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|----------|--------|--------|
| Dolar | 3,464 | 3,155 |
| Euro | 3,706 | 3,708 |
| Ibovespa | 67,671 | 67,039 |
| CDI | 9,14% | 9,06% |
| Selic | 9,15% | 9,08% |

Financial Stability Report

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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 markets; 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 volatile, marked by debates about the beginning of monetary policy easing in the major economies. 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.

Domestically, economic activity was consistent with the anticipated scenario of a slowdown in the economy. However, compared to the forecast at the beginning of the year, there was a relevant positive surprise. At the beginning of 2024, the dynamism of economic activity is also slightly higher than expected. The most recent indicators show that the unemployment rate fell again, the employment level and participation rate rose, the net creation of formal jobs increased, and the real income continued to grow.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, financial market participants see an improvement in the economy and a resilient SFN. The Financial Stability Survey (FSS) shows that, despite concerns about the international back-drop and fiscal risk, financial market agents reported an improvement in their perception of the economic and financial cycles and strengthened the perception of an upward trend in the risk-taking willingness. Confidence in the stability of the SFN remains high, close to its all-time high.

Real economy financing continued to slow down, but the monetary policy loosening and the improvement in risk perception begin to show positive signs. For households, the slowdown continued, but more recently there was stability for credit cards and non-payroll deducted credit, and acceleration in the vehicle portfolio. The slowdown eased in credit to smaller companies and the downward trend in bank

credit to large companies reversed. For the latter, the capital market remains a relevant source of funding.

In line with the economic improvement, the risk appetite of financial institutions (FIs) in credit lending, which had been declining, signals stability. However, the environment continues to demand attention. Regarding households, the undertaking criteria have remained unchanged, following a period of improvement in quality. Concerning companies, no relevant changes were noticed in the undertaking criteria, despite the continued slowdown in portfolio growth. Considering the risks related to economic activity, high levels of household debt service-to-income and indebtedness, and pressure on the payment capacity of smaller companies, the environment continues to require preservation of lending quality.

The risk materialization should maintain the trend of the last months of 2023, stable in credit to micro, small, and medium-sized enterprises (MSMEs) and declining in credit to households. The undertaking criteria and the probability of default (PD) of the portfolio did not change in credit

¹ Inflation Report, issued on March 28, 2024. Available at <https://www.bcb.gov.br/en/publications/inflationreport>.

to MSMEs. For households, the maintenance of the undertaking quality, the decrease or relative stability of PD, and the decrease in the participation of riskier modalities suggest a decline in problem assets (PAs) in the coming months.

The SFN remains with adequate provisions for expected credit losses. There was an improvement in risk, a reduction in the estimate of expected losses, and a slight decrease in the provision relative to the portfolio. BCB's estimates indicate that the level of provisions is comfortable to support expected credit losses.

After two semesters in decline, the banking system's profitability showed a timid recovery, with a positive outlook for 2024. The increase in provision expenses was an important cause of the decline in profitability in previous semesters. These expenses stabilized in the second half of 2023 and should be under less pressure in 2024 due to the better quality of recent lendings. Furthermore, the fall in the Selic rate reduces funding costs, mitigates risk, and stimulates demand for credit and other banking services. Profitability may also benefit from the disinflation process, which reduces pressure on operating costs.

The banking system increased its liquidity buffer, which remains comfortable in order to maintain financial stability. This increase is due to the

combination of stable growth in funding with the scenario of decelerating credit growth. In addition, securities increased in value as a result of the fall in interest rates.

Recent regulatory changes and the increase in the scope of institutions made capital analysis more robust. The regulatory changes refer to (i) the new prudential regulation for conglomerates integrated of payment institutions (PIs), which made the capital requirement more appropriate to the risks taken; and (ii) the improvement of the procedures for calculating the component of risk-weighted assets (RWA) relative to credit risk, which contributed to an increase in the system's capital buffer. In addition, the BCB broadened the list of institutions covered by the capital analysis to include institutions other than banks. The regulatory capital buffer is not a restriction for expanding the credit supply in a sustainable way.

The 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. The results of the capital stress tests continue to indicate that there would be no material non-compliances. The sensitivity analyses also indicate good resistance to the risk factors, simulated separately. The results of the liquidity stress tests, in turn, demonstrate the banks' ability to

withstand possible (i) extreme losses on funding; (ii) cash outflows to meet margin calls and collateral and potential devaluations in liquid assets; (iii) depositor runoffs and losses in market value; and (iv) liquidity support for investment funds managed by companies linked to members of the banking system.

In the second half of 2023, financial market infrastructures (FMIs) 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 Payment System (SPB). The interbank market settlements took place without any significant occurrences. Credit and liquidity exposures were adequately managed by the central counterparty (CCP) on all days of the period.

The BCB established procedures for calculating the component of risk-weighted assets relative to the capital requirement for operational risk, using the standardized Basel III approach. The standardized model aims to increase the robustness, risk sensitivity, and comparability of the capital requirement for operational risk. The regulation will come into force in January 2025, with implementation transitioning until January 2028, and is applicable to institutions in Segments 1 (S1) to 4 (S4). The BCB estimates an approximate 54% increase in the minimum capital requirement for operational risk for institutions in these segments.

FIs increased concern about the potential effects of climate risks on the SFN. According to research carried out by the BCB, although the impact of climatic events in 2023 was low, physical risks should become more relevant over longer horizons. The main concerns are the effects of droughts, scarcity of natural resources, and desertification. These events would cause damage to assets and production processes, loss of income, and increased costs for borrowers, with a consequent increase in delinquency for the SFN.

As anticipated on the previous FSR, the BCB carried out the first stage of the SFN and the SPB technological risks mapping and identified factors that need to be addressed by FIs to ensure safe and resilient operations. Institutions will need to improve their controls, in particular invest in testing incident response plans, establish and monitor indicators of exposure to technological risks, and ensure that their lines of defense act more proactively in managing technological risks. The BCB will proceed to the next stages of the mapping, expanding the sample of institutions and improving the questionnaire to create a broad overview of the SFN that enables identifying possible points of concern for financial stability.

Decisions of the Financial Stability Committee on the Countercyclical Capital Buffer

At its 55th and 56th ordinary meetings, on November 21 and 22, 2023, and February 20 and 21, 2024, respectively, the Financial Stability Committee (Comef) decided to hold the Countercyclical Capital Buffer for Brazil (ACCP_{Brasil}) at 0% (zero percent).²

The Committee deems the financial system prepared to face risk materialization. The credit portfolio keeps a positive yield. 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 continues to observe a slowdown in credit growth in the SFN, although some portfolios show signs of reversing the slowdown, in line with the monetary easing cycle. Given the risks related to economic activity and to households' and smaller companies' indebtedness, it is important that banks continue to uphold lending quality.

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

The Comef monitors international financial conditions, including the latest developments involving, in particular the path of monetary policy in advanced economies (AEs), uncertainties surrounding growth in China, and the impacts of global geopolitical events. The Committee remains prepared to act, minimizing any disproportionate contamination on local asset prices.

Therefore, contemplating the restrictive financial conditions, asset prices, and expectations regarding the credit market behavior, at the 55th and 56th ordinary meetings, the Comef considered appropriate to maintain the ACCP_{Brasil} at 0% (zero percent) in the coming meetings. ACCP_{Brasil} increases come into force only one year after the Comef's deliberations. These decisions were made by the Committee 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.

² Communiqués 40,936, of November 22, 2023 (available, in Portuguese, on <https://www.bcb.gov.br/estabilidadefinanceira/exibenormativo?tipo=Comunicado&numero=40936>), and 41,267, of February 21, 2024 (available, in Portuguese, on <https://www.bcb.gov.br/estabilidadefinanceira/exibenormativo?tipo=Comunicado&numero=41267>).

I

Assessment of National and International Financial Systems

| | | |
|----------|--------|--------|
| Dolar | 3,1464 | 3,1556 |
| Euro | 3,7064 | 3,7085 |
| Ibovespa | 67,671 | 67,659 |
| CDI | 9,14% | 9,06% |

1.1 International financial markets

The international financial system has shown resilience, although signs of localized vulnerabilities are still observed, while adapting to the dissipation of recent exogenous shocks, the ongoing disinflation trajectory and financial conditions in which borrowing and credit costs are higher. In recent years, international financial systems have had to face and absorb impacts related to the pandemic, in particular those related to liquidity or solvency difficulties in non-financial companies; to stress events in some non-banking institutions; to solvency problems in large Chinese real estate companies; to a more restrictive instance of monetary policy for an extended period; to the process of reducing the balance sheets of the main central banks; and , in 2023, to stress events in the US banking system; the resolution involving two European Global Systemically Important Banks (G-SIBs) and the volatility caused by uncertainty about the path of interest rate in main economies. Despite this, the international financial system has proven to be solid, with an efficient action by the authorities to maintain credibility and avoid transmission. Asset prices are at high levels by historical standards.

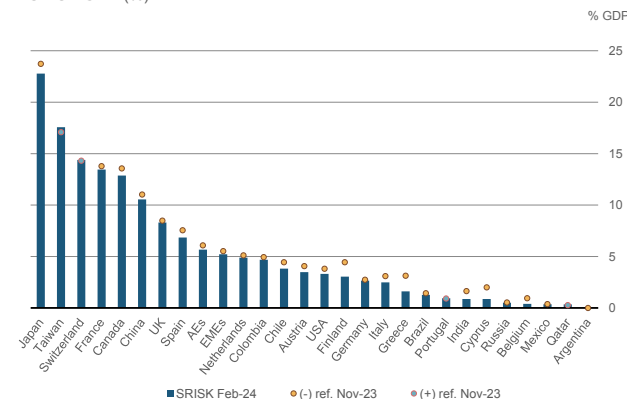
Authorities remain vigilant and active to mitigate failures and the contagion of the impacts of stress

events on financial systems. The measures proposed to address financial stability risks and strengthen the capital of the banking system remain under analysis by US regulators. Chinese regulators took measures to contain the systemic effects of the crisis on the real estate sector, while others were announced to strengthen financial supervision and the prevention and resolution of financial risks.

There was a reduction in systemic risk (SRISK)³ in almost all the countries analyzed between the last two Comef meetings. The result, observed in both advanced economies (AEs) and emerging economies (EMEs), was mainly due to the rise in stock prices of the financial sector. Among the exceptions, Taiwan stands out, where there was an increase in volatility and financial institutions (FIs)' liabilities. SRISK is estimated at 5.7% of the Gross Domestic Product (GDP) of AEs and 5.2% of the GDP of EMEs (Chart 1.1.1).

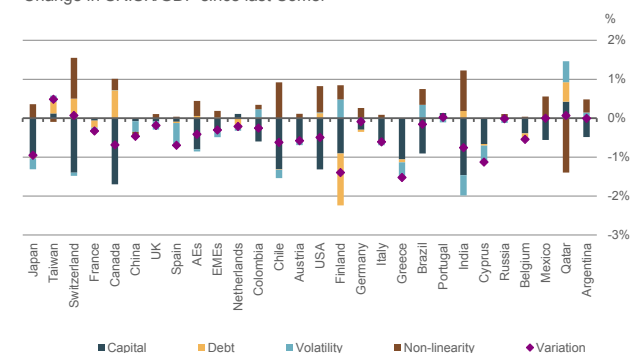
Despite the recent relief since the last Comef, financial conditions remain restrictive when compared to the recent period. Faced with the gradual fall in core inflation, which is still at high levels and the imbalances between demand and supply in labor markets, the central banks of the main economies have been reaffirming their commitments to rebalancing

Chart 1.1.1a – Systemic Risk Analysis (SRISK)
SRISK/GDP (%)



Sources: Bloomberg and BCB staff calculations.

Chart 1.1.1b – Systemic Risk Analysis (SRISK)
Change in SRISK/GDP since last Comef



Sources: Bloomberg and BCB staff calculations.

3 Systemic risk indicator that measures the capital shortfall of FIs in a global stress event. Concept presented in the April 2021 FSR.

their inflation rates around their respective targets, highlighting the need to maintain interest rates at historically high levels (Chart 1.1.2) until they ensure the convergence of expectations towards achieving the last stage of the disinflationary process. Uncertainty also remains high, specially about the trajectory of AEs' monetary policy, the growth in China and the impacts of global geopolitical events. In this context of easing financial conditions in the period, the risk appetite for emerging countries has increased (Chart 1.1.3).

Chart 1.1.2 – Monetary policy rates in advanced economies
Up to March 15

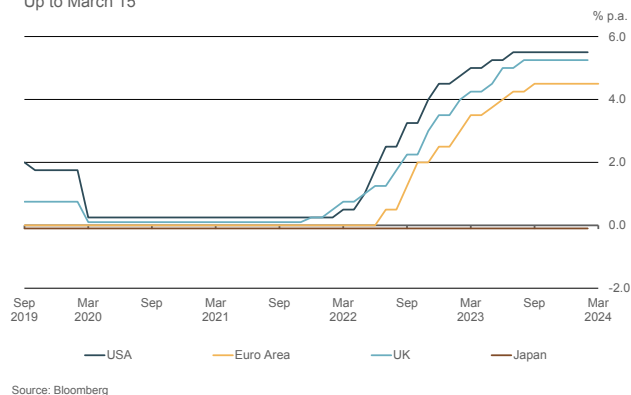
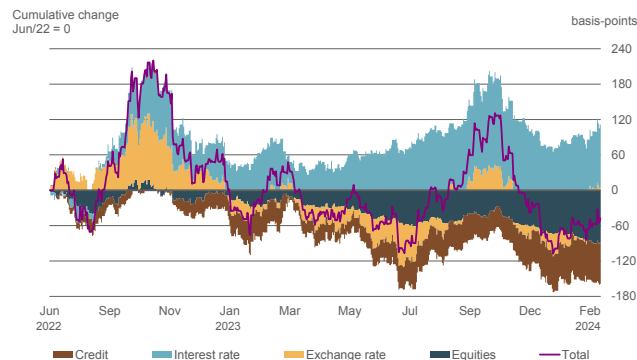


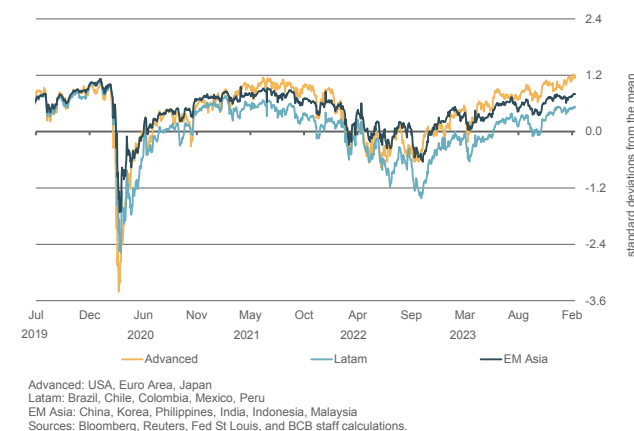
Chart 1.1.3 – US: financial conditions (up to Feb 16)



In the US, the banking system continues to show some signs of stress, still seeking to rebalance the level of reserves and deposits. Access to the Bank Term Funding Program, an emergency line implemented by the Federal Reserve (Fed) during the banking stress at the beginning of last year to provide liquidity to institutions facing abrupt outflows of deposits, continued to be widely accessed, until its closure, as initially scheduled, on March 11, 2024. Some types of credit show an increase in default rates, although the levels are still low for historical terms. General credit conditions have remained restrictive and credit contraction is already observed in some segments, especially those most sensitive to interest rates.

Financial conditions in the US have eased since the last Comef (Chart 1.1.4), although the volatility of long-term US interest rates has reduced, it remains high. In this context, the efficient management of risks, capital and funding costs remains much more important and unevenly more challenging for some smaller intermediaries or those specialized in more impacted segments. Credit conditions remain restrictive, largely due to past stress events in the banking sector, and concerns remain in the commercial real estate (CRE)⁴ credit markets.

Chart 1.1.4 – Risk appetite indicator (up to Feb 14)



⁴ In Brazil, commercial real estate credit represents 0.7% of broad credit for companies.

Consistent with the reduction in long-term interest rates, other assets have performed positively since the last Comef (Chart 1.1.5). Most stock indexes appreciated and credit spreads, especially the riskier ones, were the asset class with the best performance in the period and are at levels below those at the beginning of 2023 (Chart 1.1.6). The volume of issuances of riskier credit securities in the US has recovered in recent months, with high issuance volumes in January, raising the moving average of recent months to mid-2022 levels (Chart 1.1.7).

Chart 1.1.5 – Assets performance (up to Feb 20)

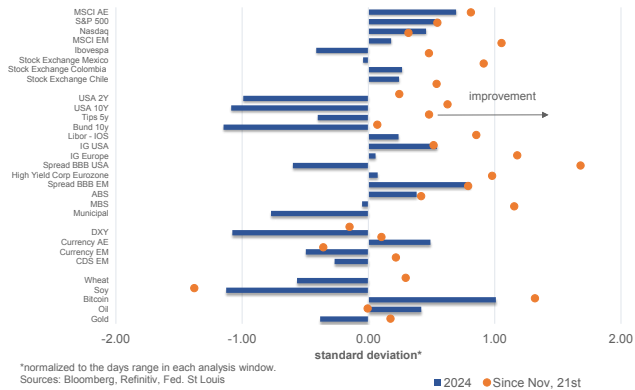
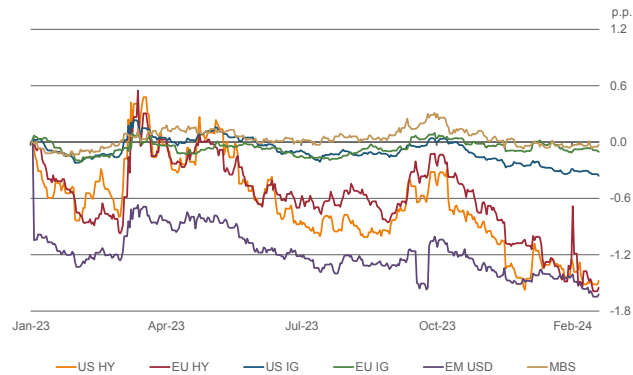
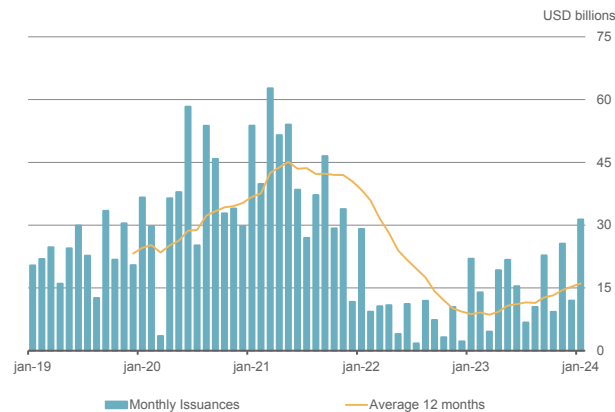


Chart 1.1.6 – Change of credit spreads since Jan/23 – Up to Feb 20



Source: Bloomberg

Chart 1.1.7 – USA: high-yield issuances



In the US, in general, household's financial conditions remain robust, with total debt and debt service levels well below those prevailing in the 2008 financial crisis and without relevant changes in relation to the pre-pandemic period. The level of delinquency is still low, but has been increasing at the margin, especially in credit card operations. Regarding commercial real estate credit, concerns persist, mainly due to structural changes in the sector since the beginning of the pandemic, which resulted in a lower level of occupancy in some segments and a drop in the prices of assets backed by this market. However, the risks have not yet materialized, although the level of delinquency, at the margin, shows a moderate increase (Charts 1.1.8 to 1.1.10).

Chart 1.1.8 – USA: Loans to households – 90 days past due
Share of total loans

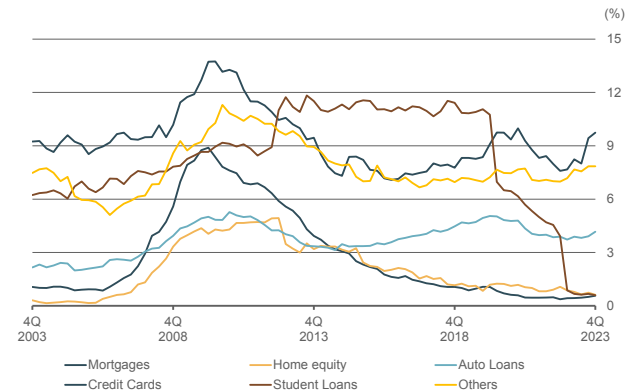


Chart 1.1.9 – Commercial mortgage-backed securities (CMBS) – 30 days past due
Share of total

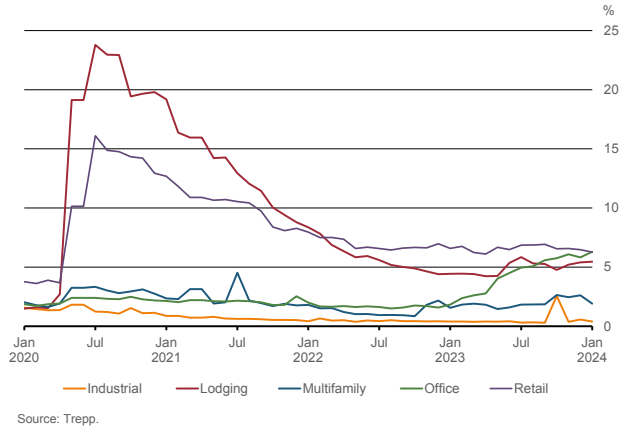


Chart 1.1.10 – USA: Real Estate Investment Trusts performance – Up to Feb 14



In China, the government has been trying to stimulate the economy and address problems in sectors that are experiencing greater difficulties.

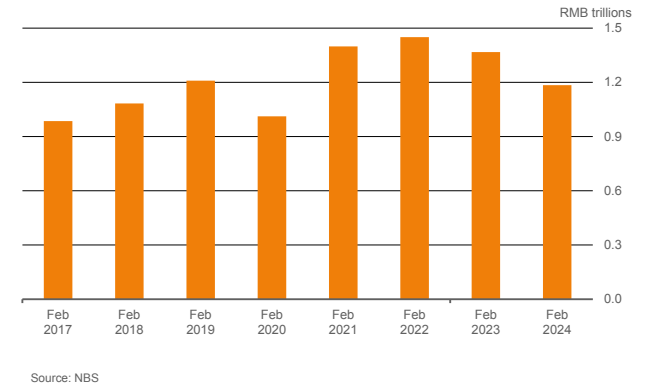
The People's Bank of China (PBC) maintained the one-year Loan Prime Rate (LPR) at 3.45% per annum, while the five-year LPR was reduced by 0.25 p.p. to 3.95% per annum, which represents an incentive for sectors more dependent on longer-term financing, such as the real estate. Credit to the non-financial sector reached 311% of GDP in the third quarter of last year, which represents an increase of 15 p.p. compared to the same period in the previous year, according to data from the Bank for International Settlements (BIS). Chinese banks' margins continue to decline to historically low levels. The relief in global financial conditions contributed to the stabilization of the exchange rate, thus facilitating a better balance of the financial account in the second half of last year compared to the same period in 2022.

The real estate sector continues to be the main point of risks to the financial sector.

Investments in the sector showed pronounced drops at the beginning of the year (Chart 1.1.11), with reductions in built area, already started and in progress, as well as drops in sales and an accumulation of completed but unsold building units. Prices for new homes are falling across all city size ranges, with evidence of inertial rigidity. A price adjustment more consistent with a reduction in demand could contribute to

structural adjustment in the sector occurring more quickly, according to studies by the International Monetary Fund (IMF).⁵ Banking system indicators, such as default, capital adequacy and return on total assets, showed stability in the period, while the net interest margin showed a reduction.

Chart 1.1.11 – China: investment in real estate development
Accumulated in the year



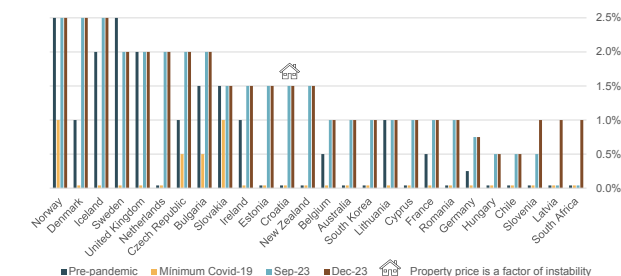
G-SIBs in AEs continue to benefit, in net terms, from the rise in interest rates, although at a slower pace than in previous quarters. Its provision

⁵ AKINCI, Ozge; CLARK, Hunter; DAWSON, Jeff; HIGGINS, Matthew; MIRANDA-AGRIPPINO, Silvia; NOURBASH, Ethan & NALLAMOTU, Ramya. "What Happens to U.S. Activity and Inflation if China's Property Sector Leads to a Crisis?". Federal Reserve Bank of New York Liberty Street Economics, March 26, 2024.

levels remain mostly stable or with a slight decline. Chinese G-SIBs have reduced expenses and have increased provisions.

Several jurisdictions maintained and some increased the Countercyclical Capital Buffer (CCyB) to strengthen banks' resilience, given a scenario that continues to present an accumulation of global financial risks and domestic economic uncertainties (Chart 1.1.12).

Chart 1.1.12 — Countercyclical Capital Buffer (CCyB)



Source: BIS, ESRB, central banks

The global outlook still presents risks that could lead to a materialization of extreme repricing for global financial assets. After a significant global monetary tightening cycle, uncertainties regarding: the extension of the period of high interest rates and the equilibrium levels of interest rates in the long term; the normalization of the level of aggregate liquidity in

central economies; Japan's exit from negative interest rate policy, plus the concerns about fiscal sustainability and the susceptibility of markets to possible supply dysfunctions resulting from geopolitical conflicts are some of the factors that contribute to maintaining risks for asset prices at a high level, despite the good performance of asset prices, even the most risky ones and, more recently, the increase in emissions from companies with the worst credit risk. Furthermore, stress events in the financial sector since 2023 have shown that there are accumulated vulnerabilities in both banks and non-bank FIs that could escalate into the materialization of a systemic financial crisis. The volatility and rise in long-term interest rates in central economies, especially in the US, and growth dynamics in China have also impacted international financial conditions and increased the chance of some risks materializing. In general, EMEs have, to date, shown resilience in the face of the adverse external scenario, even though vulnerability factors remain.

The Banco Central do Brasil (BCB) remains attentive to developments in the international scenario and assesses that the National Financial System (SFN)'s exposure to exchange rate risk is low, and dependence on external funding is small. It remains prepared to act to minimize any disproportionate contamination on local asset prices and continues to understand that macroeconomic policies that increase fiscal predictability and reduce risk premiums

and asset volatility contribute to financial stability and, consequently, improve agents' ability to keep up with their financial obligations.

1.2 National financial system⁶

1.2.1 Liquidity

Financial institutions (FIs) remain with an adequate level of liquidity to maintain financial stability and the regular functioning of the intermediation system. Funding grew steadily compared to previous semesters, while bank lending growth rates decelerated. In addition, there was a positive revaluation of securities due to falling interest rates. Consequently, there was an increase in FIs' liquidity buffers in the second half of 2023. FIs belonging to the S1 prudential

⁶ 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.

segment increased their liquidity buffers relative to the regulatory minimum, exhibiting indicators that are sufficiently robust to support new credit growth cycles. Capital structure and longer-term funding remain at levels that can adequately fund portfolios of longer-tenured assets.

Domestic and foreign funding

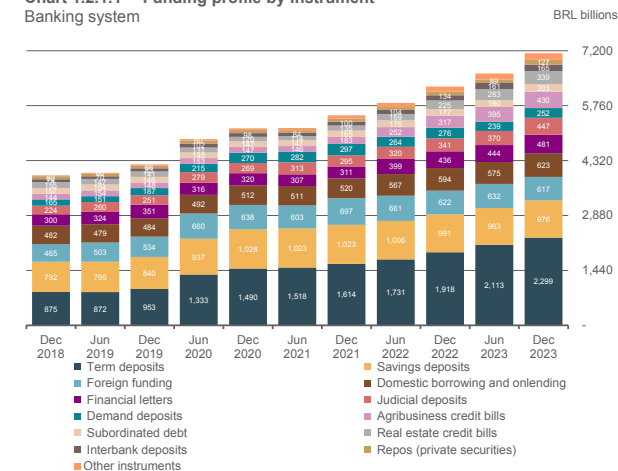
Funding maintained the growth trend observed in recent semesters. The period was characterized by the good performance of term deposits and repurchase operations with private securities, in addition to tax-exempt instruments. In the semester, we can also highlight the supply of longer terms operations and the maintenance of similar rates practiced by various segments. The foreign market funding supply remained sufficient to meet the demand for export financing.

