



Dolar	3,464	3,155
Euro	3,706	3,708
Ibovespa	67,671	67,059
CDI	9,14%	9,06%
Selic	9,15%	9,08%

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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 consists of two chapters. Chapter 1 – Assessment of the National and International Financial Systems – presents an overview of the international financial system; of the National Financial System (SFN) – with analyses of the risks related to liquidity, credit, profitability, and solvency; of capital and liquidity stress tests and their effects on institutions' solvency; – of the Financial Stability Survey (FSS); and of the operation of systemically important financial market infrastructures (FMIs). Chapter 2 – Selected Issues – discusses relevant and not necessarily

recurrent 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) on <https://www3.bcb.gov.br/sgspub>.

Executive Summary

The external environment remains challenging.

The disinflationary process has been proceeding in several countries. The central banks of the main economies stay determined to promote the convergence of inflation rates towards their targets in an environment characterized by pressures in the labor markets. This scenario continues to require caution from emerging countries.

At the domestic level, economic activity and the labor market remain dynamic.

The combination of a robust labor market, expansionary fiscal policy, and vigorous lending to families continues to indicate support for consumption and, consequently, aggregate demand. There has been continued dynamism in the labor market, with real wage gains in recent months.¹

The Banco Central do Brasil (BCB) considers that there is no relevant risk to financial stability.

The National Financial System (SFN) remains with comfortable capitalization and liquidity positions and adequate provisions to the level of expected losses.

Furthermore, the capital and liquidity stress tests demonstrate the soundness of the banking system.

As well as the BCB, the financial market perceives a reduction in international market risk, an improvement in the economy, and the resilience of the SFN. Fiscal risks gain relevance.

The Financial Stability Survey (FSS) reveals that international risks lost strength, but still require attention. Mentions of domestic default and activity risks fell, in line with recent economic performance. Fiscal risks were the most cited by financial institutions (FIs), reflecting concerns about the trajectory of public debt and the impacts of fiscal policy on asset prices and monetary policy. Confidence in the stability of the SFN remains high, close to its all-time high.

Real economy financing accelerated again in line with the higher-than-expected growth in economic activity.

The acceleration in credit to households was more pronounced in the vehicle financing and non-payroll deducted credit portfolios.² The recovery in bank lending to companies was driven by large

ones, albeit moderate compared to financing via the capital markets.

Corporate debt investment funds present significant funding in a scenario of reduced spreads, but the increase in liquidity mitigates the risk.

These funds are important holders of domestic corporate debt, and their funding is correlated with yields. The high demand for corporate debt securities caused spreads to compress. Any increase in spreads could affect the profitability and, consequently, the attractiveness of these funds, which could hinder new issues of corporate bonds, reducing access to an important source of financing for companies. However, increases in both the depth of the corporate debt market and these funds' investments in Federal Public Securities (TPFs) and reverse repo operations reduce liquidity risk.

Despite favorable economic signs, the payment capacity of households and micro, small, and medium-sized enterprises (MSMEs) remains challenging. The labor market was a positive surprise in

¹ Minutes of the Monetary Policy Committee (Copom), issued on September 24, 2024, available at <https://www.bcb.gov.br/en/publications/copomminutes>.

² This refers to the Credit Information System (SCR)'s "non-payroll deducted credit to households" submodality.



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terms of employment levels, unemployment rates, and income. Nevertheless, household indebtedness and debt service-to-income remain high. In the case of MSMEs, despite the recent dynamism in trade, services, and industry, there is a growing volume of requests for judicial recovery and a sense of high leverage. Furthermore, the new cycle of raises in the basic interest rate may increase pressure on the payment capacity of enterprises and households.

FIs slightly increased their risk appetite. For households, in addition to the reacceleration in almost all credit modalities, there was some easing in the granting criteria, especially in vehicle financing. For companies, the pace of credit growth increased, but the granting criteria did not change significantly. The risks related to the financial standing of households and companies continue to demand the preservation of the quality of grantings.

The materialization of credit risk is expected to remain stable for households and MSMEs, and with potential for reduction for large companies. Regarding households, the expectation of stabilization is due to compensatory effects. On the one hand, an improvement in the product mix and buoyant economic activity; on the other, a high level of debt service-to-income and a slight worsening in granting criteria. Concerning MSMEs, no relevant changes were

observed in the quality of new grantings, even though there was some relief in the margin. Write-offs, combined with the increase in the portfolio, explain the percentage decline in problem assets (PAs) of larger companies. Considering publicly traded companies, leverage has remained stable since the beginning of 2022, below the start of the Covid-19 pandemic.

The SFN remains with adequate provisions for expected credit losses. In all segments, the provision followed the dynamics of expected losses and remains higher than the loss estimate in most institutions.

The SFN profitability continues to gradually improve. The recovery in profitability began in the second half of 2023 and continued in the first half of 2024. As suggested in the previous FSR, the materialization of credit risk lost momentum and reduced pressure on provision expenses. In addition, credit net interest income continues to rise, and service revenues reaccelerated. The outlook for the coming periods is that profitability will continue to gradually improve, supported by relatively stable provision expenses, operating expenses under control and growth in revenues, mainly from services.

The banking system remains sound enough to absorb regulatory changes and sustain the regular operation of the economy. Despite the slight

contraction in the first half of 2024, capitalization remains comfortably above regulatory minima. The system (i) held the trend of expansion and improvement in the quality of regulatory capital, through profit retention; (ii) can absorb the improvements in prudential regulation that began to produce effects in 2023. The most significant impact stems from the new procedures for calculating operational risk, for which the capital requirement is expected to increase significantly between 2025 and 2028; (iii) and has sufficient capital margin to continue expanding the credit supply.

Results of various risk analyses and capital and liquidity stress tests continue to demonstrate the resilience of the banking system in all simulated adverse scenarios. Although some banks ended the exercise with capital below the regulatory minimum, the results of the capital stress tests continue to indicate that there would be no material non-compliances. Sensitivity analyses also indicate good resistance to the risk factors simulated in isolation. Liquid assets would be sufficient to absorb potential losses, even in stressed scenarios, and comply with current regulations. The vast majority of FIs remain with adequate liquidity for the regular operation of the intermediation system and the maintenance of financial stability.



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The financial market infrastructures (FMIs)³ contributed to the safe and efficient operation of the markets. The financial system held enough intraday liquidity to ensure the smoothness of transactions in the Brazilian Payments System (SPB). Pix continues to increase its relevance in the SFN and SPB and already represents around 24% of all retail payments. Interbank market settlements took place without any significant occurrences. Credit and liquidity exposures were adequately managed by the central counterparty (CCP) every single day of the period.

The *Conselho Monetário Nacional (CMN)* and the BCB adopted measures that contained the effects of the floods in the southern state of Rio Grande do Sul (RS). The impact on the SFN was smaller than originally expected. The initiatives safeguarded the provision of services by the SFN and avoided unnecessary burdens on citizens and companies. The guidelines for the measures were aimed at preserving financial stability and protecting consumers. No systemically relevant changes in the funding, liquidity, or

credit risk of the supervised entities (ESs) operating in RS are noticed. Specifically in relation to the farming sector, losses from Proagro coverage payments were significantly lower than the losses caused by the droughts of 2022 and 2023. The BCB continues to monitor financial intermediation in the region, with less emphasis, due to the perceived reduction in risks.

Simulation of the implementation of a carbon tax to address climate risk indicates limited impact on the SFN. The impact on FIs' capital would be limited due to the moderate exposure to the sectors most affected by the carbon tax. Losses for FIs would be concentrated mainly in the manufacturing, construction, and transportation sectors due to the increase in problem assets. Agriculture and livestock and transport are the sectors that would reduce value added the most when compared to the scenario without imposing a carbon tax. In the farming sector, despite the high exposure, the proportion of problem assets is low, which explains the lower impact when compared to the other sectors.

A survey by the BCB indicates that the new accounting rules for financial instruments will compel many entities to increase their loss provisions. New accounting concepts and criteria for measuring, recording, and disclosing financial instruments will come into effect on January 1, 2025. The provisioning for expected losses associated with credit risk will

undergo relevant changes in the calculation method and in the scope of instruments subject to it. To assess the impact of the new rules, the BCB surveyed entities responsible for around 80% of the SFN's credit exposures. The entities surveyed estimate an aggregate increase of BRL35.6 billion in provisions. This amount represents 10% of current provisions but will be recorded against capital and will not impact the FIs' results. Despite the impact at the beginning of the transition, the new rules will make the SFN more robust to face future credit risk materializations.

The BCB's assessment of eight systemically relevant institutions found a high level of maturity in the management of technological and cyber crises, but also significant points of concern for financial stability. Among the identified challenges, the following stand out: the performance of cyber exercises to enable institutions to respond in a coordinated manner in the event of systemic crises, the maintenance of staff training to deal with crises, and the need to improve the handling of relevant incidents at third-party providers. In line with these concerns, the BCB intends to develop a series of actions over the next few years focused on improving the operational resilience of the financial sector, in particular awareness-raising actions and the execution of integrated cyber exercises.

³ The FMIs refer to the set of rules, procedures, and operational structure aimed at enabling the exercise of settlement activities, centralized deposit, registration of financial assets or a combination of these activities. The systems and their functions are available at <https://www.bcb.gov.br/estabilidadefinanceira/infrastrukturamercado> (in Portuguese) and at <https://www.bcb.gov.br/en/financialstability/financialmarketinfrastructures> (in English).

Decisions of the Financial Stability Committee on the Countercyclical Capital Buffer

At its 57th and 58th ordinary meetings, on May 28 and 29 and August 27 and 28, 2024, respectively, the Financial Stability Committee (Comef) decided to hold the Countercyclical Capital Buffer for Brazil (ACCP_{Brasil}) at 0% (zero percent).⁴

The Committee deems the SFN prepared to face credit risk materialization. This materialization continues to occur in operations with micro, small, and medium-sized companies; on the other hand, the downward trend in higher risk lines granted to households persists. The Comef judges that the banks' loan loss provisions and their liquidity and capital levels remain adequate. Given reduced exchange rate exposure and low dependence on external funding, the SFN's exposure to financial fluctuations originated abroad is low.

The Comef noted that the credit market has continued to accelerate moderately since the first half of the year, in line with economic activity, which has been showing higher-than-expected growth. The importance of credit obtained via the capital markets is substantial and continues to grow. Given the risks

related to economic activity and to households' and companies' indebtedness, it is important that financial intermediaries preserve lending quality.

Macroprudential policy remains neutral, consistent with periods without significant accumulation of financial risks. The Comef recommends that supervised entities persist with the policy of prudent capital management in view of the economic uncertainties.

The Comef monitors international financial conditions, paying particular attention to the consequences of the path of monetary policy in advanced economies, global financial asset repricing movements, the dynamics of China's real estate market, and global geopolitical events. The Committee remains prepared to act to minimize any disproportionate contamination on local asset prices.

Therefore, considering the financial conditions, asset prices and expectations regarding the credit market behavior, at the 57th and 58th ordinary meetings, the Comef considered it appropriate to hold the ACCP_{Brasil}

at 0% (zero percent). ACCP_{Brasil} increases come into force only one year after the Comef's deliberations. These decisions were made by the Comef in carrying out its duties provided for in the Regulation attached to Resolution BCB 173, of December 9, 2021, and followed the principles and objectives described in Communiqué 30,371, of January 30, 2017.

⁴ Communiqués 41,683, of May 29, 2024 (available, in Portuguese, on <https://www.bcb.gov.br/estabilidadefinanceira/exibenormativo?tipo=Comunicado&numero=41683>), and 42,044, of August 28, 2024 (available, in Portuguese, on <https://www.bcb.gov.br/estabilidadefinanceira/exibenormativo?tipo=Comunicado&numero=42044>).



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I

Assessment of National and International Financial Systems

Dolar	3,464	3,155
Euro	3,7064	3,7085
Ibovespa	67,671	67,659
CDI	9,14%	9,06%

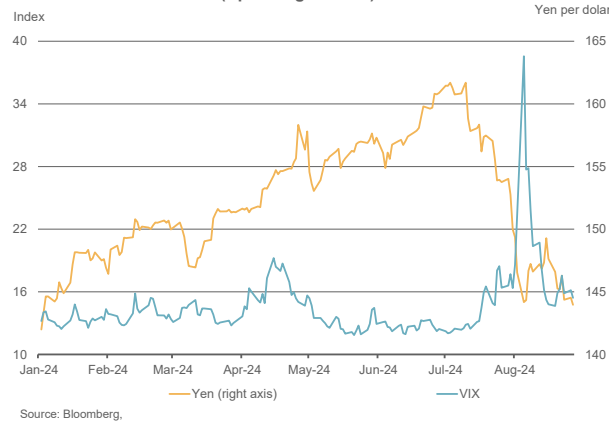
1.1 International financial system

The international financial system continues to show resilience, although pockets of vulnerability remain. In recent years, international financial systems have faced a series of cumulative spillovers and managed to absorb adverse real sector dynamics, stress episodes and uncertainties or surprises about economic policies. As a result, interest rates, asset prices and financial conditions have exhibited significant moves, but authorities have acted effectively to preserve credibility and avoid contagion. Hence, international financial stability has not been impacted. Asset prices remain relatively high compared to historic standards. Credit impulse remains subdued, consistent with moderate economic activity. Liquidity remains adequate vis-à-vis funding needs, although at high rates. Global financial conditions have eased since the last issue of the FSR.

From end-July to beginning of August, international financial markets suffered a severe volatility shock. Changes in monetary policy expectations in relevant economies led to an unwinding of concentrated financial positions and spikes in volatility (Chart 1.1.1). Nevertheless, markets remained functional, asset prices adjusted without any major

contagion or impact on financial systems and, differently from past similar episodes, without the need for liquidity support. That shock is a reminder that correction of unbalances and vulnerabilities can be intense and acute.

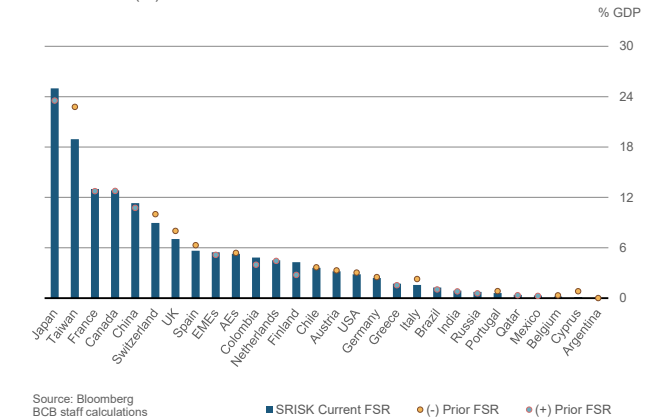
Chart 1.1.1 – Yen and VIX (Up to August 27th)



Since the last FSR, the SRISK indicator⁵ has evolved heterogeneously among assessed countries. SRISK has increased in most emerging market economies (EMEs), mainly due to the rise in financial institutions' liabilities. Inversely, it has declined in most advanced economies (AEs) due primarily to the

rise in financial institutions' market value. Japan and Finland stand out as exceptions among AEs. SRISK is estimated at 5.3% of GDP for AEs and 5.5% of GDP for EMEs (Chart 1.1.2).

Chart 1.1.2 – Systemic Risk Analysis (SRISK)
SRISK/GDP (%)



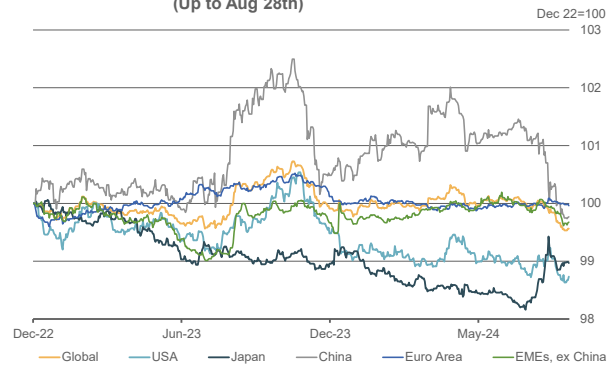
Profitability of most Global Systemically Important Banks (G-SIBs) continues to decline, reflecting falling interest income and increasing provisioning, especially among Chinese G-SIBs. For some G-SIBs, the decline in interest income was partially offset by other sources of income.

5 Indicator that measures the capital shortfall of financial institutions in a global stress event, as discussed in the April 2021 FSR.

Financial conditions in the main economies have improved since the last FSR, although with high volatility and heterogeneity.

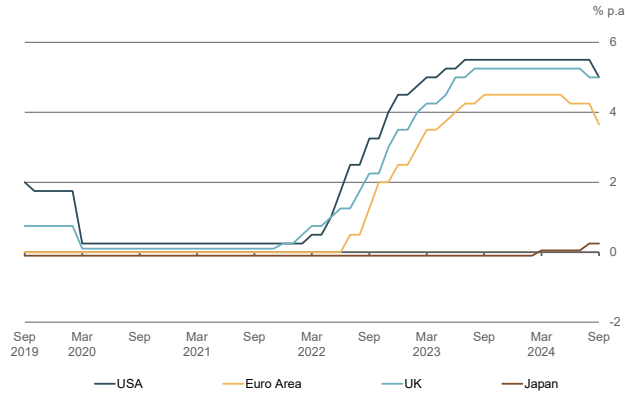
It should be noted that financial conditions have tightened in Japan and quickly eased in China (Chart 1.1.3). Considering the gradual disinflation and rebalancing of global activity, most central banks in the main economies have begun to ease the restrictive stance of monetary policy. Central banks remain committed with the sustainable convergence of inflation to their targets, keeping interest rates on historically high levels (Chart 1.1.4). Uncertainties about the path of monetary policy in AEs, Chinese growth and spillovers of geopolitical tensions remain significant. Although volatile in August, investors' risk appetite regarding EMEs has improved since the last FSR (Chart 1.1.5).

Chart 1.1.3 – Goldman Sachs: Financial Conditions Index (Up to Aug 28th)



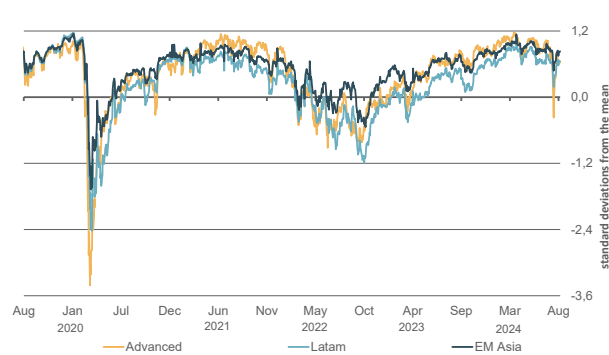
Source: Bloomberg, BCB staff calculations.

Chart 1.1.4 – Monetary policy rates in advanced economies



Source: Bloomberg - up to September 18th

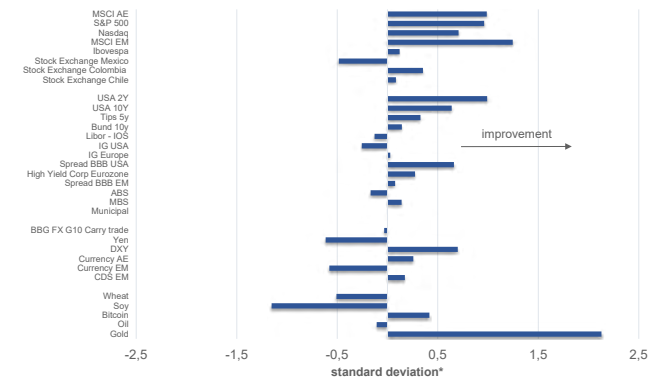
Chart 1.1.5 – Risk appetite indicator (Up to Aug 27th)



Consistent with the decline in long-term interest rate, financial assets in general have had positive performances since the last FSR (Chart 1.1.6).

Most stock exchange indexes have risen, as has happened with the DXY currency index and gold. In the opposite direction, food commodities and EMEs currencies have declined, while the Japanese Yen has appreciated, reverting the depreciation that took place until July.

Chart 1.1.6 – Assets Performance (from last FSR up to Aug 27th)



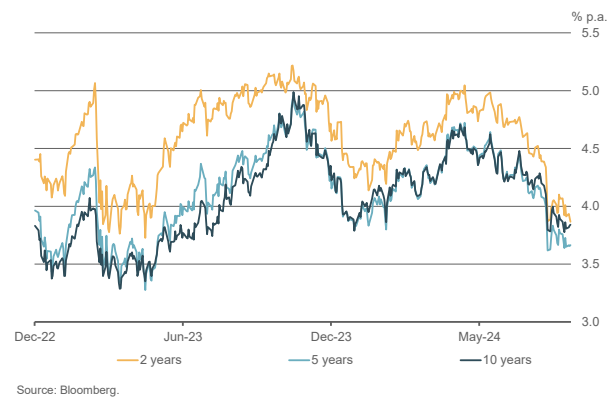
*normalized to the days range in each analysis window.

Sources: Bloomberg, Refinitiv, Fed, St Louis

U.S. long-term interest rates have fallen throughout the year (Chart 1.1.7), as uncertainties about prospective monetary policy have abated.

The yield curve normalized by the end of August.⁶ Interest rate volatility has also declined since the last FSR, although remaining at high levels. Uncertainties about the convergence of inflation to the target, labor market rebalancing, future monetary policy and pricing of risk assets contribute to interest rate volatility. Credit conditions remain tight, declining in some segments, especially those most sensitive to interest rates. Delinquency rates have increased for some types of credit, although remaining relatively low comparing to past levels.

Chart 1.1.7 – US: Long term rates (up to Aug 28th)

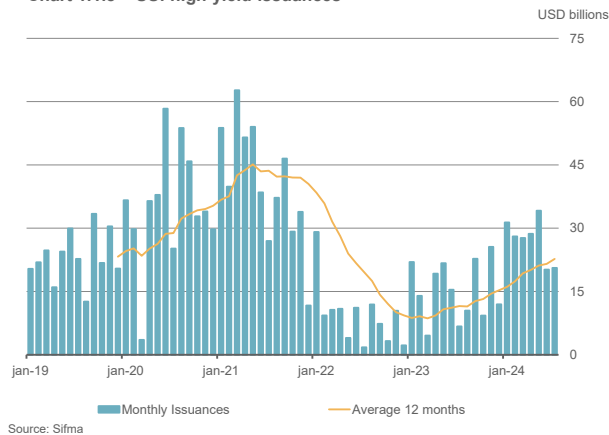


⁶ The 10-2 Year Treasury yield spread was negative between July 2022 and August.

After adjusting in 2023, issuance of high-yield securities in the US has recovered throughout 2024, with the 12-month moving average returning to mid-2022 levels (Chart 1.1.8).

The issuance of mortgage-backed securities has not yet recovered, remaining at the subdued levels registered since mid-2023.

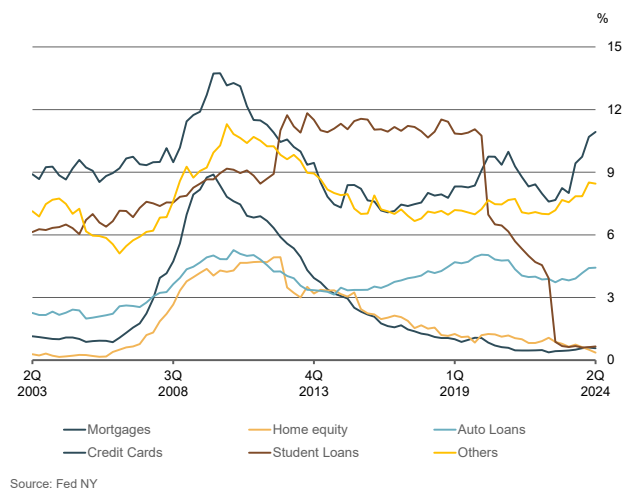
Chart 1.1.8 – US: high-yield issuances



U.S. households' financial conditions remain broadly comfortable, with total debt and debt service levels well below those prevailing during the 2008 financial crisis and unchanged in relation to the pre-pandemic period. Households' savings and liquidity have declined. Delinquency rates are still low, albeit increasing in the recent past,

especially in the case of auto loans and credit cards (Chart 1.1.9). Financial constraints are relatively higher for lower income brackets, which can trigger specific vulnerabilities.

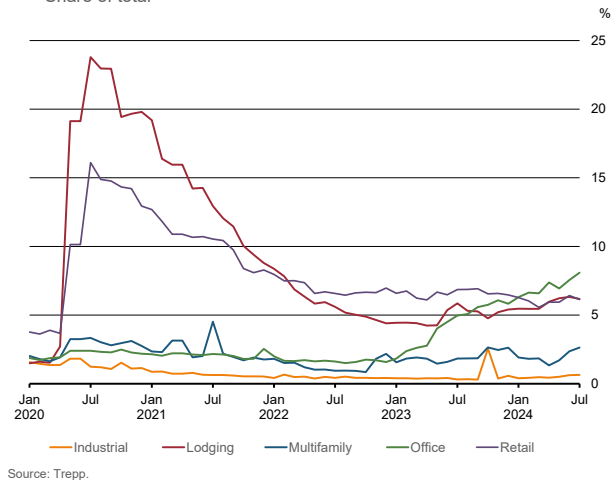
Chart 1.1.9 – US: Loans to households, 90 days past due Share of Total Loans



Commercial real estate loans concentrate corporate credit weaknesses. Structural changes in the sector since the beginning of the pandemic have led to lower demand, lower occupancy rates in some segments and a drop in commercial property prices, which are often used as collateral. Risks have not yet materialized noticeably, although delinquency rates

show a moderate uptick recently (Chart 1.1.10), increasing the likelihood of a longer price correction cycle, impacting investors and intermediaries.

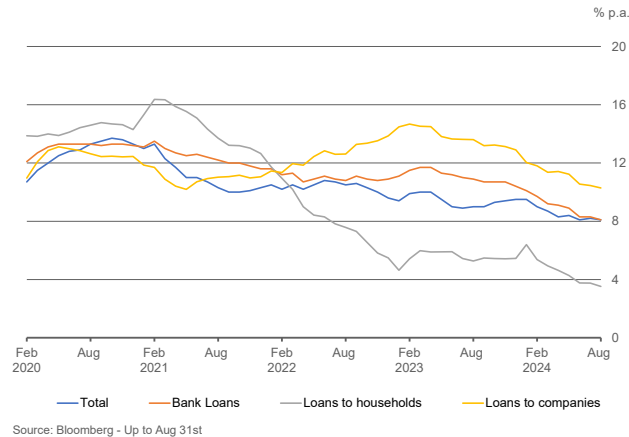
Chart 1.1.10 – US: Commercial mortgage-backed securities (CMBS) – 30 days past due
Share of total



In China, bank credit continues to expand, albeit at a slower pace, and credit costs have declined. The deceleration of credit growth is linked to lower confidence and to the slowdown of consumption and investment, which curbs demand for credit, especially by households. Credit growth is supported by bank loans to public sector entities and non-financial corporations in strategic areas and by issuance of government bonds (Chart 1.1.11). The share of shadow

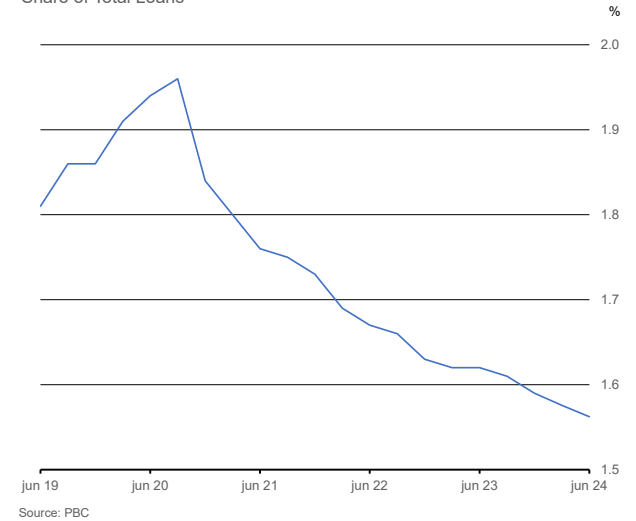
banking instruments in total credit has been declining, reducing financial sector systemic vulnerabilities. Credit has become more inclusive, with the increase in the share of low-value loans for small and medium enterprises. Credit costs have diminished. Interest rates have declined throughout the year, both in the interbanking market and for government bonds, lowering bank loan interest rates for companies and households.

Chart 1.1.11 – China: Financing to the real economy



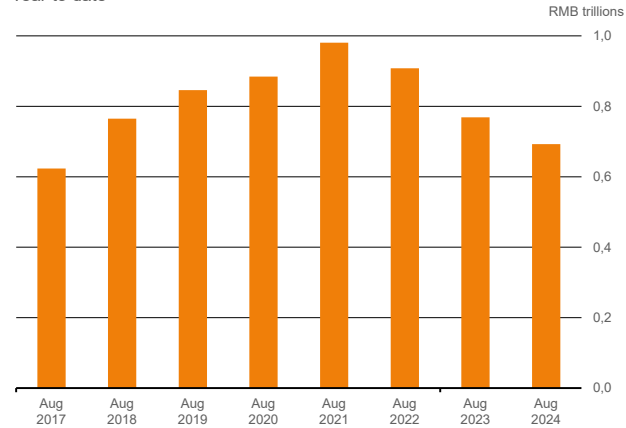
Delinquency rates in the Chinese financial system remains contained, but profitability is subdued. At the end of the second quarter, past due loans reached the lowest rate in 10 years (Chart 1.1.12). Banks' return on assets (ROA) and net interest margins reached the lowest levels since 2011.

Chart 1.1.12 – China: Nonperforming Loans
Share of Total Loans



The real estate sector continues to be China's main economic weakness. The decline in investments in the sector deepened this year (Chart 1.1.13), with reductions in starting and ongoing built area, as well as drops in sales and accumulation of completed but unsold building units. Prices for new homes are falling across all city size ranges and property types. A price adjustment more consistent with a reduction in demand could contribute to speed up the sector structural adjustment.

Chart 1.1.13 – China: investment in real estate development
Year to date



Source: NBS

Since the last FSR, most jurisdictions have maintained unchanged countercyclical capital buffers (CCyB) to strengthen banks' resilience, given an enduring scenario of global financial risks and domestic economic uncertainties, with a few exceptions (Chart 1.1.14).

The prospective global outlook still presents risks that could lead to the materialization of extreme repricing scenarios for global financial assets, despite the recent improvement in financial conditions.

Among these risks, the following stand out: uncertainties about the prospective dynamics of the main macroeconomic variables and the adequacy of policies; long-term interest rate equilibrium levels and the effects from interest rate differentials on exchange rates; expectations about asset prices and the sustainability of corporate and sovereign debt; accumulation of vulnerabilities in both banks and non-bank financial institutions, as well as the increase in the nexus between the two; and increasing concentration in certain assets or certain asset classes. Turmoil or disruptions due to various causes, such as economic, geopolitical and weather-related, can adversely impact capital costs, financing capacity and solvency of more fragile agents. EMEs have largely shown resilience in the face of an adverse external scenario, but risk factors remain. Despite recent improvements, companies and households tend to face historically unfavorable conditions for servicing and rolling over debts in the coming months. Against this background, the efficient management of risks, capital and funding costs is much more important and unevenly more challenging for smaller financial intermediaries or those specialized in niche markets.

