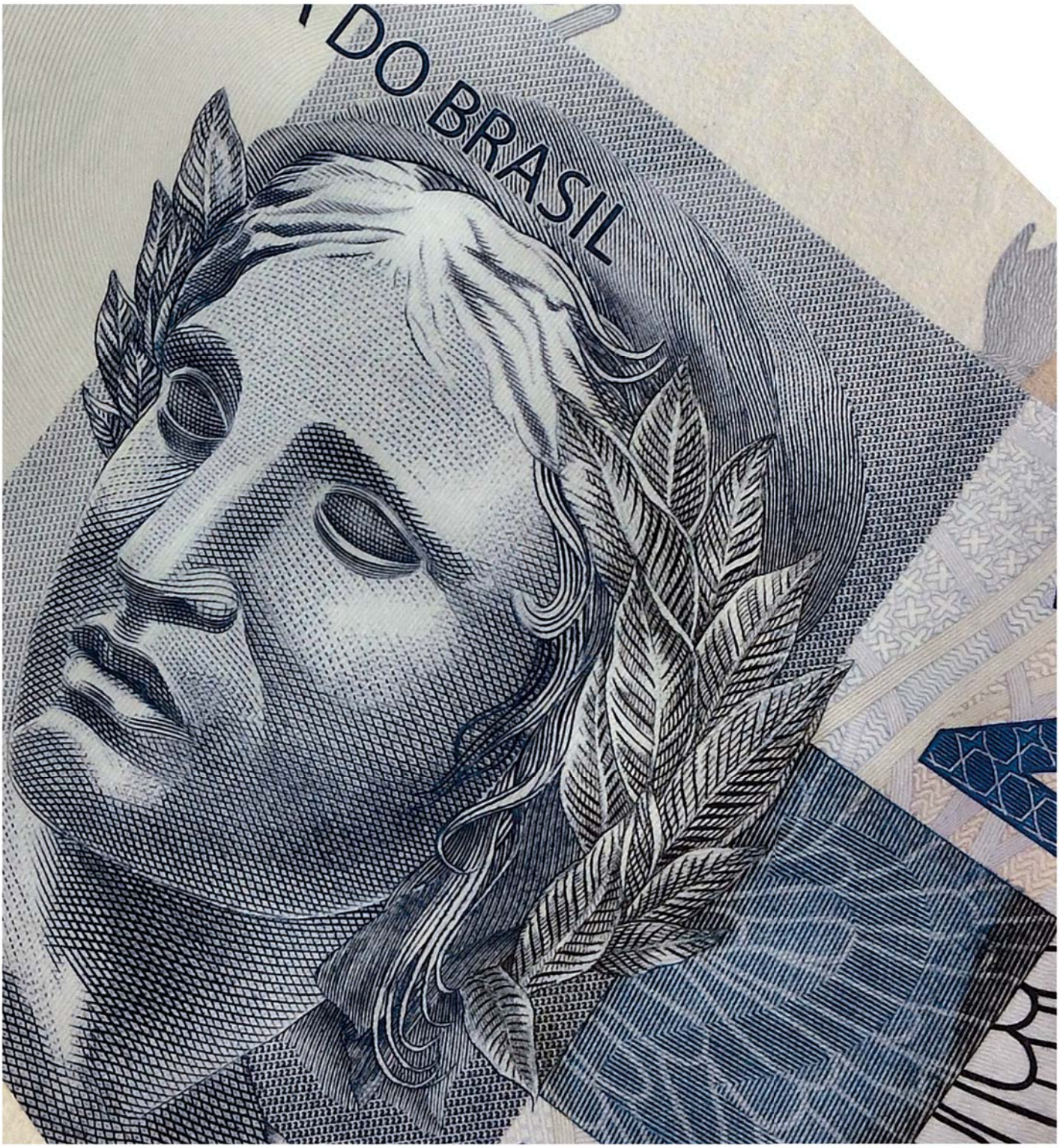

Banking Report

2023

BANCO CENTRAL DO BRASIL

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DO BRASIL

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Contents

Foreword

The Banking Report (REB) deals with several aspects of the National Financial System (SFN) and the relations between institutions and their clients.

In this edition, which focuses on events that occurred in 2023, the REB uses a more modern and direct form of communication. The first sentences of each paragraph summarize its main content, and the subsequent sentences provide further details. The REB now has five chapters instead of seven, as it no longer includes topics already covered by other communication channels (such as BC# Agenda, the Quarterly Survey on Credit Conditions – PTC, and the Banco Central do Brasil credit projections)[1] and transfers the credit content related to foreign trade financing from the now-extinct foreign exchange products chapter to the credit market chapter (Chapter 1). The chapters and boxes are more concise, and methodological details, when necessary, are presented in an appendix, thus contributing to a more fluid reading experience without failing to provide technical information for a more specialized audience.

Chapter 1 analyzes the evolution of credit in the SFN from different perspectives, including the behavior of credit aggregates, the characteristics of credit operations and borrowers, the evolution of credit portability, and credit for import and export financing. Chapter 2 examines the composition and evolution of the financial system funding. Chapter 3 presents the breakdown of the Average Cost of Outstanding Loans (ICC) and its spread in terms of its determining factors: funding cost, delinquency, administrative expenses, taxes, the Credit Guarantor Fund (FGC), and ICC's financial margin. Chapter 4 analyses the profitability – and its main drivers – of the financial institutions. Finally, chapter 5 examines the evolution of concentration and competition indicators in the SFN, innovations in the industry, and the performance of the BCB.

Additionally, REB brings a set of boxes focused on specific SFN themes. The boxes present studies and research, describing and analyzing the SFN, while addressing new indicators of the system.

1 For the BC# Agenda, see the BCB's website (https://www.bcb.gov.br/acessoinformacao/bchashtag) and the BCB 2023 Annual Report (https://www.bcb.gov.br/content/publicacoes/rig/rig_2023.pdf); for the PTC, see the respective quarterly report (https://www.bcb.gov.br/publicacoes/ ptc); and for the BCB's credit projections, consult the Inflation Report (https://www.bcb.gov.br/publicacoes/ri).

Executive Summary

Credit growth in the National Financial System (SFN) slowed down in 2023, influenced, among other factors, by the lagged effects of the restrictive monetary policy and rising delinquency. This slowdown was stronger in non-earmarked credit portfolios, with a loss of dynamism in both household and corporate segments. The trajectory of earmarked credit was uneven across its components. Whereas household loans slowed down, albeit at a slower pace than in the non-earmarked segment, corporate loans accelerated. As a result, the share of earmarked loans in the credit portfolio increased, both for households and companies.

Considering several perspectives, in general, the dynamics of household credit remained similar to that of previous years, while delinquency rates fell slightly. From the perspectives of geographic region, gender, and age group, credit growth rates were higher in the Northern region, slightly higher for women, and slower among the youngest. Delinquency reduced more significantly in the North and the Southeast, for both men and women, especially for the age group of 24 years old or less.

Despite positive movements in some segments, corporate credit portfolio, in general, slowed down, and delinquency increased. The highest growth in the corporate credit balance occurred in the North and the Central-West, with the extractive industries and construction standing out positively in the breakdown by sectors. The delinquency rate increased in all regions and in most economic sectors.

The share of micro and small enterprises (MSEs) in the corporate credit balance increased, despite a lower credit growth rate in this segment than in the previous year. The rise in the share of MSEs can partly be attributed to the predominance of long-term operations, rather than to new loans. The delinquency rate increased for all corporate sizes. Despite the highest growth rates in delinquencies observed among large and medium-sized companies, micro-enterprises recorded the highest overall delinquency rate, followed by small enterprises.

Credit portability resumed growth, reaching levels similar to those observed in 2018, especially in payroll-deducted operations. This trend was driven by the start of the Selic rate easing cycle in August 2023, which helped reduce the average interest rates charged for new payroll-deducted credit granting. Given the interest rates of existing contracts, there is room for growth in payroll-deducted and real estate credit portability at unregulated rates.

Advances on foreign exchange contracts dropped slightly, due to lower demand for this type of financing. The higher cost, following the Libor movement, explains the reduction in the contracted volume of Advances on Foreign Exchange Contracts (ACC) and Advances on Delivered Export Shipment Documents (ACE).

Banking system's funding sources continued to grow, despite the negative performance of savings deposits. Funding expansion was driven by the favorable performance of term deposits and by the high attractiveness of tax-exempt instruments. The decline in net funding for savings accounts observed in 2023, though smaller than in 2022, was still significant, reflecting a macroeconomic environment characterized by the higher Selic rate level than the return of savings accounts.

Funding cost followed the monetary cycle, decreasing from August 2023. The interest rates used for funding remained stable around 100% of the Interbank Deposit Certificate (CDI) rate throughout the year in the S1-S4 segments, despite slight fluctuations. Conversely, funding rate spreads of Bank Deposit Certificates (CDB) showed some stability or a slight downward trend, except for cooperative banks.

Despite the decline in the second half of the year, the Average Cost of Outstanding Loans (ICC) was, on average, higher in 2023 than in 2022, mainly due to increased funding cost and delinquency. The tightening monetary policy was the main factor responsible for the higher average funding cost, remaining as the primary component of the ICC. Delinquency remained as the second most relevant factor in the index.

The ICC spread also increased in 2023, driven by the rise in delinquency, its main component. In fact, the delinquency share in the spread grew from 30.5% in 2022 to 35.7%. The remaining components of the spread – administrative expenses, taxes and FGC, and the financial margin decreased and contributed to mitigate the rise of this metric.

The difference between the ICC for non-earmarked and earmarked segments widened in 2023, in line with the tightening monetary policy. Interest rates of non-earmarked credit operations are much more sensitive to the Selic rate than those of earmarked credit operations. Therefore, during periods of monetary tightening, the difference between the interest rates of non-earmarked and earmarked credit tends to increase, as observed in 2023.

The banking system profitability, measured by ROE, decreased slightly in 2023 and was heterogeneously distributed in the group of financial institutions with greater systemic importance. The increase in problem assets was the main cause of this reduction. The uneven distribution of ROE across financial institutions was mainly due to the different levels of success of the credit risk management strategies during and after the pandemic, as well as market risk in recent cycles of rising and falling base interest rates.

Provision expenses increased in 2022 and 2023, but show signs of stabilizing. After a sharp increase, provisions fell in 2023Q2, stabilizing in the second half of the year. Provision expenses reflected the evolution of delinquency and are considered adequate, above estimates of expected losses.

Credit margins stabilized throughout 2023, with a positive outlook for the coming periods. The relative stabilization of the gross interest margin resulted from the offset between the higher credit returns, influenced by the weight of recent harvests in credit revenues contracted at higher rates, and the increase in funding costs due to the higher Selic rate. However, the cost of funding fell in 2023Q4, following the Selic rate easing cycle from August, leading to a small increase in the gross margin at the end of the year. This upward trend is expected to continue as the effects of the Selic rate easing cycle continue to reduce the funding cost faster than interest rates of credit operations. In turn, the risk-adjusted net interest margin (NIM) decreased slightly in 2023, due to the provision expenses growth, but increased in 2023Q4 with the reduction of these expenses.

In 2023, nominal service revenues remained stable, but with uneven variations among its components. Revenues from payment transactions grew the most, surpassing revenues from household fees as the main source of income. Conversely, the fall in capital markets earnings was the largest among the components.

The profitability level is associated with the size of the institution, and, for the second consecutive year, state-owned banks were the most profitable. Although the profitability of smaller banks increased in 2023, it is lower than that of medium-sized banks, which in turn is lower than that of large banks. The higher profitability of state-owned banks is related to a better operational efficiency, while the operational efficiency of private banks remained stable. Problem assets increased in foreign banks, while administrative expenses grew at a faster pace than that of operational revenues.

Concentration in the SFN decreased in 2023, following the trend of recent years. Concentration decreased for all the accounting aggregates considered – total assets, total deposits, and credit operations – with increased share of credit unions and non-banking institutions, widespread in most relevant credit markets. This reduction in the level of concentration in the SFN occurred despite the clearance of four mergers/acquisitions in 2023. Similarly, the level of concentration decreased in 2023 in brokerage markets and in the market of distribution of retail investment products.

Competition in the credit market increased, continuing the trend of recent years, while competition of financial services remained relatively stable. Based on the Lerner index, in 2023, competition of the credit market in the banking and credit union sector increased, while stabilized in the non-banking sector, although at historically high levels. In turn, the Lerner index of the financial services market in the banking sector has remained at similar levels since the pandemic.

The BCB has actively worked to foster innovation and increase competition in the credit market, in line with the resolutions approved last year. In general, the resolutions aim to enhance security of the system by reducing potential asymmetries and improving credit risk assessment. Two noteworthy regulations issued in 2023 were: (1) a resolution that regulates the registration and centralized deposit of real estate receivables and the provision of these services by financial market infrastructures, (2) a resolution that creates the required conditions for the development of the credit derivatives market.

Boxes Summary

Box 1 – Use of credit around unemployment episodes

This box discusses the effects of short-term unemployment shocks on the use of credit. Several criteria are applied to select possibly involuntary unemployment. A comparison group with still employed workers is built through matching. The size of the originating firm determines different dynamics: while workers fired from larger firms have much lower wages and indebtedness than those observed in the eighteen months immediately after the firing, those fired from smaller firms have their wages recovered and higher indebtedness in the end of the observation period.

Box 2 – Judicial discretion and the supply of bank credit

This box discusses the impact of pro-debtor judicial decisions on corporate credit supply. A reduction in credit supply is observed when financial conglomerates detect a less favorable judicial environment. This reduction occurs not only for the parties involved in the process but also for other firms with which these conglomerates have a credit relationship. These results are particularly significant for small and medium-sized enterprises.

Box 3 – Payment institutions – business models and compensation of payment services

This box addresses the recent trends in the payments market, impacted by regulatory changes, and analyzes the characteristics of the business models of payment institutions (IPs). The increasing competition among participants in this system has led IPs to diversify their sources of revenue. Therefore, part of this segment has opted to organize itself into broader and more complex prudential conglomerates, thus allowing the supply of additional financial services.

Box 4 – Evolution of the National Financial System's efficiency from the perspective of resource optimization

This box analyzes the efficiency of financial institutions from 2004 to 2023. The concept of efficiency used in this box concerns the financial institution's ability to optimize inputs used on financial products. Efficiency is assessed in terms of cost and profitability, using the Stochastic Frontier Analysis (SFA) technique. Cost efficiency has remained at high levels. Nevertheless, profitability efficiency has fallen since 2009, highlighting challenges for the maximization of profits. The box's findings suggest that economic crises have boosted efficiency improvements, possibly due to the need to adapt to adverse periods.

Box 5 – Remittance costs in Brazil

Remittances are money transfers made by immigrants to their families in their home country. The aim of this box is to evaluate remittance costs in Brazil. As a result of the significant increase in remittance amounts over the last few decades, the international community has started to set principles and goals to reduce the costs of these transfers. In Brazil, these costs have fallen over the recent years. Part of this reduction is possibly associated with the modernization initiatives of the foreign exchange regulation, especially Law 14,286 of December 30, 2021, and its regulation, an item of the Agenda BC# inclusion dimension.

Box 6 – Concentration in the markets of payments card acquiring and issuing

Increased competition may benefit merchants and cardholders through more efficient services and reduced acceptance costs of the payment cards. The BCB has been adopting initiatives to eliminate entry barriers and balance competitive conditions in the payments card market. Data suggest that the actions undertaken by the BCB have created incentives to achieve these objectives through the entry of new players and the following decentralization in the activities of payments card acquiring and issuing.

Box 7 – Expansion of active users of financial services

To help understand the competitive dynamics and the effects of the digitalization of financial services, this box analyses the evolution of the number of users who carried out credit and/or payment transactions in the last three months, segregating the information by different segments of the SFN and the Brazilian Payment System (SPB) institutions. The digital credit/services segment showed the greatest increase in its total base of active users. This growth was primarily driven by new market entrants during the analyzed period, due to the offer of Pix and credit cards. Public policies implemented through the opening of household digital accounts have boosted the growth in the number of the segment's active users with the country's largest banks.

Box 8 – Results of the BCB liquidity supply from 2020 to 2023

From 2020 to 2023, the Banco Central do Brasil (BCB) implemented liquidity measures in response to the Covid-19 pandemic. These actions re-established the BCB's role in providing the SFN with financial assistance. Two temporary lines have been adopted, totaling operations around BRL 120 billion. Both fulfilled the objective of contributing to the regular functioning of the markets, as well as generating revenue for the BCB without any losses. These temporary lines also boosted the implementation, in 2021, of the Liquidity Financial Lines, a permanent tool for providing liquidity to the financial system, with expansion plans to include Bank Credit Notes (CCBs) as collateral in July 2024.

Box 9 – A Personalized, free, and scalable financial education solution: *Meu Bolso em Dia* Platform *Meu Bolso em Dia* platform

One of the challenges in bringing financial education to a greater number of citizens is personalizing financial education to meet individual needs. To this end, the *Meu Bolso em Dia* platform was created as a result of the technical cooperation agreement between the BCB and the Brazilian Federation of Banks (Febraban). Since its launch in 2021, there have been over 3.3 million hits, with 950 thousand unique users and 170 thousand people registering for access to personalized learning paths. This box presents data on the use of this platform, showing the prevalence of female users and users with lower financial health profiles. Future objectives are to expand the platform's reach and evaluate the tool's impact.

Box 10 – The short-term impact of the *Aprender Valor* (Learning Value) program on the financial literacy of children and young people

Aprender Valor (Learning Value) is the BCB's program developed to support the implementation of financial education as a cross-cutting theme in elementary education in the country. An impact evaluation to measure the program's effectiveness was carried out in 2022, based on a representative sample of participating schools. Students' performance on a financial literacy test was measured at the beginning and end of the school year. The results showed that, overall, test scores improved, particularly among students who initially performed lower and those attending schools that extensively used the program's teaching resources.

Box 11 – Climate risk and the National Financial System – a proposal for indicators

This box aims to understand the relationship between the SFN and greenhouse gas (GHG) emissions in Brazil, using three indicators: emission coefficient by activity, the SFN's carbon footprint, and the share of loans to low-carbon

sectors. The first allows to identify the activities that emit the most, such as livestock, oil refining, and transport. The carbon footprint is a proxy for the SFN's vulnerability to climate risks, and allows international comparisons. The share of loans indicator reveals a proportional increase in credit to low-emission sectors from 2012 to 2020.

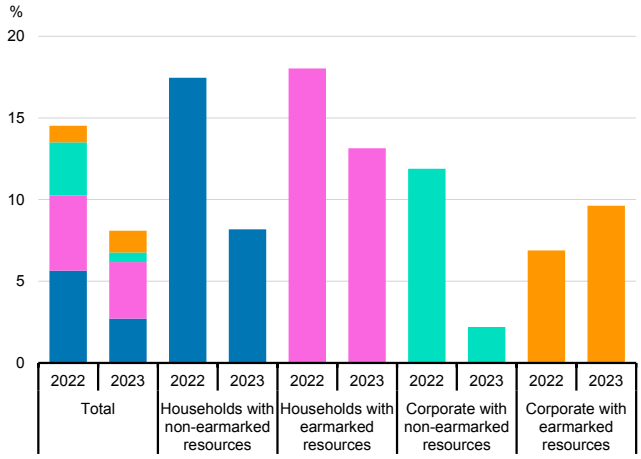
Box 12 – Impacts of Drex and "Programmable Finance" on the industrial organization of the National Financial System

The Brazilian digital currency (Drex), its platform, and the derived smart contracts are expected to significantly change the industrial organization of the financial ecosystem. These innovations are expected to generate financial inclusion and increase efficiency, with no loss of security or privacy. Moreover, the Drex infrastructure should guarantee interoperability between programmable ecosystems and financial market infrastructures. This box aims to explain how tokenized asset platforms work, their connection to Drex, and their expected effects on traditional and digital finance.

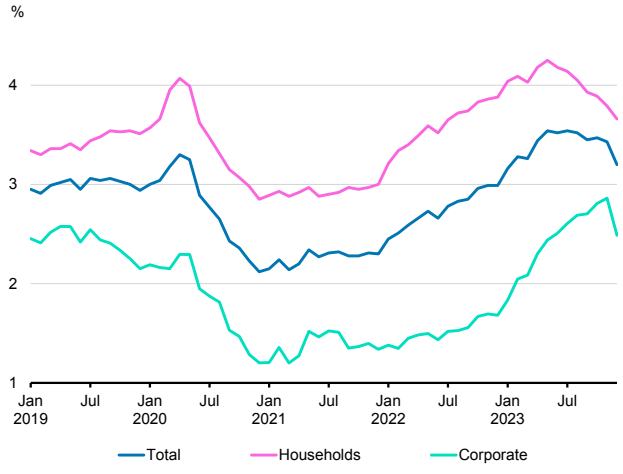
1 Credit Market[1]

1.1 Credit aggregates

Graph 1.1 – Credit Balance in the SFN
Year-over-year variation



Graph 1.2 – Delinquency rate



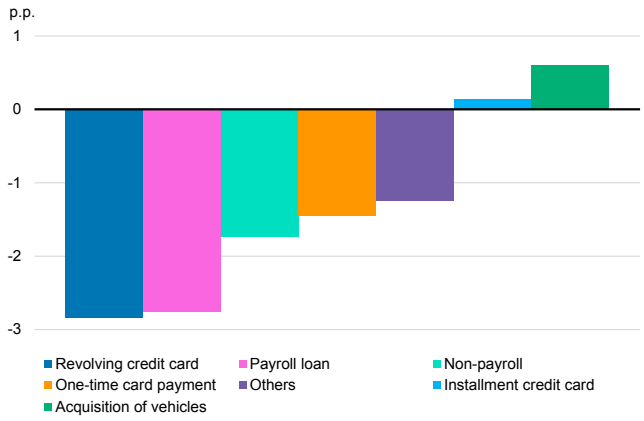
Credit growth in the National Financial System (SFN) decelerated in 2023, influenced by the lagged effects of the restrictive monetary policy and rising delinquency, among other factors. This slowdown was stronger in non-earmarked credit portfolios (Graph 1.1), with a loss of dynamism in both the household and corporate segments. Earmarked credit showed different behavior across its components, slowing down for households and accelerating for companies. However, 2023Q4 indicators showed improvement, with a reduction in the average interest rate, an increase in non-earmarked new loans, and a decline in delinquency.

SFN credit delinquency ended the year with a slight increase, mainly driven by arrears in non-earmarked corporate credit operations. The delinquency rate for corporate operations, which had been growing moderately at the beginning of the year, accelerated in the second and third quarters, ending the year with a positive change of 0.8 p.p. (Graph 1.2). This increase reflected arrears in both small and large companies and began to show signs of deceleration at the end of the year. In the household segment, delinquency increased until mid-2023Q2, driven by high-cost non-earmarked credit modalities. However, it receded in the second half, ending the year at a lower level compared with December 2022.

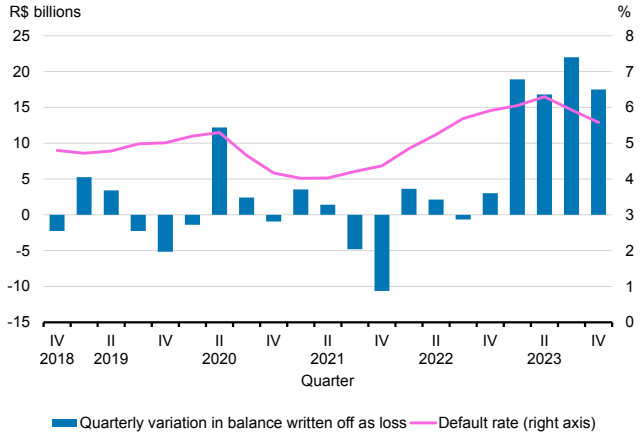
The sharp slowdown in credit to households reflected a drop in new loans, impacted by rising interest rates and increased write-offs. The non-earmarked credit portfolio registered a more significant slowdown, especially in revolving credit card and payroll-deducted loans (Graph 1.3). The tightening monetary policy increased the cost of loans over the past two years,

1 The values presented in this report refer to data available on March 8, 2024, unless otherwise stated.

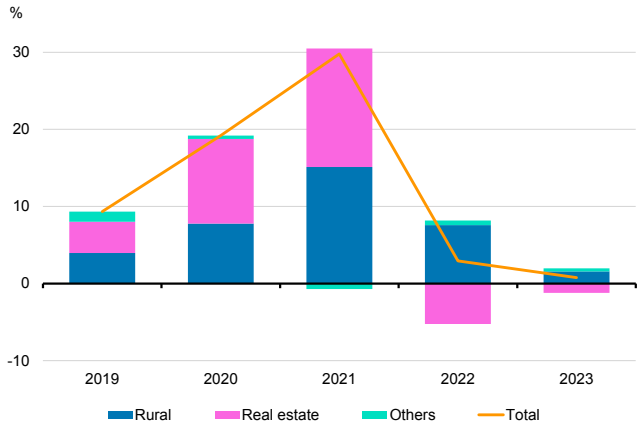
Graph 1.3 – Non-earmarked Household Credit
Contributions to deceleration – 2023



Graph 1.4 – Default Rate and Loss of Non-earmarked Household Credit



Graph 1.5 – Earmarked Credit Granting to Households
12-month variation – Deflated data



leading to a reduction in new contracts for longer-term credit modalities, such as payroll-deducted and non-payroll-deducted personal credit. Similarly, the increase in delinquency of higher-risk operations, in a context of high household debt to income and debt service ratio, favored the contraction in credit supply[2] and the increase in the volume written off. The removal of older delinquent operations from financial institutions' balance sheets contributed to reverting this upward delinquency trend in the segment in the last months of the year (Graph 1.4).

The earmarked household credit portfolio also slowed, but less intensely than non-earmarked credit. The growth in real estate credit balances decreased, impacted by the drop in new loans under the Housing Finance System (SFH) for the second consecutive year (Graph 1.5), only partially offset by an increase in operations financed with resources from the Employment Compensation Fund (FGTS). The rural credit portfolio also slowed, with a decrease in the growth of new loans.

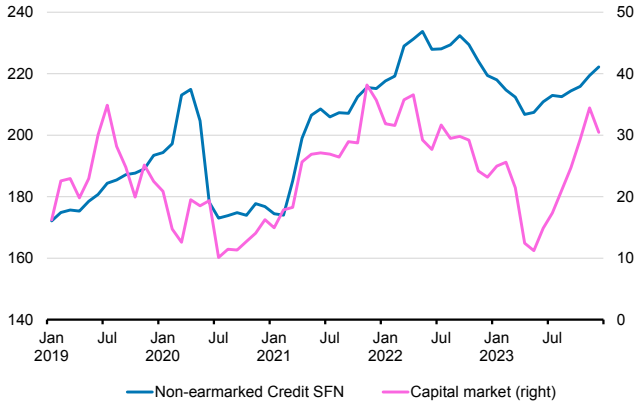
Corporate financing dropped sharply in the first half of 2023, impacted by rising credit costs and increased risk aversion, but this trend was reverted in the second half. As with households, interest rates rose at the beginning of the year for non-earmarked credit, pressured by restrictive monetary policy and rising delinquency. This was further exacerbated by judicial recovery requests at the beginning of the year.[3] However, there was a resumption of financing contracts in the SFN and in the capital market in the second half (Graph 1.6), with the start of the Selic rate easing cycle (Graph 1.7) and a decrease in uncertainties related to the macroeconomic policy. Given the adverse credit conditions for most of the year, the downward trend for corporate indebtedness as a proportion of GDP continued (Graph 1.8), concentrated this year in the non-earmarked segment.