Funding continued to grow, supported by term deposits and tax-exempt instruments, although savings presented another year of negative performance. In absolute terms, we highlight the growth of term deposit portfolio (BRL186.8 billion or 9%). In relative terms, the higher increase was observed in portfolios of repo operations with private securities (43%) – mostly backed by debentures – and judicial deposits (21%), influenced by the release of resources intended to execute court orders payments. There was also growth in the Real Estate Credit Bills (LCI)

(20%) and Agribusiness Credit Bill (LCA) (9%) portfolios, instruments that provide higher return and are free of taxes for customer, and at the same time, lower costs for banks. However, the growth rate of these instruments is expected to fall due to a new market Resolution CMN 5,119, of February 1, 2024, which adjusted eligible collaterals and LCA, LCI and Real Estate Secured Bill (LIG) maturities. Despite the discrete increase of 1% in the period, savings declined for another year, keeping the downward trend in the percentage of bank funding amount. The trajectory of this instrument remains a concern for real estate credit funding.

The profile and behavior of investors maintained the pattern observed in recent semesters, which tends to reduce the financial system concentration. Funding by type of investor remained practically stable in the period. A downward trend in the concentration of funding in the national financial system persist. Banks in the S1 segment reduced their share from 69% to 68% between December 2022 and December 2023 (Charts 1.2.1.1 to 1.2.1.3).

Chart 1.2.1.1 – Funding profile by instrument
Banking system



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

Chart 1.2.1.2 – Funding profile by type of investor
Banking system

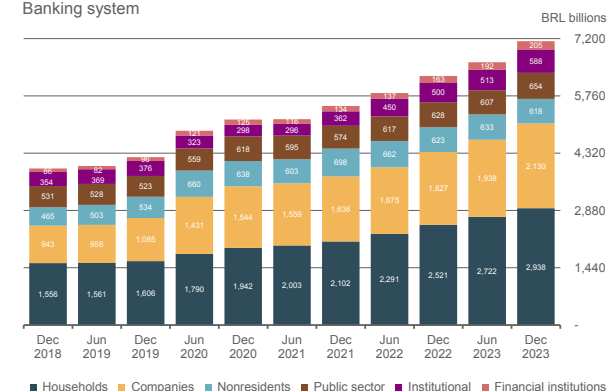
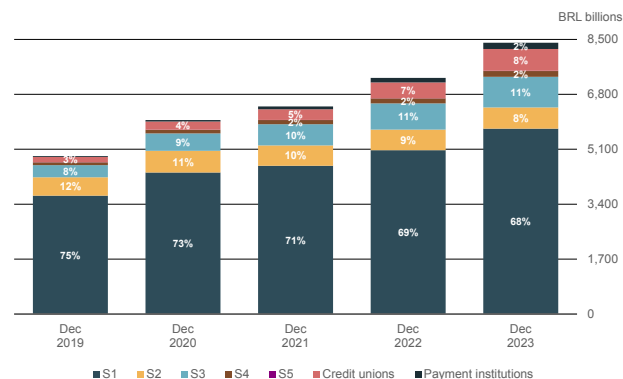


Chart 1.2.1.3 — Funding profile by type of segment



The semester is characterized by an increase in the share of long-term funding in the aggregate portfolio. In addition to the mentioned increase in judicial deposits, the monthly variations in the amount of funding by maturity point to higher growth in portfolios with maturities greater than one month and twelve months in the period. This behavior resumes the trend interrupted in the previous semester, of searching for longer and more profitable investments in a scenario of high rates (Charts 1.2.1.4 to 1.2.1.5).

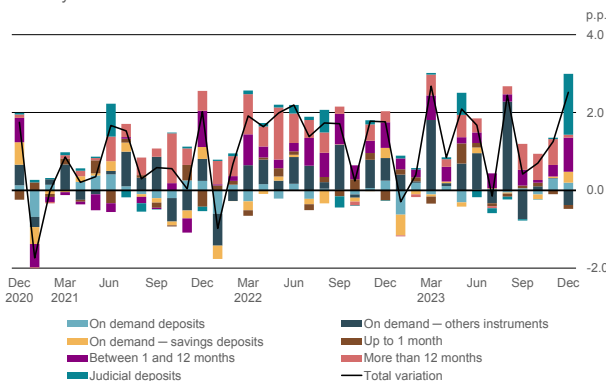
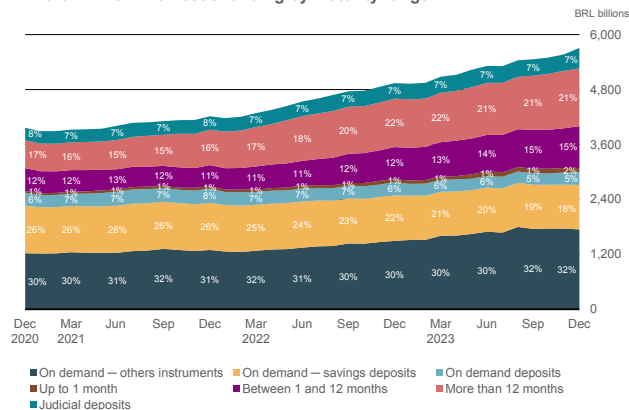
Chart 1.2.1.4 — Domestic funding by maturity range
Monthly variationsSources: BCB, [B]³, CRT4, CERC

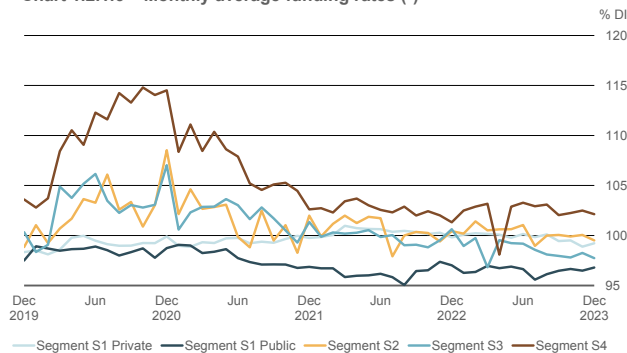
Chart 1.2.1.5 — Domestic funding by maturity range

Sources: BCB, [B]³, CRT4, CERC

The funding rates practiced by various segments remained close.

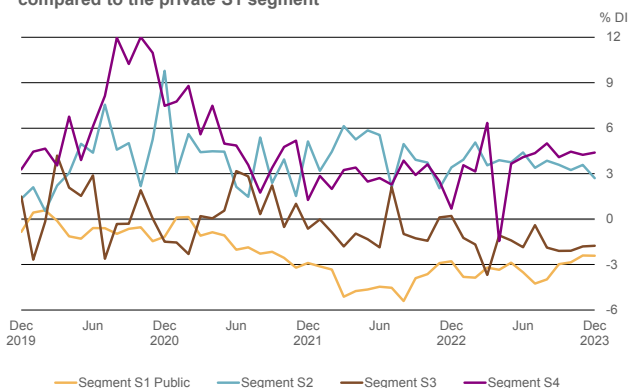
Funding rate spreads in relation to the Interbank Deposit (DI) rate showed a slight downward trend for all segments in the semester, except for S1 public, which maintained spreads stable in the period. During the semester, the average S3 rate remained close to that practiced by the S1 public (Charts 1.2.1.6 and 1.2.1.7). The main component of the reduction in average rates was the fall in term deposit rates, a movement probably associated with excess liquidity in the market.

Chart 1.2.1.6 — 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 1.2.1.7 – Difference in monthly average funding rates compared to the private S1 segment



Funding through investment platforms maintained an upward trend and grew 7% in the semester (17.3% annually). Since the second half of 2019, funding through investment platform grew 246.5%, rising from 1.6% to 3.2%⁷ of the total stock. This type of operation remains the main source of funding for a group of smaller institutions and contributes explaining the reduction in different rates charged by various segments. Resolution CMN 5,114 published in December 2023 with effects from March 2024, discouraged the use of the Credit Guarantee

⁷ Taking the financial system as the scope of analysis, the intermediated portfolio of households and companies has increased 264.0%, since the second half of 2019, rising from 1.4% of the funding stock to 3.1%. The number of non-bank institutions in which intermediation represents more than 40% of their total funding increased from 13 to 29.

Fund (FGC) to attract financial institutions funding, without preventing this type of funding (Charts 1.2.1.8 and 1.2.1.9).

Chart 1.2.1.8 – Changes in the stock of intermediated funding

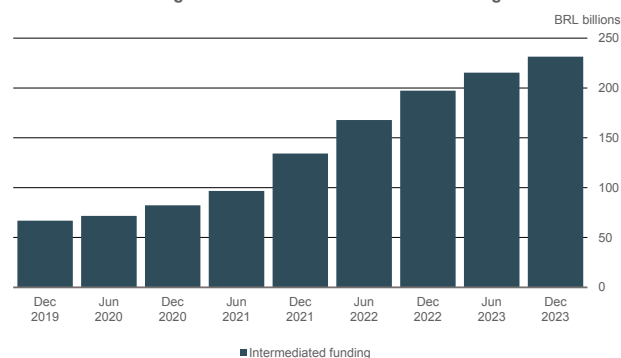
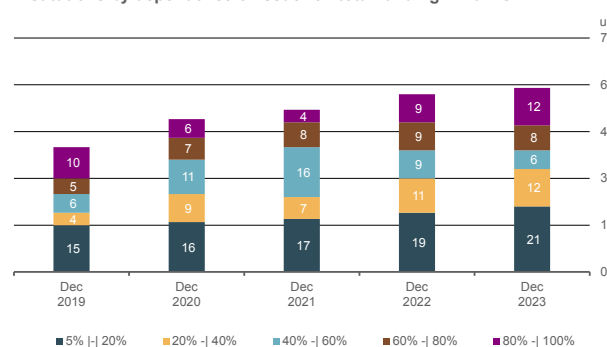


Chart 1.2.1.9 – Intermediated funding – Number of financial institutions by dependence of issuer on total funding – Banks

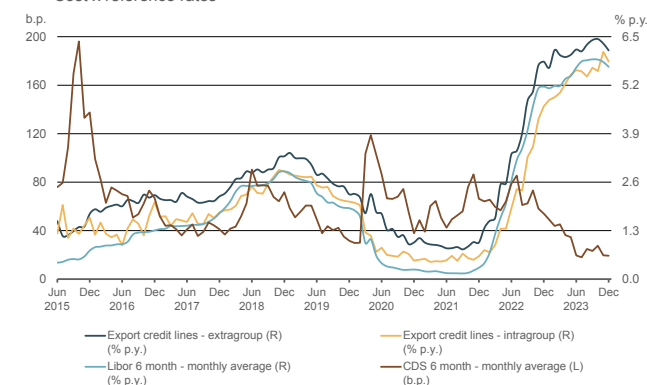


^{1/} The values on the bars refer to the number of financial institutions belonging to the corresponding interval.
Sources: BCB staff calculations and [B].³

The representativeness of foreign funding compared to the total funding of the National Financial System (SFN) continues to show a downward trend.

There was an 8.5% decrease in the stock of foreign borrowing in the semester, accompanied by an increase in the stock of domestic borrowing. The cost of external export credit lines followed international reference interest rates (Chart 1.2.1.10), with an increase in the first half of the semester and a reduction in the second half, especially for extragroup funding, with an indication of continuity for the next semester.

Chart 1.2.1.10 – External export credit lines
Cost x reference rates

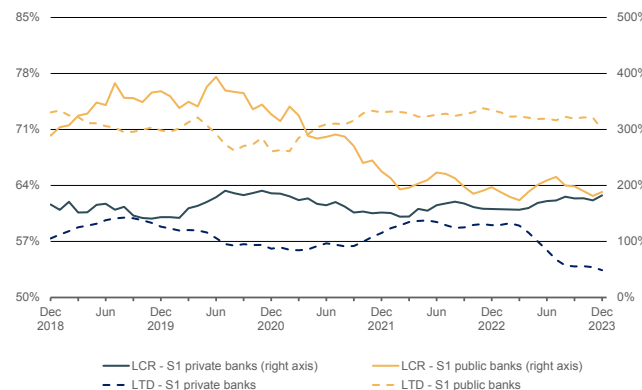


Short-term liquidity

The banking system's short-term liquidity remains sound to maintain financial stability and the regular functioning of the intermediation system. Credit growth continues to decelerate in the financial

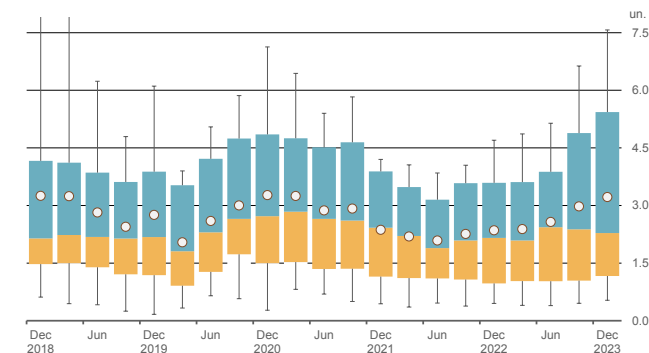
system, despite some portfolios showing signs of reverting this deceleration, in line with monetary loosening. The reduction in growth rates is more pronounced among the S1 segment's privately-owned banks, and, as net funding continues to trend upward, the ratio between FI's loans and deposits (Loan-to-Deposit ratio) decreased among privately-owned banks, resulting in improved liquidity. On the other hand, government-owned banks credit growth has been more resilient, however focusing on less risky lines, not exhibiting increases in short-term liquidity risk, as measured by the Liquidity Coverage Ratio (LCR)⁸ (Chart 1.2.1.11). Using another approach,⁹ which considers the effects of market stress and bank runs, it is possible to observe an increase in FI's aggregate liquidity (Chart 1.2.1.12).

Chart 1.2.1.11 – 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 1.2.1.12 – Short-Term Liquidity Ratio
Banking system, statistical data from individual conglomerates^{1/}



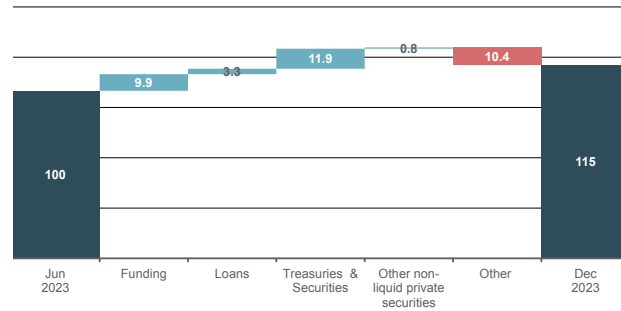
1/ The Short-Term Liquidity Ratio is capped at the level of the 80th percentile in each month, after capping each index the statistics are calculated. The values along the box and whiskers refer to the percentiles 10%, 25%, 50%, 75%, and 90%, respectively. The mean is represented by the circles.

The higher valuation of FI's securities portfolios stemming from the recent decrease in interest rates led to a better FI's liquidity safety margin. There was also a positive cash flow originating from increased net funding as well as a positive cash flow from loans, positively impacting liquidity ratios. The repricing of securities in FI's portfolios was another significant factor that led to the increase in liquid assets, especially considering that all liquid assets in FI's portfolios are counted as if marked to market when computing liquidity ratios (Chart 1.2.1.13).

8 The LCR is a ratio whose compliance is mandatory for all FIs belonging to the S1 segment, pursuant to art. 2 of Resolution CMN 4,553, of January 30, 2017. The indicator requires institutions to maintain High-Quality Liquid Assets (HQLAs) to support net cash outflows in the next 30 days, considering the stressed scenario defined by the Basel Committee on Banking Supervision (BCBS) (www.bis.org/publ/bcbs238.htm). See domestic regulation – Resolution CMN 4,401, of February 27, 2015, and Circular BCB 3,749, of March 5, 2015.

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.

Chart 1.2.1.13 – Changes in liquid assets
Banking system, breakdown of changes among dates (base 100)



1/ The values represent the changes in accounting cash flows stemming from the FI's main business lines. The "other" lines includes i) fees and expenses; ii) taxes payment; iii) dividends; iv) capital increase; and v) other changes that affect cashflows.

Long-term liquidity

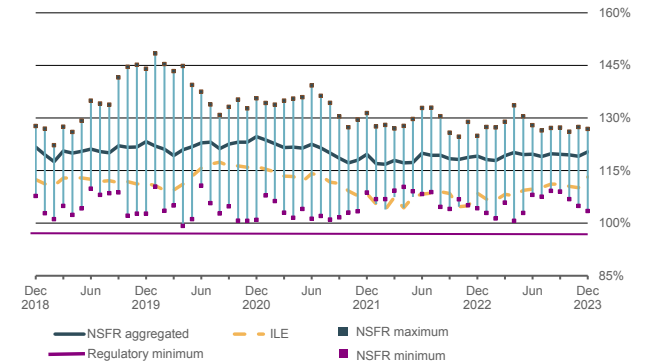
Banks' funding structure remains at a level compatible to finance long-term assets. FIs belonging to the S1 segment, which must comply with the Net Stable Funding Ratio (NSFR)¹⁰ exhibit deceleration in

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.

credit growth, resulting in modest growth in Required Stable Funding (RSF). On the other hand, the increase in long-term funding sources, including regulatory capital, wholesale funding maturing in more than one year and retail funding compensates the increase in RSF, resulting in greater resilience of structural liquidity when considering the system in aggregate (Chart 1.2.1.14). Using a simplified calculation of the NSFR, applied to all conglomerates individually, there was no relevant variation in the FIs' capacity to fund their assets, as measured by the Structural Liquidity Ratio¹¹ (ILE, in its Portuguese abbreviation) (Chart 1.2.1.15). Despite the deterioration in the lowest tiers of the ILE's distribution (10th percentile), the wide majority of institutions hold adequate levels of resources capable to fund a potential recovery in credit growth.

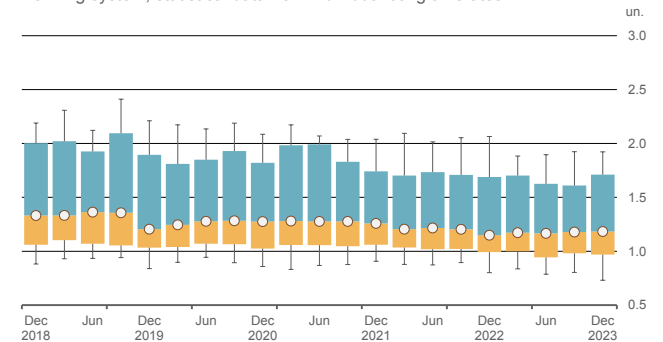
11 The Structural Liquidity Ratio (ILE) aims to measure whether banks have sufficient sources of stable funds (numerator) to finance their long-term assets (denominator). It expands the concept of the NSFR applied only for the institutions belonging to the S1 segment, to all banking financial institutions. 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 1.2.1.14 – 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).

Chart 1.2.1.15 – Structural Liquidity Ratio^{1/}
Banking system, statistical data from individual conglomerates



1/ The Structural Liquidity Ratio 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 continued to slow down. However, for household bank credit, deceleration lost momentum in the last quarter. For companies, bank credit kept growing at slower rates and capital markets continued to increase their share as a relevant funding source, mainly for large corporates.

FIs risk appetite, which had been decreasing, started to show signs of stability. Household credit growth continued to slow down, but credit card and non-payroll deducted credit growth remained stable, and vehicle financing credit accelerated. Household credit granting standards remained stable after a period of improvement. For companies, despite significant slowdown on credit growth, there was no perceived difference in credit granting standards. Prospectively, surveys with FIs point to better conditions of credit supply and demand, with more flexible¹⁴ credit granting standards. Given the risks related to the economic

activity, the household debt service-to-income (which, despite recent decreases, remain historically high) and the indebtedness of families and smaller companies, the environment continues to demand the preservation of credit granting standards.

Risk materialization for household credit tends to decrease in the coming months. The maintenance of household credit granting standards after a period of improvement, the reduction or relative stability of expected probabilities of default, and a decreasing share of higher risk modalities indicate household problem assets will continue to decrease in the coming months. Risk materialization for MSMEs is expected to remain stable, with no signs of reversion in the short term, given the recent stability of credit granting standards. Large corporates kept a downward trend of risk materialization, which is expected to continue as credit losses write-offs tend to remain larger than new problem assets.

Provisions remained above the expected credit losses estimated for the credit portfolio. Provisions hold correspondence with expected risk

materialization, remaining at an adequate level to support the 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

Broad credit-to-GDP gap increased, regardless of the real economy financing slowdown. Despite the slowdown of the broad credit year over year growth rate in the second semester, broad credit-to-GDP grew again and increased the difference to its long-term trend, at values close to those verified in December 2022 (Chart 1.2.2.1). Capital markets were the main reason for this increase, recovering the dynamism after the first semester. It is expected that this funding source continues to be the main responsible for the gap increase, given the perspective of lower domestic interest rates and the continuity of development of this market in the economy.

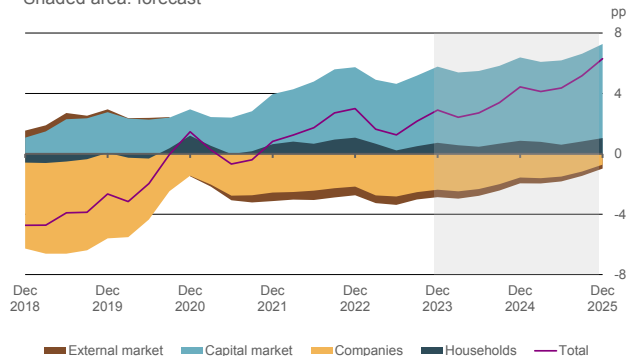
¹² Throughout this section, when we talk about bank credit or credit portfolio, we are referring to the domestic bank credit portfolio.

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.

¹⁴ See “Pesquisa Trimestral de Condições de Crédito (PTC) – Resultados de dezembro de 2023”, available from <https://www.bcb.gov.br/content/publicacoes/ptc/202312/RelatorioPTC-Dezembro2023.pdf>.

Chart 1.2.2.1 – Broad credit-to-GDP gap – Without FX variation

Shaded area: forecast



Although the projected increase in the broad credit-to-GDP gap demands attention, other factors should also be considered.

Even though the broad credit-to-GDP gap is the reference indicator proposed by the Basel Committee on Banking Supervision (BCBS) to support CCyB¹⁵ decisions, the BCBS itself does not advise the mechanical use of this indicator,

because although there is empirical evidence of its predictive power, the indicator has limitations, which are particularly important in EMEs. The calculation of the broad credit-to-GDP gap can be significantly impacted by the choice of the initial date of the series and by structural breaks occurred over time. The recent development of capital markets, for instance, does not impact the specification of the long-term trend with the same magnitude, resulting in larger values of broad credit-to-GDP gap in the last quarters and in the forecast of the next two years.¹⁶

Companies

The payment capacity of large companies showed opposite signs and continued to be challenging for MSMEs throughout the second half of the year. For publicly traded companies, the rise in both production costs and financial expenses were factors that influenced the falls in the interest coverage ratio and profitability since mid-2022 (Chart 1.2.2.2).

However, in 2023, there was some improvement in these companies' results, with an increase in profitability, maintenance of the interest coverage ratio and stability in the ratio between Net Debt and Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA). Despite this, the requests for judicial recovery by large companies returned to growth in the second half of the year, to a level higher than that seen in the previous two years, but still far from historic highs (Chart 1.2.2.3). For MSMEs, both the significant volume of judicial recovery requests in 2023 (Chart 1.2.2.4) and the recent increase in the risk materialization are elements that present a challenging situation for the payment capacity of these companies. According to the SFN institutions in the last Financial Stability Survey (FSS),¹⁷ the leverage level of companies as a whole continues to be assessed as high, but with a tendency towards stability. Despite the downward trend in debt costs, the improvement in this situation will basically depend on the evolution of economic activity.

¹⁵ 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 the April 2016 FSR (<https://www.bcb.gov.br/content/publicacoes/ref/201604/RELESTAB201604-refPub.pdf>), the ACCP_{Brasil} is not defined based on one indicator or even on a collection of pre-established indicators.

¹⁶ Since the previous FSR issue, broad credit-to-GDP gap was recalculated to include *Rural Bonds* (CPR) and *Bank Credit Notes* (CCB) without co-obligation in capital markets. These additions, especially the former, raised the gap of capital markets to their long-term trend.

¹⁷ See item 1.3 – Financial Stability Survey.

Chart 1.2.2.2 – Financial-economic indicators (medians)
Publicly traded companies

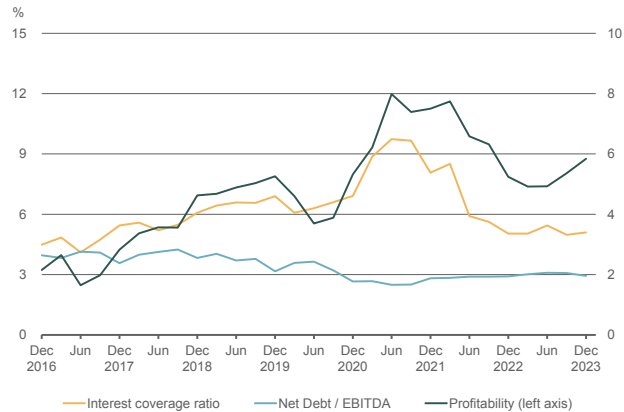
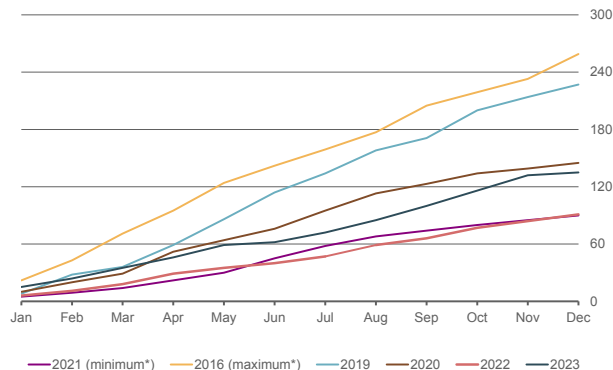


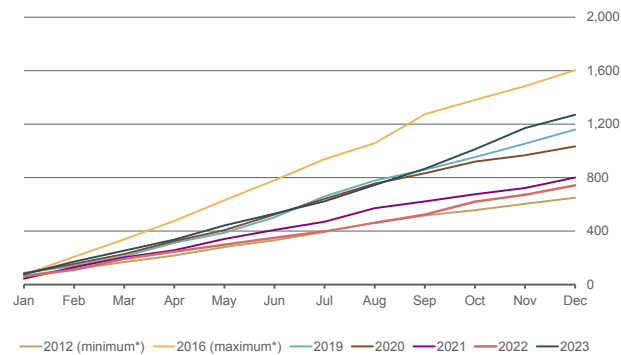
Chart 1.2.2.3 – Corporations in judicial recovery
Large Companies – Cumulative requests by year



Source: Serasa Experian

* Minimums and maximums for the period between 2012 e 2023

Chart 1.2.2.4 – Corporations in judicial recovery
MSME – Cumulative requests by year



Source: Serasa Experian

* Minimums and maximums for the period between 2012 e 2023

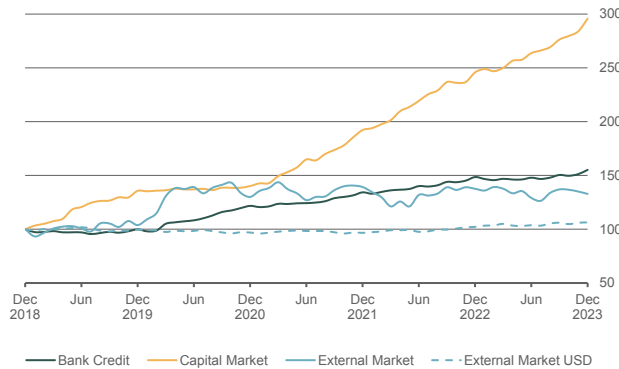
The domestic corporate debt market consolidated the recovery and gained representation in the broad credit financing, especially for large companies. Debentures continued to be the most representative instrument in the capital market, with the main uses being for ordinary management, investment in infrastructure and debt payments.¹⁸ In the second half of 2023, stocks of Commercial Notes/Promissory Notes fell slightly, while Agribusiness Receivables Certificates (CRAs) and Real Estate Receivables Certificates (CRIs) continued to grow, but

at lower rates than in the same period last year. On the other hand, the stock of Credit Rights Investment Funds (FIDCs) accelerated the growth, especially in the last quarter of the year. Prospectively, while on one hand the changes in rules for issuing CRI and CRA¹⁹ should affect capital markets, on the other hand the promulgation of the law creating infrastructure debentures, which transfer the tax advantage from the investor to the issuer, could expand the possibilities for financing through this instrument. In this way, the capital market, which as a whole showed high growth rates in 2023, should remain so at the beginning of 2024, as there is the prospect of its continued development encouraged by the internal fall in interest rates. With this, the expectation is that the capital market will continue to gain ground in broad credit for companies. On the other side, external borrowing by companies remained relatively stable in dollar amounts (Chart 1.2.2.5).