Chart 1.1.14 – Countercyclical Capital Buffer (CCyB)



Sources: BIS, ESRB, central banks

The BCB remains vigilant to developments in the international scenario and assesses that the Brazilian financial system exposure to exchange rate risk is low, and dependency on external funding is small. The BCB remains prepared to act to minimize any disproportionate contagion on local asset prices and continues to underscore that macroeconomic policies that increase fiscal predictability and reduce risk premia and asset volatility contribute to financial stability and, consequently, improve agents' ability to keep up with their financial obligations.

1.2 National financial system⁷

1.2.1 Liquidity

The banking system holds sufficient liquid assets to absorb potential losses and prevent systemic crises under stressed scenarios. Faced with slight acceleration in lending growth, FIs maintained their funding growth rates, supported by term deposits. Therefore, the system's liquidity buffer did not present relevant variations, with a wide majority of FIs exhibiting comfortable liquidity levels. Capital structure and longer-term funding remained adequate, without pronounced maturity mismatches between assets and liabilities, indicating the banking system's structural resilience.

Domestic and foreign funding

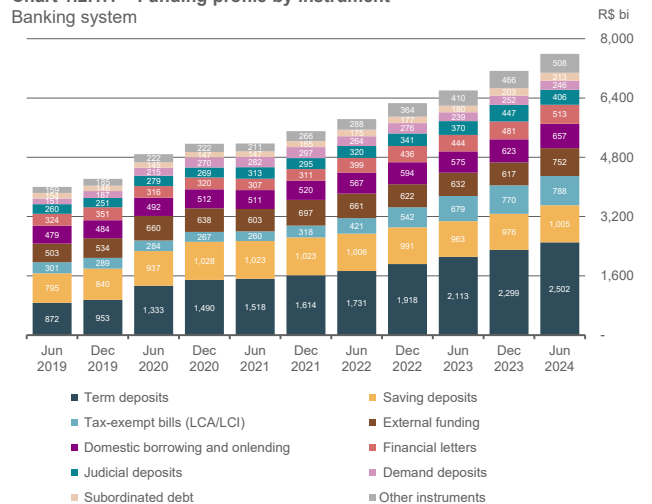
Funding maintained the growth trend observed in recent semesters. The period was characterized by the good performance of term deposits and a reduction in growth rate of tax-exempt instruments. In the semester, we can also highlight the maintenance of similar rates practiced by the various segments. The

foreign market funding supply remained sufficient to meet the demand for export financing.

Even though tax-exempt instruments growth rate decreased, funding continued to grow, supported by term deposits and a slight improvement in savings accounts. In absolute terms, we highlight the growth of term deposits (BRL202.5 billion or 9%). External funding grew by 22%, however most of the increase occurred due to a 15% devaluation of the Brazilian Real in the semester. As predicted in the last edition of this report, there was a decrease in Real Estate Credit Bills (LCI) portfolio growth rates (3% in the current semester, compared to 20% in the previous one) and Agribusiness Letter of Credit (LCA) (2% in the current semester, compared to 9% in the previous one). Despite the attractiveness of these instruments to customers due to their higher yield and tax exemption, and their lower funding costs for Banks, they were affected by the Resolution CMN 5,119, of February 1, 2024, which adjusted eligible collateral types and LCA, LCI and Guaranteed Real Estate Bills (LIG) maturities. Savings accounts registered a discrete growth of 3% in the semester, close to the average yield of the stock in the period. The trajectory

of this instrument remains a concern for real estate credit funding (Chart 1.2.1.1).

Chart 1.2.1.1 – Funding profile by instrument
Banking system



Sources: BCB, [B], CRT4, CERC, CSD-Br

Term deposits: certificates of deposit, receipts of deposit, time deposits with special guarantee by the Credit Guarantee Fund (Fundo Garantidor de Crédito - FGC). Subordinated debt: 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, guaranteed real estate credit bills (LIG), interbank deposits, repurchase agreements (repo) collateralized by private-issued securities.

⁷ The *Liquidity* and *Profitability* sections and the *Liquidity Stress Testing* subsection analyze the banking system, i.e. conglomerates comprised by at least commercial, multipurpose, savings, foreign exchange, or investment banks. The *Macroeconomic Stress Test* subsection includes development banks, in addition to the aforementioned. The *Credit* and *Solvency* sections analyze all SFN segments, including non-banking conglomerates. At last, the *Liquidity* and *Credit* sections and the *Liquidity Stress Testing* subsection narrow their analyses to the financial conglomerate, while the *Profitability* and *Solvency* sections and the *Macroeconomic Stress Test* subsection employ information from the prudential conglomerate in their analyses.

The downward trend in the National Financial System concentration persists. The S1 segment banks, private and public alike, reduced their market share in an annual comparison. On the other hand, the participation of digital FIs increased in the period, driven by the expansion and reachability of digital channels, as well as greater use of online distribution platforms. Meanwhile, funding by type of investor remained practically stable in the period (Charts 1.2.1.2 and 1.2.1.3).

Chart 1.2.1.2 – Funding profile by type of investor
Banking system

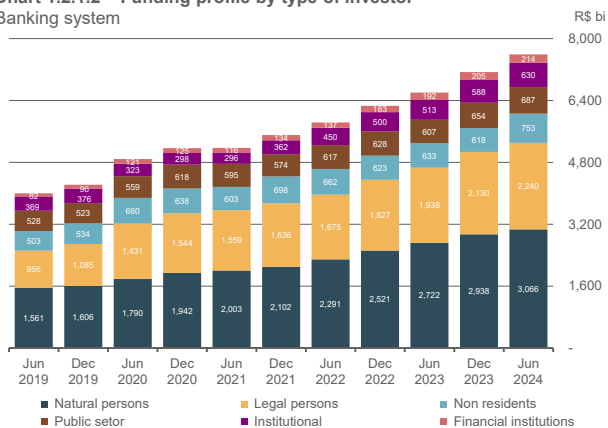


Chart 1.2.1.3 – Funding profile by type of segment

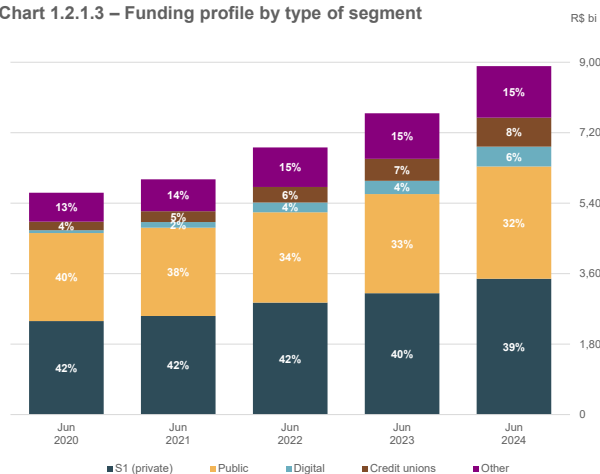
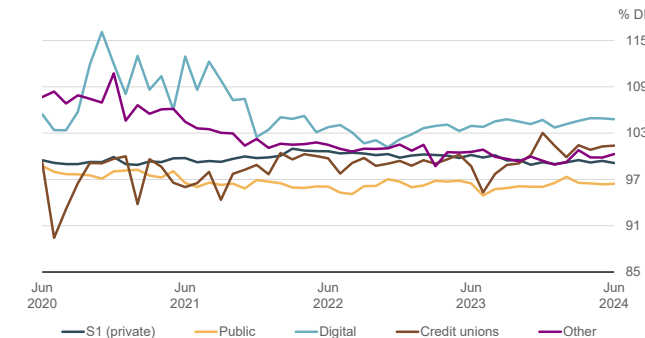
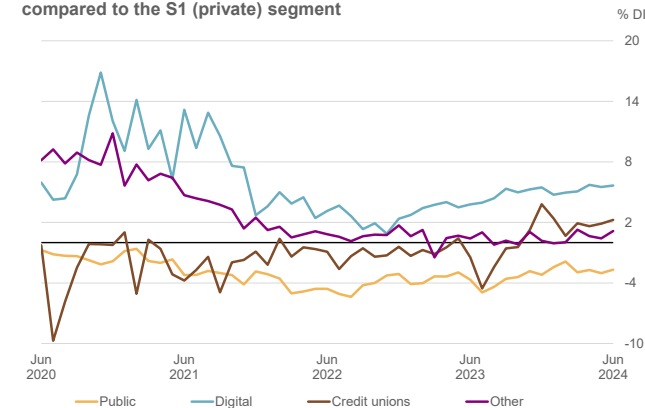


Chart 1.2.1.4 – Monthly average funding rates (*)



(*) Weighted average rate of these instruments: bank deposit certificates, bank deposit receipts, time deposits with special guarantee from the Credit Guarantee Fund (FGC), interbank deposits, agribusiness credit bills, real estate credit bills, financial letters (including with subordination clause), guaranteed real estate bills. Rates below the 1st percentile and above the 99th percentile were excluded from the calculation.

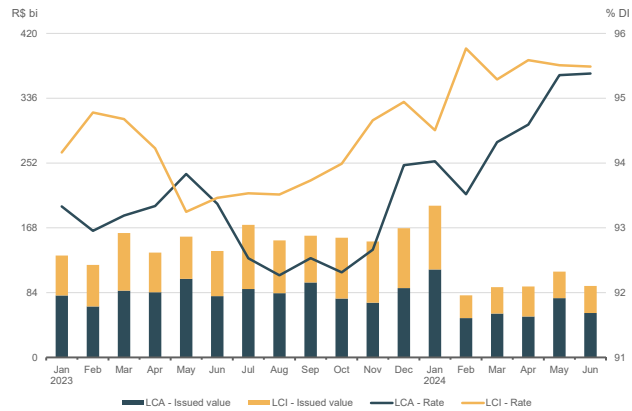
Chart 1.2.1.5 – Difference in monthly average funding rates compared to the S1 (private) segment



Funding rates⁸ practiced by various segments remained stable and close. Funding rate spreads in relation to the Interbank Deposit (DI) rate remained stable for all segments in the semester, except for credit unions, which had a slight decrease. Despite the stability in aggregate funding rates, there was an increase in rates for LCIs and LCAs due to their longer maturity imposed by Resolution CMN 5,119 (Charts 1.2.1.4 to 1.2.1.6).

8 Charts 1.2.1.4 and 1.2.1.5 are generated considering the last registration position of each Financial Institution (FI), which makes it possible for the rates of the same segment and for the same date to vary in versions of this Report generated at different times (an FI may have been reclassified from one segment to another, or it may have been acquired or merged into another FI from a different segment, for example).

Chart 1.2.1.6 – Agribusiness (LCA) and real estate (LCI) credit bills – Monthly average rates and issued values



Funding through investment platforms maintained an upward trend, remaining a relevant distribution channel for smaller institutions. This type of transaction continued to be the main source of funding for a group of smaller institutions and helps explaining the increase in competition and the reduction in rates charged by non-S1 segments in the last periods. Resolution CMN 5,114 was published in December 2023 with the aim of discouraging fund raising by FIs based on the guarantee of the Credit Guarantee Fund (FGC) as its main attractiveness. Considering the group of institutions with more than 70% of funding covered by FGC in November 2023, it was observed that 72% of those entities reduced this percentage, lowering their dependence on the guarantee fund.

Although investment platforms increased the funding capacity for FIs, they also increased pressure on rates through stiffer competition between them and other investment options (Charts 1.2.1.7 and 1.2.1.8).

Chart 1.2.1.7 – Changes in the stock of intermediated funding

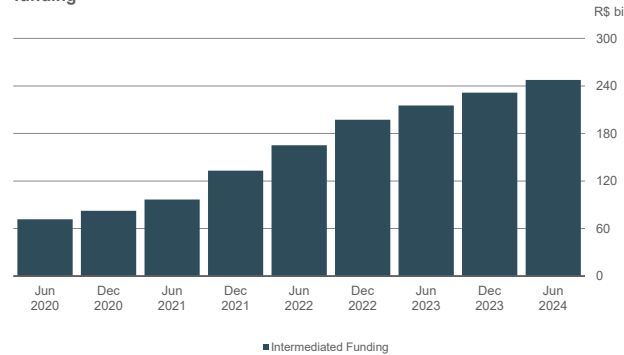
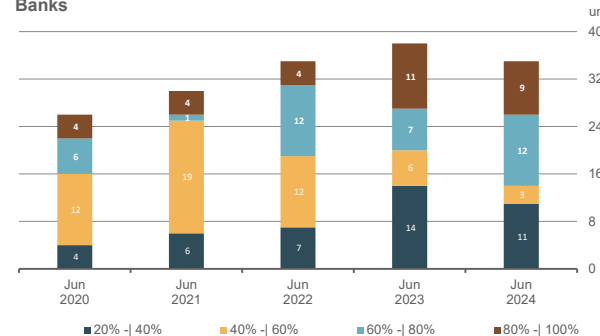


Chart 1.2.1.8 – Intermediated funding - Number of Financial Institutions by dependence of issuer on total funding – Banks



1/ The values on the bars refer to the number of financial institutions belonging to the corresponding interval. Source: BCB (Own methodology), [B]⁹

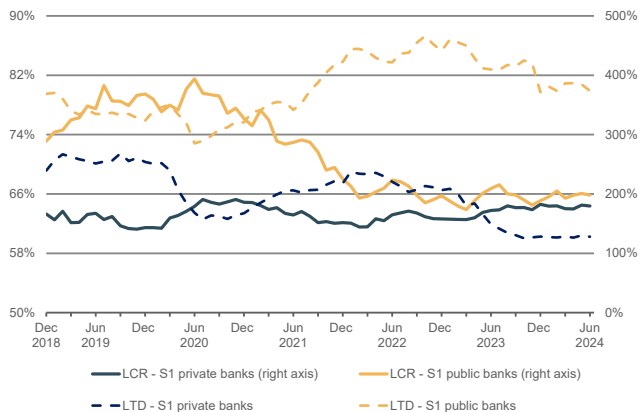
Short-term liquidity

The banking system's liquidity remains comfortable for the regular functioning of the intermediation system and preservation of financial stability. After a period of moderate credit growth, with an ensuing increase in the banking system's liquidity, the FIs accelerated lending growth to families and companies. Faced with this scenario, FIs maintained their rate of funding growth, preserving their liquidity buffers. The S1 segment FIs' regulatory ratios remain solid, with a significant surplus available in case of a stronger growth lending scenario (Chart 1.2.1.9). In another approach⁹ which encompasses all individual FIs – considering the effects of stressed scenarios and bank runs – it is observed the resilience of liquidity in the system as a whole. Although there was a drop on liquidity levels of FIs belonging to the upper quartile, this reduction is due to the resumption of the credit growth (Chart 1.2.1.10).

⁹ This approach considers an asset loss scenario under market stress, deposits run-offs and the withdrawal of the main depositors (concentration risk) in the calculation of a single indicator. It is named Short-Term Liquidity Ratio (IL), metric that covers the entire financial system and measures whether banks have sufficient liquid assets to cover its short-term cash outflows (subsequent thirty days) under a hypothetical stressed scenario, defined and calibrated by the BCB. These resources outflows arise from the possibility of redeeming funding maturing under the next 30 days or with immediate liquidity, exposures to market risk such as margin calls and daily derivative adjustments and still, other scheduled contractual outflows. For an overarching understanding of the metric, see the Concepts and Methodologies annex.

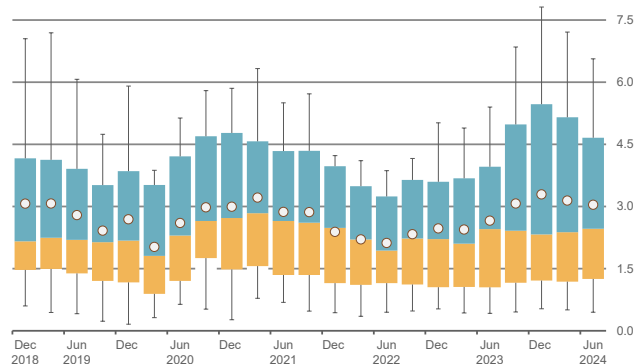
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Chart 1.2.1.9 – Liquidity Coverage Ratio (LCR)^{1/} and Loan-to-Deposit Ratio (LTD)^{2/}
Public vs. private banks



1/ Monthly average of daily data. Aggregated data of 6 FIs belonging to the S1 prudential segment.
2/ Quarterly moving average. Accounting data.

Chart 1.2.1.10 – Short-term Liquidity Ratio
Banking System, statistic data from individual conglomerates^{1/}



1/ The Short-term Liquidity Index is capped at the level of the 80th percentile in each month, after capping each index the statistics are calculated. The values along the box and whiskers refer to the percentiles 10%, 25%, 50%, 75% and 90% respectively. The mean is represented by the circles.

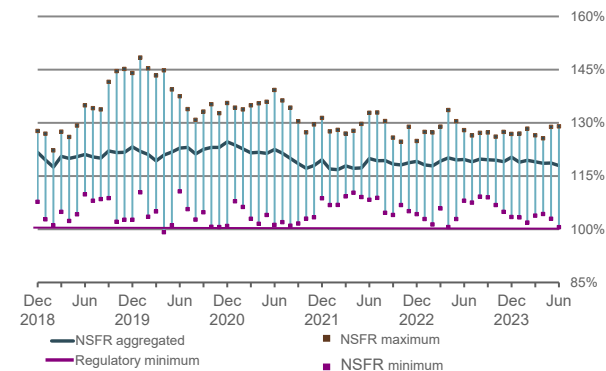
Long-term liquidity

FI's funding structure remains compatible with financing long-term assets, indicating that there are no mismatches between maturities of assets and liabilities.

The banking system's structural liquidity refers to FI's capacity to maintain a sustainable balance between assets and liabilities over time, avoiding excessive dependence on short-term funding sources. The Net Stable Funding Ratio (NSFR)¹⁰ is a regulatory ratio aimed at mitigating those risks. The regulatory compliance with the NSFR by the FIs in the S1 segment indicates a prudent management of banking liquidity (Chart 1.2.1.11). A simplified calculation of the NSFR, applied to all conglomerates individually, using the Structural Liquidity Ratio¹¹ (ILE, in its Portuguese acronym) reveals a lack of significant variation on the FIs' capacity to fund their activities (Chart 1.2.1.12). Although conditions worsened at the lower end of the ILE's distribution (10th percentile), the vast majority of institutions have enough liquidity

in their balance sheets to finance a potential acceleration in credit growth.

Chart 1.2.1.11 – Net Stable Funding Ratio (NSFR)
High, low and aggregated^{1/}

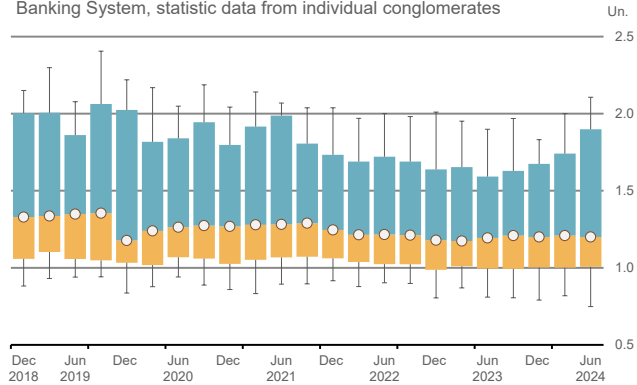


1/ NSFR and ILE data series comprise institutions classified in the prudential segment S1 (currently 6 banks).

10 The NSFR was implemented in Brazil by Resolution CMN 4,616, of November 30, 2017, with its methodology given by Circular BCB 3,869, of December 19, 2017, having started its effects from October 1, 2018. It is an indicator that corresponds to the ratio between the amount of Available Stable Funding (ASF) and the amount of Required Stable Funding (RSF). The numerator is mainly composed of regulatory capital and stable funding, and the denominator of credit portfolio. All FIs classified in the S1 segment must comply with the regulatory minimum requirement of 100% under the terms of the art. 2 of Resolution CMN 4,553, of January 30, 2017.

11 The Structural Liquidity Ratio (ILE) aims to measure whether banks have sufficient sources of stable funds (numerator) to finance their long-term assets (denominator). It expands the concept of the NSFR applied only for the institutions belonging to the S1 segment, to all banking financial institutions. Therefore, institutions with a ratio equal to or greater than 1 (or 100%) present smaller long-term maturity mismatches between assets and liabilities, remaining less subject to future liquidity problems. For details on the definition of the metric, refer to the Concepts and Methodologies annex.

Chart 1.2.1.12 – Structural Liquidity Index^{1/}
Banking System, statistic data from individual conglomerates



^{1/} The Structural Liquidity Index of each FI is capped at the level of the 80th percentile in each month, after capping each index the statistics are calculated. The values along the box and whiskers refer to the percentiles 10%, 25%, 50%, 75% and 90% respectively. The mean is represented by the circles.

1.2.2 Credit^{12,13}

Introduction

Financing to the real economy accelerated again, in line with economic activity, which had presented growth above expectations. For household bank credit, acceleration was more pronounced in vehicle and non-payroll deducted credit portfolios.

For companies, the upturn was driven in particular by large companies, which also benefited from the high growth of the capital markets, which continued to gain ground as a relevant funding source.

Despite favorable economic signs, companies' and households' paying capacity remains challenging.

The labor market has been highly dynamic recently, with favorable evolution of occupation level, unemployment rates and income. Even in this environment, household debt service to income ratio remains at an elevated historical level. In the case of companies, the recent dynamism of commerce, services and industry shows that, in terms of business activity, companies are also benefiting from growth cycle, however they are facing financial challenges, like exchange rate devaluation on the first semester, which impacted the financial balance sheets of some large companies, and the new cycle of interest rate hikes, which tends to impact financial balance sheets by increasing debt service.

FIs risk appetite had a slight elevation on semester. Regarding households, in addition to the almost generalized reacceleration in all credit facilities, there was some easing in credit grant standards, especially in vehicle financing. For companies, credit growth rate

increased, but credit grant standards weren't significantly changed. Facing the risks related to economic activity, household debt service to income and indebtedness of household and smaller companies, the environment continues to demand the preservation of credit grant standards.

Risk materialization for households tends to remain stable over the coming months.

For them, the effect of credit portfolio growth led to a small reduction in the percentage of problem assets for all facilities, except for rural credit. The current expectation is the maintenance of materialization, given the balance between positive (such as an improvement in the products mix and a heated economic activity) and negatives factors (a still elevated level of household debt service to income ratio and a slight worsening in credit grant standards) that could affect the credit portfolio. For MSMEs, the level of risk materialization should remain relatively stable, with no signs of reversal in short term, given the maintenance of recent credit grant standards. Large companies kept a downward trend of risk materialization, and this movement is expected to continue, as credit losses write-offs tend to exceed new problem assets. It should be noted that financial agents reduced again

¹² Throughout this section, when we talk about bank credit or credit portfolio, we are referring to the domestic bank credit portfolio.

¹³ Regarding bank credit, numbers presented here can differ from those in time series from BCB because the data source is the credit outstanding balance from identified clients in SCR.

the importance of delinquency and economic activity risks, in line with economic performance.¹⁴

Provisions remained above the expected credit losses estimated for the credit portfolio. The stock of provisions is in line with the expected risk materialization, remaining at an adequate level to support expected losses in the credit portfolio, estimated by the BCB based on proprietary models of Probability of Default (PD) and Loss Given Default (LGD), applied to the SCR data.

Broad credit and long run trend

The broad credit-to-GDP ratio increased the distance to its long-term trend due to the reacceleration of the credit market. The broad credit-to-GDP gap¹⁵ kept expanding in the first semester of the year, mostly due to capital markets (Chart 1.2.2.1). This source of funding is expected to remain the main driver of the gap increase, given the perspective of further development of this market in the economy. It should

also be noted that, historically, SFN had a significant share of the capital markets, a fact that did not change with the recent growth of this market (Chart 1.2.2.2).¹⁶

Chart 1.2.2.1 – Broad credit-to-GDP gap – Without FX variation
Shaded area: forecast

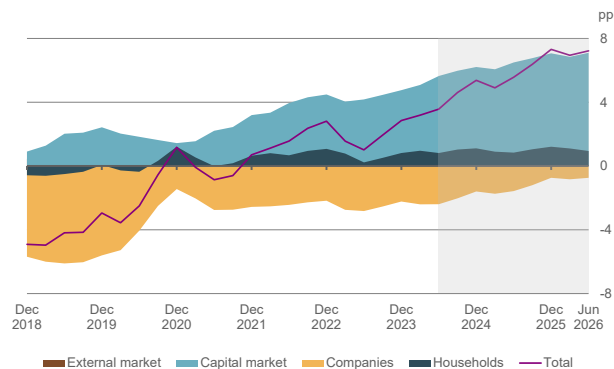
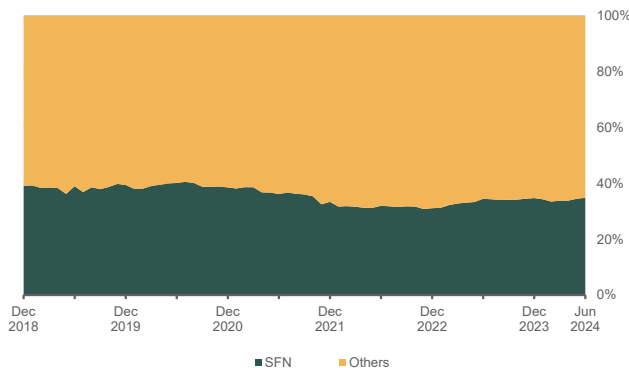


Chart 1.2.2.2 – Capital market Share



The growth projection of the broad credit-to-GDP gap demands attention, in a cycle¹⁷ where credit accelerated again, in line with the economic activity. Moreover, other factors should also be considered in the analysis of the credit growth cycle: even though the broad credit-to-GDP gap is the reference indicator proposed by the Basel Committee on

¹⁴ See item 1.3. Financial Stability Survey.

¹⁵ The broad credit-to-GDP gap only considers credit to the non-financial private sector.

¹⁶ Credit outstanding classified as “SFN” was that identified as (i) directly held by FIs (ii) held by funds prudentially consolidated, or (iii) indirect exposition held by FIs to funds not prudentially consolidated.

¹⁷ Market players themselves have different opinions about where we currently are in the credit cycle (see item 1.3 - Financial Stability Survey: despite many answers considered the broad credit-to-GDP gap high, most answers considered it stable or in a downward trend; furthermore, there is a significant volume of survey participants that consider the broad credit-to-GDP gap as “low and in a downward trend”).

Banking Supervision (BCBS) to support CCyB¹⁸ decisions, the BCBS itself do not advise the mechanical use of this indicator, even with empirical evidence of its predictive power, as this metric shows limitations that are particularly important for emerging economies. There are documented cases, especially in these economies, where jumps due to economic factors or statistical revisions impacted the broad credit-to-GDP gap for long periods (around 10 years), according to simulations made by researchers cited by the BIS.¹⁹ The authors of this paper warn about the impact of these events in the broad credit-to-GDP gap signaling function, which should be understood before the series is used in the context of the countercyclical capital buffer. In this sense, it should be noted that the recent development of capital markets in Brazil after legal and regulatory changes is an event that potentialized the growth of the broad credit-to-GDP gap, either by the expansion and consolidation in the market of instruments like debentures (especially

those with tax benefits), or by the possibility of capturing new information for Rural Bonds (CPRs),²⁰ for instance. Hence, despite current and prospective broad credit-to-GDP gaps at values that demand attention, and an undeniable credit growth, the previous counterpoints regarding capital markets and their impacts on the broad credit-to-GDP gap calculation must be considered when evaluating the current credit cycle.

Companies

The payment capacity remained challenging for SMEs in the first half of the year, and, for large companies, it was affected by indicators with opposing signs. For publicly traded companies, the greater than expected dynamism of economic activity indicators and of sectors such as commerce and services had a positive influence on the increase in revenues and Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA), meaning that, despite the

drop in margin, profitability is better than a year ago (Chart 1.2.2.3). However, currency devaluation and the increase in indebtedness had greater impacts on the financial results of some companies, especially in the second quarter, leading to a drop in the interest coverage ratio and an increase in the Net Debt/Ebitda ratio, with current levels of these indicators worse than those seen in June 2023. This scenario has also led to an increase in the volume of judicial recovery requests for large companies, but at a slower pace and further from the worst recent year (Chart 1.2.2.4). However, symptoms of a still challenging situation for MSMEs' payment capacity include the growing volume of judicial recovery requests in 2024 (Chart 1.2.2.5) – albeit a low percentage in relation to the total number of active companies, but the worst year in the historical series – as well as the current level of risk materialization. Overall, the perception that companies' leverage is high remains predominant among SFN institutions, although the leverage of large companies

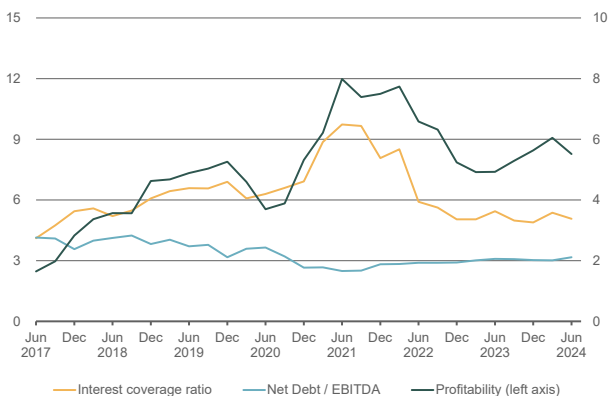
18 Broad credit-to-GDP gap could signal excessive credit growth, which in turn could result in sudden corrections with detrimental effects on financial stability. Drehmann, M., Borio, C., and K. Tsatsaronis (2011). Anchoring countercyclical capital buffers: the role of credit aggregates, BIS Working Papers 355. Drehmann, M., and Juselius, M. (2011). Evaluating early warning indicators of banking crises: Satisfying policy requirements, BIS Working Papers 421. Drehmann, M., Tsatsaronis, K. (2014). The credit-to-GDP gap and countercyclical capital buffers: questions and answers, BIS Quarterly Review. BCBS (2010). Guidance for national authorities operating the countercyclical capital buffer. As highlighted in REF of April 2016 (box "additional countercyclical main capital"), the ACCP_{Brasil} is not defined based on one indicator or even on a collection of pre-established indicators.

19 Drehmann, M., and Tsatsaronis, K. (2014). The credit-to-GDP gap and countercyclical capital buffers: questions and answers, BIS Quarterly Review.