The banking credit portfolio for micro, small, and medium-sized enterprises experienced the most significant slowdown in the corporate segment. These companies are more affected by rising credit costs and increased risk aversion. Despite the stronger slowdown,

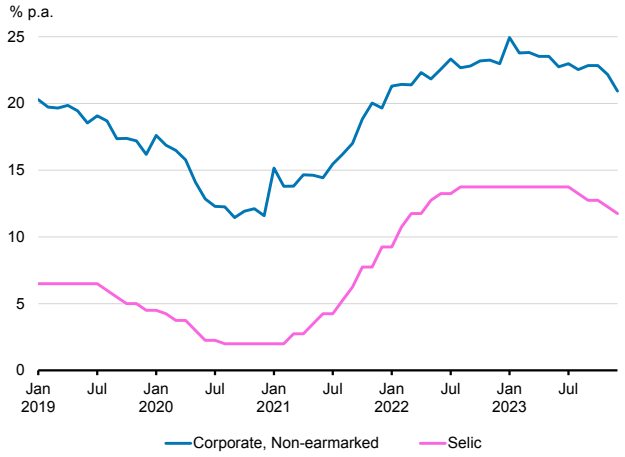
2 The Quarterly Survey on Credit Conditions (PTC) showed a drop in the consumer credit expected and observed supply indicators in 2021 and 2022.

3 On January 11, 2023, *Americanas*, a large Brazilian retailer, disclosed a material fact about inconsistencies in its balance sheet regarding credit operations accounting that surprised the market, and filed for judicial reorganization shortly afterwards. In the following weeks, other large companies also filed for judicial reorganization, bringing uncertainty to the market. This issue is thoroughly discussed in the 2023 editions of the Financial Stability Report and the Inflation Report – especially the June edition of the latter.

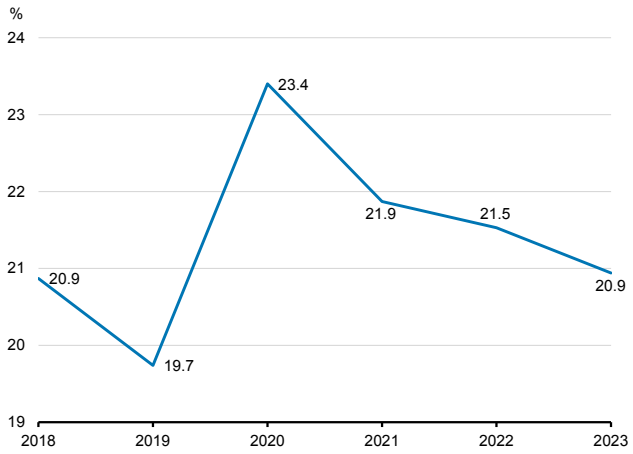
Graph 1.6 – New financing to corporates
BRL billions as of December 2023, seasonally adjusted, 3-month moving average



Graph 1.7 – Interest Rate on Non-earmarked Corporate Credit and Selic Rate



Graph 1.8 – Ratio of corporate credit balance to GDP



the growth of this portfolio was slightly higher than that of loans to large companies (Graph 1.9). Large companies, in turn, financed a significant portion of their long-term credit requirements in the capital market, as in previous years.

The growth of the earmarked corporate credit portfolio increased, contrasting with the slowdown in the non-earmarked portfolio. The National Program for Supporting the Micro and Small Enterprises (Pronampe), the Emergency Credit Access Program (Peac), and rural credit were the main drivers of growth in earmarked credit. The increase in the cost difference between non-earmarked and earmarked operations is one of the factors explaining the distinct performance.

1.2 Characteristics of operations and borrowers[4]

Household credit

The expansion of household credit in 2023 occurred unevenly across regions, with the lowest growth in the Northeast region. The states that showed the highest growth rates in household credit were generally located in the North region (Graph 1.10 and Table A of Annex B).[5]

Credit density by state in 2023 followed a distribution qualitatively similar to that of previous years. The states in the Central-West region and the state of Rondônia showed the highest population credit densities (credit per inhabitant),[6] followed by the states in the South region (Figure 1.1 and Table B of Annex B). The state of Amazonas exhibited the lowest credit density.

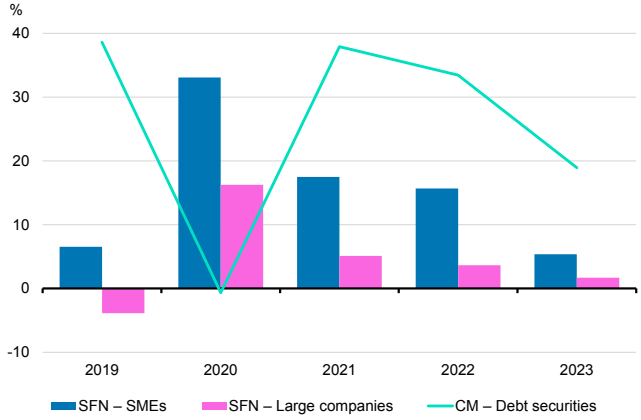
Delinquency rates reduced slightly, more noticeable in the Northeast and Southeast regions. Overall, the delinquency rates fall in 2023 was smaller than its rise in 2022, meaning that the delinquency rate ended 2023 higher than in 2021 (Table C of Annex B). The Central-West region was the only one that did not show a decrease in delinquency (Graph 1.11). The states of Amazonas, Pernambuco, and Rio de Janeiro registered the highest delinquency rates in 2023 (Figure 1.2).

4 Data herewith presented may differ from other BCB publications due to methodological differences. However, the results of the analyses in this section are robust to such differences.

5 State-level household credit, both absolute and normalized by population size, are shown in tables A and B of Annex B.

6 Largely reflecting the role of rural credit.

Graph 1.9 – Corporate credit balance in the SFN and in the domestic capital market
12-month variation



Graph 1.10 – Variation in credit balance
Households, by region

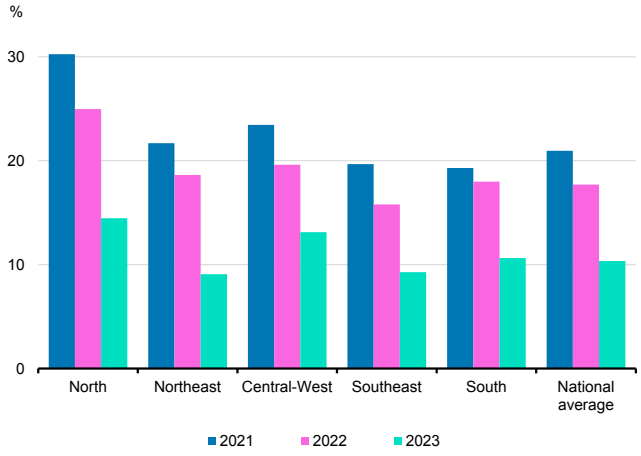
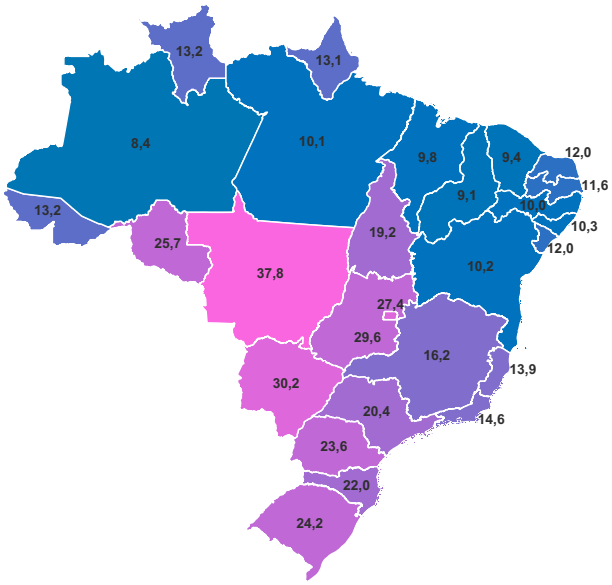


Figure 1.1 – Household credit density by state (BRL thousand)



The growth of credit for women was slightly higher than for men, and the drop in delinquency involved both genders. However, the share of women in total outstanding credit remained around 38% throughout the analyzed period showed in Table 1.1. The decrease in the delinquency rate was 0.4 p.p. for both genders, maintaining therefore the small differential in women's delinquency compared to men (Table 1.2).

The younger the age group, the higher the credit slowdown in 2023 was, repeating the pattern seen the previous year, and the higher, in general, the drop in the delinquency rate (Table 1.3). The significant slowdown in credit for the age group of 24 years old or younger in 2023 placed it as the group with the lowest growth in that year. The most noticeable movement in the delinquency rate also occurred in the 24 years old or younger age group, which experienced a reduction of 2.3 p.p. (Table 1.4).

Corporate credit

In 2023, the decline in the growth rate of the corporate credit portfolio affected all geographic regions, almost all economic sectors, and, in general, companies of different ages, although more strongly among younger companies. The South and Southeast regions showed the lowest credit balance growth (Graph 1.12). As with households, the North and Central-West regions showed the highest growth. Among economic activities, credit to Extractive Industries and Construction reached the highest percentage changes. (Table 1.5). When considering grouping by age, most groups showed lower credit growth in 2023, but younger companies were the most affected, with a decrease even in the credit balance for companies up to three years old (Table 1.6).

The delinquency rate decreased for companies up to one year old, which, along with the simultaneous reduction in credit balance, suggests greater selectivity in credit grants to new companies. Delinquency increased in almost all age groups, with a reduction only among entrants (Table 1.7). The increase in delinquency among 10-years old companies or older, due to their larger share in the analyzed segment, predominantly explains the increase in the overall delinquency rate.

The delinquency rate increased in all regions and most economic sectors. The sectors of Trade, Repair of Motor Vehicles and Motorcycles and Manufacturing Industries registered a drop in credit balance and an

Graph 1.11 – Default rate
Households, by region

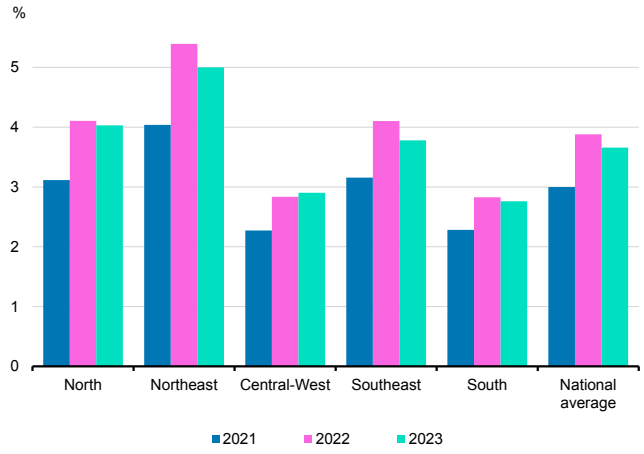


Figure 1.2 - Household delinquency rate by state (%)

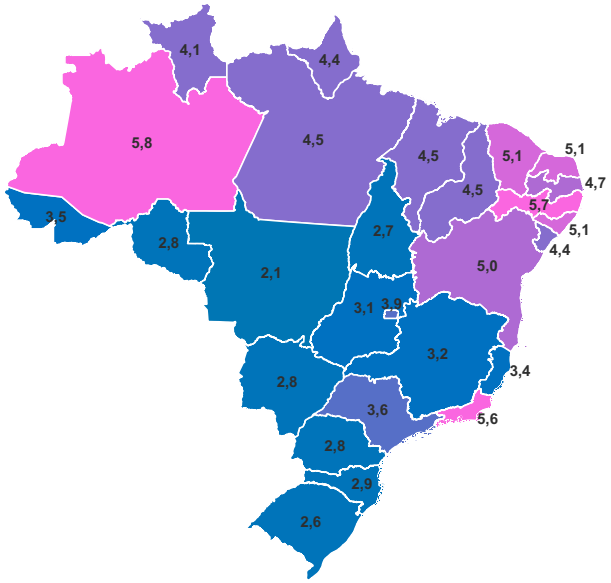


Table 1.1 – Household credit operations balance
By gender

R$ billions

Gender	2021	2022	2023	Variation %		
				2021	2022	2023
Total	2,711	3,191	3,521	21.0	17.7	10.4
Male	1,682	1,977	2,179	21.2	17.6	10.2
Female	1,029	1,214	1,342	20.6	17.9	10.6

/ The values refer to December of each year and do not consider cases where identification was not possible.

Table 1.2 – Household default rate
By gender

%

Gender	2021	2022	2023
Total	3.0	3.9	3.7
Male	2.9	3.7	3.5
Female	3.1	4.1	3.9

/ Values refer to December of each year.

increase in the delinquency rate (Table 1.8), which may indicate difficulties related to credit conditions in these sectors. Continuing the trend from 2022, the delinquency rate for companies continued to rise in all regions (Graph 1.13), with the highest values observed in the North and Northeast regions.

Corporate credit by enterprise size[7]

Despite the slowdown, micro and small enterprises (MSEs) increased their share in the corporate credit balance. Large companies showed the lowest portfolio balance growth (Table 1.9). The increase in MSEs in the credit balance follows the trend observed in recent years (Graph 1.14).

The predominance of long-term operations partly explains the increase in MSEs' share. In 2023, credit grants across different groups grew very little or declined (Table 1.10). However, 90% of the amount lent to MSEs are of long-term operations, compared with 75% of the credit to large companies. Shorter-term operations leave the portfolio more quickly and may not be offset by credit grants, which performed poorly in 2023. Thus, MSE's credit balance tended to exhibit a higher growth.

The percentage of the credit balance from earmarked resources increased for large, medium, and small companies. For MSEs, the main credit modality continues to be working capital with non-earmarked resources (Graphs 1.15 and 1.16).

Delinquency increased for all company sizes in 2023. The highest growth rates were registered for large and medium-sized companies. Still, micro-enterprises have the highest delinquency rate, followed by small enterprises (Graph 1.17).

7 This subsection analyzes the corporate credit balance and granting in 2023 according to their size: (a) micro enterprise; (b) small enterprise; (c) medium enterprise; and (d) large enterprise. Size is defined by an internal algorithm, which considers three sources of information: i) the label of micro and small enterprises in the Brazilian Federal Revenue Service's register of legal entities; ii) the mode of size reported by financial institutions to the Credit Information System – SCR (in case of a tie, the size reported by the financial institution in which the borrower has the largest debt is considered); and iii) external funding value ranges (bank credit, debentures, commercial notes, and internalized foreign debt) to delimit the size brackets. Criteria (i) and (ii) consider the annual gross revenue criteria of Complementary Law 123, of 2006, and of Law 11,638, of 2007. Criterion (iii) is used to classify enterprises that do not have a labeled size according to criterion (i) or that do not have size information according to criterion (ii). Data herewith presented may differ from other BCB publications since they include operations transferred to institutions that are not part of the SFN and do not include credits granted abroad.

Table 1.3 – Household credit operations balance
By age group

R$ billions

Age group	2021	2022	2023	Variation %		
				2021	2022	2023
Total	2,711	3,191	3,521	21.0	17.7	10.4
24 years or younger	70	89	93	37.5	27.7	4.9
25 to 39 years	844	974	1,040	20.7	15.4	6.8
40 to 59 years	1,210	1,442	1,620	21.8	19.2	12.3
60 years or older	587	686	768	17.9	16.9	12.0

/ Values refer to December of each year.

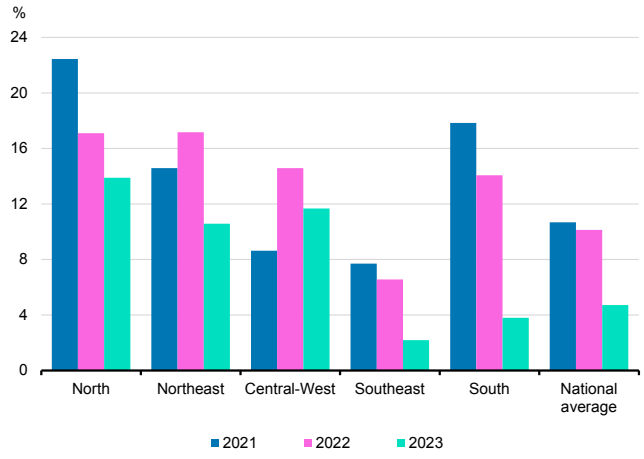
Table 1.4 – Household default rate
By age group

%

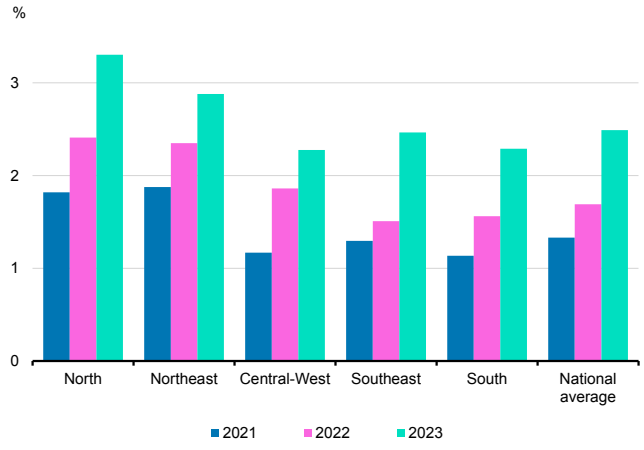
Age group	2021	2022	2023
Total	3.0	3.9	3.7
24 years or younger	6.9	10.0	7.7
25 to 39 years	3.4	5.1	4.7
40 to 59 years	2.5	3.2	3.2
60 years or older	2.9	2.8	2.8

/ Values refer to December of each year.

Graph 1.12 – Credit balance variation
Corporate, by region



Graph 1.13 – Default rate
Corporate, by region



1.3 Credit portability

After a significant drop in 2022, credit portability resumed growth last year, reaching levels similar to those observed in 2018 (Graph 1.18).[8] In 2023, the number of credit portability requests increased by 81.7% compared with 2022, to 9.3 million, with 3.5 million requests effected (+84.0%), corresponding to BRL 28 billion in ported balance (+62.6%).

In 2023, the effectiveness rate remained relatively stable, while credit conditions pressured the cancellation rate (Graph 1.19).[9] The high level of the rate of cancellations, which increased 2.7 p.p., was due to the tighter credit policy of the proposing institutions, indicating a greater risk aversion when the credit portability occurs. The combined share of effected portability and operations renegotiated with the original lender in total requests – which represent the cases in which the client obtains contractual advantages – felt slightly from 53.9% in 2022 to 52.6% in 2023.

The increase in portability mainly reflected payroll-deducted loans. In 2023, payroll-deducted credit portability increased by 80.1%, representing 14.2% of the value of payroll-deducted loans in 2023,[10] compared with 7.6% in 2021 (Table 1.12). In turn, real estate credit portability showed a weak performance. As a result, the share of payroll-deducted loans in total portability increased to 96.3% (Graph 1.20).

8 The amounts and values presented are based on the data from the Credit Transfer Center (CIP CTC) and refer to the order groupings, a method that groups the contracts according to the date of the request.

9 The portability market involves, in addition to the customer, two players: the original lender (the institution that granted the credit) and the proposer (the institution that will receive the ported contract). Frequently, a financial intermediary is also involved. Generally, portability requests can be classified into one of the following four situations: effected (the order is executed and the contract is transferred from the original lender to the proposer); canceled (at the request of the customer or, usually, at the proposer discretion – depending, for example, on the credit policy); retained (when the process stops at the request of the original lender, due to data inconsistency or renegotiation of the terms of the contract); and pending (request awaiting action; if the request is not completed or retained by the lender or canceled by the proponent, it will be canceled by the register institution). Since the retention due to renegotiation implies better contract conditions for the client, the overall effectiveness of this instrument is considered as the total of ported and renegotiated requests.

10 According to the Time Series 20671 (Non-earmarked new operations – Households – Total payroll-deducted personal loans), the value granted in 2023 in this credit facility totaled BRL 191.8 billion.

Table 1.5 – Corporate credit operations balance
By sector of activity

R$ billions

Sector	2021	2022	2023	Variation %		
				2021	2022	2023
Total	1,971	2,170	2,272	10.7	10.1	4.7
Agriculture, livestock, forestry production, fishing and aquaculture	39	45	49	19.9	16.7	9.3
Extractive industries	15	19	24	-10.1	30.8	22.0
Manufacturing industries	454	475	467	4.7	4.6	-1.8
Electricity and gas, water, sewage and waste management	218	235	238	4.3	7.8	1.5
Construction	85	104	123	9.7	23.3	18.0
Trade, repair of motor vehicles and motorcycles	497	559	552	20.7	12.6	-1.3
Transportation, storage and mail	184	207	214	8.0	12.9	3.1
Public administration, defense and social security	165	167	182	1.4	1.3	8.8
Other services	306	325	362	15.1	6.3	11.6
Corporations headquartered abroad or unclassified	9	33	62			

/ Values refer to December of each year

Table 1.6 – Corporate Credit Operations Balance
By years founded

R$ billions

Years founded	2021	2022	2023	Variation %		
				2021	2022	2023
Total	1,971	2,170	2,272	10.7	10.1	4.7
Up to one year	31	35	31	25.5	14.7	-12.7
Two or three years	87	101	101	32.9	17.2	-0.8
Four or five years	91	118	139	19.5	30.2	18.0
Six or seven years	98	109	114	3.7	10.6	4.8
Eight or nine years	110	117	126	17.6	6.7	7.8
Ten or more years	1,554	1,689	1,761	9.0	8.7	4.3
Unidentified	0	0	0			

/ Values as of December of each year

Table 1.7 – Corporate Default Rate
By years founded

%

Years founded	2021	2022	2023	Variation p.p.		
				2021	2022	2023
Total	1.3	1.7	2.5	0.1	0.4	0.8
Up to one year	3.0	5.6	4.1	1.2	2.5	-1.5
Two or three years	3.2	5.3	6.8	1.1	2.1	1.5
Four or five years	2.9	4.1	5.1	1.2	1.2	1.0
Six or seven years	2.2	3.5	5.0	0.2	1.3	1.5
Eight or nine years	1.8	2.7	3.4	-0.3	0.9	0.8
Ten or more years	1.0	1.0	1.8	0.0	0.0	0.7
Unidentified	0.0	0.0	19.1	0.0	0.0	19.1

/ Values as of December of each year

Following the Selic rate easing cycle that began in August 2023, the average interest rates for new payroll-deducted credit loans fell again, stimulating portability (Graph 1.21). The drop in the interest rates of payroll-deducted loans for the INSS retirees (Graph 1.22) followed successive reductions in the legal cap from 2.14% p.m. to 1.80% p.m. established by the National Social Security Council (CNPS) that year. This reduction increased the financial attractiveness of the INSS payroll-deducted credit operations portability, which in 2023 registered 3.1 million requests effected (up 94.0% in relation to 2022).

The reduction in real estate financing interest rates in the second half of 2023 was not enough to significantly encourage portability (Graph 1.23). In 2023, only 1,600 portability requests were registered in the real estate market (down 75.6% in relation to 2022). Effected contracts totaled 602 (down 77.6%) and the ported value reached BRL 201 million (down 78.5%).

Given the interest rates of existing contracts, there is room for growth in payroll-deducted and real estate credit portability at unregulated rates. The simple average rate among original creditors for ported payroll-deducted loans was 20.8% in December 2023. Without considering any other factors among the various portability determinants, as of the same reference date, 75.8% of the stock of payroll-deducted contracts in the SFN registered higher rates than the ported average. In real estate credit, the average rate of effected requests (Dec/2023) was 11.1% (SFH) and 11.3% (SFI). The respective percentage of the stock of operations with higher rates was 1.2% and 18.2%, respectively.

Table 1.8 – Corporate Default Rate
By sector of activity

%

Sector	2021	2022	2023	Variation p.p.		
				2021	2022	2023
Total	1.3	1.7	2.5	0.1	0.4	0.8
Agriculture, livestock, forestry production, fishing and aquaculture	0.9	0.8	1.2	-0.5	-0.1	0.4
Extractive industries	10.4	1.0	0.9	10.1	-9.4	-0.1
Manufacturing industries	0.6	1.0	1.6	-0.2	0.3	0.6
Electricity and gas, water, sewage and waste management	0.1	0.1	0.1	-0.4	0.0	0.1
Construction	2.9	2.8	3.0	-0.8	0.0	0.1
Trade, repair of motor vehicles and motorcycles	1.8	2.6	4.8	0.2	0.7	2.2
Transportation, storage and mail	1.4	1.3	1.4	0.5	-0.1	0.1
Public administration, defense and social security	0.0	0.0	0.0	0.0	0.0	0.0
Other services	2.0	2.6	2.9	0.4	0.6	0.3
Corporations headquartered abroad or unclassified	1.7	2.3	2.9	0.7	0.6	0.7

/ Values as of December of each year

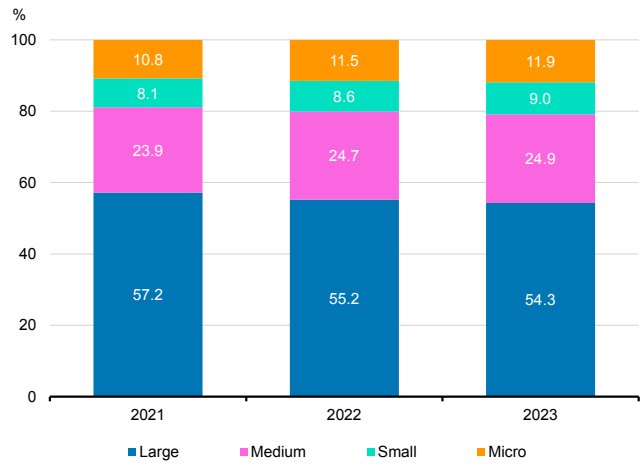
Table 1.9 – Corporate Credit Operations Balance
By enterprise size

R$ billions

Enterprise Size	2021	2022	2023	Variation %	
				2022	2023
Total	1,970.6	2,170.3	2,272.5	10.1	4.7
Large	1,127.0	1,198.8	1,233.6	6.4	2.9
Medium	471.0	535.9	565.0	13.8	5.4
Small	159.5	185.7	203.4	16.4	9.6
Micro	213.2	250.0	270.5	17.2	8.2

/ Values as of December of each year

Graph 1.14 – Corporate credit
Share in balance by size



1.4 Credit for import and export financing[11]

Bank credit to exporters through foreign exchange advances reduced in 2023. Advances on Foreign Exchange Contracts (ACC)[12] operations showed lower volume and increased cost compared with the previous year. Over 2023, Advance Export Receipts (RAE) and long-term import payments increased slightly.

Advances on export exchange contracts showed a slight decline in 2023, due to lower demand from Brazilian exporters for this type of financing. The contracted volume of ACCs and ACEs in 2023 was USD 31.1 billion, 8.2% lower than the total in 2022, despite a 3.4% increase in the total export exchange volume.

11 The analyses are based on the exchange operations recorded in the BCB's Foreign Exchange System (Sistema Câmbio). Authorized exchange institutions make these records on the day they occur, as a rule, but exchange contracts can be retroactively changed at any time. The amounts reported in this chapter were calculated in February 2024 and include operations with the "Without fund transfer" foreign currency delivery method. They may differ from the contracted exchange series disclosed by the BCB weekly in the Consolidated Economic Indicators and in the Time Series Management System (SGS), which, until 2022, did not include retroactive records.