18 ANBIMA. Boletim de Mercado de Capitais.

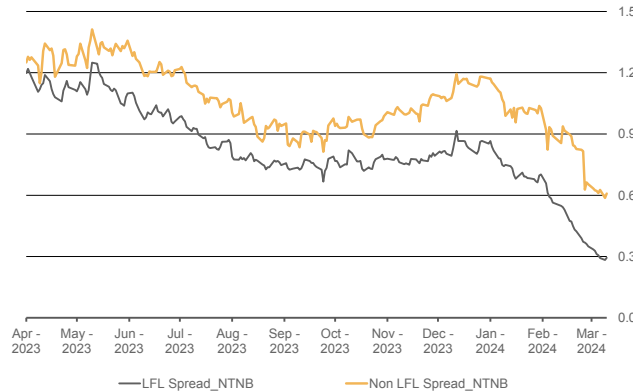
19 Resolution CMN 5,118/2024.

Chart 1.2.2.5 – Corporate Indebtedness
Dec/2018 = 100



Reduction in the spread on the National Treasury Note Series B (NTN-B) of incentivized debentures accelerates after changes in the rules for issuing fixed-income instruments with tax exemption. With the reduction in the supply of securities with tax benefits, incentivized debentures showed a significant drop in their returns shortly after Resolution CMN 5,119, of February 1, 2024, came into force, which made adjustments to the eligible backing and maturity dates of LCA, LCI, and LIG. The median spreads on NTN-B fell by around 0.4 basis point between the new rule and February 2, 2024 (Chart 1.2.2.6). It should be noted that the behavior recently observed may indicate that these instruments may continue with strong demand due to the restrictions on other tax-exempt instruments.

Chart 1.2.2.6 – Incentivized Debentures
Spread NTN-B % p.a.

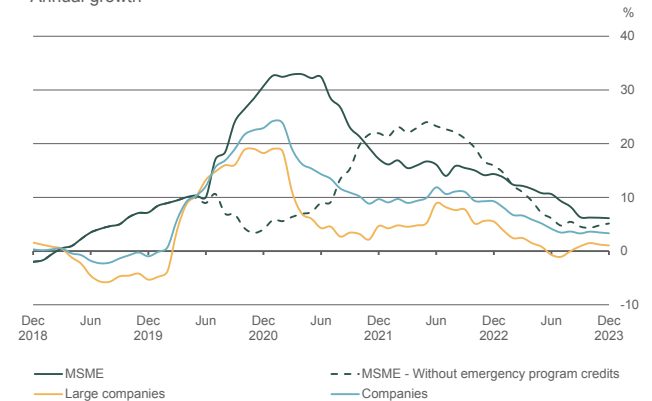


Companies bank credit continued to slow down, especially for smaller companies. There was a reduction in the rate of bank credit to MSMEs growth in 2023, albeit more smoothly in the last quarter (Chart 1.2.2.7). The slowdown was more pronounced in the micro-sized companies, with lending still heavily influenced by emergency credit programs.²⁰ In the case of small-sized companies, working capital of more than a year and vehicle financing were the highlights of the increase observed; in medium-sized companies, this modality was also one of the fastest growing,

²⁰ In this case, the National Program to Support Micro and Small Enterprises (Pronampe).

along with infrastructure, development, and project financing. Loans to large companies grew by 4.7% in the second half of the year, more than offsetting the fall seen in the first half of the year, with rural credit operations (especially industrialization) and receivables standing out. Despite the notable slowdown in loans to small businesses, the FIs generally point to a continued improvement in supply and demand factors in the first quarter of 2024,²¹ with emphasis on attracting new clients in the case of MSMEs and better economic conditions and competition between banks in the case of large companies.

Chart 1.2.2.7 – Bank Credit
Annual growth



²¹ PTC – December 2023 results.

The FIs' risk appetite did not change significantly in the second half of the year. For micro and small companies, disregarding emergency program operations,²² there was no significant change in the quality^{23, 24} of the credit granted. Despite this, the slowdown in the growth rate of this segment may indicate more rigor in granting, especially because a significant part of the new loans came from emergency programs. For medium and large companies, there were also no significant changes in granting criteria when we compare the second and first half of 2023 (Chart 1.2.2.8). This general scenario is not expected to change in the short term, as the FIs indicate a still flexible credit approval pattern for both MSMEs and large companies.²⁵

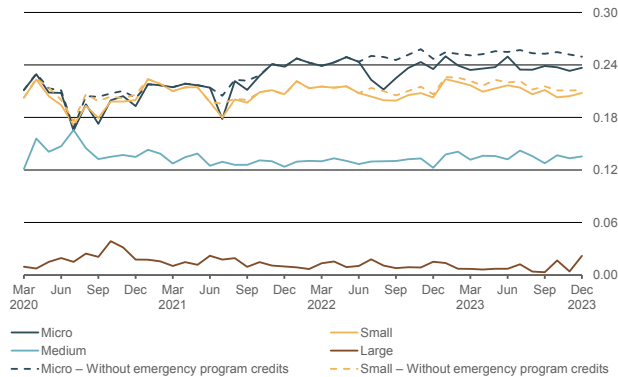
22 Specifically, the Credit Stimulus Program (PEC), the Emergency Credit Access Program (Peac), and the National Program to Support Micro and Small Enterprises (Pronampe).

23 The credit granting average score is a measure that quantifies the credit risk of new granting in the reference month becoming problem assets in a 12-month window, determined by a proprietary statistical BCB model. The higher the score, the riskier the operations.

24 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.

25 PTC – December 2023 results.

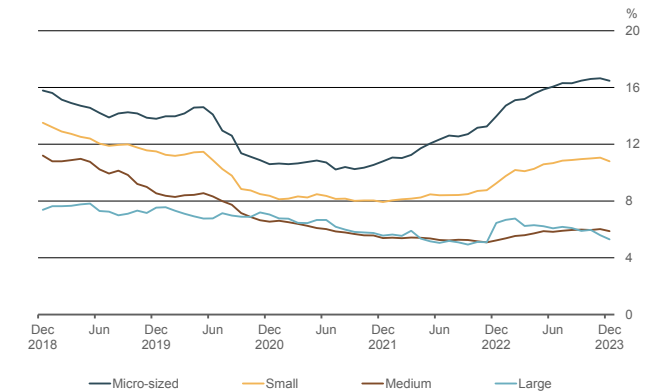
Chart 1.2.2.8 – Credit granting average score
By company size



The risk materialization showed signs of stability in the margin for MSMEs and it is expected to remain so. Despite the growth in problem assets (PA) ratio seen in the comparison between December and June, the situation was relatively stable throughout the last quarter of the year for smaller companies, while large companies maintained the downward trend in PA ratio (Chart 1.2.2.9). Looking ahead, the maintenance of granting criteria and the stability of default probabilities^{26, 27} in the non-problematic

MSME portfolio in the last quarter suggest that future risk materialization for this segment should continue at similar levels to the current ones (Chart 1.2.2.10). For large companies, the expectation is that write-offs will tend to exceed new entries into PA, which would lead to the percentage of risk materialization continuing to fall.

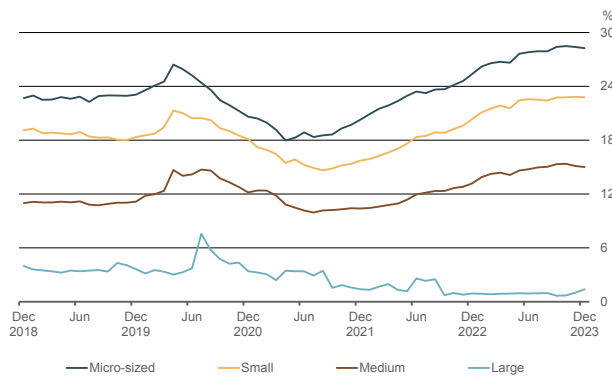
Chart 1.2.2.9 – Problem Assets
By company size



26 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.

27 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.

Chart 1.2.2.10 – Credit Outstanding – Probability of default
Performing loans – By company size



Households

Household payment capacity improved in the last semester. Individual debt service-to-income ratio (DSTI),²⁸ based on individual data from SFN credit borrowers, had a slight reduction in the second half of 2023 (Chart 1.2.2.11). The improvement was more significant for borrowers at lower income brackets (Chart 1.2.2.12). Individual debt-to-income ratio, based on individual data from SFN credit borrowers,

²⁸ For more information about debt service-to-income and debt-to-income ratios, refer to the FSR issue of October 2021, Chapter 2 – Selected Issues 2.2 *Household debt-to-income and debt service-to-income ratios*, and, at the end of this report, section “Concepts and Methodologies” items “d”, “e” and “f”.

also had a slight reduction in the second semester of 2023 (Chart 1.2.2.13).²⁹ In line with the highlights above, FIs identified, for the credit segment of household consumption,³⁰ overall improvements on supply factors, mainly in debt service-to-income ratio, employment level/salary conditions, delinquency and risk tolerance.³¹ Despite the improvements, debt service-to-income and debt-to-income ratios remain historically high.³² Prospectively, the current cycle of monetary easing, in addition to the increase of household gross income and wages, is expected to continue to positively impact household payment capacity in the coming quarters.³³

²⁹ On the methodology of individual debt-to-income ratio, refer to notes 1 and 2 of Chart 1.2.2.13.

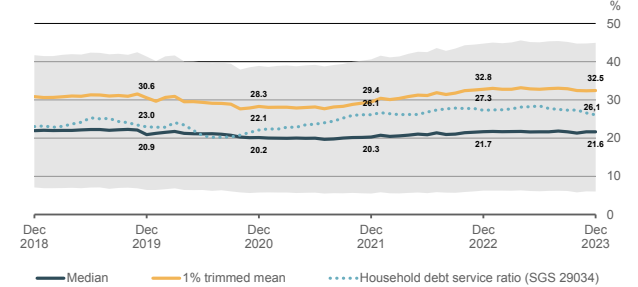
³⁰ Credit card, overdraft facility, payroll deducted credit, non-payroll deducted credit, vehicle financing.

³¹ PTC – Results of December 2023.

³² The absolute majority of FIs in the PEF of the first quarter of 2024 perceived household leverage as high, however the number of respondents which recognized a downward trend in leverage increased.

³³ See BCB time series 29023 and 432 for household income data and basic domestic interest rate, respectively.

Chart 1.2.2.11 – 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 1.2.2.12 – Individual debt service-to-income ratio
1% trimmed mean – By income bracket – Seasonally adjusted

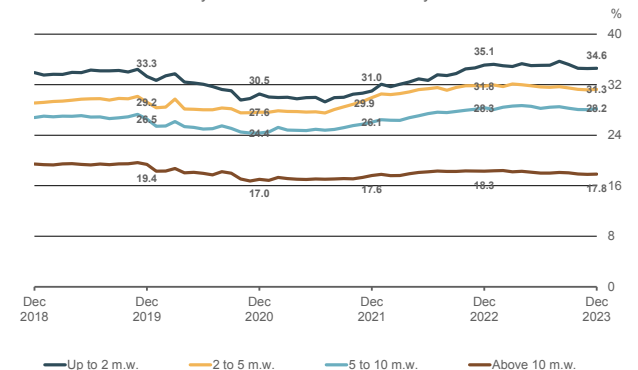
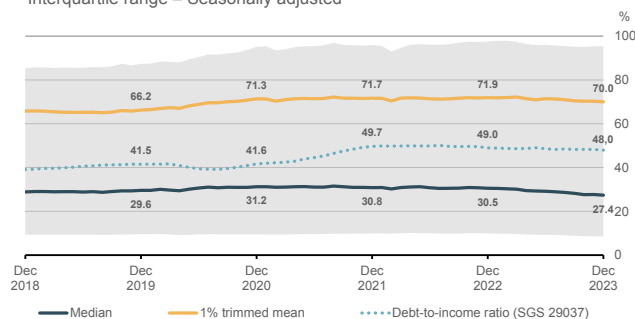


Chart 1.2.2.13 – Individual debt-to-income ratio^{1,2}
Interquartile range – Seasonally adjusted



^{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 continued to slow down, except for vehicle financing. However, credit card and non-deducted payroll credit modalities, after a period of growth rate reduction, presented a stable growth rate in the last months of 2023

(Chart 1.2.2.14); the credit card modality growth rate, however, decreased at lower income brackets (Chart 1.2.2.15). Improvements in the supply conditions of the vehicle market³⁴ led to a rise in credit origination³⁵ for all income brackets, especially in the last quarter, helping to increase the growth of the modality (Chart 1.2.2.16). Another highlight was the amount of real estate credit granting, which, despite remaining stable in total, changed in composition throughout 2023, with an increase of the share of loans funded by the Length-of-Service Guarantee Fund (FGTS) because of greater flexibility on eligibility criteria and larger funding availability (Chart 1.2.2.17).³⁶ Prospectively, FIs spotlighted, for the first quarter of 2024, the expectation of improvements to the supply factors and the strengthening of credit demand for household credit consumption, with more flexible credit granting standards. However, for real estate financing, cost and availability of funding are expected to be negative factors in the same period.³⁷

Chart 1.2.2.14 – Credit outstanding – Year over year growth
By credit modality

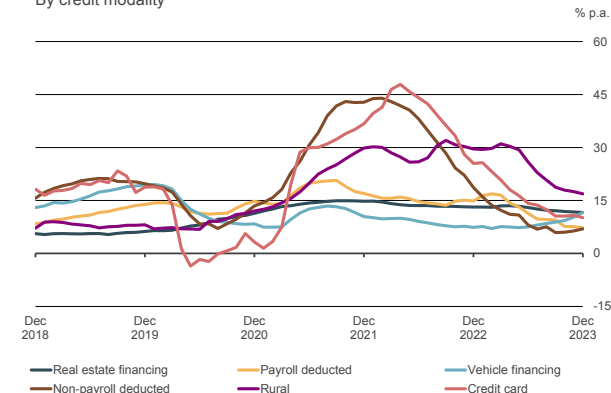
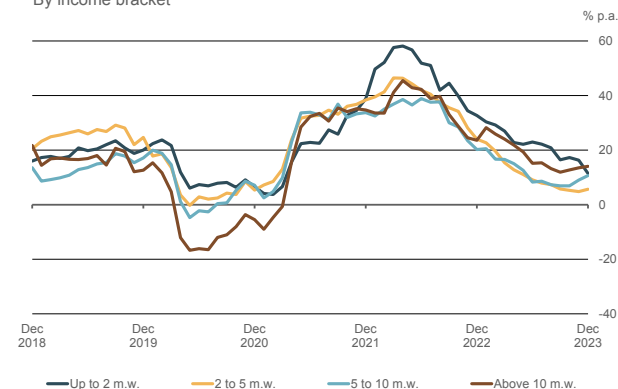


Chart 1.2.2.15 – Credit card – Credit outstanding – Year over year growth
By income bracket



34 As stated by *Federação Nacional da Distribuição de Veículos Automotores* (Fenabrave), “cost and credit access have improved since the last quarter of 2023. This, in addition to the expectation of reduction in official interest rates throughout 2024, has improved the availability and reduced the credit restrictions by financial agents” (available in <http://www.fenabrave.org.br/portaltv2/Noticia/17440>).

35 Credit granting is comprised of credit operations informed for the first time in SCR and whose month of granting equals the month of reference for Document 3040 sent by supervised institutions.

36 With the relaunch of program *Minha Casa Minha Vida* (MCMV), eligible income brackets and real estate maximum value were increased. Besides, the budget for *Programa Especial de Crédito Habitacional ao Cotista do FGTS* (Pró-Cotista) line of credit was increased.

37 See PTC – Results of December 2023.

Chart 1.2.2.16 – Vehicle financing – Credit granting
By income bracket

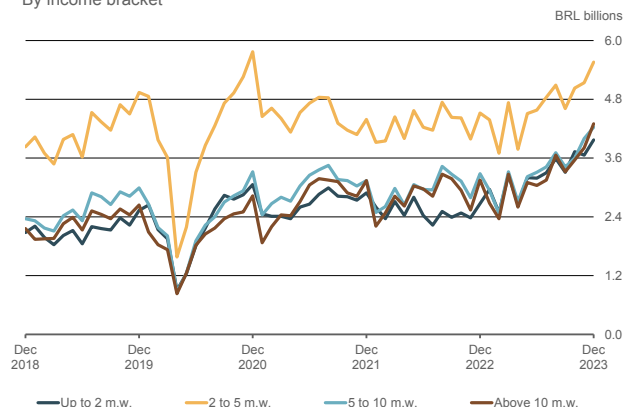
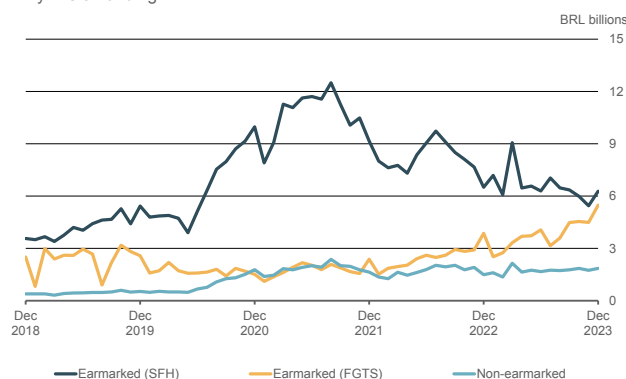
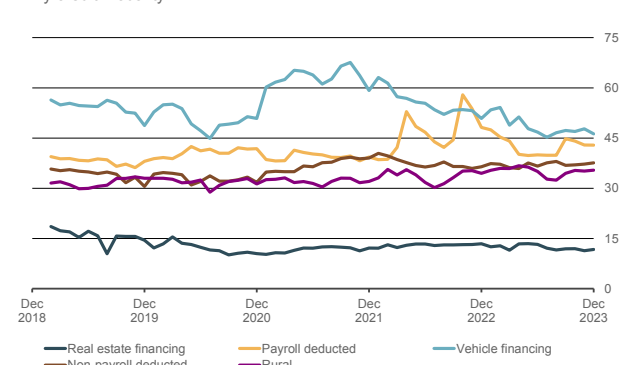


Chart 1.2.2.17 – Real estate financing – Credit granting
By line of funding



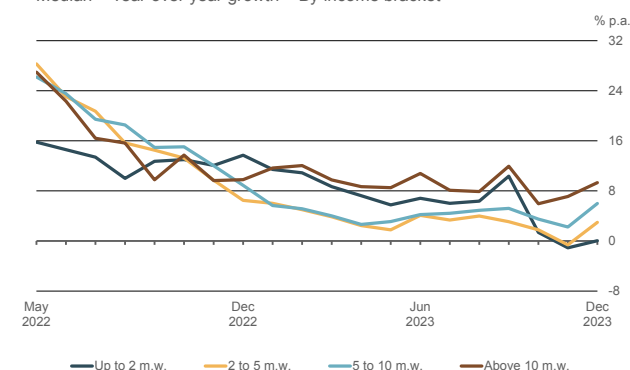
FIs risk appetite on household credit granting was stable. Overall, after a period of quality improvement during the first semester, there was relative stability in FIs credit granting standards³⁸ during the second semester, except for payroll deducted credit, which increased due to new credit operations granted to beneficiaries of *Benefício de Prestação Continuada* (BPC) from September 2023 (Chart 1.2.2.18). On credit card modality, credit supply³⁹ grew in larger proportion at higher income brackets, indicating more risk aversion from FIs; besides, current levels are inferior to those seen in the middle of 2022 (Chart 1.2.2.19). However, the significant rise in vehicle financing credit granting in the end of 2023 may represent a larger propensity to risk taking from FIs in this modality. Additionally, for real estate financing, even though the share of the constant amortization schedule (SAC) remained stable in the second half of 2023 (Chart 1.2.2.20), it is at a lower level than previously seen in the middle of 2021, while the average credit granting term of operations funded by FGTS increased again (Chart 1.2.2.21). These are factors to watch out for in the coming periods, as they may indicate greater risk taking in the modality, especially in credit grants funded by FGTS.⁴⁰

Chart 1.2.2.18 – Average credit granting score
By credit modality



The scores of different modalities cannot be directly compared, since different models were used to generate them; therefore, the most appropriate comparison of the current score of a modality is with its own historical levels.

Chart 1.2.2.19 – Credit card total limit
Median – Year over year growth – By income bracket



38 Household credit score models are based on variables of borrowers and specific operation features.

39 Total limit here is defined as the sum of the available limit and the utilized limit in the modality.

40 It should be noted that another important credit granting metric, loan-to-value ratio (LTV), did not have a significant increase in the recent period.

Chart 1.2.2.20 – Real estate financing – Credit granting
Share of the constant amortization schedule

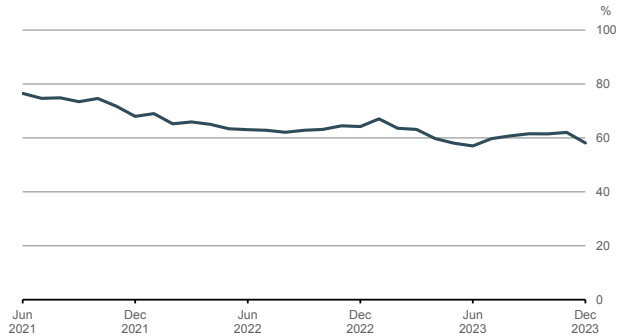
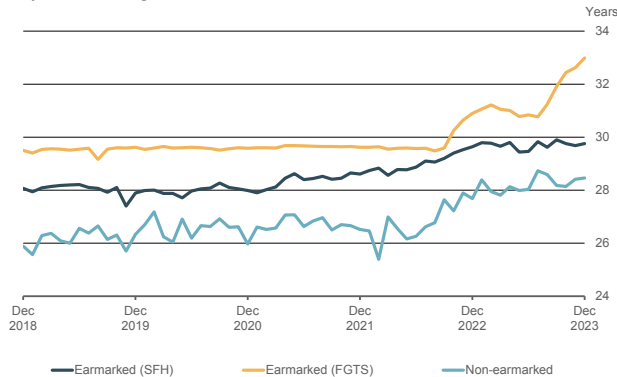


Chart 1.2.2.21 – Real estate financing – Average credit granting operation term
By line of funding



Credit risk materialization decreased during the semester but remains high.

While total credit portfolio increased, total problem assets portfolio remained relatively stable in the second half of 2023, which led to a reduction of the percentage of problem assets. Except for rural credit, the percentage of problem assets of the credit modalities decreased or remained stable (Chart 1.2.2.22). On the credit card modality, whose percentage of problem assets peaked during the first semester, the rise of the percentage of payment of the bills – notably for users at lower income brackets (Chart 1.2.2.23) – and higher levels of write-offs in relation to total credit portfolio in the second semester of the year were factors that contributed to decrease the percentage of problem assets in this modality (Chart 1.2.2.24).

Chart 1.2.2.22 – Problem assets
By credit modality

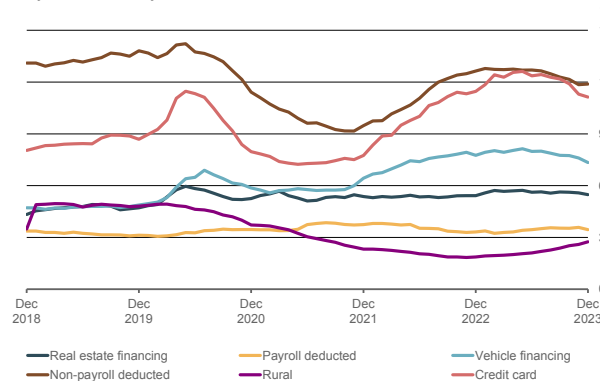


Chart 1.2.2.23 – Credit card – Average payment
By income bracket

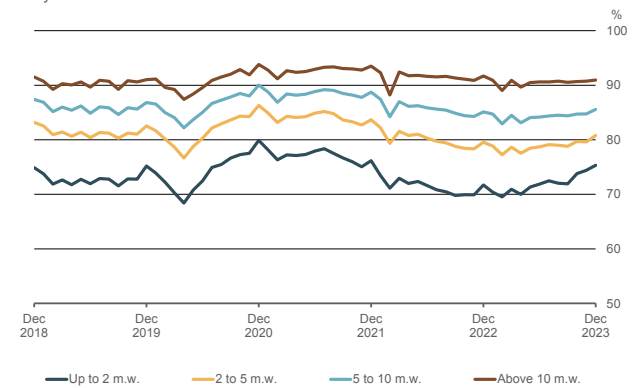
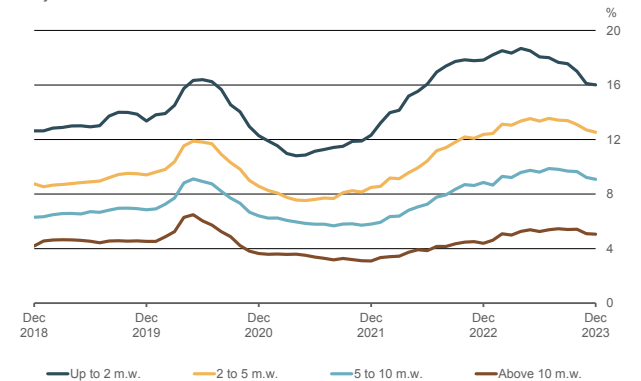


Chart 1.2.2.24 – Credit card – Problem assets
By income bracket



Risk materialization should reduce in the next months for household credit. Improvement in credit products mix (with slight share reduction of higher risk modalities), associated with overall stable credit granting standards, continues to translate to reduction or relative stability of expected probabilities of default in the portfolio of different credit products (Chart 1.2.2.25 and 1.2.2.26), suggesting a lower percentage of problem assets in the coming months. Another factor corroborating this statement is the percentage of pre-problem assets, which decreased throughout the second semester of 2023 (Chart 1.2.2.27).