20 Resolution CMN 4,927, of 2021, established a phase-in in the registration of Rural Product Notes (CPR) that was only completed in 2023. Before 2021, calculations made here captured only CPRs held by FIs; even after this date, only CPRs required to be registered were captured. Therefore, when we include CPR in the credit-to-GDP gap calculation, we capture the growth of the product as well as the growth of its registration and data availability, leading to a break in the series considered.

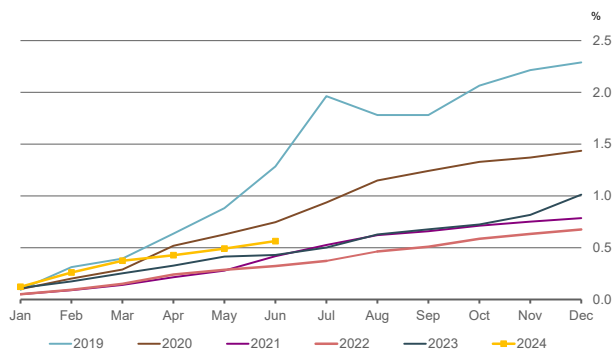
did not increase prominently in 2024 and is at lower levels than the pre-pandemic ones (Chart 1.2.2.3 – “Net Debt/Ebitda” line).²¹ The improvement of this scenario will depend on the conjunction of factors related to a more dynamic economic activity vis-à-vis possible adverse financial impacts – such as the new cycle of interest rate hikes, which will pressure companies’ payment capacity – and, because this scenario has heterogeneous impacts among companies of different sizes and sectors, there is a no clear defined trend for companies’ payment capacity as a whole.

Chart 1.2.2.3 – Financial-economic indicators (medians)
Publicly traded companies



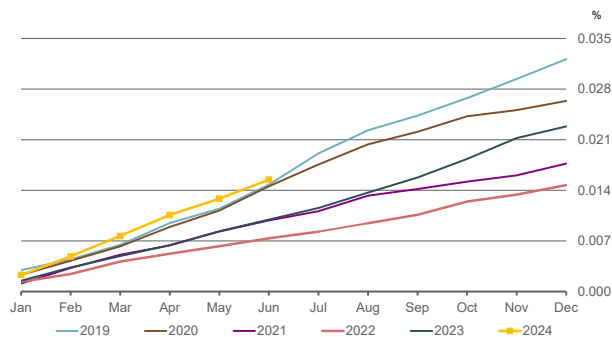
21 See item 1.3 – Financial Stability Survey.

Chart 1.2.2.4 – Corporations in judicial recovery
Large Companies - Cumulative requests by year^{1/}



1/ Ratio between the total number of requests per year (Source: Serasa Experian) and the total number of active companies in the economy (with some flow of TED, boleto, PIX, cards, or export receipts in the last three months, according to the methodology used in section 2.2 Stress Test - Covid, REF October/2020, available at <https://www.bcb.gov.br/content/publicacoes/ref/202010/RELESTAB202010-refPub.pdf>).

Chart 1.2.2.5 – Corporations in judicial recovery
MSME - Cumulative requests by year^{1/}



1/ Ratio between the total number of requests per year (Source: Serasa Experian) and the total number of active companies in the economy (with some flow of TED, boleto, PIX, cards, or export receipts in the last three months, according to the methodology used in section 2.2 Stress Test - Covid, REF October/2020, available at <https://www.bcb.gov.br/content/publicacoes/ref/202010/RELESTAB202010-refPub.pdf>).

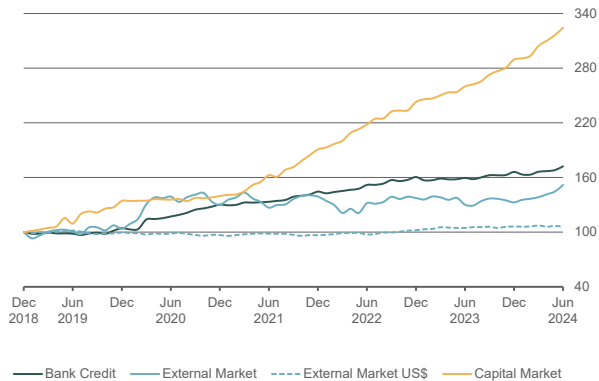
The domestic corporate debt market continued to gain prominence as a relevant source of financing in broad credit, especially for large companies.

Debentures remained the most representative instrument in the capital market, with their volume driven by high inflows from fixed-income funds and many companies taking advantage of high liquidity for ordinary management, infrastructure investment, or debt payments.²² The stocks of Real Estate Receivables Certificates (CRIs), Agribusiness Receivables Certificates (CRAs), and Credit Rights Investment Funds (FIDCs) continued to grow at rates higher than those observed in the same period of the previous year – for the first two, the changes made to the issuance rules²³ had little effect on the dynamism of the instruments. The stock of Commercial Notes/Promissory Notes, which had been slowing down in 2023, resumed its growth, especially in the second quarter. Overall, the capital market is expected to continue showing high growth rates due to the expansion of liquidity in the market combined with the greater economic dynamism, despite a higher basic interest rate. On the other hand, foreign funding by companies remained stable in dollars but suffered an impact in Brazilian reais due to the currency devaluation in the first semester (Chart 1.2.2.6).

22 *Boletim de Mercado de Capitais* (Source: Anbima).

23 Resolution CMN 5,118, of 2024.

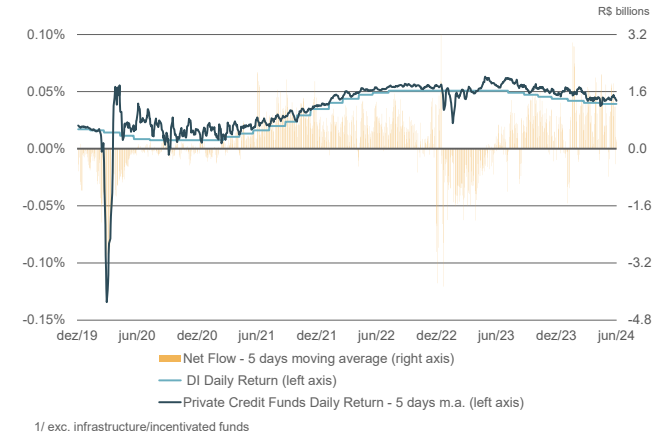
Chart 1.2.2.6 – Corporate Indebtedness
Dec/2018 = 100



Corporate debt funds present relevant inflow in a scenario of reduced spreads. Investment funds, more specifically corporate debt funds,²⁴ are important holders of domestic corporate debt. After the effects of the Americanas case, from mid-2023, securities spreads narrowed, raising profitability and promoting corporate debt fund inflows (Chart

1.2.2.7). The inflows of these funds are correlated with the returns, which in turn depend on the spreads of the securities in their portfolios. In the pandemic and in the case of Americanas, there was a significant and abrupt increase in securities spreads, reducing fund returns, causing waves of redemptions, which were attended with the sale of their portfolio securities. Events of this nature, in addition to generating losses for the holders of these securities, tend to hinder the realization of new corporate securities issues, obstructing access to an important source of financing for companies. With the learning of crises, instruments were developed and improved by the BCB, contributing to the increase in the depth of the corporate securities market.²⁵ Additionally, it is worth mentioning that these funds, following large recent inflows, have increased the allocation in liquid assets (Federal Public Securities – TPFs – and reverse repos), thus reducing their liquidity risk.

Chart 1.2.2.7 – Return and net flow
Private credit funds ^{1/}



Companies bank credit²⁶ has accelerated again, especially for large companies. The first half of 2024 was marked by an increase in the growth rate of bank credit to companies, more significantly in the second quarter (Chart 1.2.2.8). The acceleration was more pronounced for large companies, whose annual

²⁴ Corporate debt funds are defined as fixed income financial investment funds governed by Resolution CVM 175, of December 22, 2022, that have the expression “private credit” in their name and that possess more than 50% of the portfolio composed of corporate debt securities. The Supplement B of the same Resolution CVM describes corporate debt as debentures, promissory notes, commercial paper, export note, CCB, CPR, WA, NCA, CDA and CDCA.

²⁵ During the pandemic, the CMN and the BCB implemented measures to increase liquidity and normalize markets, including corporate debt market. More details at: https://www.bcb.gov.br/content/publications/financialstabilityreport/202004/fsrSection2_2.pdf. With the increase in securities issued by private entities, BCB has also started to offer specific credit lines for institutions’ liquidity, called Financial Liquidity Lines (LFL). More details at: <https://www.bcb.gov.br/en/financialstability/liquidityfacilities>.

²⁶ Anticipation of receivables from acquirers and similar institutions with financial institutions (FIs) are not considered here.

growth rate exceeded those of the last quarter of 2022, with foreign trade operations and infrastructure / project financing standing out. In the segments of micro and small-sized companies, credit grant continued to be heavily influenced by emergency credit programs,²⁷ but while the former had marginally high growth rates, the latter advanced more clearly in the semester. Medium-sized companies had growth rates with a slight increase in the semester, at levels lower than a year ago, especially in terms of investment and infrastructure / project financing credit modalities. In terms of financial institution (FI) segments, the credit portfolio of private banks in the S1 prudential segment once again grew in positive territory, still at a low level, while public banks expanded their growth rates; both movements are relevant for credit to companies, as these segments together account for more than 70% of bank credit to companies (Chart 1.2.2.9). Digital entities and credit unions remained the segments with the greatest expansion in their portfolios.²⁸ In general, the financial institutions

themselves pointed out that credit supply conditions were more flexible in the second quarter of 2024 for all company sizes.²⁹

Chart 1.2.2.8 – Bank Credit
Annual growth

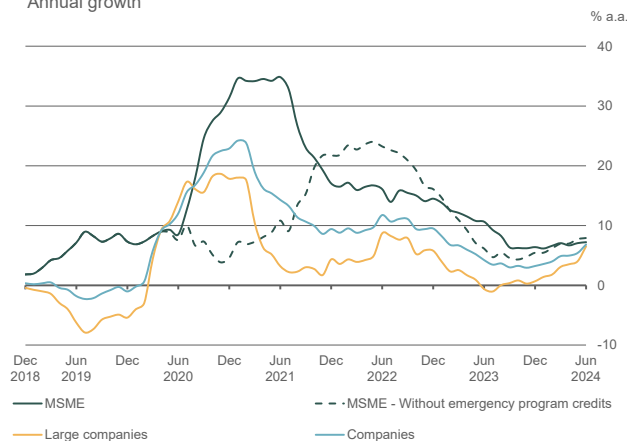
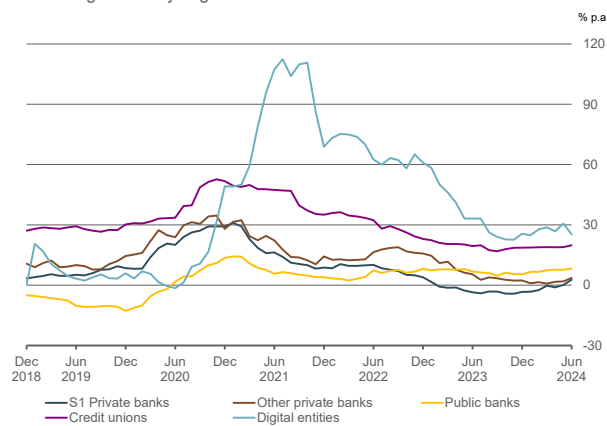


Chart 1.2.2.9 – Bank Credit
Annual growth - By segment



The risk appetite of financial institutions did not change significantly in the first half of the year.

There were no relevant changes in the quality^{30,31,32} of credit granted to MSMEs, although there was some decompression in the margin (Chart 1.2.2.10). Despite lower growth rates, but still in positive territory, than

27 Mainly the National Program to Support Micro and Small Enterprises (Pronampe).

28 Despite the high growth, the portfolio of the Digital segment still has little representation and, in June 2024, accounted for about 1.5% of the total credit portfolio for legal entities.

29 See “Pesquisa Trimestral de Condições de Crédito (PTC) – Resultados de junho de 2024”, available at <https://www.bcb.gov.br/content/publicacoes/ptc/202406/RelatorioPTC-Junho2024.pdf>

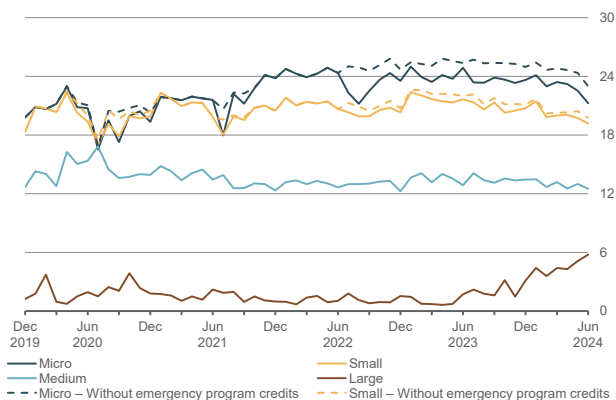
30 Specifically for micro and small enterprises, when disregarding the operations of emergency credit programs.

31 The credit granting average score is a measure that quantifies the credit risk of new granting in the reference month, determined by a proprietary statistical BCB model. The higher the score, the riskier the operations.

32 For companies, the model is based on borrowers' variables. The scores of micro, small, and medium-sized companies cannot be directly compared, given that different models were used to generate them. For large companies, the variable is the percentage of the credit granting for companies that either are already deteriorated or with a high chance of deteriorate within a period of three months.

those seen in recent years for MSMEs, the market itself does not see a significant change in this general scenario in the short term, since there is an indication of a still flexible credit supply pattern for smaller companies. For large companies, the deterioration in the quality of credit granted was due to idiosyncratic events of specific borrowers, with no generalized effects yet, and financial institutions indicate lower demand for credit and conditions almost in restrictive territory of supply in the short term, probably due to greater concern about delinquency in the market.³³

Chart 1.2.2.10 – Credit granting average score
By company size



33 Regarding the expectations of credit supply and demand by company size for the next quarter, see “Pesquisa Trimestral de Condições de Crédito (PTC) – Resultados de junho de 2024”, available at <https://www.bcb.gov.br/content/publicacoes/ptc/202406/RelatorioPTC-Junho2024.pdf>

The credit risk materialization continued to show signs of stability in the margin for MSMEs and is expected to remain so. Despite the growth in problem assets (PA) percentages during the semester for smaller companies, there was some stability in the latest observations, while large companies continued the trend of reducing PA percentages due to write-offs and a more pronounced increase in the portfolio (Chart 1.2.2.11). This movement among large companies helped to reduce the materialization of risk, especially in the Private – S1 segment (Chart 1.2.2.12), while the credit unions were more affected by the increase in materialization amongst smaller companies. Prospectively, the unchanged credit granting criteria and the slight variation in the probabilities of default of the non-problematic portfolio^{34,35} suggest that the risk materialization should remain at similar levels to the current ones for MSMEs (Chart 1.2.2.13). For large companies, the expectation is that the risk

34 The probability of default (PD) is a measure that quantifies, for operations in the portfolio that are not problem assets, the percentage that would migrate to default (here defined as entering in PA). This measure is based on the scores of each credit operation, which are used for risk ranking. The default rate for portfolios of the same risk in the recent period is then taken as the default estimate for that risk group. It is therefore a non-conditional estimate on the economic cycle and, by construction, depends on the recent performance of same-risk portfolios.

35 For companies, the calculation is made at the borrower level, considering a 12-month horizon for MSMEs or a short-term PA projection for large companies.

materialization will continue to decline as write-offs continue to exceed new entries in PA.

Chart 1.2.2.11 – Problem Assets
By company size

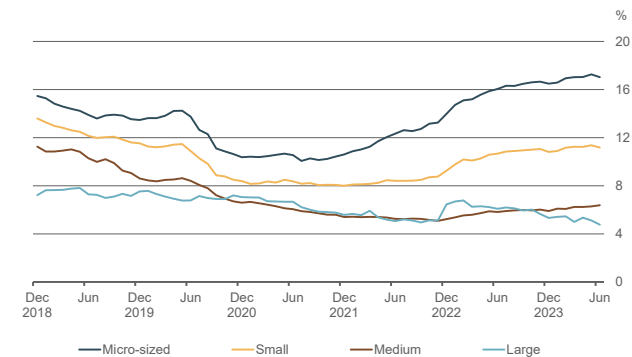


Chart 1.2.2.12 – Problem Assets
By segment

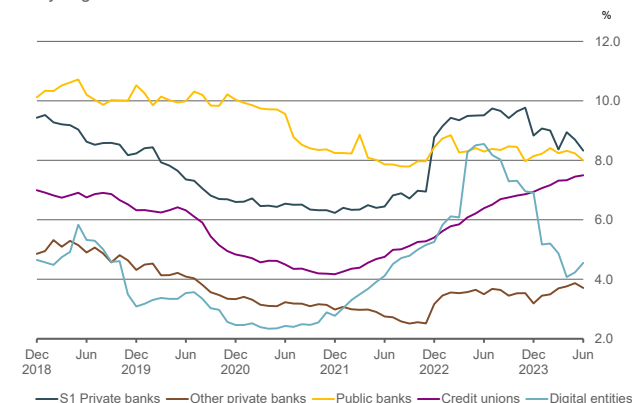
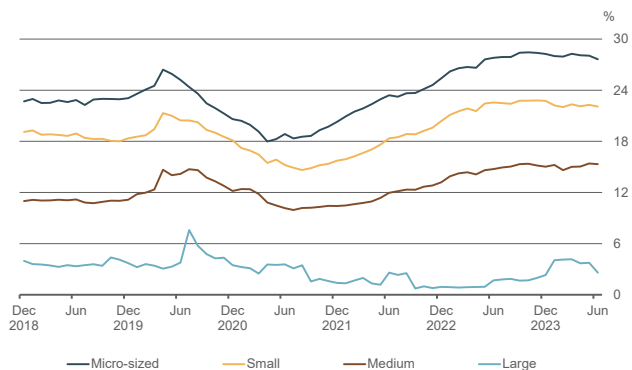


Chart 1.2.2.13 – Credit Outstanding –Probability of default
Performing loans - By company size



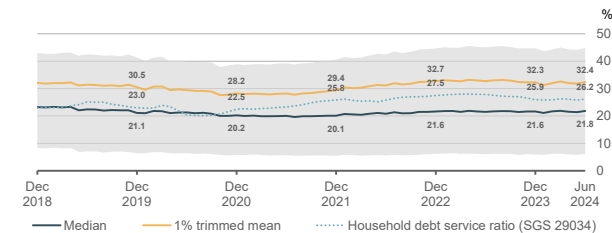
ratio (DSTI),³⁶ based on data for each borrower reported in SCR, showed relative stability in first semester of 2024 (Chart 1.2.2.14), at historical levels that are still high, a fact that can also be observed among the most diverse income brackets (Chart 1.2.2.15). This occurred regardless of a favorable economic context, where there was an improvement in income, unemployment rate and a level of economic activity that surprised positively. Regarding household indebtedness, the distribution of Individual Indebtedness of SFN credit borrowers decreased in the first half of 2024 (Chart 1.2.2.16).³⁷ Prospectively, the current cycle of rising gross household income and wages increasing above inflation should continue to bring positive impact on household payment capacity in the coming quarters, which is already noticeable by economic agents at the margin.³⁸

Households

Despite the greater-than-expected dynamism in the labor market and economic activity, household payment capacity still requires attention.

The distribution of individual debt service-to-income

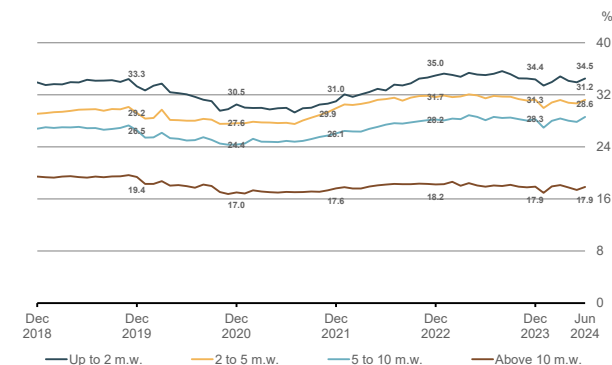
Chart 1.2.2.14 – Individual debt service-to-income ratio^{1,2}
Interquartile range – Seasonally adjusted



¹ The interquartile range, the median and the 1% trimmed mean refer to the distribution of the individual debt service-to-income ratio of SFN borrowers. For this calculation, borrowers with credit outstanding lower than BRL200 or with debt service only in credit card purchases or credit card installments financed by merchants were excluded. For the calculation of debt service, credit card purchases or credit card installments financed by merchants were not included.

² The household debt service-to-income ratio, SGS time series 29034 of BCB, is an aggregate measure that compares the debt service of SFN borrowers to the restricted households gross disposable national income. For this measure, credit card installments financed by merchants are included in the debt service.

Chart 1.2.2.15 – Individual debt service-to-income ratio
1% trimmed mean – By income bracket – Seasonally adjusted

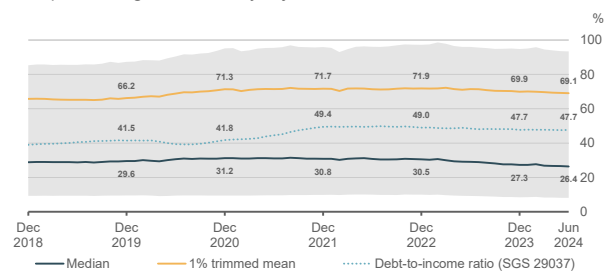


36 As displayed at Selected Theme 2.2 “Indebtedness and income commitment of credit borrowers” from FSR of October 2021, indebtedness and debt service-to-income measures can be calculated for household as whole (on an aggregate basis) or individually, considering data from each credit borrower. Calculation on aggregate basis compare total debt service to households gross disposable national - restricted (see Time Series 29034). Concerning calculations of individual metrics, see “Concepts and Methodologies” at the end of this report, items “g”, “h” and “i”. For a better understanding of the difference between metrics, see notes 1 and 2 of Chart 1.2.2.14.

37 About Individual indebtedness methodology, see notes 1 and 2 of Chart 1.2.2.16.

38 See item 1.3 – Survey of Financial Stability, where market agents consider that, although still high, there is a greater perception of downtrend in household indebtedness. Likewise, Quarterly Survey of Credit Conditions (PTC) of June 2024 for the segment “household consumption” brings a perception of improvement in the level of the household debt service-to-income ratio.

Chart 1.2.2.16 – Individual debt-to-income ratio^{1,2}
Interquartile range – Seasonally adjusted



¹ The interquartile range, the median and the 1% trimmed mean refer to data of the distribution of measures of the individualized debt-to-income of SFN borrowers. For this individualized calculation, all credit of individuals are considered, except rural and corporate operations. The amount of these operations is then compared to the debtor's annual income.

² The household debt-to-income ratio, SGS time series 29037 of BCB, is an aggregate measure that compares the debt of SFN borrowers to the restricted households gross disposable national income accumulated in the last 12 months.

Household bank credit accelerated again, in line with a more dynamic economic activity.

In term of segments, digital banks reduced their growth rate, but they still do so at a much higher level than their peers. As a result, this segment now accounts for 18% of outstanding credit to higher risk modalities (Chart 1.2.2.17).³⁹ Within this group of modalities, non-deducted payroll credit showed a significant acceleration (Chart 1.2.2.18), while credit cards saw a slowdown in the growth rate, with low rates

³⁹ Higher risk facilities are defined as credit card, non-deducted payroll and other credits portfolios. In June 2024, digital segment already represents 22%, 19% and 5% of these facilities, respectively.

remaining in the lower income bracket and an acceleration in the others (Chart 1.2.2.19). In turn, among lower credit risk modalities, the highlight is the credit granting⁴⁰ of vehicle financing, which continues to grow in all income brackets (Chart 1.2.2.20). Another highlight among lower credit risk facilities was the volume of housing credit granting, with the FGTS line remaining quite dynamic, given the increases in the eligible income brackets and the maximum value of the properties financed under the program “Minha Casa Minha Vida” (MCMV) in 2023 and maintained in the current year. Also noteworthy in the first half of the year was the increase in credit granting volumes of SFH line, although prospectively it is necessary to follow the trajectory of savings deposit accounts as a funding instrument for the evolution of this line⁴¹ (Chart 1.2.2.21).

⁴⁰ Credit contracting is defined as a credit operation informed first time in SCR and with month of contracting equal to reference month of Document 3040 of SCR informed by supervised entity.

⁴¹ To verify recent movements of savings accounts, see section 1.2.1 - Liquidity.

Chart 1.2.2.17 – Credit outstanding – Year over year growth
By segment

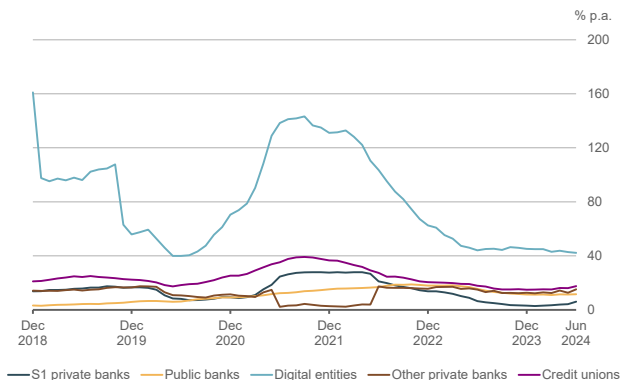
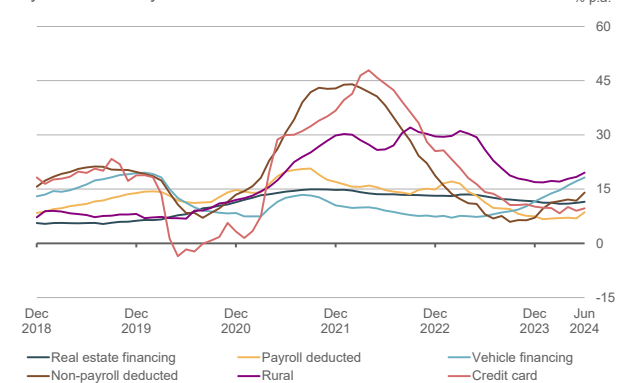


Chart 1.2.2.18 – Credit outstanding – Year over year growth
By credit modality



— Real estate financing — Payroll deducted — Vehicle financing
— Non-payroll deducted — Rural — Credit card

Chart 1.2.2.19 – Credit card – Credit outstanding – Year over year growth
By income bracket

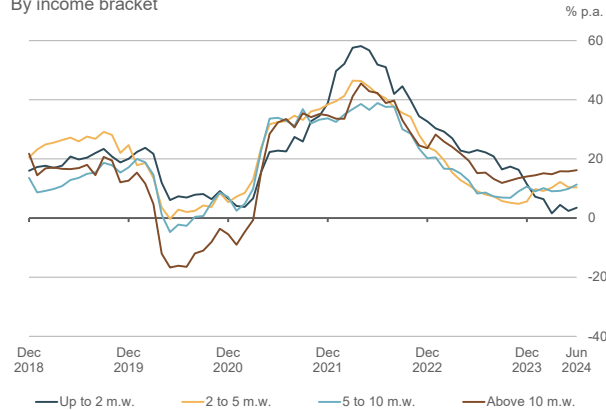


Chart 1.2.2.20 – Vehicle financing – Credit granting
By income bracket

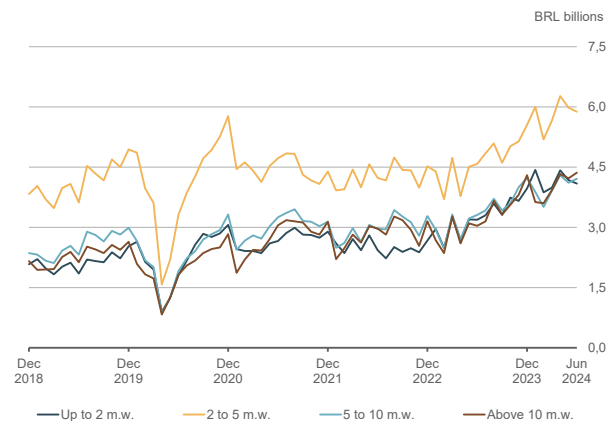
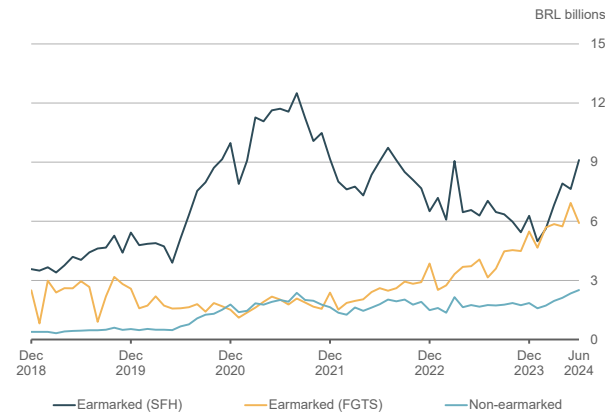


Chart 1.2.2.21 – Real estate financing – Credit granting
By line of funding

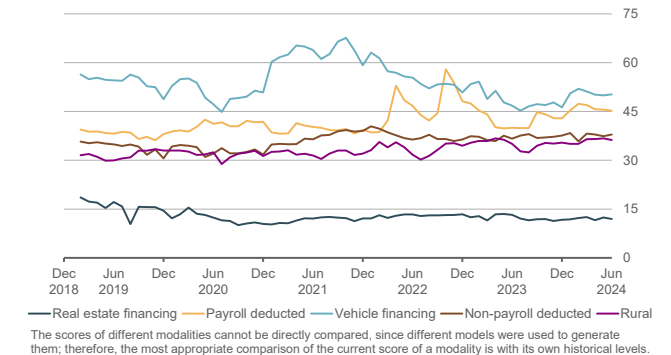


FIs risk appetite on household credit granting was higher than in the previous semester.

In addition to the increases in growth rates, there was some worsening in credit granting standards⁴² (Chart 1.2.2.22), more clearly in vehicle financing, having a raise in credit granting with higher LTVs and greater age vehicles,⁴³ although with even better average scores compared to the pre-pandemic period (Chart 1.2.2.23 and 1.2.2.24). Regarding credit card modality, the drop in the annual

growth rate of the total limit⁴⁴ for lower income bracket, stability in the rates for the higher brackets and current levels lower to those verified in 2022 suggest greater conservatism on the part of FIs in this modality (Chart 1.2.2.25). However, for housing credit, either LTVs and average term of credit granting increased in first semester of 2024, with the latter reaching the peak of the historical series (Chart 1.2.2.26 and 1.2.2.27, respectively). These are factors to watch out in the coming periods, as they indicate a greater risk appetite in the modality, which seems to be occurring in lines other than the one with FGTS funding.

