Law 13,999, of May 18, 2020, and amended by Provisory Measure 975, of 2020, subsequently approved into Law 14,042, of August 19, 2020, with prudential treatment set by Circular 4,026, of June 10, 2020.

124 Announcement (Portaria) 19,492, of August 18, 2020.

125 Provisory Measure 975, of 2020, subsequently converted into Law 14,042, of 2020, with prudential treatment by Circular 4,034, of June 29, 2020.

126 Provisory Measure 992, of 2020, and Resolution 4,838, of July 21, 2020. Prudential treatment was regulated by BCB Resolution 12, of August 25, 2020.

Table 2.1.3.1 – Comparison Pronampe x PEAC-FGI

Amounts released up to August 7, 2020 (R\$ million)

Segment	Pronampe		PEAC-FGI		Total	
	Number of operations	Released amounts (cumulative)	Number of operations	Released amounts (cumulative)	Number of operations	Released amounts (cumulative)
Microenterprises	105,166	4,714.7	-	-	105,166	4,714.7
Small enterprises	112,691	13,986.6	2,401	478.0	115,092	14,464.6
Medium-sized enterprises	-	-	4,126	6,906.5	4,126	6,906.5
Total	217,857	18,701.3	6,527	7,384.5	224,384	26,085.8

Source: https://www.bcb.gov.br/content/acessoinformacao/covid19_docs/Evolucao_Recente_do_Credito.pdf[Statistical annex](#)

It can be verified that the timely measures adopted by the BCB and CMN have been successful to maintain the liquidity and fluidity in the credit market, benefiting individuals and firms of all sizes. Taken together, the potential value of release measures amounts to BRL 1,274 billion, equivalent to 17.5% of GDP. Similarly, the measures adopted to alleviate temporarily the capital requirements of financial institutions can potentially increase the supply of credit in BRL 1,348 billion, of 18.5% of GDP (Table 2.1.3.2).

Table 2.1.3.2 – Measures to safeguard financial stability

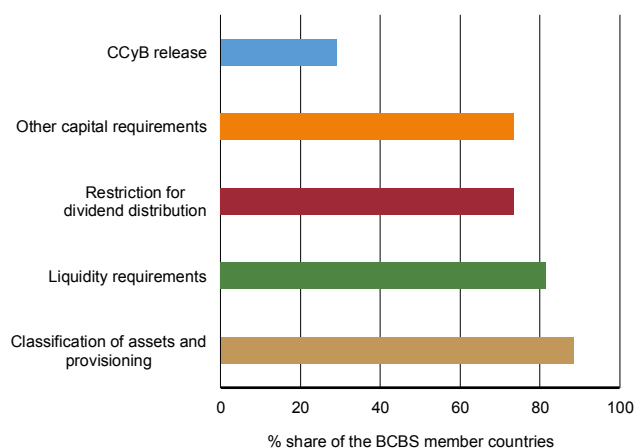
Measure	Potential	Implemented	2008
Liquidity release	R\$ 1.274 bi	R\$ 315,3 bi	R\$ 117 bi
Required Reserves + Liquidity Coverage Ratio (LCR)	R\$ 135 bi	R\$ 135 bi	0.0
Release of additional required reserves	R\$ 70 bi	R\$ 70 bi	R\$ 82 bi
LCA flexibility	R\$ 2,2 bi	R\$ 2,2 bi	0.0
Loan backed by guaranteed LF	R\$ 670 bi	R\$ 41,3 bi	0.0
Repurchase of Brazilian sovereign bonds	R\$ 50 bi	R\$ 23,2 bi	R\$ 25 bi
New DPGE	R\$ 200 bi	R\$ 15,7 bi	R\$ 10 bi
Loan backed by corporate bonds (debêntures)	R\$ 91 bi	R\$ 3 bi	0.0
Change in required reserves on savings accounts	R\$ 55,8 bi	R\$ 24,9 bi	0.0
Capital release	R\$ 1.348,2 bi	R\$ 797 bi	0.0
Overhedge	R\$ 520 bi	R\$ 520 bi	0.0
Reduction in ACCP _{Brasil}	R\$ 637 bi	R\$ 637 bi	0.0
Reduction in capital requirement for credit operations to SMEs	R\$ 35 bi	R\$ 35 bi	0.0
Reduction in capital requirements for small financial institutions	R\$ 16,5 bi	R\$ 16,5 bi	0.0
Reduction of capital requirement on DPGE exposures	R\$ 12,7 bi	0.0	0.0
Capital optimization (CGPE)	R\$ 127 bi	0.0	
Provisioning exemption for loan modifications	R\$ 3.200 bi*	R\$ 797 bi	0.0
Purchase of assets in the secondary market	N.D.	-	0.0
Other measures			
Dollar swap line with the Fed	US\$ 60 bi	0.0	US\$ 30 bi
Creation of a special credit line for SMEs (PESE)	R\$ 40 bi	R\$ 4,5 bi	0.0
Property as collateral for more than one loan	R\$ 60 bi	0.0	0.0

Source: https://www.bcb.gov.br/acessoinformacao/acompanhamento_covid19 (accessed on Aug. 12, 2020)

* Credit potentially benefited by the measure.

[Statistical annex](#)

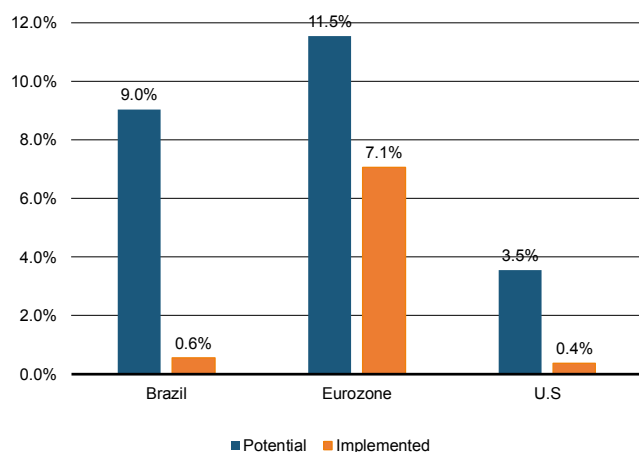
Chart 2.1.4.1 – Measures adopted by countries



Sources: BCBS, BIS

[Statistical annex](#)

Chart 2.1.4.2 – Liquidity facilities backed by credit operations



Sources:

<https://data.worldbank.org/?locations=US-CN-BR>

<https://www.bcb.gov.br/conversao>

<https://www.bcb.gov.br/detalhenoticial/17162/nota>

<https://www.congress.gov/bills/116/congress/house-bill/266/text>

Notes:

Specific liquidity and credit programs (does not include other specific government guarantee programs):

a) Brazil – LFG: Guaranteed Financial Bill;

b) Eurozone – LTRO: Long Term Refinancing Operations (includes PELTRO and TLTRO III programs). The potential of LTRO in the Eurozone may increase, depending on the volume of credit;

c) U.S. – PPPLF: Paycheck Protection Program Liquidity Facility / TALF: Term Asset-Backed Securities Loan Facility

[Statistical annex](#)

2.1.4 The measures adopted in Brazil in international perspective

The measures adopted in Brazil are similar to those from other economies in terms of their principles and objectives, falling into the same action fronts.

We highlight that the measures that facilitate the rolling-over bank debt were the most adopted by the members of the Basel Committee. Additionally, the large majority of Committee members adopted measures of liquidity supply in the market, restrictions to discretionary capital payouts, and reductions in capital requirements (Chart 2.1.4.1).

Liquidity measures were adopted in other countries also to maintain market functionality and the flow of credit to the economy. As the financial-economic scenario deterioration intensified, responses were adopted in the form of liquidity facilities, asset purchases by central banks, and flexibilization of liquidity requirements of financial institutions, such as required reserves and the LCR¹²⁷ (Chart 2.1.4.2).¹²⁸

In Brazil, the release of funds held at the BCB as required reserves stands out, given its rate significantly higher than the other countries. Internationally, China is the country that most resembles Brazil in terms of the average rate of required reserves (Chart 2.1.4.3).

In countercyclical prudential regulation, other countries used mechanisms that are similar to those in Brazil to release capital of financial institutions, to leverage lending, including changing the implementation date of new rules and regulatory agenda.¹²⁹

Communication was extensively used to encourage the use of capital buffers.¹³⁰ Additionally, many jurisdictions reduced the countercyclical capital buffer to zero and, in some cases, other capital buffers were also reduced

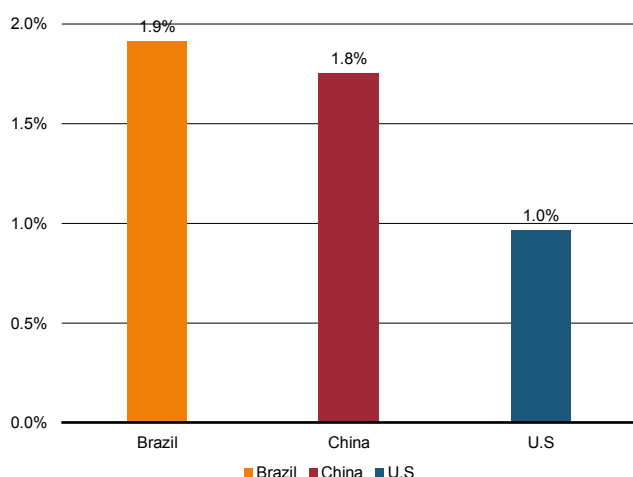
¹²⁷ South Africa, Australia, United States, European Central Bank, India, England, Japan, Mexico, Sweden, Turkey.

¹²⁸ Specific programs of liquidity and of credit (not including other programs of state guarantees): Brazil – LFG: Long Term Refinancing Operations (LTRO), which includes PELTRO and TLTRO-III (the potential LTRO in the Eurozone may increase, depending on credit volume). USA – Paycheck Protection Program Liquidity Facility (PPPLF)/Term Asset-Backed Securities Loan Facility (TALF).

¹²⁹ In addition to the countries that reduced their capital buffers listed below, the following countries adopted other mechanisms to promote countercyclical prudential regulation: Russia, Korea, India and Singapore.

¹³⁰ The following countries publicly encouraged the use of buffers: Australia, Canada, United States, England, and European Central Bank.

Chart 2.1.4.3 – Release of required reserves / GDP



Sources:
<https://data.worldbank.org/?locations=US-CN-BR>
 2019: <http://www.guillermovuletin.com/data>,
https://www.bcb.gov.br/content/estabilidadefinanceira/docscomplementares_rc/Box_compulsorios_REB_2019.pdf, <https://www.ceicdata.com/en/indicator/china/reserve-requirement-ratio>.
 2019: https://www.bcb.gov.br/conteudo/relatorioinflacao/EstudosEspeciais/EE072_Discussao_sobre_as_funcoes_dos_recolhimentos_compulsorios.pdf
 2019/20: <https://www.federalreserve.gov/releases/h3/current/default.htm>
 2020: PBOC, Euler Hermes, Allianz Research
<https://www.bcb.gov.br/conversao>
 Note:
 Amounts of reduction in reserve requirement in local currency

[Statistical annex](#)

temporarily, such as the Domestic Stability Buffer of Canada.¹³¹

The large majority of national authorities have been adopting measures to facilitate the rolling over of bank debt, with slight differences in strategies – guidance or rules for capital release. In all cases, jurisdictions have been encouraging using longer horizons for credit risk assessment, taking into consideration the particularities of the exceptional measures of credit support and the outstanding uncertainties. It is in this context that trade-off between flexibility and prudence of the accounting and prudential treatment of loan modifications impose the need for a continuous reassessment of the evolution of the crisis.¹³² Loan modifications help the affected firms and households face the crisis, but they may also delay the recognition of permanent deterioration of credit quality.

Under the uncertainties of the current scenario, in many countries, the authorities discourage or limit the distribution of earnings to shareholders and managers of financial institutions to preserve capital and maintain the flow of credit and to absorb expected losses.¹³³

Finally, several countries also moved to address the insufficiencies of the liquidity and regulatory measures in order to ensure the flow of credit to the economy. To this end, they adopted measures of credit facilitation via government programs of credit guarantees or supply.¹³⁴

2.1.5 Conclusion

The vision of the BCB is that the objectives to safeguard stability have been being met. Together with other governmental authorities, the BCB has moved in several fronts to preserve market functionality and widen the regulatory leeway for the financial system act as a shock absorber. These actions are similar to those adopted in

¹³¹ In Chart 2.1.4.1, the release of the countercyclical capital buffer was one of the least adopted measures, by the simple fact that few jurisdictions had activated it before the crisis. Among the eight jurisdictions that had activated it, seven reduced or zeroed their countercyclical buffer: Germany, Belgium, Canada, France, Hong-Kong, Norway, England, and Sweden.

¹³² Countries that facilitated loan modifications: South Africa, Australia, Canada, China, Spain, United States, India, England, Italy, Japan, Mexico.

¹³³ Examples include: South Africa, Germany, Argentina, Australia, Belgium, Spain, France, Netherlands, India, Ireland, Iceland, Israel, Italy, Mexico, Pakistan, Poland, Portugal, United Kingdom, Russia, Sweden, Switzerland, Ukraine.