Chart 1.2.2.25 – Credit outstanding probability of default
Performing loans – By credit modality

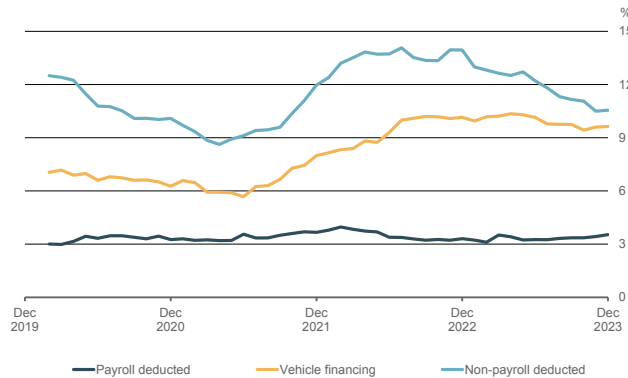


Chart 1.2.2.26 – Real estate financing – Credit outstanding probability of default
Performing loans – By line of funding

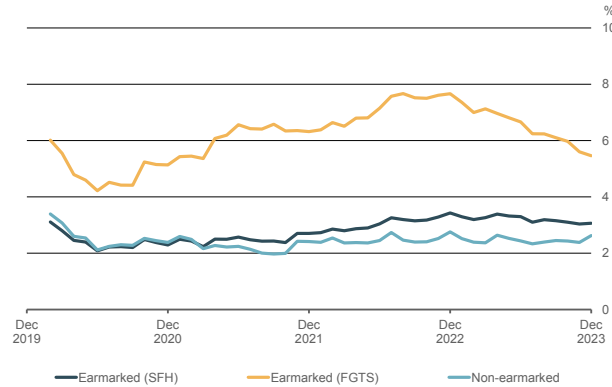
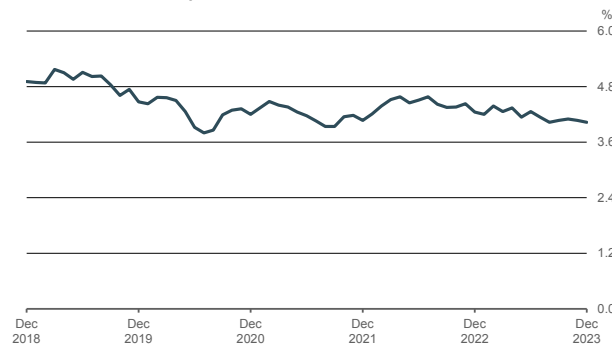


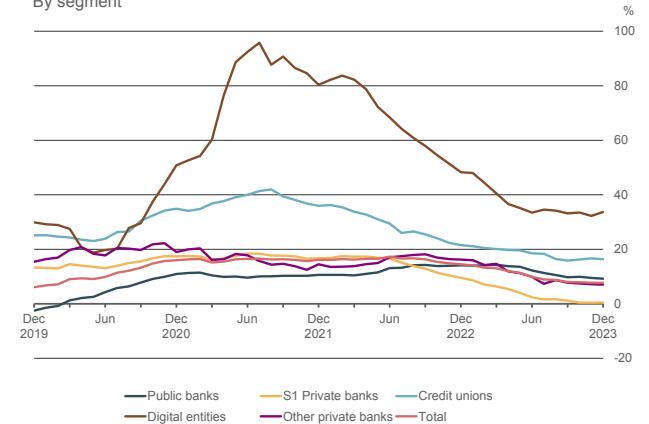
Chart 1.2.2.27 – Pre-problem assets



Domestic bank credit by segment

Supervised entities maintained a low-risk appetite, but the slowdown in loan portfolio growth rate weakened in all analyzed segments. The credit portfolio of private banks in the S1 prudential segment experienced the lowest growth among the analyzed segments (Chart 1.2.2.28). Digital entities and credit unions remained as the segments with the highest growth rate in the financial system.

Chart 1.2.2.28 – Year over year credit growth
By segment



Concentration of the domestic banking credit market is still decreasing.

Digital entities, credit unions and other private banks increased their share in the financial system's credit portfolio during the second semester of 2023, while private banks in the S1 prudential segment reduced their market share (Charts 1.2.2.29 and 1.2.2.30). The credit unions market share increase occurred mainly in the micro and small companies portfolio, while the digital entities growth occurred in households credit cards.

Chart 1.2.2.29 — Households portfolio market share
By segment

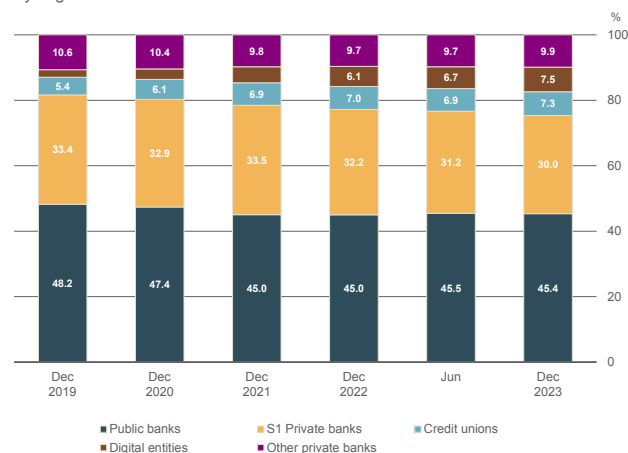


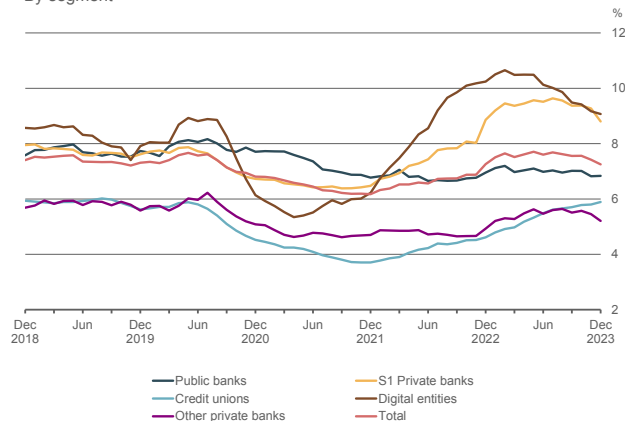
Chart 1.2.2.30 — Companies portfolio market share
By segment



Risk materialization decreased in the analyzed segments, except for credit unions.

The participation of problem assets in credit portfolios decreased in the last semester, mainly in digital entities and private banks in the S1 prudential segment, segments that present the highest levels of risk materialization (Chart 1.2.2.31). The reduction of problem assets occurred in the household portfolio, especially in credit card and non-payroll deducted credit modalities, and in the companies portfolio, both MSMEs and large companies, the latter influenced by impairments.

Chart 1.2.2.31 — Problem Assets
By segment

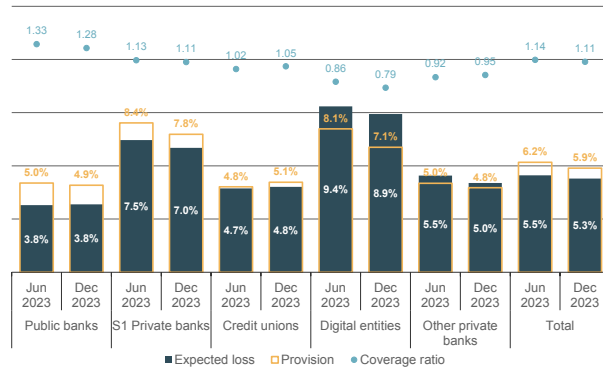


Provisions remained higher than the estimated expected losses for the credit portfolio.

Provisions remained higher than expected losses⁴¹ in most of the analyzed segments. Provisions constituted by supervised entities followed the improvement in risk and the reduction of expected losses in credit portfolios in the second semester of 2023. The expected loss coverage ratio per provision in the financial system is 1.11 as of December 2023 (Chart 1.2.2.32).

⁴¹ The expected losses estimates are conducted by the BCB based on proprietary credit risk models.

Chart 1.2.2.32 – Expected loss and coverage ratio
By segment



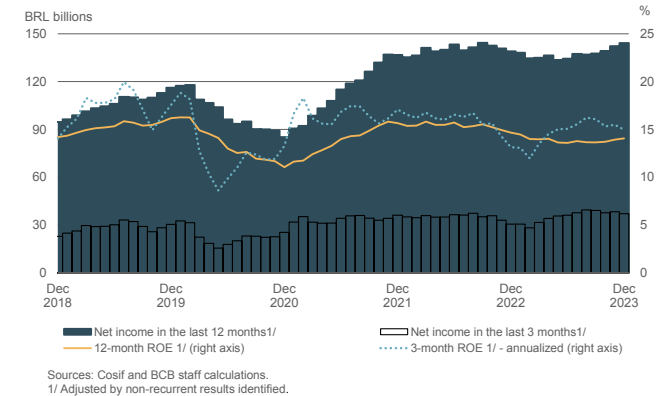
1.2.3 Profitability

The profitability of the banking system showed a timid recovery in the second half of the year and remains with a positive outlook for 2024. After recovering in the second quarter of 2023, FIs profitability showed a modest increase in the second half of the year. Loan loss provisions (LLPs),⁴² operational revenues⁴³ and administrative expenses remained stable. The profitability outlook for 2024 is for a slight improving trend. The maintenance of the quality of

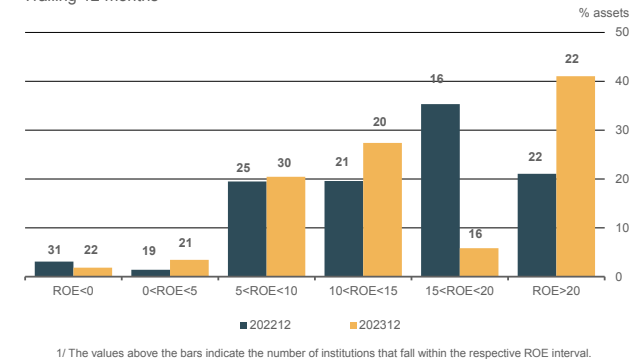
new loans should reduce credit risk and, consequently, the pressure on results deriving from provisions. The easing cycle reduces funding expenses, stimulates demand for credit and other banking services and mitigates credit risk, and the disinflation process reduces the pressure on operational costs. These elements, together, tend to contribute to better results in 2024.

The timid recovery in profitability in the second half of the year resulted in a slight reduction in the system's Return on Equity⁴⁴ (ROE) in 2023. FIs ROE was 14.1% in 2023, a drop of 0.6 p.p. in comparison with 2022 (Chart 1.2.3.1). The system's ROE distribution showed mixed movements in the profitability of S1 FIs, banks of greater systemic importance, with greater risk materialization reflected in the results of some institutions (Chart 1.2.3.2).⁴⁵ This movement reflects, mainly, the difference in success in the asset risk management strategy from FIs during the pandemic and interest rate cycles, with the most relevant materialization of risks in recent years. The increase in problem assets (PAs) was the main cause of the observed differences in profitability.⁴⁶

Chart 1.2.3.1 – Net income and ROE^{1/}
Banking system



1.2.3.2 – ROE Frequency Distribution
Trailing 12 months



42 In this section of the Report, we use the term “loan loss provisions” to refer to expenses recorded on FI's income statements.

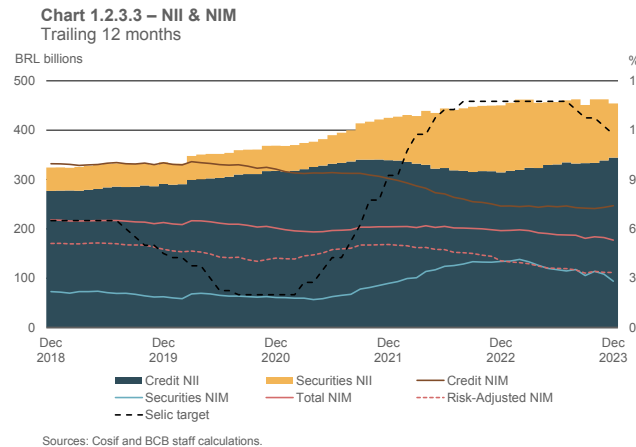
43 Operational revenues comprise NII and service revenues.

44 In 2023, FIs net profit was BRL145 billion, increase of 5% in the annual comparison.

45 In December 2023, the percentage of FI assets with negative ROE was 1.8%, a drop of 1.3 p.p. in the annual comparison. Around 98% of the system's assets were FIs with positive ROE, 95% with ROE higher than 5% and 74% with ROE greater than 10%.

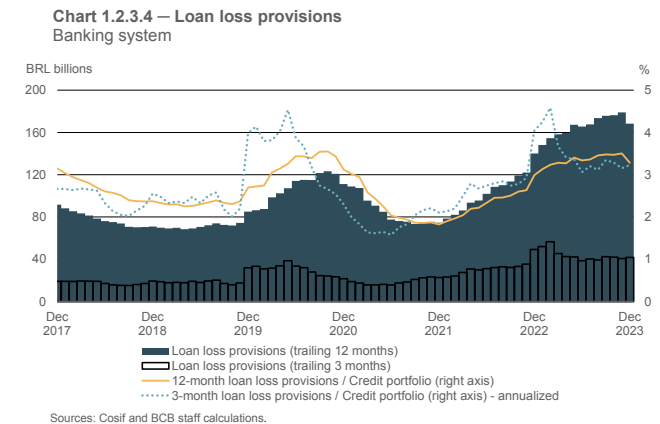
46 In addition to the increase in problem assets, differences in profitability are related to operational efficiency, fixed rate risk management in the securities portfolio and, to a certain extent, the effects of increased competition in the SFN.

Net Interest Income⁴⁷ (NII) remained practically stable throughout the second half of the year. In the second half of 2023, there was a drop in treasury NII, which was practically offset by the increase in credit NII. The fall in the treasury NII is mainly related to the decrease in the returns of the securities portfolio. The increase in credit NII, in turn, continues to be influenced by the reduction in funding expenses and, to a lesser extent, by the weight in credit revenues of loans granted at higher rates in recent periods. The continuation of the easing cycle should support credit NII⁴⁸ and reduce treasury NII. Net Interest Margin⁴⁹ (NIM) presented a small reduction, mainly reflecting the drop in the treasury margin (Chart 1.2.3.3). The expectation is that the credit margin will continue to improve and contribute to a recovery in the system's NIM.



After a consistent growth cycle that began at the end of 2021, LLPs stabilized. The sharp growth, mainly influenced by the increase in problem assets⁵⁰ in general and, in particular, by the Americanas case, gave way to consistent drops in quarterly LLPs in the first half of the year and stabilization in the second. LLPs over the last twelve months are also showing signs of easing in the last quarter of the year (Chart 1.2.3.4). The maintenance of the quality of new loans, the relative stability of the participation of riskier

modalities and the reduction in estimated credit loss in portfolios indicate a continued decline of PAs in the household portfolio in the coming months. Regarding companies' credit, risk materialization tends to remain stable in MSMEs and continues to decline in large corporates. This tends to reduce the pressure on FIs results via provisions. According to internal estimates, the provisions in place are considered adequate, above the expected loss estimates.⁵¹



⁴⁷ 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).

⁴⁸ Due to higher concentration of funding on floating rate instruments and their shorter average term, funding expenses tend to respond more promptly to declines in the Selic rate than the credit income. Thus, cycles of monetary easing tend to improve credit NII.

⁴⁹ NIM is calculated by dividing NII by total interest-earning assets.

⁵⁰ The increase in families' income commitment, the reduction in companies' payment capacity and, finally, the Americanas case, were the main factors that influenced the increase in PAs in that period.

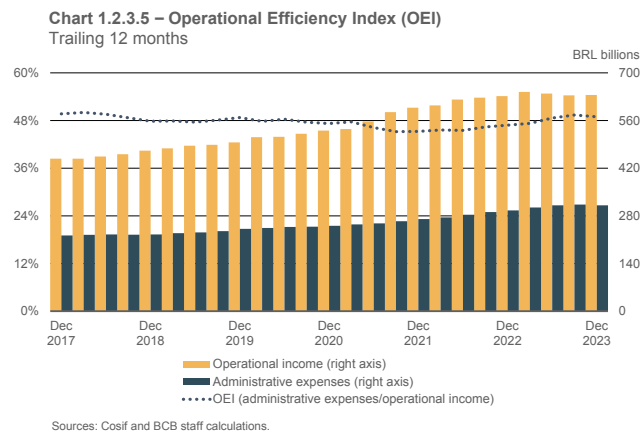
⁵¹ For further information, see Section 1.2.2 of this Report.

After a period of reduction, the system's operational efficiency⁵² remained stable in the second half of the year, but the outlook is for improvement in the medium term. Higher growth in administrative expenses relative to operational revenues resulted in a reduction in operational efficiency since the end of 2021 (Chart 1.2.3.5). This movement mainly reflected inflationary pressures on costs and the adverse scenario for the growth of operational revenues.⁵³ In 2023, operational revenues grew by 0.5%, while administrative expenses increased by 5%.⁵⁴ In the second half of the year, however, growth in both was practically zero, with a greater slow-down in the growth of administrative expenses. As a result, there was marginal improvement in operational efficiency in the last quarter's data. The outlook is for a relative improvement in operational efficiency in the medium term, supported by lower inflationary pressures, banking digitalization and cost control on the one hand, and, on the other, growth in operational revenues driven by the easing cycle and improved economic activity.

52 The system's operational efficiency is measured by the Operational Efficiency Index (OEI), calculated by dividing administrative expenses by operational revenues. The greater the value of the index, the lower is the system's operational efficiency, and vice versa.

53 Operational revenues were impacted by the slowdown in credit and reduced risk appetite of FIs and by low growth in service revenues given tightening financial conditions, weaker activity, and increased competition.

54 Inflation measured by the National Consumer Price Index (IPCA) was 4.62% in 2023. There was no relevant impact from the effects of exchange rate variation on the expenses of subsidiaries and branches of banks abroad in the second half of 2023.

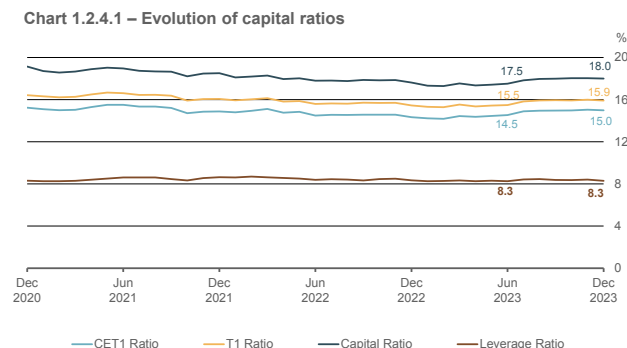


1.2.4 Solvency

The banking system remains solid and apt to sustain regular functioning of the economy. Even with the expansion of the scope of entities covered in this report,⁵⁵ capitalization ratios remain comfortably above regulatory requirements (Charts 1.2.4.1 and

55 Until the previous semester, this section only addressed institutions and conglomerates made up of banks with and without a commercial portfolio, excluding development banks. The scope of this report is all banking and non-banking entities, payment institutions (PI) and credit unions belonging to all prudential segments. Most of these entities calculate regulatory capital according to the simplified methodology provided for by Resolution CMN 4,606, of October 19, 2017, which presents a greater capital requirement.

1.2.4.2). Of the institutions, 96.2% are able to fulfill⁵⁶ the minimum regulatory capital (RC)⁵⁷ using only Common Equity Tier 1 (CET1) (Chart⁵⁸ 1.2.4.3), which is considered to be the best quality. Solvency does not pose a risk to financial stability.



56 Considering all risk-weighted requirements, including the capital buffer and Basel Pillar 2, the capital shortfall of 62 institutions which hold 1.0% of the system's assets amounts to BRL6.0 billion, corresponding to 0.44% of the system's RC.

57 The minimum RC requirements in relation to risk-weighted assets are defined by Resolutions CMN 4,958, of October 21, 2021, CMN 4,606, of October 19, 2017 and Resolutions BCB 198 and 200, both of March 11, 2022. The standard value of the factor is 8% for institutions in prudential segments S1 to S4 and 17% for institutions that adopt the simplified methodology for determining the minimum RC requirement. Differentiated values are applied to single credit unions due to affiliation with the central credit unions and conglomerates led by PIs, currently under transition rules.

58 Chart 1.2.4.3 does not consider 917 entities that calculate RC using the simplified methodology which account for 3.8% of the system's assets. The aggregate Total Capital Ratio of these institutions on the base date is 21.2%.

Chart 1.2.4.2 – Capital ratio variation

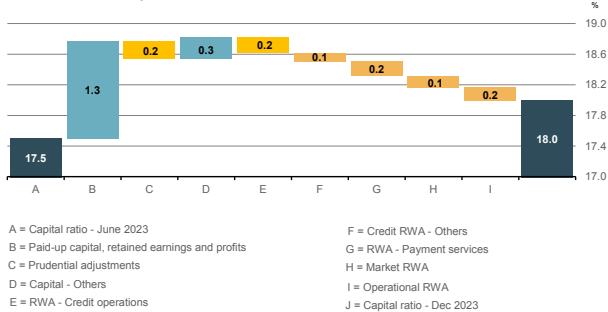
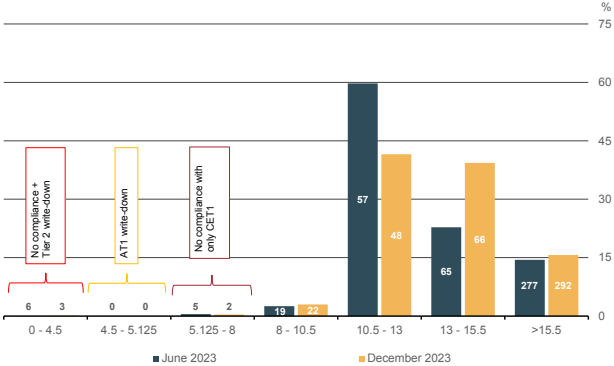


Chart 1.2.4.3 – CET1 ratio
Frequency distribution weighted by assets¹



¹ Inside the bars are the number of financial institutions in the correspondent CET1 ratio range.
² The institutions with CET1 ratio in the AT1 Capital or Tier 2 Capital write-down range do not possess these instruments

The change in the list of institutions covered had a significant impact on the capitalization ratios presented in this report. Due to the higher capital requirement imposed by the simplified methodology and the fact that some of the business segments now included are less dependent on third-party capital, the added institutions have higher capitalization than the banking conglomerates in aggregate terms. Although they only account for 24% of the system’s RC, the change in the scope of this report significantly increased all capital ratios (Table 1.2.4.1).

Table 1.2.4.1 – Effect of including entities in capital ratios

| BRL billions | Capital ratios | Scopes | | | |
|--------------|-------------------------------|------------------------|---------------------|--------|---------------|
| | | Previous ^{1/} | Added ^{2/} | System | Variation (%) |
| | CET1 Ratio | 13.4% | 22.2% | 15.0% | 11.4% |
| | CET1 | 903 | 318 | 1,220 | 35.2% |
| | RWA | 6,711 | 1,434 | 8,146 | 21.4% |
| | Tier 1 Ratio | 14.6% | 22.2% | 15.9% | 9.3% |
| | Tier Capital | 977 | 319 | 1,296 | 32.7% |
| | Total Capital Ratio | 16.6% | 24.7% | 18.0% | 8.7% |
| | Total Capital | 1,112 | 355 | 1,466 | 31.9% |
| | Leverage Ratio ^{3/} | 7.50% | 15.34% | 8.30% | 10.6% |
| | Total Exposures ^{3/} | 12,901 | 1,462 | 14,363 | 11.3% |

^{1/} Banks, except development ones.
^{2/} Development banks, non-banking institutions, payment instittuins and credit unions.
^{3/} The leverage ratio data refers only to banks and credit unions (Art. 1 Circular BCB 3,748/15).

The new prudential framework⁵⁹ for PI-led conglomerates has made the capital requirement more appropriate to the risks incurred. Until then, the calculation of RC and capital required based on the Risk-Weighted Assets (RWA) of type 3 conglomerates was restricted to the member FIs, which allowed their PIs to assume certain risks without having to bear the corresponding capital to cover unexpected losses. Type 2 conglomerates are now subject to a more simplified minimum requirement than type 1 and 3 conglomerates. The new framework contains a transitional rule with full implementation of the minimum requirements only in January 2025. Currently, 27% of the conglomerates led by PIs, representing 0.26% of the system's assets, do not meet the minimum requirements, a situation that is being monitored and regularized by supervision.

The lower retention of profits in the first half of the year was no obstacle to the continued increase in the system's capital base. Despite the higher remuneration distributed to shareholders⁶⁰ compared to the first half of the year (Chart 1.2.4.4), retained earnings remain the main driver of regulatory capital. In addition, the capital base was boosted by accumulated other comprehensive income relating to the available-for-sale securities portfolio and issues of instruments eligible for Tier 2. On the other hand, there was an increase in prudential adjustments, especially those related to intangible assets and investments in FIs and the like. The variations resulted in a small increase in the CET1 share of RC and an expansion of the latter by 7.8 per cent.

59 Resolution BCB 197 classified conglomerates comprising at least one PI as follows:

I – Type 1: prudential conglomerate whose leading institution is a financial institution or other institution authorized to operate by the Banco Central do Brasil [...];

II – Type 2: a prudential conglomerate whose leading institution is a payment institution and which is not made up of a financial institution or another institution authorized to operate by the Banco Central do Brasil [...]; and

III – Type 3: prudential conglomerate whose leading institution is a payment institution and which is made up of a financial institution or another institution authorized to operate by the Banco Central do Brasil [...].

In addition, the Resolution established that, for the purposes of proportional application of prudential regulation, type 3 conglomerates must fit into one of the S2 to S5 segments in a similar way to that introduced by Resolution CMN 4,553 of January 30, 2017.

The methodologies for calculating RC and capital requirements for type 2 and type 3 conglomerates were defined by Resolutions BCB 198, 199 and 200 of March 11, 2022.

60 Credit unions differ from other segments in that their surpluses are based on the operations carried out by their members, and not in proportion to their paid-up capital. The diversity of accounting procedures for recording distributed surpluses makes it difficult to measure them, which is why they were excluded from the analysis of retained earnings.

Chart 1.2.4.4 – Profit retention by ownership

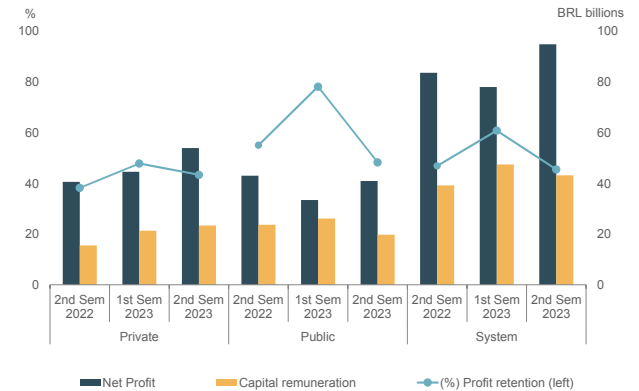
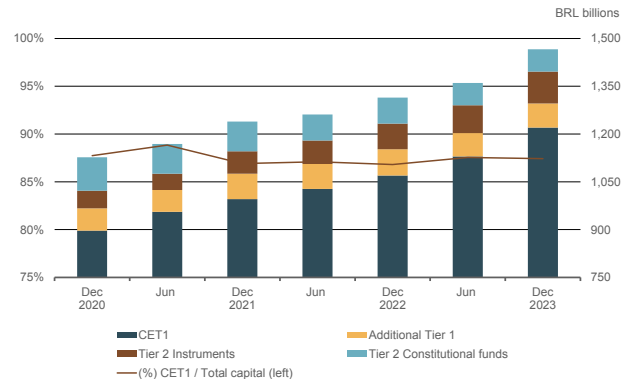


Chart 1.2.4.5 – Capital structure



The improvement of procedures for calculating the portion of RWA relating to credit risk contributed to an increase in the system's capital margin.

Resolution BCB 229, of May 12, 2022, refined the concept of exposure in line with international recommendations, as well as bringing greater risk sensitivity to the definition of the capital required for these exposures. As foreseen in the Explanatory Memorandum of the regulation, there was a reduction in the capital required to cover the system's credit risk in July 2023,

the month in which it came into force. The average risk weighting factor of institutions from S1 to S4 fell from 40.3% to 38.1% in the six-month period, resulting in a reduction in the share of credit risk in RWA (Table 1.2.4.2). In the same period, the system's capital margin⁶¹ reached BRL464 billion, compared to BRL415 billion in the previous semester period, which means there is substantial room for asset expansion without the need for capital contributions due to regulatory restrictions.