Chart 1.2.2.22 – Average credit granting score
By credit modality



42 For household, score models are based on borrowers' variables and specific credit operations characteristics.

43 In addition, there has been an increase in participation of motorcycle financing, despite car financing still being predominant: 11% and 84% of financing contracting in June 2024 was for motorcycles and cars, respectively.

44 Total limit here is understood as sum of available limit and utilized limit in facility.

Chart 1.2.2.23 – Vehicle financing – Credit granting
By LTV ratio bracket

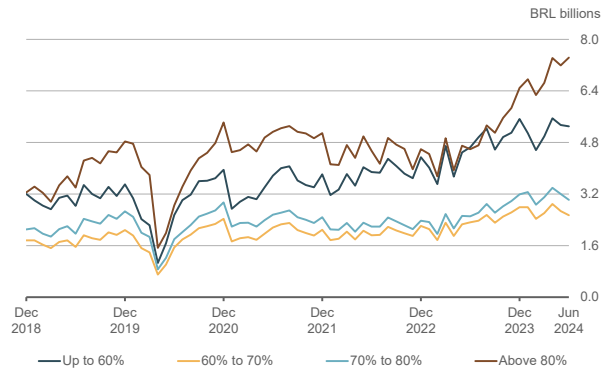


Chart 1.2.2.24 – Vehicle financing – Credit granting
By age of vehicle

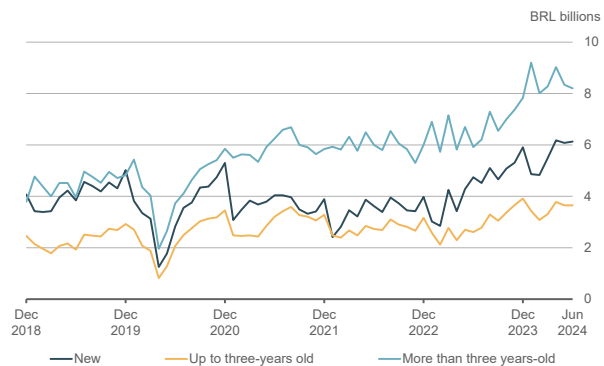


Chart 1.2.2.25 – Credit card total limit
Median – Year over year growth – By income bracket

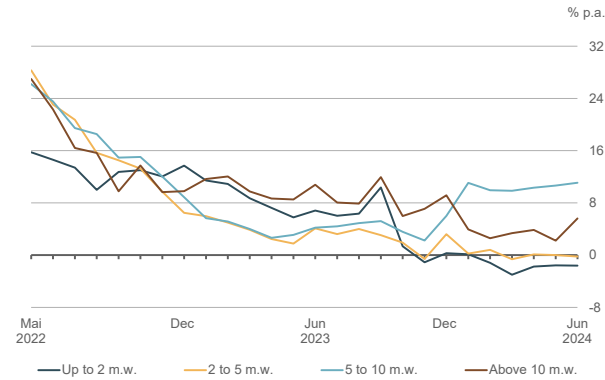


Chart 1.2.2.26 – Real estate financing – Average credit granting LTV ratio
By line of funding

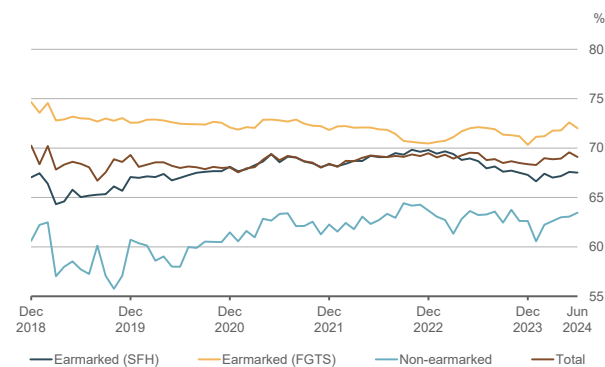
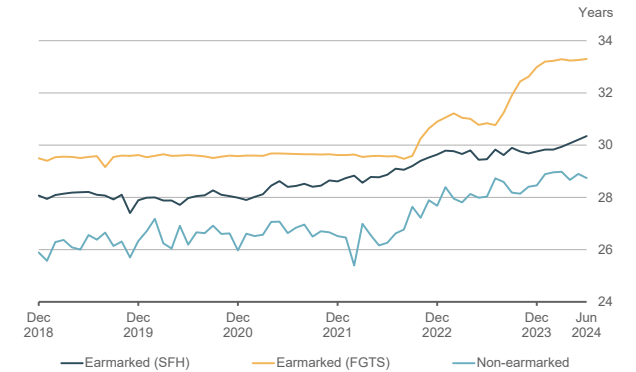


Chart 1.2.2.27 – Real estate financing – Average credit granting operation term
By line of funding



Credit risk materialization had a slight drop due to credit portfolio growth.

The increase of credit portfolio and stability of problem assets led to a reduction in the percentage of problem assets. Except for rural credit, other credit modalities reduced or stabilized problem assets percentage (Chart 1.2.2.28). Regarding credit cards, which reached a peak of problem assets in the first semester of 2023, the stability seen in the first half of 2024 was influenced by lower risk materialization (Chart 1.2.2.29) and the increase in the average payment of the bills (Chart 1.2.2.30) among lower income brackets, and also by the continuity of the process of credit write off in this modality as a whole (Chart 1.2.2.31). With regard to the banking segments,

there has been a significant increase in risk materialization among digital entities, as a result of a greater risk appetite in higher risk facilities, and among credit unions, on which risk materializes especially in non-payroll deducted loans (Chart 1.2.2.32).

Chart 1.2.2.28 – Problem assets
By credit modality

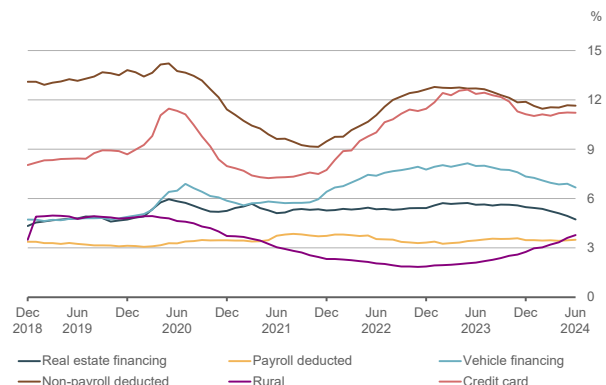


Chart 1.2.2.29 – Credit card – Problem assets
By income bracket

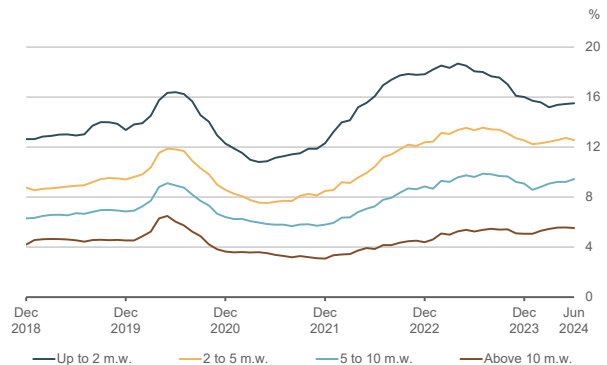


Chart 1.2.2.30 – Credit card – Average payment
By income bracket

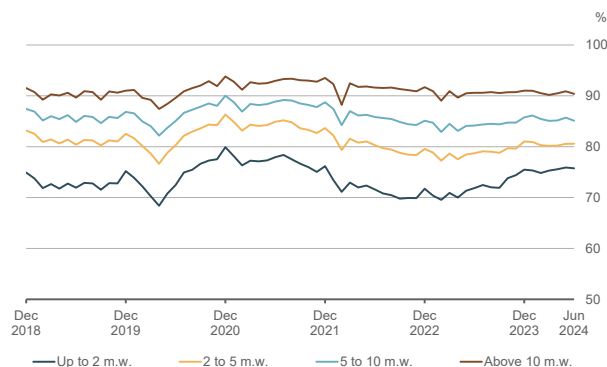


Chart 1.2.2.31 – Credit card – Write-offs in the last twelve months
By income bracket

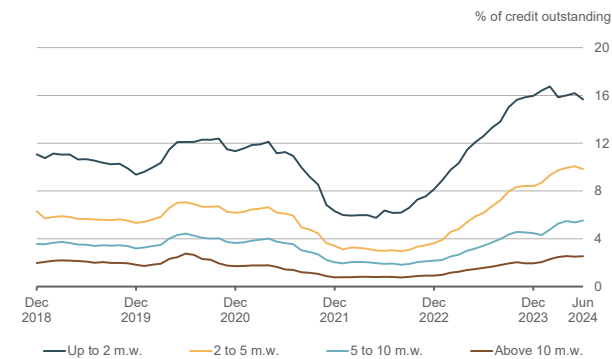
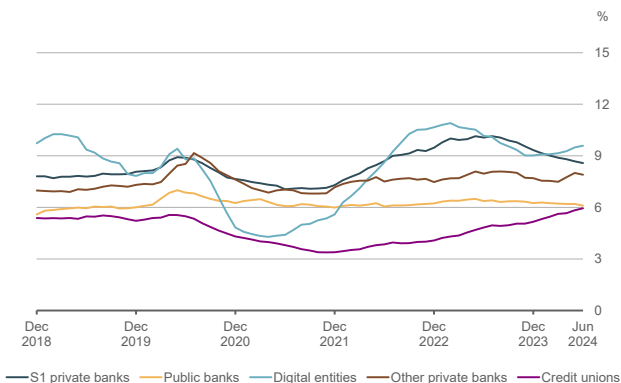


Chart 1.2.2.32 – Problem assets
By segment



Risk materialization is expected to remain stable in the coming months for household credit.

On the one hand, the improvement in the credit products mix (with a slight reduction of higher risk facilities), in the economy and in the labor market are positive factors to influence risk materialization in the future; on the other hand, the still high levels of DSTI and the slight worsening of credit granting standards are factors that could bring negative impacts. In this balance of factors, there is generally stability or reduction in the estimates of the probability of default⁴⁵ of portfolios of different modalities (Charts 1.2.2.33 and 1.2.2.34). In absence of relevant macroeconomic shocks, there should be some stability in the percentage of problem assets in the coming months.⁴⁶ Another factor that corroborates this understanding is the pre-problems assets percentage, which was relatively stable throughout the first half of 2024 (Chart 1.2.2.35).

Chart 1.2.2.33 – Credit outstanding probability of default
Performing loans – By credit modality

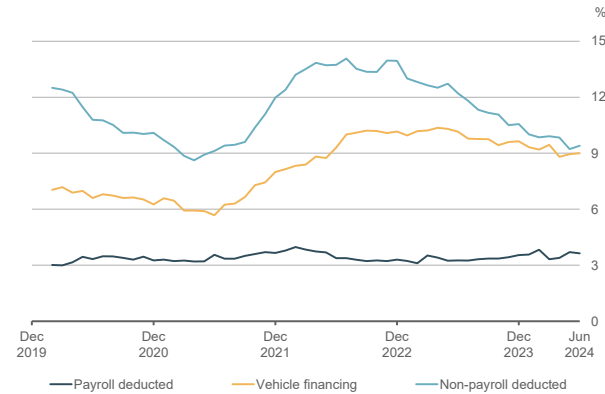


Chart 1.2.2.34 – Real estate financing – Credit outstanding probability of default
Performing loans – By line of funding

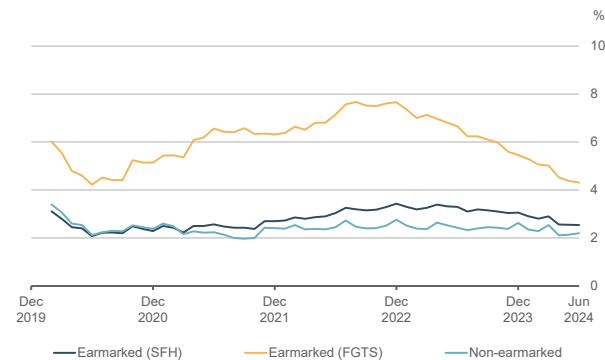
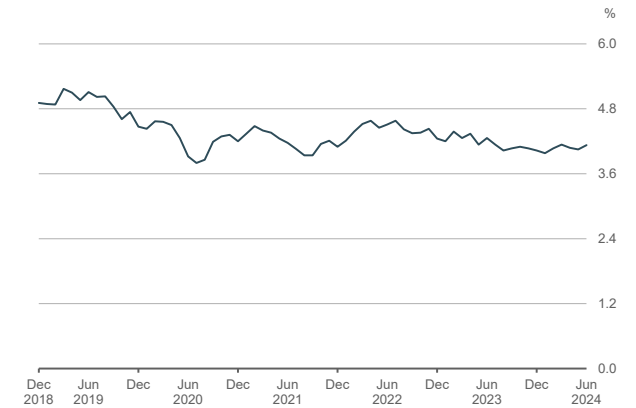


Chart 1.2.2.35 – Pre-problem assets



Provisions for Credit Losses

Provisions remained higher than the estimated expected loss for the SFN credit portfolio.

Provisions remained above expected losses⁴⁷ in most of the analyzed segments. In the private banks of the S1 prudential segment, provisions followed the improvement in risk and the reduction of expected losses in credit portfolios in the first half of 2024. In the digital entities, credit unions and other private

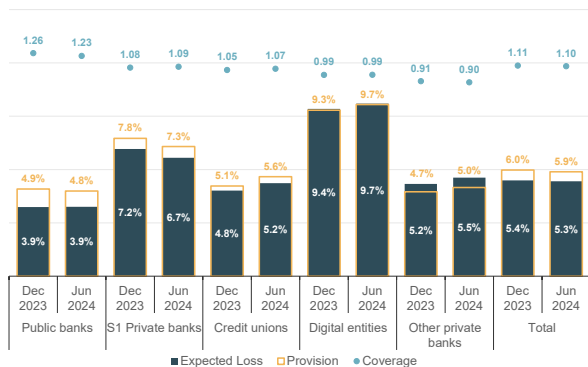
⁴⁵ Although the PD metric is the same for all diverse modalities, a more adequate comparison is between current PD to historical PD in the same modality, or, alternatively, comparison between current PD to problem assets ratio for the same modality.

⁴⁶ Probability of default model used here is calculated from recent performance of credits comparable to those in analysis. In other words, it's not a forecasting exercise conditional to any scenario of change in the economic cycle.

⁴⁷ The expected losses of the credit portfolio are estimated by the BCB based on proprietary PD and LGD models.

banks, expected losses increased due to a higher level of problem assets in their portfolios, a movement that was followed by provisions. The expected loss coverage ratio (by provision) in the SFN remained stable at 1.10 in June 2024 (Chart 1.2.2.36).

Chart 1.2.2.36 – Expected Loss and Coverage ratio
By segment



1.2.3 Profitability

The profitability of the NFS⁴⁸ remains in a trend of gradual improvement.

The recovery in profitability that began in the second half of 2023 persisted throughout the first semester of 2024. Most segments of the NFS increased profitability in the first half of 2024, and entities with low or negative Return on Equity (ROE) reduced their representativeness in the system's total assets. Credit Net Interest Income (NII)⁴⁹ in the banking system continues to grow, and service revenues reaccelerated in the second quarter of 2024. The risk materialization cycle has weakened, reducing the pressure of provisioning expenses on the results. With controlled administrative expenses and growth in operational revenues, the operational efficiency of the NFS has improved. The outlook for profitability in the coming periods is for a continuation of the gradual improvement trajectory, supported by revenue growth, stable provisioning costs, and control of operational expenses.

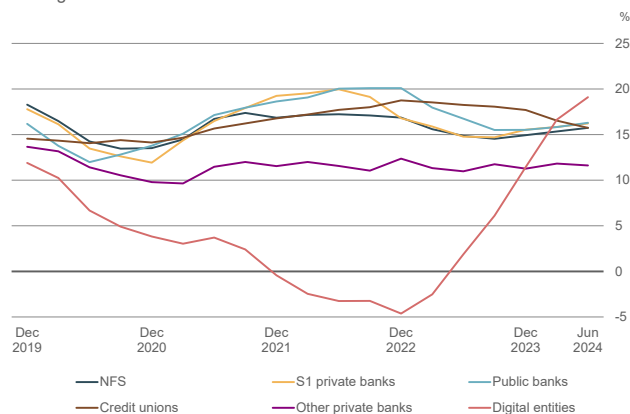
Most segments of the NFS recorded an increase in profitability in the first half of 2024.

The "Digital entities" and "S1 Private banks" segments showed the largest gains in profitability (Chart 1.2.3.1). The recovery has been significant in the "Digital entities" segment since the end of 2022, due to the positive effects of operational leverage via the successful monetization of customers in some of the entities and the lower pressure of provisioning expenses in the segment. The profitability of the "S1 Private banks" segment has also been recovering since the end of 2022. The segment was affected by an increase in problem assets in portfolios aimed at households and by the "Americanas" case at the end of 2022. After some entities reviewing their risk appetite and business strategies, the profitability of the segment has improved in recent periods. The "Credit unions" segment was the only one with consecutive declines in profitability since the end of 2022, following an increase in risk materialization in non-payroll deducted credits.

48 The analyzes in this Section were carried out considering the scope of the SFN, unless otherwise indicated for issues related to data availability or quality.

49 Refers to the difference between interest income and interest expenses, without considering the effects of loan loss provision. Interest income derives from interest-earning assets (mainly treasury and credit assets) and interest expenses derives from interest-bearing liabilities (mainly funding).

Chart 1.2.3.1 – ROE
Trailing twelve months

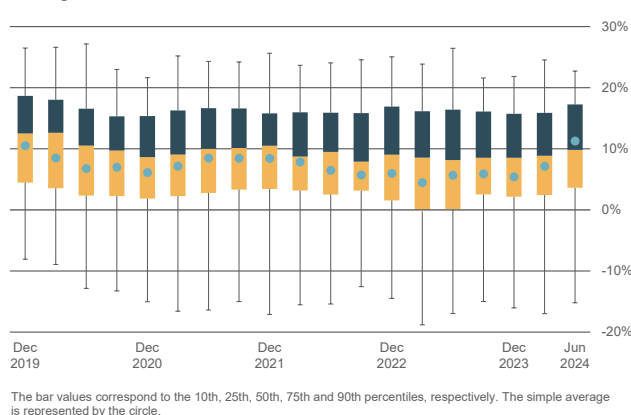


The ROE distribution in the banking system has improved, and entities with low or negative ROE reduced their representativeness in the total assets of the system. The median ROE of the banking system increased in the second quarter of 2024, and there was a migration of entities to higher ROE ranges compared to June of the previous year (Charts 1.2.3.2⁵⁰ and 1.2.3.3). Although some entities in the system reported negative ROE, they represented less than 2% of the system's total assets at the end of the

⁵⁰ The increase in the average ROE in June 2024 is due to, mainly, an entity that has been reporting significant losses until February 2024, when it was acquired by other entity and no longer impacted the average ROE of the system.

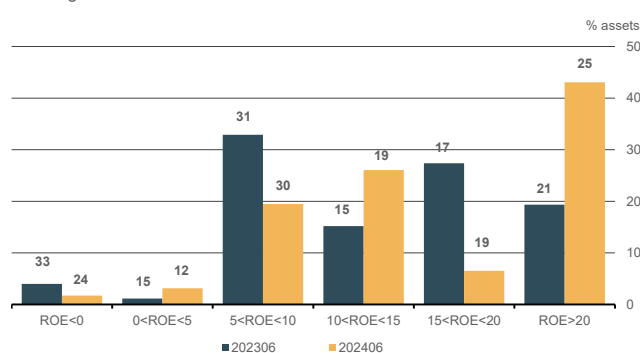
first half of 2024. On the other hand, entities with ROE above 10% represented more than 75% of the banking system's total assets at the same period.

Chart 1.2.3.2 – ROE Dispersion
Trailing twelve months



The bar values correspond to the 10th, 25th, 50th, 75th and 90th percentiles, respectively. The simple average is represented by the circle.

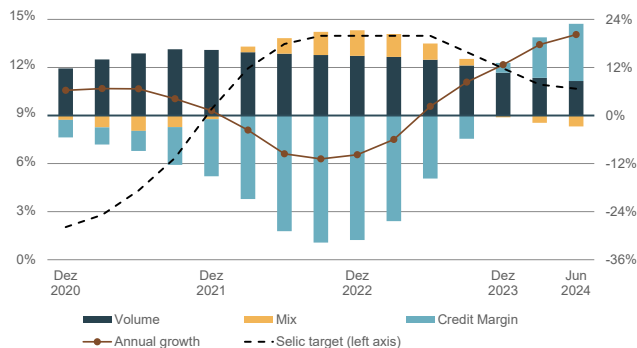
1.2.3.3 – ROE Frequency Distribution
Trailing twelve months



^{1/} The values above the bars indicate the number of institutions that fall within the respective ROE interval.

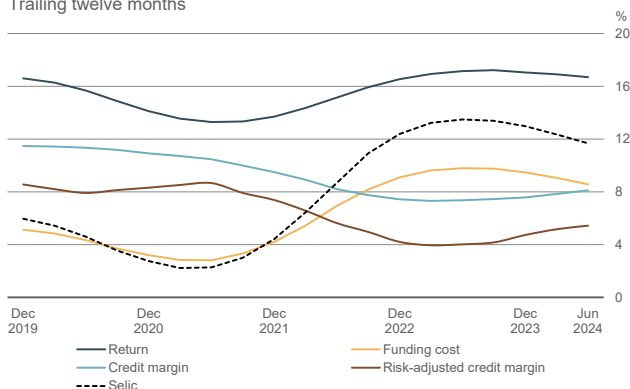
Credit NII in the banking system continues to grow. Since the second half of 2022, there has been a reacceleration of credit NII (Chart 1.2.3.4). This was largely due to gains in the credit margin, which measures the difference between the return on the credit portfolio and the cost of funding. The gains resulted from the renewal of the credit portfolio at higher rates and the decline in funding costs (Chart 1.2.3.5). There has been a gradual reduction in the contribution of portfolio growth (volume) to NII increase since the end of 2021, following the reduced risk appetite of entities during the period. However, there has been a recent reacceleration of credit that may change this trend. Given the recent portfolio growth in lower-risk modalities, the portfolio mix produced lower results in the first half of 2024. An eventual hiking cycle in the Selic rate, even if moderate, tends to put pressure on funding costs and limit more significant advances in the credit margin. The expectation is that credit NII will continue to grow, supported by portfolio growth and relative stability in the credit margin.

Chart 1.2.3.4 – Credit NII
Annual growth and factor decomposition
Trailing twelve months



Source: Cosif and SCR – BCB staff calculation.

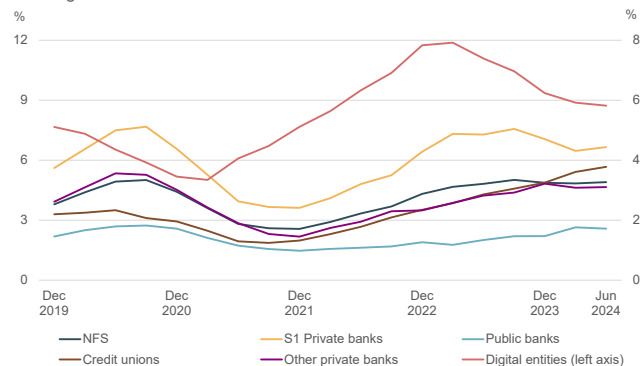
Chart 1.2.3.5 – Credit Margin
Componentes
Trailing twelve months



Source: Cosif and SCR - BCB staff calculation.

The risk materialization cycle has weakened, reducing the pressure of provisioning expenses on profitability. The cycle of higher provisioning expenses in the NFS began in 2021, following the rise in problem assets. More recently, most segments of the NFS have shown a reduction in provisioning costs⁵¹ (Chart 1.2.3.6). Throughout the first half of 2024, the “Credit unions” segment experienced the higher increase in provisioning costs. This segment continues to be affected by the rise in problem assets in non-payroll deducted credits.⁵² The risk materialization in the NFS is expected to remain stable in the coming periods, with provisioning expenses growing in line with the credit portfolio for most segments. According to internal estimates, the provisions constituted by the NFS are sufficient to cover expected losses. However, a potential increase in the NFS risk appetite, in an environment marked by high household income commitment, may require additional provisions in the future. Therefore, it is important for entities to maintain the quality of credit concessions to avoid compromising profitability ahead.

1.2.3.6 – Provisioning costs^{1/}
Trailing twelve months



Source: Cosif - BCB staff calculation.

1/ Refers to the ratio between provision expenses and the average balance of the credit portfolio.

Service revenues reaccelerated in the second quarter of 2024, after a period of declining growth.

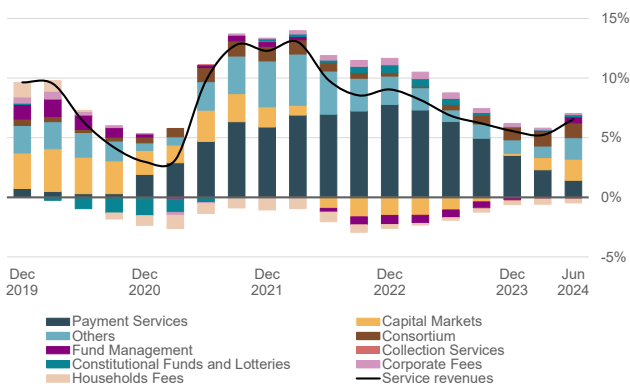
Since the end of 2021, the growth in service revenues had been primarily driven by income related to payment activities (Chart 1.2.3.7). However, the contribution of payments to the growth of total revenues has been gradually decreasing. This decline is related to the increased use of alternative payment methods such as Pix, the intensification of competition and the innovation in the NFS. The recent acceleration

51 Provisioning costs refer to the ratio between provisioning expenses and the average balance of the credit portfolio.

52 See section 1.2.2. for more detail.

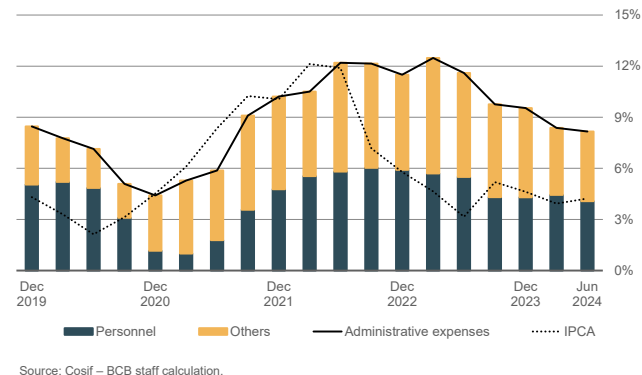
was mainly influenced by revenues related to capital markets,⁵³ consortium, and insurance activities. Since the second half of 2020, revenues from fees aimed at households have been decreasing due to intensified competition in this line of business.

1.2.3.7 – Service revenues
Annual growth and factor decomposition
Trailing twelve months



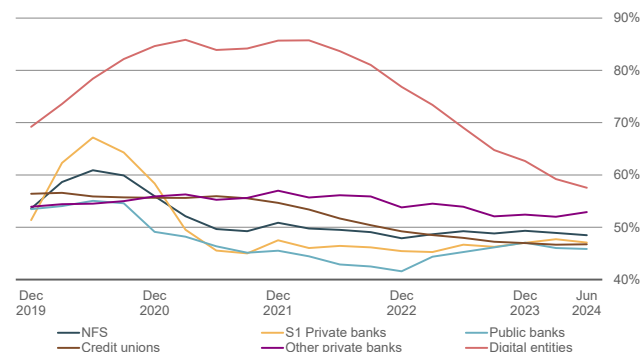
The operational efficiency of the NFS has improved, with controlled administrative expenses and growth in operational revenues. Administrative expenses continue to decelerate, following the easing of inflationary pressures on operational costs (Chart 1.2.3.8). The control of these expenses,⁵⁴ combined with the gradual improvement in operational revenues, has led to gains in operational efficiency⁵⁵ in the NFS in recent periods. Since the beginning of 2022, there have been significant gains in operational efficiency in the “Digital entities” segment (Chart 1.2.3.9). This reflects the positive effects of operational leverage of entities in this segment that have successfully monetized their customer base during this period. The digitalization of banking services will continue to be a relevant factor for advances in operational efficiency in the NFS. Along with this ongoing digitalization process, the outlook remains for operational efficiency gains in the NFS in the medium term, with costs under control and gradual revenue growth.

1.2.3.8 – Administrative expenses
Annual growth and factor decomposition
Trailing twelve months



Source: Cosif – BCB staff calculation.

Chart 1.2.3.9 – Operational Efficiency Index^{1/}
Trailing twelve months



Source: Cosif – BCB staff calculation.
1/ Refers to the ratio between administrative expenses and operational results.

53 The growth in revenues related to the capital market activities is mainly due to commissions from the placement of debt securities.
54 There was no significant impact from exchange rate variations on the expenses of subsidiaries and branches of banks abroad in the first half of 2024.
55 The operational efficiency of the system is measured by the Operational Efficiency Index (IEO), calculated by dividing administrative expenses by operational results, excluding the effects of provision expenses.

1.2.4 Solvency

The banking system remains robust and able to sustain regular functioning of the financial intermediation system. Although there was a slight decline over the semester, aggregate capitalization ratios remain comfortably above the regulatory requirements (Charts 1.2.4.1 and 1.2.4.2). The frequency distribution of the Regulatory Capital Adequacy Ratio (RCAR)⁵⁶ shows that about half of the institutions have more than double the required capital, and that the asset representativeness of institutions with insufficient capital to meet prudential requirements⁵⁷ is less than 1% (Chart 1.2.4.3). Solvency does not pose a risk to financial stability.