¹³⁴ Examples are South Africa, Germany, Canada, China, Spain, France, Netherlands, England, Italy, Japan, Singapore, Sweden, Turkey, United States.

the main economies. The volume of operations under the measures suggests that they have been successful in maintaining liquidity and fluidity in the credit market, benefiting individuals and firms of all sizes. The measures are temporary, to allow the economy to bridge the most acute moment of the shock preserving financial stability. The BCB continues to monitor the financial system and the repercussions of the measures and will remain ready to identify timely the need for corrective action, seeking the soundness and the efficiency of the system.

2.2 Covid-19 stress test

Section 2.1 of the April issue of this report presented results of an specific stress test aiming at estimating the impacts of the Covid-19 on the economy. That test, at an initial stage of the pandemic, used assumptions not validated by observed data. For this report's issue a rerun with enhancements has been conducted to incorporate events occurred after REF's last issue. Changes are depicted below.¹³⁵

In essence, previous exercise applied downgrades to the credit risk rating of firms, in accordance with a theoretical exposure to effects of the pandemic, as a result of an assessment of vulnerable sectors. Hence, a drop on the creditworthiness of the most vulnerable companies was simulated. Firms with defaulted ratings as a result of the downgrade and suppliers depending on those companies have been deemed in default. Increased credit provisions generated by the downgrades, plus total exposures of defaulted firms and respective employees, compound the financial system loss. The result is the capitalization needed to absorb the shock.

Two enhancements have been implemented: effectively observed vulnerability replaced the theoretical assessment; an additional input was introduced to include impacts from reduced income for the professions considered most affected by the pandemic.

First change made was the vulnerable firms selection criteria. In the previous version a group of firms was selected using different studies on impacts of the epidemic on economic activity by the IMF, banks or consultancies, which pointed to the most affected economic sectors.

135 More details on the methodology adopted and results achieved, please refer to https://www.bcb.gov.br/content/publicacoes/ref/202004/RELESTAB202004-secao2_1.pdf. Aspects not mentioned in this REF have not changed.

This version of the test uses criteria for companies selection based on flows of receivables by means of payment documents (‘boletos’), bank transfers (‘TEDs’), debit and credit cards and exports. The flow of received funds was used as a proxy for the invoicing, which is a key indicative of a company’s financial soundness. In other words, a steep drop on the invoicing is considered a probable sign of reduced creditworthiness.

The monthly average of received flows from January to November, 2019 was compared with volumes as of August, 2020. Table 2.2.1¹³⁶ presents August, 2020 figures, the date the stress test are referenced, as well as May, 2020 changes over the 2019 average flows, as May, 2020 has been the most critical month. The flows of receivables have been improving over time, suggesting a recovery in economic activity.

Table 2.2.1 – Flow of receivables by sector and firm size – May, 2020 vs August, 2020

Sector	Size					
	Micro and Small		Medium		Large	
	May	Aug	May	Aug	May	Aug
Public administration and NGOs	-8%	-4%	-8%	13%	-20%	1%
Agriculture	20%	41%	11%	27%	14%	14%
Food	-1%	24%	0%	13%	7%	12%
Automotive	-17%	21%	-43%	-9%	-56%	-17%
Beverages and tobacco	6%	31%	-8%	13%	-19%	16%
Construction, wood and furniture	-7%	22%	-17%	8%	-17%	16%
Animal breeding	16%	43%	-2%	20%	1%	3%
Electroeletronics	-12%	26%	-26%	1%	-16%	33%
Energy	-25%	8%	-30%	9%	-16%	10%
Machinery and appliances	-16%	6%	-14%	4%	-18%	23%
Media and entertainment	-47%	-25%	-57%	-48%	-37%	-34%
Pulp and paper	-16%	20%	-23%	-8%	-32%	-20%
Petrochemical	-25%	8%	-33%	-5%	-24%	-3%
Chemical, Pharma and Hygiene	1%	21%	-10%	10%	-4%	7%
Health, Sanitation and Education	-12%	1%	-7%	-1%	-13%	-9%
Other Services	-16%	7%	-13%	1%	-6%	25%
Steel and Metallurgy	-6%	23%	-29%	2%	-37%	-4%
Sugar-alcohol	-23%	85%	-1%	10%	-31%	-5%
Telecom	31%	42%	109%	12%	-26%	-18%
Textile e leathers	-36%	-9%	-41%	-25%	-48%	-27%
Transportation	-16%	4%	-19%	-7%	-35%	-28%
Retail	5%	32%	7%	27%	-2%	28%
Others	-21%	9%	-9%	12%	-24%	19%

¹³⁶ For an exhaustive table with the flows of receivables in BRL refer to the statistical annex.

Table 2.2.2 – Downgrades

Flow variation	Downgrade (levels)
<=-75%	4
>-75% and <=-50%	3
>-50% and <=-25%	2
>-25% and <=-15%	1
>-15%	0

[Statistical annex](#)

Based on the drops of the flow of receivables in August, 2020 from the 2019 January to November monthly average, credit rating downgrades were applied to each firm, as per Table 2.2.2. Companies without a stable¹³⁷ or significant flow of receivables were downgraded according to the receivables of the respective economic sector ('CNAE') to which each firm belongs.

The aggregate of Corporates' debt, including bank loans, capital market issuances and internalized foreign debt, was BRL3.7 trillion. Downgraded corporates (at least one level) totaled BRL1.1 trillion (30% of total debt). Only bank loans have been affected in the simulations (Table 2.2.3).

Table 2.2.3 – Total debt and firms selected by economic sector (BRL billion)

Sector	Total (a)	Selected (b)	(b)/(a) %	Selected Bank Debt (c)	(c)/(b) %
Petrochemical	703	127	18%	16	13%
Energy	397	94	24%	49	52%
Steel and Metalurgy	318	85	27%	26	30%
Transportation	313	108	34%	81	75%
Construction, wood and furniture	218	56	26%	43	77%
Other services	179	53	29%	26	49%
Health, sanitation and education	152	67	44%	39	58%
Automotive	150	110	73%	45	41%
Animal breeding	145	26	18%	11	43%
Pulp and paper	140	129	92%	27	21%
Agriculture	132	6	4%	5	82%
Telecom	126	66	53%	11	17%
Retail	102	14	13%	10	73%
Food	97	10	11%	8	77%
Sugar-alcohol	95	14	15%	10	69%
Chemicals, Pharma and Hygiene	73	9	13%	7	73%
Beverages and tobacco	71	16	22%	5	32%
Textile and leathers	58	43	73%	35	80%
Media and entertainment	58	48	83%	35	72%
Electroelectronics	41	6	13%	4	60%
Machinery and appliances	41	14	33%	6	41%
Public administration and NGOs	3	1	18%	0	37%
Other	77	8	11%	7	84%
Total	3,691	1,109	30%	505	46%

[Statistical annex](#)

¹³⁷ Highly irregular receivables are filtered by obtaining the variation coefficient (standard deviation-to-average) of the 2019 figures. Only firms with a smaller than 25% coefficient have been considered. Volumes-wise, companies with higher than BRL20.000 in each of the months were considered. Firms excluded by means of these filters were assumed, instead of its individual data, the variation of the flows of receivables observed for its economic sector as defined by the Brazilian Geography and Statistics Bureau ('IBGE') in its classification of economic activity types ('CNAE'). If the respective CNAE subclass does not achieve BRL100.000 as of August, 2020, the companies excluded via the two filters do not suffer credit downgrades.

The second enhancement was aimed at including individuals whose occupation or other situations were deemed vulnerable, as defined by a study from the Institute for Applied Economic Research ('IPEA'), published in the '*Carta de Conjuntura nº 48 – 3º trimestre de 2020*',¹³⁸ which identified average losses of income for varied occupation types. These losses have been applied to reassess each natural person's credit rating. All debtors whose occupations had an income loss greater than 20% and individually had receivables drops in excess of 40% were deemed as defaulted individuals and their debts considered losses for the respective banks. Total debt selected as per this criterion totalled BRL250.8 billion, which amounts to 12% of total natural persons loans in the banking system in June, 2020 (BRL2.0 trillion), as per Table 2.2.4.

Table 2.2.4 – Natural persons Debt to the Banking System (June, 2020)

Occupation	Persons (thousands)			Exposure (BRL billion)		
	Total (a)	Selected (b)	% (b)/(a)	Total (c)	Selected (d)	% (d)/(c)
Businessman	3,684	849	23%	149.6	89.3	60%
No identified occupation	21,779	4,183	19%	132.2	83.8	63%
Self employed	2,232	601	27%	60.8	41.0	67%
Individual Microentrepr. ('MEI')						
Workers employed by natural persons	3,272	1,102	34%	51.3	36.5	71%
Subtotal	16	4	25%	0.2	0.2	65%
Other ^{1/}	30,984	6,740	22%	394.1	250.8	64%
	54,776			1,647.9		
Total	85,760			2,042.0		

1/ Occupations with income losses not greater than 20%

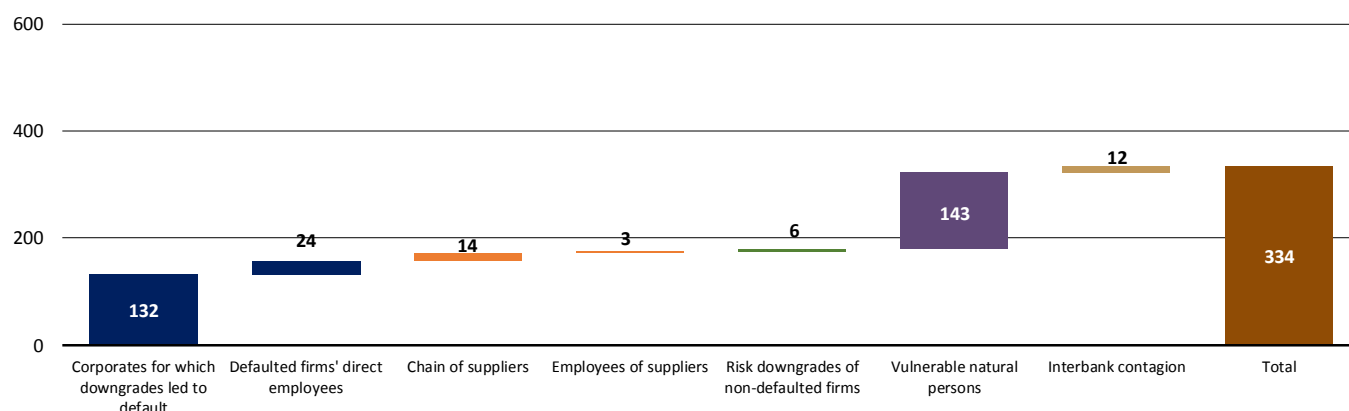
[Statistical annex](#)

Results

Impacts from the reclassification of the defined shocks, comprising the increase in banking provisions due to downgrades and total defaulted credits from defaulted firms, both from downgrades or due to contagion, as well as employees from these corporates, and total credit from natural persons of occupations deemed vulnerable or with income losses greater than 40% are summarized in Chart 2.1.1

¹³⁸ Effects of the pandemic on job incomes and the emergency aid impact: what Covid-19 PNAD microdata say, from the original 'Os efeitos da pandemia sobre os rendimentos do trabalho e o impacto do auxílio emergencial: o que dizem os microdados da PNAD Covid-19'. Available at: https://www.ipea.gov.br/portal/images/stories/PDFs/conjuntura/200702_cc_48_mercado_de_trabalho.pdf.

Chart 2.2.1 – Increase of Banking Provisions



[Statistical annex](#)

The shock of increased provisions and additional losses would lead to a capital ratio of 14.5% from 18.6%. An additional BRL34.9 billion regulatory capital, equivalent to 3.5% of total banking system capital, would be needed in order to re-establish regulatory minima. In previous issue's estimations, capital shortfall estimated was BRL70.0 billion, equivalent at the time to 7.2% of total system-wide regulatory capital.

Impacts estimated in the current study were less stringent than in previous REF issue, even after the inclusion of a new component in the shocks definition, which alone generated half of the increase in provisions and credit losses. Despite the methodology changes in the corporates selection, the key contributing factor to the impact reduction was the recovery in the flows of receivables of August, 2020 compared to the beginning of the pandemic. Flows reductions were the greatest in April and May, for the majority of the economic sectors. Table 2.2.1 shows the flows were gradually recovered.

Therefore, despite the methodology tweaks, current shock, which was estimated based on actual data, indicates that the banking system has maintained its loss absorbance ability to the effects of the pandemic, even under severe assumptions.

2.3 Investment abroad and overhedge

Brazilian financial institutions (FI), in order to serve their clients with global financial products and services, expand its international presence and access new markets, make investments in international business markets through the establishment of branches, subsidiaries

The chart displays two metrics over time from June 2013 to June 2020. The left Y-axis represents percentages from 0% to 25% in 5% increments. The right Y-axis represents US\$ billion from 0.00 to 75.00 in 15.00 increments. The X-axis shows time in quarters, with labels for June and December of each year. The 'Over Hedge' ratio (blue line) starts at approximately 7% in mid-2013, rises to 10% by late 2013, and then fluctuates between 11% and 15% until late 2019, where it spikes to nearly 17% before dropping to about 10% in early 2020. The 'Investment Abroad' (orange line) starts at approximately 14% in mid-2013, rises to about 17% by late 2013, and then fluctuates between 17% and 20% until late 2019, where it spikes to nearly 20% before dropping to around 12% in early 2020. A red dashed line labeled 'CSLL' is shown at 15% and 20%.