Table 1.2.4.2 — RWA Composition

| BRL billions | System | | | Var. (%) Dec/Jun | |
|------------------------------------|-------------|-------------|----------|------------------|---------|
| | Jun/23 | Dec/23 | Var. (%) | Public | Private |
| Total RWA | 7,775 | 8,146 | 4.8% | 4.9% | 4.7% |
| Credit RWA | 6,614 85.1% | 6,756 82.9% | 2.1% | 4.5% | 0.9% |
| Credit operations | 3,317 | 3,409 | 2.8% | 6.0% | 0.4% |
| Leasing | 25 | 24 | -1.8% | -11.1% | -1.6% |
| Interbank investments | 212 | 214 | 0.8% | -16.5% | 5.6% |
| Securities | 648 | 567 | -12.5% | -12.4% | -12.5% |
| Derivatives | 236 | 145 | -38.4% | -56.7% | -37.3% |
| Fixed Assets | 254 | 392 | 54.3% | 91.8% | 38.2% |
| Non-cancellable credit commitments | 190 | 166 | -12.5% | -9.9% | -13.0% |
| Guarantees provided | 371 | 385 | 3.6% | 9.6% | 1.8% |
| Tax assets | 375 | 409 | 9.0% | 5.4% | 11.1% |
| Other | 986 | 990 | 0.3% | -9.7% | 4.4% |
| Market RWA | 369 4.7% | 436 5.4% | 18.2% | 20.5% | 17.8% |
| Operational RWA | 792 10.2% | 869 10.7% | 9.8% | 4.8% | 13.5% |
| Payment Services RWA | 0 0.0% | 85 1.0% | - | - | - |

⁶¹ The capital margin of each institution corresponds to the smallest margin in all prudential requirements.

1.2.5 Stress tests

Capital and liquidity stress tests⁶² results indicate that the banking system presents adequate levels of capital and liquid assets in all adverse scenarios simulated.

Capital stress tests show that banks on aggregate remain compliant to regulatory minima after absorbing losses stemming from the simulated macroeconomic scenarios. 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.

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

Box 1 – Scenarios used in the macroeconomic stress tests⁶³

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 second 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 end 2023 GDP levels would be recovered only in the second semester of 2025. 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 second 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 third quarter, 2024 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.

⁶³ 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. Additionally, no “V” shaped recovery would occur, instead a slow economic rebound after activity slumps, in both scenarios.

Chart 1.2.5.1 – Inflation

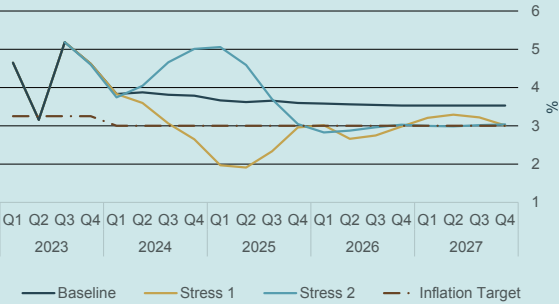


Chart 1.2.5.2 – Exchange Rate

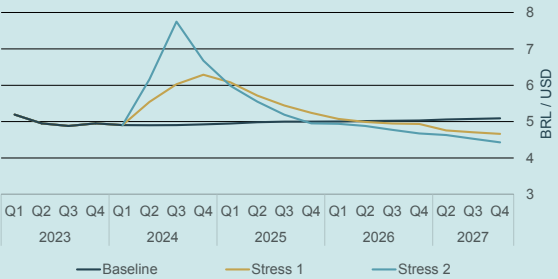


Chart 1.2.5.3 – GDP Change

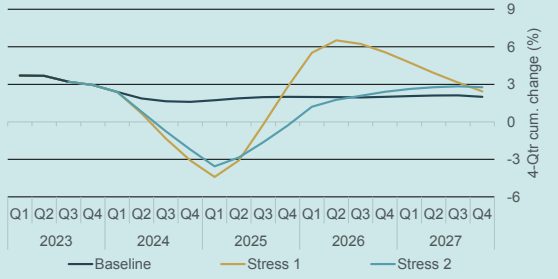


Chart 1.2.5.4 – Unemployment

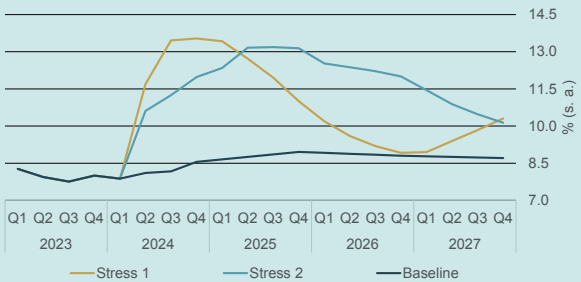
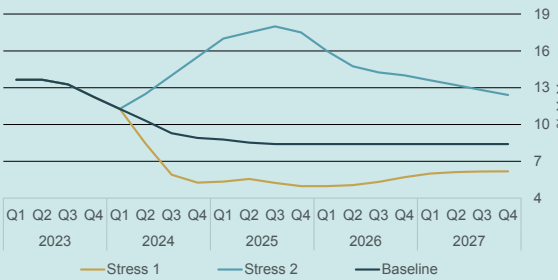


Chart 1.2.5.5 – Selic Rate



Macroeconomic stress test

The estimated system capital shortfall⁶⁴ is low in both simulated scenarios in the macroeconomic stress test, confirming the adequate loss absorption capacity of the banking system. The largest capital shortfall would be 3.3% of the current regulatory capital of the system at the 12th simulated quarter of the Stress 2 Scenario (Chart 1.2.5.6). This figure is greater than the 2.0% capital shortfall presented at the previous FSR, also at the last simulated quarter. For the Stress 1 Scenario, capital shortfall reaches 0.9% of the current regulatory capital of the system at the last simulated quarter, at the same level of the previous study. Problem assets would peak at 6.8% of total loans⁶⁵ (Chart 1.2.5.7), at the Stress 1 scenario. Institutions that together account for 84% of system total assets would continue to show capitalization ratios above regulatory minimum of 10.5% (Chart 1.2.5.8).

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

65 Problem assets reached a peak of 8.6%, in May 2017. The data series has been computed starting in January 2012. Prior to this date, for comparison purposes, the proportion of E- through H-classified loans, as a percentage of total credit portfolio is used as a proxy.

Chart 1.2.5.6 – Capital shortfall (% regulatory capital)

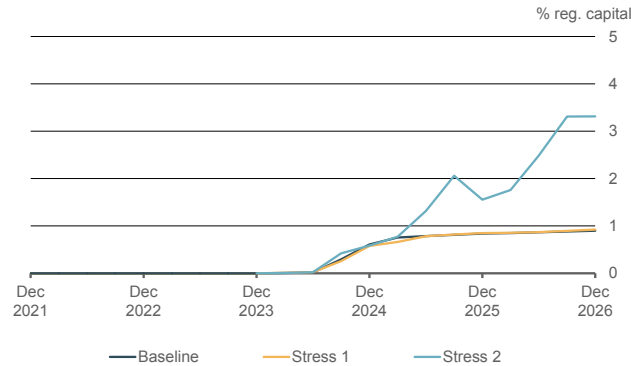


Chart 1.2.5.7 – Problem Assets projection

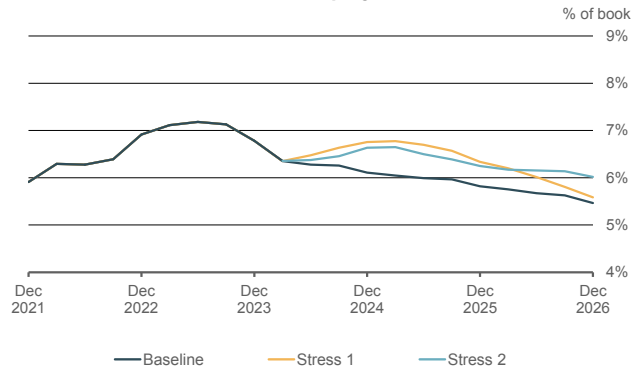
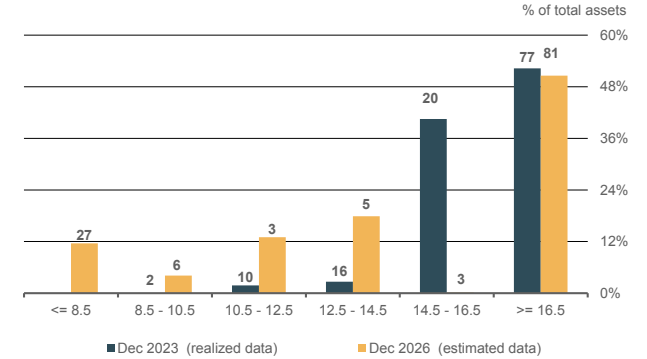


Chart 1.2.5.8 – Assets distribution by capital ratio ranges Stress 2 Scenario^{1/}



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

Sensitivity analysis

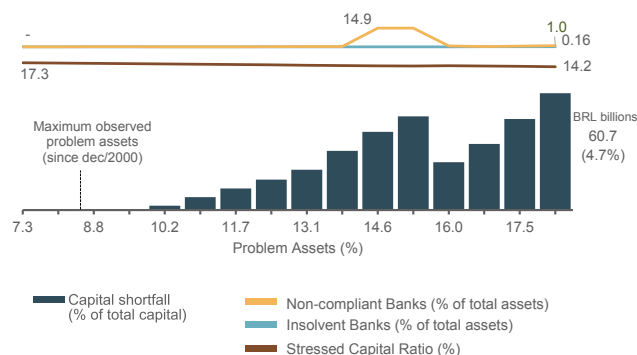
The system has low sensitivity to shocks in the exchange rate. Non-compliances⁶⁶ occur in institutions representing 0.02% of total system's regulatory capital, if the exchange rate presents a 100% increase relative to the rate observed by end of December 2023. The low observed net exposure inhibits greater adverse effects resulting from drastic fluctuations in the exchange rate.

66 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), and Common Equity Tier 1 (CET1).

Only very large positive shocks in the interest rate could generate some capital shortfall. A shock equivalent to the greater variation observed⁶⁷ would result in a capital shortfall of 3.0% of the regulatory capital, affecting banks accounting for 2.2% of system assets. Hedge policies aiming at limiting exposure to assets that are sensitive to fixed rates, in the trading book, reduce the risk of losses arising from interest rate shocks.

Incremental credit risk shocks indicate to a low capital shortfall if problem assets reached their highest historical mark. Capital shortfall would be 0.02% of system's regulatory capital (Chart 1.2.5.9), in case problem assets reach 8.6%, the historical maximum level observed in May 2017. In an extreme situation, if the proportion of problem assets reached 18.2% of the credit portfolio there would be a capital shortfall⁶⁸ equivalent to 4.7% of system's regulatory capital. These institutions would represent 1.0% of system assets.

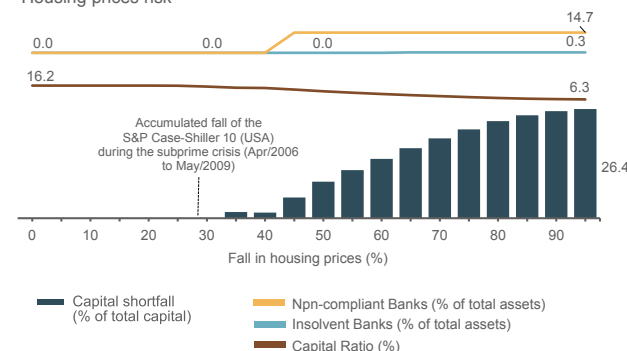
Chart 1.2.5.9 – Sensitivity analysis
Credit risk



Simulation of reductions in residential property prices show a very low possibility of non-compliances. There would only be any capital shortfall in the event of nominal drops greater than 35% in collateral prices of real estate credit operations, compared to the 36-month average of the Residential Real Estate Collateral Value Index (IVG-R). This shock exceeds the 33% drop observed in the S&P Case-Shiller during the subprime crisis in the U.S. Only a reduction of 45% or more in nominal prices would lead to insolvency, characterized by negative CET1. In December 2023, the stock of the residential real estate loan portfolio had an average LTV of 58.1%, considering collateral prices

updated by IVG-R⁶⁹ and outstanding balances updated by interests and amortizations. Origination criteria with moderate LTVs and the low share of real estate loans to the total credit portfolio reduce impacts of housing price shocks in extreme scenarios (Chart 1.2.5.10).

Chart 1.2.5.10 – Sensitivity Analysis
Housing prices risk



Simulation of direct interbank contagion

The simulation suggests a low need for resources to recapitalize the system due to contagion caused by the bankruptcy of each financial institution individually. Contagion occurs when a negative

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

⁶⁸ Capital shortfall considers what the institution would need to comply with all regulatory requirements.

⁶⁹ The Residential Real Estate Collateral Value Index (IVG-R) is calculated and disclosed by the BCB, based on property appraisals carried out for the granting of housing loans.

shock is transmitted to other institutions through direct links, such as loans and interbank deposits. In the worst case simulated,⁷⁰ the capital shortfall resulting from contagion would be below 1% of system's regulatory capital. This low impact is explained by the good level of capitalization of the system and the existence of an exposure limit per client, which restricts exposures between institutions. In addition, a considerable share of direct interbank exposures is collateralized, such as repurchase agreements backed by Federal Public Securities (TPF), thus reducing the likelihood of contagion.

Liquidity stress testing

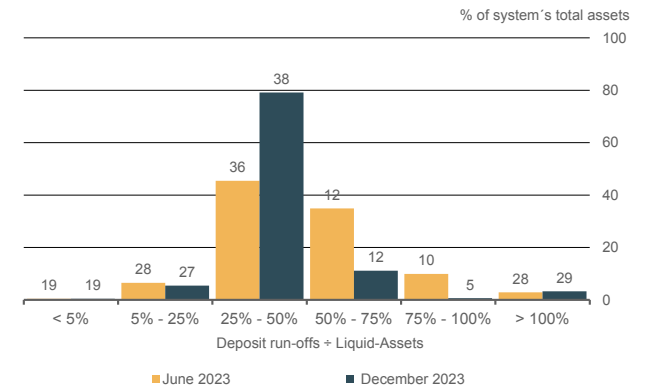
The system holds enough liquid assets to withstand losses under stressed scenarios and comply with current regulations. Liquidity stress testing reinforces the system's resilience to promote financial stability and the regular functioning of the intermediation system, even under adverse scenarios, demonstrating that the wide majority of FIs, including the largest ones, exhibit a liquidity buffer large enough to withstand depositor withdrawals and potential market losses under a stress scenario.

⁷⁰ Simulation consists in computing the impact of a bank's default to its creditor banks. This process is iterated for all banks to calculate its effects on capitalization ratios.

The depositor outflow stress testing indicates the system's resilience to withstand extreme funding losses. The depositor outflow scenario over a thirty-day horizon applies standardized deposit withdrawal percentages (run-offs) to funding sources, considering each client's type and the kind of funding operation. In addition, to complement the outflows estimated by run-offs, the methodology captures the effect of deposit volatility to estimate supplementary outflows over a 21-day holding period,⁷¹ individualized for each FI. Finally, it considers the total withdrawal of all funding maturing over the following 30 days, as well as full withdrawals by the largest counterparties, capturing concentration risk. The results of the simulation indicate that only a subset of institutions representing 3.3% of the system's assets exhibit impairment of liquid assets greater than 100% (Chart 1.2.5.11).

⁷¹ The depositor outflow stress test aggregates a subset of components of the IL's methodology associated with withdrawals: deposit profile, anticipated withdrawals, maturing intermediated funding and intermediated funding subject to anticipated withdrawals. Refer to the Concepts and Methodologies annex.

Chart 1.2.5.11 – Frequency distribution of 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.

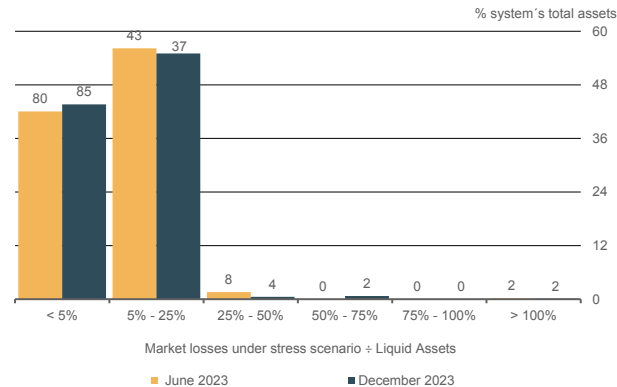
The result of shocks to market parameters indicates that banking institutions remain sufficiently resilient to withstand, over the short term, possible cash outflows to meet margin calls and collaterals, as well as a possible devaluation of liquid assets.⁷²

Greater risk aversion, and consequent reduced exposure to foreign currencies, combined with greater

⁷² The 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 different market risk factors, independently, for each institution; that is, it may have two independent scenarios, one shock estimating an increase for a certain risk factor for an institution and other a decrease for the same risk factor for an institution B.

volatility during the period, but also greater liquidity, contributed to a modest improvement in the ratio between market stress and liquid assets in comparison to December 2022 (Charts 1.2.5.12 e 1.2.5.13). In those simulations the value necessary to cover market losses resulting from market price variations for liquid assets, derivatives, and other financial instruments⁷³ is estimated. For assessing liquidity, liquid assets are marked to market independently of their accounting classification, which eliminates potential adverse effects of revaluating securities classified as Held to Maturity (HtM) and accounted for using the accrual method.

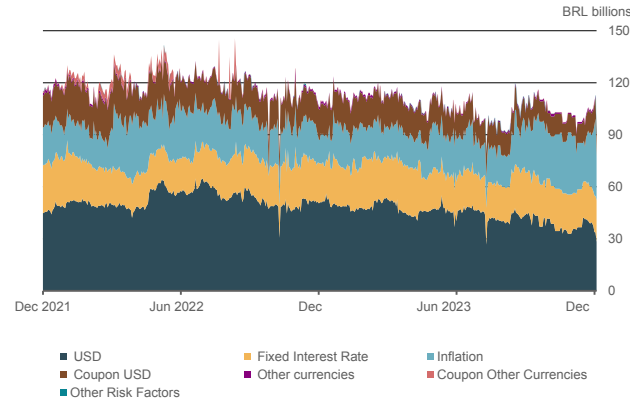
Chart 1.2.5.12 – Frequency distribution for market losses under stressed scenarios^{1/}



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.

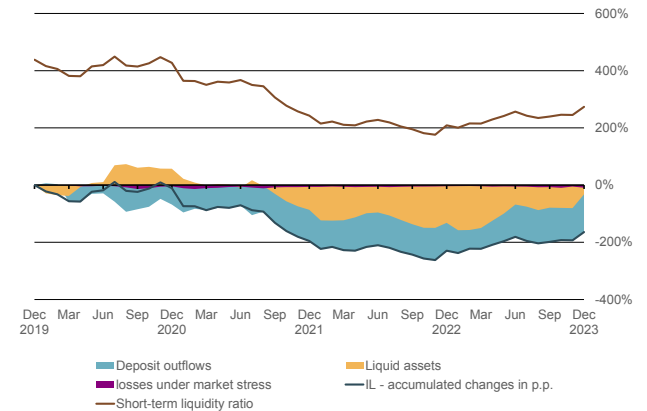
73 The losses/cash outflows include: (i) additional margin calls deposited in clearing houses; (ii) disbursements in positions of derivative markets; (iii) loss of value of liquid assets on repo-agreements or given as a collateral in clearing houses and the BCB.

Chart 1.2.5.13 – Impact of market stress by risk factors on Liquidity Ratio



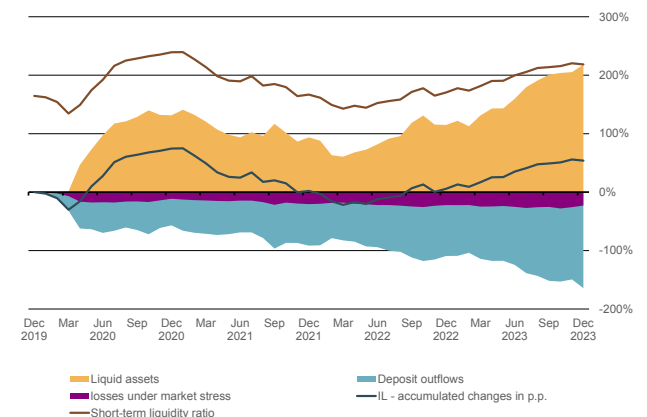
The system holds sufficient liquid assets to withstand, in aggregate, the stress test featuring depositor outflows and loss of market value. The Short-Term Liquidity Ratio (IL, in its Portuguese abbreviation), which represents the ratio between liquid assets and expected outflows in a stressed scenario combining both these factors, exhibited growth in the second semester for both government-owned and private banks. An important factor is the greater retention of liquid assets, due to a slowdown in lending growth, while funding growth remained steady. Losses resulting from the market stress scenario remain not significant for the system (Charts 1.2.5.14 and 1.2.5.15).

Chart 1.2.5.14 – Short-term liquidity ratio^{1/}
Public banks, monthly accumulated changes in percentage

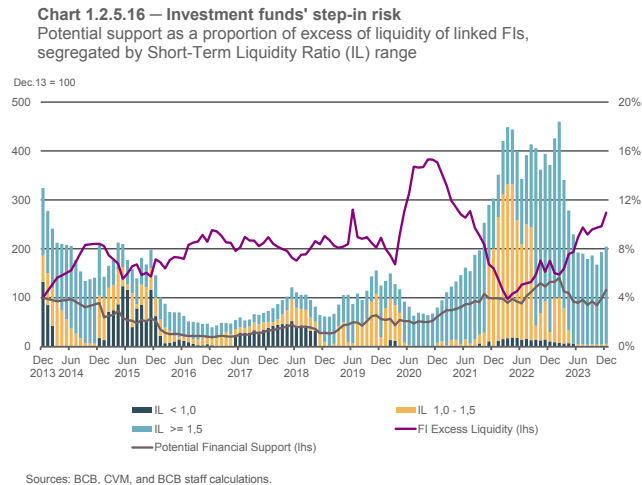


1/ The chart accumulated area shows how much each component has impacted in percentage points, since December 2019, on the evolution of the Short-term Liquidity Ratio.

Chart 1.2.5.15 – Short-term liquidity ratio (IL)
Private banks, monthly accumulated changes in percentage points (p.p.)



The impact of eventual liquidity support to investment funds⁷⁴ 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 remained relatively stable during the second half of 2023, representing 8% of the excess liquidity of the linked FIs. The ongoing linked FIs liquidity recovery process (verified since March 2022) counterbalanced the increase in the value of eventual liquidity support to the funds (Chart 1.2.5.16).



1.3 Financial Stability Survey⁷⁵

Compared with the survey conducted two quarters ago, the global scenario risks became the most important, in a context of still relevant fiscal

risks, but with an improved perception of economic and financial cycles. In the global scenario, it stood out the geopolitical risks and the inflation persistence on central economies that could lead to a restrictive monetary policy for a longer period. Financial conditions have improved, with emphasis on the strengthening of the upward trend perception of financial institutions to take risks and in asset prices in relation to economic fundamentals, in addition to a positive assessment of the access to funding and liquidity means. At the latest two Comef meetings, most respondents expected and suggested that the ACCP_{Brasil} value should be kept at 0%.

Risks to financial stability⁷⁶

The global scenario risks increased due to concerns with inflation persistence and increased volatility on global markets. Respondents believe that a greater persistence of the inflationary process will call for restrictive monetary policies for longer periods, resulting in a slower economic recovery.

⁷⁴ The concept and methodology for assessing potential liquidity support to investment funds were presented in the October 2017 FSR, available at <https://www.bcb.gov.br/publications/financialstabilityreport/201710>. Investment funds considered in the estimation of the potential support are those under Instruction CVM 555/2014, managed by entities belonging to the banking system, open-end and non-exclusive, not fund of funds, having a redemption no longer than thirty days and whose financial statements are not consolidated into prudential conglomerates.

⁷⁵ The BCB conducts a quarterly survey to identify and monitor risks to financial stability according to the perception of SFN's institutions. It should be stressed that since 2023Q4 the BCB started to release statistics and main highlights about responses obtained in the Financial Stability Survey (FSS) in the Thursdays after the Comef. The contents of this FSS develops these statistics and highlights. Opinions reported here are those of the responding financial institutions. Since the previous FSS, surveys were conducted in October 23-30, 2023, and January 22-30, 2024, with respective response rates of 90% and 91% (100% for the segment of BCB regulated institutions in both surveys; and 68% and 71% for the segment of CVM, Previc, or Susep regulated institutions). In December 2023, the sample for the segment of BCB regulated institutions that responded to the latest FSS accounted for 89.2% of the assets in this segment.

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 (total SFN's assets): very low (<0.1%); low (0.1%-1%); medium (1%-5%); high (5%-10%); very high (>10%)".

Some citations also indicate the Chinese economic deceleration might impact global activity and commodity prices. Financial institutions argued that the geopolitical conflicts and the 2024 U.S. presidential elections may increase uncertainties and the volatility of global markets, reducing trade and investment flows, and affecting the regular functioning of global productive chains and commodity prices (Table 1.3.1).

Table 1.3.1 – FSS – Most important risks

| Risk | Frequency (%) | | | Probability | Impact |
|-----------------------------------|---------------|----------|----------|-------------|--------|
| | Aug 2023 | Nov 2023 | Feb 2024 | Feb 2024 | |
| Global scenario | 28 | 39 | 33 | Medium-low | High |
| Fiscal risks | 32 | 25 | 31 | Medium-High | High |
| Delinquency and economic activity | 18 | 15 | 19 | Medium-High | High |
| Liquidity risk | 3 | 5 | 5 | Medium-low | High |
| Market risk | 0 | 2 | 3 | Medium-low | Medium |

Fiscal risks are still considered relevant, highlighting concerns with public debt sustainability. Financial institutions evaluate that expanding public expenses, if not accompanied by sustainable sources of resources approved by the National Congress, may compromise the achievement of fiscal targets, which might undermine the confidence in the government's economic policy.

Delinquency and economic activity risks remain stable, at relatively low levels. Respondents' concerns involve the high debt-to-income level of companies and households, which might affect the expected losses in the financial system credit portfolio. Although provisions seem to be sufficient, the materialization of this risk would have a relevant impact on the financial institutions' results.

Operational risks become increasingly relevant due to the growing concerns with frauds, cybernetic attacks, and risks involving the expansion of the digitalization of financial activities. Respondents believe that risks of widespread cybernetic attacks may affect the payment system and likely prevent the availability of financial services. An increased frequency of banking frauds would lead to users' loss of confidence and might become a relevant source of financial or reputation losses. Furthermore, the concern with these vulnerabilities increases as innovations and digitalization of financial services evolve in the financial industry (Table 1.3.2).

Table 1.3.2 – FSS – Three risks cited by IFs

| Risk | Frequency (citations/FI) | | | Probability | Impact |
|-----------------------------------|--------------------------|----------|----------|-------------|--------|
| | Aug 2023 | Nov 2023 | Feb 2024 | Feb 2024 | |
| Global scenario | 0.92 | 1.04 | 0.99 | Medium-High | Medium |
| Fiscal risks | 0.73 | 0.63 | 0.64 | Medium-High | High |
| Delinquency and economic activity | 0.47 | 0.48 | 0.46 | Medium-High | Medium |
| Operational risk | 0.13 | 0.14 | 0.17 | Medium-low | Medium |
| Domestic inflation | 0.11 | 0.11 | 0.10 | Medium-low | Medium |

Note: Financial institutions answer the following question: "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? Describe the three risks in order of importance (the most important first, considering the product between the probability of the event occurring and the magnitude of losses as a fraction of the total SFN's assets)". The BCB then classifies these descriptions into different risk categories for analytical purposes. Table 1.3.1 presents information referring only to the most important risk according to each institution, while Table 1.3.2 refers to the three risks listed by each of them.