12 Export exchange operations may be contracted either previously or after the shipment of goods, with the advance payment of the domestic currency to the Brazilian exporter by the bank authorized to operate in foreign exchange, against future receipt of the foreign currency. The advance payments of the domestic currency are intended to provide exporters with the capital they need to finance their industrial or commercial cycle. Advances on Foreign Exchange Contracts (ACC) occurs when the exporter receives the domestic currency before the shipment of goods. Advances on Delivered Export Shipment Documents (ACE) occurs when the exporter receives the domestic currency after the shipment of goods.

Table 1.10 – Corporate Credit Granting

By enterprise size

R$ billions

Enterprise Size	2021	2022	2023	Variation %	
				2022	2023
Total	2,246.9	2,736.7	2,736.4	21.8	0.0
Large	1,225.1	1,451.2	1,461.5	18.5	0.7
Medium	561.8	722.4	711.7	28.6	-1.5
Small	195.9	243.8	245.5	24.4	0.7
Micro	264.1	319.3	317.7	20.9	-0.5

Table 1.11 – Credit Maturity for Large and Micro/Small Enterprises

Share in credit balance

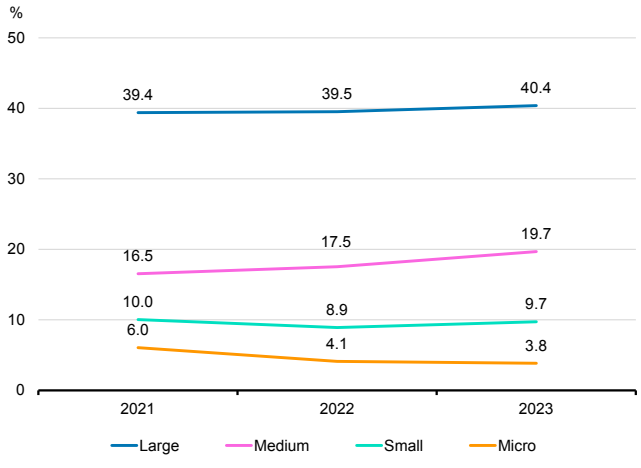
%

Maturity	2021	2022	2023	Δ
Large enterprise				
Short-term	27	27	25	
Long-term	73	73	75	
Micro and small enterprise				
Short-term	12	12	10	
Long-term	88	88	90	

/ Values as of December of each year.

Graph 1.15 – Earmarked credit resources

Share in balance by size



Relative to the total export exchange made during the year (USD 276.7 billion), the value of advances represented 11.2%, a drop of 1.4 p.p. compared with 2022. The decrease is also observed in the ratio (9.1% in 2023) between the value of advances and the total physical exports[13] (USD 339.7 billion), down 1.0 p.p. compared with 2022.

The average term of ACC and ACE contracts was in line with what has been observed in recent years, but the cost is higher, following the movement of the Libor. The average term of ACCs and ACEs in 2023 was 7.6 months, within the range of 7 to 9 months seen in recent years. The interest rates on these advances rose from 6.0% in December 2022 to 6.8% in December 2023, but with a stable trend in the last half year, following the movement of the 6-month USD Libor reference rate (Graph 1.24). The spread concerning this rate did not change significantly during the year, having increased by only 0.2 p.p. compared with the previous year. The main funding source used by financial institutions when celebrating export related ACC/ACE contracts with their clients were specific credit lines obtained from banks abroad.

Considering all external credit lines targeted to Brazilian exports, the cost also increased, following the Libor's change. Considering all external lines raised for Brazilian exports, the average nominal cost in December 2023 was 6.0% p.a. (Graph 1.25)[14], 0.7 p.p. higher than in December 2022. This increase followed the variation in the 6-month USD Libor rate. The spread over this rate ended the year at 0.3 p.p., without significant change compared with 0.1 p.p. at the end of 2022.

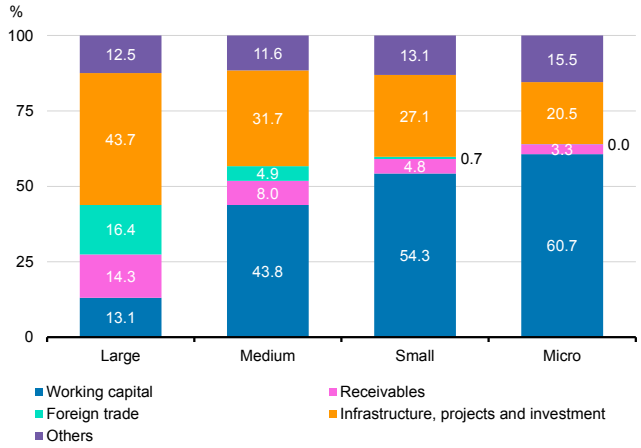
The relevance of long-term RAE[15] operations in total exports remained stable in 2023 compared with 2022, but below the previous years. In total, RAE operations amounted to USD 65.4 billion in 2023 (Table 1.13), with a share of 23.6% of the total export exchange operations. As in 2022, long-term operations explain this low share, while short-term operations remained close to the average of recent years.

13 Values published by the Ministry of Development, Industry, Commerce, and Services – Secretariat of Foreign Trade.

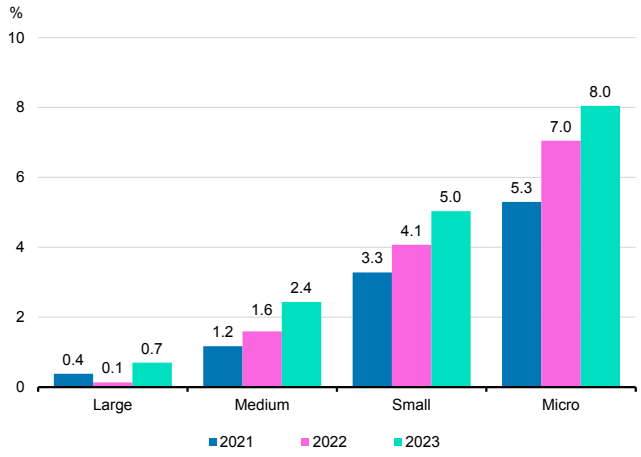
14 Graph 1.19 considers all external funding raised for Brazilian exports, not just the advance payment modalities.

15 RAE is a more common export financing modality among multinational companies, which obtain resources from their foreign affiliates for the future shipment of goods.

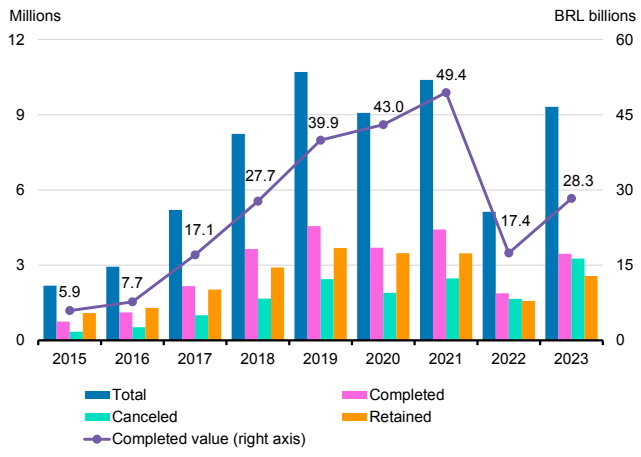
Graph 1.16 – Credit modalities
Share in balance by size – 2023



Graph 1.17 – Default rate
Corporate, by size

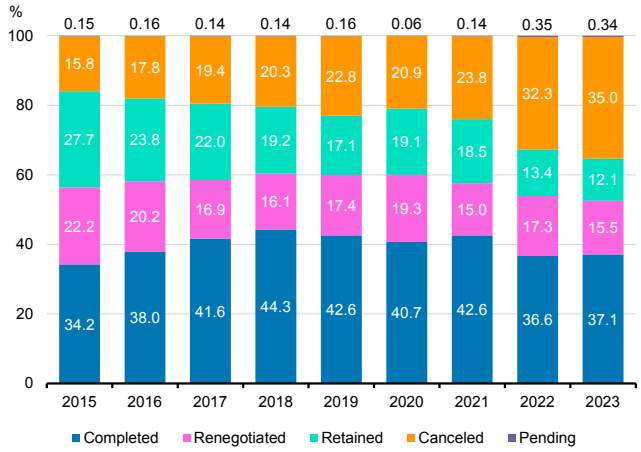


Graph 1.18 – Portability requests
Accumulated by year and status

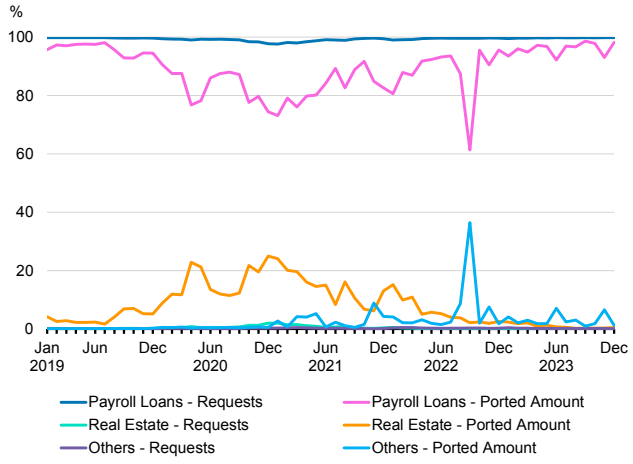


The proportion of imports paid with a term of over one year remained very low in 2023, mainly supplying the wholesale trade and chemical manufacturing sectors. Only 1.2% of payments related to imports during the year corresponded to amortizations of long-term financing (Table 1.13). The main sectors demanding such financing were wholesale trade (except motor vehicles and motorcycles) and chemical manufacturing, which accounted for 45% of the total value of long-term import financing exchange contracts.

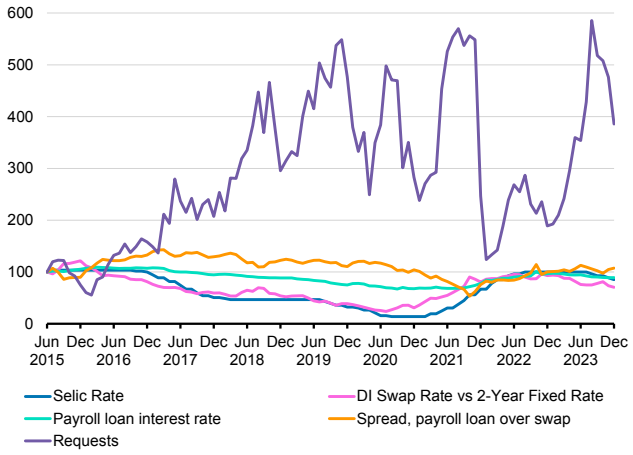
Graph 1.19 – Portability Requests
Evolution of status participation



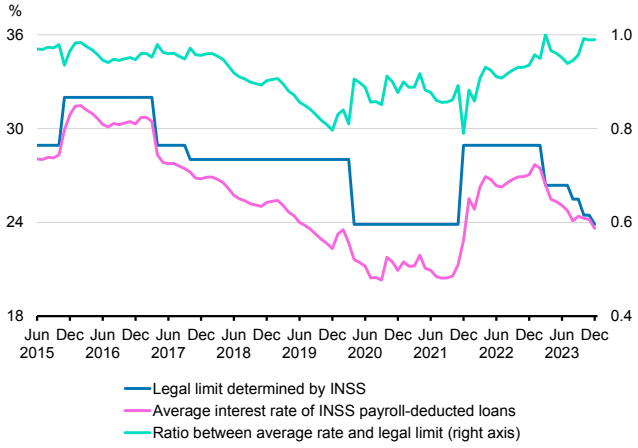
Graph 1.20 – Payroll and Real Estate Credit
Participation in requests and transferred value



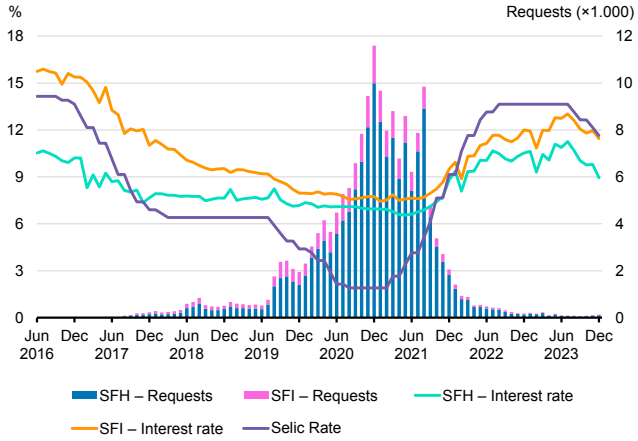
Graph 1.21 – Interest Rates and Portability
Index 100 in Jun 2015



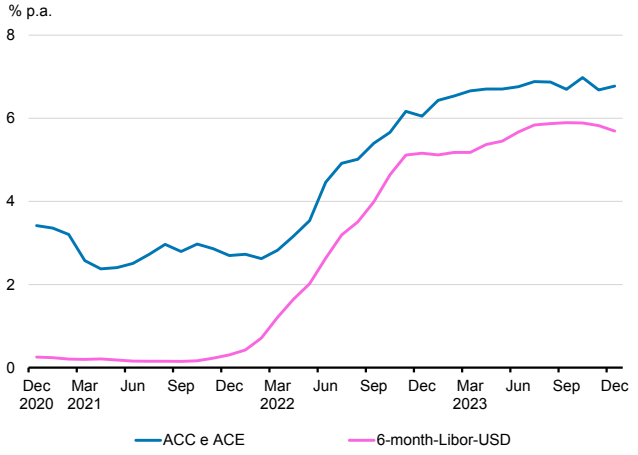
Graph 1.22 – INSS Payroll-Deducted Loans
Market interest rate vs. legal limit



Graph 1.23 – Real estate credit portability
Number of requests and interest rates



Graph 1.24 – ACC and ACE Cost vs. Libor
Monthly average rates



Graph 1.25 – Cost of External Credit Lines for Export vs. Libor
Monthly average rates

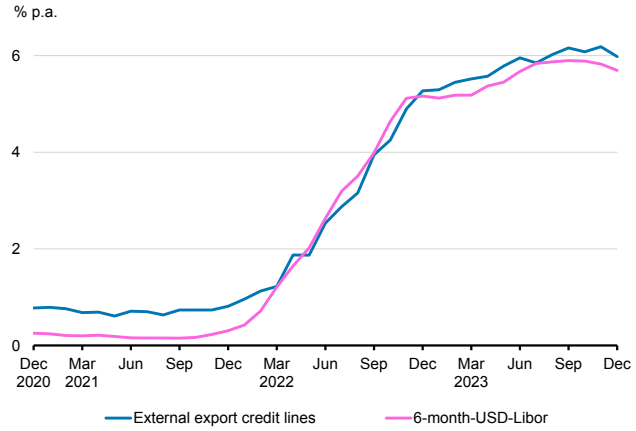


Table 1.13 - Export and Import

Modality	2020		2021		2022		2023	
	US$ billions	%	US$ billions	%	US$ billions	%	US$ billions	%
Export	191.8	100.0	223.6	100.0	267.5	100.0	276.7	100.0
Advance receipt	70.7	36.8	55.0	24.6	61.3	22.9	65.4	23.6
Short-term	29.3	15.3	30.1	13.5	39.3	14.7	42.8	15.5
Long-term	41.3	21.5	24.9	11.1	21.9	8.2	22.6	8.2
Other modalities	121.1	63.2	168.6	75.4	206.2	77.1	211.3	76.4
Import	164.8	100.0	207.4	100.0	231.3	100.0	212.0	100.0
Long-term financing	3.1	1.9	2.5	1.2	2.2	0.9	2.6	1.2
Other modalities	161.7	98.1	204.8	98.8	229.1	99.1	209.4	98.8

Box 1 – Use of credit around unemployment episodes

One of the key roles that consumer credit is usually expected to play is that of smoothing income shocks, allowing, for instance, households to reduce the negative impact of unemployment on their consumption.[1] Nevertheless, at moments of income reduction and absence of collateral, the credit supply may decline, making the smoothing action of credit difficult to take place. On the other hand, it is possible that borrowers also become more cautious, leading to a reduction of demand due to a perception of increased uncertainty about the prospective income. Furthermore, there is evidence that negative income shocks are correlated with the reduction of self-control, thus increasing the possibility of credit borrowers entering into an unsustainable indebtedness trajectory.[2]

The aim of this box is to analyze which are the effects of involuntary unemployment on the use of credit in the Brazilian labor market.[3] The analysis is focused on relatively short unemployment episodes, of up to six months, so as to reduce the occurrence of cases of change in occupation before the formal re-employment or permanent income reductions due to the lack of salary for a long time.

To answer the questions under analysis, some methodological issues must be circumvented. Firstly, it is required to define a control group made up of not fired workers with very similar characteristics to those of fired ones. Thus, one may obtain the counterfactual of fired workers and measure with greater plausibility the unemployment effects. The technique used for constructing the control group was the discreet exact matching, which draws for each fired individual a pair that remained employed during the period of observation and had similar characteristics to this individual six months before the unemployment. Individual's characteristics (as gender and age) and employment characteristics (as salary and corporate activity sector), as well as credit variables (as indebtedness) were taken into account.

Secondly, it is necessary to select likely involuntary unemployment episodes to characterize a shock. Despite the fact that the database allows to identify cases for contractual termination by the employer without just cause, a series of additional criteria were used to refine the selection of involuntary unemployment. In particular, those fired and re-employed by the same company were excluded so as to reduce the probability of including cases of collusion between the employee and the employer.[4] Moreover, only workers employed in the same firm for at least two years are considered, thus excluding high turnover labor relationships.[5]

Lastly, one has to be able to follow the trajectory of individuals both in the formal labor market and in the credit market. Data used for this purpose come from the Credit Information System (SCR) of the Banco Central do

1 See Sullivan (2008).
2 See Gathergood (2012).
3 The results presented in this box are included in the project Labor Market Shocks and Consumer Finance: Evidence from Brazil by the researchers Gabriel Garber (BCB), Carlos Eduardo Ladeira (HEC Montreal and Treasury Board and Finance, Gov. of Alberta – Canada), and Renata Narita (PUC-RJ).
4 See Van Doornik *et al*. (2023).
5 In addition, only urban employees of the private sector with open ended contracts were considered. Only individuals in the age range from 23 to 55 years old were maintained, so as to characterize a high adherence to the labor market.

Brasil (BCB) and from the Annual Social Information Report (RAIS) of the Ministry of Labor and Employment. The unemployment episodes analyzed occurred from July 2014 to June 2018.[6] Information regarding formal employment and credit use were followed for 37 months, of which 18 before and 18 after the firing month.

Sample and comparison among groups

In the observed period, there is nearly 566 thousand individuals facing unemployment episodes with the characteristics selected for this study. For 48% of these unemployment episodes, it was possible to find a match, i.e., an individual that continued employed for the entire observation period and with the same characteristics of the fired workers. Of these, a sample of 25% was drawn with the purpose of computational efficiency. Therefore, the analyzes presented were carried out with a sample of 135 thousand observations by period, comprising 67.5 thousand observed unemployment episodes and their 67.5 thousand pairs that continued employed. In terms of the temporal dimension, the final sample contains nearly 5 million observations.

The size of the firm from where the worker is fired heavily influences the longer-term consequences of the short-term unemployment. This is possibly related to differences, between small and large firms, of labor conditions, especially earnings. With the aim of obtaining groups of similar size, the median of this measure was calculated six months before the firing, weighted by the number of employees, which led, before the matching, to the separation between workers at firm with up to 97 employees and workers at firms with 98 employees or more. The comparison between fired workers by companies above and below this median indicates that workers of larger companies have a 11.9 p.p. lower probability of being women, 8.5 p.p. of having complete graduation, and gain nearly BRL 1 thousand more before firing than those of smaller firms.

Empirical approach

The empirical strategy employed is an event study, according to equation (1). It measures the effect of the firing on the salary, use of credit, and delinquency by comparing fired workers with those of the control group 18 months earlier and 18 months after being fired. In this equation the individuals are indexed by i, and the time, in months, is indicated by the indexes t and k. Whereas t measures the calendar months, k measures in relation to the firing month ($k = 0$). Negative values represent the months before the firing, while positive ones represent subsequent periods. The first term of the equation measures the effect of interest (δ_k), of belonging to the group of fired workers ($fired_i = 1$), on a dependent variable Y_{it} in each period k. For this, the equation controls by average values obtained in the control group in each k (θ_k), by the effect of the calendar months (γ_t), which captures the macroeconomic effects that are common to the groups, and by and effect of the individual himself (α_i) that absorbs all his characteristics without temporal variability. The specification requires the choice of period for equaling the groups, which is done six months before the unemployment ($k = -6$), when it is supposed that it is too early to the occurrence of anticipation effects related to the employee's firing.

$$Y_{it} = \sum_{\substack{k=-18 \\ k\neq -6}}^{18} \delta_k 1(t - t_i^* = k) \times fired_i + \sum_{k=-18}^{18} \theta_k 1(t - t_i^* = k) + \alpha_i + \gamma_t + \varepsilon_{it} \quad (1)$$

For the unemployment effects related to values of k after -6 to be considered valid, the existence of a parallel trend between the fired and control groups is required. This is confirmed if there are no statistically significant effects of firing before -6. The results presented below, where this validity can be checked, unfold this specification to differentiate the effects on the groups of workers of larger and smaller companies.

6 This interval was defined in view of the availability of data on an administrative dataset from 2013 on and by the exclusion of the period starting in 2020, due to the Covid-19 pandemic.

Effects on salary, consumption, and credit use

Graph 1 shows the effect of unemployment on the salary. The month zero represents the unemployment month. As the goal is to capture the effect of income loss while the worker is unemployed, the salary is considered to be zero until the individual is re-employed. The fall in salaries is higher for individuals fired from larger firms during the unemployment episode than that of those fired from smaller firms, which is consistent with the salary difference between groups. Furthermore, individuals fired from smaller firms recover the initial salary level after the unemployment episode, while those of larger firms tend to be re-employed with salaries around 20% lower than the initial level. In addition, this group presents a downward salary trend when measured in relation to their not fired pairs. Therefore, for the group of fired individuals of larger firms, there is a lasting effect of firing on the salary level.

For measuring the indebtedness, credit categories without specific purposes are selected, mostly in the consumer segment,[7] aggregating the modalities linked to credit cards, overdraft facility, and personal credit (payroll and non-payroll-deducted).

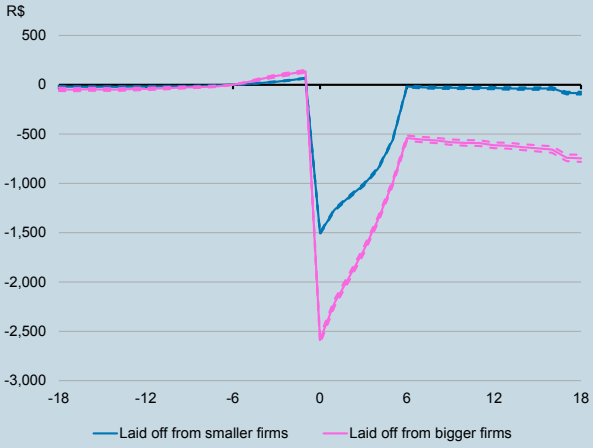
Firstly, one verifies that workers from both groups – but especially from smaller companies – tend to increase indebtedness in the months immediately before firing (Graph 2). A possible cause for this is that part of them is aware of firing before creditors, using the opportunity to obtain better financing conditions while still employed. This effect is statistically significant in all periods from -5 to -1 for the group of fired workers of smaller firms, reaching 7.3%[8] in the period -2. As for the group from larger firms, the effect is statistically significant only in the period -3.

In the months subsequent to firing, both groups present significant reductions in the indebtedness values. This effect is possibly due to a combination of the amortizations allowed by greater liquidity from the Employment Compensation Fund (FGTS) and the penalty fine, coupled with the lower availability of some credit lines in relation to the control group. This reduction is noticeably relevant for the fired group of larger firms, in which the credit decline reaches 55.3% in the month subsequent to firing.

In a third moment, the indebtedness resumes growth as workers are re-employed, but this trend is reverted for the fired group of larger firms. Thus, at the end of the period, quite uneven situations are observed for both groups. Fired workers from smaller firms, which obtained salary recomposition (and even lower reductions of disposable income, probably due to the wider coverage of the unemployment-insurance in terms of salary percentage), end up with debt 27.4% larger than what they had six months before firing. Conversely, for fired workers of larger firms, which had a more prolonged income reduction, the credit reduction was 44.7%, in the same comparison basis.

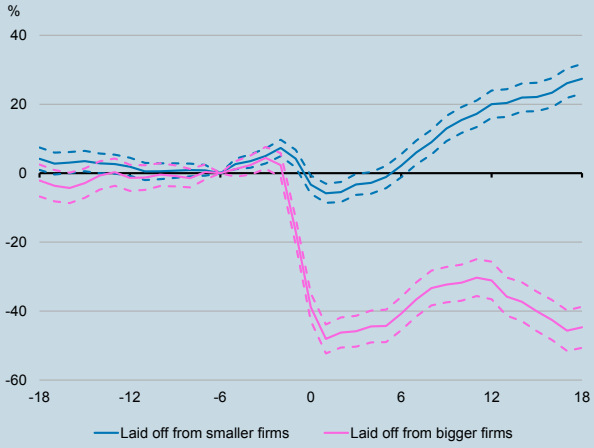
7 This excludes, for instance, mortgages and vehicles financing, which are targeted to the purchase of specific goods that are also used as collaterals.
8 The dependent credit variables were used in the form ln (1+balance), thus allowing to calculate the average percentage change with the inclusion of individuals with a zero balance.

Graph 1 – Effects on wages
Change compared to 6 months before dismissal



/ Values adjusted by IPCA to June 2018 reais.
Dotted lines represent 95% confidence intervals.

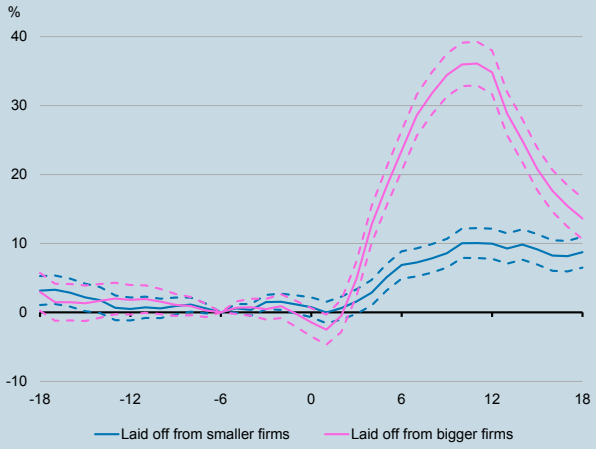
Graph 2 – Debt for consumption
Change compared to 6 months before dismissal



/ Dotted lines represent 95% confidence intervals.

In cases of negative income shock, the probability of payment of debts decreases. Nevertheless, as already observed, firings are followed by a process of indebtedness reduction with a possible opposite effect. It is noteworthy that these movements might impact different groups of individuals. Graph 3 presents the effects of firing on delinquency (measured by over 90 days past due loans). Both groups show increased defaulted values, with peaks between 10 and 11 months after the firing. Part of the observed reversion after this seems to be caused by the reclassification of operations as losses.

Graph 3 – Default
Change in relation to 6 months before dismissal



/ Dotted lines represent 95% confidence intervals.

Discussion

This box studied the effects of short-term unemployment shocks on the use of credit. The size of the firm from where the worker is fired seemed to be the key variable for explaining the dynamics of the use of this tool for smoothing the shocks, since the size of the firm is correlated with the salary loss and, possibly, with other employment characteristics.