Year	Month	Over Hedge (%)	Investment Abroad (US\$ bi)
2013	Jun	7.0	45.0
2013	Dec	7.5	43.0
2014	Jun	10.5	50.0
2014	Dec	10.5	50.0
2015	Jun	12.0	58.0
2015	Dec	13.5	55.0
2016	Jun	15.0	60.0
2016	Dec	15.0	58.0
2017	Jun	15.0	58.0
2017	Dec	15.0	60.0
2018	Jun	14.0	55.0
2018	Dec	13.0	50.0
2019	Jun	13.5	58.0
2019	Dec	13.5	58.0
2020	Jun	10.5	30.0

and investments in other companies. In the last years, institutions even reported to the BCB amounts over USD60 billion in investments abroad (IAs).¹³⁹ At the end of February 2020, institutions reported IA of USD 58.9 billion (Chart 2.3.1).

IAs are carried out in foreign currency, but their accounting in Brazil is made in Brazilian currency, which leaves the balance sheet of institutions subject to fluctuations, due to exchange rate variation. So, to avoid changes on the balance sheet, arising from an appreciation of the domestic currency, institutions use financial structures investment protection (hedge). However, due to tax rules to treat earnings differently and losses arising from the exchange variation of the investment abroad and the derivatives used to hedge investment, IAs demand an additional hedge, usually called overhedge.

Although the hedge and overhedge structure neutralize the effects of exchange variation on the result and the equity of the IAs, after the tax effects on hedge results, situations of devaluation exchange rate can result in significant impacts both in determining the minimum capital levels and in need of liquidity. In such cases, the FIIs will need a greater volume of liquidity to cope with margin calls and daily settlements given the increase in volatility and more capital, as the hedge/overhedge operation result in the constitution of deferred tax assets that, in general, are deducted from capital to determine the operational limits.

This adverse scenario materialized from March 2020, due to market uncertainties regarding to the consequences of Covid-19 on the economy. The currency devaluation raised the cost of maintenance investment hedge structures abroad,¹⁴⁰ in addition to reducing the attractiveness of these positions the reduction of the interest differential between the local market and the international market. Thus, the FIs started an accelerated process of reducing investments abroad. The amount ended the first semester

139 Investments abroad, according to the definition of Resolution CMN
4,817, of May 29, 2020, comprise the participations in the abroad in
controlled, affiliated and jointly controlled entities with other entities.
This concept includes investments in branches (agencies) abroad,
which are treated, both from the point of from an accounting and tax
perspective, such as equity.

140 Hedge structures tend to raise their maintenance costs by direct function
of the increase in market volatilities. So many costs financial instruments
necessary to protect investments regarding the guarantees required by
the stock exchanges (counterparties central banks) to guarantee some
of these contracts are increased when there is an increase in volatility
in the markets

in USD37.7 billion, representing a reduction of 28.9%, compared to the March position, USD53 billion (Chart 2.3.1). This movement has other consequences, as the need to purchase a large volume of dollar derivatives to exit hedge positions / overhedge that must be undone, since the financial institution reduced investments abroad.

In order to correct this distortion, MP 930, of March 30, 2020, was converted into Law 14,031, of July 28, 2020, which makes tax treatment practically¹⁴¹ equal hedge object and the protection instrument used, dispensing with the constitution of overhedge. This law also allows the deferred assets constituted in the events of exchange devaluation can be converted into cash in some situations, such as bankruptcy, which allows you to change your prudential treatment, reducing capital need to maintain this asset.

In order to understand how this distortion worked, putting financial stability at risk in the sequence are detailed how the exchange variation on investment abroad affects the institution's balance sheet, side effects on market risk, liquidity and hedge markets, and how the new framework legal and regulatory resolved the issue.

2.3.1 Effects of changes in foreign exchange on Investment Abroad

Foreign operation (subsidiaries and branches abroad) operate in markets with other currencies than the Brazilian currency and, therefore, the effects of changes in foreign exchange (FX) on these investments affect the financial statements of the head company, due to the equity method, and to the financial conglomerate, due to the consolidation.¹⁴²

141 Treatment has not yet become totally equal in aspects as there is still a difference in the application of PIS / COFINS about the protection instrument

142 Briefly, the accounting of changes in FX depend on the functional currency applied. This currency must be related to the main economic environment and market where the "subsidiary company" operates (in this case, the investment abroad). The functional currency of each investment abroad is determined by factors such as the market place of cash flows, the currency that most influences its costs and profitability, among other aspects. Thereby, the functional currency is not necessarily the same currency of the country where the investment abroad is located and will influences the accounting treatment. If the functional currency of the foreign operation is set as non-Brazilian currency, the effects of the changes in FX are registered directly as equity adjust (other comprehensive income) - for translate of financial statements ends. If, on the other hand, it is set as Brazilian currency, the same FX effects are associated with translate of transactions (not financial statements) and are recognized in the income statement, in their respective income or expense items.

Hedge of Investments Abroad

Whereas changes in FX may represent relevant non-predicted earnings and/or equity effects (head company and financial conglomerate), financial institutions design hedge transactions, usually with derivatives in financial market. This tool aims to protect the equity position and/or the earnings from big changes in FX, minimizing these FX changes effects on equity and net income.

Summarizing, effects of hedge are always inverse to the behavior of the changes in FX. When the Brazilian currency depreciates (appreciates) in relation to foreign currency, the head entity recognizes gain (loss) in these investments, due to exchange rate fluctuations, and, in contrast, the head entity recognizes loss (gain) derived from hedge instruments.

Overhedge as a condition to the effectiveness of the hedge of net investment in Investment Abroad

Hedge structures in general deal with equivalences between the exposure value and hedge instruments. However, in the case of net investment in investment abroad, there are asymmetry in the tax treatment of the changes in FX over net investment in foreign operation compared with fair value adjustments of linked hedge instruments. This disparity causes a gap between their net effects on the earnings or equity in the case of equivalences of hedge and net investment value.

The cause of this mismatch is due to changes in FX of these investments are non-taxed, while fair value adjustments of the hedge instruments is taxed. Therefore, due to this tax issue, hedge structure equivalents to net investment in investment abroad would not be suitable to promote an effective hedge.

To promote an effective hedge, thus, the head company needs to improve its hedge structure. The impacts of fair value adjustments, after taxes, need to be equivalent to changes in FX on this investment. This additional is the Overhedge and its estimation is available with the following expression:

$$HedgeInst = Investment\ Abroad + Overhedge = FXExposure * (\frac{1}{1 - TaxRate})$$

Where:

HedgeInst: the total hedge instruments;

Investment Abroad: net investment in investment abroad (it should be hedged);

Overhedge: additional hedge to promote an effective hedge;

TaxRate: the tax rate on hedge instruments.

Whereas the tax rate on the fair value adjustment of hedge instruments is around 48%, total hedge instruments should match to 192.31% of the net investment in investment abroad (exposure). Therefore, for the effective protection of its earnings/equity, Head Company should take short positions at almost twice the value of the exposure, aiming to compensate the secondary effects of taxes on hedge instruments and to promote an effective hedge.

Deferred tax assets arising from the hedge/overhedge structure

The tax base for each period comprise gains or losses on hedge/overhedge instruments. However, if the expense (losses) of above-mentioned is so relevant as to turn tax profit into tax loss, the head company should recognize a deferred tax asset (DTA).¹⁴³ This tax effect could happen in periods of more relevant devaluation of Brazilian currency. These DTA, whenever recognized, represent a negative situation, since they are assets without a predicted realization and, in general, they must be deducted for regulatory capital purposes, as well as they could be adjusted in financial analyses.

2.3.2 Market and liquidity risk

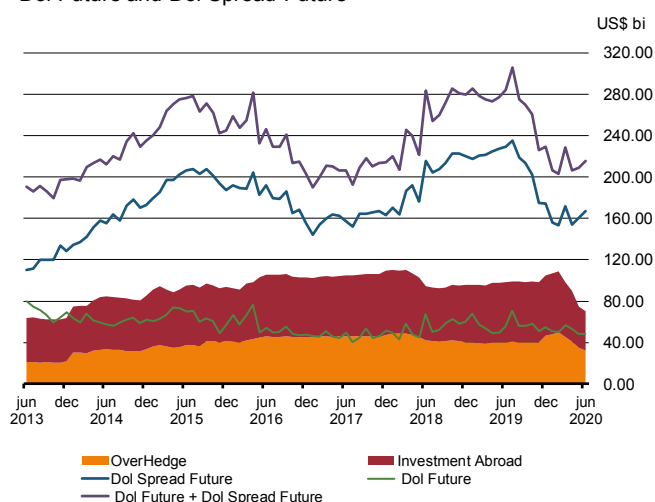
Investment Abroad, hedge and overhedge structures affect other areas of institutions and the hedge market that should be analyzed.

Market and liquidity risk

The constitution of hedge/overhedge instruments of described so far has the consequence of an increase in market and liquidity risk for the institution. Even considering that the overhedge is sufficient to neutralize

¹⁴³ Another situation that may result in deferred tax assets is the use of hedge instruments which earnings or losses would only be taxable on the due date or on the cash settlement of the instrument. In these cases, the losses (or earnings) with the hedge instrument takes respectively recognition of DTA (or deferred tax liability – DTL), due to the temporary difference between the accounting recognition variation and the period of effective taxation.

Chart 2.3.2 – US Future Contracts Market
Dol Future and Dol Spread Future



[Statistical annex](#)

the tax effects on the accounting result of the institution, this only occurs due to the generation of tax credits. The loss of value resulting from the devaluation financial instruments used in the structuring of the hedge and overhedge is offset by tax credits which are considered in the balance sheet at their nominal value and not at market value. In effective terms, even neutralizing the accounting result, the overhedge exposes the economic value of the institution. The hedge portion has its market risk neutralized by the object of the hedge, but the overhedge portion is an open position, which results in greater exposures, an increase in some capital requirements and affect the perception of risk of the institution by the market.

In relation to liquidity risk, according to the instrument used, payment of daily settlements and margin calls are required, according to market volatility. Usually, the hedge portion is part of the operation, but the overhedge portion represents an additional cost for the institution. It is necessary to allocate practically twice the liquidity to guarantee the desired hedge, raising costs and making an inefficient market.

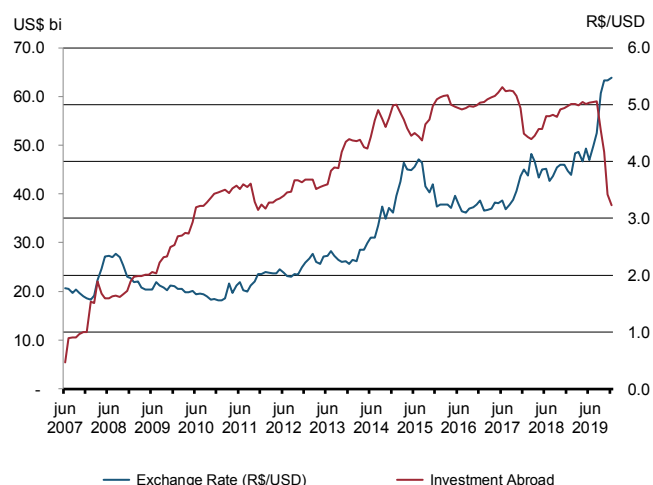
In scenarios of high market volatility, that is, during a crisis, such as that observed in the 1st semester, the institution needs to immobilize a quantity much higher than necessary to guarantee the hedge intended, limiting its ability to face the crisis and maintain the regular functioning of the credit supply and services.

Hedge instruments market

As shown, the current tax structure resulted in the need for over 90% overhedge in addition to the amount invested abroad. Thus, possible strategic decisions of the institutions in increasing or decreasing your investment abroad (IA) can lead to relevant movements in the hedge markets, eventually resulting in greater volatility of the FX and momentary price distortions, impacting the proper functioning of the market.

Several instruments can be used for hedging/overhedge. However, the future market, due to cost and volume characteristics, ends up being the basic market for transferring risks between entities. In the case of operations aimed at hedging and overhedge of IA, the main anchoring currency of these investment is the US dollar. (Chart 2.3.2).

Chart 2.3.3 – Investment Abroad and US Dollar
Since 2007



[Statistical annex](#)

Although the local market has a daily volume of open contracts higher than the needs of positioning of the IAs, between USD 150 and 230 billion for US Dollar Spread Futures (DDI) Contracts, and between USD 45 and 65 billion for US Dollar Future Contracts (DOL) contracts (Chart 2.3.2), the amount needed to meet the needs of hedge and overhedge cannot be overlooked. Movements strategic repositioning of IA make the institutions to access markets with high volumes. This demand for derivative contracts can cause price distortions and affect market balance highly sensitive as the FX risk market.

Note that the IA and, therefore, the hedge/overhedge generate pro-cyclical risks. In pressure exchange rate scenarios, with increased volatilities, the hedge/overhedge causes increased daily settlements and margin calls, increased need for liquidity and increased cost of opportunity. In this scenario, institutions can, strategically decide to reverse the IA and the structure hedge/overhedge, resulting in pressure buyer in the FX markets in a moment of upward pressure.