Chart 1.2.4.1 – Evolution of capital ratios

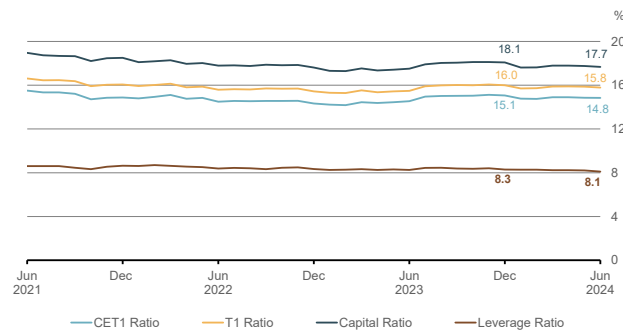


Chart 1.2.4.2 – Capital ratio variation

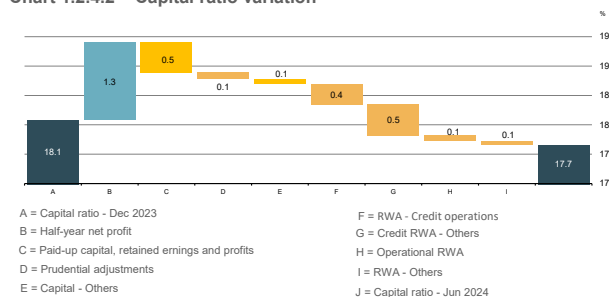
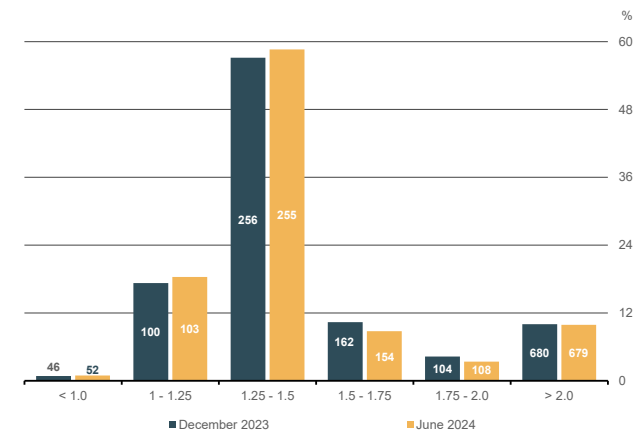


Chart 1.2.4.3 – Regulatory Capital Adequacy Index
Frequency distribution weighted by assets



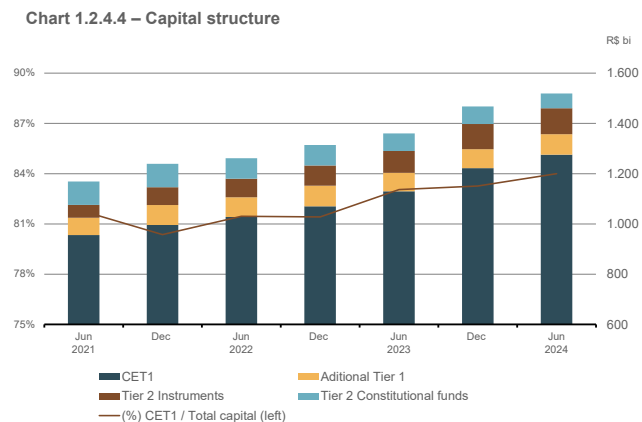
1 Inside the bars are the number of financial institutions in the correspondent CET1 ratio range.

The system maintained the trend of expansion and improvement in the quality of regulatory capital through profit retention. Retained earnings comfortably exceeded the negative adjustments related to intangible assets and the available-for-sale

56 The RCAR consists of the quotient between the Regulatory Capital (RC) and the total required RC, including the capital buffers and Basel Pillar 2. This ratio allows for the joint analysis of entities with different minimum RC requirements. For a detailed description of the capital requirements applicable to various entities within the system, see items 2 to 6 under the title Concepts and Methodologies in the Appendix of this report.

57 Including the requirements applicable to other levels of capital (Tier I and Common Equity Tier I), the capital shortfall of 54 institutions that hold 1.0% of the system's assets totals BRL3.6 billion, corresponding to 0.24% of the consolidated Regulatory Capital.

securities portfolio. Tier II Capital decreased due to the lower recognition of resources from constitutional funds in public banks.⁵⁸ Additional Tier I showed modest growth, explained by new issuances and the appreciation of instruments issued in foreign currency. Thus, these variations resulted in an increase in the share of Common Equity Tier I (CET1) in the regulatory capital (Chart 1.2.4.4), maintaining the trend of previous semesters.



The system is capable of absorbing the effects of recent prudential regulation enhancements in the coming years. The prudential framework for conglomerates led by payment institutions (PIs)⁵⁹ will be fully implemented by 2025, which will result in higher capital requirements and increased prudential adjustments. The new procedures for calculating the portion of risk-weighted assets related to the capital required for operational risk (RWA_{OPAD})⁶⁰ are expected to significantly increase its value between 2025 and 2028. The methodologies for determining the provision for expected credit losses established by Resolution CMN 4,966, of 2021, are expected to reduce the system's regulatory capital. Law 14,467, of 2022, which aligned tax deductibility rules with accounting provisioning criteria, may generate temporary increases in deferred tax assets from tax losses during its transition regime, which are largely deducted from capital.⁶¹ The aggregate capitalization ratios are fully sufficient to withstand the impact of these provisions, which can be mitigated by a series of measures by

institutions, such as capital injections, higher profit retention, and exposure reduction.

The system has sufficient capital margin to continue expanding the supply of credit, despite the prospect of its reduction by regulatory changes. Risk-Weighted Assets (RWA) have increased at a higher percentage than capital due to the growth in exposures during the semester, particularly in credit operations (Table 1.2.4.1). However, the system possesses a capital margin of BRL486 billion, equivalent to 32% of its aggregate Regulatory Capital. This surplus can provide significant asset expansion without the need for additional capital contributions, even in light of the aforementioned regulatory changes.

58 According to the schedule established by article 31 of Resolution CMN 4,955.

59 Resolutions BCB 198, 199, 200, and 201, of March 11, 2022, provide transitional rules that facilitate compliance with the minimum capital requirements for conglomerates led by PIs during the period from July 2023 to December 2024.

60 Resolution BCB 356, of November 30, 2023, replaced the three methodologies for calculating RWA_{OPAD} provided in Circular 3,640, of March 4, 2013 with a single standardized model. This aims to increase the robustness, risk sensitivity, and comparability of the capital requirement for operational risk, in line with BCBS recommendations. The implementation will be phased between 2025 and 2028 to mitigate the impact of the higher difference between the value calculated under the new methodology and that calculated in December 2024.

61 The potential impact of the provisions of Law 14,467 on the capital of entities has been mitigated by Provisional Measure 1,261, of October 2, 2024. This measure not only postpones the deduction of losses related to 2024, which are accounted for on January 1, 2025 in the determination of the taxable income and the Social Contribution on Net Profit (CSLL) calculation base from April 2025 to January 2026, but also extends the deadline for this deduction.

Table 1.2.4.1 – RWA Composition

R\$ billions	System			Var. (%) Dec/Jun	
	dez/23	jun/24	Var. (%)	Public	Private
Total RWA	8,117	8,600	6.0%	6.3%	5.8%
Credit RWA	6,753 83.2%	7,165 83.3%	6.1%	5.5%	6.4%
Credit operations	3,409	3,573	4.8%	2.9%	6.3%
Leasing	24	26	7.2%	1.2%	7.3%
Interbank investments	214	215	0.5%	19.4%	-3.7%
Securities	567	625	10.2%	-0.2%	14.1%
Derivatives	145	180	23.6%	212.0%	16.0%
Fixed Assets	392	466	18.6%	19.4%	18.2%
Non-cancellable credit commitments	166	152	-8.7%	6.4%	-12.2%
Guarantees provided	385	406	5.5%	4.4%	5.8%
Tax assets	408	435	6.5%	7.0%	6.2%
Other	987	1,023	3.7%	8.7%	1.9%
Market RWA	436 5.4%	458 5.3%	5.0%	40.0%	-0.4%
Operational RWA	866 10.7%	910 10.6%	5.1%	5.5%	4.8%
Payment Services RWA	63 0.8%	68 0.8%	8.7%		6.5%



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1.2.5 Stress Tests

Capital and liquidity stress tests⁶² results indicate that the banking system presents adequate levels of capital and is resilient in all adverse scenarios simulated, although some banks reach capital ratios below regulatory minima. Due to solid capital ratios at the onset of the tests, noncompliance⁶³ events are not that relevant, when adverse macroeconomic scenarios are simulated. Sensitivity analyses also point to a good resilience to risk factors, when simulated on a solo basis. The liquidity stress test indicates a comfortable amount of liquid assets in the event of cash outflows in adverse conditions or shocks to market parameters in the short term.

Regulatory changes⁶⁴ due through the next years have noticeable effects on capitalization levels, but do not greatly affect banking system's resilience. The simulation of its effects together with macroeconomic stress scenarios resulted in higher capital shortfall and an increase of noncompliant or restrict institutions. Nevertheless, system capital ratios stay above June 2024 levels at the end of the analysis period (from September, 2026 onwards), which attests the system's resilience and recapitalization ability.

62 Details on methodology and scope of the macroeconomic test, sensitivity analyzes, interbank direct contagion and liquidity stress test can be found in Concepts and Methodologies section.

63 A bank is considered non-compliant if any of the three capital adequacy indices are not met: Total Capital Ratio (TCR), Tier 1 Capital Ratio (T1 Ratio) and Common Equity Tier 1 Ratio (CET1 Ratio).

64 Regulations scheduled to be enacted which have effects on this stress test are: Law 14,467, of 2022, which brings tax deductibility rules closer to accounting provisioning criteria; new provisions calculus procedures for credit risk expected losses, established by Resolution 4,966, of 2021; the new framework for computing operational risk risk-weighted assets (RWA_{OPAD}).



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Box – Scenarios used in the macroeconomic stress tests⁶⁵

The scenarios, named Stress 1 and Stress 2, which were used in the Macroeconomic stress test, are described below (Charts 1.2.5.1 to 1.2.5.5).

Scenario Stress 1 supposes a relevant drop in domestic demand, together with a strong decline in the global economy, from the fourth quarter of 2024 onwards. The magnitude of the external economic activity slide resembles that of the Covid-19 pandemic, together with a strengthening US Dollar and falling commodities prices. In the domestic economy, household consumption and gross fixed capital formation would significantly decline, and a slow recovery would follow, so that mid 2024 GDP levels would be recovered only in the end of 2026. A reduced economic activity would trigger relevant increases in unemployment rates. Economic idleness would lead to reduced inflation, in spite of the currency depreciation. In accordance with a Taylor rule, falling inflation would lead to Selic rate cuts by the BCB, aiming at achieving inflation convergence to inflation targets. In summary, the scenario depicts falling economic activity, inflation, and interest rates.

Scenario Stress 2 is characterized by a significant increase of uncertainty in the economy starting on the fourth quarter, 2024, together with expectations of fiscal and monetary deterioration, leading to increases of risk premia, steep currency depreciation, elevation of the neutral interest rate and economic activity contraction. The building of such a scenario utilized as reference the fiscal deterioration and economic uncertainty seen in the past, between mid-2014 and the beginning of 2016. Despite the GDP drop and increased unemployment, inflationary effects of the currency depreciation would prevail. FX rate peaks in the first quarter, 2025 and then starts appreciating, in response to an increased interest rate differential to international markets. In accordance with a Taylor rule, to pursue convergence of inflation rates to the target, the significant rise of inflation would lead the BCB to hike the Selic rate. Output recovery occurs more gradually than in Stress 1 scenario. In summary, this scenario is characterized by falling economic activity and raising inflation and interest rates.

⁶⁵ For both scenarios, the Selic rate movement described is solely intended to keep macroeconomic consistency and does not represent any indication or compromise if any of the described scenarios materialize.



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Chart 1.2.5.1 – Inflation

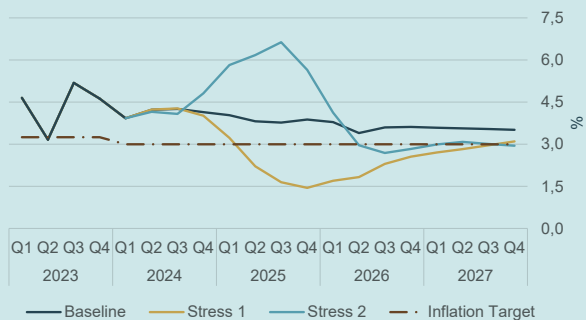


Chart 1.2.5.2 – Exchange Rate

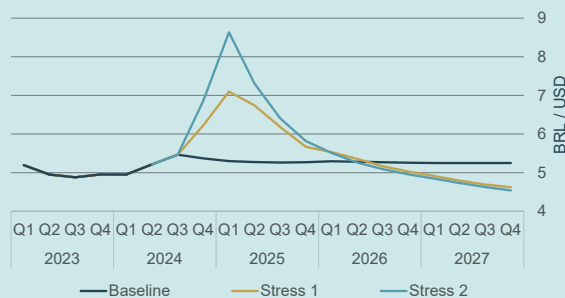


Chart 1.2.5.3 – GDP Change

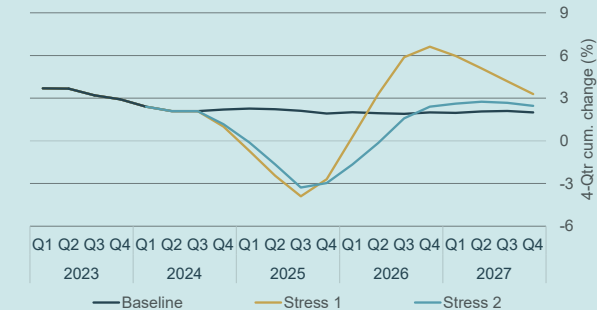


Chart 1.2.5.4 – Unemployment

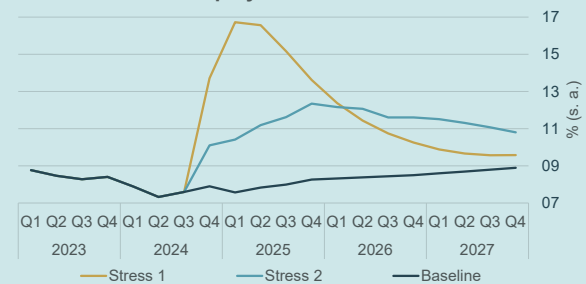
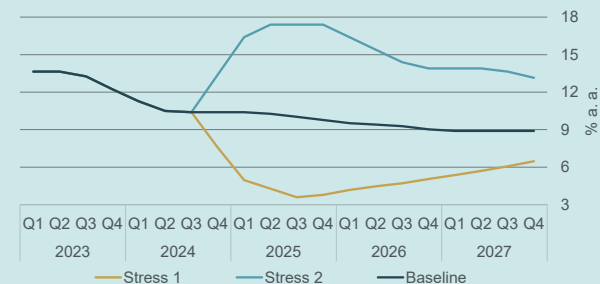


Chart 1.2.5.5 – Selic Rate



Macroeconomic stress test

The estimated system capital shortfall⁶⁶ is low in both simulated scenarios, confirming the adequate loss absorption capacity of the banking system.

Institutions that together account for 70.7% of system total assets would continue to show capitalization ratios above regulatory minimum of 10.5% (Chart 1.2.5.7).

Most of the capital shortfall is due to impacts from the regulatory changes. The largest capital shortfall would be 5.3% of the current regulatory capital of the system at the 12th simulated quarter of the Stress 2 Scenario (Chart 1.2.5.6); in the absence of the regulatory changes' effects, the largest capital shortfall would be 1.9% of current regulatory capital. This figure is greater than the 0.9% capital shortfall (regulatory changes not considered) presented at the previous FSR, also at the last simulated quarter. For the Stress 1 Scenario, capital shortfall reaches 2.2% of the current regulatory capital of the system (1.2% of which are exclusively due to macroeconomic stress) at the last simulated quarter, a raise when compared to the 0.5% figure at the previous tests.

Chart 1.2.5.6 – Capital shortfall (% of regulatory capital)

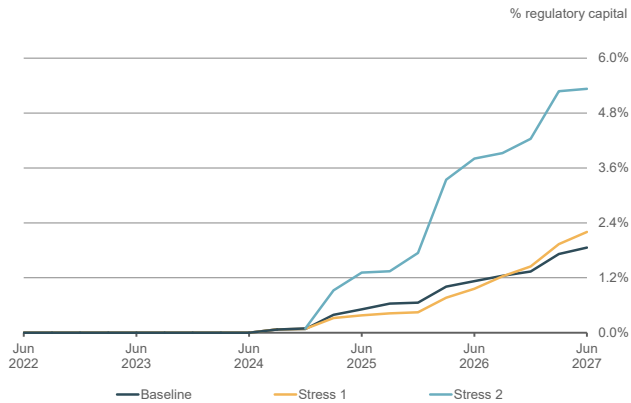
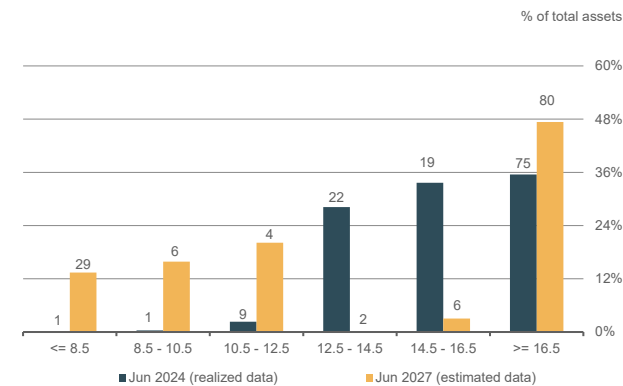


Chart 1.2.5.7 – Assets distribution by capital ratio ranges Stress 2 Scenario^{1/}



1/ Values above bars indicate the number of banks in each range.

Sensitivity Analysis

The system has low sensitivity to shocks in the exchange rate. Non-compliances occur in institutions representing 0.005% of system's regulatory capital, if the exchange rate reaches 200% of the rate observed by end of June 2024. The low net exposure observed inhibits greater adverse effects resulting from drastic fluctuations in the exchange rate.

Only very large positive shocks in the interest rate could generate some capital shortfall. A shock equivalent to the greater variation observed⁶⁷ through the last 25 years would result in a capital shortfall of 3.8% of the regulatory capital, affecting banks accounting for 2.0% of system assets. Hedge policies aiming at limiting exposure to trading book assets that are sensitive to interest rates, reduce the risk of losses arising from interest rate shocks.

Incremental credit risk shocks point to a low capital shortfall if problem assets reached their highest historical mark. Capital shortfall would be 0.007% of system's regulatory capital (Chart 1.2.5.8), if problem assets reach 8.6%, the historical maximum level

⁶⁶ The concept of capital shortfall encompasses amounts necessary to fully comply with minimum requirements, as determined by Resolution CMN 4,958, of 2021, and includes all capital buffer requirements (ACP) applicable. Particularly, systemically important banks are subject to the systemic capital buffer (ACP_{Sistémico}).

⁶⁷ In 21-day windows, since 1999, the maximum change of the six-month rate was circa 83.5%.

Simulation of direct interbank contagion

The contagion⁷¹ simulation suggests a low need for resources to recapitalize the system due to contagion caused by the bankruptcy of each financial institution individually. Impact from the failure of one bank is transmitted to other institutions through direct links, such as loans and interbank deposits. In the worst case simulated, the capital shortfall resulting from contagion would be below 1% of system's regulatory capital. This low impact is explained by the appropriate level of capitalization of the system and the existence of an exposure limit per client, which restricts exposures between institutions. In addition, some direct interbank exposures are collateralized, such as repurchase agreements backed by Federal Public Securities (TPF), thus reducing the likelihood of contagion.

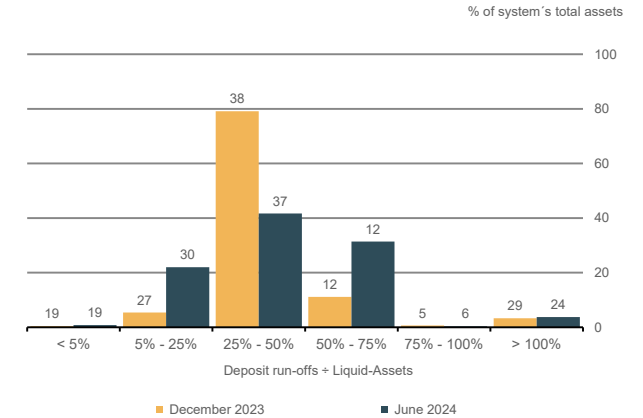
Liquidity Stress Testing

The banking system holds enough liquid assets to absorb potential losses under stressed scenarios and to comply with current regulations. The liquidity

stress test indicates the system is sufficiently resilient for the preservation of financial stability and the regular functioning of the intermediation system. The wide majority of FIs, including the larger ones, hold a liquidity buffer large enough to withstand depositor run-offs and potential market losses under adverse scenarios.

Depositor's runoff stress tests indicate the system is resilient enough to withstand extreme funding withdrawals. The depositor's run-off scenario for the thirty-day horizon applies standardized run-off percentages to funding sources, considering the client profile and the type of funding instrument. Additionally, it uses a methodology that captures the effect of deposit volatility to estimate supplementary run-offs, considering a 21-day holding period.⁷² Furthermore, it considers the total withdrawal of all instruments maturing over a thirty-day horizon, as well as withdrawal of eligible instruments by the largest counterparties, capturing concentration risk. Simulation results indicate that only a small subset of institutions representing 3.7% of the system's assets have deposit run-offs representing more than 100% of their liquid assets. (Chart 1.2.5.11)

Chart 1.2.5.11 – Frequency distribution off deposits run-offs^{1/}



1/ The values on the top of the bars refer to the number of financial institutions with the value of the expected earlier redemptions for next 30 days (run-offs) as a share of its liquid assets belonging to the corresponding interval.

The result of the shocks in the market parameters shows that banking institutions continue to present resilience to face eventual cash outflows and potential devaluations in liquid assets in the short-term horizon.⁷³ Greater risk aversion, with an average reduction in currency exposures, combined with lower

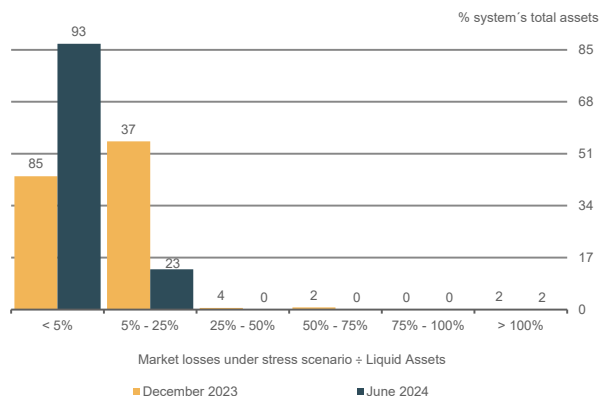
71 Details on methodology of the interbank direct contagion can be found in Concepts and Methodologies section.

72 The early withdrawal of depositors' stress test aggregates a subset of components of the Short-Term Liquidity Ratio methodology (IL) associated with unexpected deposits outflows: deposit profile, early redemption and brokered deposits. For further details about the IL's methodology, please refer to the Concepts and Methodology annex (the Stressed Cash Flow component of the Liquidity Ratio).

73 This simulation is based on projections of shocks in market parameters through different scenarios for yield curve, exchange rate, currency coupons and inflation price index. The stress tests consider the worst impact of high/low shock scenario for the different marks risk factors, independently, for each institution; that is, we may have two independent scenarios, one shock estimating an increase for a certain risk factor for an institution A and other a decrease for the same risk factor for an institution B.

volatility in the period and the maintenance of liquidity cushion, contributed to a decrease in the market stress ratio on institutions' net assets compared to December 2023 (Chart 1.2.5.12). These simulations estimate the necessary amount to cover losses resulting from fluctuations in market prices of liquid assets, derivatives, and other instruments.⁷⁴ Liquid assets, in turn, are marked to market regardless of their accounting classification, eliminating potential problems arising from the revaluation of securities classified as hold to maturity and accounted for the acquisition curve value.

Chart 1.2.5.12 – Frequency distribution for market losses under stressed scenarios^{1/}

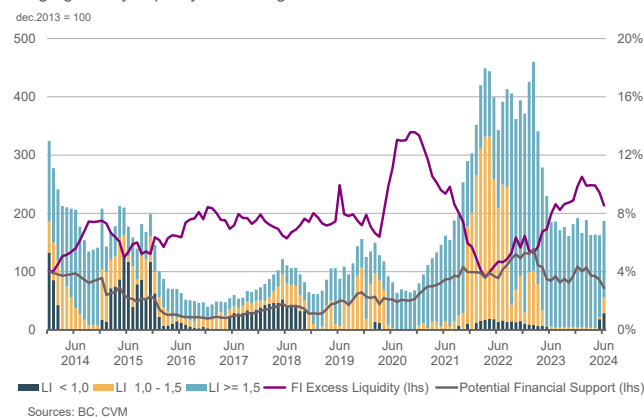


^{1/} The values on top of the bars refer to the number of institutions with estimated market losses under stressed scenarios as a share of liquid assets belonging to the corresponding interval.

74 Resource losses/cash outflows include: (i) additional margin calls deposited in clearing houses; (ii) disbursements in positions of derivative markets; (iii) loss of value of liquid assets on repo agreements or given as a guarantee in clearing houses and BCB.

The impact of eventual liquidity support to investment funds managed by bank-linked managers on the banking system participants is not a relevant matter of concern. The step-in risk is the ratio between the value of potential liquidity support to investment funds provided by their bank-linked managers – estimated in a scenario of strong withdrawals in investment funds – and the excess liquidity of their linked FIs – estimated from the liquidity stress tests performed by the BCB. The indicator has remained relatively stable over the last twelve months, representing 8% of the excess liquidity of the linked FIs. In the last half-year there was a reduction of the excess liquidity of linked FIs as well as the value of eventual liquidity support to the funds, contributing to the stability of the indicator (Chart 1.2.5.13).

Chart 1.2.5.13 – Investment funds' step-in risk
Potential support as a proportion of excess of liquidity of bank-linked managers, segregated by Liquidity Index range



Sources: BC, CVM

1.3 Financial Stability Survey⁷⁵

Regarding the survey conducted in February, fiscal risks have become the most relevant, while risks arising from the international outlook have weakened and delinquency and activity risks maintained their downward trend. Considering the most important risk identified by each financial institution, fiscal risks were the most frequently mentioned in the last survey conducted in August 2024, reflecting a deterioration in the agents' perceptions on this topic. Delinquency and activity risks declined in the surveys of May and August, in line with the recent economic performance. International risks, despite weakening, remain relevant, particularly those associated with the monetary policy and the presidential elections in the U.S., in addition to geopolitical risks (Table 1.3.1). At the latest two surveys, most respondents expected and suggested that the ACCP_{Brasil} value should be kept at 0%.

⁷⁵ The BCB conducts a quarterly survey to identify and monitor risks to financial stability according to the perception of SFN's institutions. It is noteworthy that the BCB has started publishing a [quarterly FSS report](#) since 2023Q4 (available only in Portuguese). The survey is published on the Thursday of the subsequent week to the Comef meeting. Opinions reported here come from the respondent financial institutions. Since the previous FSS edition, two surveys have been conducted, one from April 22 to May 2, and another from July 29 to August 12, 2024. Both surveys were responded by 100 regulated financial institutions, 75 by the BCB, 12 by CVM, 8 by Previc, and 5 by Susep. In June 2024, the sample with the BCB's segment of regulated institutions that responded to the latest FSS accounted for almost 92% of the assets in this segment.

Risks to financial stability⁷⁶

Fiscal risks have grown, becoming the most frequently mentioned, reflecting increasing concerns about the public debt trajectory and the impacts of fiscal policy on asset prices and the monetary policy. Many respondents emphasized the risk of deterioration in fiscal balances, which could impact the interest rate curve and the exchange rate, potentially affecting the monetary policy conduct. In this scenario, the rise in funding costs and the increase in market risk would negatively impact the balance sheets of financial institutions.

International risks have fallen, but concerns about geopolitical risks and with the monetary policy and the presidential elections in the U.S. persist. Financial institutions believe that increasing geopolitical tensions in the Middle East could lead to a rise in oil prices, which would boost global inflation. The presidential elections in the U.S. are a source of uncertainty regarding trade and foreign policies, with expectations

of unilateral tariff increases or heightened migration barriers. The restrictions imposed by the monetary policy in central economies contribute to the increase in risk premia and the search for higher-quality assets, reducing capital flow to emerging market economies.

Delinquency and activity risks have declined, reflecting better-than-expected economic performance. Despite the persistence of corporate and household indebtedness at high levels, the recovery of economic activity and labor market has contributed to maintain delinquency rates under control, supported by a level of provisions considered adequate.

Operational risks continue to be highlighted, with concerns focused on cyber attacks and electronic fraud in an increasingly digitalized financial services environment. Respondents believe that cyber attack risks could affect confidence in the financial system. Technological changes that incorporate new financial intermediation modalities, despite boosting competition, may also translate into sources of diffuse risks that are harder to mitigate (Table 1.3.2).

⁷⁶ Questions: "In the next three years, which risks to financial stability does your institution deem as most relevant, considering the probability of occurrence and their impact on the SFN?" and: "For each of the three mentioned risks, indicate the probability and the impact, considering the following classes: i) probability: low (<1%); medium-low (1%-10%); medium-high (10%-30%); high (>30%); ii) impact (SFN's total assets): very low (<0.1%); low (0.1%-1%); medium (1%-5%); high (5%-10%); very high (>10%)".



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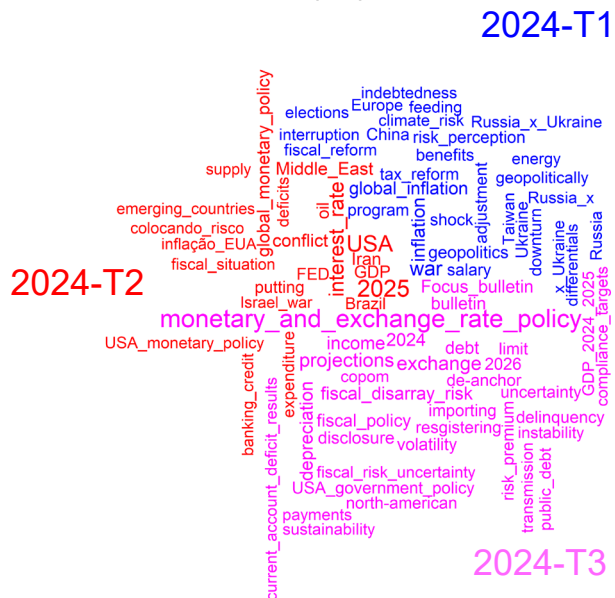


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Chart 1.3.2 – FSS – Evolution of risk perception

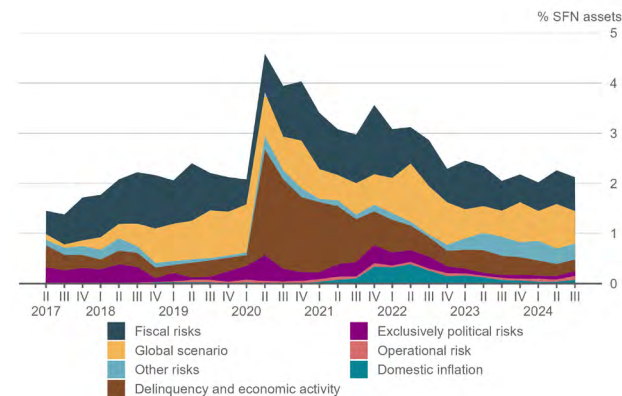


Note: The comparative word cloud is compiled from the textual analysis of the most important risk described by each respondent. The color of the word indicates the FSS in which the word frequency was predominant. The size of the word is proportional to the difference between the word frequency in the corresponding FSS and the average frequency of the same word in the three surveys depicted in the chart.