Borrowings from workers of smaller firms are higher in the periods immediately before firing. This increase is reverted during the unemployment period, but, as of the sixth month, when all the workers in the sample are re-employed, the indebtedness starts an upward trend, followed by higher delinquency. In this research agenda, the main question is: what is the reason for the increase of indebtedness in a longer horizon, since this group of workers is re-employed at a salary condition similar to that previously to the unemployment?

On the other hand, workers from larger firms have a process of adjustment in the use of credit to lower income levels after the re-employment. Therefore, there is a strong initial reduction of indebtedness, possibly helped by resources from contractual termination fines. At the same time, there is strong increase of delinquency. For this group, the questions to be surveyed are different: does the increase of delinquency reach those individuals that reduced the initial indebtedness level or are there different sub-groups of individuals? And, if these groups are different, what determines the prevalence of each phenomenon?

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Box 2 – Judicial discretion and the supply of bank credit

Introduction

Effective protection of creditors is a fundamental factor for the development of credit markets. Laws and institutions that ensure the enforcement of contracts reduce risks related to the recovery of collaterals and create incentives for compliance. This box investigates whether the supply of bank credit is affected by a judicial environment that is more or less friendly to the creditor. This was achieved by a random distribution of cases among judges within a jurisdiction. The assumption is that banks would adjust the corporate credit supply according to the perceptions built over time regarding the performance of the local judiciary. In places where the bank perceives that the judiciary tends to be more beneficial to the debtor, it tends to offer less credit.

Institutional framework

The analysis focuses on the performance of the first-instance state courts of São Paulo and the top four financial conglomerates operating in Brazil – excluding Caixa Econômica Federal, because the cases it participates fall under federal jurisdiction.

During the study period, the state judiciary of São Paulo was organized into 319 districts, encompassing 615 municipalities. Typically, each district has a court that may contain one or more divisions. Divisions are branches corresponding to a judge's jurisdiction, and when there is more than one division responsible for cases of a certain legal nature, the distribution among them is random.

The random distribution of cases to different judges within the same district is the variation used to identify the effect of the financial conglomerates' perception of the local judiciary. The difference in information received among conglomerates[1] – generated by the judgments in which they participate – constitutes different perceptions regarding the average behavior of the local judiciary. The way financial conglomerates react to this informational shock, and the transmission to their related companies, is the object of analysis for the remainder of the study.

Data

The data sources for this analysis are the first-instance judgments of the São Paulo State Court of Justice (TJSP) and the credit contract information from the Credit Information System (SCR) of the Banco Central do Brasil (BCB). The sample period is from 2013 to 2018.

1 Whenever the term "conglomerate" is used in this box, it refers to financial conglomerates.

From the TJSP's database of judgments,[2] judicial decisions were collected for cases classified as "common civil procedure" related to credit contracts involving individuals and legal entities. Subsequently, these cases were classified according to whether the plaintiff's request was granted or not. For classification, regular expressions were used to identify in the text whether the plaintiff's request was granted. Information such as case number, party names, date, presiding judge, and district was also extracted, and, finally, cases in which defendants were BCB's authorized financial institutions, were selected. From a total of 339,671 cases, it was possible to identify specific actions against financial companies of the top four financial conglomerates in Brazil, accounting for two-thirds of the database. Information related to the four identified conglomerates was aggregated at the district, by quarter and conglomerate levels. The variable of interest resulting from this process is the proportion of pro-debtor decisions observed by a financial conglomerate in a given district in a quarter.

Data from the SCR of the BCB were used to extract information related to credit contracts for legal entities originated by financial institutions linked to the four conglomerates identified in the judicial database. Information regarding the volume of credit granted and the average interest rate of new contracts were aggregated at the level of the borrower's municipality, quarter, and conglomerate. Since each municipality corresponds to a single district, both databases were merged through the unique identification of district-quarter-conglomerate and municipality-quarter-conglomerate.

Methodology

The reasoning for this work is that financial conglomerates learn about the judiciary pro-debtor bias from the outcomes of their cases. The aggregated bias of judges observed by each financial conglomerate was used as a measure of judicial behavior within the same district. Since the distribution of cases among local judges is random, different financial conglomerates may face more or less lenient judges and infer the average behavior of the local judiciary on a different way, given a limited set of rulings. Thus, the following measure of a judge's pro-debtor bias is proposed, as well as the bias observed by each conglomerate in each district and quarter.

$$B_{jbct} = \frac{\sum_{n=1}^{n_j} PD_n - PD_{jbct}}{n_j - n_{jbct}}$$

$$V_{bct} = \frac{\sum_{k=1}^{J} B_{kbct}\, n_{kbct}}{\sum_{k=1}^{J} n_{kbct}}$$

For each observation of a judge's decisions (j) related to a given financial conglomerate (b), district (c), and quarter (t), the average pro-debtor decisions issued by that judge in the entire sample (PD_n) were calculated, excluding the decisions of the respective observation identified by judge-financial conglomerate-district-quarter (PD_{jbct}). The total number of decisions by the judge is n_t. B_{jbct} represents the measure of each judge's pro-debtor bias participating in the decisions compiled in the database described in the previous section, and V_{bct} is the bias observed by each conglomerate.

Since each financial conglomerate observes the decisions of several judges in a district and quarter, each judge's bias is aggregated by the proportion of decisions issued in the total sentences observed by the financial conglomerate. The variable V_{bct} represents this aggregation, resulting in an observation at the conglomerate-district-quarter level of the judicial bias faced by the conglomerates.

2 Available at www.https://esaj.tjsp.jus.br/cjpg/ (Portuguese only).

After constructing the measure of bias observed by financial conglomerates, which was used as an instrumental variable for the proportion of pro-debtor decisions, the following two-stage model were estimated:

$$\log(\text{pro-debtor}+1)_{b,c(m),t} = \delta_t + \rho_{c(m),y(t)} + \pi \log(\text{V}+1)_{b,c(m),t} + \mu_{b,c(m),t} \quad (1)$$

$$y_{b,m,t+1} - y_{b,m,t} = \phi_t + \zeta_{c(m),y(t)} + \Theta \log(\text{pro-debtor}+1)_{b,c(m),t} + \eta_{b,m,t} \quad (2)$$

Equation (2) represents the second stage of the estimation, where the dependent variable is the difference between the subsequent quarter and the observation quarter at the financial conglomerate-municipality level, and the explanatory variable is the logarithm of the proportion of decisions observed by the financial conglomerate in a given district and quarter. The first stage corresponds to the regression of the explanatory variable of the second stage against the logarithm of the bias measure observed by the financial conglomerates. Both equations include quarter fixed effects that capture common shocks to all financial conglomerates in the period (e.g., macroeconomic conditions) and district-year fixed effects. This second set of fixed effects is added in view of the random distribution within the same district, and the interaction with the year captures possible changes in the composition of cases and allocated judges. Thus, the variation that identifies the estimator is the quarterly difference in the dependent variable influenced by the variation in the proportion of pro-debtor decisions generated by judges with different levels of bias within the same district in the same year.

A very similar model specification will be used to analyze the transmission of the judicial shock to legal entities with a credit relationship with the financial conglomerate, but at the firm level. The assignment of treatment to the firm will be given by the quarter in which a contract with a specific financial conglomerate expires – the purpose is to minimize self-selection issues. Firms with short-term credit supply are more likely to need to renew contracts quickly, and the inability to renew, or renew under less favorable terms, can negatively affect the performance of these companies. Since the number of contracts maturing in a given period and region is endogenous to the financial conglomerates' responses to judicial behavior, this specification also includes a fixed effect for conglomerates.

Results

The results at the financial conglomerate level of the model estimation presented in the previous section are shown in Table 1 and explained in the next paragraph. The first column presents the results when the dependent variable is the difference in the logarithms of the value of credit contracts originated in each quarter, and the second when the dependent variable is the difference in the average interest rate of contracts in each quarter.

Table 1 – Effect of pro-debtor decisions on credit and interest rates

	Δ log(new loans)	Δ interest rates
Panel A: OLS		
log(pro-debtor)	-0.010	0.011
	(0.041)	(0.015)
Panel B: 2SLS		
log(pro-debtor)	-2.300***	0.755**
	(0.850)	(0.374)
Panel C: Reduced form		
log(bias)	-0.569***	0.186**
	(0.179)	(0.081)
Panel D: First stage		
	log(pro-debtor)	
log(bias)	0.247***	0.246***
	(0.059)	(0.059)
F statistic	[69.4]	[67.9]
FE year-district	YES	YES
FE quarter	YES	YES
Observations	32,892	32,400

Note: Standard deviations were clustered at the judicial district level. * p < 0.1; ** p < 0.05; *** p < 0.01.

Panel A presents the result for the simple correlation model between pro-debtor decisions and changes in credit supply, while Panel B presents the result for the two-stage estimation using the judicial bias faced by financial conglomerates as an instrument for the proportion of negative decisions observed. One observes, from the Panel A results, that only the proportion of decisions against the conglomerate is not informative to the external observer regarding their reaction. This happens because one cannot observe all the characteristics of the cases potentially influencing the outcome. Conversely, the first column of Panel B shows that financial conglomerates reduce credit supply when they realize a great deal of pro-debtor decisions for involving judges more lenient with debtors. These results demonstrate that financial conglomerates learn about the local judiciary behavior through the court decisions of cases in which they participate. Still regarding Panel B, the second column shows that the effects of this judicial shock can be observed on the interest rates of new contracts. Based on the volume of new credit granting, the estimated value of -2.3 can be interpreted as a relative reduction of 23 p.p. in the growth rate of new contracts caused by a 10% increase in the proportion of pro-debtor decisions observed by the conglomerate.[3] The proportion of pro-debtor decisions in the sample is 41%. A 10% increase corresponds to an increase around 4 p.p. in the proportion of pro-debtor decisions observed by financial conglomerates. Similarly, the estimated value of 0.75 in the second column corresponds to a 7.5 p.p. increase in the annualized interest rate of new contracts in view of an increase in pro-debtor decisions of the same proportion. Panels C and D present the results for the reduced version of the model and for the first stage. Both estimations confirm the validity of the instrument, conditional to the exclusion restriction being met. This final assumption of the model is not verifiable but plausible given the discussed institutional framework.

3 The result is a reduction of 23 p.p. in the growth rate of new contracts between quarters t and t+1. Quarter t is when the conglomerate observes the court decisions, and t+1 is the subsequent quarter. The magnitude of the result is likely due to the fact that smaller districts have greater variation in the instrument. In these places, there are few new substantial contracts each quarter. Thus, if the treatment reduces the number of new contracts to almost zero, the growth rate may be substantial.

Table 2 shows evidence of the transmission of the judicial shock effect on financial conglomerates to firms with which they have credit relationships. By using only contracts with a maturity of less than 12 months, it is defined that the shock transmitted to the firm is that received by the financial conglomerate in the quarter prior to the maturity of its credit contracts. The purpose of selecting firms with short-term credit is that the renewal of these credits is potentially more crucial to the company's ability to continue operating, restricting the firm's decision to either an immediate renewal or a search for another financial conglomerate.

Table 2 – Effect on credit for corporates with credit relationship

	Δ log(new loan)				y=1 (new loan)
	(1)	(2)	(3)	(4)	(5)
log(pro-debtor)	-0.295	-0.548	-1.144**	-1.345***	-0.099**
	(0.392)	(0.431)	(0.485)	(0.483)	(0.045)
FE disctrict-level	YES	YES	YES	YES	YES
FE fin. conglo.	YES	YES	YES	YES	YES
FE quarter	YES	YES	YES	YES	YES
Observations	1,099,610	874,485	678,837	603,865	603,865
Subsample	Complete	1 Fin. Conglo	SME	1 Fin. Conglo., SME	1 Fin. Conglo., SME

Note: SME stands for Small and Medium-sized Enterprises. 1 Fin. Conglo. refers to firms with only one banking relationship. Standard deviations were clustered at the judicial district level. * p < 0.1; ** p < 0.05; *** p < 0.01.

The number 1.144 in column (3) indicates that firms with debts maturing in the subsequent quarter experience a proportional reduction of 11.44 p.p. in the value of new credit contracts if their financial conglomerates observe a 10% increase in pro-debtor results from lawsuits judged by pro-debtor judges. Comparing columns 1 and 2 with 3 and 4, one can observe that small companies take on less credit with financial conglomerates that suffer negative judicial shocks in the quarter prior to the maturity of their contracts. These results indicate that the effect is concentrated on small and medium-sized enterprises.

Column 5 of Table 2 uses a variable that assumes the value of 1 when a new contract is observed between the firm and the same conglomerate in t+1. The estimated coefficient indicates a reduction of about 1% in the probability of firms taking on a new credit contract when they have a contract maturing in the quarter subsequent to the conglomerates observing of a 10% increase in pro-debtor decisions induced by pro-debtor judges.

Conclusion

This box discussed the impact of pro-debtor judicial decisions on credit supply. Conditional on similar laws and other institutional frameworks, financial conglomerates credit supply is lower when they realize a less favorable judicial environment. The heterogeneity of the judges' biases generates exogenous variation in the outcomes of lawsuits in which financial conglomerates are involved, allowing to identify how they react when realize a greater proportion of negative results in their legal disputes.

It also shows how these negative shocks to financial conglomerates impact other firms with which they have credit relationships, extrapolating the simple dispute between the parties involved in the process. The deterioration in the conglomerates' perception about the quality of their rights protection effectively leads to a reduction in their credit supply. The consequences of these effects extrapolate the parties in dispute, making it essential to understand how current regulations are applied in the resolution of judicial conflicts.

Box 3 – Payment institutions: business models and compensation of payment services[1]

Payment institutions (IP) have become increasingly relevant in the national financial system due to their growing market share in the payments sector, while also contributing to the promotion of financial inclusion by providing easier access to payment services to a wide range of financial service users. This box discusses how recent regulatory changes in the financial and payment systems have influenced the emergence of new business models and the search for conglomerate structures that promote economic efficiency.

According to BCB Resolution 80 of March 25, 2021, there are four types of payment services subject to authorization by the BCB:

i. Electronic Money Issuer (EME): a payment institution that manages a prepaid payment account for end users, providing payment transactions involving payments or transfers based on electronic money previously deposited into that account. Converting such funds into physical or scriptural money, or vice versa, it can enable the acceptance of electronic money with settlement in a payment account it manages, commonly referred to as a prepaid issuer (or debit card issuer) or an electronic money wallet (e-wallet).

ii. Postpaid Payment Instrument Issuer: a payment institution that manages a postpaid payment account for end users, allowing payment transactions based on this account, commonly known as credit card issuer.

iii. Acquirer: a payment institution that, without managing a payment account, a) enables payees to accept payment instruments issued by a payment institution or a financial institution participating in the same payment arrangement; and b) participates in the payment transaction settlement process as a creditor to the issuers referred to in items i and ii, according to the rules of the payment scheme.

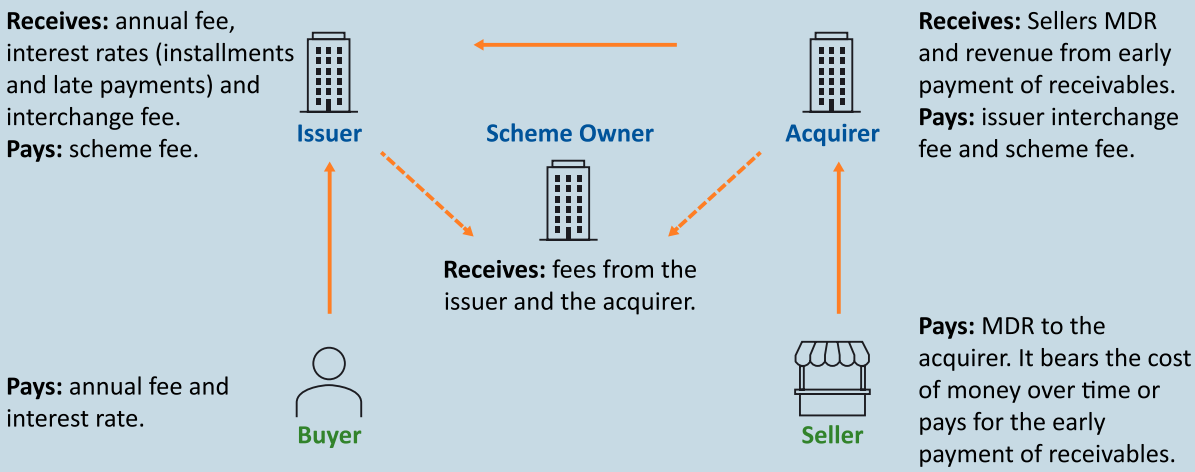
iv. Payment Initiation Service Provider, also known as PISP: emerged from one of the phases of Open Finance,[2] as a system that aims to open up and integrate financial services in Brazil. It is a payment institution that provides payment initiation services: a) without managing a payment account; and b) without holding, at any time, the funds transferred when providing the service.

The compensation structure for these services, according to the main payment types authorized by the BCB, is outlined in Figure 1.

1 This box deals with authorized payment schemes. A payment scheme is a set of rules and procedures for making purchase payments, enabling fund transfers, deposits and withdrawals, as well as any other service that can be defined as a payment service to the public. It should be noted that the BCB does not authorize neither Payment Schemes Owners (IAP) nor their administrators.

2 Open Finance means the possibility for customers to share their registration and transactional data among institutions authorized to operate by the BCB, as well as to access payment-related services and credit operations within the payment ecosystem, see https://www.bcb.gov.br/estabilidadefinanceira/openfinance (Portuguese only).

Figure 1 – Compensation structure of payment services operating as two-sided markets



To eliminate regulatory asymmetries between financial conglomerates led by financial institutions and those led by payment institutions, the BCB published Resolution 197 of March 11, 2022, which established a classification for prudential conglomerates into three distinct types: Type 1, Type 2, and Type 3 (see definitions in Annex 1) and adjusted the capital requirements, both quantitatively and qualitatively, to absorb unexpected losses.

This box will focus only on Type 2 and Type 3 conglomerates, which are the types led by payment institutions, on the base date of December 2023, hereinafter referred to as IP.

Interchange Fee (TIC)

Within the scope of the BCB, TIC is defined by BCB Resolution 246 of September 22, 2022, as: (i) compensation paid by the acquirer to the payment instrument issuer for each transaction within the payment scheme; and (ii) any other form of compensation for the payment instrument issuer within the scheme, with an equivalent purpose or effect, whether paid directly by the payment scheme owner, the acquirer, or any other intermediary in the payment transaction.

MDR

Merchant Discount Rate (MDR)[3] is the discount rate charged to sellers when carrying out a credit or debit card transaction, by acquirers. This discount rate is negotiated between the acquirer and the seller contractually, which considers the TIC and other costs of the acquirers (including the payment scheme fees), plus the acquirer's profit margin.

Table 1 shows that 76.5% of the IPs are classified as Type 2 prudential conglomerates and, in their case, revenue from payment services is proportionally divided into revenue due to early payment discount and gross MDR. For IP classified as Type 3 prudential conglomerates, this revenue comes primarily from gross MDR. It is noteworthy that, in the IP market, Type 2 conglomerates have fewer funding sources (mainly equity) and rely on scale (high transaction volume) to generate positive results.

3 MDR is negotiated between the parties and influenced by the interchange fee.

Table 1 – Share of payment revenue by type – 2023

	Ips quantities	Advance receipt	MDR brut
		%	%
Type 2	62	51.1	48.9
Type 3	19	2.0	98.0
Total	81		

Payment Scheme Fee

The IAP, also known in the card payment world as “brands”, sets up a payment scheme. The participants (financial and payment institutions) pay them a fee typically proportional to the amount transacted within the payment scheme. This fee is part of the MDR calculation, but is not analyzed in this box, since the focus of the analysis is on IP (Type 2 and Type 3 conglomerates).

Interest income on government securities purchased by electronic money issuers to safeguard balances held in customer accounts

EME must allocate funds held in their customers’ payment accounts exclusively: (i) in cash in the Electronic Money Correspondent Account (CCME) held by the issuer at the BCB, or (ii) in federal government securities in the Special System for Settlement and Custody (Selic), with the respective yields. This requirement aims to mitigate liquidity risk for funds recorded in electronic money.

Early payment of receivables[4]

As of June 7, 2021, CMN Resolution 4,734 of June 27, 2019, and BCB Circular 3,952 of June 27, 2019, later revoked by BCB Resolution 264 of November 25, 2022, came into force, establishing conditions and procedures for discount and credit operations guaranteed by receivables, present (constituted) or future (to be constituted), related to payment obligations, through registration with trade repositories.

All amounts from sales made with payment cards must be registered in trade repositories, certifying the existence and uniqueness of these receivables, as well as making it possible to establish encumbrances and liens on these receivables. Trade repositories, whose systems are authorized and supervised by the BCB, provide the interface for potential lenders to access sellers' receivables schedules and potentially offer them credit, using their receivables as collateral.

Acquirers can offer early payment of receivables (prepayment of liabilities) to sellers, usually with a discount. Additionally, acquirers can sell their receivables or negotiate an early payment from issuers to obtain funds to be anticipated to sellers.

4 Operation in which the IP anticipates the payment of its future obligation to the end user (seller). Early payment of receivables carried out by acquirers authorized to operate by the BCB are not considered prohibited operations.

ITP Compensation

ITP compensation depends on the business model. Revenue can come from a fixed or variable fee per transaction, which can be paid by the end user or the payment recipient, and from compensation paid by the IP or platforms benefiting from the increased transactions' volume generated by ITP.

To expand their service offers and revenue sources, many IP have started to set up financial institutions and/or investment funds as subsidiary companies.

Table 2 – Evolution of the volume of financial transactions of IPs by type and in relation to the total SFN

	Acquirer			Prepaid			Postpaid		
	Type 2	Type 3	In relation to the total SFN	Type 2	Type 3	In relation to the total SFN	Type 2	Type 3	In relation to the total SFN
	R$ billions	R$ billions	%	R$ billions	R$ billions	%	R$ billions	R$ billions	%
2021	522.2	562.7	41	10.3	103.5	84	6.1	197.8	13
2022	627.6	850.6	44	19.7	189.4	82	10.1	310.3	15
2023	696.5	990.7	46	28.1	213.9	74	16.7	408.5	18

Table 2 shows the importance of IP-led conglomerates in the issuance of postpaid payment instruments and electronic money (prepaid) and acquirement within the financial and payment systems. The significant participation of IP in the prepaid card market is noteworthy, although decreasing (74% of the total in the National Financial System). In acquirement activities, the participation of these conglomerates has been growing, accounting for 46% of the total volume. In postpaid issuances, the participation is lower, though increasing, reaching 18%.

Evolution of the payment institutions market organization

The dynamism observed in the payment institutions market in recent years has been driven by various factors. Revenue tends to increase with scale gains, and competition is a relevant variable in determining service prices.

An IP seeking new sources of compensation through the diversification of services and products ends up migrating from a Type 2 conglomerate structure, focused solely on payment services, to a Type 3 conglomerate. This transition provides them access to more funding options, such as Bank Deposit Certificates (CDB) and investment funds, as well as revenue from providing services and offering products other than payment services.

The main impact of this change is the compensation from liability prepayments, which, for Type 2 conglomerates, accounts for 51% of total payment revenues and have equity as their main funding source (Table 1). For Type 3 conglomerates, such revenues represent only 2% of payment revenues.

There is a trend for Type 2 conglomerates that choose to offer a wider range of financial products and services, diversifying their revenue sources, to adjust their business models to include activities typical of financial institutions. Recent improvements in the regulatory framework accommodate market evolution, allowing migration between conglomerate types in line with the development of the IP business model. In this context, the IP of Type 2 conglomerates that migrated to Type 3 have preserved the core of providing payment services and added new financial products and services, as well as new funding options.

Annex 1

Classification by Type of Conglomerate

Type 1: a prudential conglomerate whose leading institution is a financial institution, or another institution authorized to operate by the BCB, according to Law 4,595 of December 31, 1964; commonly referred to as banking conglomerates. A financial institution or other institution subject to Law 4,595/64 that provides payment services and does not belong to a prudential conglomerate, will also be classified as Type 1. This conglomerate may be classified in segments S1 to S5.

Type 2: a prudential conglomerate whose leading institution is a payment institution and that does not include a financial institution, or another institution authorized to operate by the BCB according to Law 4,595/64. It is typically composed only of independent payment institutions. This conglomerate may be classified in segments S1 to S5.

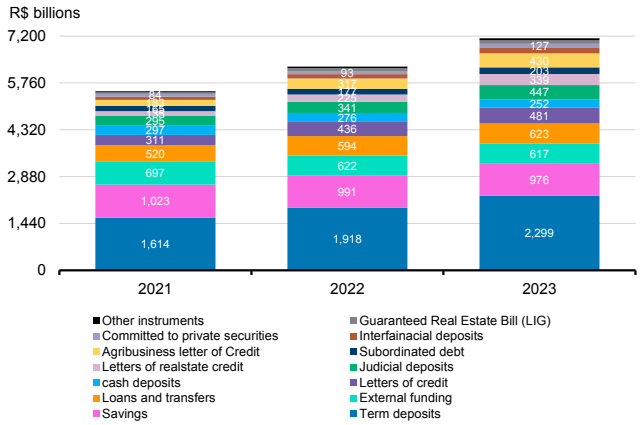
Type 3: a prudential conglomerate whose leading institution is a payment institution and that includes a financial institution, or another institution authorized to operate by the BCB according to Law 4,595/64, commonly observed in business models where payment-related activities are the main activity of the conglomerate. This conglomerate may be classified in segments S2, S3, S4, or S5.

Funding

2

2.1 Funding profile by instrument types

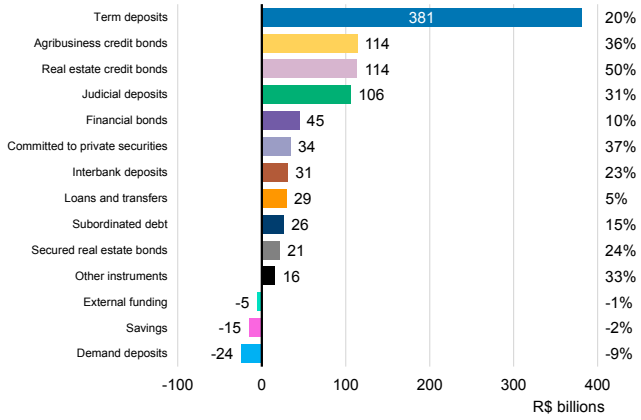
Graph 2.1 – Funding profile by instrument
Banking system



Sources: BCB, B3

/ Term deposits: bank deposit certificates, bank deposit receipts, term deposits with special guarantee from the Credit Guarantee Fund (FGC). Subordinated debt: bank deposit certificates with subordination clause, financial bills with subordination clause and instruments eligible for capital composition. Other instruments: COE, bills of exchange, mortgage bills, box operations. Repurchase agreements: only repurchase agreements with private securities.