This pro-cyclical behavior of IA can be observed in Chart 2.3.3. The IA maintains a growing trend or stable, when the dollar / real ratio does not present great oscillations. However, when, for example, a shock occurs, and the real depreciates sharply against the dollar, the IA is also reduced in order to minimize the impacts commented in the previous paragraph.

The events observed since February showed the materialization of this behavior, the national financial institutions started an accelerated process of reducing IA. The amount closed the first semester in USD 37.7 billion, representing a reduction of 28.9%, compared to March (USD 53 billion) - Chart 2.3.1. After June 2020, the level of IA remained stable, with a small positive fluctuation, reaching USD 38.5 billion on August 31st.

2.3.3 Regulatory framework

The edition of Provisional Measure 930, of March 30, 2020, and its conversion into Law 14,031, of July 28, 2020, changed the tax regime applicable to the hedge of foreign investments, eliminating a distortion in the tax code, through the taxation of the foreign exchange variation gains in the value of investments in a controlled company incorporated abroad, when protected by hedge operations, when calculating the IRPJ tax and CSLL tax, thus eliminating the need to overhedge. The effects of

the law will materialize on a 50% basis in 2021 and fully starting in the financial year of 2022.

Furthermore, the aforementioned law decouples the use of tax losses DTAs, resulting from the hedge structure from the institution's future profitability until December 31, 2022, which, according to the principles of international recommendations, allows these DTAs not to be deducted from regulatory capital.

This last provision largely matches Resolution 4,680, of July 31, 2018, which had its term extended by Resolution 4,784, of March 18, 2020, thus allowing, until the end of 2021, the aforementioned DTAs not to be deducted from regulatory capital.

2.3.4 Conclusion

With the enactment of Law 14,031, in July 28, 2020, the tax asymmetry between investment abroad and hedge instruments was eliminated, reducing not only the financial and the liquidity costs and the impact on the hedge instruments market, but, mainly, avoiding that major oscillations arising from the depreciation of the Brazilian currency against foreign currencies result in risk to stability, by compromising liquidity from banks more than necessary, result in the weakening of the capital, due to the constitution of DTAs and potentially bring volatility to hedge markets by pro-cyclical divestment decision movements of FIs in the midst of the crisis.

2.4 Information security: cyber incident response and recovery

2.4.1 Introduction

Cyber incidents bring daily concern to a financial institution's technology operation. The effects of these incidents include losses to customers and society, damage to the reputation of an institution, losses due to poorly executed operations, lawsuits for moral and material damages, impacts on other FIs, among other consequences, and may even escalate to a systemic crisis with impacts on financial system stability.

Thus, it is important to answer the question: what is the degree of SFN resilience to cyber incidents that can threaten financial stability? To answer this question,

it is desirable to use a cybersecurity framework that systematizes and enables the assessment of the various activities necessary for organizations to adequately deal with cyber risk.

In this sense, it is worth considering some cyber security frameworks that consolidate the good practices verified in the industry and provide tools for organizations to plan the acquisition of cyber incident management capabilities.

One of the advantages of using a reference framework is to employ an industry standard, facilitating comparison with other organizations, communication with suppliers and the establishment of objective goals in the implementation of best practices. Among the most well-known frameworks are Payment Cards Industry Data Security Standard (PCI DSS),¹⁴⁴ ISO 27001 and supplementary guides (ISO 27017 and ISO 27032),¹⁴⁵ Critical Security Controls (CIS)¹⁴⁶ and Framework for Improving Critical Infrastructure Security (NIST).¹⁴⁷

No framework is absolute. Each one will have its own specificities (life cycle and evolution, among other aspects) and will be better suited to certain sectors or activities. The PCI framework, for example, establishes security practices for handling credit and debit card information. The most important thing is that companies evaluate the different existing options and adopt procedures and controls in an organized manner, in line with their business models and with their inherent cyber risks.

The comparison between SFN regulation and industry frameworks is an important exercise in identifying possible opportunities for improving the current regulatory framework. At the same time, the verification of the practices effectively implemented by the FIs guides the development of specific actions by the BCB, aimed at improving the controls adopted by the institutions to deal with cyber incidents. These aspects will be explored in the following sections.

144 <https://www.pcisecuritystandards.org/>

145 <https://www.iso.org>

146 <https://www.cisecurity.org/>

147 <https://www.nist.gov/>

2.4.2 The functions of the NIST cybersecurity framework

The cybersecurity framework developed by NIST¹⁴⁸ has consolidated itself as one of the references regarding cyber incident response and recovery, especially in the financial sector. The practices and objectives established in the NIST framework are divided into five functions.¹⁴⁹

1. Identify: concentrates the practices for organizing and identifying assets, resources and information existing in a business environment, and for mapping risk exposure.

2. Protect: addresses corporate access control and the protection and security of data and assets, with the objective of cyber securing the business environment and its surrounding. It can be considered as a preventive phase of the institution's cyber security.

3. Detect: concentrates the practices that allow the identification of possible violations, monitoring the logs and taking care of the intrusion detection procedures of the networks and devices.

4. Respond: consolidates the response practices to be applied by institutions after an incident is detected, understanding the incident, correcting the vulnerability and proceeding to recovery.

5. Recover: gathers recovery procedures, dealing with planning, disaster recovery and backup plans.

Considering that the NIST framework is aimed at acquiring capacities to deal with cyber incidents and has a widespread application in the financial sector, it becomes a good reference to demonstrate the scope of the regulatory framework in force in the SFN on in this matter.

2.4.3 SFN Regulatory Framework and Supervisory Practices

The SFN regulation has a series of provisions that addresses issues present in the functions of NIST, although their references are not organized as established in the cybersecurity framework. As an example, some of these references can be illustrated considering the most

¹⁴⁸ <https://www.nist.gov/cyberframework>

¹⁴⁹ https://www.uschamber.com/sites/default/files/intl_nist_framework_portuguese_finalfull_web.pdf

Table 2.4.3.1 – List of regulatory provisions versus functions of the NIST framework

Function	Resolution CMN 4.658 and Circular 3.909 (Cybersecurity Policy)	Resolution CMN 4.557 and Resolution CMN 2.554 (Risk Management and Internal Controls)	GPS
Identify	<ul style="list-style-type: none"> Sharing relevant incident information. Establishment of the objectives of the cybersecurity policy and definition of guidelines to be considered in the identification of relevant services of data processing and storage, and cloud computing. Vulnerability detection tests. 	<ul style="list-style-type: none"> Definition of risk appetite. Identification of critical business processes and potential evaluation effects resulting from the interruption of these processes. Continuous evaluation of the different risks associated with the activities of the institution. Periodic security testing of information systems. 	<ul style="list-style-type: none"> Existence of an information governance system. Alignment between security strategy and business strategy. Implementation of vulnerability analysis.
Protect	<ul style="list-style-type: none"> Implementation of mechanisms for dissemination of cybersecurity culture. Senior management commitment to continuous improvement of procedures related to cybersecurity. Dissemination and training. Implementation of security controls - encryption, information leak prevention, protection against malicious software, among others. Access control implementation. Security measures for transmission and data storage. Segregation of data and access controls to protect customer information. Development of initiatives for sharing information about relevant incidents. 	<ul style="list-style-type: none"> Establishment of strategies to ensure continuity of activities and limit losses arising the interruption of critical business processes. Implementation of information protection and security mechanisms with objective to preventing, detecting and reducing vulnerability to digital attacks. 	<ul style="list-style-type: none"> Implementation of mechanisms for dissemination of risk and security cultures. Establishment of security system information. Establishment of policies: data and information classification, cyber, among others. Segregation of IT environments. Implementation of audit track. Implementation of mechanisms of physical and logical security.
Detect	<ul style="list-style-type: none"> Controls for intrusion prevention and detection. Handling of information on incidents occurred in service providers. 	<ul style="list-style-type: none"> Information protection and security mechanisms aiming to prevent, detect and reduce vulnerability to digital attacks. 	<ul style="list-style-type: none"> Monitoring and attack prevention.
Respond	<ul style="list-style-type: none"> Establishment of Incident Response Plans. Reporting to the BCB on occurrence of relevant incidents. Analysis of the root-cause and impact of incidents. Mitigation of the effect of relevant incidents. 		<ul style="list-style-type: none"> Incident handling.
Recover	<ul style="list-style-type: none"> In line with actions aimed at continuity business: execution of procedures in case of interruption of contracted relevant services, setting recovery time for restart or normalization of interrupted relevant activities or services. 	<ul style="list-style-type: none"> Establishment of continuity plans for restart and recover the activities. 	<ul style="list-style-type: none"> Establishment of business continuity plans.

relevant rules in relation to the topic (Resolution CMN 4,658, of April 26, 2018, and Circular 3,909, of August 16, 2018; Resolution CMN 4,557, of 23 February 2017, and Resolution CMN 2,554, of September 24, 1998) and the Supervisory Practices Guide (GPS) – Table 2.4.3.1.¹⁵⁰

Although the table presented is not exhaustive, it is possible to verify the functions of the NIST framework in the different regulatory or supervisory instruments, either in the risk management structure, in the cybersecurity policy or in the expectations presented in the GPS.

It is worth emphasizing that the digitalization of financial services causes changes in the institutions' risk profile, culminating in increased exposure to technological risks. Thus, institutions must identify and assess risks considering this new context and develop adequate capacities for identification, protection, detection, response and recovery.

2.4.4 Implementation of practices, procedures and controls by the Supervised Entities

At the beginning of this year, the BCB consolidated an information survey (base date April 2020) targeted to FIs and payment institutions in order to establish an overview of the implementation stage of the cyber security policy and other provisions of Resolution CMN 4,658, of 26 April 2018, and Circular 3,909, of September 18, 2018. In addition, institutions were able to declare which typical cyber and information security controls they have already implemented or plan to implement.

Based on the results of the survey, it is possible to have a perspective of the level of preparedness of the institutions of the different groups / prudential segments to deal with cyber incidents. It is worth remembering that the data presented in the survey provide an aggregate perspective on the implementation of security controls; however, the real need for a certain control will depend on the characteristics of the business models of each financial institution and its respective operational profile, which will condition the real exposure to cyber risk and the consequent need for mitigation controls.

150 Guia de Práticas da Supervisão – Gestão do Risco de TI: <https://www3.bcb.gov.br/gmn/visualizacao/listarDocumentosManualVinculadoPublico.do?method=pesquisarManualVinculadoPublico&idManualVinculado=2&idManual=1>

As can be seen, larger and more complex institutions (institutions in the S1 and S2 prudential segments) have more consolidated security procedures and controls. The percentage of S3 institutions that implement the set of controls is similar to the group of payment institutions. The operational characteristics and the dependence on digital channels indicate the need for significant investments in security controls by these last two groups (Table 2.4.4.1).

A smaller percentage of smaller institutions (segments S4 and S5) has implemented the security controls considered in the survey. However, it is possible to verify some very opportune movements of these institutions, such as the structuring of security operation centers (SOC), secure application development and the execution of vulnerability analyzes.

From the perspective of the functions provided in the NIST framework, it turns out that SFN entities have better proficiency in “protection” and “recovery” functions. Considering the group of smaller and less complex entities (segments S4 and S5), there is a great opportunity for improving the functions to “identify”, “detect” and “respond”, mainly in the case of institutions that have a relevant dependence on digital channels for the operationalization of their businesses.

Considering specifically the need to improve the functions “identify” and “detect”, it is worth highlighting the importance of information sharing on cyber incidents among market participants. This information is decisive for the timely identification of potential weaknesses, as well as for fine-tuning capabilities aimed at detecting threats. Effective information sharing is fundamental for the improvement of these functions in the financial system.

Another finding of the research is the incipient use of tools to deal with advanced threats (anti-APT – Advanced Persistent Threats). The increase in the complexity of the attacks will certainly demand the use of increasingly modern controls and tools for detection and response, always aiming at reducing the time between the moment when an incident is detected and the moment when an effective response is fully implemented. However, considering the survey data, there is an important lag in the use of this type of tool by institutions, notably S2 institutions.