Despite the reduction in relation to the two previous surveys, "inflation", "interest" and "delinquency" are the most cited terms by financial institutions in the textual answers about the key risks to the financial stability.⁷⁷ When comparing the three latest

⁷⁷ It should be noted that terms such as "inflation" and "interest" may refer to both domestic and international variables.

surveys, the occurrence of terms related to the global scenario risks and the fiscal monetary policy increased, such as “fiscal outlook”, risk_uncontrolled_fiscal”, “China”, “Ukraine”, “Russia”, “American elections”, and “reacceleration_inflation”. By contrast, the citations of terms indicating adversities in political and macro-economic conditions decreased, such as “uncertainty”, “recession”, “delinquency”, and “instability”, indicating an improved scenario (Charts 1.3.1 and 1.3.2).⁷⁸

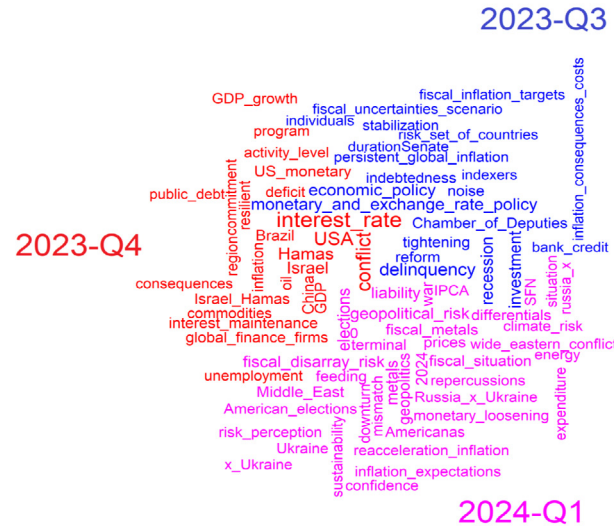
Chart 1.3.1 – FSS – Word cloud describing the most important risk



Note: The word cloud is compiled from the textual analysis of the most important risk described by each respondent. The size of the word is proportional to its frequency.

⁷⁸ In many cases, the word cloud does not allow to distinguish whether the variable refers to Brazil or abroad. However, the assessment is complemented with a more granular analysis.

Chart 1.3.2 – FSS – Evolution of risk perception

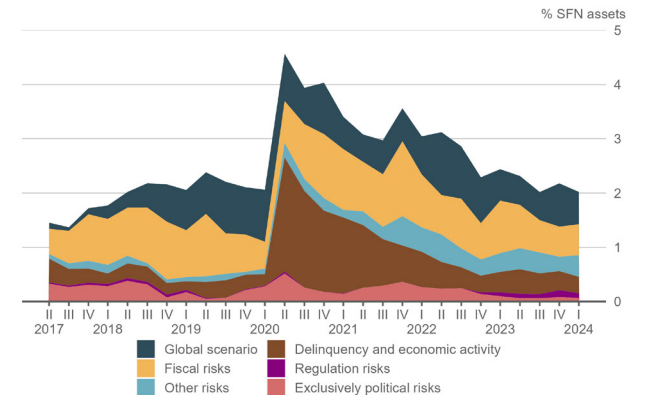


Note: The comparative word cloud is compiled from the textual analysis of the most important risk described by each respondent. The color of the word indicates the FSS in which the word frequency was predominant. The size of the word is proportional to the difference between the word frequency in the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

The average expected impact of risks to the SFN remained relatively stable, at a level close to the period before the Covid-19 pandemic. The sum of the average expected impact of all risks showed stability in the February 2024 survey compared with the August 2023 survey but with significant changes in individual

contributions (Chart 1.3.3). The average expected impact of delinquency and economic activity risks fell to 0.30% of SFN's assets in February 2024, against 0.38% in August 2023. Global scenario risks, in turn, rose to 0.60% of SFN's assets in February 2024, against 0.52% in August 2023, while fiscal risks fell from 0.59% to 0.57% of SFN assets in the same period. When the probability of materialization and the impact, in terms of the percentage of SFN's assets, are observed separately from the risks deemed more important, it stands out the increased probability of the materialization of the fiscal risks and the decreased probability of activity and delinquency risks (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 and impact 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

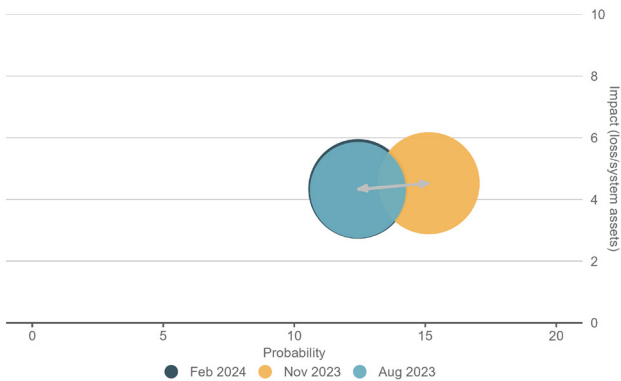


Chart 1.3.4.b – FSS – Fiscal risks: probability, impact and frequency

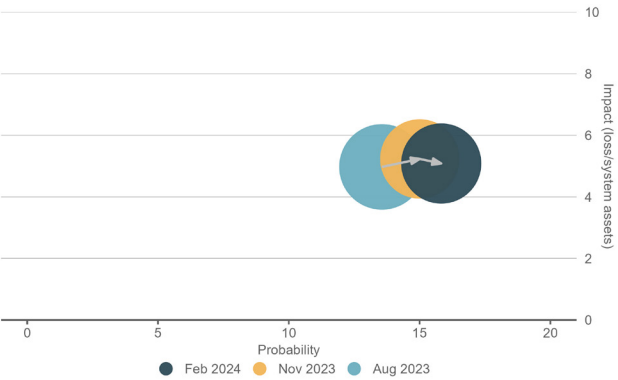


Chart 1.3.4.d – FSS – Liquidity risk: probability, impact and frequency

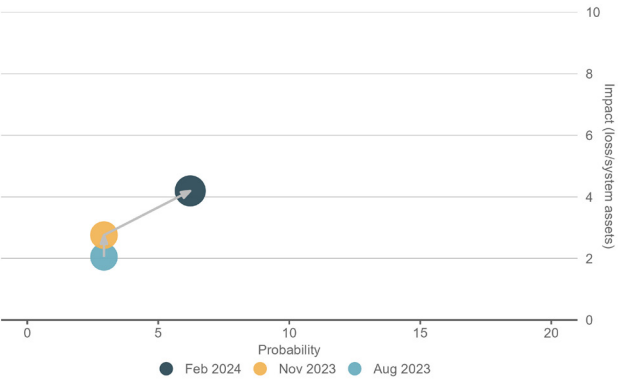


Chart 1.3.4.c – FSS – Delinquency and economic activity: probability, impact and frequency

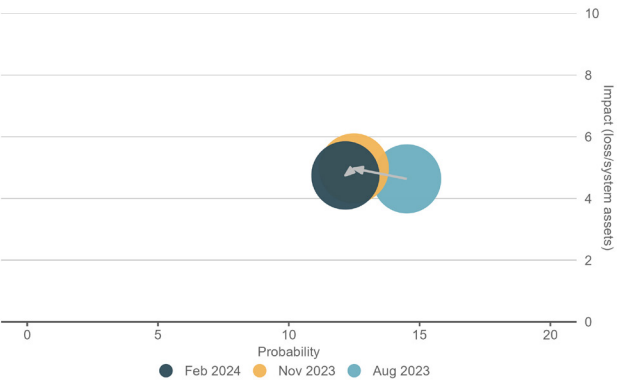


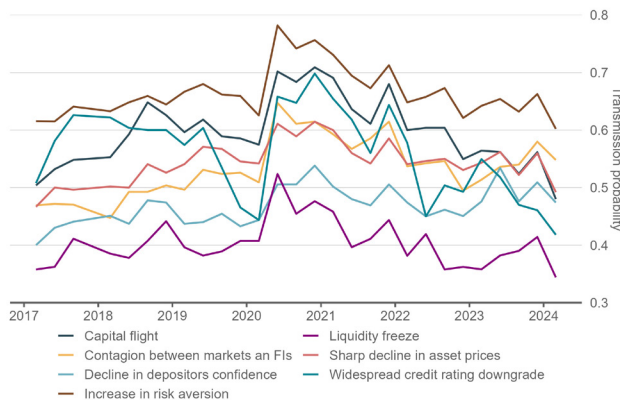
Chart 1.3.4.e – FSS – Market risk: probability, impact and frequency



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.

According to institutions, the probability of shock transmission through different SFN's channels decreased. In the February 2024 survey, the probability of transmission through the channel “liquidity freezing, including the interbank market and credit lines abroad” reached the lowest level of the time series. The probabilities of the channels “Widespread downgrade of credit rating, including sovereign rating”, “Capital flight and/or relevant exchange rate depreciation”, “Sharp decline of prices of domestic financial assets, including guarantees”, and “Increased risk aversion and uncertainty, affecting current decisions about consumption and investment” also accompanied the downward movement when compared with the surveys’ figures of August 2023 (Chart 1.3.5).

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

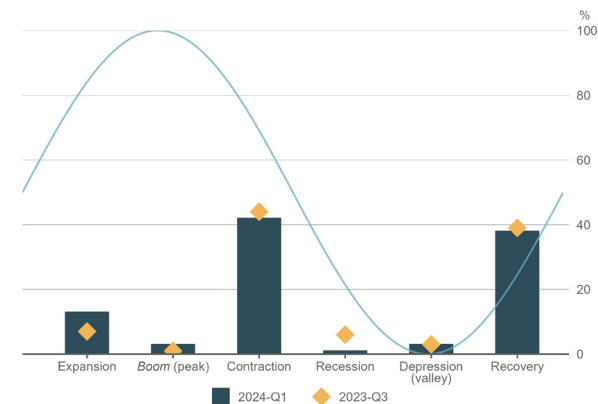


Note: Financial institutions answer the following question: “In the case of the occurrence of the event described as the most relevant to financial stability, what is the probability of this shock being carried through the channels below?”

Economic and financial cycles⁷⁹

The share of institutions with a more positive assessment of the economic cycle increased. The share of financial institutions assessing that the economic cycle is on a positive stage (expansion, boom, and recovery) become preponderant. The share of respondents assessing that the economy is expanding increased, while the percentage of assessments of the cycle as recessive fell to only 1% (Chart 1.3.6).

Chart 1.3.6 – FSS – Economic cycle



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”.

The perceptions about the gap in the GDP/credit ratio continue to be heterogeneous but with an improved perception of an upward trend and increased willingness of financial institutions to take risks. Although still a minority, the share of respondents considering an upward trend in the credit/GDP ratio rose from 17% to 28% (Chart 1.3.7.a). In terms of the willingness of financial institutions to take risks, the share of those identifying an upward trend rose to 44% in February 2024, against 34% in August 2023 (Chart 1.3.7.b).

The degree of household leverage is mainly perceived as on a downward trend, while the degree of corporate leverage is mainly perceived as stable. The share of respondents assessing the household leverage as high continues high (92%); however, the share of respondents assessing a downward trend increased (47% in February 2024, against 27% in August 2023) (Chart 1.3.7.c). Regarding corporate leverage, 67% of respondents believe it is high (Chart 1.3.7.d).

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

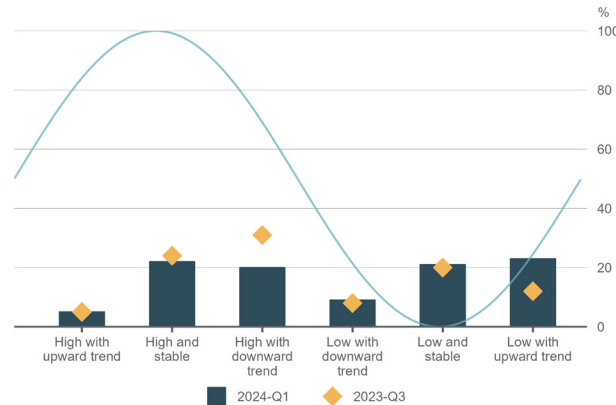


Chart 1.3.7.c – FSS – Financial cycles
Households leverage

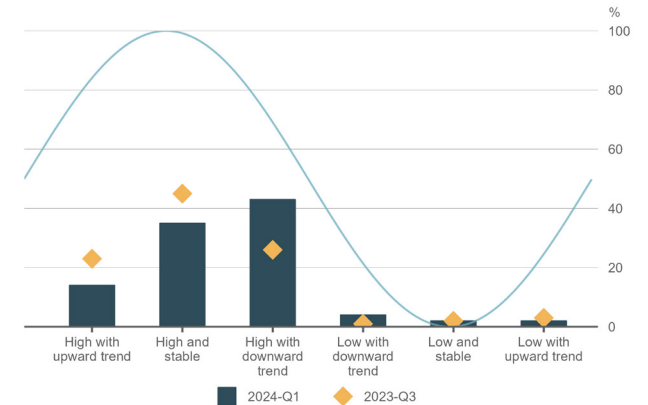


Chart 1.3.7.b – FSS – Financial cycles
Risk appetite

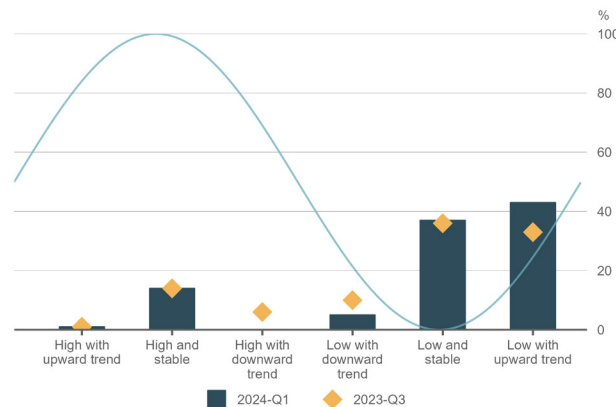


Chart 1.3.7.d – FSS – Financial cycles
Companies leverage

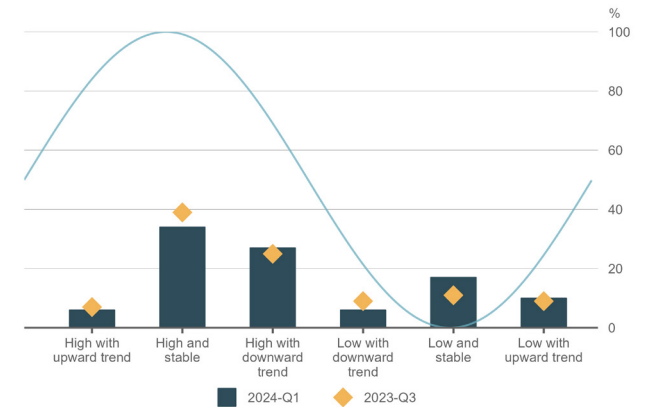


Chart 1.3.7.e – FSS – Financial cycles
Funding and liquidity

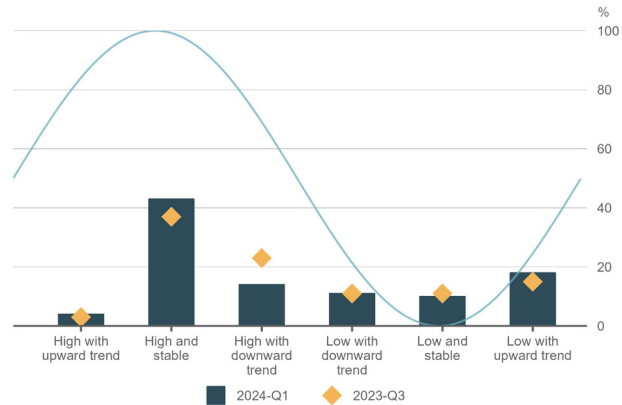
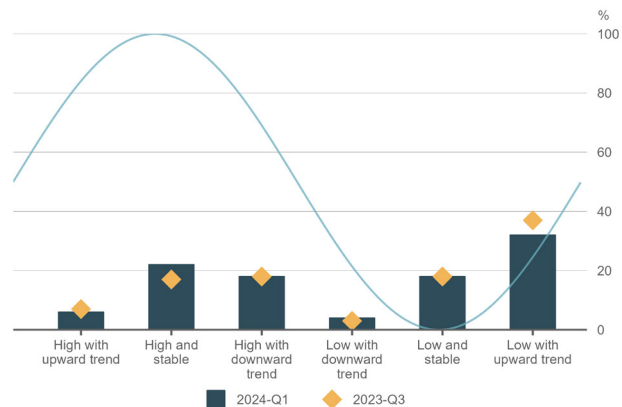


Chart 1.3.7.f – FSS – Financial cycles
Asset prices with respect to the fundamentals of the economy



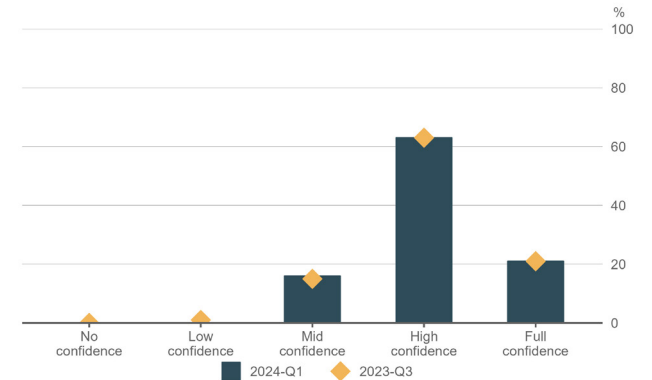
Resilience and confidence in the financial system stability

The indicator of confidence in the SFN's stability remains high. This indicator rose slightly over the August 2023 level and is quite close to the historical peak, reflecting the confidence of institutions in the SFN's financial stability. Most financial institutions are very or completely confident in the SFN's resilience (84% in the August 2023 and February 2024 surveys). In the November 2023 and February 2024 surveys, there were no negative citations ("little 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, around 97% expect the ACCP_{Brasil} to remain at 0% and 96% recommend maintaining it at this level (Charts 1.3.9.a and 1.3.9.b). This result has remained relatively constant during all the surveys.

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

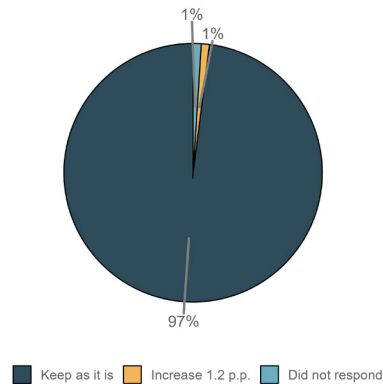
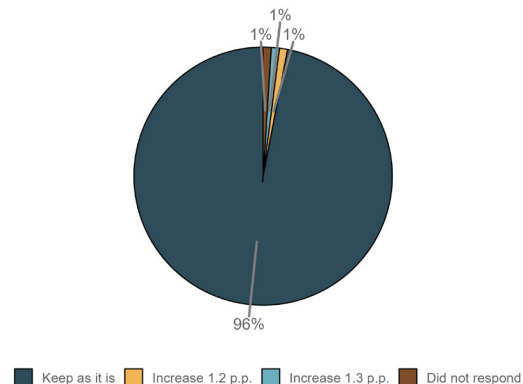


Chart 1.3.9.b – FSS – Expectations and suggestions for the Countercyclical Capital Buffer (Brazil)
Suggestions



1.4 Financial market infrastructures

In the second half of 2023, 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.

The financial system held enough intraday liquidity⁸⁰ to ensure smooth flow of payments in the 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 turn-over 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 5.3%. The Instant Payment System (SPI) reached 178 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

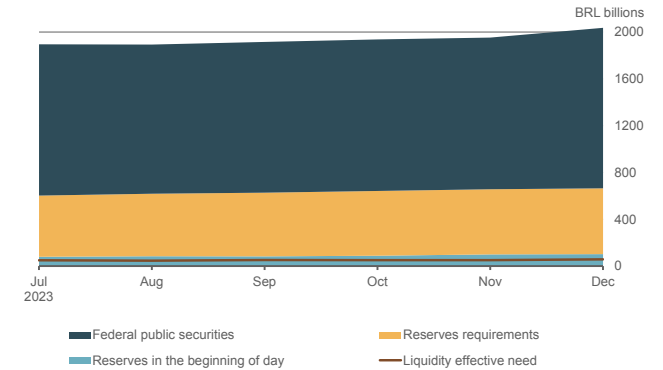
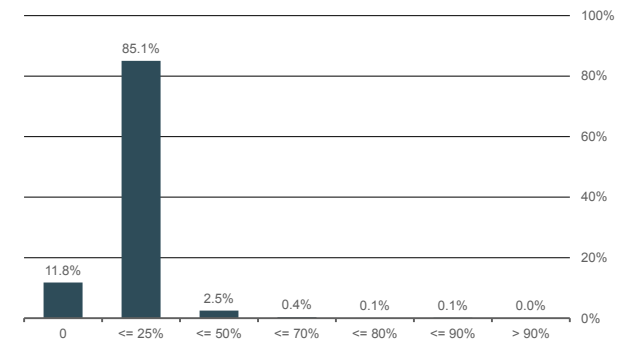


Chart 1.4.2 – After-Hours Liquidity Needs



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

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

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

Pix continues to increase its relevance in the SFN and SPB. Pix already accounts for 21.5% of total retail payments. The average monthly growth in transaction volume (Chart 1.4.3) was around 6.67%. Most transactions continue to be between households (P2P), as shown in Chart 1.4.4, with potential for expansion in other use cases. The SPI maintained availability above 99.9% throughout the period and ninety-nine percent of transactions were settled in less than 1.07 seconds.

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

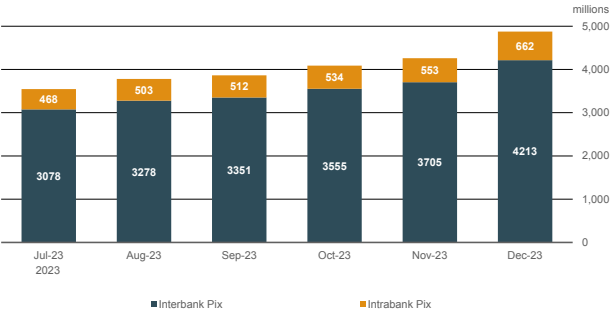
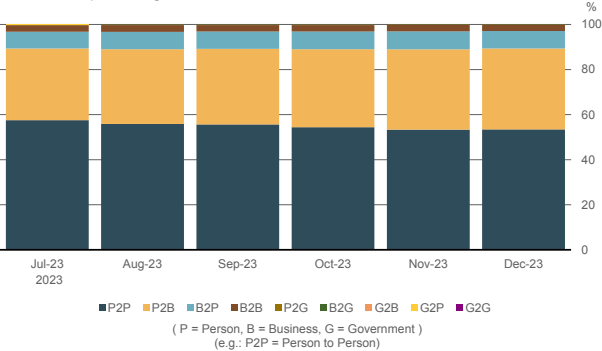


Chart 1.4.4 – Pix transactions types (Interbank Pix)
Transaction percentage



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

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

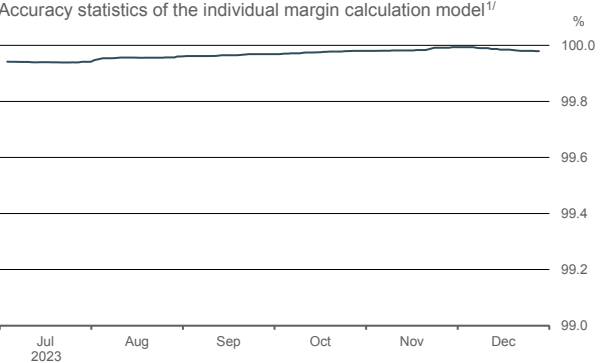
84 The primitive risk factor associated with a derivative contract is the designation given to the financial variables that are relevant to the contract's price formation.

Table 1.4.1 – B3 Clearinghouse

| Discrimination | Primitive Risk Factors (PRF) | |
|----------------|------------------------------|--------------------|
| | Low ^{1/} | High ^{1/} |
| Ibovespa spot | 15% | 20% |
| USD spot | 21% | 18% |
| Fixed rate 42 | 17% | 19% |
| Fixed rate 126 | 14% | 46% |
| Fixed rate 252 | 13% | 68% |
| Fixed rate 756 | 15% | 75% |
| DDI2/ 180 | 12% | 8% |
| DDI 360 | 19% | 8% |
| DDI 1080 | 29% | 11% |

Sources: [B]³, BCB, and BCB staff calculations.
1/ Highest percentage of accumulated variation over 2 days considering the low and high scenarios in the 2nd semester of 2023.
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, BCB, and BCB staff calculations.

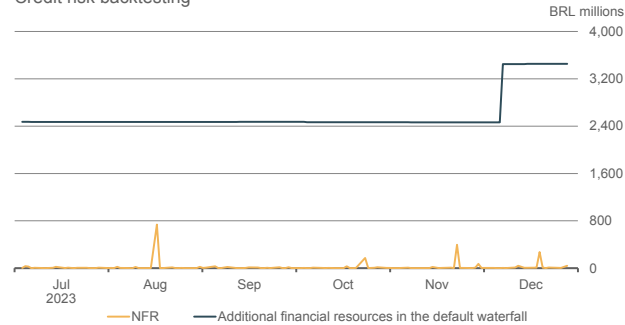
The credit and liquidity exposures were adequately managed by the CCP on all days of the period.⁸⁵

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

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.

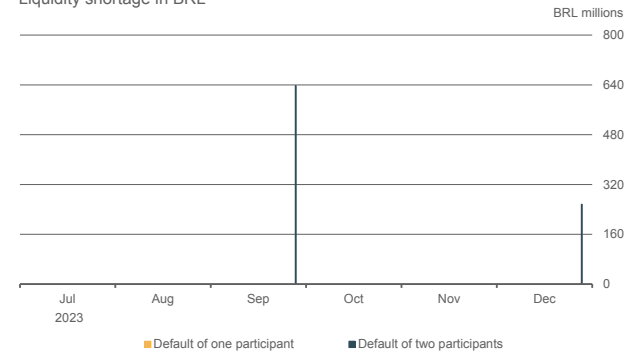
Chart 1.4.6 – B3 Clearinghouse
Credit risk backtesting



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.

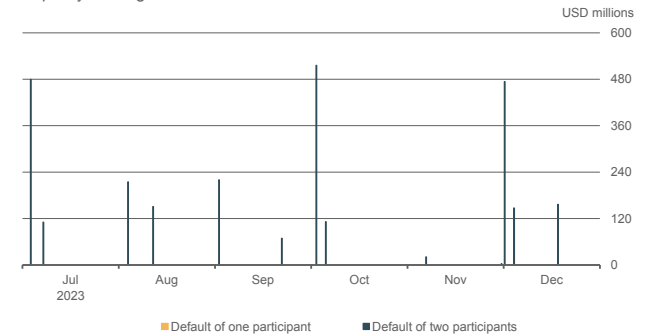
Sources: [B]³, BCB, and BCB staff calculations.

Chart 1.4.7 – B3 FX Clearinghouse
Liquidity shortage in BRL



Sources: [B]³, BCB, and BCB staff calculations.

Chart 1.4.8 – B3 FX Clearinghouse
Liquidity shortage in USD



Sources: [B]³, BCB, and BCB staff calculations.

II

Selected Issues

| | | |
|----------|--------|--------|
| Dolar | 3,1464 | 3,1556 |
| Euro | 3,7064 | 3,7085 |
| Ibovespa | 67,671 | 67,659 |
| CDI | 9,14% | 9,06% |

2.1 New methodology for required capital calculation for operational risk

Resolution BCB 356, published on November 28, 2023, established the procedures for calculating the RWA related to the required capital for operational risk using the standardized approach (RWA_{OPAD}) of Basel III. The new methodology replaces the three others provided for in Circular BCB 3,640 of 2013 with a single standardized model aimed at increasing the robustness, risk sensitivity, and comparability of the capital requirement for operational risk. The regulation will come into force on January 1, 2025, with implementation transition until January 2028, and is applicable to institutions classified under S1 to S4, as per Resolution CMN 4,557 of February 23, 2017.

The new methodology consists of two components: the Business Indicator Component (BIC) and the Internal Loss Multiplier (ILM). The BIC is a proxy for the institution's business volume, based on the premise that operational risk grows nonlinearly as activity level increases. To this end, interest and service revenues and expenses, as well as profits or losses from the banking and trading books, are considered and weighted by a factor of 12%, 15%, or 18%, progressively. The ILM component aims to modulate the value of BIC to increase or decrease the required capital according to the historical relationship between the operational losses of each

institution and the BIC. Studies conducted within the BCBS framework, as well as literature on operational risk, demonstrate that the FI's historical losses are a good predictor of their future losses. Therefore, by incorporating this element into the capital calculation, greater risk sensitivity is contemplated compared to a proxy based solely on business volume.

ILM depends on the ratio between the Operational Loss Component (LC) and BIC. If both values are equal, ILM will be equal to 1, indicating that the capital is adequately sized by BIC *vis-à-vis* historical losses. If the loss value recorded exceeds BIC, the multiplier will increase the required capital, and vice versa.