Graph 2.2 – Fundraising instruments – Changes in stocks
December 2022 to December 2023



Sources: BCB, B3

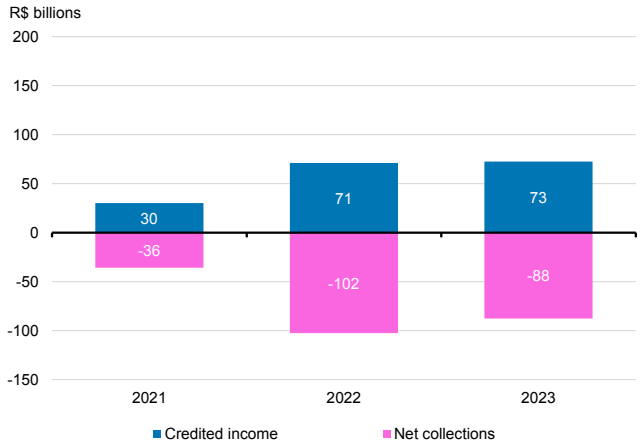
/ Term deposits: bank deposit certificates, bank deposit receipts, term deposits with special guarantee from the Credit Guarantee Fund (FGC). Subordinated debt: bank deposit certificates with subordination clause, financial bills with subordination clause and instruments eligible for capital composition. Other instruments: COE, bills of exchange, mortgage bills, box operations. Repurchase agreements with private securities: only repurchase agreements with private securities.

Funding maintained the upward trend observed in recent years The pace of expansion in the banking system's funding stock in 2023 (13.9%) was similar to that of 2022 (13.7%) (Graph 2.1). This expansion was impacted by positive net funding, signaling greater propensity to the accumulation of bank funding instruments by economic agents, despite the decline of the Selic rate level as of August 2023 (effective values fell from 13.65% p.a. to 11.65% p.a. in the year).

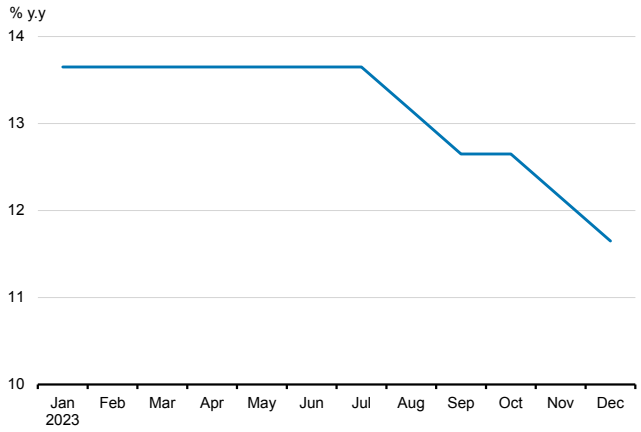
Funding expansion was driven by the favorable performance of term deposits and by the high attractiveness of tax-exempt instruments Term deposits stand out among the instruments with positive growth in absolute terms, with an increase of BRL 381 billion (Graph 2.2). In relative terms, there was strong growth – similar to what happened in 2022, but to a lesser extent – in Agribusiness Credit Bills (LCAs), Real Estate Bills (LCIs), and Guaranteed Financial Bills (LIGs). These instruments are attractive to clients due to their profitability and exemption from household Income Tax (IR) and represent lower financial costs to banks.

Savings accounts continued on a downward trend, while repurchase operations improved in the period. In 2023, similarly to 2022, savings and demand deposits showed a negative performance. As for savings accounts, even though net funding declined less than in 2022, it still registered a negative value of BRL 88 billion in 2023. In terms of balance, negative net inflows were to a great extent offset by accrued earnings (Graph 2.3). The performance of savings accounts is sensitive to the macroeconomic scenario in which the Selic rate is higher than the return on savings. It should be also mentioned the strong expansions, higher than in 2022,

Graph 2.3 – Savings accounts
Breakdown of stock variation

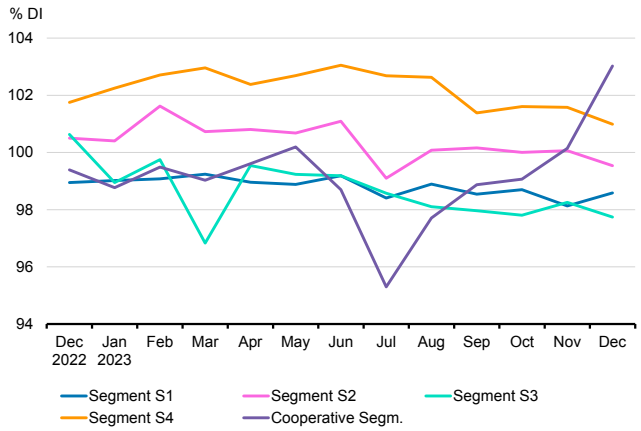


Graph 2.4 – Evolution of the average fixed rate (overnight) of the DI



Sources: B3

Graph 2.5 – Average monthly fundraising rates as a percentage of DI by segment



Sources: BCB, B3

/ Weighted average rate of the following instruments: bank deposit certificates, bank deposit receipts, term deposits with special guarantee from the Credit Guarantee Fund (FGC), interbank deposits, agribusiness letters of credit, real estate letters of credit, financial letters (including those with a subordination clause), guaranteed real estate letters.
/ In this report, the cooperative segment includes only cooperative banks (which are part of the b1 or b2 macro-

of repurchase portfolios with private securities – largely backed by debentures – and court-ordered deposits, the latter influenced by the higher value released for court-ordered payments in 2023 than in 2022.

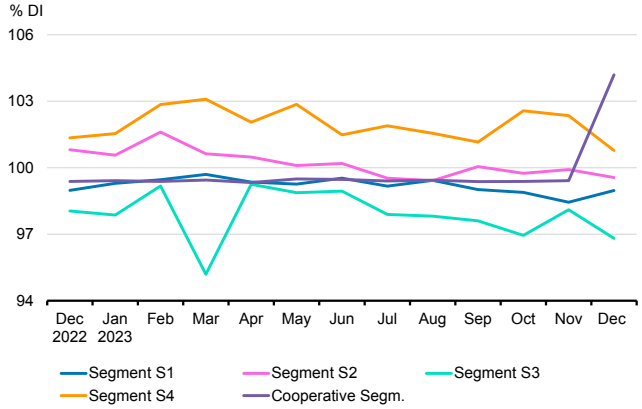
2.2 Funding rates

Despite slight oscillations, the funding rates of segments S1 to S4 remained similar, around 100% of the Interbank Deposit Certificate (CDI). A relevant component of the funding cost is the Interbank Deposit (DI) rate, which, in turn, is associated with the Selic rate. As of the second half of 2023, Copom started a new monetary easing cycle, leading to a decline in the DI (Graph 2.4). The average funding rate of the S1 segment remained at around 99% of the DI rate. A slight downward trend was observed in segments S2 to S4 in 2023, with higher volatility than in S1. As for the credit union segment – considering only those of the b1 or b2 macro segments, rates registered higher volatility, with a stronger upward trend as of the second half of the year (Graph 2.5).

Funding rate spreads of Bank Deposit Certificates (CDBs) did not vary significantly throughout the year, with a slight downward trend, except for cooperative banks. Concerning CDBs, the average funding rates as a DI percentage remained relatively stable during 2023 for the S1 and S4 segments, with cumulative changes lower than 1% compared with December 2022, while the S2 and S3 segments showed a slight downward trend compared with the same month. Regarding the credit union segment, the average rate of December 2023 registered a higher increase – of around 5% of the DI (Graph 2.6).

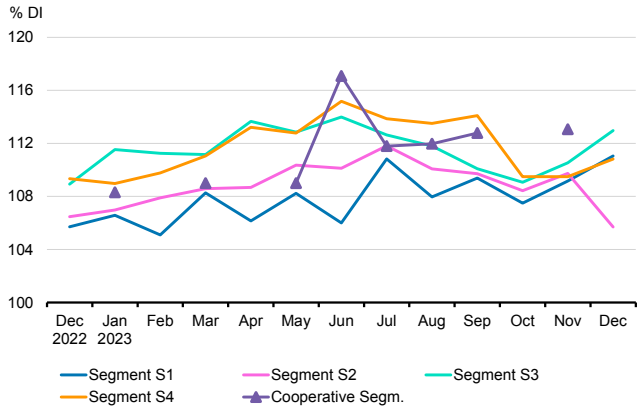
Funding rate spreads of financial bills closed the year with values above those observed in 2022, while those of LCAs and LCIs remained stable. In turn, funding rates as a DI percentage of financial bills with no subordination clause (securities that raise long-term funding) ended the year with higher averages than those of December 2022 for all segments but S2. Conversely, higher volatility was observed in average rates for all segments (Graph 2.7). For LCAs and LCIs (Graph 2.8), volatility also increased for all segments, despite small changes in average rates in the end of 2023 – except for the credit union segment, for which an almost 3% decline was observed in the same period.

Graph 2.6 – Average collection rates as a percentage of DI by segment
Bank deposit certificates – CDBs



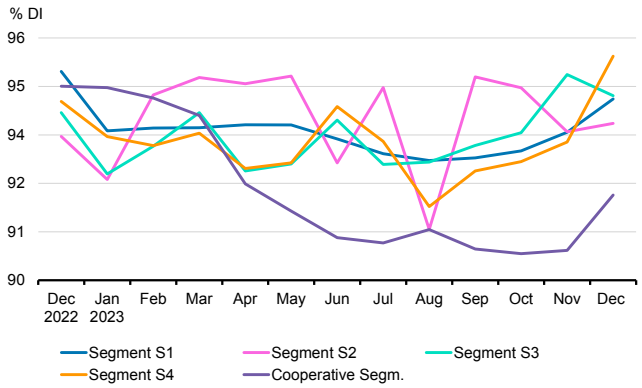
Sources: BCB, B3
/ In this report, the cooperative segment includes only cooperative banks (which are part of the b1 or b2

Graph 2.7 – Average funding rates as a percentage of DI by segment (excluding LFG)
Financial letters without subordination clause



Sources: BCB, B3
/ In this report, the cooperative segment includes only cooperative banks (which are part of the b1 or b2

Graph 2.8 – Average funding rates as a percentage of DI by segment
Agribusiness credit letters (LCAs) and real estate credit letters (LCIs)

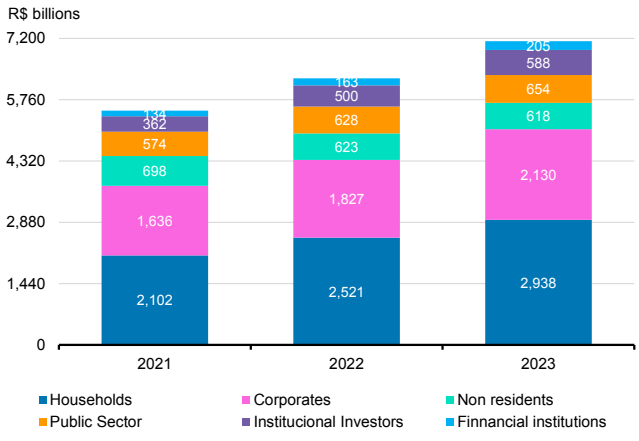


Souces: BCB, B3
/ In this report, the cooperative segment includes only cooperative banks (which are part of the b1 or b2 macro-

2.3 Investor types

Households and companies (not classifiable as institutional investors or non-residents) remain as the main source of funding for the banking system. In December 2023, households and companies not classifiable as institutional investors or non-residents accounted for 71% of the total stock of the banking system's funding stock (Graph 2.9). Non-residents, public sector, and institutional investors complete the relevant banking system's funding sources, with respective shares of around 9%, 9%, and 8%. It is noteworthy in the year the increases of 18% in the stock held by institutional investors and 17% in that held by households and companies not classifiable as institutional investors or non-residents.

Graph 2.9 – Fundraising profile
By investor nature – Banking system



Sources: BCB, B3

3 Credit Cost and Spread Decomposition

Table 3.1 – ICC adjusted average breakdown

p.p.

Item	2021	2022	2023	Average
1 – Funding cost	5.15	6.76	7.55	6.49
2 – Delinquency	2.97	3.67	4.52	3.72
3 – Administrative expenses	3.31	3.07	3.04	3.14
4 – Taxes and FGC	2.53	2.69	2.60	2.61
5 – ICC financial margin	2.26	2.62	2.52	2.47
Adjusted average ICC (1 + 2 + 3 + 4 + 5)	16.22	18.81	20.23	18.42

Graph 3.1 – ICC and its spread

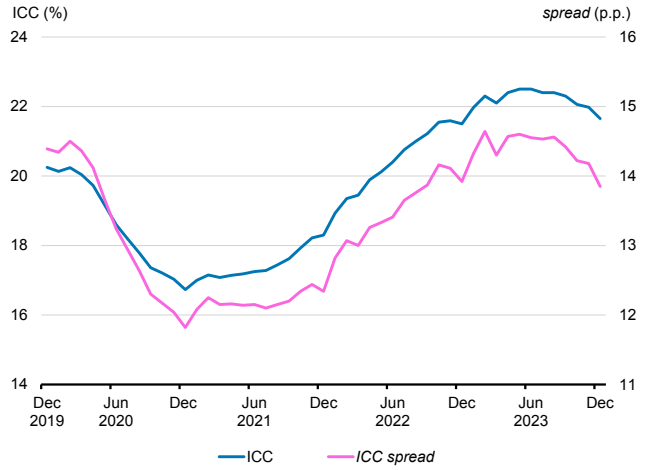


Table 3.2 – ICC adjusted average breakdown

As a proportion of adjusted average ICC

%

Item	2021	2022	2023	Average
1 – Funding cost	31.75	35.94	37.32	35.00
2 – Delinquency	18.31	19.51	22.34	20.05
3 – Administrative expenses	20.41	16.32	15.03	17.25
4 – Taxes and FGC	15.60	14.30	12.85	14.25
5 – ICC financial margin	13.93	13.93	12.46	13.44
Adjusted average ICC (1 + 2 + 3 + 4 + 5)	100.0	100.0	100.0	100.0

Despite the decline in the second half of the year, in 2023 the Average Cost of Outstanding Loans (ICC) was, on average, higher than in 2022, due to increased funding cost and delinquency. The adjusted average ICC increased from 18.81% in 2022 to 20.23% in 2023, with the contributions of funding cost rising from 6.76 p.p. to 7.55 p.p., and delinquency increased from 3.67 p.p. to 4.52 p.p. (Table 3.1).[16] Even though the Selic rate decreased from August 2023, the average rate in the year was higher than in 2022, still reflecting the tightening monetary policy, which resulted in higher average funding cost. The delinquency rate, in turn, rose in 2023. The other factors – administrative expenses, taxes and FGC, and the ICC financial margin – contributed to the ICC reduction, but to a small extent. The ICC increased throughout the first half of 2023 and fell in the second, ending the year at similar levels to those of late 2022 (Graph 3.1).

The order of importance of ICC components remained stable, with funding cost at the first place, followed by delinquency, administrative expenses, taxes and FGC, and, lastly, the ICC financial margin. Funding cost and delinquency have been the main ICC components, with their respective shares in the 2023 ICC increasing to 37.3% and 22.3% (Table 3.2). Considering the 2021-2023 average, a measure more stable and less subject to the economic cycle, the participations of both components were slightly lower (Graph 3.2).

The ICC spread also increased in 2023, driven by delinquency. The average ICC spread increased from 12.05 p.p. in 2022 to 12.68 p.p. in 2023, with the contribution of delinquency rising from 3.67 p.p. to 4.52 p.p. All other factors that make up the spread – administrative expenses, taxes and FGC, and the financial

16 For methodological details of this calculation, see the appendix of this chapter.

Graph 3.2 – ICC breakdown
Average 2021 to 2023

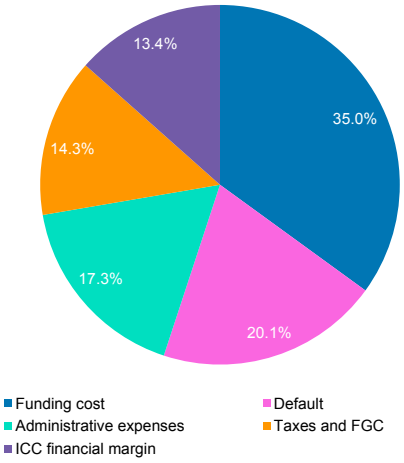


Table 3.3 – ICC spread breakdown

p.p.

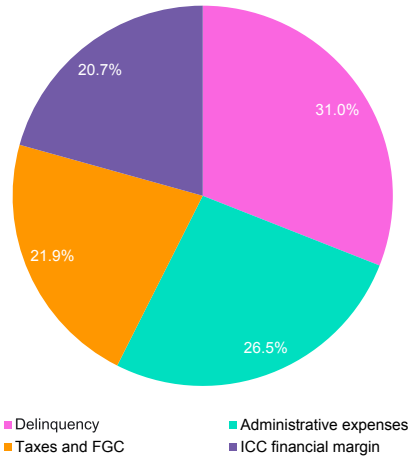
Item	2021	2022	2023	Average
1 – Delinquency	2.97	3.67	4.52	3.72
2 – Administrative expenses	3.31	3.07	3.04	3.14
3 – Taxes and FGC	2.53	2.69	2.60	2.61
4 – ICC financial margin	2.26	2.62	2.52	2.47
ICC spread (1 + 2 + 3 + 4)	11.07	12.05	12.68	11.93

Table 3.4 – ICC spread decomposition
As a proportion of the spread

%

Item	2021	2022	2023	Average
1 – Delinquency	26.83	30.46	35.65	30.98
2 – Administrative expenses	29.90	25.48	23.97	26.45
3 – Taxes and FGC	22.85	22.32	20.50	21.89
4 – ICC financial margin	20.42	21.74	19.87	20.68
ICC spread (1 + 2 + 3 + 4)	100.0	100.0	100.0	100.0

Graph 3.3 – ICC spread breakdown
Average 2021 to 2023



margin – decreased but only managed to mitigate the rise of this metric (Table 3.3). Therefore, the change in delinquency was large enough to make the spread in 2023 higher than in 2022. Similarly to the ICC, the ICC spread increased throughout the first half of 2023 and fell in the second, ending the year at similar levels to that of late 2022 (Graph 3.1).

Delinquency continues as the main ICC spread component. In fact, the delinquency participation in the spread grew from 30.5% in 2022 to 35.7% in 2023 (Table 3.4). Considering the 2021-2023 average, this participation was 31.0%. The remaining components, in order of importance, are administrate expenses, taxes and FGC, and the ICC financial margin (Graph3.3).

The average ICC for earmarked credit and each of its components remained much lower than those for non-earmarked credit. Similarly to previous years, the financial margin of the earmarked credit remained around zero (Table 3.5 and Graph 3.4). The caps on interest rates for earmarked credit imposed by specific regulations explain this characteristic. Assuming the non-existence of an earmarked credit portfolio with near-zero profitability, it is reasonable to assume that the profitability of the non-earmarked credit portfolio could be lower,[17] since financial institutions tend compensate for profitability by increasing the ICC financial margin of non-earmarked credit to generate returns on the capital invested in both types of credit.

The difference between the ICC for non-earmarked and earmarked ICC widened in 2023, still reflecting the tightening monetary policy. As non-earmarked interest rates are more sensitive to Selic rate changes than earmarked rates[18], during restrictive monetary policy periods, the difference between earmarked and non-earmarked rates tends to widen. The difference between the average ICC of the non-earmarked and earmarked segments increased from 17.56 p.p. in 2022 to 18.96 p.p. in 2023. In this decomposition, it is clear how little the monetary policy influences the earmarked segment as compared with the non-earmarked segment. Whereas the funding cost of non-earmarked operations rose 1.01 p.p. from 2022 to 2023, the increase in the funding cost of earmarked operations was only 0.55 p.p.

17 Simulations on Box 6 of the Banking Report 2017 "Methodology for Assessing the Impact of Reserve Requirements and Earmarked Credit" demonstrate that reductions in the rates of non-earmarked credit are proportional to reductions in the earmarked credit balance.

18 See, for instance, the box "Monetary policy power" in the March 2020 Inflation Report.

Table 3.5 – ICC Decomposition by Credit Type

p.p.

	Non-earmarked			Earmarked			Overall		
	2021	2022	2023	2021	2022	2023	2021	2022	2023
Funding cost	5.70	8.11	9.12	4.39	4.73	5.28	5.15	6.76	7.55
Delinquency	4.28	5.32	6.70	1.55	1.59	1.91	2.97	3.67	4.52
Administrative expenses	4.90	4.44	4.47	0.99	0.95	0.92	3.31	3.07	3.04
Taxes and FGC	3.92	4.14	3.99	0.37	0.37	0.32	2.53	2.69	2.60
ICC financial margin	3.36	3.82	3.70	0.54	0.63	0.59	2.26	2.62	2.52
Adjusted average ICC (1 + 2 + 3 + 4 + 5)	22.16	25.83	27.98	7.84	8.27	9.02	16.22	18.81	20.23

Graph 3.4 – ICC components
Non-earmarked, earmarked and total credit Average
2021 to 2023

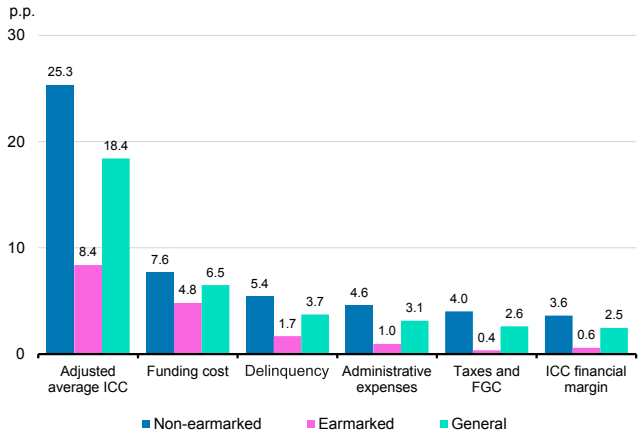


Table 3A.1 – ICC Composition

p.p.

Item	2021	2022	2023
A.1 – Average ICC	17.49	20.52	22.21
A.2 – Adjustment for capitalization method	1.27	1.71	1.98
A – Adjusted average ICC (A.1 - A.2)	16.22	18.81	20.23
B.1 – Funding cost	5.28	6.97	7.81
B.2 – Adjustment for capitalization method	0.13	0.21	0.26
B – Adjusted funding cost (B.1 - B.2)	5.15	6.76	7.55
C – *Spread* (A - B)	11.07	12.05	12.68
D – FGC expense	0.05	0.05	0.05
E – IOF	0.27	0.32	0.33
F – PIS and Cofins contributions	0.47	0.50	0.52
G – Administrative expenses	3.31	3.07	3.04
H – Loss estimate	2.27	2.77	3.41
I – Interest not received from operations with delays of 60 days or more	0.45	0.63	0.78
J – Discounts granted	0.25	0.27	0.33
K.1 – Interest on equity received by shareholders	0.42	0.54	0.57
K.2 – Withholding income tax on interest on equity	0.07	0.09	0.10
K – Interest on equity expense (K.1 + K.2)	0.49	0.63	0.67
L – ICC margin before income tax, social contribution (C - D - E - F - G - H - I - J - K)	3.52	3.82	3.55
M – Income tax and social contribution	1.67	1.73	1.60
N – ICC financial margin (L - M + K.1)	2.26	2.62	2.52

Methodological appendix

The ICC decomposition aims to identify and measure the main determinant factors of borrowers' credit cost.[19] Table A3.1 shows the items used for the calculation of decomposition and its values, while Table A3.2 decomposes the overall ICC into non-earmarked and earmarked credits. These items are grouped into five components, as follows (between brackets, the corresponding lines in the table):

1) "Funding Cost" (B): estimates the interest paid by financial institutions on their funding, as in the case of time deposits;

2) "Delinquency" (H + I + J): captures losses arising from non-payment of debts or interest, in addition to discounts granted;

3) "Administrative Expenses" (G): captures diverse administrative expenses such as personnel and marketing, incurred by financial institutions when performing their credit operations;

4) "Taxes and FGC" (D + E + F + K.2 + M): reflects taxes on credit paid by borrowers and financial institutions. Clients pay the Tax on Financial Operations (IOF). Financial institutions pay contributions to the Social Integration Program (PIS), Contribution for Social Security Financing (Cofins), Income Tax (IR), Social Contribution on Net Income (CSLL)[20] and also withhold the income tax (IRRF) on interest paid to equity owners. All these taxes, directly or indirectly, affect the ICC.

19 For methodological details on the ICC decomposition, see box 5 "Credit cost and spread decomposition methodology" of the Banking Report 2017, and boxes concerning methodological improvements in subsequent reports.

20 The CSLL rate was 15% in January and February 2020. On March 1st, 2020, the CSLL rate returned to 20%, and as of July 1st, 2021, it increased to 25% until December 31st, 2021. As of January 1st, 2022, the rate changed to 20% until July 2022, when it increased to 21% until the end of 2023.

Table 3A.2 – ICC Composition by Credit Type

Average from 2021 to 2023

p.p.

Discriminação	Non-earmarked	Earmarked	Overall
A.1 – Average ICC	28.52	8.71	20.07
A.2 – Adjustment for capitalization method	3.19	0.33	1.65
A – Adjusted average ICC (A.1 - A.2)	25.33	8.38	18.42
B.1 – Funding cost	7.93	4.91	6.69
B.2 – Adjustment for capitalization method	0.28	0.11	0.20
B – Adjusted funding cost (B.1 - B.2)	7.64	4.80	6.49
C – *Spread* (A - B)	17.69	3.58	11.93
D – FGC expense	0.05	0.03	0.05
E – IOF	0.50	0.02	0.31
F – PIS and Cofins contributions	0.72	0.15	0.50
G – Administrative expenses	4.60	0.95	3.14
H – Loss estimate	3.82	1.34	2.82
I – Interest not received from operations with delays of 60 days or more	1.21	0.17	0.62
J – Discounts granted	0.40	0.17	0.28
K.1 – Interest on equity received by shareholders	0.51	0.51	0.51
K.2 – Withholding income tax on interest on equity	0.09	0.09	0.09
K – Interest on equity expense (K.1 + K.2)	0.60	0.60	0.60
L – ICC margin before income tax, social contribution (C - D - E - F - G - H - I - J - K)	5.78	0.14	3.63
M – Income tax and social contribution	2.66	0.07	1.67
N – ICC financial margin (L - M + K.1)	3.63	0.59	2.47

In addition, all institutions associated to the Credit Guarantor Fund (FGC), shall monthly contribute to the fund with a certain percentage of the balances of guaranteed accounts;[21] and

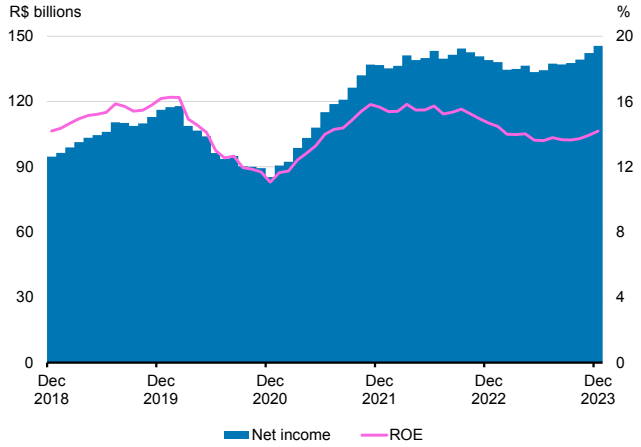
5) "ICC Financial Margin" (N): includes the portion of the ICC that remunerates the shareholders' capital of financial institutions for credit activity and other factors not mapped by the methodology, such as errors and omissions in the estimates.

21 Further details on the institutions associated to the Credit Guarantor Fund (FGC) and guarantees offered are available at https://www.fgc.org.br/.