Table 2.4.4.1 – Percentage of institutions that declared to implement IS controls, grouped by NIST functions

Function	Practices / Procedures / Information Security Controls	S1	S2	S3	S4	S5	Credit Union (System)	Payment Institutions
Identify	Vulnerability analysis (IT environment)	100%	100%	89%	53%	57%	67%	85%
	Pentest - Penetration Testing	100%	100%	86%	42%	33%	67%	85%
	Vulnerability analysis (IT systems)	100%	100%	81%	42%	59%	67%	85%
	Evaluation of security controls prior to contracting relevant services	100%	83%	92%	68%	60%	33%	46%
	Red Teaming	83%	50%	38%	10%	2%	0%	62%
Protect	Protection against malicious software (antivirus, antimalware, others)	100%	100%	100%	94%	83%	83%	92%
	Backup of data and information	100%	100%	97%	92%	79%	100%	100%
	Computer network segmentation / segregation of environments	100%	100%	95%	75%	61%	83%	85%
	Management of cryptographic keys and digital certificates	100%	100%	89%	57%	56%	83%	69%
	Logical Access Management	100%	83%	97%	76%	58%	100%	92%
	Cryptography	100%	83%	86%	56%	54%	100%	77%
	MDM - Mobile Device Management	100%	83%	76%	25%	5%	33%	54%
	Patch Management	83%	100%	89%	68%	49%	83%	85%
	Secure systems development	83%	100%	51%	33%	51%	50%	69%
	Password vault	67%	67%	73%	33%	11%	50%	46%
	Network Access Control (NAC)	67%	33%	49%	41%	46%	50%	62%
	Web Application Firewall (WAF)	50%	67%	62%	52%	29%	83%	85%
Protect / Detect	Prevention of DDoS (Distributed Denial of Service) attacks	100%	83%	81%	60%	47%	100%	69%
	Data Loss Prevention - DLP	83%	50%	68%	32%	16%	33%	38%
	Anti-APT (APT - Advanced Persistent Threat)	83%	17%	51%	25%	10%	33%	31%
	Cloud Access Security Broker (CASB)	33%	17%	24%	11%	4%	17%	38%
Detect	Intrusion Detection System (IDS) / Intrusion Prevention System (IPS)	100%	100%	95%	68%	47%	100%	69%
	Traceability mechanisms, including audit trails and log implementation	100%	100%	89%	74%	55%	83%	85%
	Log correlator / Security Information and Event Management (SIEM)	100%	67%	65%	26%	7%	33%	69%
Detect / Respond	Cyber incident management	100%	100%	76%	72%	63%	33%	77%
	Security Operations Center (SOC)	100%	67%	68%	29%	27%	33%	54%
Respond	Mitigation of impact of relevant incidents	100%	67%	73%	63%	54%	50%	77%
Respond / Recover	Establishment of procedures to be followed in case of interruption of relevant services	67%	67%	51%	45%	51%	33%	54%
Recover	Procedures for reporting crisis situations to the BCB	100%	100%	81%	62%	54%	67%	62%
	Definition of RTO (Return to Operation) for relevant activities or services	100%	100%	78%	72%	60%	67%	62%
	Definition of incident scenarios to be considered in business continuity tests	100%	83%	65%	64%	57%	67%	69%

Universe of surveyed institutions: 6 institutions in the S1 segment, 6 institutions in the S2 segment, 37 institutions in the S3 segment, 236 institutions in the S4 segment, 237 institutions in the S5 segment, 6 cooperative systems and 13 payment institutions.

[Statistical annex](#)

It is necessary to recognize the increasingly importance of IT service providers in structuring institutions' capacities to deal with incidents, whether providing specialized knowledge or supplying resources for the proper operationalization of services.

In the survey carried out by the BCB, information was also collected on the level of outsourcing of technology and information security activities, from hiring to complement internal teams to the full outsourcing of an activity. Likewise, the information was consolidated by making an association with the functions provided in the NIST framework (Table 2.4.4.2).

The percentage of institutions that have declared some level of outsourcing in information security activities clearly demonstrate an expressive level of outsourcing in this area in all NIST functions, from identification to recovery from cyber incidents. The results show the increasingly intense relationship between regulated (institutions authorized by the BCB), and unregulated (IT and IS service providers) segments, reinforcing the need for the implementation, by financial institutions, of adequate controls for the management of contracted services from third parties.

In this scenario, maintaining an SFN that is operationally resilient and prepared to deal with cyber incidents will require IT service providers to adopt information security standards and procedures equivalent to those that are demanded from regulated institutions.

2.4.5 Final considerations

The importance of the “cybersecurity” theme is expected to increase progressively in the coming years due to factors such as the growth of institution's dependence on IT resources and new technologies in the operationalization of businesses and the increase in the number and complexity of cyber-attacks directed at the financial sector. Considering this scenario, the improvements in financial regulation, as well as in the BCB's supervisory efforts, aimed to ensure the adoption of the best cybersecurity practices by the regulated institutions, focusing on the continuous improvement of security controls of all SFN actors.

Comparing with the NIST framework, it is possible to verify that the SFN regulation has provisions that cover the main functions of that framework, providing a

Table 2.4.4.2 – Percentage of institutions that declared some type of outsourcing of IT and / or IS activities

Função	Technology or information security activities	% of Entities that reported some type of service contracting						
		S1	S2	S3	S4	S5	Credit Unions (System)	Payment Institutions
Identify	Project management, including management of the technology master plan	50%	17%	43%	28%	36%	33%	46%
	Vulnerability analysis (systems)	67%	67%	78%	64%	68%	67%	46%
Protect	Deployment of systems in production environment	67%	67%	65%	54%	67%	33%	62%
	Database administration	67%	83%	59%	69%	76%	67%	46%
	Messaging systems administration	50%	50%	51%	52%	32%	67%	31%
	Server administration	50%	50%	57%	61%	72%	50%	46%
	Computer network administration	33%	67%	62%	57%	70%	50%	46%
	Management of communication channels / links	67%	67%	65%	57%	62%	83%	62%
	User support and service (Help desk / service desk)	100%	100%	86%	60%	58%	83%	62%
	User account administration	67%	50%	51%	40%	58%	67%	46%
	Administration of user accounts with privileged access	50%	33%	38%	38%	38%	67%	46%
	Administration of third-party user accounts	50%	33%	46%	39%	36%	67%	46%
	Administration of digital certificates	50%	17%	35%	31%	32%	17%	38%
	Administration of security tools, such as firewalls, IDS / IPS, WAF, among others	50%	50%	65%	64%	71%	50%	62%
Detect	Monitoring and operation of the production environment	67%	83%	57%	58%	68%	50%	54%
	Batch control and execution	33%	67%	57%	38%	48%	33%	38%
Detect/Respond	Security Operations Center (SOC)	33%	50%	65%	33%	42%	33%	38%
Respond	Incident management - 1st level	67%	100%	73%	46%	55%	50%	46%
	Incident management - 2nd level	83%	67%	76%	49%	56%	67%	46%
	Incident management - 3rd level	100%	50%	73%	56%	57%	67%	38%
Recover	Backup management	50%	67%	57%	58%	71%	50%	38%
	Management of business continuity plans	17%	17%	22%	26%	27%	33%	15%

[Statistical annex](#)

regulatory environment compatible with the challenges imposed by the digital evolution of SFN. Thus, institutions are expected to implement controls and continuously improve their cyber defenses to deal with cyber incidents, mitigating their risk exposure.

The data from the survey carried out by the BCB indicates that it is necessary to improve information sharing on cyber incidents among SFN participants in order to improve the functions of identifying and detecting, enabling institutions to better understand the environment in which they operate, to know the most common cyber-attacks and to map their potential weaknesses in technology assets. This information is essential for the establishment of adequate defense systems.

The growing provision of information technology (IT) and cybersecurity services by non-regulated third-party companies stands out as a growing challenge to the governance of FIs and payment institutions. The progressive migration of an institution's IT operations to "cloud computing" solutions represents this phenomenon.

Therefore, the maintenance of SFN's operational and cyber resilience will also depend on the adequacy of security controls of these service providers and the BCB will act permanently with the supervised entities in order to ensure a sound operation.

2.5 Operational risk in Covid-19 pandemic times

The pandemic has impacted and continues to significantly impact financial and payment systems. Entities of these systems, both in Brazil and in other countries, had to adapt to a new reality imposed by measures of social distancing, aiming at preserving the provision of financial services to their clients.

Therefore, it is worth understanding how institutions of the National Financial System (SFN) faced the challenges arising from the health crisis and how they are preparing to operate in an environment that, despite the end of social distancing measures, will be quite different from pre-pandemic times.

2.5.1 The transition to social distancing regime and challenges faced during this process

The transition process, which began in March this year, was implemented in a short period of time and required FIs to adapt their governance and management structures as well as their work processes. Remote working, as well as management and customer service models based on offsite solutions, was rapidly implemented by FIs, which faced different challenges, especially those listed below.

a. Management of remote workforce

Although many institutions already planned the introduction of remote work (home office), they did not expect the massive migration of employees to this type of work in the near future. In other words, not all institutions had adequate technological infrastructure to abruptly and comprehensively implement remote work.

Institutions had to urgently buy equipment, especially notebooks. Regarding connectivity solutions, some institutions provided 4G modems to employees without broadband access. Institutions also had to improve communication channels, especially Virtual Private Network (VPN) infrastructure to safely implement remote work.

Many institutions relocated their workforce to contingency facilities, which are typically used to respond to operational crisis events, in order to ensure the implementation of safe distancing measures recommended by health authorities.

b. Information technology and information security capabilities to address new demands

Social distancing measures also imposed technological and information security challenges. In addition to the large-scale implementation of remote work in the short term, institutions had to deal with the need of increasing their processing, storage and data transmission capabilities, and manage the increased exposure to the risk of cyberattacks, data leakage incidents and electronic frauds.

A common strategy observed by institutions was the freezing their IT production environments at the beginning of the crisis, i.e., institutions stopped implementing changes to the production environments and updating critical systems and applications, aiming

at reducing the risk of incidents that could impact the IT operations or the provision of customer services.

In addition, considering the overload of IT operations resulting from the operationalization of remote work, the BCB issued regulations to temporarily reduce the requirements for the provision of regulatory information by FIs, encouraging them to direct their efforts to the management of the crisis and the most imminent operational risks.

c. Adaptations to work processes

The operationalization of activities strongly based on face-to-face procedures was also challenging.

The collection and return of checks were directly impacted by restrictions on movement and access to bank branches or ATMs within commercial establishments, such as shopping malls.

In the beginning of the pandemic, one of the measures taken by the BCB was to issue Circular 4,008 of April 28, 2020, allowing the withdraw of returned checks at the agencies in which they were deposited.

The closure of notaries and courts also impacted relevant processes such as debt recovery, lawsuits, summons, pledges, collateral registering and so on. Processes that required the collection of signatures were also impacted, requiring institutions to look for alternatives such as the use of electronic signatures.

d. Implications for customer service channels

Call centers and companies contracted for debt recovery were impacted by difficulties related to the adaptation of physical facilities to the requirements of safe distancing among employees and by the heterogeneity of restrictions on the movement of people and the operation of services issued by city halls and state governments.

For instance, institutions had to implement additional measures in order to guarantee the opening of branches, including the maintenance of property security services, which were affected by difficulties in replacing security guards taken out of services due to health reasons. These difficulties were aggravated by restrictions imposed on the displacement of employees from other cities.

Due to reduced capabilities for face-to-face assistance at the branches, institutions directed their clients to remote service channels. However, these channels were not initially sized to absorb the increased demand, thus impacting the operation of the institutions. The situation was aggravated by the loss of teleservice positions due to safe distancing requirements.

e. Implementation of federal government programs

Another relevant challenge was faced by institutions in the implementation of federal government emergency aid programs. These programs required institutions to urgently operationalize new functionalities to enable the access to benefits and banking services, as well as required the creation of a mass amount of digital accounts.

One of the side effects, albeit not yet fully sized, was the potential increase in the banking level of the Brazilian population. While financial inclusion is desirable, the accelerated financial inclusion due to the pandemic context has brought significant challenges arising from the unfamiliarity of these people with digital channels, which makes them vulnerable to electronic fraud and hackers.

2.5.2 Towards a “new normal”

As the institutions realized that the operational context due to pandemic would last longer than expected, they started to adopt long-term measures to improve business management and risk management controls, considering the current situation as a lasting operational context.

Institutions made the strategy of restricted freezing more flexible and began to perform a controlled freezing of the production environment, allowing the correction of vulnerabilities and the deployment of critical updates of their systems and applications. They also began reviewing and updating their contingency and business continuity plans, considering as business as usual many of the scenarios materialized during the pandemic.

However, the acceleration of digitalization projects and the large-scale implementation of remote work increased the exposure of institutions to operational incidents and, consequently, implied in a worsening of the exposure of the SFN, including the Brazilian Payment System (SPB), to operational risk.

In this context, the BCB identified three main sources of concerns regarding the operational resilience of the SFN, which justified the close monitoring of operational aspects of critical institutions since the beginning of the pandemic.

a. Infrastructure to support remote operation

Considering the remote work was adopted by almost all economic sectors, there were growing concerns about the capacity of broadband providers to meet increased demand. Thus, the BCB and the telecom regulator (Anatel – National Telecommunications Agency) held joint meetings to monitor the operational context and the measures taken aiming at the maintenance of Internet services.

b. Cyberattacks and electronic frauds

One of the main concerns regarding a more digital operation lies in cyberattacks. In general, financial institutions have not faced so far security issues different from pre-pandemic times, although they reported a significant increase in malware, phishing and spam events targeted at customers and employees.

The increased number of new financial services consumers who were unfamiliar with digital channels and were unaware about cyber risk became an opportunity for fraudsters and hackers. In this way, the BCB, class associations and financial institutions have developed campaigns for the internal (employee) and external (customers and partners) public, with the aim of increasing awareness and risk culture regarding cyber risk and risks arising from remote operation.

c. Availability of Financial Market Infrastructures

In addition to the challenges arising from the pandemic, the BCB had been developing strategic initiatives of its positive agenda (Agenda BC#), including the implementation of Instant Payments Ecosystem (Pix) and Open Banking, both projects focused on technological developments and aiming at fostering competition among financial system participants.