The average expected impact of risks on the SFN has remained relatively stable in recent surveys.

The sum of the average expected impact of all risks showed stability in the August 2024 survey compared with February 2024 survey but with significant changes in individual contributions. Fiscal risks have become the group with the highest average expected impact, reaching 0.68% of SFN assets in August, up from 0.57% in February. International outlook risks increased to 0.64% of SFN assets in August, up from 0.60% in February (Chart 1.3.3). When observing separately the probability of materialization and the impact of risks in the universe of financial institutions that mentioned these risks, a growing trend in the probability of materialization of domestic inflation risks stands out, along with increased probabilities for international outlook and fiscal risks in August compared with February (Charts 1.3.4.a to 1.3.4.e).

Chart 1.3.3 – FSS – Average expected impact



Note: The average expected impact of risk r is computed as $I_r = \frac{1}{n} \sum_b \text{probability}_{br} * \text{impact}_{br}$, where n is the number of financial institutions; and probability_{br} and impact_{br} are values assigned by the respondents to the r risk cited in the FSS. Risks are assumed to be independent so they can be aggregated into a single indicator. Hence, $I = \sum_r I_r$. All three risks pointed out by financial institutions are considered. The measure I_r refers to the expected impact of a risk type from the point of view of the group of respondents. It is not a feature of the r risk class itself but of the group's expectation about the materialization of that risk. For example, there could be a risk class with a very high expected impact mentioned by only one respondent. In this case, the average expected impact of the risk from the respondents' point of view would be low.

Chart 1.3.4.a – FSS – Global scenario:
probability, impact and frequency

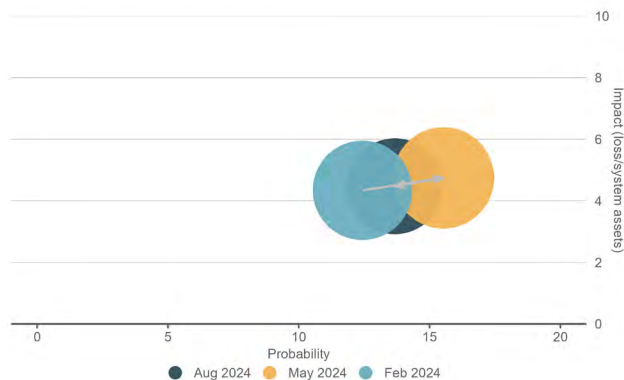


Chart 1.3.4.b – FSS – Fiscal risks:
probability, impact and frequency

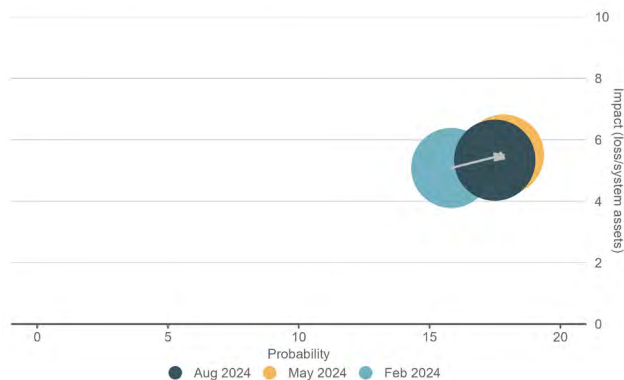


Chart 1.3.4.c – FSS – Delinquency and economic activity:
probability, impact and frequency



Chart 1.3.4.d – FSS – Operational risk:
probability, impact and frequency

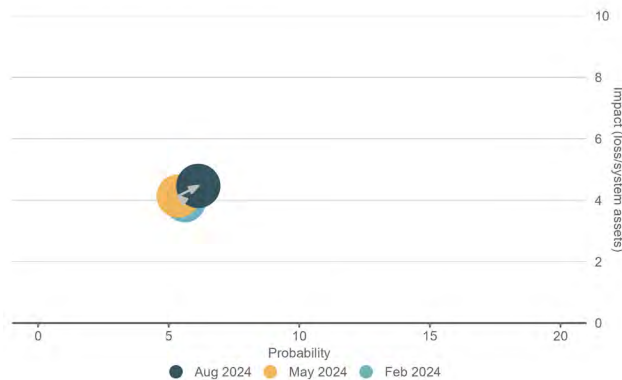
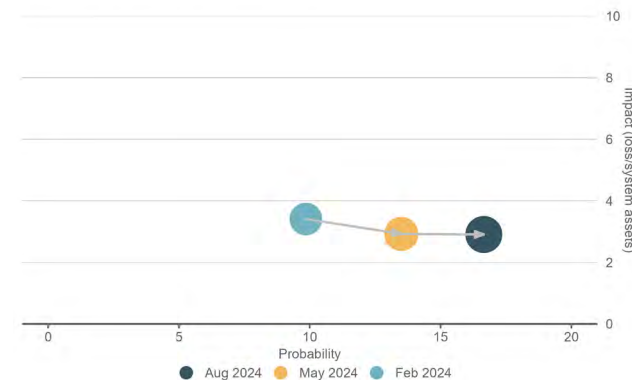


Chart 1.3.4.e – FSS – Domestic inflation:
probability, impact and frequency

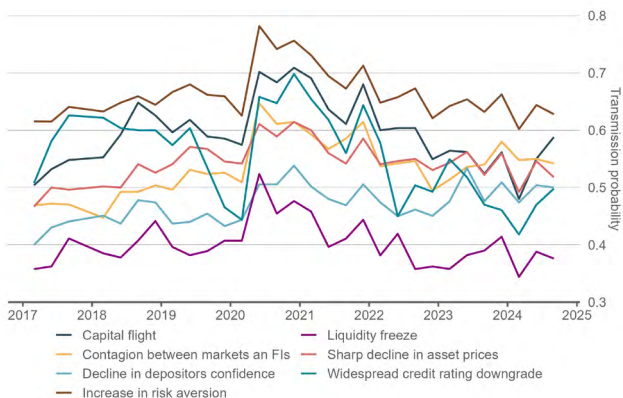


Note: The size of the circle represents the frequency of the risk. The x and y coordinates represent the midpoint of the probability and the impact classes, respectively.

“Increase in risk aversion” and “capital flight” are the most likely shock transmission channels considered. Compared with the February survey, the sharpest increases in the probability of shock transmission occurred in the “capital flight”, which has become the second most relevant channel, and in “rating downgrade” channels. The probabilities of transmission through the following channels have also increased: “increase in risk aversion”, “liquidity freeze”, “decline in depositors’ confidence”, and “sharp decline in asset

prices". The probability of transmission through the channel "liquidity freezing, including the interbank market and credit lines abroad" remained at a low level (Chart 1.3.5).

Chart 1.3.5 – FSS – Transmission channels of high-impact events

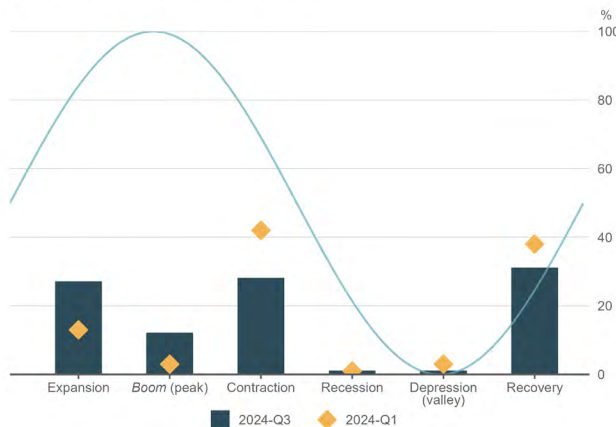


Note: Financial institutions answer the following question: "In the case of the occurrence of the event described as the most relevant to financial stability, what is the probability of this shock being carried through the channels below?"

Economic and financial cycles⁷⁹

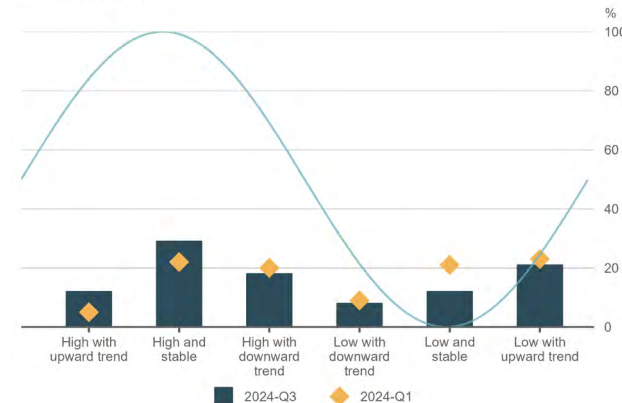
The share of institutions with a more positive assessment of the economic cycle increased significantly. The percentage of respondents who consider the economic cycle is in a positive phase (expansion, boom, or recovery) increased from 54% in February to 70% in August. Mentions to the "contraction" or "recovery" phases declined, while mentions to the "expansion" or "boom" phases increased. The share of respondents assessing that the economy is in "recession" or in "depression (valley)" is still residual (Chart 1.3.6).

Chart 1.3.6 – FSS – Economic cycle



The perception of a high credit-to-GDP gap has become predominant, while the perception of low risk appetite among financial institutions prevails. The share of financial institutions that consider the credit-to-GDP gap to be at a high level rose to 59% in August, from 47% in February (Chart 1.3.7.a). Despite a slight increase in the perception of the level "high", the risk appetite of financial institutions is considered low by 80% of respondents. The perception about an upward trend has been weakening since the February survey, with a majority now assessing that the risk appetite of financial institutions is stabilizing (Chart 1.3.7.b).

Chart 1.3.7.a – FSS – Financial cycles
Credit-to-GDP gap



⁷⁹ Questions: "How would your institution classify the current phase of the economic cycle? Classifications: Expansion; Boom; Contraction; Recession; Depression; and Recovery." and "Classify your institution's assessment of the following financial cycle factors: Credit/GDP gap; Access to funding and means of liquidity; Degree of corporate leverage; Degree of household leverage; Asset prices in relation to economic fundamentals; Willingness to take risks of institutions in your segment. Classifications: High/increasing; High/stable; High/declining; Low/declining; Low/stable; and Low/increasing".

Chart 1.3.7.b – FSS – Financial cycles
Risk appetite

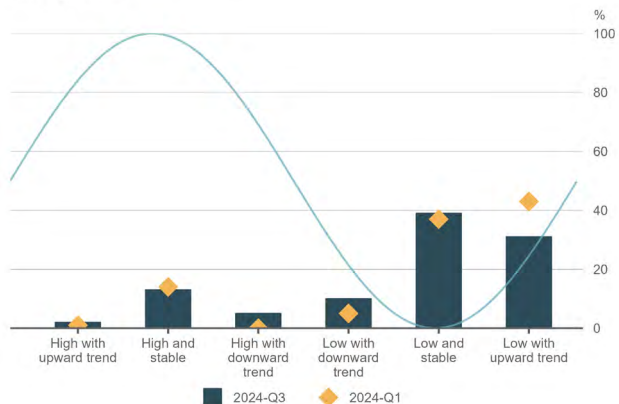


Chart 1.3.7.d – FSS – Financial cycles
Companies leverage

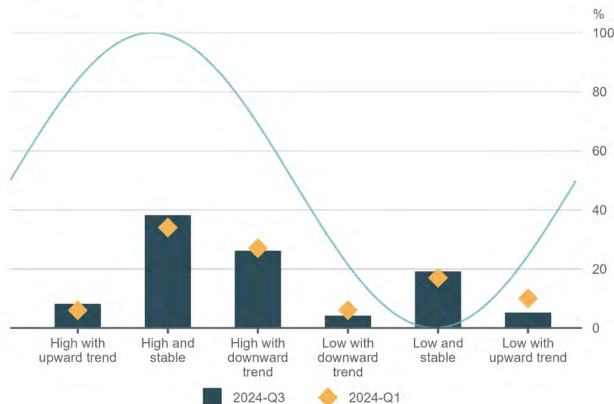


Chart 1.3.7.f – FSS – Financial cycles
Asset prices with respect to the fundamentals of the economy

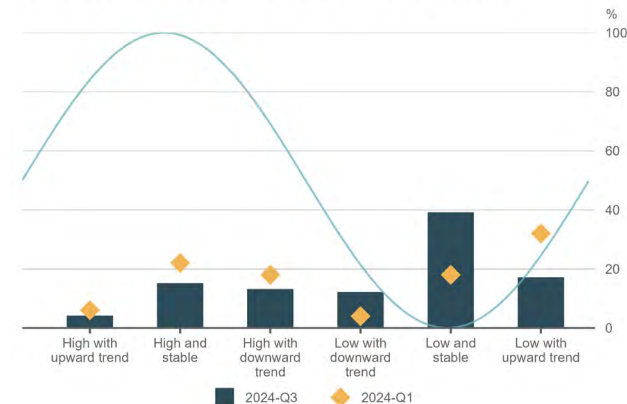


Chart 1.3.7.c – FSS – Financial cycles
Households leverage

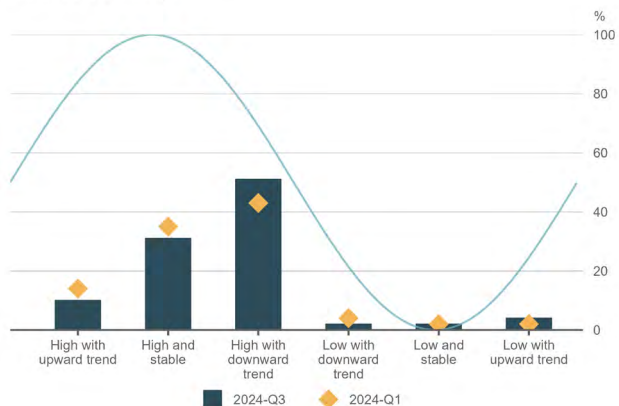
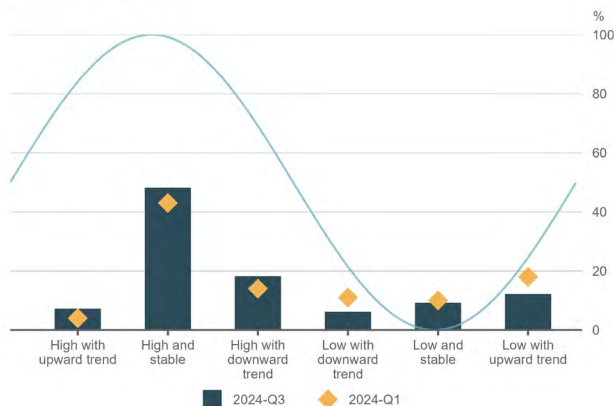


Chart 1.3.7.e – FSS – Financial cycles
Funding and liquidity



Although the degree of households leverage is still perceived as high, the assessment about a downward trend has increased, while the degree of companies leverage, also predominantly classified as high, is deemed stable by most respondents. The share of respondents assessing that the households leverage is still high remains elevated (92%). However, the share of respondents assessing that there is a downward trend increased from 47% in February to 53% in August (Chart 1.3.7.c). Regarding companies leverage, 72% of respondents believe that it is high, compared with 67% in February. Despite this moderate level increase, the perception that there is a trend towards stability rose to 57% in August, from 51% in February (Chart 1.3.7.d).

Access to funding and liquidity continues to be considered high, but the perception about asset prices have worsened.

The share of respondents assessing that the access to funding and liquidity is high increased from 61% in February to 73% in August (Chart 1.3.7.e). Regarding the assessment about asset prices with respect to the fundamentals of the economy, the perception of a low level has strengthened, rising from 54% of respondents in February to 68% in August (Chart 1.3.7.f).

Resilience and confidence in the financial system stability

Confidence in the SFN stability remains high.

According to respondents, confidence in the stability of the financial system continues at a high level, close to the historic high. In the latest survey, the indicator showed a slight decline compared with the February 2024 result. Most financial institutions are very or fully confident in the SFN's resilience (84% in August, compared with 76% in February). In the August and May 2024 surveys, there were no negative mentions – “low confidence” or “no confidence” (Charts 1.3.8.a to 1.3.8.b).

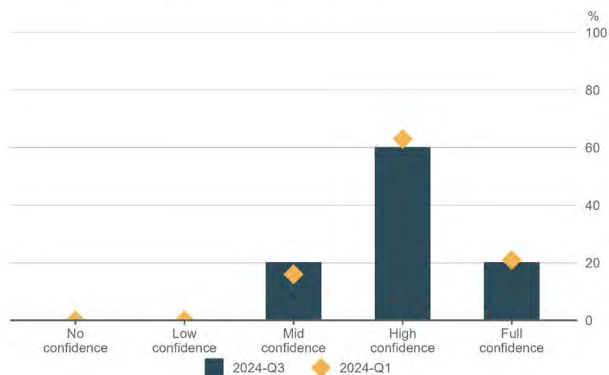
Chart 1.3.8.a – FSS – Index of confidence in the stability of the financial system

Evolution of confidence indexes



Chart 1.3.8.b – FSS – Index of confidence in the stability of the financial system

Relative distribution of confidence perceptions



Expectations for the CCyB

The financial institutions regulated by the BCB subject to the CCyB expect and suggest an **ACCP_{Brasil} at 0%**. Of those, 99% expect the ACCP_{Brasil} to remain at 0% and around 97% suggest that this level is maintained (Charts 1.3.9.a and 1.3.9.b). This result has remained relatively stable during all the surveys.

Chart 1.3.9.a – FSS – Expectations and suggestions for the Countercyclical Additional Buffer (Brazil)

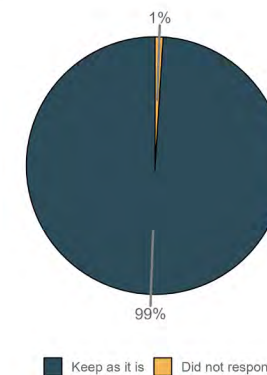
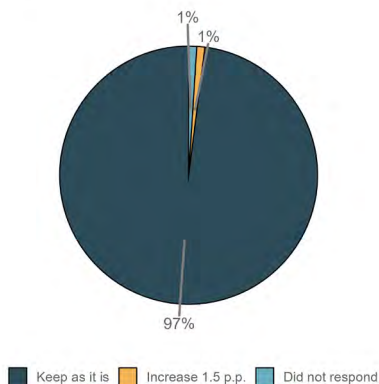


Chart 1.3.9.b – FSS – Expectations and suggestions for the Countercyclical Additional Buffer (Brazil) Suggestions



The financial system held enough intraday liquidity⁸⁰ to ensure smooth flow of payments in the Brazilian Payment System (SPB).⁸¹ Interbank market transactions were settled without any relevant issues and under low risk of intraday fund insufficiency throughout the semester (Chart 1.4.1).⁸² Every two and a half days STR managed a turnover that roughly equals to the Brazilian GDP. During the semester, the average need for funds for daily payments (NEL) was 2.6% of the total available liquidity, with a peak of 4.5%. The Instant Payment System (SPI) reached 206 million transactions on a single day. In more than 96% of time, institutions demanded no more than 25% of their liquidity to settle payments off the STR's operating timetable (Chart 1.4.2).

Chart 1.4.1 – Liquidity Potential and Effective Liquidity Needs

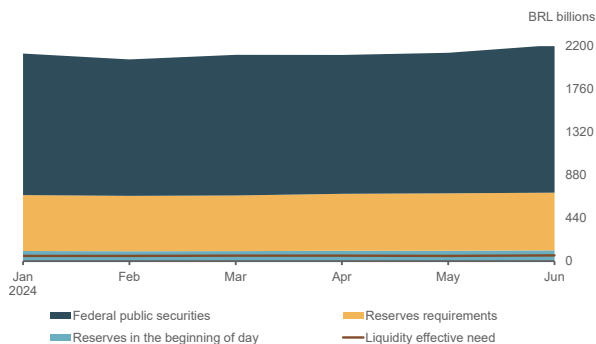
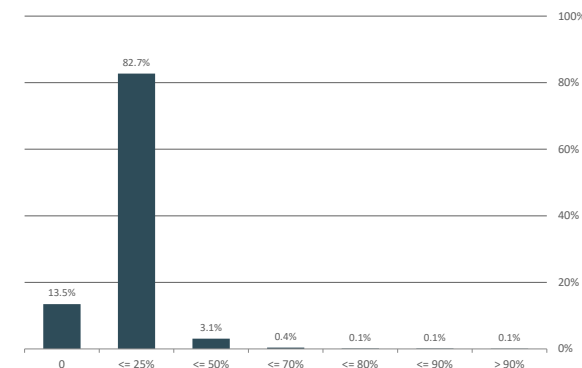


Chart 1.4.2 – After-Hours Liquidity Needs



Pix continues to increase its relevance in the SFN and SPB. Pix already accounts for 23.6% of total retail payments. The transaction volume grew by 8.27% in the past semester (Chart 1.4.3). Most transactions continue to be between natural persons (P2P), as shown in Chart 1.4.4, although there is a continuous increase in other use cases. The SPI maintained 100% availability throughout the period, and ninety-nine percent of transactions were settled in less than 0.87 seconds.

1.4 Financial market infrastructures

In the first half of 2024, FMIs contributed to the safe and efficient functioning of the markets.

The systems were compliant with regulatory requirements and applicable international principles. These are necessary conditions for the stability of the SFN.

80 Aggregate balance of funds available for interbank payments and transfers.

81 Real-time gross settlement systems: Reserves Transfer System (STR), Instant Payment System (SPI) and Funds Transfer System (CIP-Sitraf).

82 FIs can transfer required reserve balances to the Reserves Account and convert Brazilian Government Bonds into Central Bank money by doing repo operations, both without intraday financial costs.

Chart 1.4.3 – Interbank Pix (settled by SPI) and Intraday Pix

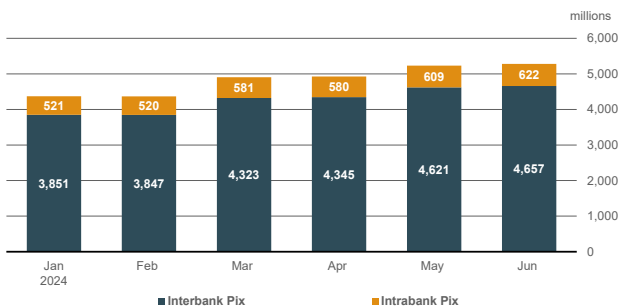
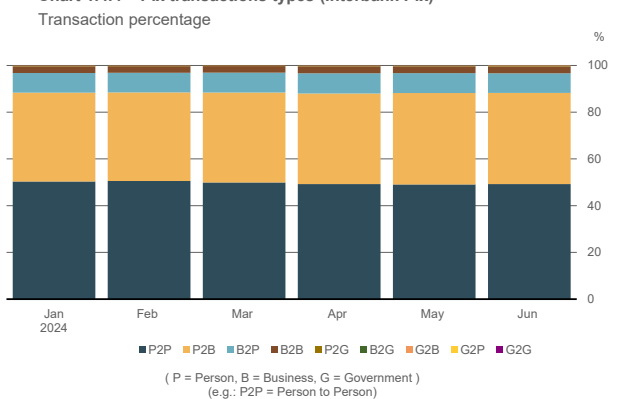


Chart 1.4.4 – Pix transactions types (Interbank Pix)



confidence level exceeds 99%, in accordance with the Principles for Financial Market Infrastructures (PFMI),⁸³ The stress scenarios employed by B3 were more severe than the variations observed in the main Primitive Risk Factors (PRF)⁸⁴ in the period (Table 1.4.1). The margins required by B3 Clearinghouse were sufficient to cover the risk of a high percentage of investors’ portfolios, as assessed by the BCB (Chart 1.4.5).

Table 1.4.1 – B3 Clearinghouse

Discrimination	Primitive Risk Factors (PRF)	
	Low ^{1/}	High ^{1/}
Ibovespa spot	18%	14%
USD spot	10%	21%
Fixed rate 42	7%	7%
Fixed rate 126	9%	14%
Fixed rate 252	14%	16%
Fixed rate 756	18%	19%
DDI ^{2/} 180	11%	6%
DDI 360	10%	8%
DDI 1080	19%	14%

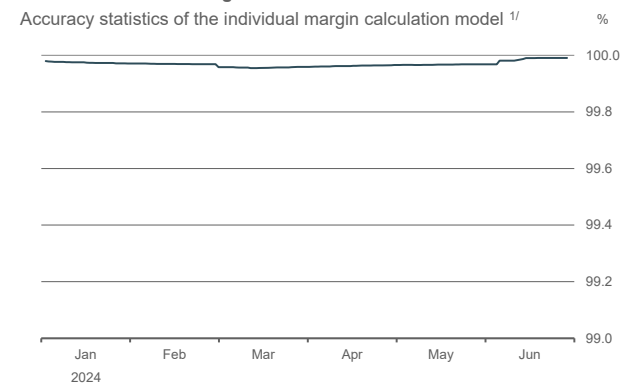
Sources: [B]³ and BCB

Internal methodology

1/ Highest percentage of accumulated variation over 2 days considering the low and high scenarios in the 1st semester of 2024.

2/ Foreign exchange coupon.

Chart 1.4.5 – B3 Clearinghouse



1/ Simply put, the statistic corresponds to an average, over a moving period of 63 working days, of the ratio between (i) the number of portfolios that would not have suffered losses greater than those calculated by the individual margin model used by the CCP; and (ii) the total number of portfolios.
Sources: [B]³ and BCB Internal methodology

The financial risks of the financial assets, securities and foreign exchange markets were properly managed by the FMI. B3 S.A. acts as CCP in two systems: the B3 Clearinghouse and the B3 FX Clearinghouse. In both cases, the initial margin model’s

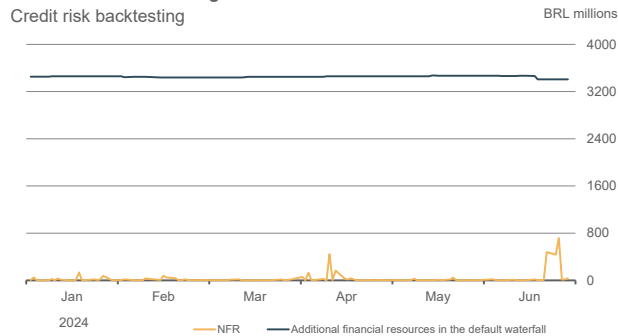
83 This confidence level relates to the estimated distribution of future exposure to settled financial instruments.

84 The primitive risk factor associated with a derivative contract is the designation given to the financial variables that are relevant to the contract’s price formation.

The credit and liquidity exposures were adequately managed by the CCP on all days of the period.⁸⁵

In the B3 Clearinghouse, individual margin and prefunded additional resources would be sufficient to cover B3's credit exposure to the two participants whose joint default would cause the largest aggregate credit exposure (Chart 1.4.6). The liquid resources maintained by the B3 Clearinghouse would be sufficient to ensure the timely settlement of obligations for the two participants with the largest net debt positions. In the B3 FX Clearinghouse, the required collateral would be sufficient to cover its credit exposures associated with each of the participants. Liquid resources held by the B3 FX Clearinghouse would be sufficient to cover the default of the participant with the largest obligation in Brazilian reais (Chart 1.4.7) and in U.S. dollars (Chart 1.4.8).⁸⁶

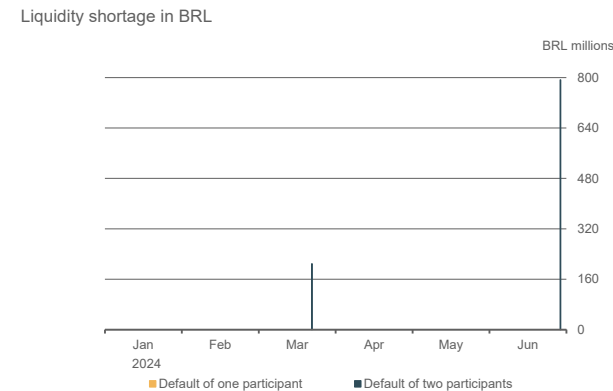
Chart 1.4.6 – B3 Clearinghouse



The Net Financial Result (NFR) is determined by comparing the financial result arising from the simulation of closing-out the participant's position against the value of its collateral, if it is declared in default. This result is calculated based on the close-out strategy projected by the individual margin calculation model and the actual changes in asset prices, observed in the subsequent days.

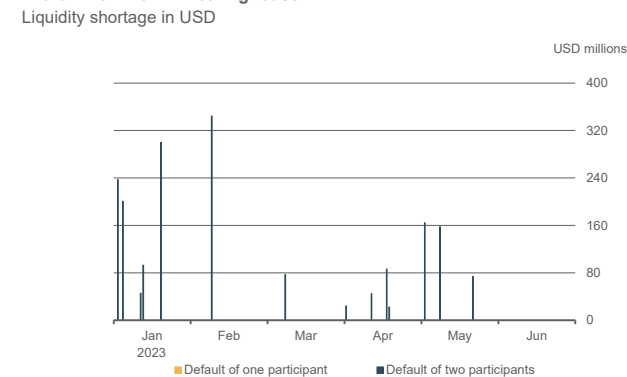
Sources: [B]³ and BC Internal methodology

Chart 1.4.7 – B3 FX Clearinghouse



Sources: [B]³ and BCB Internal methodology

Chart 1.4.8 – B3 FX Clearinghouse



Sources: [B]³ and BCB Internal methodology

⁸⁵ Backtestings indicate that the B3 Clearinghouse and the Foreign Exchange Clearinghouse are complying with SPB legislation and the objectives of the PFMI.

⁸⁶ Principle 7 of the PFMI determines: a) maintenance of sufficient liquid resources to timely settle the obligations arising from the default of the two participants, including companies controlled by them, which would generate the largest aggregate payment obligation for the CCP, in the case of CCPs that are considered systemically important in more than one jurisdiction, or that have a complex risk profile; or b) maintenance of sufficient liquid resources to timely settle the obligations arising from the default of the participant and its affiliates, which would generate the largest aggregate payment obligation for the CCP, in the case of the other CCPs. Since the B3 FX Clearinghouse is systemically important only in Brazil, does not have a complex risk profile and only settles spot dollar purchase and sale contracts, the events represented in charts 1.4.7 and 1.4.8 are compatible with international recommendations and domestic regulations.

II

Selected Issues

Dolar	3,464	3,155
Euro	3,706	3,708
Ibovespa	67,671	67,059
CDI	9,14%	9,06%

2.1 Banco Central do Brasil's actions to ensure financial stability and mitigate the effects of the floods in the southern state of Rio Grande do Sul

After a joint assessment with the market, the *Conselho Monetário Nacional (CMN)* and the BCB adopted measures that contained the effects of the floods in RS.⁸⁷ The initiatives safeguarded the provision of services by the National Financial System (SFN) and avoided unnecessary burdens on citizens and companies. The guidelines for the measures were aimed at preserving financial stability and protecting consumers. The BCB continues to monitor financial intermediation in the region, with less emphasis, due to the perceived reduction in risks.