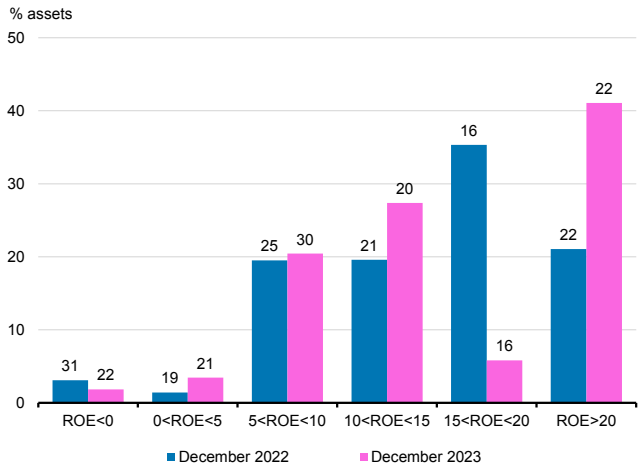
Profitability

4

Graph 4.1 – Net income and ROE
12-month accumulated



Graph 4.2 – ROE Distribution



/ The values above the bars refer to the number of FIs in the corresponding ROE range.

4.1 System profitability

The system's ROE decreased slightly in 2023 and had an heterogeneous distribution in the group of financial institutions of greater systemic importance. The ROE[22] of the Brazilian banking system was 14.1%[23] in 2023, a drop of 0.6 p.p. compared with 2022 (Graph 4.1). The results of some financial institutions in the S1[24] segment were more pressured,[25] resulting in a more heterogeneous distribution of these financial institutions' ROE (Graph 4.2). This heterogeneity reflects, mainly, the different levels of success of the financial institutions' credit risk management strategy during and after the pandemic and market risk in recent cycles of rising and falling basic interest rate. The increase in problem assets was the main cause of the differences in profitability observed.[26]

Provision expenses increased in 2022 and 2023 but signal stabilization. The sharp growth in provision expenses since late 2021, mainly influenced by the increase in problem assets,[27] turned into a consistent fall in 2023Q2, with stabilization in the second half of 2023. In the 12-month

22 In 2023, the net income of the banking system was BRL145 billion, an increase of 5% in the YoY comparison.

23 Refers to the annual ROE, calculated by dividing the net income accumulated in the twelve months ending in December 2023 by the average adjusted net equity in the last thirteen months ending in December 2023.

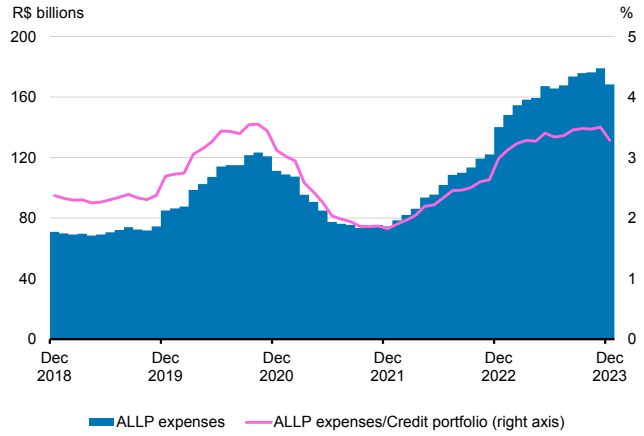
24 According to Resolution 4,553 of January 30, 2017, Segment S1 refers to institutions whose size is 10% or more of the GDP or, regardless of their size, carry out relevant international activity. This study only used privately-owned institutions with a size equal to or greater than 10% of the GDP.

25 In December 2023, the percentage of the system's assets with negative ROE was 1.8%, down 1.3 p.p. in the YoY comparison. Around 98% of the system's assets were from financial institutions with positive ROE, 95% with ROE of more than 5% and 74% with ROE of more than 10%.

26 In addition to the increase in problem assets, the differences in profitability are related to operational efficiency, the management of pre-fixed risk in the securities portfolio and, to a certain extent, the effects of increased competition in the National Financial System (SFN).

27 The increase in household service-to-income debt, the reduction in companies' payment capacity and, finally, the *Americanas* case were the main factors that influenced the increase in problem assets in that period.

Graph 4.3 – Provision expenses (ALLP)
12-month accumulated



Graph 4.4 – Credit margins
12-month accumulated

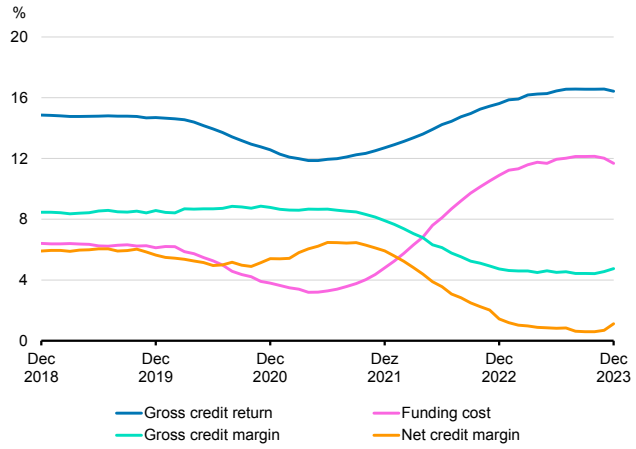


Table 4.1 – Service Revenue Composition
Accumulated in each year

R$ billions

Service Groups	2021	2022	Variation %	2023	Variation %
Total	172.8	181.5	5.1	181.5	0.0
Total fees	46.3	45.9	-0.8	45.0	-2.0
Household fees	34.1	32.9	-3.5	31.8	-3.4
Corporate fees	12.2	13.0	6.8	13.2	1.7
Investment fund management	16.3	14.7	-9.7	13.6	-7.6
Management of constitutional funds, lotteries	8.2	9.4	15.3	9.6	1.6
Collection service	7.0	6.8	-2.3	6.5	-4.0
Capital markets	17.3	14.4	-16.3	12.6	-13.0
Payment transaction result	22.8	31.7	39.2	34.5	8.8
Other service revenues	55.1	58.6	6.3	59.8	2.2

accumulated criterion, provision expenses showed signs of slowing at the end of the year (Graph 4.3). Maintaining the quality of grants and reducing the estimates of losses in the financial institutions' portfolios results in lower need for provisioning. The provisions are considered adequate, above the estimates of expected losses.

Credit margins stabilized throughout 2023, with a positive outlook for the coming periods (Graph 4.4). Throughout 2023, credit returns increased, influenced by the weight of recent harvests in credit revenues contracted at higher rates. The funding cost also increased in the period but fell in 2023Q4 as a result of the drop in the Selic rate from August onwards. The result of these movements was a slight increase in the gross margin over the year, especially in the last quarter. This increase tends to continue as the effects of the fall in the Selic rate continue to reduce the funding cost faster than credit returns.[28] Finally, the risk-adjusted net interest margin (NIM) slightly reduced in 2023, due to the increase in provision expenses. However, in 2023Q4, NIM has already increased due to the reduction in provision expenses in this period.

In 2023, nominal service revenues remained stable but exhibited an heterogeneous behavior among its components. While a portion of service revenue increased, another decreased (Table 4.1). The main contributor to service revenues in 2023 was the result of payment transactions,[29] surpassing revenues from household fees, which had been the most significant in 2021 and 2022. It is worth noting the consistent drop in revenues from household fees in recent years, influenced by increased competition, new products, and technological innovation in the segment. The share of capital market earnings reduced from 10% in 2021 to 6.9% in 2023, the biggest drop among the components. This behavior is associated with the reduction in the activity pace for this segment in recent years due to the Selic rate upward cycle.

Administrative expenses increased in real terms. In 2023, the increase in administrative expenses was 5.6%, while inflation measured by the Extended National Consumer Price Index (IPCA) was 4.62% in the period

28 Because of the greater concentration in floating rate instruments and the shorter average term of funding, the cost of funding tends to respond more quickly to Selic variations than credit returns. Thus, monetary easing cycles tend to increase credit margin.

29 In 2023, the result of payment transactions accounted for 19% of total service revenue. Excluding the item "other service revenues", the result from payment transactions became the most relevant group within service revenue.

Table 4.2 – Administrative Expenses Composition

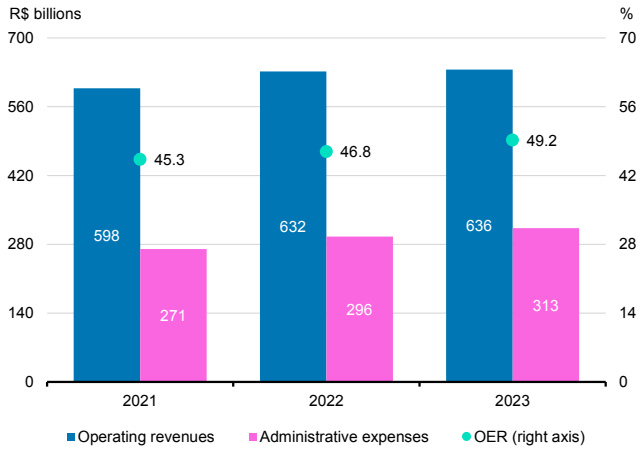
Accumulated in each year

R$ billions

Description	2021	2022	Variation %	2023	Variation %
Total	272.9	297.3	8.9	314.1	5.6
Personnel	143.5	156.8	9.3	165.2	5.4
Data processing and telecommunications	24.6	27.8	13.1	29.4	5.9
Facilities	15.4	16.2	5.0	16.1	-0.8
Third-party services	32.9	36.5	11.0	40.1	9.8
Advertising and promotion	7.8	9.0	15.8	8.4	-6.9
Depreciation, amortization and impairment[1]	21.4	22.2	3.6	26.1	17.6
Others	27.4	28.8	5.3	28.8	0.0

[1] Does not include amortization of goodwill on acquisitions.

Graph 4.5 – Operational efficiency ratio (OER)



/ The higher the OER, the lower the operational efficiency.

(Table 4.2). The increase in labor expenses, mainly due to collective labor agreements, was the main cause of the increase in administrative expenses. Additionally, expenses with third-party services and data processing and telecommunications were the lines that most increased their share in administrative expenses over the recent years. In contrast, facilities expenses decreased their share, from 5.7% in 2021 to 5.1% in 2023, in line with the trend of reducing physical structures and increasing digitalization in customer service.

Operational efficiency[30] reduced again, with administrative expenses growing at a faster pace than operational revenues. The higher growth in administrative expenses compared with operational revenues resulted in reduced operational efficiency since the end of 2021 (Graph 4.5). This trend mainly reflected inflationary pressures on costs and the adverse moment for operational revenues growth. Operational revenues were impacted by the slowdown in credit, the materialization of risks in portfolios, and the low growth in service revenues due to tighter financial conditions and increased competition, which significantly affected revenues from household fees, capital markets, and investment funds. In 2023, operational revenues grew 0.5%, while administrative expenses increased 5.6%.[31] However, in the second half of the year, the growth of both was virtually zero, with a greater slowdown in the growth of administrative expenses. As a result, there was a marginal improvement in operational efficiency in the data from 2023Q4.

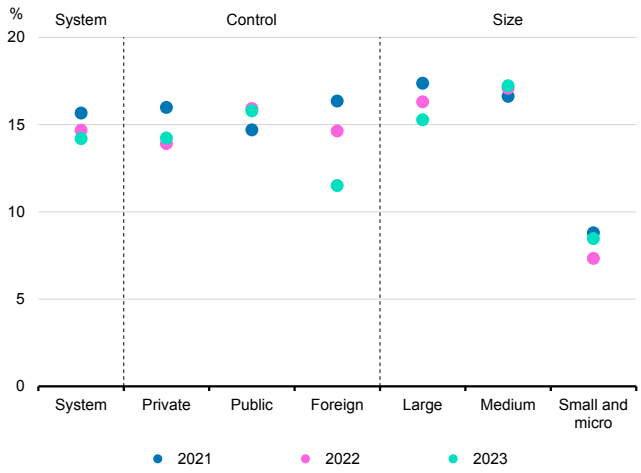
4.2 Profitability by type of control, size, and activity

For the second consecutive year, public banks continued to be the most profitable. Private banks, with a modest recovery in profitability, did not outperform the public banks. Still regarding private banks, profitability was influenced by a decline in profitability of a large institution. Foreign banks' ROE declined. They were more significantly impacted by the increase in problem assets and the higher growth in provision expenses, still influenced by the *Americanas* case. Risk-adjusted credit

30 The system's operational efficiency is measured by the Operational Efficiency Index (IEO), calculated as the ratio between administrative expenses and operational revenues.

31 In the second half of 2023, there was no relevant impact of the effects of exchange rate variations on the expenses of subsidiaries and branches of banks abroad.

Graph 4.6 – ROE by control type and size



interest income (credit NII),[32] for private and public banks grew 3.41% and 3.61%, respectively. However, for foreign banks, there was a decrease of 7.38%, because the increase in provision expenses surpassed the growth in credit NII.[33] Additionally, the operational efficiency of private banks remained stable, while that of public banks improved. Foreign banks, in turn, experienced a deterioration due to higher growth in administrative expenses compared to operational revenues.

Banks' profitability level continues to be associated with the size of the institution. In 2023, in terms of size, there is still a distinction in profitability levels between large and medium-sized banks on the one hand, and small and micro banks on the other hand (Graph 4.6). This difference can be attributed to factors such as economies of scale and a broader offer of products and services, which ensure greater diversification of revenue sources. This allows large and medium-sized banks to operate with relatively lower costs and achieve higher returns on their activities. Conversely, smaller banks often have the advantage of fast adaptability to market changes due to their less complex organizational structure. In 2023, smaller banks recorded, on average, an increase in profitability. Medium-sized banks maintained their profitability stable, while large banks experienced another decline. The decline in profitability of large banks does not apply to all of them, as mentioned in the previous section. The most affected were primarily impacted by the increase in problem assets in recent years.

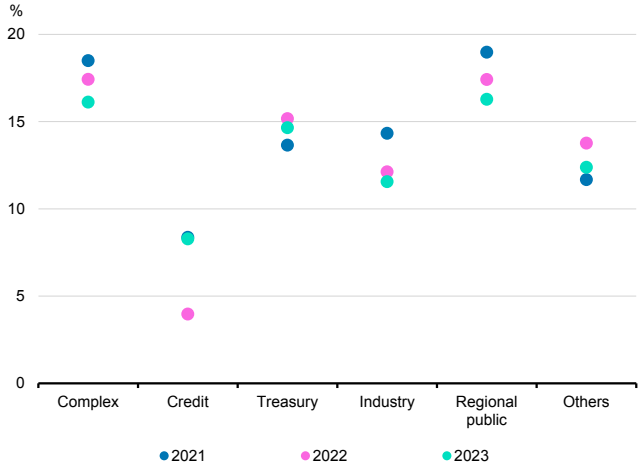
There was a decline in profitability by type of activity in most segments in 2023.[34] Despite the decline in ROE for the "Complex" and "regional public" segments, they remained the most profitable in 2023 (Graph 4.7). Only banks that operate predominantly with credit presented

32 Refers to the credit NII subtracted from provision expenses in the period.

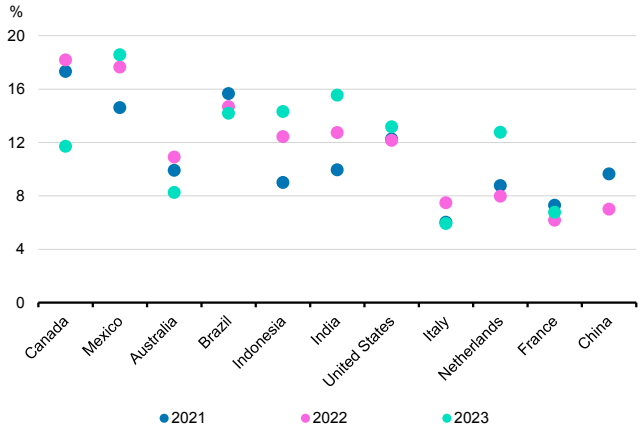
33 It refers to the difference between credit interest income and interest expenses on credit funding. Further information on section 4.3 of this Report.

34 The segmentation based on activity consists in grouping banking conglomerates according to the profile of their operations, defined by the selection of qualitative or quantitative attributes that reflect similar characteristics among banking entities, as follows: a) complex banks – with multiple operations and products, such as credit portfolio, demand and time deposits, capital market, fund management, among others, besides an extensive branch network and diversified customer profile; b) regional public banks – under federal or state control that operate regionally and have a branch network and a relevant number of customers where they operate, with diversified funding; c) industrial banks – linked to industrial or commercial groups, focused on promoting the group's productive chain d) credit banks – mostly operating with credit operations and credit risk exposures, such as guarantees and endorsements, with operating income more dependent on credit intermediation; and e) treasury and business banks – predominantly treasury and business operations (securities, repo operations, and investments), with greater dependence on these operations to generate their income.

Graph 4.7 – ROE by type of activity

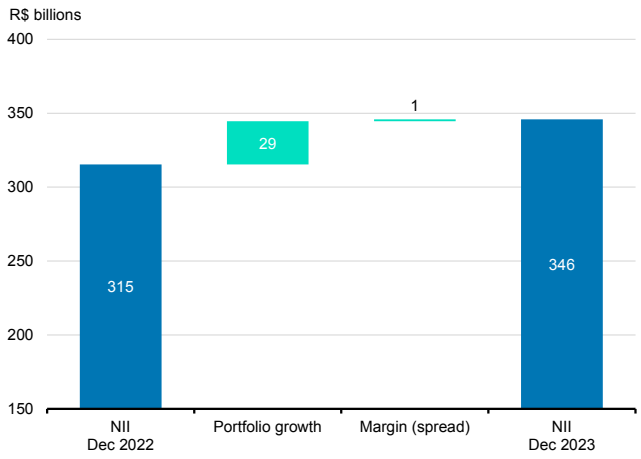


Graph 4.8 – Annual ROE
International comparison



Sources: ROE (IMF - Financial Soundness Indicators)
/Latest available data

Graph 4.9 – Credit interest income
Contributions to change



a growth in profitability, while other segments had a slightly lower profitability compared with 2022. The increase in profitability in the "Credit" segment is associated with a reduction in losses for a representative institution in this segment.

Bank profitability in Brazil is among the highest, despite the decline observed in the last two years. In 2023, the movement in profitability in the banking systems of representative countries from different continents[35] revealed a mixed scenario, with no defined trend (Graph 4.8). In the Brazilian case, the ROE recorded in 2023 was among the highest in the group analyzed, surpassed only by the indicators observed in Mexico and India, and at a similar level to Indonesia. It is also worth noting that the variability of ROE in Brazil in recent years was lower than in most other countries, being closer to the United States and France.

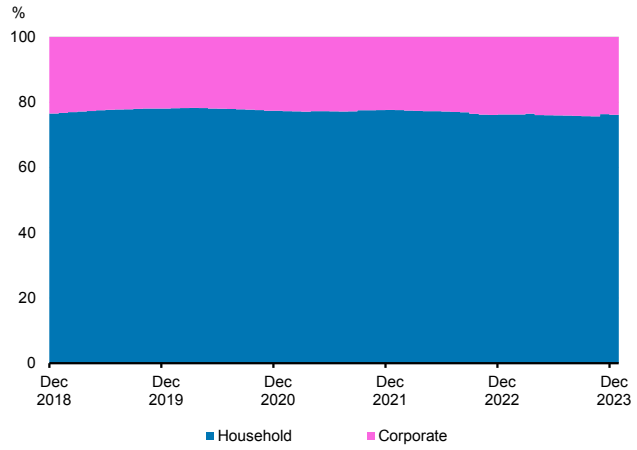
4.3 Credit interest income

Credit interest income (credit NII) increased, reflecting the growth of the portfolio. Credit NII grew 6.8% in 2023, mainly influenced by the growth of the credit portfolio in the period (Graph 4.9). The financial margin had little influence on NII growth, given that the variation in credit returns and in the funding cost was practically the same, slightly higher in the former. Thus, the margin's contribution to NII was positive but not very relevant.

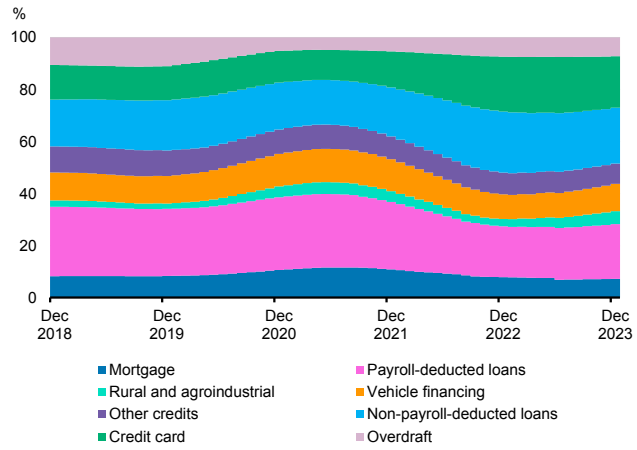
The household credit portfolio continued to account for most of the generation of credit NII. The representativeness of both household and corporate clients in the system's credit NII remained practically stable throughout 2023, with some decrease in the household participation throughout the year and recovery at the end of the period (Graph 4.10). The household portfolio continued to be the most significant in the system (67% of total outstanding credit) and household clients continued to account for most of

35 Data sent by the countries and available on the Financial Soundness Indicators (FSI) of the International Monetary Fund (IMF).

Graph 4.10 – Composition of credit NII
Household vs. corporate



Graph 4.11 – Credit NII by product
Household



the credit NII (76%).[36] Given the representativeness of the household portfolio for the generation of credit NII, additional analyses on the generation of credit NII resulting from products aimed at household customers are presented below.

In the household portfolio, operations with higher risk and return declined, but remain significant for the system's results. Types of credit such as non-payroll deducted, credit cards, and overdraft facilities declined, but still contributed significantly to the system's result due to the higher interest rates associated with these operations. In 2023, these operations represented 48.4% of the household credit NII and 11.03% of the total outstanding loans.[37] The reduction in the share of these types of credit in the NII for the period was 2.0 p.p., 1.3 p.p. and 0.2 p.p., respectively (Graph 4.11). The decline in riskier credit lines reflects the strategy of some institutions to mitigate exposure to credit risk, given the significant increase in problem assets and provision expenses over the last year.

36 The contribution of each credit modality to the credit NII cannot be considered as participation of a certain product in the final net profit, since the methodology does not consider the assessment of indirect expenses, such as administrative, processing and control, commercial, and taxes. Depending on the commercial, technological, and administrative structure required for each type of credit, participation in possible assessments can be very different. Additional details of the methodology and its limitations can be found in the box "Methodology for calculating the credit margin by subgroups of the portfolio", of the 2018 REB.

37 The "credit card" and "installment credit card" modalities are not included in this calculation, as they are considered payment services for the purposes of this analysis and not credit granting (these modalities do not earn interest for the financial institution). In turn, revolving credit card and installment payments made by the financial institution itself are included in the calculation. Even though they do not bear interest, the "credit card" and "installment credit card" operations bear the risk of delinquency. For this reason, financial institutions need to set up a provision for credit losses related to these receivable balances.

5 Concentration, Competition, and Innovation

5.1 Concentration indicators[38]

Concentration in the National Financial System (SFN) decreased in 2023, following the trend of recent years. The Normalized Herfindahl-Hirschman Index (HHIn) decreased for all the accounting aggregates considered: total assets, total deposits, and credit operations (Table 5.1). Considering the references of the BCB's Merger Review Guidelines (2012), the concentration level classification for total assets and deposits remained at the lowest level (non-concentrated market), while for credit operations the classification changed from moderate to non-concentrated, an unprecedented fact since the beginning of the series in 2016. Similarly, the Concentration Ratio of the Top Four Financial Institutions (CR4) also showed a reduction in all accounting aggregates, maintaining the same composition of leading institutions.

The reduction in concentration in the SFN consisted in an increase in the participation of the credit unions (b3) and non-banking institutions (n1 + n2) segments. As a result, banking segment institutions (b1 + b2) lost market share. This movement was seen in all the accounting aggregates observed in the period (Table 5.1). This movement can be associated with the non-banking institutions performance in the credit card and non-payroll-deducted credit markets, while credit unions, in 2023, stood out for their performance in the overdraft facility and working capital markets.

38 The concepts of the concentration indexes used in this section can be found in the methodological appendix to this chapter.

Table 5.1 – Summary of SFN Concentration Indicators

	Total Assets			Total Deposits			Credit Operations		
	2021	2022	2023	2021	2022	2023	2021	2022	2023
Participation by segment (%)									
b1+b2	87.7	87.8	87.6	92.2	91.2	90.7	86.3	86.2	85.9
b3	4.5	5.1	5.5	5.9	6.4	6.6	6.0	6.3	6.8
b4	6.3	4.9	4.5	0.2	0.1	0.1	6.2	5.7	5.3
n1+n2	1.5	2.0	2.2	1.6	2.2	2.4	1.5	1.7	2.0
n4	0.1	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0
Participation by type of control (%)									
Public	38.3	37.2	37.5	32.5	31.7	32.6	43.5	43.5	44.1
Private	61.7	62.8	62.5	67.5	68.3	67.4	56.5	56.5	55.9
Concentration indicators									
IHHn	0.0929	0.0896	0.0882	0.1016	0.0966	0.0945	0.1022	0.1003	0.0990
E.N.	10.8	11.2	11.3	9.8	10.3	10.6	9.8	10.0	10.1
RC4 (%)	56.1	56.0	55.3	59.7	58.4	57.9	58.9	58.6	57.8
Participation of the four largest institutions (%)									
	CEF	BB	CEF	BB	BB	BB	CEF	CEF	CEF
	14.6	14.9	15.0	15.9	15.7	15.5	18.7	19.1	19.6
	BB	CEF	BB	Bradesco	Itaú	Itaú	BB	BB	BB
	14.5	14.4	14.9	15.4	15.3	15.1	16.1	16.1	16.4
	Bradesco	Itaú	Itaú	Itaú	Bradesco	CEF	Bradesco	Itaú	Itaú
	13.7	13.6	13.8	15.2	14.6	13.9	12.1	11.9	11.5
	Itaú	Bradesco	Bradesco	CEF	CEF	Bradesco	Itaú	Bradesco	Bradesco
	13.4	13.1	11.6	13.2	12.7	13.4	12.0	11.6	10.3

The reduction in concentration occurred in most of the relevant credit markets. When the main credit segments are considered, concentration fell in most segments in 2023, whether using the EN or CR4 metrics (Table 5.2). When considering the EN indicator, the sharper reduction in the concentration level in the market of operations with acquired receivables (corporate) stands out. It is also noteworthy that, in 2023, there was an increase in the number of financial institutions offering working capital (corporate), non-payroll-deducted personal credit (household), and overdraft facility (household + corporate). Considering the references of the BCB's Merger Review Guidelines (2012), the level of concentration remains high in rural and agribusiness financing (household + corporate), housing financing (household + corporate), and infrastructure and development financing (corporate), with predominantly earmarked resources. A moderate concentration degree is observed in operations with acquired receivables (corporate), payroll-deducted personal credit (household), vehicle financing (household), credit cards (household + corporate), and overdraft facility (household + corporate). Concentrations in credit granted via working capital (corporate) and non-payroll-deducted personal credit (household) remained low.