In the context of the development of new business models and new financial ecosystems, clearing and settlement systems and trade repositories, also known as financial market infrastructures (FMI), play a critical function due to their centralizing role in the settlement, clearing and recording of financial transactions. The unavailability of a FMI system can cause substantial damage to the proper operation of markets.

For this reason, the BCB closely monitored the operational context of relevant FMIs since the beginning of the pandemic. Incidents involving extensions of processing grids and delays in closing procedures, or even caused temporary unavailability of some services, were reported, but they had limited impact on users or the operation of financial markets.

2.5.3 The post-pandemic context

The challenges faced by institutions turned into several opportunities. The measures adopted over the last months have shown very satisfactory results in some cases. For instance, now there is wide support to remote work and customers previously accustomed to face-to-face assistance are more adapted to digital channels.

Considering this background, the institutions are planning their strategies to return to onsite operation, pursuing to properly manage the risks during the phase-out of social distancing measures. They also plan a new operational framework for post-pandemic times.

a. Return plans

Institutions already designed their return plans, some of them considering the lessons learned from other jurisdictions that are in more advanced stages in terms of resumption of activities.

Several procedures have been defined to mitigate the risk of infection of the teams that will return to onsite work such as testing employees for virus detection, establishment of health protocols, establishment of staggered return and reinforcement of the influenza vaccination campaigns.

b. New operation models – Opportunities arising from the crisis

There are expectations that many customers will continue to use financial services provided through remote and/or digital channels. Moreover, some institutions experienced increased levels of productivity due to remote work. Considering also the implementation of relevant structural projects of the Agenda BC# that rely on intensive use of technology, there is the consolidation of an operational scenario with more digitization, more remote work, more real-time transactions and even more connectivity between institutions inside and outside the BCB's regulatory perimeter.

There is evidence that the pandemic accelerated the use of innovations, such as contactless technology, and increased the use of cloud computing services for data processing and storage. Cloud computing will certainly be a topic constantly discussed in the strategic decisions regarding the modernization of FI's technological infrastructure in the coming years.

2.5.4 Final remarks

The crisis highlighted that operational risk management is an increasingly determining factor for the survival of financial institutions. In this way, special emphasis should be placed by institutions on the revision of their contingency plans, incident management and management of third-party providers, especially critical IT service providers.

The concerns about operational resilience cover all institutions of the SFN, including new players such as payment institutions and trade repository FMIs recently authorized by the BCB. Although new players have a smaller operation and a portfolio of clients in consolidation, these new actors should implement controls proportional to their exposure to operational risk, given the interconnectivity with other agents.

The pandemic crisis showed that the SFN is operationally resilient, despite the structural changes in the operation of financial institutions. Thanks to the use of technology, procedures were adapted to reduce face-to-face interactions and the handling of physical documents, and the demands for financial services were successfully directed to remote/digital service channels. Digital channels were also essential to implement government aid programs, resulting in a forced financial inclusion process that will leave good legacy.

On the other hand, increased use of technology implies greater exposure to operational risk, especially cyber risk and electronic frauds. To face this challenge, institutions will need to continuously develop actions aiming at raising their clients' awareness of the safe use of financial services, as well as improve their operational risk management and business continuity management, preserving the soundness of the SFN in a scenario of greater digitization.

2.6 BCB's participation in the global sustainability and socio-environmental agenda

BCB directs its actions to reduce risks and mitigate the impact, occurred or expected, of shocks on the economy and the financial system, in order to fulfill its mission of ensuring price stability and ensuring the soundness and efficiency of the SFN. In this sense, the socio-environmental risk (RSA) can impact BCB's objectives. Materializing these risks can bring significant damage to the financial system. Climate shocks – fires, droughts, floods, extreme temperatures – affect relative prices in the economy and therefore can have impacts on monetary policy decisions. These same extreme events jeopardize the SFN, which can alter the demand for currency, values of physical goods and collateral, in addition to bringing high financial costs to society as a whole.

The formulation of BCB policies considers the socio-environmental risk and the impact of extreme events on the economy and financial system. In fact, the financial system in Brazil is one of the forerunners in the sustainability agenda, with a long history of initiatives to foster green or sustainable finance and mitigate social and environmental risks.

In the last two decades, BCB has been expanding its regulatory and supervisory framework, with the objective of developing best corporate governance practices for the assessment and management of social and climate-related risks and, consequently, fostering a greener or more sustainable financial sector in Brazil.

Climate change and other socio-environmental issues impact advanced, emerging and developing economies and therefore require coordinated global action. In this sense, the BCB has been actively engaged in several international forums to continue inserting in its regulation and supervision the approach of these risks in the SFN.

Recently, on September 8, 2020, BCB launched the Sustainability dimension in the Agenda BC#, which aims to promote sustainable finance, fostering the proper management of socio-environmental and climate risks in the SFN, as well as integrating sustainable variables into the BCB's decision-making process.

2.6.1 History of BCB's performance in socio-environmental issues

BCB has been actively working on the socio-environmental agenda since the late 2000s. During that period, the CMN published regulations requiring FIs to verify compliance with environmental legislation as one of the conditions to provide credit for rural and agro-industrial activities. The legislation aims to protect some of Brazil's biomes and foster low-carbon agriculture.¹⁵¹

In 2014, the CMN issued a resolution on Social and Environmental Responsibility, which established the foundation and principles for social and environmental practices to be followed by the FIs. Under this Resolution, the FIs are obliged to implement a Social and Environmental Responsibility Policy (PRSA), proportional to their exposure to the RSA, based on the nature of their services and activities, which also establishes how the management of the RSA will be performed.¹⁵²

In 2016, in order to support the preparation of the Supervisory Action Plan (PAS), the BCB implemented the first version of its Socio-environmental Risk Matrix, considering both the socio-environmental risk incurred by the FIs and the adequacy of its risk management action plan.

In 2017, the BCB established requirements for an integrated risk management approach for FIs, which should consider the RSA. Under this integrated approach, FIs must identify, measure, evaluate, monitor, report and mitigate financial risks, including socio-environmental ones. They should also implement risk management structure and governance for risk mitigation, including the socio-environmental risk and, if considered relevant, climate-related risks.¹⁵³

Additionally, larger FIs are obliged to consider the socio-environmental risk in their Internal Capital Adequacy Assessment Process (ICAAP), with the mandatory disclosure of any exposure to the RSA in the risk assessment process of the FIs and in their capital adequacy calculations.¹⁵⁴

151 CMN Resolution 3,545 of February 29, 2008; CMN Resolution 3,813 of November 26, 2009; CMN Resolution 3,814 of November 26, 2009; and CMN Resolution 3,896, 17 August 2010.

152 CMN Resolution 4,327, 25 April 2014.

153 CMN Resolution 4,557, February 23, 2017.

154 Circular BCB 3,547, of July 7, 2011.

From 2020, the Supervision included the evaluation of the RSA in the SRC (Risk Assessment System and Controls). The SRC is continuously conducted and is composed of a set of structured criteria and procedures, which allow the Supervisor to consolidate and keep up-to-date its knowledge about the risk profile of banking institutions, as well as to identify in a timely manner the situations that present the greatest risk.

It is also noteworthy, a joint initiative with the Ministry of Economy, involving the FiBraS Project, sponsored by the German Society for International Cooperation (GIZ), with the objective of expanding the sustainable finance market in Brazil and improving the surveillance of the socio-environmental risk associated with the FIs. The project should contribute to improving procedures for supervising social and environmental risks and risks related to climate change.

2.6.2 Inclusion of the “Sustainability” dimension in the Agenda BC#

Concern for sustainable development and social and environmental risks has grown among the entities of the global financial system. Specifically in the financial market and capital market, the absence of policy debate and the implementation of measures aimed at social, climatic and environmental risks can result in financial losses arising from the materialisation of these risks.

In this context, the “Sustainability” dimension was included in the Agenda BC#, with three main objectives: (i) promoting sustainable finance within the SFN; (ii) improve the social, environmental and climate risk management rules applicable to FIs; and (iii) incorporate variables associated with sustainability in the work and decision-making processes in the BCB.

The Agenda BC#, created in 2019 from the reformulation of the project initiated in 2016 by the BC+ Agenda, defines BCB’s strategic line of action. In its original conception, four dimensions were established (Inclusion, Competitiveness, Transparency and Education) to guide the BCB’s performance.

The inclusion of this new dimension in the Agenda BC#, as a new pillar, stems from the impacts of extreme weather events such as fires, droughts and floods on the main economic variables, as well as from the growing relevance of the theme to society.

This new reality potentially affects relative prices in the economy and consequently impacts economic policy decisions. This impact reaches not only the market value of financial assets and the ability to pay economic agents, but also the values of physical and collateral assets, with repercussions on the stability of the SFN.

The environmental issue, which was already the focus of relevant debate on the international agenda, gained significant momentum after the Covid-19 pandemic. Promoting a sustainable and inclusive recovery is now a key part of the agenda and policy advice criteria of key international forums such as the International Monetary Fund (IMF), the Organisation for Economic Cooperation and Development (OECD), central banks, FBS and G-20. In some of these, as in the IMF special case, the decision to integrate the topic of mitigation and adaptation to climate change into the process of regular surveillance of the economies of the countries will already be the result of evaluation from 2020.

In the future, new modules of the Financial Sector Assessment Program (FSAP) are also expected to be dedicated to sustainability, with a special focus on issues related to stress tests and data generation on climate change.

In this sense, the launch of the new dimension of the Agenda BC# seeks to respond to structural changes in the economy in the face of the emergence of climate and socio-environmental risks, integrating sustainable variables in the BCB decision-making process.

The new dimension establishes a comprehensive but not exhaustive set of measures applicable to both FIs and BCB itself in initiatives listed below:

- **Social and Environmental Responsibility of BCB itself**
 - » Promoting a culture of sustainability
 - » Inclusion of the theme in the Museum of Economics
 - » Reduction of environmental impact on the processes of the circulating environment
 - » Review of the BCB's Social and Environmental Responsibility Policy

- » Implementation of the recommendations of the Task Force on Climate related Financial Disclosures (TCFD)
- » Improvement of integrated risk management, including socio-environmental issues in all BCB decision-making processes
- **Partnerships**
 - » BCB's entry into the Network for Greening the Financial System (NGFS)
 - » Signing of the Memorandum of Understanding with the CBI
- **Policies**
 - » Creation of a sustainable liquidity financial line
 - » Inclusion of sustainability criteria in the administration of international reserves
- **Supervision**
 - » Structuring and expansion of the collection of information on social and environmental risks
 - » Monitoring climate risks and conducting stress tests
- **Prudential and procedural regulation**
 - » Management of social and environmental risks by FIs - Improvement of regulation (CMN Resolution 4,327, of April 25, 2014)
 - » Expanding transparency based on TCFD recommendations
 - » Creation of the Green Bureau of Rural Credit
 - » Establishment of incentives for green rural credit

2.6.3 Cooperation actions for social and environmental sustainability

It is worth highlighting the growing interaction of BCB with other central banks and international organizations in the proposition of regulatory guidelines related to socio-environmental and climate risks, as well as the frequent

dialogue with the institutions of the SFN, with a view to monitoring the evolution of the theme and conducting its performance as a regulatory and supervisory body.

Among BCB's most recent actions associated with the theme is the partnership established with CBI, an international non-profit organization that promotes investments in projects and assets needed to transition to a low-carbon and climate-resilient economy to facilitate the exchange of sustainability information.

Another important action was the entry into NGFS, a network established in 2017 by representatives of eight central banks and supervisory bodies. Since then, the network has expanded and – by July 2020 it already had 69 members and 13 observers from five continents.¹⁵⁵

NGFS discloses non-binding recommendations, with the aim of assisting central banks and supervisors in monitoring and supervising environmental risks and climate-related risks, as well as inspiring them to take the necessary measures to promote a financial system focused on sustainability.

As next steps, based on the experiences so far, NGFS plans to work on the following issues:

- continuity of the identification of best practices to assist central banks and supervisors, as well as relevant stakeholders, in assessing and mitigating climate-related risks and environmental risks;
- metrics to assist supervisors in assessing climate-related risks and environmental risks;
- transmission channels through which environmental risks materialize as a source of financial risk;
- classification system for economic activities (taxonomy); and
- development of new lines of work in the fields of research and data generation, to cover gaps already identified in the area.

The work at NGFS is part of a series of actions in which BCB is involved. Over the past few years, experts at the institution have participated, as regular or invited members, in several other discussion and cooperation

155 Source: <https://www.ngfs.net/en/about-us/membership>.

forums on green finance, sustainable finance and climate risks, such as those listed below:

- **Task Force on Climate-related Financial Risks (TCFR) of the Basel Committee on Banking Supervision (BCBS)**

Established in January 2020 under the BCBS, known as the “Basel Committee”, TFCR is a group dedicated to the subject of climate-related financial risks. Its work consists of a gradual and sequential approach, with an initial focus on the analytical aspects related to the measurement of climate risk in financial systems, as well as the exchange of information in banking supervision approaches. The BCB is supporter of the group.

Among the group’s products, we highlight the publication of the report “Climate-related financial risks: a survey on current initiatives”, which includes research on regulatory and supervisory practices currently adopted by its members in relation to the financial risks associated with climate.