The impact of the floods on the SFN was less than originally expected. No systemically relevant changes in the funding, liquidity, or credit risk of the supervised entities (ESs) operating in RS are noticed. Specifically in relation to the farming sector, losses from Proagro coverage payments were significantly lower than the losses caused by the droughts of 2022 and 2023.

Internal actions and communication with ESs, guarantee funds and trade associations

Establishment of the Committee for Coping with Financial Crises (CCF) to monitor the impacts of the floods. Initially, the market estimated a 0.2 p.p. drop in GDP and a 0.2 p.p. impact on inflation in 2024.⁸⁸ Next, a survey of 79 institutions with intense activity in the region identified only occasional problems and little concern about financial stability. Between early and mid-June, expectations were already more optimistic about the impact on GDP. The upturn in economic activity appeared to be faster than projected. New survey with systemically important FIs showed that the estimated losses would not be relevant. In early July, the CCF was demobilized due to the perception of reduced risk to the SFN.

Intensification of communication with supervised entities (SE) that have relevant business operations in areas affected by floods. The BCB has established periodic follow-up meetings with SE with potentially higher stakes in the event. Other than the concerned SE, also participated in those follow-up meetings the Credit Guarantee Fund (FGC), the Credit Cooperative Guarantee Fund (FGCoop), the National

Association of Credit, Financing and Investment Institutions (Acrefi) and the Brazilian Association of *Administradoras de Consórcio* (Abac). Permanent monitoring of impacted institutions was deemed necessary, which includes assessing possible effects on the credit portfolio, the rebuilding of SE's physical structures as well as the dynamics of economic activity in the aftermath of the most critical period. Communication with SE turned out to be more intense up to three months following the initial shock, returning gradually back to normal by September 2024.

Impacts on the SFN

The impacts on the SFN resulting from the floods turned out to be lower than those indicated by the initial analyses. The information sent by the ESs showed no systemically relevant changes in funding, liquidity, or credit risk. There was a slight increase in deposits, possibly due to the lack of alternative allocations for clients. As far as the physical structures of the ESs are concerned, few were significantly affected. Branches and IT services were affected for a short time, and contingency measures were swift, flexibility possibly ascribable to lessons learned from the Covid-19 pandemic.

87 Between late April and mid-May 2024, the state of RS was affected by heavy rains that caused the biggest weather tragedy in the history of Brazil's southernmost state.

88 Median estimate of institutions participating in the June 2024 Pre-Copom Questionnaire, available, in Portuguese, at [Questionário Pré-Copom \(bcb.gov.br\)](https://www.bcb.gov.br/questionario-pre-copom).



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Although some financial institutions have modified significant portions of their credit portfolios, the problems were limited in scope.

The flow of loan modifications with borrowers located in Rio Grande do Sul (RS) increased significantly, especially for households (Chart 2.1.1) and in the rural credit. However, the volume of loan modifications is small when compared to the credit portfolio as a whole (Chart 2.1.2).⁸⁹

Chart 2.1.1 – Modified loans – Monthly flow

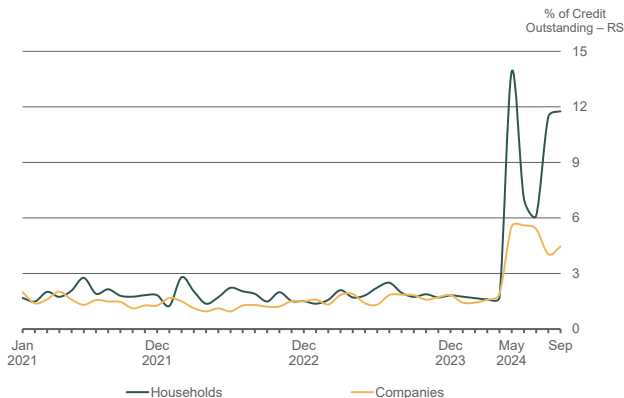
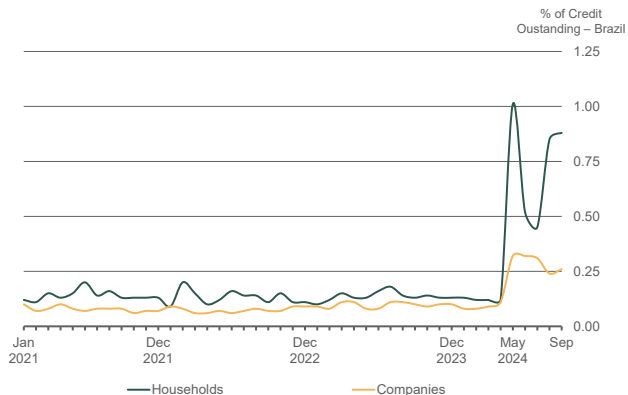


Chart 2.1.2 – Modified Loans – Monthly flow



Losses observed on agriculture, considering the payments made by Proagro, were significantly lower than those caused by droughts on the previous years. Even considering the relevance of agriculture for Rio Grande do Sul economy,⁹⁰ the impact of the calamity for this sector was restricted, as the floods happened after most of the crops had already been harvested. Until September 2024, Proagro payments due to flood losses added up to BRL450 million. This amount is much lower than the BRL6.4 billion paid in 2022 and the BRL10.5 billion paid in

2023 by Proagro.⁹¹ During those periods, agriculture of Rio Grande do Sul has faced hardships, due to severe drought resulting in losses in grain production.

Conduct and Financial Consumer Protection Initiatives

The BCB acted to preserve the proper relationship with clients and users of the SFN affected by the tragedy. This effort included actions related to strengthening service channels, applying exceptional conditions, and monitoring the effective compliance with these conditions, as well as communication and management of associated vulnerabilities.

With supervisory oversight, financial service providers (FSPs) reinforced remote and digital channels, prioritizing service to clients and employees in the affected regions. Call centers had their teams strengthened and their flow facilitated, especially for claims and assistance cases. FSPs created temporary units and rearranged teams to ensure the continuity of service.

89 About the amount of modified loans in the Covid-19 pandemics, see FSR October 2020, “2.1.3 - Initiatives geared towards stimulating the supply of credit”. Available in [Financial Stability Report – October 2020](#).

90 In 2021, agriculture represented up to 14.9% of Rio Grande do Sul GDP. Source: *IBGE, Contas Regionais*.

91 Source: Sicor.

FSPs applied special conditions on terms, fees, and rates to a wide range of products, including checking accounts, credit cards, personal loans, payroll loans, real estate loans, consortia, and insurance.

In addition to differentiated conditions applied to credit granting, FSPs increased flexibility for the payment of contracted service installments, with extended terms and grace periods. They also granted exemptions from fees, administrative charges, and penalties.

The evolution of complaints in internal channels and the ombudsman of the financial institutions has been and continues to be closely monitored to ensure the effectiveness of the measures adopted.

Particular attention has been given to compliance with special business rules regarding improper charges that do not comply with the exceptional rules implemented.

The BCB encouraged the reinforcement of communication through various channels to maximize the reach of the measures.

In line with the principles of the relationship with clients and users of the SFN, the BCB demanded that information be provided clearly and accurately to allow free choice and decision-making by the affected population.

Financial institutions reclassified the vulnerability level of their clients to address the events in Rio Grande do Sul.

The public with increased vulnerability received priority and simplification in service processes and demand handling, as well as in insurance claims. Consequently, the BCB has been monitoring the improvement of statistical models for classifying clients based on their vulnerability level to ensure these clients are marked due to the natural disaster, climate change effects, and temporary vulnerabilities.

Temporary Regulatory Permissions Due to Floods in RS

Restructure credit operations and do not classify them as problematic asset, maintaining them at the risk level they were at on March 31, 2024.

The CMN and the BCB established that restructurings carried out between May 1 and December 31, 2024, exclusively due to the floods in RS, should not be characterized as problematic asset. These rules do not apply to operations that were already overdue by fifteen days or more before March 31, 2024, nor to operations with evidence that the counterparty will not be able to meet the obligation under the new agreed conditions. In summary, these procedures apply only to

operations that were delayed due to the floods, where the payment trouble is considered temporary by the institution's assessment. By maintaining the risk level of March 31, it allows the initial risk weights assigned to these exposures to be maintained.

Regulatory flexibilization for agriculture.

CMN has published a new regulation providing special conditions to renegotiate rural credit operations.⁹² CMN has also published temporary rules that facilitated the process of proving losses covered by Proagro, such as allowing the use of satellite remote sensing as well as statistical criteria to evaluate these losses.⁹³ The flexibilization was needed as transit turned to be difficult due to the floods. CMN also issued a specific norm defining temporary criteria to evaluate social, environmental and climatic risks for new credit contracts.⁹⁴

Flexibility in Loss Provisions for Credit Operations under Federal Programs.

The CMN decided that operations under federal programs aimed at addressing the economic consequences of climatic events in RS will be subject to minimum provision levels only in cases of delays exceeding ninety days in the payment of principal or interest. This rule applies to

92 Resolution CMN 5,132, May 10, 2024, and 5,162, August 13, 2024.

93 Resolution CMN 5,135, May 13, 2024.

94 Resolution CMN 5,158, May 23, 2024.



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operations where the credit risk is held by the Federal Government, either directly or through a guarantee fund or an institution controlled by it.

Deduct the reserve requirements on savings deposit resources. This prerogative was granted to financial institutions that, as of the base date of March 31, 2024, had at least 10% of the total credit granted to resident individuals or legal entities established in municipalities covered by the state of public calamity.⁹⁵ Among the institutions eligible for the deduction, five were using the prerogative during the compliance period, from September 9 to 13, 2024, which represented, during this period, the release of BRL2.6 billion in reserve requirements over savings deposits and BRL6.3 billion in reserve requirements over rural savings deposits.

Extension of Deadline for Submission of Accounting Documents. The BCB has temporarily extended the deadlines for the submission of accounting documents by financial institutions with headquarters or branches in the affected municipalities. This measure applies only to documents related to the periods from April to June 2024.

Flexibility in Rules for Consortium Administrators.

The BCB has allowed consortium administrators, until December 31, 2024, exclusively for consortium members economically affected by the climatic events in RS, who hold quotas in consortium groups established until May 2024, to:

I – pay the credit in cash or through credit in deposit accounts or payment accounts held by the consortium members who have been awarded and have not yet used the credit for the acquisition of goods or services, upon full settlement of obligations with the group and the administrator; and

II – extend the deadlines to charge and execute guarantees given to consortium operations with delays in the payment of more than one installment. This measure applies to consortium contracts that do not provide specific deadlines for taking such actions, subject to other precautionary measures provided for in the regulation, always under the responsibility of the consortium administrator and its managers.

⁹⁵ Resolution BCB 379, of May 13, 2024.



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Box – Estimates of the economic impact of the floods in the state of Rio Grande do Sul

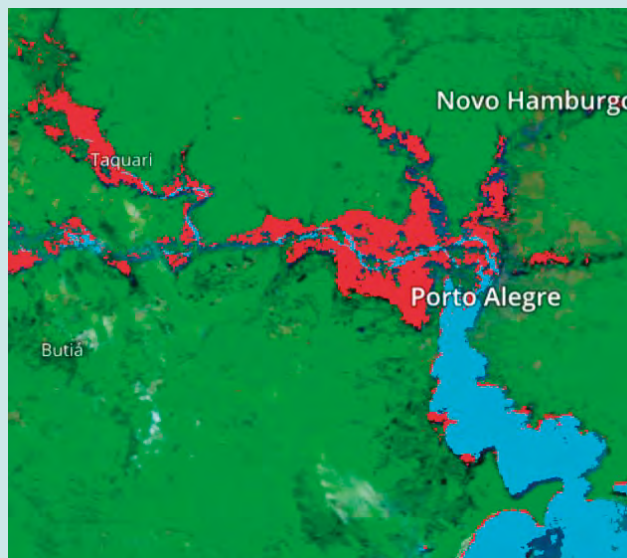
Households and firms have been directly hit by more severe and more frequent climate events, such as droughts, rainfalls and floodings. Climate risk is associated with the intensity of the event, exposure and vulnerability of the region. Regarding FIs, extreme weather events can affect the ability of borrowers to pay their debts; reduce the value of assets pledged as collateral; and, consequently, increase credit risk.

The state of RS recently saw heavy, unprecedented rainfalls and floods. The BCB assessed the exposures and possible losses for FIs operating in the region. The BCB estimated the possible impact on FIs from direct exposure to borrowers, both firms and individuals, located in municipalities affected by the floods. The indirect effects on the supply chain of firms located in these areas were also evaluated.

The direct impact on the SFN results from the default of firms and credit borrowers located in flooded areas. The indirect impact is estimated by building a network of suppliers for firms located in areas hit by floods. The direct exposure of FIs considers loans to firms and their employees, and credit granted to individuals located in the affected areas

(personal, real estate and rural credit). The indirect effect considers the impact on suppliers that would also be affected by the reduction in their sales to local firms. In this way, the impact on the SFN takes into account the entire identified network, including local firms, their suppliers and employees.

Figure 2.1.1 – In red, flooded areas around the city of Porto Alegre (RS) on 7 May 2024



Source: MODIS Near Real-Time (NRT) Global Flood Product.

The exposure of the FIs to both firms (and suppliers) and individual borrowers was obtained by mapping the information on the geographic coordinates of their addresses to the flooded areas that were delineated using satellite images. An area was considered as flooded if it was classified positively when checking daily images of a global flood map, between May 1 and 16, 2024 (Figure 2.1.1). After identifying the flooded areas, firms located within a radius of 1 km were considered affected by the floods.

Despite the grievous social and economic consequences of the floods, the exercise shows that FIs' exposures and possible impact on their capital are limited. Around 54,000 firms, employing 663,000 people, would have been affected by the floods. The largest credit exposures of FIs to firms located in the affected areas occur in the region of Porto Alegre and its surroundings (Figure 2.1.2). The total exposure, direct and indirect, is around BRL53 billion. In the event of losses materializing, BRL8 billion would be necessary to restore FIs' capital ratios to the minimum requirements, which represents 0.6% of the system's regulatory capital (Table 2.1.1). As a proportion to regulatory capital, the largest losses would occur in small FIs with operations restricted to the

municipalities most affected. As large banks in Brazil operate in different municipalities and economic sectors across the country, losses are limited even in the extreme case observed in RS.

Figure 2.1.2 – Credit exposure of FIs to firms located in flooded areas

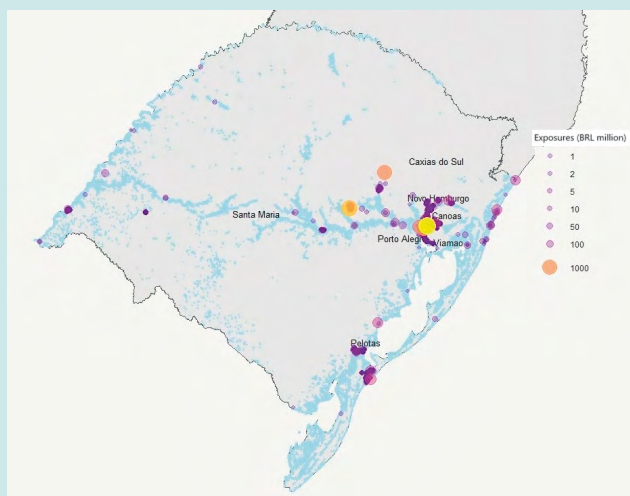


Table 2.1.1 – Estimation of impact	
Floodings in RS state	as of March/2024
Number of firms (thousand)	54
Number of employees (thousand)	663
Exposure to firms (BRL billion)	22.9
Exposure to individuals (BRL billion)	29.6
Interfinancial contagion (BRL billion)	1.8
Capital ratio impact (p.p.)	-0.8
Capital shortfall (BRL billion)	8.1
Capital shortfall (%RC)	0.6

Source: BC

This exercise does not constitute a prediction of default by firms and individuals located in areas affected by the floods or future losses of FIs, but an analysis of an extreme, yet possible, scenario.

The results show that the financial institutions with operations in the flooded areas would have enough capital to absorb losses if the simulated scenario materializes. Given the resilience of the society and economic activity, and the measures adopted by public authorities, the impact observed so far has proven to be less adverse than simulated.

2.2 Climate transition risk: estimating the impact on the SFN

Climate transition risk refers to the potential losses to FIs due to regulatory changes, changes in consumption patterns or technological innovation associated with the transition to a low-carbon economy. The exposure of FIs to sectors experiencing the highest transition risk was assessed in the November 2022 FSR edition. It was estimated using an indicator that jointly evaluates the contribution to gross greenhouse gas (GHG) emissions, the relative exposure of economic sectors and the dependence on external markets. At that time, the exposure of the SFN credit portfolio to sectors classified as facing high or medium transition risk was estimated at 8%, with the segments S4 and S5 most exposed to these sectors.

The current study presents a step forward on the assessment of the SFN's exposure to the transition risk evaluating its impacts on the real economy and possible losses to FIs in a climate transition scenario. Additional costs associated with non-financial firms' transitioning to a low-carbon economy are estimated using a computable general equilibrium (CGE) model for all economic sectors. The

macroeconomic variables forecasted using the CGE model, including the sectoral GDPs, are used as input of an econometric model that aims to estimate the effect of the transition-risk impacted sectors on the problem assets of FIs (PAs). Finally, the impact of additional provisions on each institution's capital, due to a deterioration of assets exposed to sectors affected by the transition, is estimated using the BCB's macroeconomic stress test framework.

Evaluating the financial and economic impacts of the transition to a low-carbon economy presents challenges due to the long-term horizon inherent to the process, as well as the high degree of uncertainty regarding the evolution of regulation, technology and socioeconomic factors. Since the effects of the transition are widespread and affect the entire economy, the Central Bank conducted a scenario analysis to estimate the impacts on different economic sectors. Given the high degree of uncertainty associated with long-term modeling, the analysis is set for a three-year horizon, in line with the macroeconomic stress test. It is worth noting that the scenarios analyzed do not represent a forecast for the coming years, but a hypothetical yet plausible, transition scenario for the economy.

The CGE model characterizes the additional cost arising from GHG emissions by imposing a tax on the economic sectors. The framework can be interpreted as a one-time shock on firms' costs due to either a carbon tax or any other regulatory measure limiting their emissions and, therefore, reducing the country's GHG emissions, for instance, as a carbon market.⁹⁶

Two scenarios of gradual increase in emissions costs for all sectors of the economy are simulated, starting in 2025 and achieving USD50/tCO_{2e} (Transition Scenario 1) or USD100/tCO_{2e} (Transition Scenario 2) in 2030. Monetary policy responses to eventual goods and services price increase, even though expected are not captured by the CGE model. Also, technological development plays a fundamental role in reducing carbon emissions, especially in contexts of higher costs. However, the adopted CGE model does not consider innovations in production processes, investments in green technology or the creation of new industries that could benefit from the energy transition. To estimate the effects of the transition on the FIs' credit portfolios over a three-year horizon, macroeconomic variables such as inflation, interest rate (Selic)

⁹⁶ Carbon pricing (carbon tax or emissions trading system) aims at reducing GHG emissions. The idea is to internalize the cost associated with emissions, so payments by the polluter must be proportional to the amount of emissions. In Brazil, there are ongoing discussion for the establishment of a carbon regulated market (PL 2148 de 2015, PL 412 de 2022). There are no regulatory provisions for carbon taxes in the country at the moment.



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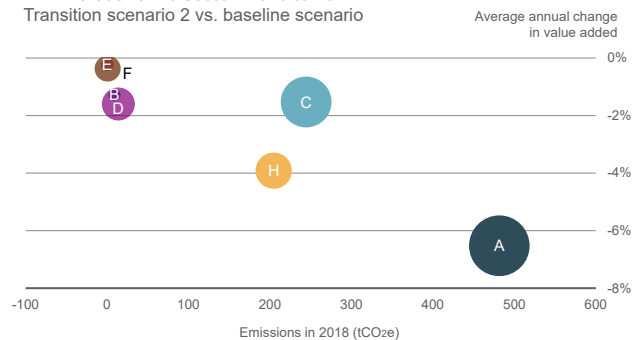
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and unemployment follow the baseline scenario as defined in “Box 1 – Description of the scenarios used in the macroeconomic stress test” of this Report. The exercise considers the FIs’ all exposures to nonfinancial firms and rural credit granted to individuals.

Agriculture and transportation are the sectors that show the largest drops in GDP following the imposition of the carbon tax (Chart 2.2.1) vis-à-vis the no-tax setting.⁹⁷ The reduction in value added is due to the increase in the production cost of the sector itself and the cost of inputs from other sectors.

The imposition of a tax of USD50/tCO_{2e} would reduce Brazilian emissions by 23% by 2030 at the cost of a reduction of 0.3 percentage points in the annual GDP growth forecast for the five-year period from 2025-2030 – the reduction in emissions being proportional to the decline in the value added of each sector. For a tax of USD100/tCO_{2e}, the reductions in emissions and annual growth would be 38% and 0.5 percentage points, respectively.

Chart 2.2.1 – Carbon emissions and value added by CNAE’s economic sector: 2025 to 2027^{1/}
Transition scenario 2 vs. baseline scenario



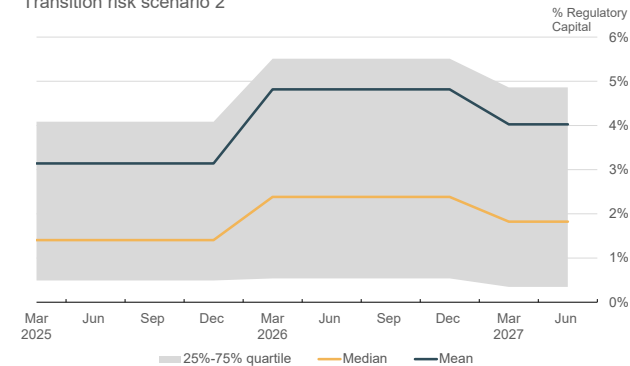
1/ The size of the bubbles represents the credit outstanding to CNAE sections: A, B, C, D, E, F and H.

The losses from addition provisions for the FIs are mainly concentrated in the manufacturing, construction and transportation sectors due to the increase in problem assets in these sectors.

Considering the highest GHG emission sectors, the FIs are most exposed to agriculture, manufacturing and transportation (Chart 2.2.1). The impacts of required additional provision expenses are not homogeneous among FIs and result from the different levels of exposure to the most carbon-intensive sectors (Chart 2.2.2). Nevertheless, the large exposure of the SFN to the

agricultural sector does not translate into impacts of equivalent magnitudes on FIs, as it shows a lower proportion of PAs as compared to other economic sectors.

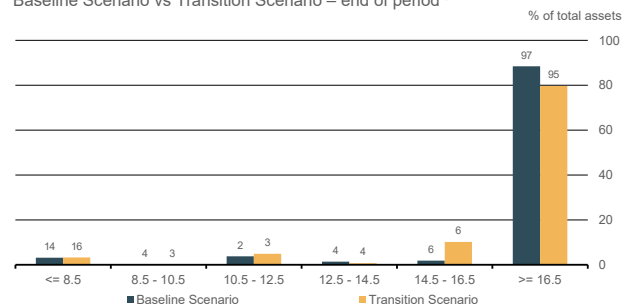
Chart 2.2.2 – Forecast of the impact of additional provisions^{1/}
Transition risk scenario 2



1/ Ratio represents additional provisions in proportion to total capital (TC).

The impact on capital ratios is limited given the moderate increase in PAs for FIs exposed to the sectors most impacted by the carbon tax. The comparison between the baseline scenario and the transition scenario 2 shows a slight reduction in FIs’ capital ratios and no significant effect on the system’s capitalization (Chart 2.2.3).

97 The economic sectors are represented by the Brazilian CNAE (National Classification of Economic Activities) taxonomy A: agriculture, livestock, forestry, fishery and aquaculture.; B: mining; C: manufacturing; D: electricity and gas; E: water, sewerage, waste management and decontamination; F: construction; e H: transportation, storage and mail.

Chart 2.2.3 – Frequency distribution of banks' capital ratioBaseline Scenario vs Transition Scenario – end of period^{1/}

^{1/} Values above bars refer to the number of banks in each range.



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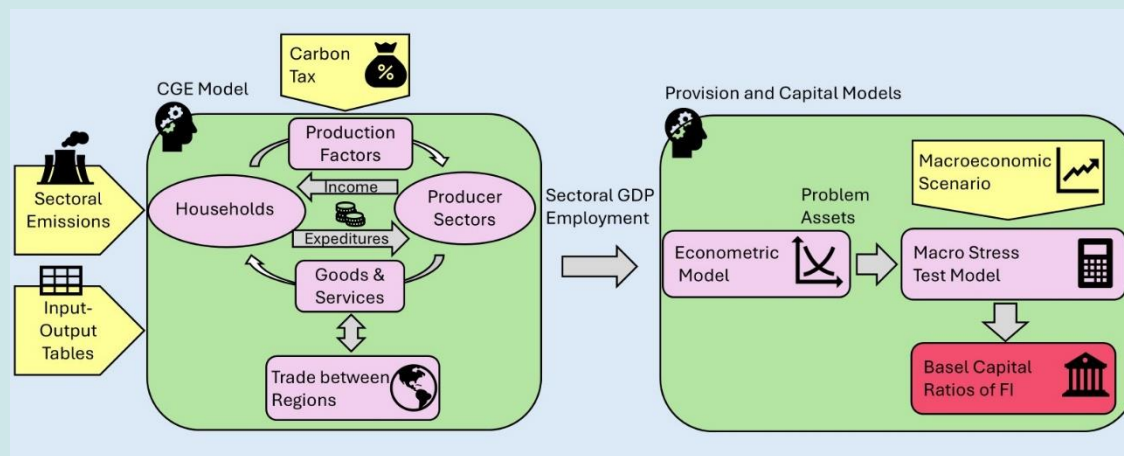


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Box – Climate transition risk estimation framework

The methodology proposed to assess the potential impacts of climate change on the SFN consists of three parts (Figure 2.2.1). First, the macroeconomic effects arising from the increased costs of the transition to a low-carbon economy on the Brazilian economic sectors are simulated through the calibration of a computable general equilibrium model. Second, a credit risk model is estimated to translate the impacts on the different economic sectors on the asset quality of the FIs. Finally, using the methodology consolidated for the BCB's macroeconomic stress test, we evaluate the shock absorption capacity of FIs and, ultimately, the stability of the SFN.

Figure 2.2.1 – Diagram representing the framework (set of models and their interconnections) for estimating the impacts of the climate transition risk on FIs



The Computable General Equilibrium Model

To evaluate the transition risk impacts on different economic sectors, a Computable General Equilibrium (CGE) model is developed with a view to incorporating the macroeconomic effects of a carbon tax on the

Brazilian economy, disregarding prices adjustment and the monetary policy response.⁹⁸

The model represents the Brazilian economy through forty-six economic sectors that interact with ten trade blocs around the world. The model considers the

98 The development of the model was in partnership with Instituto de Pesquisa Econômica Aplicada (Ipea). The CGE model is based on: Oliveira, J. M. (2020) Efeitos da equalização tributária regional/setorial no Brasil: uma aplicação de equilíbrio geral dinâmico. Universidade de Brasília; e Caliendo, L.; Dvorkin, M.; Parro, F. (2019) Trade and labor market dynamics: General equilibrium analysis of the China trade shock. *Econometrica*, v. 87, n. 3.

interactions between economic agents (production sector, families, government and exporters/importers) and the effect of intersectoral migration of the labor force in Brazil over time. In this way, it is possible to simulate the state of the economy, especially for short and medium-term horizons due to the rigidity assumed for production structures.

The size of and the interrelations between the Brazilian economic sectors and the trade blocs are represented by input-output tables, base year 2017. The GHG emissions in Brazil are disclosed by **MCTI (Ministry of Science, Technology and Innovation)**, while the effect of intersectoral labor migration is estimated using the **Rais (Annual database of social information)** database. Finally, **IBGE** (Brazilian Institute of Geography and Statistics) economic data for the period 2018-2024 is used to represent the development of the Brazilian economy up to the initial year of the simulation horizon.

An emission tax for carbon dioxide and other greenhouse gases in equivalent terms (CO₂e) is introduced to simulate the impacts on the value added (GDP) of economic sectors in the period 2025-2030. Estimates

for carbon equivalent prices (USD/**tCO₂e**) used in the transition scenarios are based on a survey of pricing implementation for GHG emissions – either through taxation or markets prices – as well as analyses of climate scenarios carried out in other countries.⁹⁹

The assessment of the transition risk for the financial system simulates two scenarios, both of gradual increase in emissions costs to all economic sectors, starting in 2025 and linearly increasing up to 50USD/**tCO₂e** and 100USD/**tCO₂e** in 2030 – transition scenarios 1 and 2, respectively. This methodology produces trajectories of sectoral GDPs for each scenario, reflecting the additional cost of carbon emissions.

The Econometric Model

The connection between the effect of rising emission costs on different economic sectors and the FIs, and the potential implication for financial stability is established by the credit risk model.

The credit risk model estimates the relationship between the proportion of **PAs** from the various economic sectors in the FIs' credit portfolios and

macroeconomic variables, such as the sectoral GDP, unemployment, inflation and interest rates. To carry out the exercise, the rural credit for individual and credit to non-financial companies granted by banks are considered. A panel data, fixed-effects model, whose individuals are the CNAE divisions, grouping together different economic activities, for the period 2012-2021 is used for the estimation.

Once the parameters have been estimated, the proportion of **PAs** for each FI is projected for the period 2025 to 2027. For these projections, the trajectories of sectoral GDPs simulated in the CGE model are used. For the other macroeconomic variables, the baseline scenario developed for the **BCB's** macroeconomic stress test described in “**Box 1 – Description of the scenarios used in the macroeconomic stress test**” of this Report is used.

Capital ratios computation: using the macroeconomic stress test framework

Finally, to assess the capacity of the **SFN** to absorb the effects arising from the transition to a low-carbon economy, the eventual decline in asset quality

⁹⁹ World Bank (2021). Not-so-magical realism: A climate stress test of the Colombian banking system. EFI Insight-Finance. Washington, DC: World Bank.
IMF (2022). Mexico Financial Sector Assessment Program: Technical note climate risk analysis. IMF Country Report No. 22/360, 2022.
World Bank (2023). State and Trends of Carbon Pricing 2023. Washington, DC: World Bank.



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effects on the capital of the FIs are accounted for by using the methodology applied in the macroeconomic stress test. It is assumed that the composition of the FIs' portfolios do not change over time (static balance sheet). That is, any additional provision expenses arising from the projected stock of PAs add to the macroeconomic shocks from the baseline scenario, and the effects on the balance sheets and capital ratios of the FIs are calculated. Henceforth, it is possible to measure the impact of the increase in GHG emission costs and translate them into possible resulting losses for the FIs most exposed to carbon-intensive economic sectors.

2.3 Regulatory Convergence with International Accounting Standards: Financial Instruments and Hedge

Research by the BCB indicates that the new accounting rules for financial instruments will require many entities to increase their loss provisions.