Table 5.2 – Concentration Indicators of SFN Credit Operations Balance by Relevant Market

Relevant Market	Concentration Index								
	Equivalent Number (E.N.)			RC4 (%)			Effective FIs[2]		
	2021	2022	2023	2021	2022	2023	2021	2022	2023
Rural and agribusiness financing (Household + Corporate)[1]	3.5	3.7	4.0	64.2	65.6	64.0	66	67	60
Housing financing (Household + Corporate)[1]	2.1	2.1	2.1	92.2	92.6	92.6	11	12	12
Infrastructure and development financing (Corporate)[1]	2.2	2.3	2.3	94.0	93.2	93.7	16	16	16
Receivables operations (Corporate)	7.8	8.1	9.9	65.8	63.0	55.5	33	31	32
Working capital (Corporate)	10.8	11.0	11.4	57.0	57.4	57.0	63	67	78
Payroll-deducted personal credit (Household)	8.1	8.3	8.3	65.2	64.6	63.6	29	33	31
Non-payroll-deducted personal credit (Household)	12.6	13.1	14.1	49.7	47.5	46.6	55	54	62
Vehicle financing (Household)	7.9	8.6	9.2	65.1	61.5	58.3	20	22	24
Credit card (Household + Corporate)	7.5	8.0	8.8	66.0	62.4	59.5	34	33	35
Overdraft (Household + Corporate)	6.4	6.7	7.2	73.5	71.1	68.0	29	38	50

[1] Unlike other relevant markets, both non-earmarked and earmarked resources were considered.

[2] Only FIs with a share greater than 0.1% in the total active credit portfolio.

Concentration by type of control differs according to the origin of funding for credit operations. Among markets with high concentration, in which earmarked credit prevails,[39] the participation of state-owned banks is higher than that of private banks. Among markets with moderate concentration, characterized by non-earmarked resources, the participation of private banks predominates.

In 2023, the concentration level in brokerage markets (stocks and commodities and futures) reduced, although remaining higher than in 2021, and concentration in the distribution of investment products market continued the downward trend already observed in 2022. This movement can be seen in the analysis of both the EN and the CR4 indicators (Table 5.3). Considering the references in the BCB's Merger Review Guidelines (2012), in 2023 the concentration level is low in the brokerage markets and moderate in the distribution of investment products market.

Table 5.3 – Concentration Indicators of Financial Volumes for Stocks, Commodities and Futures, and Retail Investment Product Distribution

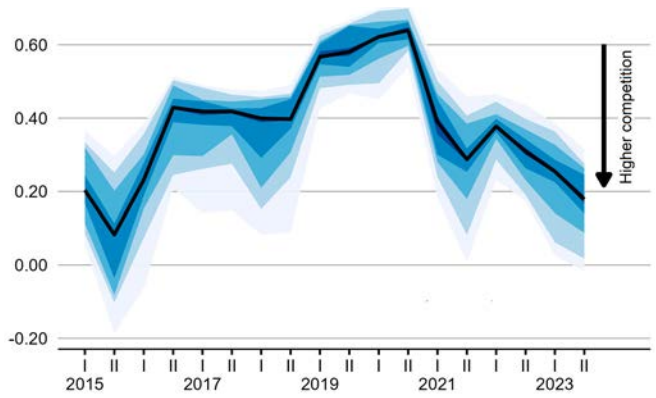
Relevant Market	Concentration Index								
	Equivalent Number (E.N.)			RC4 (%)			Effective Fis		
	2021	2022	2023	2021	2022	2023	2021	2022	2023
Brokerage – commodities and futures	13.3	12.0	12.8	43.6	47.1	45.9	47	48	48
Brokerage – stocks	15.1	14.3	14.5	40.3	41.9	41.6	58	57	55
Distribution of investment products	8.3	8.7	8.9	62.9	61.0	58.9	87	91	89

Source: B3 and Anbima.

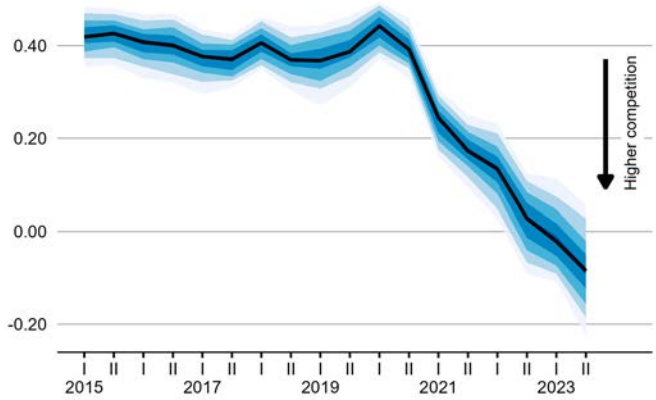
39 Tables A to J of Annex C.

The reduction in the concentration level in the SFN occurred despite the clearance of four mergers in 2023. Three of these mergers directly involved at least one bank and some type of credit among the relevant markets affected. It is worth highlighting the acquisition, by Safra Conglomerate, of financial institutions controlled by Alfa Conglomerate and the combination of the UBS's and Credit Suisse's activities.

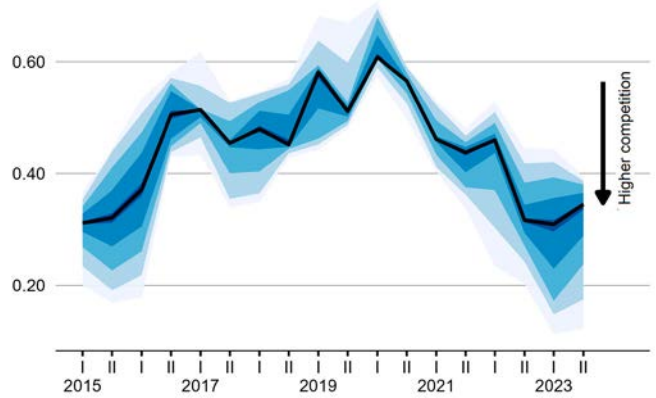
Graph 5.1.a – Credit Lerner (banking sector)



Graph 5.1.b – Credit Lerner (credit unions sector)



Graph 5.1.c – Credit Lerner (non-banking sector)



5.2 Competition

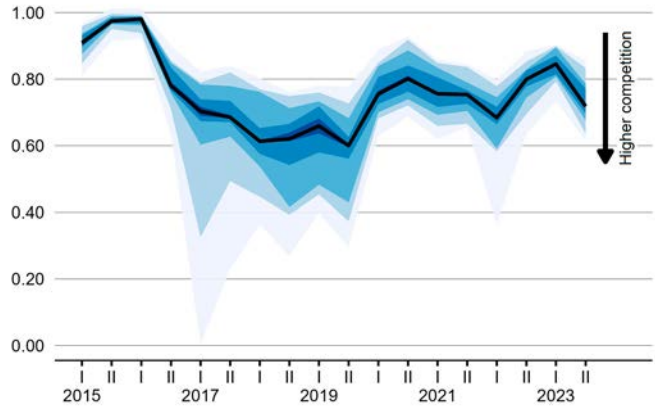
In 2023, competition in the credit market increased, following the trend of recent years, while competition in financial services remained relatively stable. Competition is analyzed here using the Lerner index. It is important to note that the lower the index, the higher the degree of competition estimated. In general, since the outbreak of the pandemic, there has been an increase in competition or at least a relative stability.

Competition in the banking and credit union sectors of the credit market has increased. The fall in the Lerner index for these sectors led them to historically low levels (Graphs 5.1.a and 5.1.b). This decline was due to an increase in marginal costs at a higher magnitude than the increase in prices. In the credit union sector, the Lerner index shows negative values, which means that the marginal cost is higher than the price. It should be noted that the Lerner index calculated is limited to the credit market, since financial institutions have other products in their portfolio with specific prices, marginal costs, and Lerner indexes.

Competition in the non-banking sector of the credit market stabilized in 2023, but at historically high levels. Despite having interrupted a downward trend that had been in place since the pandemic, the credit Lerner index of institutions in the non-banking sector has stabilized at one of the lowest levels in the time series, but still in a positive territory (Graph 5.1.c). Institutions' marginal costs and prices in this segment showed small changes in 2023 compared with 2022.

Competition in the banking sector of the banking services market remained relatively stable. The Lerner indexes for the financial services market in the banking sector have fluctuated but have been maintaining a similar level since the pandemic (Graph 5.2). The increase in the first half of 2023, driven by the price component, was reverted in the second half.

Graph 5.2 – Financial services Lerner (banking sector)



5.3 Financial innovations and the BCB's role

Rules for the registration and centralized deposit of real estate receivables

BCB Resolution 308 of March 28, 2023, which regulates the registration and centralized deposit of real estate receivables and the provision of these services by financial market infrastructures, increased the security of financing operations targeted at the construction of real estate, providing improved credit conditions for builders and developers, especially the smaller ones. Real estate receivables are credit rights originating from purchase and sale agreements or promises to purchase and sell signed between developers and buyers or prospective buyers of autonomous real estate units or lots. This Resolution contains complementary rules necessary to comply with CMN Resolution 5,055, of December 15, 2022, which established the mandatory registration of credit rights received as collateral by credit institutions when contracting financing operations for the construction of real estate.

The greater security provided by this rule stems from improved management of collaterals and, consequently, the governance of incorporations, reducing asymmetries that hinder the assessment of their credit risk by credit granting institutions. By requiring more transparent, timely, and reliable information on collaterals, the regulation provides greater security for this type of credit operation, with potential benefits for purchasers of properties under construction as well. This contributes to the sustainable, healthy, and efficient development of the real estate credit market, with positive impacts on the country's socio-economic indicators.

Credit derivative transactions

CMN Resolution 5,070, of April 20, 2023, should create the required conditions for the development of the credit derivatives market in the country, with the expectation of positive impacts on credit risk management, increased liquidity in the private securities market, and a reduction in the cost of credit supply and fundraising by companies for investment in the non-financial economy. Prior to the issuance

of this resolution, there were only sporadic credit derivative transactions in Brazil, which did not lead to the formation of a relevant national market for this instrument. This stems from the restrictions imposed by the previous domestic regulation, which induced some financial institutions to operate in this segment only through their subsidiaries located abroad, while others resorted to alternative instruments for transferring credit risk, such as credit assignment, linked asset operations, credit insurance, or guarantees. The international experience, however, shows that credit derivatives, by providing liquidity to the assets used as a reference, are very important in the pricing of credit risk, in the price formation process of obligations whose reference entity has a short credit history, and in mitigating the risk of longer maturity instruments, such as debt securities or long-term loans, typically used to finance investment in infrastructure and other major productive activities.

In line with best practices and international standards for the derivatives market, new requirements have been established to provide greater security for credit derivative transactions in which at least one of the counterparties is an institution authorized to operate by the BCB. The main innovations established by this Resolution are the following:

I – expansion of the list of possible risk-receiving counterparties, expressly allowing the risk transfer to non-financial institutions considered professional investors, according to the classification of the Securities and Exchange Commission (CVM);

II – expansion of the types of financial instruments allowed to be used as reference obligations, including customized baskets and standardized indexes;

III – allowing the use of consistent and verifiable pricing models, so as not to preclude the use of less liquid reference obligations;

IV – easing the conditions for risk transfer without holding title to the reference obligations, which is now mandatory only when they include loans or leasing operations;

V – update of the information requirements for the credit derivative documentation and of the eligible credit events, in line with the standards established by the International Swaps and Derivatives Association (ISDA) and the standards practiced by the derivatives market;

VI – allowing credit derivatives to be carried out between controlling, related or controlled companies or institutions from the same prudential conglomerate, provided that they are performed under the same market conditions as those practiced with other counterparties; and

VII – permission to carry out credit derivatives with financial flows named or referenced in currencies or indices other than those of the reference obligation, which was not previously allowed, but with treatment provided for in the prudential rules in force.

Methodological appendix

To systematically monitor the concentration levels of different segments of the SFN, the BCB uses the Normalized Herfindahl-Hirschman Index (HHIn), the "HHIn equivalent number" (EN), and the Concentration Ratio of the Top Four Financial Institutions (CR4) in the accounting aggregates related to total assets, credit operations, and total deposits in Brazil.

The HHI is used by domestic and international antitrust authorities as an auxiliary tool for assessing levels of economic concentration. In its normalized version, the HHIn is obtained by the sum of the square of each financial institution market share, in the decimal form, resulting in a number between 0 and 1. According to Communiqué 22,322, of April 27, 2012 (BCB's Merger Review Guidelines, 2012), the BCB considers markets that register values corresponding to the HHIn to be situated:

a) between 0 and 0.10 are of low concentration;

b) above 0.10 to 0.18 are of moderate concentration; and

c) above 0.18 to 1 are of high concentration.

The "HHIn equivalent number" (EN) indicates which would be the number of financial institutions (FI) with equal share in the market that would generate the same observed HHIn (HHIn = 1/EN).

The CR4 measures the concentration degree by adding up the market shares of the top four financial institutions in each market.

These indicators are analyzed for three accounting aggregates[40] and consider the following adjustments:

a) for total assets, it is used the Adjusted Total Assets (ATA), which excludes investments in interfinancial deposits, interfinancial transfers, and investments in institutions authorized by the BCB;

b) for total deposits, it is used total deposit (-) interfinancial deposits (+) Agribusiness Credit Bills (LCA) (+) Real Estate Bills (LCI) (+) Financial Bills, and, in the case of the non-banking segment (b3 + b4 + n1 + n2 + n4), Exchange Bills are included; and

c) for credit operations, the balances of the outstanding portfolio of all the institutions' credit operations are considered.

With regard to the concentration level in credit operations, in addition to the general analysis, an assessment is also carried out for each relevant market, i.e. for each set of close substitute products.[41] This type of analysis contributes to greater transparency of the environment in which competition takes place in the SFN and to the improvement of the BCB's role in defending competition. The set of relevant markets is made up of:[42] rural and agribusiness financing (household + corporate),[43] housing financing (household + corporate),[44] infrastructure and development financing (corporate),[45] operations with acquired receivables (corporate),[46] working

40 The monetary values of the accounting aggregates considered the IF.data prudential conglomerate concept, available at https://www3.bcb.gov.br/ifdata/. Prudential conglomerates include, in addition to the institutions belonging to the financial conglomerate: i) consortium management; ii) payment institutions; iii) companies that perform the acquisition of credit operations, including real estate or credit rights; iv) other companies headquartered in the country whose exclusive corporate purpose is to hold equity stakes in the aforementioned institutions; v) investment funds in which the institutions that make up the prudential conglomerate substantially assume or retain risks and benefits.

41 For details on the definition of a relevant market, see the BCB's Merger Review Guidelines.

42 Data from Document 3040 – Credit Risk Data, whose information is incorporated into the Credit Information System (SCR) database – were used for the modalities analyzed.

43 It covers sub-modalities 801 (costing and pre-costing), 802 (investment and working capital for agribusiness financing), 803 (sale and pre-sale), and 890 (project financing).

44 It covers sub-modalities 901 (housing finance from the Housing Finance System – SFH) and 902 (housing finance - mortgage portfolio).

45 It covers sub-modalities 1101 (infrastructure and development financing), 1190 (project financing), and 490 (project financing – BNDES). Sub-modality 490 includes other types of BNDES operations, in addition to those directly related to infrastructure and development.

46 It covers sub-modalities 250 (loan-acquired receivables), 450 (financing-acquired receivables), and 1350 (other receivables-acquired receivables).

capital (corporate),[47] payroll-deducted personal credit (household),[48] non-payroll-deducted personal credit (household),[49] vehicle financing (household),[50] credit card (household + corporate),[51] and overdraft facility (household + corporate).[52] Together, the relevant markets analyzed account for 75.2% of the total outstanding SFN credit operations on December 31, 2023. Indicators refer to credit operations granted with both non-earmarked and earmarked resources[53] in the banking and non-banking segments (b1+b2+b3+b4+n1+n2+n4).[54]

In addition, the concentration of the relevant markets of brokerage and distribution of retail investment products is analyzed.[55] The source of brokerage market data is the B3 and refers to the annual financial volume, while the distribution market data is the Brazilian Financial and Capital Markets Association (Anbima) and refer to the consolidated annual financial volume of distribution of traditional retail and high-income products, except savings.

The brokerage segment encompasses relevant markets of stocks and of commodities and futures due to the low level of substitutability between the products traded on the stock market and those traded on the commodities and futures market. This reflects the differences concerning traded assets, business environments, operating platforms, and customers profiles.

47 It covers sub-modalities 215 (working capital with a maturity of less than 30 days) and 216 (working capital with a maturity of 30 days or more).
48 It covers sub-modality 202 (payroll-deducted personal credit).
49 It covers sub-modality 203 (non-payroll-deducted personal credit).
50 It covers sub-modality 401 (acquisition of goods – motor vehicles).
51 It covers the following sub-modalities: 204 (revolving credit linked to a credit card); 210 (purchase, invoice in installments or withdrawal financed by the card-issuing institution); 406 (purchase or invoice in installments by the card-issuing financial institution), 1304 (cash purchase and in installments from a shopkeeper), and 218 (not migrated).
52 It covers sub-modality 213 (overdraft facility).
53 Credit operations granted with non-earmarked resources, except housing, rural, and agribusiness, and infrastructure and development financing, whose resources are both earmarked and non-earmarked.
54 Tables A to J in Annex C present the participation of the top four institutions in each relevant credit market considered and show the evolution of the relevant markets by type of control and by source of funds.
55 The following products are considered: investment funds 555 (fixed income, multimarket, mutual privatization fund (FMP), foreign exchange and shares, except those arising from Decree-Law 157 of February 10, 1967), structured funds (credit rights investment funds, real estate investment funds, equity investment funds, and fixed and variable income Exchange Traded Fund (ETF), and securities (shares, government securities, private securities, and structured operations certificates).

Box 4 – Evolution of the National Financial System's efficiency from the perspective of resources optimization

This box aims to present an assessment of the evolution of the National Financial System's (SFN) efficiency considering the resources optimization. More efficient financial institutions (FIs) seek innovations to meet the demands arising from the real economy, improving the supply of financial products and services without compromising the solidity of the SFN. A FI that is not cost-efficient could impose excessive costs on clients. A FI that is not profitability-efficient might be lenient when managing its business, not generating enough profit for its economic sustainability. This box considers these perspectives by evaluating the efficiency of the SFN in terms of cost and profitability.

Concept of efficiency

The efficiency analysis in this box uses the concept of **technical efficiency**. To illustrate this concept, consider a production system that transforms a single input into a single output. The technical efficiency of a FI is the ratio between the amount of output it produces (Q) and the amount produced by a theoretically fully efficient FI (Q*) when both use the same amount of input. For example, consider that "deposits" is the input and that "volume of credit" is the output. For the same amount of deposits, FI A produces eighty units of credit, while another theoretically fully efficient FI produces one hundred units of credit. The technical efficiency of FI A would be 0.8. In other words, FI A produces 80% of what is possible, considering the same amount of input used. It should be noticed that the technical efficiency of a fully efficient FI is always equal to one.

For multi-product production processes with multiple inputs, there may be complementarities between these factors. This makes efficiency measurement complex, as the production function is not observed, and it is particularly difficult to identify how different inputs jointly contribute to final products. However, the concept remains the same, considering the distance between the production of each FI and the fully efficient FI. A production/cost function is used to capture these interrelations between outputs and inputs. Since there is more than one product, the comparison can no longer be made relatively to a specific product but using a performance metric.

Methodology

The parametric technique of Stochastic Frontier Analysis (SFA) is used to measure the efficiency of the SFN. The SFA method assumes that there is a stochastic frontier on which the FIs with best practices are positioned, i.e., the fully efficient FIs. The other FIs are positioned below the frontier, with the distance to it proportional to their level of inefficiency and a random noise component specific to each institution[1] – factors that are beyond

1 Random noise or errors are not controlled by the FI but can impact its calculated efficiency value. For example, the opening of a company near a bank branch could affect its efficiency due to a positive externality (such as a potential increase in clients or borrowers) or a negative one (such as increased pollution driving clients away). Another type of noise is measurement errors in the variables used in the efficiency model. The goal is to calculate only the FI's distance from maximum efficiency, considering the factors that the FI controls. To this end, it is essential to separate inefficiency from noise.

the FIs control. Efficiency ranges from 0 to 1, with FIs on the frontier having an efficiency of 1, while those off the frontier have lower efficiencies.

The choice of Stochastic Frontier Analysis is motivated by the following facts: (i) it allows for the separation between inefficiency and potential noise and idiosyncratic events uncontrollable by the FI; (ii) it has low sensitivity to outliers,[2] favoring more robust modeling of the heterogeneity existing in the SFN; and (iii) it is one of the most widely used techniques in the literature on the efficiency of financial institutions.

To estimate the stochastic efficiency frontier, it is necessary to choose the functional form for the production function, the inputs, and the financial products. In this regard, the translog function is used with three inputs (funding, management, and capital) and five products (credit, Securities Trading – ST, other usual assets, service revenue, and deposits).

In this box, two performance metrics are used: cost and profit. These efficiency aspects are relevant, interrelated, and have microeconomic foundations. The FI should seek a balance between minimizing its costs and optimizing profit.[3]

Data and results

The sample used consists of 232 FIs from the banking and non-banking sectors,[4] with at least six semi-annual data points from January 2004 to December 2023. Performance metrics were obtained from data extracted from the Cosif accounting data as follows:

$$Total\ Cost_{it} = Administrative\ expenses_{it} + Financial\ Intermediation\ expenses_{it} + Provision\ expenses_{it} + Other\ Operational\ Expenses_{it} + Tax\ expenses_{it}$$

$Recurring\ profit_{it}$: it starts from net profit and extraordinary gains or losses that are not expected to recur in subsequent periods are excluded (based on historical data).

For the analysis of results, the concept of each of the efficiency perspectives must be considered:

- Cost efficiency concept: A more cost-efficient FI is one that transforms the same amount of inputs into products with the lowest total cost.

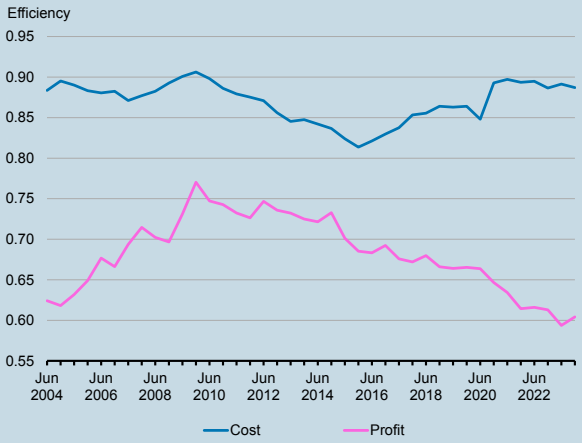
- Profit efficiency concept: A more profit-efficient FI is one that transforms the same amount of inputs into products generating higher recurring profits.

Graph 1 shows the evolution of the total asset-weighted average of cost efficiency and profit efficiency over the last twenty years. Cost efficiency has higher levels, oscillating between 0.80 and 0.90, while profit efficiency has always been below 0.80, reaching a level below 0.60 at the end of the sample.

From 2004 until the recession of 2009, cost efficiency remained relatively stable at a level just below 0.90. Then, it followed a downward trend until the middle of the 2015-2016 recession. It rose in the following years, showing a leap in the second half of the first year of the Covid-19 pandemic, and has remained relatively stable since then at a level close to 0.90.

2 This aspect of SFA is important due to the significant heterogeneity among the FIs of the SFN.
3 The annex "Methodology for calculating the efficiency of the Brazilian National Financial System from the perspective of resources optimization" provides a more thorough description of the methodology used in this box.
4 Segments b1, b2, and n1.

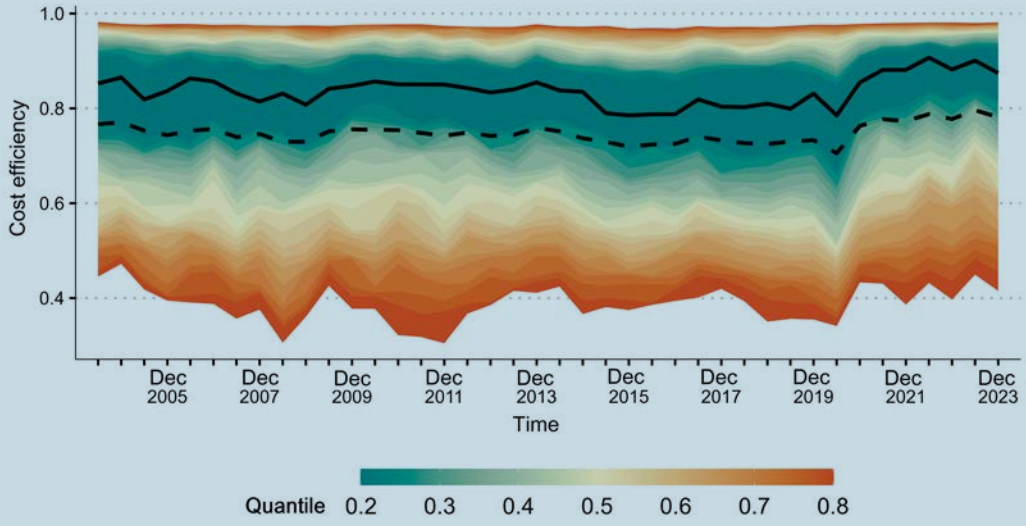
Graph 1 – Average cost and profit efficencies weighted by total assets (ATA)



Profit efficiency was on an upward trend from 2004 until the 2009 recession, when it surpassed 0.75, the peak in the sample period. After this peak, profit efficiency consistently decreased until it reached 0.60 at the end of the sample.

It is also possible to analyze the distribution of individual cost and profit efficiencies of the FIs (Graphs 2 and 3). FIs above the median have very similar cost efficiencies, close to 1. Below the median, there is a wide dispersion among the estimated efficiencies, with the last quartile showing efficiencies below 0.50, i.e., half the theoretical maximum efficiency. Therefore, the distribution is quite asymmetric.

Graph 2 – Cost efficiency: distribution of FIs' efficiency

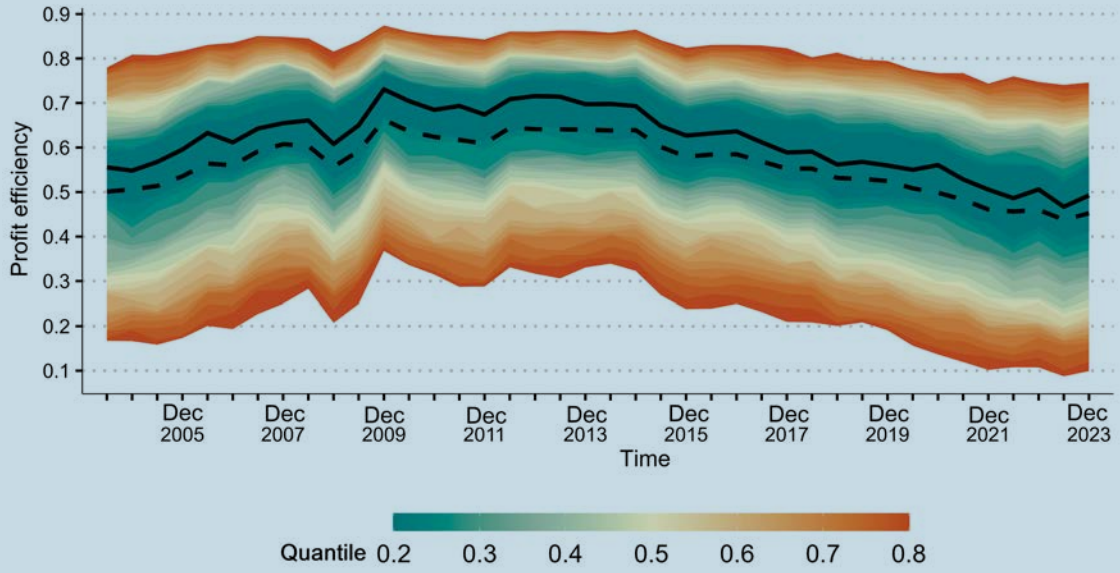


Note: the solid black line represents the median, and the dotted line represents the mean.