- **Financial Innovation Laboratory (LAB) - Working Group (WG) Green Finance**

LAB serves as a forum for the interaction of institutions in various sectors. It was launched in 2017 by the Brazilian Development Association (ABDE), the Inter-American Development Bank (IDB) and the Brazilian Securities and Exchange Commission (CVM), with support from GIZ. The Green Finance Work Group brings together more than 90 institutions, including government, private sector and civil society. The objective of the work group is to strengthen sustainable finances in the financial and capital markets in Brazil.

- **G20 Sustainable Finance Study Group**

Established in 2016 under the name Green Finance Study Group (GFSG), this forum had its scope expanded in 2018 and became the Sustainable Finance Study Group. Based on the experiences of member countries, the group seeks to develop measures to improve the financial system's capacity to mobilize private capital for sustainable activities, that is, with positive environmental, social and economic impacts.

- **Sustainable Banking Network**

The Sustainable Banking Network (SBN) is a network of financial regulators and banking associations from 38 emerging countries who are voluntarily committed to advancing the theme of sustainable finance, aligned with international best practices. Created by the International Finance Corporation (IFC), an integral institution of the World Bank Group, the network fosters learning among its participants and supports countries in the development of public policies and initiatives focused on sustainable finance. BCB has been a member of the network since its founding in 2012.

2.6.4 Identification of the exposure of institutions to RSA for supervisory purposes

In order to improve supervisory practices focused on sustainability, BCB has also advanced in the development of a methodology for identifying the RSA, which includes a classification system (taxonomy) of exposures to that risk. The BCB uses this taxonomy, for example, in the Risk Matrix that subsidizes the annual preparation of its PAS, in order to direct BCB's supervisory actions on the subject.

The Risk Matrix consists of two dimensions: (i) the adequacy of the management of the socio-environmental risk, by the FIs; and (ii) the relevance of their credit exposures to the socio-environmental risk. The latter is evaluated considering the sectors of economic activity of customers and the socio-environmental damage that they may eventually cause (pollution, child labor, slave labor and environmental disasters, among others) or suffer, leading, consequently, to financial losses in institutions.

As provided in Resolution 4,327 of April 25, 2014, the socio-environmental risk is defined as the possibility of losses of FIs resulting from socio-environmental damage. The RSA permeates several risks, such as credit, market, legal and image risk, among others. For example, the occurrence of socio-environmental damage can affect a customer's ability to pay, leading to credit losses from the institution that financed it. If this socio-environmental damage was caused by the client himself, we could also potentially have image risk and legal risk from the financial institution.

It is important to highlight that the fact that an institution grants credit to a particular client exposed to the RSA does not mean that this client is necessarily generating socio-environmental damages. Such client can efficiently mitigate the risks of causing socio-environmental damage, or even be exposed to the financial consequences arising from socio-environmental damage not caused by it.

The main objective of Resolution 4,327 of April 25, 2014, is to induce the FIs to include the evaluation of the RSA in its management and in its decision-making process, aligned with its PRSA. According to the World Bank, by implementing a Socio-environmental Management System, a financial institution can improve its understanding of the socio-environmental risk associated with each transaction, which can even be included in the decision-making process of proceeding or not with the operation.

The RSA measurement methodology, currently used in BCB, is based on the risk categories and subcategories presented in studies by the International Finance Corporation (IFC) of the World Bank (Table 1). The IFC evaluated, for 29 sectors of economic activity, the risk they present in these subcategories, and their risk consolidated to the RSA. By the association of the CNAE codes¹⁵⁶ of the clients that make up the Total Credit Responsibility¹⁵⁷ of the FIs to these 29 sectors of economic activity, the level of the socio-environmental risk proposed by the IFC is identified for each operation of each client. The exposure of each institution subject to the RSA is the sum of the Total Credit Responsibility of clients who are related to economic sectors that present a medium or high classification of socio-environmental risk.¹⁵⁸

The BCB has been studying ways to improve this methodology, in particular, seeking to:

Table 1 – Categorization of social and environmental risks

Exhibition category	Subcategory
Environmental	Energy
	Water use
	Water pollution
	Waste
	Air pollution
	Damage to ecosystems
	Disaster risk
	Soil contamination
Social	Health and safety at work

¹⁵⁶ BCB uses the codes CNAEs (National Classification of Economic Activities) up to the seventh level (about 1300 CNAEs).

¹⁵⁷ The Total Credit Responsibility of each financial institution is obtained in the Credit Information System (SCR) of the BCB, and considers the operations contracted from 2015, that is, in the last 5 years. The exposures used to calculate the total liability are: the active credit portfolio (installments due and overdue installments), the co-obligations assumed and the guarantees provided.

¹⁵⁸ IFC references (International Finance Corporation – World Bank Group) to the degree of exposure of each of the 29 sectors of economic activity can be found on the site <https://firstforsustainability.org/risk-management/risk-by-industry-sector/>

- the inclusion of additional subcategories, particularly regarding risks of social damage;
- improving the way of assessing the degree of risk exposure in each of the subcategories;
- the use of more complex forms of mapping of the risk of each subcategory, due to limitations of the CNAE. For example, there is a single CNAE code for electricity generation. However, the socio-environmental risk profile of each type of generation (wind, hydroelectric, thermoelectric, solar, etc.) is quite different from each other; and
- the inclusion of information related to customer compliance in relation to socio-environmental norms and regulations.

Appendix

Banco Central do Brasil Management

Acronyms

Banco Central do Brasil Management

Board of Governors

Roberto de Oliveira Campos Neto
Governor

Bruno Serra Fernandes
Deputy Governor

Carolina de Assis Barros
Deputy Governor

Fábio Kanczuk
Deputy Governor

Fernanda Feitosa Nechio
Deputy Governor

João Manoel Pinho de Mello
Deputy Governor

Maurício Costa de Moura
Deputy Governor

Otávio Ribeiro Damaso
Deputy Governor

Paulo Sérgio Neves de Souza
Deputy Governor

Acronyms

ACCP _{Brasil}	Countercyclical Capital Buffer
ACP _{Sistêmico}	Systemic Buffer Requirement
Anatel	National Telecommunications Agency
AP	Problem asset
APT	Advanced Persistent Threat
ATM	Automatic teller machine
[B]3	Brasil, Bolsa, Balcão
BCB	Banco Central do Brasil
BCBS	Basel Committee on Banking Supervision
BNDES	Brazilian Development Bank
BRL	Brazilian Real
CBI	Climate Bonds Initiative
CCP	Central counterparty
CDB	Bank Deposit Certificate
CET1	Common Equity Tier 1
CGPE	Program of Working Capital for the Preservation of Firms
CI	Coverage index
CIS	Center for Internet Security
CMN	National Monetary Council
CNAE	National Classification of Economic Activities
Comef	Financial Stability Committee
Copom	Monetary Policy Committee
Covid-19	Corona Virus Disease – 2019
CSLL	Social Contribution on Net Profit
DFAST	Dodd-Frank Act Stress Testing
DI	Interbank deposit
DPGE	Term Deposit with Special Guarantee
DTA	Deferred tax asset
EMBI+ Br	Brazil's Country Risk Premium, calculated by J.P. Morgan Chase
FED	Federal Reserve
FGC	Deposit Insurance Fund
FGTS	Length-of-Service Guarantee Fund
FI	Financial institution
FMI	Financial market infrastructure
FPR	Risk-weighting factor
FSAP	Financial Sector Assessment Program
FSR	Financial Stability Report
FSS	Financial Stability Survey
FX	Foreign exchange

GDP	Gross Domestic Product
GIZ	German Society for International Cooperation
GPS	Supervisory Practices Guide
IBC-Br	Index of Economic Activity of the Central Bank
IBGE	Brazilian Institute of Geography and Statistics
IL	Short-Term Liquidity Ratio
ILE	Structural Liquidity Ratio
INSS	National Social Security Institute
IPCA	Extended National Consumer Price Index
IRPJ	Corporate Income Tax
IS	Information security
ISO	International Organization for Standardization
IT	Information technology
IVG-R	Residential Mortgage Collateral Value Index
LCA	Agribusiness Credit Bill
LCR	Liquidity Coverage Ratio
LFG	Financial Letter with Guarantee
LLP	Loan-Loss Provisions
LR	Leverage ratio
LTEL	Special Temporary Liquidity Line
LTV	Loan-to-value
MSME	Micro, Small and Medium Enterprise
NDPGE	New Term Deposit with Special Guarantee
NEL	Effective Liquidity Need
NFR	Net Financial Risk
NII	Net interest income
NIST	National Institute of Standards and Technology
NSFR	Net Stable Funding Ratio
OTC	Over the Counter
PAS	Supervisory Action Plan
PCI DSS	Payment Cards Industry Data Security Standard
Peac	Emergency Credit Access Program
Pese	Emergency Employment Support Program
PFMI	Principles for Financial Market Infrastructures
PNADC	Continuous National Household Sample Survey
p.p.	Percentage point
Pronampe	National Program to Support Micro and Small Businesses
PRSA	Social and Environmental Responsibility Policy
RC	Regulatory capital
RDB	Bank Deposit Receipt
ROE	Return on equity
RSA	Social-environmental risk
RWA	Risk-weighted assets
SCR	Credit Information System
Selic	Domestic interest rate
Selic	Special System for Settlement and Custody
SFN	National Financial System
SGS	Time Series Management System
SME	Small and Medium Enterprise
SOC	Security operation center

SPB	Brazilian Payments System
SRC	Risk Assessment System and Controls
STR	Reserves Transfer System
TPF	Federal public security
USA	United States of America
USD	United States Dollar
VAR	Autoregressive vector
VPN	Virtual Private Network
YoY	Year-over-year

Concepts and Methodologies

- a) Short-term Liquidity Ratio (IL)** – Conceptually like the Liquidity Coverage Ratio (LCR), it is the ratio between the stock of liquid assets held by the institution and the net stressed cash flows (estimated disbursements in the next 21 business days under a stress scenario). Therefore, institutions with IL above one (100%) have enough liquid assets to withstand this stress scenario.
- i. Liquid assets – liquid resources available for each conglomerate/institution to honor its stressed cash flows for the next 21 business days. It is the sum of highly liquid assets, release of required reserves (due to deposits run-off) and supplemental resources.
 - a. Highly liquid assets – These include: i) unencumbered Brazilian sovereign bonds held by the institution or received as a collateral in reverse repurchase agreement operations (reverse repos); ii) stocks listed in Ibovespa index; iii) liquid quotas of investment funds; iv) cash; and (v) free central bank reserves.
 - b. Release of required reserves – amount of the required reserves that would be released to the institution due to the deposit run-off estimated in the stressed cash flows calculation.
 - c. Supplemental resources – other options for monetization in the scenario’s time-horizon, such as: Bank Deposit Certificate (CDB), Bank Deposit Receipt (RDB), Interbank Deposit (DI), long positions in box strategies (options), reverse repurchase agreements (reverse repos) backed by private securities.
 - ii. Stressed cash flows – an estimate of the amount of cash that the institution needs within the scenario’s timeframe (21 business days) under a stress scenario. The analyses take into account retail deposits run-off, wholesale funding run-off, market stress and net contractual cash flows.
 - a. Retail deposits run-off – estimate of the necessary amount to cover the retail-customers withdrawals in demand deposits, term deposits, savings accounts, box strategies, securities issued by the bank, and repurchase agreements (repos) backed by private securities.
 - b. Wholesale funding run-off – estimate of the necessary amount to cover the possibility of early redemption of the liability positions from the three largest market counterparties.
 - c. Market stress – estimate of the necessary amount to cover losses arising from market movements affecting the liquid assets or others positions that may cause a cash outflow of the institutions in the

stress scenario. The losses comprise: i) margin calls; ii) pre-settlements of derivatives contracts; iii) losses on the marked-to-market values of the liquid assets.

- d. Net contractual cash flow – payments due in derivatives positions and in contractual cash flows (assets and liabilities positions) with market agents, maturing within the horizon of the scenario.

b) Structural Liquidity Ratio (ILE) – It is the ratio between the available stable funding (part of the equity and liabilities on which the institution can rely for a one-year horizon) and the required stable funding (part of the assets, including off-balance-sheet assets, which must be financed by stable funding because they have long maturities and/or low liquidity). Institutions with ILE equal or above one (100%) are less susceptible to future liquidity problems. The calculation methodology is based on the final version of the Net Stable Funding Ratio (NSFR), which was introduced as a minimum mandatory compliance in October 2018.