Resolution BCB 356 of 2023 mandated the use of ILM for institutions classified under S1 and S2, considering in its calculation the annual average of operational losses equal to or greater than BRL500,000 over the last ten years. Additionally, the ILM formula was adjusted based on statistical models conducted by the BCB to allow for the adjustment of required capital for institutions with low levels of operational losses, as well as the necessary increase in required capital for institutions with higher levels of losses. S3 institutions may request authorization to use ILM from 2028 on, after the complete adaptation of their operational loss databases to the provisions of Circular BCB 3,979 of 2020, which will be mandatory for S3 from June 2026.

An approximate 54% increase in the minimum capital requirement for operational risk is estimated for institutions from S1 to S4, equivalent to BRL38.3 billion, with BRL31.4 billion coming from S1 institutions.

2.2 Savings microdata

The BCB carried out a study using microdata to investigate the significant reduction in the savings account balance in 2022 (Chart 2.2.1). The analyses were carried out using data provided by the top five banking institutions in Brazil from more than 57 million individuals with a savings account balance of at least BRL500.00.⁸⁷ In this sample, 29.5 million individuals withdrew a total of almost BRL279 billion from these accounts and invested nearly BRL201 billion in other financial assets.

87 The aggregate balance of these accounts for 89% of the total stock of savings accounts in December 2021 (BRL914 billion) and 2022 (BRL891 billion). This data was cross-checked with the databases of financial asset registries B3 and Ceric, securities, investment fund quotas and the Credit Information System (SCR).

Chart 2.2.1 – Monthly percentage change in savings account balances over the previous year (SBPE and Rural)



The analyses presented show that the reduction in the savings account balance was mainly due to a small proportion of withdrawers who reallocated their funds. This portion has a higher income and reallocated funds to other products, especially Agribusiness Credit Bills (LCAs), Bank Deposit Certificates (CDBs), and Real Estate Credit Bills (LCIs). Increased disbursements and any real investments or investments in financial assets not considered (stocks, *Tesouro Direto* government bonds, shares in exchange-traded funds, or funds with unidentified shareholders) explain the reduction secondarily.

The distribution of withdrawals and investments in other financial assets was quite heterogeneous.

Only one million individuals (4% of withdrawers) withdrew around BRL146 billion from savings accounts, corresponding to more than half of the total volume withdrawn (green vertical line in Chart 2.2.2). Nearly 80% of the total volume was withdrawn by 16% of withdrawers (red vertical line in Chart 2.2.2). In terms of investments, only 4.3 million individuals (approximately 15% of withdrawers) invested BRL291.1 billion in other investments, while 23.3 million individuals (nearly 79% of withdrawers) not even held funds in these other financial assets (Table 2.2.1).

Chart 2.2.2 – Cumulative percentage of savings account withdrawals by percentile of withdrawers

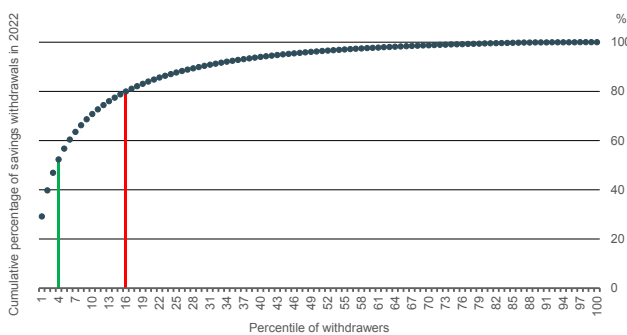


Table 2.2.1 – Amount of reduction in savings accounts and changes in other financial investments in 2022

| Status of other investments in 2022 | Reduced savings account balance in 2022 | | |
|------------------------------------------------------------|-----------------------------------------|---------------------------------------------------|--------------------------------------------|
| | Customers (millions) | Change in savings accounts balance (BRL billions) | Change in other investments (BRL billions) |
| Balance increased in other investments | 4.3 | -99.4 | 291.1 |
| Balance maintained or reduced in other investments balance | 1.9 | -32.3 | -90.0 |
| No other investments | 23.3 | -147.2 | 0.0 |
| Total | 29.5 | -279.0 | 201.1 |

Top withdrawers also have the highest income. The annual median income of the top 4% (16%) withdrawers stands above BRL78,000 (BRL47,500) (green and red line in Chart 2.2.3).

Chart 2.2.3 – Median annual income by withdrawer percentile

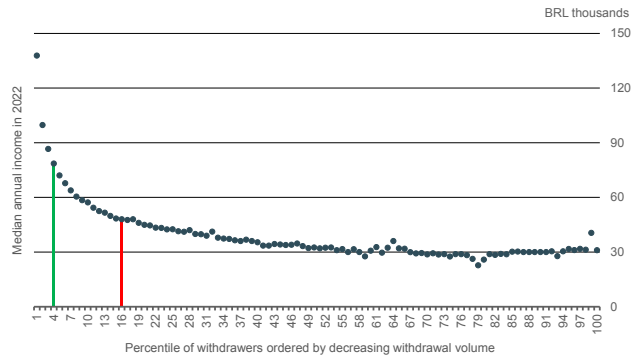
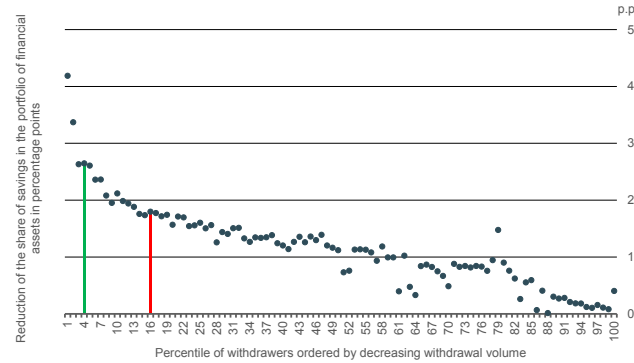
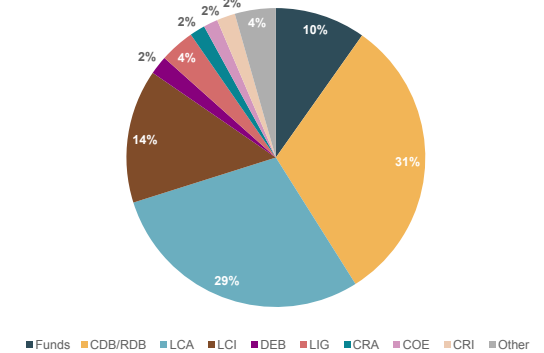


Chart 2.2.4 – Percent reduction of the share of savings in the financial assets portfolio by percentile of withdrawers in 2022



Source: BCB, CETIP

Chart 2.2.5 – Breakdown of investments in other financial assets made in 2022 by the top 16% savings accounts' withdrawers

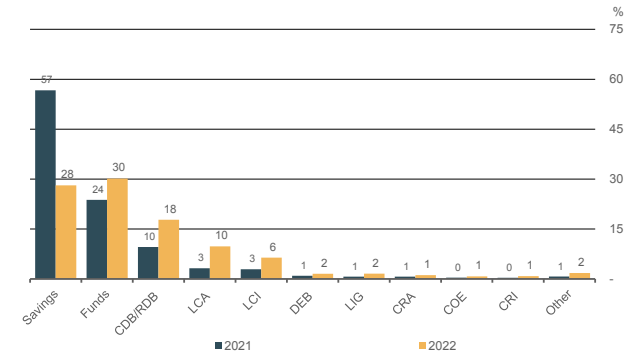


The importance of savings accounts in the financial assets portfolios was reduced for all withdrawers' percentiles. The participation of savings fell more sharply for the top 4% (16%) withdrawers (red and green lines in Chart 2.2.4), from 55% to 29% (37%), i.e., a decline of 26 (18) percentage points.

LCAs, CDBs, and LCIs were the preferred financial assets as the destination of resources withdrawn from savings accounts. The top 16% withdrawers invested the equivalent to 52% of the value withdrawn, nearly BRL116 billion, in other financial assets. LCAs, CDBs/RDBs⁸⁸ and LCIs received nearly BRL34

billion, BRL37 billion, and BRL17 billion, respectively (Chart 2.2.5). This change in the preferred investment led to a new distribution of the shares of each asset in the investments' portfolio. The participation of CDBs/RDBs grew nearly 8 p.p.; of LCAs tripled (grew nearly 7 p.p.) and of LCIs doubled (grew nearly 3 p.p.) (Chart 2.2.6). It should be noticed that other financial assets related to real estate credit with very small shares (Real Estate Receivables Certificates – CRIs, and Real Estate Secured Bills – LIGs) also doubled their shares in the total portfolio.

Chart 2.2.6 – Changes in the composition of the financial assets portfolio of the top 16% withdrawers



Source: BCB, CETIP

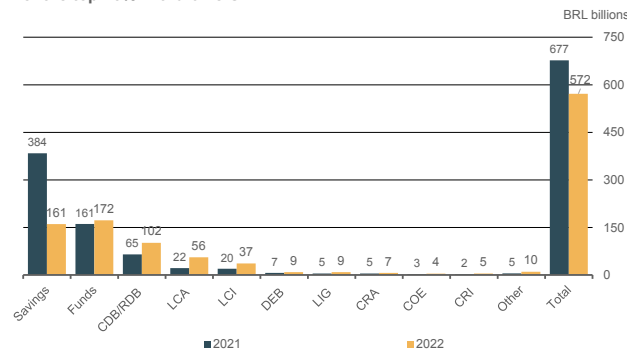
⁸⁸ RDBs (Bank Deposit Receipts) amounts were added up to CDBs due to the similarity of these instruments, but most share of the values are in fact CDBs.

Nevertheless, other factors contributed to reduce the savings accounts balance.

Despite the expansion of balances related to all financial assets, except savings accounts, the top 16% withdrawers held nearly BRL106 billion less in their portfolio of financial assets (Chart 2.2.7). In other words, the equivalent to 48% of the value withdrawn from savings accounts was allocated to other purposes than these financial assets. Several factors may have contributed to this reduction, such as disbursements to increase consumption or to amortize loans, invest in real assets or in governments securities traded via *Tesouro Direto* or in shares and investment funds traded in stock exchanges. Lack of data made it impossible to identify likely allocation of resources in real assets and in these modalities of financial investments.

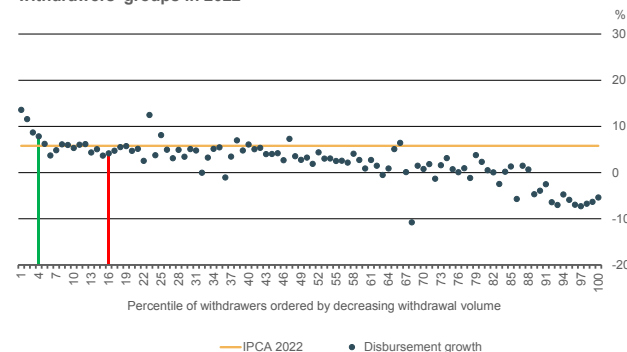
The increase of disbursements was a secondary factor for the reduction of balances. Nominal disbursements of all withdrawer's percentiles varied between -11% and 14% in 2022, compared with 2021, in a period when the IPCA change was 5.79% (Chart 2.2.8). Disbursements of the top 4% withdrawers grew above that of the other percentiles. However, the expansion of this group's disbursements of nearly BRL16 billion is well below their withdrawals of BRL146 billion.⁸⁹

Chart 2.2.7 – Changes in the financial asset portfolio balances of the top 16% withdrawers



Source: BCB, CETIP

Chart 2.2.8 – Percentage growth of disbursements in all withdrawers' groups in 2022



Source: BCB, CETIP

2.3 Financial Stability Survey⁹⁰ – Climate risks

Compared with the 2023 survey, financial institutions are increasingly concerned about the potential effects of climate risks on the SFN. The 83 financial institutions that responded to the BCB's survey reported a very low impact of climate risks on their operations in 2023. However, they believe physical risks will likely become more relevant over longer horizons. The main climate-related events are droughts, scarcity of natural resources, and desertification. They would affect the SFN mainly through damage to assets and production processes, losses and cost increases for borrowers, and increased delinquency. Less than half of the respondents manage transition risks, which would be transmitted to the SFN mainly through changes in climate regulation, regulation compliance costs, and increased delinquency. It is also noteworthy the increase in the scope

90 The BCB conducts an annual survey to identify the perceptions of financial institutions about the effects of climate risks on the SFN's financial stability. All reported opinions come from the responding financial institutions. This survey has been restructured since its last release in 2023, with the inclusion of new questions, standardization of terminology, and the inclusion of a glossary to ensure the same understanding of climate risk concepts. Thus, some questions have no historical records. Data collection period goes from January 22 to February 8, 2024. Of the 100 institutions invited (75 regulated by the BCB and 25 by the CVM, Previc, and Susep), 83 responded (corresponding to 77% of the total assets of the sample).

89 The estimate of disbursements relied on the sum of payments of bank slips, except services providers, credit card and financed credit card, payments of installments, and amortizations of loans and financing.

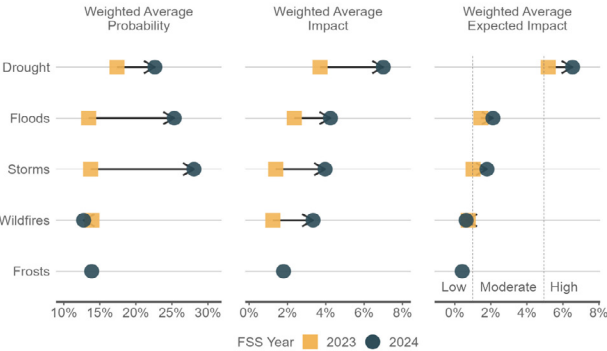
of actions adopted by financial institutions to mitigate the effects of climate risks, but with great heterogeneity within the surveyed group.

Climate physical risks⁹¹

Drought is the climate event with the highest expected impact on the financial institutions' assets in the long term. Respondents believe that the impact and the probability of acute climate events in the long term have increased. These increases did not lead to significant changes in the weighted average expected impact,⁹² except for droughts. In the view of the responding financial institutions, the expected impact of droughts on the financial institutions' assets, which were already estimated to be high in 2023, has increased over the long-term horizon (Chart 2.3.1). Regarding chronic climate risks, financial institutions considered the scarcity of natural resources and desertification as the most relevant, both with moderate expected average impact

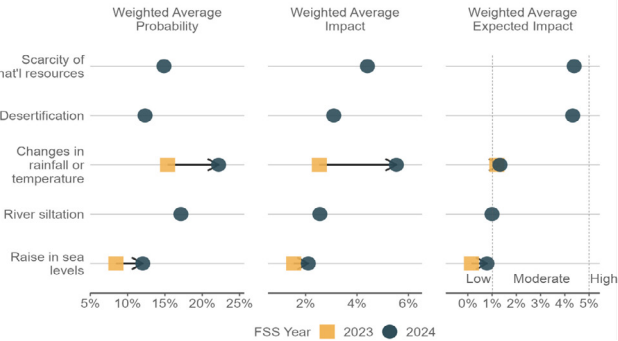
in the long term (Chart 2.3.2). It is worth stressing that changes in the probability and impact of events may be related to periodical reassessment or improvement of respondents' internal procedures regarding the management of climate risks of the institution itself.

Chart 2.3.1 – FSS – Acute physical risks and their long term effects on financial institutions' assets (5 to 30 years)



Note: The climate event “Frosts” has no historical record because it was included in the restructuring of the survey in 2024.

Chart 2.3.2 – FSS – Chronic physical risks and their long term effects on financial institutions' assets (5 to 30 years)



Note: The climate events “Scarcity of natural resources”, “Desertification”, and “Siltation of rivers” have no historical records because they were included in the restructuring of the survey in 2024.

91 Questions: “A. Consider the physical climate events (acute/chronic) below. Assuming the occurrence of each event, indicate the respective impact in your institution in terms of losses of total assets of your financial institution over a horizon of up to five years (from 5 to 30 years)” and “B. Indicate the probability of occurrence of climate events listed in Question A over a horizon of up to five years (from 5 to 30 years)” For questions related to physical risks, short-term refers to a horizon up to five years and long-term, from 5 to 30 years. The parameters to answer these questions are: (i) physical acute events: drought, storm, waterlogging/floods, fire, and frost/hailstorm (ii) physical chronic events: change in the rainfall regime or in the temperature, desertification, soil degradation and compression and siltation of rivers, scarcity of natural resources, and rising sea level; iii) impact: very low (<0.1%); low (0.1%-1%); medium (1%-5%); high (5%-10%); very high (>10%); and (iv) probability: low (<1%); medium-low (1%-10%); medium-high (10%-30%); high (>30%).”

92 The expected individual impact of the financial institution is computed by multiplying the probability by the event’s impact. This measure considers both the severity of the event (impact) and its possibility of occurrence (probability). The expected individual impact will be high only when both components have high values. The average expected impact is the average of the expected individual impacts weighted by the financial institutions’ assets.

Transition climate risks⁹³

Less than half of the responding financial institutions manage transition climate risks, and they believe that the impact is more relevant in the long term. Only 42% of financial institutions affirmed that transition climate risks are part of their risk management. The vast majority limit their analysis to a short-term horizon. Only 19% of respondents carry out assessments over the long term. The definition of the horizons considered is substantially heterogeneous.⁹⁴ The variability of the horizons depends on the climate risk factors considered. Shorter horizons are associated with acute physical risks or abrupt changes related to transition risks, such as political/regulatory changes. Longer horizons are associated with chronic physical risks or structural changes among transition risks (Table 2.3.1.) Regarding the effects of transition risks on financial institutions’ assets, in terms of percentage losses, most respondents consider the impact to be low in the short-term horizon and moderate in the long-term (Table 2.3.2).

93 Questions: “Is transition climate risk incorporated into your institution’s risk management?”, “Which (is/are) the time horizon(s) considered in the transition climate risk analysis in your institution?”, “What is the impact of the transition risk on your institution in terms of asset losses in the time horizon(s) considered?” and “Describes the methodology used by the financial institution to evaluate transition risk (scenario, etc).” Note: this question was introduced in the 2024 survey.

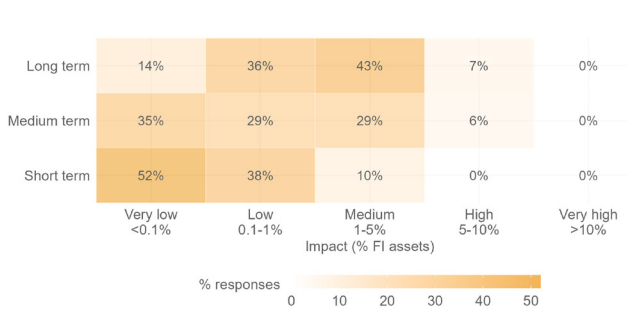
94 For example, the analysis of transition risk for the short-term horizon varies from one to six years among respondents.

Table 2.3.1 – FSS – Transition climate risk management

| Transition risks management? | FIs (%) | Term (Years) | |
|------------------------------|---------|--------------|---------|
| | | Mean | Std dev |
| Yes | 42 | - | - |
| Long Term | 19 | 28 | 5 |
| Medium Term | 22 | 9 | 7 |
| Short Term | 40 | 4 | 2 |
| No | 58 | - | - |

Note: The percentage values in the column “Does the institution manage transition risk?” refer to the entire sample.

Table 2.3.2 – FSS – Effects of transition risks on financial institutions’ assets



Note: The percentages in each cell show the share of respondents indicating “very low”, “low”, “moderate”, “high”, or “very high” impact within a certain horizon (short-, medium-, or long-term). That means that the sum of shares for the same horizon is always one.

Financial institutions evaluate transition climate risks using the scenarios outlined by global entities, sectoral analysis, and the monitoring of relevant clients and operations. Financial institutions reported the use of scenarios from the Network for Greening the Financial System (NGFS), the Intergovernmental Panel on Climate Change (IPCC), and the European Central Bank (ECB) in their methodologies for the management of transition risks. They also affirmed using the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD), the green taxonomy, and the sensitiveness rule of the Brazilian Federation of Banks (Febraban) to evaluate their clients about the potential climate impact. Financial institutions monitor and evaluate operations, clients, and portfolio concentration by estimating the sectors’ sensitiveness to greenhouse gas emissions reduction targets. They also consider changes in consumption patterns, repricing of emissions (mainly in carbon-intensive sectors, such as oil and gas), regulatory changes, and export barriers, which might affect corporate results in some sectors. Part of the respondents assume in their analyses the counterpart’s own capacity to manage transition risks. Some financial institutions also apply periodic questionnaires of Social, Environment, and Climate Responsibility to clients and suppliers.

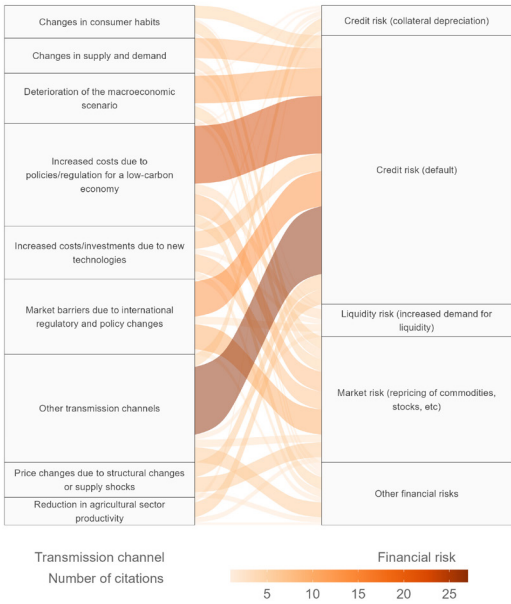
Climate risks and transmission channels⁹⁵

The effects of physical climate and transition risks on financial institutions occur mainly through delinquency. Responding financial institutions associate several channels through which the materialization of physical risks would result in credit risk (delinquency). The three main transmission channels that would lead to delinquency are related to the loss of income or wealth of clients: (i) decline of corporate productivity due the interruption of business or slack of assets; (ii) loss/reduction of household income; and (iii) reduction of productivity of the agricultural sector (Chart 2.3.3). Regarding the transmission channels of transition risks to delinquency, the highlights are: (i) increased costs due to policies/regulations for a low-carbon economy and (ii) market barriers due to international regulatory and policy changes. The number of transmission channels is larger for traditional financial risks, as shown by the relevance of “other transmission channels” (Chart 2.3.4).⁹⁶

Chart 2.3.3 – FSS – Transmission channels of physical climate risks to financial risks



Chart 2.3.4 – FSS – Transmission channels of transition climate risks to financial risks



Note: “Other transmission channels” is relevant in terms of the amount of frequently mentioned responses. This channel represents several less frequently mentioned transmission channels. The most relevant are the increased cost and consumption of energy, changes in the agricultural productive area, climate litigation, and loss or reduction of household income.

95 Question: “Considering the main physical risks (transition risks) listed by your financial institution, indicate the three main transmission channels of these risks to financial risks by relevance (the most relevant first) for your institution and indicate the respective risk to which your financial institution is exposed. Choose the transmission channel and the associated risk: Transmission channel (Financial risk)”.

96 The most relevant channels included in “Other transmission channels” are: “Increased cost/consumption of energy”, “Changes in the agricultural productive area”, “Climate litigation”, “Loss/reduction of household income”.

The most severe physical climate risks threatening the SFN's financial stability are increasing delinquency and inflation. A small group of responding institutions consider that physical climate risks do not represent a relevant threat to financial stability.

97 Question: "How does your institution believe that climate risks could threaten the SFN's financial stability?"

Transition climate risks also jeopardize financial stability through increased delinquency, stemming from additional costs for productive procedures and business models to comply with new legal and regulatory requirements. Among the instruments to promote the transition to a low-carbon economy are changes in government environmental policy and regulatory changes related to carbon emission and the transition to renewable energy sources. Respondents also believe that the transition process may generate changes in society's consumption preferences and market barriers to changes in international regulations and policies. Together, these factors lead to changes in the supply and demand of goods and the need to adapt production processes and business models. The costs of adapting to these new requirements encumber companies and may lead them to delinquency. Financial institutions with significant portfolios of loans to companies largely affected by regulatory

Chart 2.3.5 – FSS – Financial stability impacts from climate risks



Note: This word cloud comprises all responses to the question regarding how climate, physical, and transition risks may jeopardize the stability of the SFN.

Climate risks and governance⁹⁸

Few institutions reported climate events that impacted their operations in 2023. Among the affected financial institutions, the impact was not significant. The percentage of financial institutions that reported impact from the materialization of climate risk in their operations remained stable and low in both the 2023 and 2024 surveys (Table 2.3.3). Some financial institutions reported operational problems due to power outages from rain, cyclones, flooding, and waterlogging. Other financial institutions reported that climate events had also impacted the productivity of some clients, increasing their credit risk. However, the impact of climate events on financial institutions’ operations was reported to be very low.

| Table 2.3.3 – FSS – FI affected by weather events in the previous year? | | |
|-------------------------------------------------------------------------|------|------|
| Responses (%) | 2023 | 2024 |
| Yes | 16 | 17 |
| No/No answer | 84 | 83 |

98 Questions: “Has your institution identified any effect on its operations and/or business model arising from the materialization of climate risk in the last year?”, “What actions is your institution taking to mitigate the impacts arising from physical and transition climate risks?” and “What actions does your institution recommend the regulator to take to mitigate the impacts of physical transition climate risks on the SFN?”.

The institutions’ level of maturity⁹⁹ in adopting climate-related measures has increased since the previous survey, but there is still high heterogeneity among them. The percentage of financial institutions reporting the existence of actions to mitigate the impact of climate risks increased in 2024 compared with 2023. The percentage of financial institutions that have already implemented methodologies related to climate risks and have started to set targets to reduce their exposure to these risks has increased.¹⁰⁰ The percentage of financial institutions that adopt decision-making processes that consider the client’s green production process (downstream dimension) and processes that ensure that suppliers

adhere to sustainable initiatives (upstream dimension) increased. The percentage of financial institutions claiming to have signed green economy-related initiatives doubled.¹⁰¹ The increased average maturity level between 2023 and 2024 may indicate that financial institutions are adapting to the latest regulations on climate risks (Table 2.3.4).

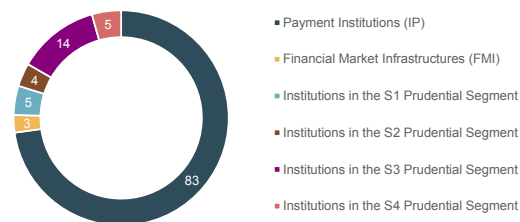
99 The level of maturity was built based on the textual description of measures used by the financial institution to mitigate the effects of climate risks. Responses were classified into one or more of the following dimensions: (i) Governance and culture – encompasses the methodologies for analyzing climate risks. This dimension is subdivided into four items and reflects the stage the financial institution is at: 1 – Own activities – when the financial institution has sustainable actions limited to administrative activities (e.g., water reuse); 2 – Methodology under analysis – when it has defined the methodology and indicators associated with climate risks, but has not yet implemented them; 3 – Methodologies implemented – when the methodologies and indicators are already used to analyze climate risks; and 4 – Impact and target setting – when the financial institution not only has and calculates indicators related to climate risks, but also includes institutional targets associated with these risks; (ii) Alignment – indicates whether the financial institution is a signatory to global, national, or regional initiatives encouraging a sustainable economy; (iii) Downstream – indicates that the financial institution has actions or develops products aimed at clients that encourage a sustainable economy; (iv) Upstream – indicates that the financial institution has mitigation actions aimed at suppliers; and (v) Society – indicates that the financial institution develops actions that engage several actors, from employees to society in general. The financial institution’s level of maturity regarding the existence of actions to mitigate the effects of climate risks is given by a sum of the five dimensions: in governance and culture, the financial institution can score from 0 to 0.5 points, with 0.125 points added for each stage advance (0 for the own activities stage and 0.5 for the impact and goal-setting stage). In the other four dimensions, the institution can score 0 or 0.125 points, depending on whether there are mitigating actions in that dimension. In this methodology, the maturity level ranges from 0 to 1.