New accounting concepts and criteria for measuring, recording, and disclosing financial instruments will come into effect on January 1, 2025. The constitution of provisions for expected losses associated with credit risk will undergo significant changes in the calculation method and the scope of instruments subject to it. To assess the impact of the new rules, the BCB surveyed entities responsible for about 84% of the credit exposures of the National Financial System (SFN). The surveyed entities estimate an aggregate increase of BRL37.8 billion in provisions, representing 10.7% of current provisions. Despite the impact at the beginning of the transition, the new rules will make the SFN more robust to face credit risk.

New accounting concepts and criteria for recognition, measurement, and disclosure of financial instruments effective January 1, 2025.¹⁰⁰ The

convergence of accounting standards applicable for financial institutions with international accounting standards will improve significantly, as the new rules are aligned with the International Financial Reporting Standard (IFRS 9) Financial Instruments and IFRS 7 Financial Instruments: Disclosures. Financial instruments represent more than 70% of the total assets of institutions authorized to operate by the BCB. IFRS 9 outlines the accounting concepts and criteria for classification, measurement, recognition, derecognition, and provisioning of financial instruments, as well as the accounting criteria for hedge designation and recognition. IFRS 7, on the other hand, sets out the disclosure requirements to enable the assessment of the nature and significance of risks arising from financial instrument transactions for the institution's financial position and performance.

The measurement of financial assets and liabilities is among the most relevant changes.

At first, financial instruments will be measured at fair value, plus or minus transaction costs. In subsequent periods, these instruments will be remeasured at fair value or amortized cost, according to their initial classification. Additionally, income and expenses will

be recognized periodically using the effective interest method, making accounting recognition more aligned with the cash flow of operations.

There are two methodologies for entities to estimate expected losses associated with credit risk: the complete methodology and the simplified methodology.¹⁰¹

In the complete methodology, expected losses are evaluated considering the probability of the instrument being characterized as a problem asset and the expectation of recovery of the instrument. These parameters must be estimated prospectively, based on current and forecasted economic conditions, considering the stages in which the instruments are allocated. In the simplified methodology, expected losses are evaluated based on the counterparty and financial instrument risk factors, considering the potential condition of the instrument as a problem asset.

In addition to constituting provisions in amounts corresponding to the expected losses of financial instruments, entities must observe regulatory levels of provision for incurred losses and additional provision for expected losses. Entities must

100 Resolution CMN 4,966, of 2021, and Resolution BCB 352, of 2023.

101 Entities in segments S1, S2, and S3, cooperative systems of two or three levels containing institutions in these segments, Payment Institutions of type 2 with total assets exceeding 0.1% of GDP, and S4 entities authorized by the BCB to adopt this methodology must use the complete methodology. Other entities must use the simplified methodology.



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record provisions for incurred losses¹⁰² for financial assets with due dates exceeding ninety days¹⁰³ and for financial assets whose counterparty is a company in bankruptcy proceedings. Additionally, entities using the simplified methodology must constitute, in addition to the provision for incurred losses, an additional provision for expected losses¹⁰⁴ for credit operations, operations with credit characteristics, financial lease operations, receivables related to payment transactions with end-users, and other financial assets originated from the renegotiation of these operations.

There will also be an increase in the scope of instruments subject to provision for expected losses. Current accounting rules require provision for credit operations and other operations with credit characteristics, financial lease operations, and financial guarantees provided.¹⁰⁵ The new rules expand the scope of financial instruments subject to

provision, including non-cancellable credit commitments, undrawn credit facilities, and financial assets in general,¹⁰⁶ which include, for example, debentures and other private securities.

The BCB conducted a survey with entities to assess the impact of the new rules on provisions for expected losses associated with credit risk.

The survey requested a sample of entities to provide information on provisions calculated according to the new rules, considering their estimates of expected loss, provisions for incurred losses, and additional provisions for expected losses, in the case of entities using the simplified methodology. The data requested refers to the base date of June 2024 and includes (i) credit operations and other operations with credit characteristics; (ii) debentures and other securities with credit characteristics; (iii) other financial assets classified as amortized cost; (iv) financial guarantees

provided; (v) credit commitments; and (vi) undrawn credit facilities. The sample consisted of ninety entities,¹⁰⁷ responsible for 83.6% of the credit exposures of the SFN within the scope of the Credit Information System (SCR).¹⁰⁸ Of these entities, 49 will use the complete methodology¹⁰⁹ and 41 the simplified methodology for calculating provisions for expected losses associated with credit risk.

Entities estimate an aggregate increase of BRL37.8 billion in provisions, representing 10.7% of current provisions.

For financial instruments currently requiring provision under existing accounting rules, the estimated increase in provisions is BRL31.8 billion (9.6% of current provisions for these instruments). For instruments that will require provision for expected losses associated with credit risk, the estimated increase in provisions is BRL6.0 billion (1.7% relative to current provisions recorded for all

102 The levels of provision for incurred losses are defined by portfolio and delinquency range.

103 In line with deductible losses for income tax purposes under Law 14.467, of 2022.

104 The levels of additional provision for expected losses are defined by portfolio, delinquency range, and problem assets.

105 Resolution CMN 2,682, of December 21, 1999, and Resolution CMN 4,512, of July 28, 2016.

106 Do not include equity instruments of another entity, derivative instruments, and financial assets classified in the fair value through profit or loss (FVPL) category measured at level 1 of the fair value hierarchy, except for private securities, credit operations, and other operations with credit-granting characteristics.

107 Cooperative Systems that participated in the survey answered in an aggregated manner. Considering all cooperatives in the systems as individual entities, we had 540 entities participating in the survey.

108 There are exposures subject to the constitution of provisions for expected losses associated with credit risk that are not currently within the scope of the Credit Information System (SCR).

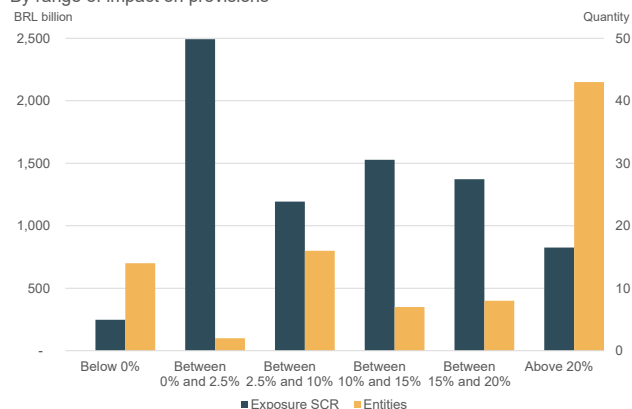
109 Considering all cooperatives in the systems as individual entities, 499 entities will use the complete methodology.

financial instruments). It is worth noting that, as this is a new accounting regime, the increase in provisions will affect capital but not the entities' financial results.

New rules for accounting for financial instruments do not pose a risk to the stability of the SFN, although there will be a significant increase in provisions for many entities. According to the survey, credit exposures are concentrated in entities with provision impacts below 20%. Although a large portion of the entities that responded to the survey indicated an increase in provisions for credit risk above 20%, their credit exposures represent 10.8% of the exposures of the participating entities. About 35% of the entities reported provision impacts below 10%, representing more than half of the credit exposures (Chart 2.3.1).

Chart 2.3.1 – Distribution of exposure and entities

By range of impact on provisions



2.4 Cyber and Information Technology crisis management

Financial institutions must be prepared to manage adverse events that could lead to operational crises, which may even have implications for their peers and for the SFN. The risk of operational events with the potential to affect the regular functioning of the financial system is increasing due to several factors such as the high interconnectivity among SFN participants, the focus on providing services through digital channels, and the growing dependence on technology service providers. Increasingly complex technological environments, characterized by the massive use of computational models, including artificial intelligence models, also contribute to a higher risk scenario. While institutions have established incident response plans and structured continuity management processes, the possibility of unforeseen events for which institutions do not have previously established response and recovery procedures should not be dismissed. In these situations, it is important that the agents involved in crisis management are aware of their role and make timely decisions to mitigate the impact of a severe incident and recover the impacted services as soon as possible.

An evaluation developed by the Central Bank considering relevant SFN institutions mapped the necessary capacities to implement an effective process for operational crisis management. The

study was focused on the management of cyber and IT crises, and considered eight systemically relevant institutions. Its objective was to identify how these institutions were organized to face severe operational crises. The study was developed from the analysis of policies, internal regulations and documentation in general, governance structures established, communication and business continuity plans developed, mechanisms for crisis management involving third parties and verification of the role of lines of defense.

The first step to an effective and well-structured crisis management process is the establishment of a definition for operational crisis. The definition of operational crisis is essential for the timely identification of situations that will require the declaration of crisis and the initiation of crisis management procedures for their proper treatment. Severe, unexpected and complex adverse event, unavailability of operations, threat to strategy, financial deterioration, risk to reputation, risk to people and, at the limit, risk to the existence of the institution are terms typically found in the definitions of crisis mapped in the assessment developed by the Central Bank.

It is also crucial to establish objective criteria to characterize situations that may indicate the occurrence of IT and cyber crises. The institutions considered in the analysis periodically review the classification of incidents in resolution. The expected time

to resolution, the impact on customers (e.g., type of unavailable channels), the critical systems affected, and the impact on processing grids are examples of factors considered in the periodic reassessment of incidents and that may indicate the need to escalate to a crisis.

Another important capability involves the creation of a robust structure for crisis management, which, considering the institutions analyzed, typically consists of an organizational component dedicated to the process, tactical/operational groups that act in the resolution of incidents, and a crisis committee, which has participants from senior management and is responsible for the strategic decision-making process. The governance structure for crisis management typically encompasses the definition of the strategy, maintenance of the process, execution of crisis management and post-crisis recovery activities. A team dedicated to the crisis management process is responsible for keeping the process up to date, establishing guidelines and procedures, training the people involved, orchestration between the operational areas and the crisis committee and, at the time of a crisis, activating the mentioned committee. In the tactical/operational groups, technical managers work to resolve the event, as well as support the execution of the communications plan. These are groups activated by the crisis management team and usually include representatives from the business and/or product areas. The crisis committee is responsible for assessing the impacts of a crisis, deciding

on which areas will be activated and what actions will be adopted, coordinating communication with stakeholders, and monitoring the actions taken, as well as the repercussions of the crisis. Commonly, it is composed of the CEO and executive directors of the impacted areas, who are directly responsible for decision-making.

Regarding governance aspects, the assessment developed by the Central Bank highlighted the importance of the involvement of senior management in crisis resolution. The senior management of analyzed institutions demonstrated high awareness of IT and cyber risk, ensuring attention to the topic and investments in the acquisition of capabilities and in the development of incident prevention and crisis response practices. A characteristic of these institutions is the involvement of senior management from the beginning of a more serious incident, even before a crisis is declared. Lessons learned during the pandemic were also important to identify opportunities to improve crisis management, such as the use of pre-configured virtual rooms to enable the timely participation by senior management in monitoring relevant incidents, providing a more agile and effective environment for decision-making.

Crisis management must be supported by policies, procedures and plans that are properly established and tested. The normative framework of the institutions includes, at least:

- Corporate policy and/or standards for crisis management: definition of concepts, governance, scope, responsibilities and procedures of crisis management.
- Corporate policy and/or standards for business continuity: establishment of processes, guidelines and mechanisms to ensure business continuity and data integrity of critical processes within impact tolerance levels.
- Corporate standards for IT incident management: definition of guidelines, governance, classification criteria (impact, urgency), categorization, prioritization, responsibilities and, in some cases, details of procedures and tools.
- Corporate Information Security Policy/Cybersecurity Policy: establishment of principles, guidelines and attributions related to information security and data protection of the institution.
- Corporate standards for the management of Information Security (IS) incidents: definition of responsibilities in the resolution of IS incidents, governance established in the decision-making process considering, for example, scenarios of compromise of the institution's information and assets caused by a cyber-attack.



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Proper management of an operational crisis also depends on an effective and objective communication process. Poor communication or improper exposure of information can amplify the effects of a crisis. The institutions analyzed have defined communication procedures to be observed when a crisis is declared, including the communication to regulators based on a decision made by the crisis committee. Training and controls are typically implemented to mitigate the risk of possible undue exposure of information. Some institutions have developed communications templates to be used in internal and external communications during crisis.

It is also important that the crisis management process considers the identification and management of events originating in critical service providers, given the increasing dependence of FIs on these providers. Typically, business managers are responsible for monitoring and identifying problems in the performance of contracted service providers. The IT and IS areas also monitor possible incidents at providers and partners by different means: monitoring the services provided, collecting information from the Dark Web/Deep Web, contracting information sources to get threat intelligence and incident information, among others. Three of the eight institutions in the study highlighted that they were

able to detect an incident occurred at one of their suppliers or partners before they were reported by these providers. Two institutions also declared that they had supported their respective suppliers in resolving the incident.

Periodic testing of the crisis management process and response plans are crucial to increasing the success rate in resolving a high-severity event. Testing of established procedures and plans is essential to validate their adequacy to the defined operational objectives, as well as to identify any deficiencies and opportunities for improvement. Testing is also important to verify that everyone involved in the simulation is aware of their responsibilities, as well as to ensure that they have adequate proficiency to address the causes and mitigate the implications of an incident.

Although the institutions considered in the study have not yet experienced operational crises caused by cyberattacks, the development of cyber exercises has proven to be necessary for the assessment and enhancement of institutions' capacities to respond to cyber incidents and to recover impacted services. In the case of cyber incidents, institutions usually perform simulations and tabletop tests, considering predetermined cyber

scenarios. Among the scenarios commonly explored, ransomware attacks, denial-of-service (DDoS) attacks, and information leaks stand out.

The analysis was also useful in identifying points of concern, such as the need to train and raise risk awareness of institutions' staff, promote greater collaboration between SFN institutions to manage systemic crises, and discuss potential improvements in the communication of incidents occurring at suppliers. The institutions reported the challenges to keep their employees, especially professionals directly linked to crisis management, trained and updated to manage crises. In addition, despite reports of collaboration between institutions in cases of global incidents, the institutions analyzed highlighted the importance of advancing in developing cyber exercises in the financial sector with the aim of responding in a coordinated manner in the event of systemic crises. Finally, they highlighted the need to advance in the communication of incidents verified at critical service providers, which still does not occur in a fluid and timely manner.



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A slow decision-making process can amplify the impacts of an incident and hinder the rapid return to normality.

Outdated documentation hinders the adoption of timely actions and increases the risk of further incidents.

Outdated response plans, in addition to being ineffective, increase the risk of further incidents.

Not having mechanisms in place to monitor incidents that occur in critical service providers weakens the institution's crisis management.

Erratic communication can amplify the crisis.

What to do?

- Establish roles and responsibilities.
- Define objective criteria to support decision-taking process.
- Prepare clear and objective documentation(*), focusing on the usability of those who will consume the information.
- Keep documentation available and updated. (*) Quantity does not necessarily mean quality
- Keep plans timely updated, especially when significant changes are implemented in the technological environment.
- Periodically test established plans.
- Monitor the execution of services provided by third parties.
- Establish incident communication protocol.
- Establish service level agreements in contract, including indicators related to incident reporting.
- Establish communication plans.
- Use communication as a tool to help responding to the crisis, in particular, to eliminate noise and to reassure the market/third parties.
- Develop communication templates.

What not to do?

- Act in an improvised manner and without adequate guidance.
- Maintain overly detailed documentation that is difficult to update.
- Hinder access to important information for crisis management.
- Not testing the plans.
- Update plans only after testing.
- Delegate the management of the crisis entirely to the third party.
- Failing to establish roles and responsibility in managing incidents.
- Create unfounded expectations (e.g., setting a return-to-operation deadline that will not be reached).
- Comment on internal information or matters involving other parties.
- Answer questions for which you have no direct competence or responsibility.
- Respond in a hasty manner or provide inaccurate, incorrect, or incomplete information.

The institutions considered in the study demonstrated high maturity in the management of operational crises; nevertheless, the Central Bank will continue to make efforts to improve the operational resilience of the financial sector broadly, with emphasis on developing integrated cyber exercises and sharing information and knowledge with institutions to increase risk awareness. The Central Bank's strategic agenda includes initiatives to share knowledge on operational resilience recommended practices. In addition, the Central Bank will develop cyber exercises in conjunction with the financial sector, aiming to discuss the potential definition of coordinated actions to manage systemic crises.

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Banco Central do Brasil Management

Abbreviations

Dolar	3,464	3,155
Euro	3,706	3,708
Ibovespa	67,671	67,059
CDI	9,14%	9,06%

Banco Central do Brasil Management

Board of Governors

Roberto de Oliveira Campos Neto

Governor

Paulo Picchetti

Deputy Governor

Ailton de Aquino Santos

Deputy Governor

Otávio Ribeiro Damaso

Deputy Governor

Carolina de Assis Barros

Deputy Governor

Renato Dias de Brito Gomes

Deputy Governor

Diogo Abry Guillen

Deputy Governor

Rodrigo Alves Teixeira

Deputy Governor

Gabriel Muricca Galípolo

Deputy Governor



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Abbreviations

ACCP_{Brasil}

Countercyclical Capital Buffer for Brazil

AE

Advanced economy

ALM

Asset liability management

BCB

Banco Central do Brasil

BCBS

Basel Committee on Banking Supervision

BIS

Bank for International Settlements

CCP

Central counterparty

CCyB

Countercyclical Capital Buffer

CET1

Common Equity Tier 1

Comef

Financial Stability Committee

CRA

Agribusiness Receivables Certificate

CRE

Commercial real estate

CRI

Real Estate Receivables Certificate

CVM

Securities and Exchange Commission

DI

Interbank Deposit

DSIR

Individual debt service-to-income ratio

EBITDA

Earnings Before Interest, Taxes, Depreciation, and Amortization

EME

Emerging economy

Fed

Federal Reserve

FGC

Credit Guarantee Fund

FGTS

Length-of-Service Guarantee Fund (*Fundo de Garantia do Tempo de Serviço*, in Portuguese)

FI

Financial institution

FIDC

Credit Rights Investment Fund

FMI

Financial market infrastructure

FSR

Financial Stability Report

FSS

Financial Stability Survey

GDP

Gross Domestic Product



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G-SIB

Global Systemically Important Bank

HQLA

High-Quality Liquid Asset

IL

Short-Term Liquidity Ratio

ILE

Structural Liquidity Ratio

IMF

International Monetary Fund

IPCA

National Consumer Price Index

IT

Information technology

IVG-R

Residential Mortgage Collateral Value Index

LCA

Agribusiness Credit Bill

LCI

Real Estate Credit Bill

LCR

Liquidity Coverage Ratio

LFL

Financing Lines

LGD

Loss given default

LGFV

Local Government Financial Vehicle

LIG

Real Estate Secured Bill

LLI

Immediate Liquidity Facility

LLP

Loan loss provision

LLT

Term Liquidity Facility

LTV

Loan-to-value

MSME

Micro, small, and medium-sized enterprise

NII

Net interest income

NIM

Net interest margin

NSFR

Net Stable Funding Ratio

OEI

Operational Efficiency Index

PA

Problem asset

PD

Probability of default

PFMI

Principles for Financial Market Infrastructures

PI

Payment institution

PTCQuarterly Credit Conditions Survey (*Pesquisa Trimestral de Condições de Crédito*, in Portuguese)**RC**

Regulatory capital



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ROE

Return On Equity

RSF

Required Stable Funding

RWA

Risk-weighted asset

SAC

Constant amortization schedule

SCE

Foreign Capital Information Provision System

SCR

Credit Information System

SFN

National Financial System

SGS

Time Series Management System

SPB

Brazilian Payment System

SRISK

Systemic risk indicator

STR

Reserves Transfer System

TEBU

Bottom-up stress test

TPF

Federal Public Securities

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Concepts and Methodologies

Working Papers about financial stability

Dolar 3,464 3,155

Euro 3,7064 3,7085

Ibovespa 67,671 67,659

CDI 9,14% 9,06%

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 meet its stressed cash flows for the next 21 business days. The methodology does not consider different accounting classification methods. In other words, it marks securities to market or by the price disclosed for collateral under repurchase agreement operations with the BCB. 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; v) free central bank reserves and vi) voluntary deposits at the BCB.
 - 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%)



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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 (FIs). 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) Loan-to-Deposit ratio (LTD)** – It measures the ratio between the loans granted by the Financial Institution and the volume of deposits of its customers, constituting a complementary metric for liquidity assessment. A high LTD ratio means that the volume of loans granted corresponds to a relevant portion of the Financial Institution's deposit base, which may lead to an increase in its liquidity risk.

Conversely, a low LTD ratio may be an indication that the Institution is not adequately monetizing its assets, as a significant proportion of its deposits may be allocated to less profitable assets than credit ones. The scope for calculating the LTD ratio is that of the prudential conglomerate and repo operations are excluded from the funding base for calculating the indicator.

- d) 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 FIs in the Credit Information System (in case of tie, it is considered information of the FI 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) are residual and classifies companies' sizes not set by criteria (i) or (iii).
- e) 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.

- f) 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 modalities, except for rural and business modalities, 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.

- g) Monthly income** – As a customer's income may vary when informed by different FIs, 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.

- h) Total Capital Ratio (TCR)** – Basel Committee on Banking Supervision international concept, consisting of the system regulatory capital (RC) divided by the system RWA. The minimum RC requirement in relation to RWA is defined by Resolutions CMN 4,958, of October 21, 2021, 4,606,



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of October 19, 2017, and Resolutions BCB 198 and 200, both of March 11, 2022. For S1 to S4 institutions, the default value of the factor is 8.0%. For conglomerates led by PIs and with no member institution authorized to operate by the BCB, the factor is 8% from July to December 2023, 10% during 2024 and 12% from 2025 onwards. For conglomerates led by PIs and made up of a financial institution authorized to operate by the BCB on the date of publication of Resolution BCB 200, the factor applied is 6.75% from July to December 2023, 7.5% during 2024 and 8% from 2025 onwards. Single credit unions not affiliated to central cooperatives and not opting for the simplified methodology defined in Resolution CMN 4,606, of October 19, 2017, have their minimum capital requirements increased by 4%. For institutions adopting the simplified methodology, the value of the factor is 12% for single credit unions affiliated to central credit unions and 17% for other institutions.

i) Tier 1 Capital Ratio (T1 Ratio) – It consists of the quotient between Tier 1 Capital and RWA. The minimum T1 Ratio requirement established by Resolution CMN 4,958 and Resolution BCB 200 is 6%. However, the latter standard defined a transition rule for conglomerates whose leading institution is a PI and integrated by a financial institution authorized to operate by the BCB on the date of publication of the standard, whereby the factor is reduced to 5.5% between July and December 2023.

j) Common Equity Tier 1 Ratio (CET1 Ratio) – It consists of the ratio between CET1 and RWA. The minimum CET1 requirement established by Resolution CMN 4,958 and Resolution BCB 200 is 4.5 per cent of RWA.

k) Capital Buffer – Additional CET1 requirement corresponding to the sum of the following installments: conservation, countercyclical and systemic. The value of the conservation buffer corresponds to 2.5 per cent of RWA. The value of the countercyclical buffer is currently zero for exposures in Brazil and is limited to a maximum of 2.5% of RWA. The systemic buffer depends on the ratio between total exposure and GDP and is currently equal to 1% of RWA for S1 institutions, under the terms of Resolution CMN 4,553, of January 30, 2017. Failure to comply with the capital buffer results in the restrictions described in article 9 of Resolution CMN 4,958. Resolution BCB 200 established a similar conservation buffer requirement for conglomerates led by IPs and made up of a financial institution authorized to operate by the BCB, with two distinctions: the percentage to be applied to RWA to calculate the conservation buffer is zero between July and December 2023 and 1.25% of RWA during 2024; and there is no requirement for the systemic portion. As the excess of CET1 used to meet the other minimum requirements cannot be used to fulfil the capital buffer, this requirement is added to all three minimum requirements described in the previous items.

l) Leverage ratio (LR) – Basel Committee on Banking Supervision international concept, consisting of Tier 1 Capital to Total Exposure ratio. In Brazil, the Circular BCB 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 30, 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 1, 2017.

m) Capital stress tests – Comprised by a macroeconomic stress test and sensitivity analyses to risk factors deemed relevant, these stress tests are simulations to estimate losses arising from extreme events, though plausible, and assess the resilience of an institution or the financial 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 acute changes in macroeconomic variables. For each stress scenario, new capital ratios (Total Capital Ratio, Tier 1, and CET1) are calculated. An FI 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, as well as the

additional capital needed so that no bank might become non-compliant is calculated. The relevance of an institution is based on of its Total Assets (ATA) as a proportion to the banking system.

The positive effects of the eventual activation of Tier 2 and Additional Tier 1 capital triggers, in which values are converted into CET1 capital, are classified as income.

Furthermore, when computing capital shortfall, all applicable capital buffer requirements (ACP) are taken into account, as determined by Resolution CMN 4,958, of October 21, 2021.

Finally, the framework also considers the potential changes of registration and uses of deferred taxes and its implications on regulatory capital calculus, according to Resolution CMN 4,955, of October 21, 2021, and later modifications.

- i. Macroeconomic stress test** – The macroeconomic stress test framework is an exercise that consists of the application of adverse macroeconomic scenarios and simulation of balance sheet responses on an individual basis. Based on these results, capital shortfall for the entire financial system is estimated.
- ii. Scenario design** – Three macroeconomic scenarios are built, for a time horizon of twelve quarters, based on market information and the following macroeconomic

variables: 1) economic activity (GDP); 2) exchange rate (quarter average of the Brazilian real vs US dollar parity); 3) Brazilian Benchmark Interest Rate (quarter average of the Selic rate); 4) inflation (consumer prices given by the Extended National Consumer Price Index – IPCA – cumulative twelve months) and 5) unemployment rate (calculated by IBGE – *Instituto Brasileiro de Geografia e Estatística*).

The baseline scenario is built upon the median of market expectations (Focus report). Scenarios stress 1 and stress 2 used for simulations are described in Box 1 – Scenarios used in the Macroeconomic stress test.

- iii. Stress simulation** – The stress simulation is conducted by projecting seven basic income statement accounts, representing operational performance, presented in the last income statement (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 incomes: mark-to-market effects, hedges and exchange rates fluctuations; 3. Fees & commissions; 4. Gains from non-consolidated companies; 5. Administrative expenses and; 6. Provision expenses; and 7. Other results.

In the ‘net interest income’ account, credit, and bonds/securities incomes as well as funding costs are modeled based on the Selic rate behavior. Funding

volumes are adjusted according to loan portfolio volumes, in a 1:1 proportion. Provision expenses are estimated based on problem assets (PA) evolution given by each of the scenarios.

Non-interest incomes are modeled by the application of market risk shock on positions observed in the date the test starts and adds the historic average of this account. The stressed market risk factors are obtained out of the macroeconomic scenario, and positions are then recalculated. The result is the difference between stressed and initial values. This amount is applied on the first quarter of projection and incorporated to earnings.

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

“Other results” account is modeled by the average of all other income statement items not included in the six previous accounts, e.g. non-operational results, other operational incomes and treasury results.

Besides the performance simulation, verified through income statement items, the BCB has incorporated the interfinancial contagion into the macroeconomic stress test framework. For each quarter in the test

time horizon, it is verified whether any institution falls below the Core Tier 1 capital ratio minimum threshold of 4%. If this is the case, inter-financial contagion is estimated. Uncollateralized interbank exposures issued by the affected institution are assumed as losses into the creditors' balance sheet, and its new capital position is recalculated. If any institution also falls below the abovementioned threshold, the process is repeated iteratively until there is no new institutions falling below the threshold. The stress test continues with the new affected capital levels and the process is repeated in all quarters of the projection, until the end of the time horizon.

iv. Sensitivity analyses are aimed at complementing the macroeconomic stress test. Sensitivity analyses assess the individual effects of credit or market risk factors that might affect institutions' regulatory capital, causing eventual capital shortfalls. Those analyses are conducted by applying incremental variations to individual risk factors, while keeping other factors fixed.

- a. Sensitivity analysis – changes in market risk factors – exposures subject 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 components (RWA_{JUR1} , RWA_{JUR2} , RWA_{JUR3} , RWA_{JUR4}). In the case of fixed rates, new regulatory parameters of capital requirements are recalculated based on each yield curve generated by a shock.

Exposures to gold, foreign currency, and other instruments subject to changes are also stressed. Impacts due to exchange rate fluctuations on regulatory capital and capital requirements (RWA_{CAM}) are then recalculated. It is assumed that all exposures subject to exchange rate fluctuations are revalued following the percentage points projected for the stressed USD/exchange rate.

Shocks alter, individually, interest rates and the exchange rate, in 10 percentage points steps, downward until it reaches 10% of the original value, and upward until an increase of 100% of the original value is reached. After assessing impacts, new capital ratios are calculated, and then regulatory capital adequacy and the solvency of banks are verified.

- b. Sensitivity analysis – increases in problem assets – This analysis aims at measuring the effect of problem assets increases on the regulatory capital of institutions. Problem assets are raised to 150% of its current level in several steps. For each step, additional provisions required are estimated, and regulatory capital and RWA_{CPAD} suffer the impacts from additional provisioning. After impacts are applied, new capital ratios are computed, and solvency and capital adequacy status of banks are evaluated.
- c. Sensitivity analysis – fall in housing prices – The objective of this analysis is to estimate the impacts of falling residential real estate prices on the regulatory capital of institutions with mortgages to households in their loan portfolio. Prior to the simulations, real estate prices are updated using the IVG-R index, by the incorporation of the variations measured by the index since each loan's inception up to the date of the simulation.

Adverse shocks are applied to prices, in sequential steps of 5 percentage points. In each step, loans whose collaterals do not amount to 90% of the loan's outstanding balance are considered as delinquencies.



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The loss of each delinquent loan is estimated as the difference between the outstanding balance and the present value of the amount recovered from the foreclosure process. To compute the recovered amount, residential real estate prices after applied shocks are considered, and deducting an estimate for taxes, maintenance, and auction costs. Furthermore, the auction sale is considered to occur at a discounted price proportionate to the price fall due to the applied shock. This amount's present value is obtained by discounting the sale proceeds by the 1-year future rate. New regulatory capital ratios of each institution are calculated considering the estimated losses associated to each step of housing prices decline.



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Working Papers about financial stability

- 592 Renewable Energy Shocks and Business Cycle Dynamics with Application to Brazil**
Alexandre Kornelius, Jose Angelo Divino
- 591 Mitigating Policies for Pollutant Emissions in a DSGE for the Brazilian Economy**
Marcos Valli Jorge, Angelo M Fasolo, Silvio Michael de Azevedo Costa
- 590 Pre-Publication Revisions of Bank Financial Statements: a novel way to monitor banks?**
Andre Guettler, Mahvish Nae/em, Lars Norden, Bernardus Van Doornik



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BANCO CENTRAL DO BRASIL