- i. Available stable funding – the funding that shall remain in the institution for at least a year. The main sources of banks' stable funding are the capital; non-redeemable liabilities with residual maturities above one year regardless of counterparty; and funding with no maturity or with a maturity of less than a year coming from retail customers.
- ii. Required stable funding – the amount of stable funding needed to finance the long-term activities of financial institutions. Therefore, it takes into account the liquidity and the maturity of the assets of the institution. The long-term assets are mainly the credit portfolio maturing in over a year; non-performing assets; less liquid or encumbered securities (i.e. margin requirement in clearings); fixed assets; and the items deducted from the regulatory capital.

c) Total Capital Ratio – Basel Committee on Banking Supervision international concept, consisting of the system regulatory capital (RC) divided by the system RWA. In Brazil, until September 2013, the minimum required ratio was the factor “F”, according to Resolution CMN 3,490, of 29 August 2007, and Circular BCB 3,360, of September 12, 2007. Until October 2013, financial institutions and other institutions authorized to operate should observe the 11% limit established by the BCB, except for individual credit unions not affiliated to central units. From October 2013 on, the minimum required ratio has been disciplined by the Resolution 4,193, of March 1, 2013, which defines a convergent calendar, requiring 11% of RWA from October 2013 to December 2015; 9.875% in 2016; 9.25% in 2017; 8.625% in 2018; and 8% from 2019 on. On top of this requirement must be added a capital buffer, as mentioned in the Common Equity Tier 1 (CET1) Ratio topic.

d) Tier 1 Capital Ratio – According the Resolution 4,193, of 2013, a Tier 1 Capital requirement became effective from October 2013 on, corresponding to 5.5% of RWA, from October 2013 to December 2014, and 6% from January 2015 on. On top of this requirement must be added a capital buffer, as mentioned in the Common Equity Tier 1 (CET1) Ratio topic.

e) Common Equity Tier I Ratio (CET1) – According the Resolution 4,193, 2013, a CET1 capital requirement became effective from October 2013 on, corresponding to 4.5% of RWA. In addition to this requirement, the Resolution established a capital buffer, composed by the following items: conservation, countercyclical and systemic. The conservation buffer requirement corresponds to the following RWA percentages: zero, until December 31, 2015; 0.625%, from January to December 2016; 1.25%, from January to December 2017; 1.875%, from January to December 2018; and 2.5% from January 2019 on. The countercyclical buffer requirement is limited to the following maximum RWA percentage: zero, until December 31, 2015; 0.625%, from January to December 2016; 1.25%, from January to December 2017; 1.875%, from January

to December 2018; and 2.5% from January 2019 on. The systemic buffer requirement is limited to the maximum RWA percentage: zero until December 31, 2016; 0.5%, from January to December 2017; 1.0%, from January to December 2018; and 2.0% from January 2019 on.

- f) Leverage ratio (LR)** – Basel Committee on Banking Supervision international concept, consisting of Tier I Capital to Total Exposure ratio. In Brazil, the BCB Circular 3,748, of February 27, 2015, established the LR methodology. This index intends to complement the current prudential requirements, through a simple, transparent and non-sensitive risk metric. The leverage ratio minimum requirement of 3.0% was established by the Resolution CMN 4,615, of November 30th, 2017, which is effective from January 2018 on, applicable for institutions classified as S1 or S2, accordingly to the Resolution CMN 4,553, of January 1st, 2017.
- g) Household debt service-to-income ratio (DSTI)** – Defined as the ratio between monthly debt service and monthly income. A methodological review of the measure presented in the FSR issues of September 2014, March 2015 and October 2015, this measure uses data from BCB's Credit Information System (SCR) to calculate the ratio for each debtor in the SFN and, from individual data, calculates measures of central tendency for the SFN and other aggregation levels.
- h) Monthly debt service** – Credit outstanding due in 30 days, except for: a) real estate financing, whose 30-day due amount is estimated by a constant amortization system; b) overdraft, whose debt service is defined as its monthly interest; and c) other revolving facilities, whose 30-day due amount is estimated by a Price amortization system. It considers all household loan facilities, except for rural and business facilities, even when loaned by an individual. Even though it is calculated, 30-day due amount in credit card purchases are not considered in the DSTI base measure, being included only in alternate measures of the indicator.
- i) Monthly income** – As a customer's income may vary when informed by different financial institutions, the following procedure applies: i) in case of more than one income bracket, the mode is used to select a single income bracket for the customer – if there is a tie among income brackets, the one with the largest amount of credit outstanding is chosen; ii) among the FIs which informed the selected income bracket, the largest informed income is chosen, capped by the lower and upper bounds of the income bracket; and iii) an estimate of income tax and social security contribution is deducted from the selected income.
- j) Companies' size** – Defined by an intern algorithm, which considers three sources of information: i) size of micro and small enterprises set by Federal Revenue of Brazil; ii) size mode informed by financial institutions in the Credit Information System (in case of tie, it is considered information of the financial institution in which the company has the greatest volume of debt); (iii) corporate indebtedness amount (bank credit, capital market, internalized external debt) to enclose size's boundaries. The criteria (i) and (ii) take into consideration annual gross revenue standards of Complementary Laws 123/2006 and 11,638/2007. The criteria (iii) is residual and classifies companies' sizes not set by criteria (i) or (ii).

Concepts and Methodologies – Capital Stress

1.1 Stress test – Introduction

The stress tests executed in BCB comprise a macroeconomic stress test as well as sensitivity analysis to relevant risk factors. These exercises are simulations executed by the BCB to estimate potential losses and capital shortfalls in the banking system stemming from extreme adverse, but plausible, scenarios. It also provides assessment of the resiliency of either an individual institution or the banking system. Hence, it is possible to determine the impact on the capital of institutions taking into consideration unexpected, and thus, not provisioned losses caused by changes in macroeconomic variables.

For each stressed scenario new capital ratios (Basel Ratio, Tier 1 and CET1) are calculated. A financial institution is considered as non-compliant whether any of its capital ratios is below the minimum required and classified as insolvent in the case of total depletion of the CET1. The relevance of non-compliant and/or technically insolvent institutions is assessed and the additional capital required in order that no other bank could get non-compliant is calculated. The relevance of an individual entity is determined based on the representativeness of its Adjusted Assets with respect to the assets of the whole banking system.

The positive effects of the activation of the triggers related to Tier 2 and Additional Tier 1 capitals, in which values are converted into CET1 capital, are classified as income. Furthermore, the requirement of additional capital buffers, according to the Resolution 4,193 with the redaction given by the Resolution 4,443 from Oct. 29th, 2015, is taken into account in the calculation of capital shortfalls. And finally, the framework also considers the potential changes of registration and uses of deferred taxes and its implications on regulatory capital calculations, according to the Resolution 4,192, from Mar 1st, 2013, and posterior modifications.

1.2 Macroeconomic stress test

The macroeconomic stress test framework is an exercise that consists of the application of adverse macroeconomic scenarios and the simulation of how the balance sheet of each financial institution individually would behave under such scenarios. With that information in hands, capital shortfall of the whole system is calculated.

1.2.1 Scenarios design

Three macroeconomic scenarios are designed, all of them with time horizon of twelve quarters, based on market information, having the following macroeconomic variables: 1) economic activity (Economic Activity Index measured by the BCB – IBC-Br); 2) exchange rate (Brazilian Real vs US Dollar parity); 3) Brazilian Benchmark Interest Rate (measured by the Selic rate); 4) inflation rate (measured by the Extended National Consumer Price Index – IPCA – accumulated in twelve months); 5) Brazil's country risk premium (EMBI+Br spread, calculated by J.P. Morgan Chase); 6) the 10-yr US Treasury Yield; 7) unemployment rate (calculated by the IBGE based upon the Continuous National Household Sample Survey – PNADC); and 8) commodities index (CRB index, calculated by Thomson Reuters/CoreCommodity). All variables are measured as a 3-month average.

The baseline scenario is built using the median of the market expectations (Focus report) for the following variables: economic activity, interest rates, FX (foreign exchange) rates and inflation. The GDP – Focus expectation – and the IBC-Br (VAR variable) are perfectly correlated. The Brazil's country risk premium, unemployment rate and commodity index are kept constant over the forecast horizon. On the other hand, the path of the 10-yr US Treasury Yield is defined according to the adverse scenario published by the Board of Governors of the Federal Reserve System in the report “2018 Supervisory Scenarios for Annual Stress Tests Required under the Dodd-Frank Act Stress Testing Rules and the Capital Plan Rule”.

The Structural Break scenario is obtained by verifying the historic periods in which each variable showed the greatest change (either positive or negative) through an eight-month interval. In each identified period, it is added the subsequent four quarters to form the total projection horizon (three years). Then, the changes between each quarter are calculated and applied onto the observed values of the variables in the reference date.

In the Worst Historical scenario, repetition of the macroeconomic variable's behavior is simulated, through a six-quarters rolling window since July 2003. Each window is plugged into dynamic panel data models and the historical scenario is the one with the lowest earnings before taxes.

1.2.2 Stress simulation

The stress simulation is done by projecting six basic groups of the income statement, trying to represent the operational performance of banks presented in the last income statement (net non-operational income is not considered in the test):

1. Net interest income: comprises net credit income, accrued income from bonds and securities and funding costs;
2. Non-interest income: mark-to-market effects, hedges and exchange rates variations;
3. Fees & commissions;
4. Non-consolidated companies;
5. Administrative expenses and;
6. Provisions expenses.

In the “net interest income”, credit and bonds/securities income as well as funding costs are modeled based on the Selic rate. The total funding is adjusted according to their credit portfolio volume, in the proportion of 1:1. Provision expenses are estimated based on the problem assets evolution, resulting from the macroeconomic scenario.

The non-interest group is modeled by applying a shock on market risk sensible positions observed in the starting date of the test. The stressed market risk factors are obtained out of the macroeconomic scenario and positions are then recalculated. The result is the difference between the stressed and the initial values. This amount is applied on the first quarter of projection and incorporated into the result.

The BCB changed the methodology used to capture the interest risk exposures. Hence, from the second semester of 2018 onwards this method will be different. Until recently the shocks were applied only on the trading book positions, all of them informed by banks, according to the Circular 3,354, from June 25th of 2007. However, this criterion is no longer in place and now the framework will encompass all the liquid positions, notably both government and corporate bonds as well as derivatives. The effect of this change is that the number of exposures subjected to these shocks have increased, which make the “non-interest” group more significant in the stress test.

The “Fees & Commissions”, “Non-consolidated companies” and “Administrative Expenses” groups are modeled by making use of dynamic panel data models, obtained with the same macroeconomic variables employed in the scenarios.

Besides the performance simulation, verified through the income statement, the Banco Central do Brasil has incorporated the inter-financial contagion into the macroeconomic stress test framework from the first semester of 2019 onwards. In each quarter of the stress test time horizon, there is a verification whether any institution falls below the minimum threshold of 4% of the Core Tier 1 capital ratio. If this is the case, the inter-financial contagion is estimated. The uncollateralized interbank exposures issued by that institution are assumed as losses in the creditors’ balance sheet, and then capital is recalculated. If any financial firm also falls below that threshold, the process is repeated iteratively until there is no more institution below the threshold. The stress test continues with new affected capital levels and the process is repeated in all quarters of the projection, until the end of the time horizon.

1.3 Sensitivity analysis – Introduction

Sensitivity analysis complements the macroeconomic stress test framework. Its objective is to assess the individual effects of credit or market risk factors that might affect the regulatory capital of institutions, causing eventual capital shortfalls. Those analyses are conducted by applying incremental variations in such risk factors, keeping the other factors fixed.

1.3.1 Sensitivity analysis – Changes in market risk factors

The exposures subjected to interest rate changes (e.g. fixed rates, currency coupons, price indexes and interest rates) listed in the trading book are stressed. The positions at all vertices (from 21 to 2,520 days) are recalculated after the application of shocks as well as the financial impact on banks’ capital positions. Stressed exposures also affect risk weighted assets (RWA) components. In the case of fixed rates, new regulatory parameters of capital requirements are recalculated based on every new yield curve generated by a shock.

Exposures in foreign currency, gold and other instruments subject to changes in the exchange rates are also stressed, and their impacts on capital and RWA estimated. Here we assume that all exposures are revalued following the percentage points projected for the stressed USD/exchange rate.

We apply shocks individually in each factor, the interest rate and the exchange rate, starting at their current values, in steps of 10% in both directions, until it reaches 200% and 10% of its current value, on the upside and on the downside, respectively. After recalculating capital ratios, we evaluate both the regulatory capital adequacy ratios and the solvency of banks.

The calculation of interest rate shocks follows the same methodology as for the “non-interest” items of the macroeconomic stress test. For the other risk factors all the balance sheet positions are considered.

1.3.2 Sensitivity analysis – Increases in problem assets

This analysis tries to measure the effect of problem assets increases over the regulatory capital of institutions. We increase problem assets up to 150% of its current level and compute the additional provision required. These additional provisions affect both banks’ capital positions and the RWA component of the required capital. After recalculating capital ratios, regulatory capital adequacy and the solvency of banks are evaluated.

1.3.3 Sensitivity analysis – Fall in housing prices

The objective of this exercise is to estimate the impacts of fall in housing prices over the capital of financial institutions with outstanding mortgages. Prior to the simulations we proxy housing prices with the value of the updated collateral provided for the loan using the IVG-R index, adding the variations measured by the index since the date that the loan was generated until the date of simulation.

The analysis consists of reducing house prices, simulating a sequence of decreases in steps of 5 pp. In each step collaterals that become lower than 90% of the remaining loan are considered delinquent.

The loss of each delinquent loan is equal to the difference between the outstanding balance and the present value of the amount recovered from the foreclosure process. To calculate the recovered amount, we calculate new housing prices after shocks, net of taxes, maintenance fees and costs related to the foreclosure process. In addition, we consider that the sale in the foreclosure process is done with a discount proportional to the reduction of price due to the shock. The present value is obtained by discounting that sale amount by the 1-year future rate negotiated in the BM&FBovespa. New regulatory capital ratios of each institution are calculated considering the estimated losses to the related decline in housing price.

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