100 Actions of the “Governance and culture” dimension have changed, with a decrease in “Methodologies under analysis” and “Methodology implemented” and an increase in “Impact and definition of targets”.

101 These initiatives include the Principles for Responsible Banking (PRB), the Net-Zero Banking Alliance (NZBA), and the Principles for Responsible Investment (PRI). These initiatives were established or jointly created by the United Nations Environment Programme Finance Initiative (UNEP-FI).

introduced in the previous Financial Stability Report¹⁰³ and consolidated the information provided by 114 institutions, distributed among different groups of the financial system (Chart 2.4.1). The development of the work allowed the validation of procedures for collecting and processing the information obtained through a self-assessment questionnaire focused on the IT operation of the institutions and the cyber and operational resilience mechanisms they have implemented. Although the institutions considered in this first stage represent a small sample of the SFN, the preliminary analysis provided valuable inputs to understand how the technology has been used in the financial system and what are the potential implications for financial stability. The use of cloud computing services, for example, has been widespread in the financial system and service providers have shown to play a relevant role in the operation of institutions' business processes. However, institutions will need to improve their controls, in particular, testing of incident response plans, establishing and monitoring of indicators of exposure to technological risks, and ensure a more proactive performance of their lines of defense in the management of technological risks in order to ensure a safe and resilient operation.

Chart 2.4.1 – Sample distribution of institutions considered in the mapping



The mapping indicated that most institutions prevent their critical business processes from being supported by legacy technologies or technologies that are not under the management of the IT area. In addition, most institutions use only established technologies to support these processes, although investments are made in innovative technologies. Only 9% of the responding institutions reported that they have critical business processes that are supported by IT solutions that are not under the management of the IT area, hereinafter referred to as departmental solutions (*Shadow IT*). On the other hand, the percentage of institutions that reported using legacy technologies in solutions that support critical business processes reached approximately 19%. Most institutions (65%) reported that they aim at employing established technologies in critical business processes, while still investing in innovative technologies that can support their business

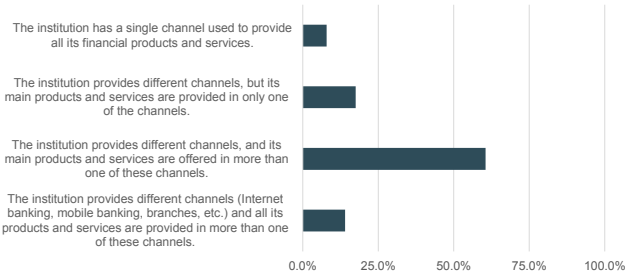
processes in the future. The survey also pointed out that 17% of institutions use innovative technologies in their critical processes. The existence of departmental solutions or the use of legacy technologies are relevant risk factors that should be monitored more closely in the next stages of the mapping, given the potential implications for business continuity and data and information security. The use of maturing innovative technologies also adds additional risks (the technology may not be established and have its life cycle prematurely terminated, support for new technologies is typically more limited, the number of professionals with expertise in new technologies is more limited, etc.), requiring specific controls for adequate risk management.

The mapping showed that most institutions provide their main products and services in more than one channel (Chart 2.4.2), which is positive for mitigating impacts on customers in case of unavailability of resources. In addition, almost half of the institutions prioritize the use of digital channels to offer financial products and services. Special attention should be directed to a set of institutions that make their products and services available through a single channel. These institutions must maintain adequate processes and controls to ensure business continuity, since the unavailability of the single channel will mean a severe interruption of their operation. The spread of digital channels

103 <https://www.bcb.gov.br/publicacoes/ref/202310>

among institutions confirms the digital transformation process seen in the financial sector, however, this scenario implies greater exposure to cyber risk and electronic fraud, demanding from financial institutions continuous investments in the security of their systems and in their fraud prevention processes.

Chart 2.4.2 – Availability of financial products and services versus customer relationship channels



Another relevant characteristic verified was the wide use of cloud computing services by the institutions evaluated, in the most different modalities, reinforcing the relevance of this technology in the financial sector. Most institutions, approximately 86%, reported using one or more cloud computing services, with emphasis on *Infrastructure as a Service (IaaS)* (Chart 2.4.3). The survey also indicated the relevance of *Software as a Service (SaaS)*, when we consider the IT solutions used to support the business processes of the institutions (Chart 2.4.4). In the next

stages of the mapping, it will be important to assess the relevance of cloud computing services for the operation of critical business processes, however, preliminary data already indicate that this technology is established in the financial sector and, therefore, it is essential to ensure that institutions implement good practices and recommended controls to ensure a safe and resilient operation of their IT environment.

Chart 2.4.3 – Characteristics of the technological infrastructure

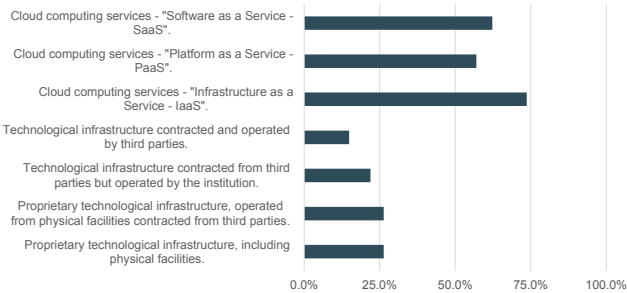
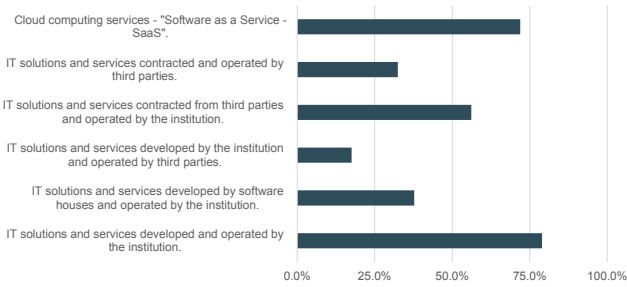
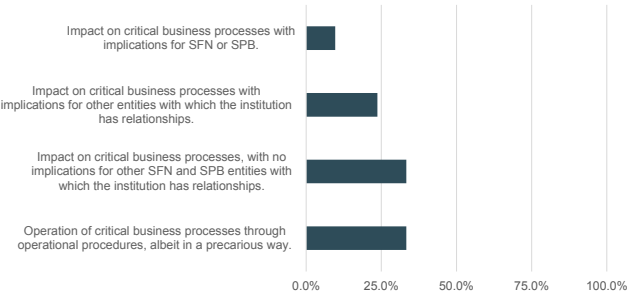


Chart 2.4.4 – Features of IT solutions and services



Institutions reported having a high dependence on IT resources to support their business processes (Chart 2.4.5), which in many situations depend on complex computational models for their proper operation. The process of digitalization of the financial system has significantly increased the dependence of institutions on IT resources, as highlighted in the mapping. Many of the financial services currently provided by these institutions cannot be performed through manual processes and the unavailability of technological resources often impacts the provision of these services to customers.

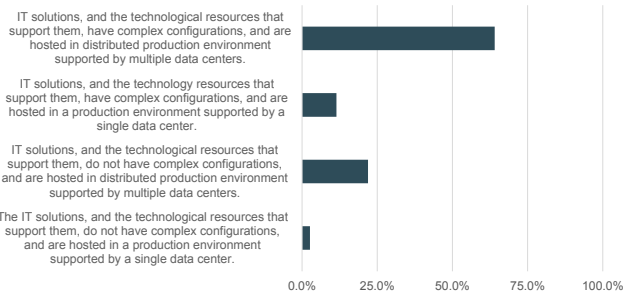
Chart 2.4.5 – Impact due to unavailability of IT resources



Institutions also reported that their IT solutions are of moderate or high complexity, are typically distributed in more than one data center (Chart 2.4.6), are complex to deploy, and have moderate or high coupling with each other, and that the development of regulatory reports typically involves the

processing of information from a moderate or high number of systems or databases. In summary, the evolutionary or corrective maintenance of IT solutions is a complex activity that typically implies changes in different IT assets, reinforcing the need for robust controls to test the quality of the solutions developed and to properly manage incidents that may impact the security, availability, and integrity of data and information.

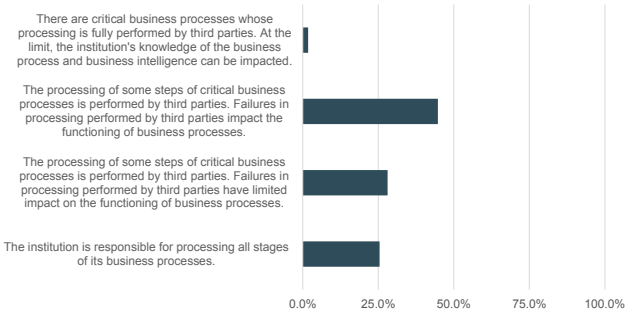
Chart 2.4.6 – Distribution of IT solutions in the technological environment.



The information provided by the institutions also highlighted the great dependence on third-party services, which is a very relevant factor considering operational and cyber resilience issues. In only 25.4% of the cases the institution is fully responsible for processing all stages of its business processes (Chart 2.4.7). Considering the group evaluated, 88% of the institutions reported using IT solutions provided by service providers over the Internet. In addition, in 72% of cases there is dependence on third-party

service providers to ensure operations, in 65% of cases to ensure security and in 77% of cases to ensure the continuity of IT solutions and services used in critical business processes. These numbers reinforce the relevant role of third-party service providers in the operation of the financial system and will certainly be a topic that will continue to be explored in the next stages of technological risk mapping.

Chart 2.4.7 – Relevance of third parties in the processing of business processes



Focusing on the analysis of the profile of technology and information security controls, the mapping indicated that a reasonable group of institutions do not have a Strategic IT Plan. The number of institutions that do not have a Strategic Information Security Plan is also significant. The digital transformation of financial systems reinforces the strategic nature of institutions' developments related to IT operations and cybersecurity. The Strategic IT Plan (PDTI) is an important resource to ensure that the strategy of

the technology area will be aligned with the corporate strategy. Similarly, the Strategic Information Security Plan (PDSI) concentrates the set of strategic actions to be developed to support a secure operation, also contributing to the achievement of the institution's strategic objectives. At least 33% of the institutions still do not have PDTI, while 26% of the sample considered reported not having PDSI.

IT risk management is consolidated in the institutions considered in the mapping, although there is room for the improvement of practices and activities related to the definition of the appetite for technological risks and the definition and monitoring of indicators of exposure to these risks, as well as the integration of IT risk management with the corporate risk management framework of these institutions. Almost all institutions (92% of cases) reported having an IT risk management process in place. This process is integrated with the corporate risk management process in 65% of the institutions and considers, among the factors monitored, the risks arising from legacy technologies (in 86% of cases), departmental solutions (in 74% of cases) and solutions provided by third parties (in 87% of cases). Regarding the practices implemented by the institutions considered in the analysis (Chart 2.4.8), it is possible to verify that the definition and monitoring of indicators of exposure to IT risks, as well as the establishment of an appetite for technological risks, are activities that have not yet been properly disseminated.

Chart 2.4.8 – IT Risk Management – IT and Information Security – activities

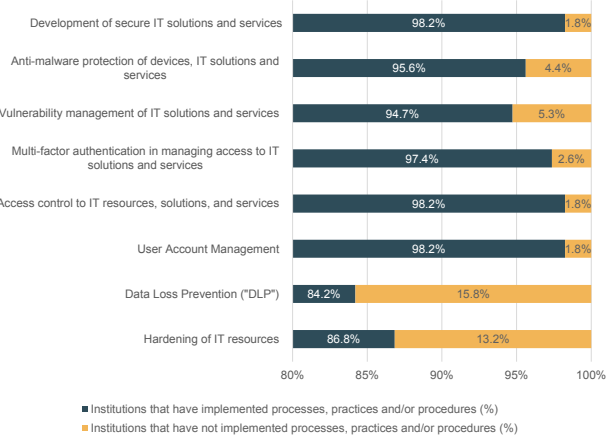


Considering the security of the technological environment, in general terms, institutions implement typical security practices and controls, however, the analysis indicates that it is necessary to advance in the adoption of preventive controls such as data leakage prevention mechanisms (DLP) and implementation of secure configuration (*Hardening*) of IT resources (Chart 2.4.9). The implementation of basic cyber hygiene practices is essential to reduce the exposure of institutions to the most common cyber threats, especially if we consider that financial institutions employ complex IT solutions, providing services predominantly through digital channels. In this sense, it is worth reinforcing the importance of continuous

investments in preventive controls, which are essential to reduce exposure to cyber threats and, consequently, to mitigate the occurrence of incidents.

The management of IT and security incidents is extremely relevant to maintaining a resilient operation. The institutions considered implement most of the typical security incident management activities (Chart 2.4.10), however, testing of incident response plans needs to be more widespread. A similar situation was observed in the case of the management of technological incidents (Chart 2.4.11). Even if an institution implements the full range of information security controls, it will still be susceptible to incidents that can

Chart 2.4.9 – Information security practices/controls



compromise the security of its technological environment. Similar concerns arise when we consider the implementation of IT controls and the potential impact (e.g., unavailability) over the technology operation due to disruptive incidents. Therefore, it is essential to have an incident management process that allows the institution to respond to an adverse event and recover the impacted technological resources. In this context, the testing of incident response plans is essential to ensure that the plans developed are adequate and effective to ensure the operational resilience of an institution. In addition, initiatives aimed at cooperation and the development of joint cyber exercises and tests should be stimulated by the regulator and the industry.

Chart 2.4.10 – Information security incident management – activities

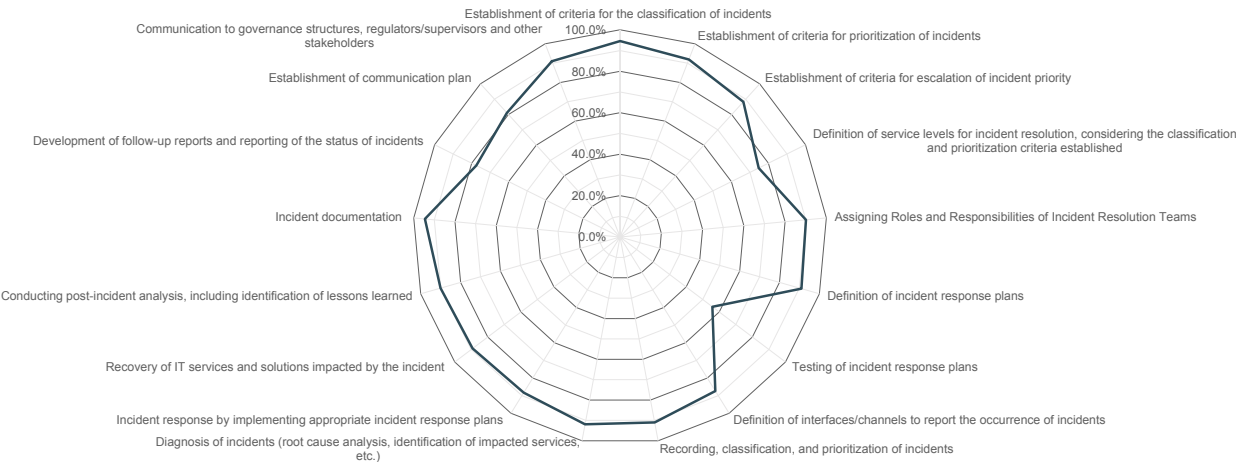
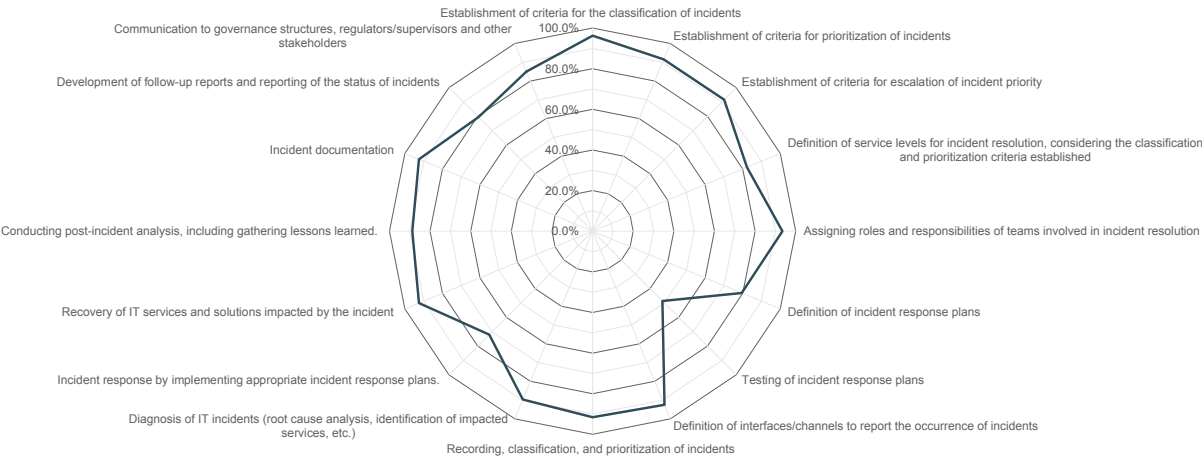


Chart 2.4.11 – IT incident management – activities



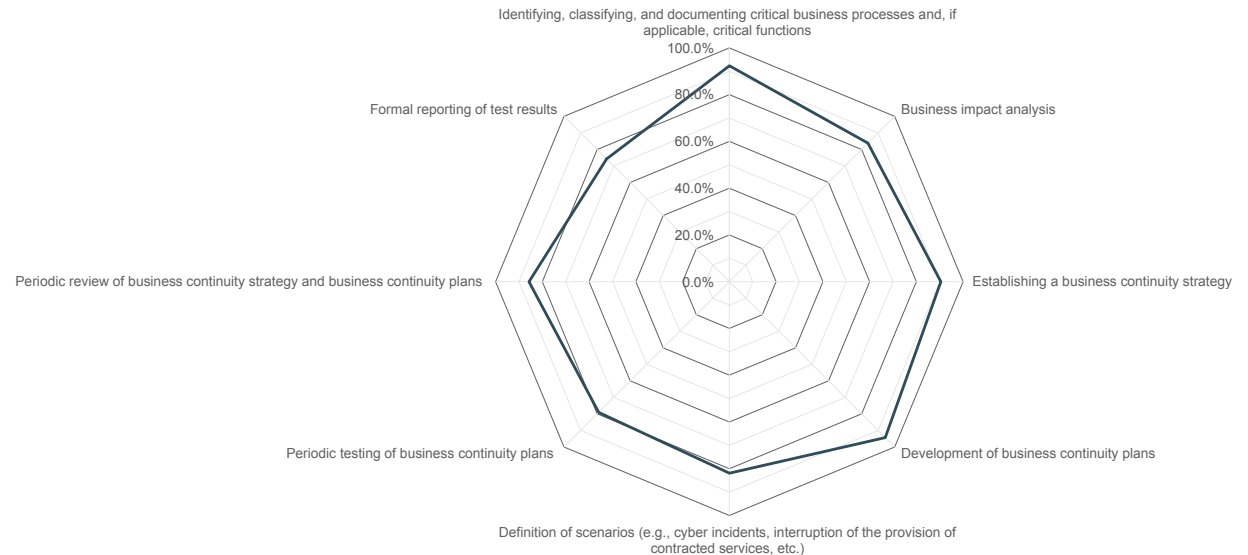
The organization of the structures for monitoring and managing technological and information security incidents was also evaluated in the mapping, which indicated that, although the monitoring of incidents can be shared between the institutions and third parties, the treatment of more complex incidents is still preferably performed by teams from the institution. It is worth mentioning that approximately 60% of the institutions reported that the monitoring and management of technology incidents is performed by a team other than the one that performs the monitoring and management of information security incidents. The mapping also indicated, both for the treatment of technology incidents and for the treatment of information security incidents, that although monitoring can be done by the institution's own teams or shared with third parties, the treatment of more complex incidents is commonly done by teams from the institution. This scenario is positive, as it suggests that the most advanced knowledge about the operation of IT solutions and problem solving remains with the institution's teams. In the next surveys, it will be opportune to better understand how the operation of incident monitoring teams works in the case of SaaS services, especially given the relevance of these services, as previously illustrated.

Business continuity management is another process that directly contributes to the technological and operational resilience of institutions and

is consolidated in the institutions considered in the mapping, although the analysis indicates that it is necessary to advance in the testing of business continuity plans. Practically all the institutions analyzed have a business continuity policy (94.7%) and an established business continuity management process (92.1%). Among the institutions that have business continuity management, 89.5% consider the services provided by service providers in their process. However, the survey of the activities typically performed in business continuity management (Chart 2.4.12) indicates that it is necessary to develop actions to increase the number of institutions that test continuity plans and report the results of these tests. It should be noted that the number of institutions that provide for the participation of third-party service providers in the testing of business continuity plans is even smaller.

As mentioned earlier, the high reliance on third-party service providers reported by the institutions highlights the importance of establishing a third-party relationship management process to support a safe and resilient operation. However, the preliminary mapping (Chart 2.4.13) indicates that relevant activities related to third-party risk management and performance monitoring of these service providers are still insufficiently executed, which is a point of concern given the potential implications for financial stability. Although 85.1% of the

Chart 2.4.12 – Business continuity management – activities



institutions have policies for the management of the relationship with third parties and in 84.2% of the cases there is an established process for the management of these relationships, the monitoring and evaluation of the adequacy of the provision of services, as well as the periodic assessment of risks, are examples of activities performed by a restricted set of institutions. In addition, it is worth noting that only 58.8% of the institutions have established procedures and/or controls to identify, monitor and manage concentration risk or other risks related to the ecosystem of third-party

service providers that supports the financial system. Considering that a relevant part of the operation of the financial system depends on third-party service providers, inadequate management of risks associated with such companies is a major concern in terms of financial stability, in particular when there is concentration in certain service providers. Relevant incidents occurring in the technological environment of these third-party companies can impact a relevant number of financial institutions, in a scenario that can escalate to a systemic operational crisis.

The last item considered in the mapping of technological controls highlighted that there is still a long journey regarding the implementation of adequate data governance mechanisms in institutions, which can be a deleterious factor for the implementation of relevant innovations such as artificial intelligence. Having policies that include the guidelines for data management was a situation reported by 78.9% of the institutions. Notwithstanding the high percentage of institutions that reported having a data management process (90.4%), the mapping indicated that the percentages of institutions that perform typical activities related to data management are much more discrete (Chart 2.4.14). In addition, only 72.8% of the institutions document data flows, 84.2% have established procedures for the reconciliation of data and information from IT solutions and the data and information present in management reports and documents delivered to supervisors, and 70.2% have policies and/or controls related to integrations and manual adjustments made to data or information of IT solutions. The establishment of data quality management was reported by 71.9% of the institutions and the establishment of quality indicators monitored by Senior Management was only reported in 45.6% of the cases. The information collected indicates that reasonable effort is required for the dissemination of best practices in data governance and management, which can be a risk for the incorporation of innovative technologies such as artificial intelligence.

Chart 2.4.13 – Third-party risk management – activities

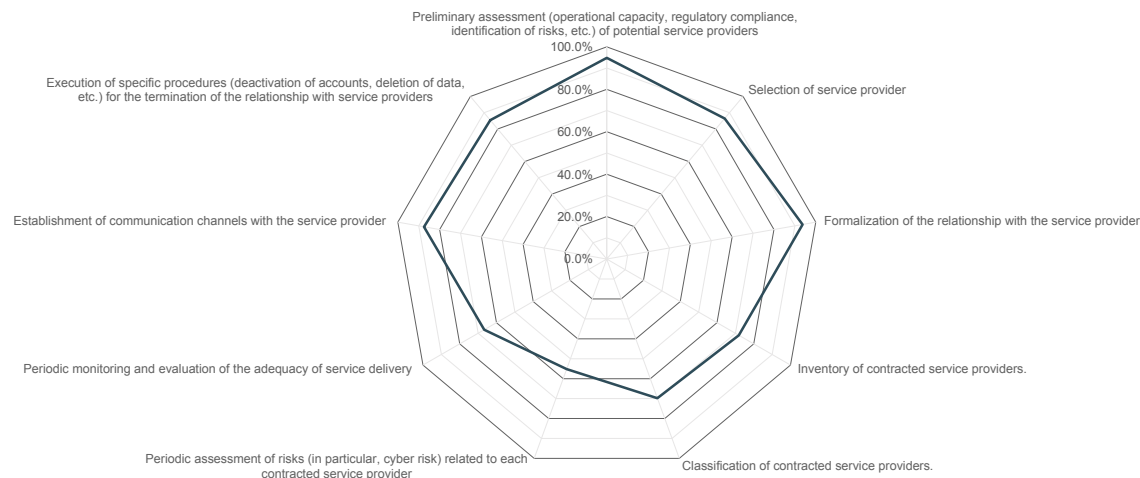
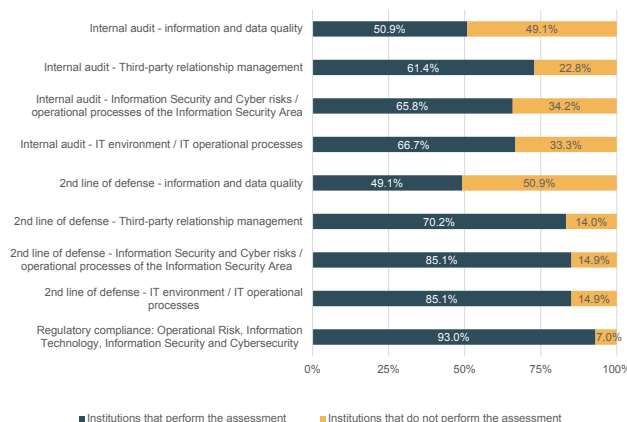


Chart 2.4.14 – Data management – activities



The mapping also provided an overview of how the lines of defense have been acting in the assessment and monitoring of technological risks. Improvements are needed, especially in the assessment of procedures and controls to ensure the quality of data and information and in establishing a more proactive involvement of Internal Audit in the assessment of IT risks. At least for the sample universe considered in this first stage of the mapping, the performance of the Internal Audit in relation to technology and information security activities was quite limited (Chart 2.4.15). In addition, the number of institutions whose lines of defense verify procedures and controls to ensure the quality of data and information is still small. Given the growing relevance of technological risks, an adequate risk management framework will depend on the effectiveness of the institution's lines of defense regarding the assessment and monitoring of IT risks.

Chart 2.4.15 – Scope of defense lines



Finally, the BCB will proceed with the mapping of technological risks, expanding the number of institutions considered in the analysis, as well as improving the questionnaire to obtain a broad overview of the financial system's exposure to IT and cyber risks, thus enabling the identification of possible points of concern and implications for financial stability. Although the first stage of the study considered a small sample of institutions, the information collected was very rich and allowed the identification of important factors related to the operational profile of institutions considered. These inputs were also important in detecting weaknesses that will be the subject of scrutiny by the BCB with the aim of continuously improving the operational and cyber resilience of the SFN and SPB.

Appendix

Banco Central do Brasil Management

Abbreviations

| | | |
|----------|--------|--------|
| Dolar | 3,464 | 3,1556 |
| Euro | 3,7064 | 3,7085 |
| Ibovespa | 67,671 | 67,639 |
| CDI | 9,14% | 9,06% |

Banco Central do Brasil Management

Board of Governors

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Governor

Renato Dias de Brito Gomes

Deputy Governor

Ailton de Aquino Soares

Deputy Governor

Rodrigo Alves Teixeira

Deputy Governor

Carolina de Assis Barros

Deputy Governor

Diogo Abry Guillen

Deputy Governor

Gabriel Muricca Galípolo

Deputy Governor

Paulo Picchetti

Deputy Governor

Otávio Ribeiro Damaso

Deputy Governor

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

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

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

Annex

Concepts and Methodologies

Working Papers about financial stability

| | | |
|----------|--------|--------|
| Dolar | 3,7464 | 3,7456 |
| 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%) 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) 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).

- d) 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.
- e) 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.

- f) 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.
- g) 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, CMN 4,606 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.

h) 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 BC on the date of publication of the standard, whereby the factor is reduced to 5.5% between July and December 2023.

i) 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.

j) 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.

k) 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.

l) 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. A 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.

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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