It is worth highlighting the rapid increases in cost efficiency after the global crisis of 2008 and after the Covid-19 pandemic, especially for FIs with low levels of efficiency (Graph 2). Crises can force FIs to increase efficiency (Bradrania *et al*., 2017).

The distribution of profit efficiencies is more spread out when compared to the distribution of cost efficiencies, especially among FIs with efficiencies above the median. As with cost efficiency, the profit efficiency of the lower quartile increased right after the global crisis of 2008 but stabilized after the pandemic (Graph 3).

Graph 3 – Profit efficiency: distribution of FIs' efficiency



Note: the solid black line represents the median, and the dotted line represents the mean.

Final remarks

The analysis of the SFN's efficiency over the past twenty years shows that cost efficiency, which measures how FIs transform inputs into products at lower costs, remained high. Conversely, profit efficiency, related to the FIs' ability to generate higher profit when transforming their inputs into products, has been declining since 2009. This suggests challenges in maximizing profits, especially in a scenario of increasing financial competition.

The distribution of efficiencies among FIs shows a wide dispersion, especially in profit efficiency, indicating opportunities for improvement. Economic crises seem to drive increases in the SFN's efficiency, highlighting the financial sector's adaptability. In summary, the evolution of the SFN's efficiency reveals a complex panorama with persistent challenges in maximizing profits and ongoing opportunities for improvement.

References

BRADANIA, R.; LI, X.; XU, L. *Bank failures and management inefficiency during the global financial crisis*. In: ECONOMOU, F.; GAVRIILIDIS, K.; GREGORIOU, G.; KALLINTERAKIS, V. (org.). Handbook of investors' behavior during financial crises. 1. ed. Cambridge: Academic Press, 2017. Cap. 11, p. 191-201.

Annex – Methodology for calculating the National Financial System's efficiency from the perspective of resources optimization

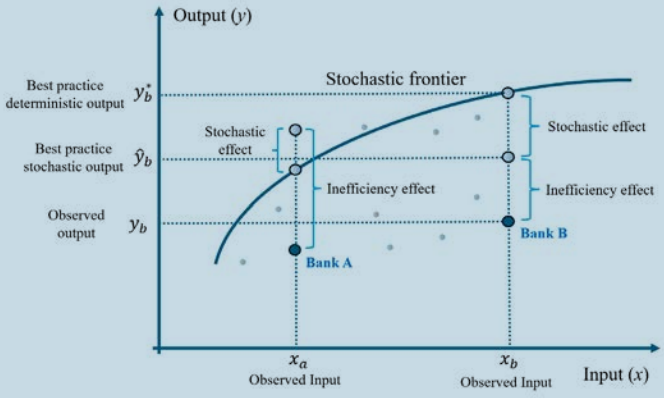
This annex complements the information about the methodology used to estimate the efficiencies presented in the box "Evolution of the National Financial System's efficiency from the perspective of resources optimization."

The parametric technique of Stochastic Frontier Analysis (SFA) is used to measure the National Financial System's (SFN) efficiency. Graph 1 provides an overview of this technique, considering one input and one output. The SFA method assumes that there is a stochastic frontier on which the FIs with the best practices are positioned, i.e., the fully efficient FIs. Other FIs are positioned below the frontier, with the distance to it proportional to their level of inefficiency and a random noise component specific to each institution[1] – factors that are beyond the FI's control. Efficiency ranges from 0 to 1, with FIs positioned on the frontier having maximum efficiency.

For the case of multiple inputs and multiple outputs, the concept remains the same. Efficiency is the distance between the production of the FI and the production of a fully efficient FI. To estimate this distance, a performance metric of the FI is used.

To estimate the stochastic efficiency frontier, it is necessary to choose the functional form for the production function. Due to its flexibility, the translog function is used in the literature when the functional form of the production function is uncertain.

Graph 1 – Example of an optimal frontier for the product considering one input



After choosing the technique to estimate the efficiency frontier (SFA), the model to be used to calculate efficiencies must be defined. There are various models in the literature based on different assumptions about efficiency. This Banking Report uses the model of Wang and Ho (2010), which best suits the substantial heterogeneity present among the FIs in the SFN and the long period analyzed.

1 Random noise or errors are not controlled by the FI but can impact its calculated efficiency value.

Efficiencies are estimated by the distance between the observed performance of the FI and the stochastic frontier. This is done using the model that relates the performance metric M_{it} and the production function:

$$\log(M_{it}) = \alpha_i + \gamma_t + f_{translog}(inputs,\ outputs; \beta) + v_{it} - u_{it} \quad (1)$$

where i and t index the FIs and period, respectively. Moreover, α_i and γ_t are the fixed effects of FI and time; v_{it} is the random noise component that captures measurement errors and/or uncontrollable idiosyncratic factors that affect the FI's proximity to the frontier; u_{it} is the distance component to the frontier, related to the degree of inefficiency of the FI. In general, $u_{it} > 0$ as most FIs exhibit some degree of inefficiency and are therefore below the production frontier. The greater the u_{it}, the greater the distance to the frontier and the lower the technical efficiency.

Efficiencies are analyzed under two distinct performance metrics M_{it} – cost and profit. From a cost perspective, equation (1) is estimated by minimizing the cost function, while from a profit perspective, the production function is maximized.

Three inputs and five outputs are considered. The measurement of inputs is based on their prices – funding cost, administrative cost, and capital cost – while the measurement of outputs is based on volume in financial terms – credit volume, Securities Trading (ST) volume, volume of other usual assets, service revenue, and deposit volume.

In the model, considering two FIs with the same products and inputs (and similar noise), the observed differences in cost or profit will be loaded into the term u_{it} (distance to the frontier), defined according to the following expression:

$$u_{it} = exp\left(\sum_{c \in Covariates} \beta_i z_{it}^c\right) u_i^* \quad (2)$$

where:
z_{it}^c: efficiency control covariate (via distance to the frontier);
u_i^*: fixed effect (intrinsic inefficiency of the institution); and
$Covariates$: set of specific variables of the financial institution and macroeconomic variables.

After simultaneously estimating equations (1) and (2) according to the model of Wang and Ho (2010), technical efficiency is extracted by:

$$Efficiency_{it} = \exp(-u_{it}) \quad (3)$$

It is necessary to use an exponential function as the logarithmic function is used in equation (1).

Reference

WANG, Hung-Jen; HO, Chia-Wen. *Estimating fixed-effect panel stochastic frontier models by model transformation*. Journal of Econometrics, v. 157, n. 2, p. 286-296, 2010.

Box 5 – Remittance costs in Brazil

There is a global effort to reduce the cost of remittances, which are transfers of resources by migrants abroad to their families in their home country, also known as "personal transfers." These remittances are an essential source of income for millions of families in various countries and an important tool for combating poverty, especially in emerging countries. In recent years, regulatory actions have been adopted to reduce these costs. This box aims to document the evolution of remittance costs in Brazil. Higher remittance receipts generally reduce the level and severity of poverty, with positive effects on access to information and communication technologies, health and education, as well as fostering financial inclusion, entrepreneurship, disaster recovery, and the reduction of child labor.

With the significant increase in remittance amounts over the last few decades, the international community has started to set principles and goals to reduce the costs of these transfers. Efforts to reduce costs began to be structured in 2007, with the "General Principles for International Remittance Services"[1] from the Bank for International Settlements (BIS) and the World Bank. In subsequent years, the G20 began setting targets for the continuous reduction of the average costs of personal transfers, considering the growing number of beneficiary families. In Brazil, in line with this effort, Law 14,286, of December 29, 2021, allowed for the adoption of requirements proportional to the transactions amount and the involved risks, aligned with international efforts to reduce costs and to increase the agility of these remittances.

The growing use of new business models for remittances, as well as the application of new technologies, is an important step to facilitating the use of formal channels for personal transfers, especially by immigrants. These tools facilitate access to personal transfer services for both senders and receivers and have contributed to the decline in remittance costs observed in recent years, particularly for transfers through digital channels.

The reduction of these costs is linked to the increasing efficiency of remittance services but can increase intermediation risks. There is growing use of technological innovations to process these transfers, such as the movement of resources using digital assets, like crypto assets (tokens). There are also initiatives aimed at structuring instant international transfers, including the use of central bank digital currencies (CBDCs). The use of these innovations enables efficiency gains, including cost reductions and faster processing of international transactions. However, there is a potential increase through risks in the intermediation of related services, the volatility of transfers, and the use of sovereign currencies. A summary of these evaluations can be found in a recent IMF publication focused on consolidating the implications of digital money and digital assets for the functioning of the international monetary system (Digital Money, Cross-Border Payments, International Reserves, and the Global Financial Safety Net).[2] The understanding and the collective adoption of solutions aligned with jointly defined principles aim to ensure that the parties involved can benefit from these innovations safely.

1 https://www.bis.org/cpmi/publ/d76.htm
2 https://www.imf.org/en/Publications/IMF-Notes/Issues/2024/01/04/Digital-Money-Cross-Border-Payments-International-Reserves-and-the-Global-Financial-Safety-538733

Personal Transfers to and from Brazil (2018-2023)

Personal transfers from Brazil abroad were negatively impacted by the pandemic, but this situation has already been reversed. Transfers from Brazil abroad decreased from USD 2,093 billion in 2019 to USD 1,471 billion in 2020 and USD 1,599 billion in 2021 (Table 1), a decline that can be attributed to the reduction in economic activity in Brazil due to the COVID-19 pandemic. Since 2022, these remittances have resumed an upward trend, reaching USD 2,140 billion in 2023, recovering pre-pandemic levels.

Conversely, personal transfers from abroad to Brazil have shown consistent growth, even during the pandemic period. Between 2018 and 2023, transfers from abroad increased from USD 2,565 billion to USD 3,997 billion, with a peak of USD 4,712 billion in 2022. The significant and particularly sharp growth in these transfers between 2020 and 2022 can be linked to two main factors. First, Brazilian migrants may have felt a greater need to provide financial support to their families in Brazil during the pandemic. Second, mobility restrictions, which made it more difficult for migrants and their families to transport money across borders, may have made digital payments the only option for many.[3]

Table 1 – Personal transfers[1]

Annual flows

US$ millions

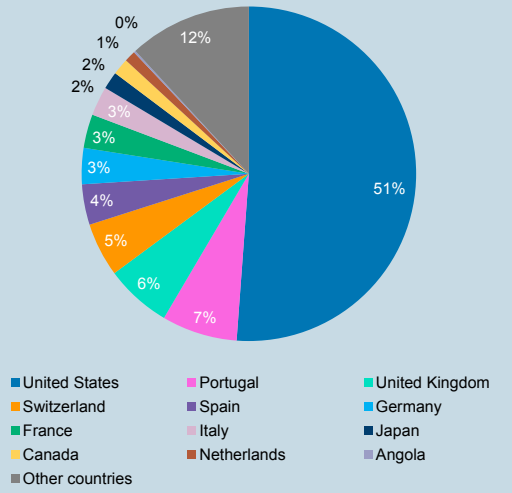
Flow	2018	2019	2020	2021	2022	2023
From Brazil to abroad	2,133	2,093	1,471	1,599	2,077	2,140
From abroad to Brazil	2,565	2,880	3,312	3,845	4,712	3,997

[1] Transfers, without economic counterpart, made between individuals residing abroad and in Brazil.

The main origins or destinations for personal transfers in Brazil are the United States, Portugal, and the United Kingdom. In 2023, the U.S. led the ranking, accounting for 51.2% of the remittances received by Brazil, equivalent to just over USD 2 billion (Graph 1). Additionally, it was also the main destination for remittances sent from Brazil, although to a lesser extent, with a share of 22.7%, or USD 487 million (Graph 2). Portugal ranked second, receiving 17.2% of remittances sent from Brazil and originating 7.33% of remittances received by Brazil. The UK, in turn, appeared in third place, with 6.4% of inflows and 6.9% of remittances.

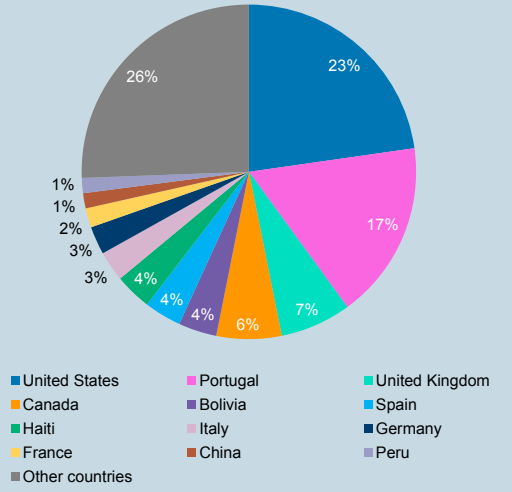
3 https://blogs.worldbank.org/developmenttalk/did-remittances-really-increase-during-pandemic.

Graph 1 – Personal transfers[1]
Transfers by country of immediate origin – 2023



[1] Transfers, without economic counterpart, made between individuals residing abroad and in Brazil.

Graph 2 – Personal transfers[1]
Transfers by country of immediate destination – 2023



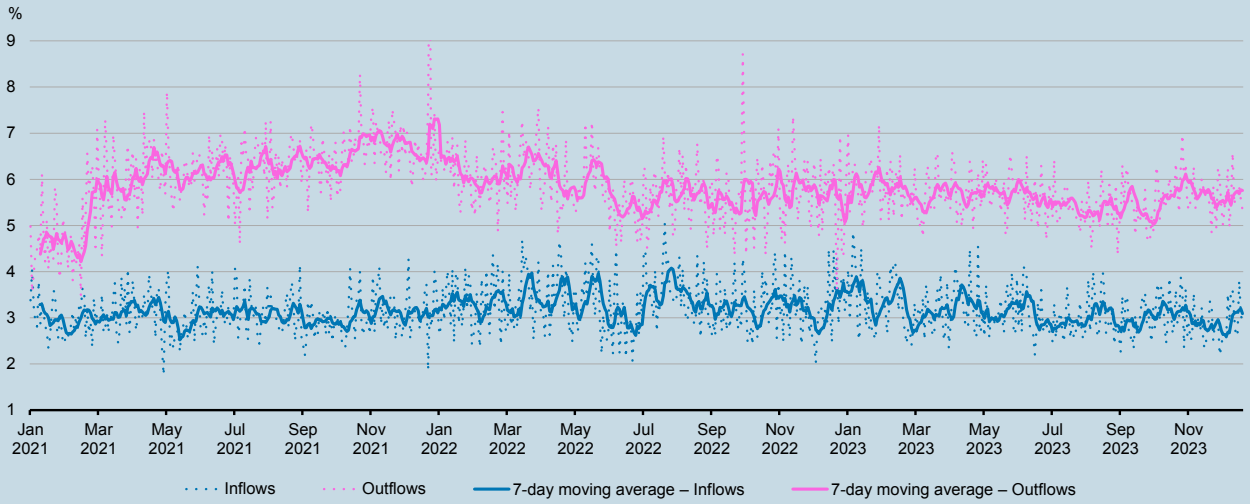
[1] Transfers, without economic counterpart, made between individuals residing abroad and in Brazil.

Remittance costs in Brazil

The costs involved in remittances have decreased, with the cost of receiving being lower than that of sending. The evaluation of the average costs of these transactions provides a comprehensive perspective on their economic impact. In 2023, the average cost for receiving USD 200[4] from abroad was around 3% of the transaction value, while the cost of sending the same reference amount abroad was around 5.6%. Graph 3 presents these figures for the period from 2021 to 2023, considering the respective seven-day moving averages, and Graph 4 shows the quarterly data for this period. The highest cost for remittances abroad was recorded in 2021Q4, decreasing afterward until mid-2022 and showing a new decline in the second half of 2023, ending 2023Q4 at 5.6%. In contrast, the variations in average costs for inflows into the country are smaller, with a peak of 3.3% in 2022Q3, but ending the last two quarters of 2023 with the lowest levels on record, at 2.9%.

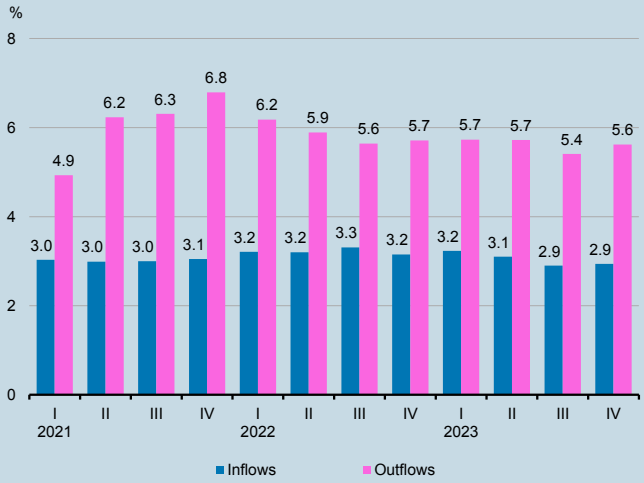
4 The World Bank considers the USD 200.00 value as a standard measure for assessing remittance costs, as it is representative of a typical remittance sent by migrant workers to their families in their countries of origin.

Graph 3 – Personal transfers[1]
Average cost of US$200 operations



[1] Transfers, without economic counterpart, made between individuals residing abroad and in Brazil.

Graph 4 – Personal transfers[1]
Average cost of US$200 operations



[1] Transfers, without economic counterpart, made between individuals residing abroad and in Brazil.

Part of this cost reduction may be associated with the initiatives to modernize exchange legislation promoted by the Banco Central do Brasil (BCB) in recent years, as part of the Inclusion dimension of the Agenda BC#. In October 2021, for example, CMN Resolution 4,942 and BCB Resolution 137 came into effect, which, among other measures, implemented the international payment or transfer service (eFX), provided digitally and with less bureaucracy. These measures allowed information provision to the BCB on remittance transactions through data aggregation, thus being less costly. In December 2022, Law 14,286 of 2021 and its regulations came into force, aiming to simplify, modernize, and bring more efficiency to the foreign exchange market in the country, enabling the reduction of operational and legal structures of foreign exchange market participants and allowing the implementation of business models that increase competition and provide more efficient services. An example of the modernization introduced is the possibility of sending funds abroad in BRL through international bank correspondence services from BRL accounts held in the country of banks not established

in Brazil. Another example is the possibility of waiving information and supporting documents when carrying out foreign exchange transactions, considering the client's assessment and the characteristics of the operation. Finally, it is worth highlighting a measure with a direct impact on the processing of foreign exchange transactions, which is the elimination of all requirements regarding the formalization of foreign exchange transactions with clients. Authorized institutions only need to be able to prove that the client consented to the agreed conditions.

To calculate the cost, it was used the Total Effective Value (VET) in BRL per unit of foreign currency. The VET is calculated considering the exchange rate, the Tax on Financial Transactions (IOF), and any fees charged. The foreign exchange regulation establishes that institutions authorized to operate in the foreign exchange market must inform the BCB of the VET of each foreign exchange transaction with a client for spot settlement of up to USD 100,000. The cost per foreign exchange transaction is estimated by comparing the VET of the transaction with the respective exchange rates, depending on the case, of the USD disclosed by the BCB, called Ptax rates, for that day. Thus, the Ptax is used as an approximation of the funding cost of remittance operations. Finally, it is worth noting that the survey only considered transactions carried out in USD. A reference amount of USD 200 was used, considering transactions within a 10% range above or below this amount.

Box 6 – Concentration in the markets of card acquiring and card issuing

In Brazil, legislative and regulatory actions have been implemented to address potential market failures in the card industry and to provide greater welfare to its end-users (merchants and cardholders) through a more contestable and potentially more competitive environment. In this context, this box aims to present elements that indicate a commitment to this policy in terms of the level of concentration in the activities of card acquiring and card issuing in the country, based on an analysis of indicators established in the literature. First, it is important to understand the characteristics of this industry.

Two-sided market theory – card industry

The assessment of the card industry can be based on the two-sided market model, as developed by Rochet and Tirole (2003). In this model, the total number of transactions would depend on both the fees charged by the payment arrangement and how these fees are split between the two groups of users. Additionally, there is a network effect, which occurs when the value of the payment arrangement for each user increases as the number of users on the other side of the market grows. In this market, externalities are costs or benefits experienced by one group of users due to the actions of another group – hence, the decisions of one group could impact the other. Generally, the authors discuss how the design of the platform, particularly the fee structure, can influence the participation and the volume of transactions.

Applying this concept to the card payments industry, as done by Rochet and Tirole (2002), one sees that one or more payment arrangements, whose facilitators are also known as brands, facilitate transactions between end-users on each side of the market. On one side of the card market are the issuer and the cardholder, and, on the other side, the acquirer and the merchant. The issuer is the financial institution (FI) or payment institution responsible for the relationship with the cardholder, i.e., for providing the payment instrument, enabling, identifying, and authorizing payment transactions, as well as managing benefit programs, when applicable.[1] The acquirer (also known as "point-of-sale machines") enables the merchant to accept the payment instrument through transaction capture and processing services. The facilitators of payment arrangements hold the brand and set the rules for business operations, as well as establish security measures so that issuers and acquirers can process card transactions with their brands.

Organization of the card industry

Due to the synergies in the activities performed by participants in the card industry within this two-sided market, where participants can leverage fee structures and network effects, the segment has incentives to exhibit vertical integration. This means participants operate both in issuing and acquiring, or even combine these activities with those of payment arrangement facilitator.

1 In the case of credit cards, the issuer is also responsible for providing credit limits, setting financial charges, and billing the cardholder.

In this context, the traditional theoretical and empirical perspective of the Structure-Conduct-Performance (SCP) paradigm argues that high concentration, characterized by the presence of a few large institutions and the consequent market power they exercise, tends to raise prices, reducing population welfare; therefore, deconcentration is important for competition. More recently, the economic literature warns that a concentrated structure characterized by entry barriers or the exercise of market power by incumbents can lead to a negative relationship between concentration and competition (Philippon, 2019).

To address this new paradigm, actions taken by the Banco Cenral do Brasil (BCB) have aimed at creating a more contestable[2] card market, either by lowering entry barriers or by creating rules that balance competitive conditions among all participants. Greater contestability, characterized by the free entry of potential competitors into a given market, has been shown to be important for promoting competition (Claessens; Laeven, 2004). As a positive externality of this movement, the regulator expects beneficial effects on reducing agents' costs and the fees charged to merchants (De Castro; Schmitz; Azevedo, 2023).[3]

Context: initiatives to deconcentrate and to increase competition in Brazil

Regarding regulatory actions in the card industry, it is important to highlight the determination of the Administrative Council for Economic Defense (Cade), starting in 2010, to eliminate the exclusivity between the acquirers Visanet and Redecard (now Cielo and Rede) with the Visa and Mastercard brands, respectively. It is also worth mentioning the publication of the BCB's directive 1 on payment cards (2006) and the Payment Card Industry Report (2010), which highlighted inefficiencies and pointed out the path to be followed by the industry. Among the recommendations of these publications is the end of contractual exclusivity in acquiring activities between scheme owners and acquirers.

On October 9, 2013, Law 12,865 came into effect, establishing the regulatory framework for payment arrangements and institutions, introducing the concept of a payment scheme, which comprises a set of rules and procedures that governs the provision of a particular payment service to the public accepted by more than one receiver, with direct access by end-users, payers, and receivers,[4] such as card-based payment schemes. This law gave the BCB the authority to regulate the sector under the guidelines of the National Monetary Council (CMN).

Under this new legal framework, the BCB has implemented regulatory actions that stimulated competition in the card industry, including interoperability between payment scheme participants and between payment schemes, open participation in these schemes, centralized risk management, neutrality of the scheme facilitator, centralized settlement of card transactions, and effective opening of acquiring (allowing new acquirers to offer previously closed brands). It is also noteworthy the Law 13,455, of June 26, 2017, which allowed price differentiation between instruments, encouraging competition between different means of payment used in the country.

The next section presents an evolutionary analysis suggesting that, from the perspective of card acquiring and credit card issuing, regulatory actions have reduced entry barriers, which tends to improve competitive conditions.

2 A contestable market means that new entrants will not face any disadvantage in technical aspects of production or product quality compared to existing participants, and that potential entrants find it appropriate to judge the profitability of entry based on prices already practiced in the market before their entry. Therefore, for perfectly contestable markets to exist, there must be no barriers to entry (Baumol, 1982).

3 In the card market, Castro, Schmitz, and Azevedo (2023) showed that deconcentration in acquiring activities, measured by market share, and increased competition, represented by the decline in the Lerner Index (Lerner, 1934), have empirical and economic relevance in explaining the decline of the Merchant Discount Rate (MDR), also known as the discount rate, paid by merchants to the acquirer for debit card transactions between 2018Q4 and 2020Q1 in Brazil.

4 See item I of art. 6 of Law 12,865, of October 9, 2013.

Concentration in card acquiring and issuing in Brazil

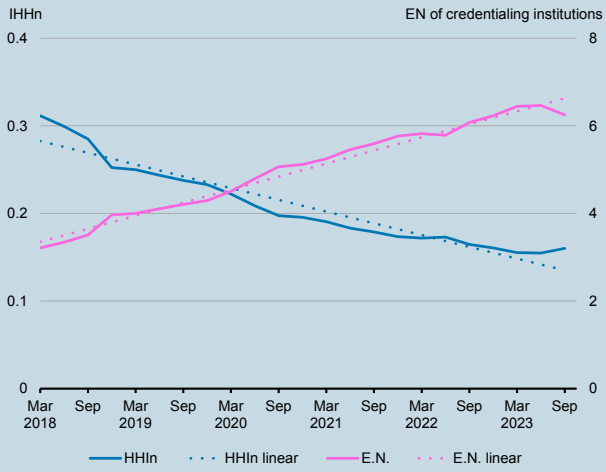
The levels of concentration in card acquiring and issuing activities are analyzed based on the Normalized Herfindahl-Hirschman Index (HHIn),[5] the "equivalent number of HHIn" (EN),[6] and the Concentration Ratio of the Top Four FI (CR4)[7] (Bain, 1951; Vanhoose, 2022).

Evolution of concentration in debit and credit card acquiring

The acquiring market, which was concentrated in two competitors until 2010, expanded to more than 25 in 2023. The entry of new competitors led to changes in commercial strategies, such as the end of the practice of charging rental fees for point-of-sale machines by acquirers, who began to sell equipment to merchants to process their transactions or provide them at no cost. Moreover, acquirers entering the market during this period began to offer their services to small merchants who were not previously well-served by incumbent acquirers, contributing to the inclusion of micro and small entrepreneurs in new banking relationships. Between 2020Q1 and 2023Q3, there was a 107% increase in the number of active accredited merchants.[8]

Graph 1 shows, the concentration of credit and debit card acquiring activities, measured by the HHIn and the EN, has decreased since the beginning of the available time series (2018Q1). More recently, there has been a slowdown in the decline of the HHIn. These results also indicate a 0.49% decline in the concentration level in the acquiring market, measured by the HHIn, from high (0.31) to moderate (0.16) between 2018Q1 and 2023Q3. The EN increased from 3.21 in 2018Q1 to 6.25 in 2023Q3, out of a total of 28 acquirers in 2023Q3, meaning that the value of transactions processed with cards would occur in 6.25 equivalent institutions in terms of market share in acquiring activity.

Graph 1 – HHIn and EN in credentialing



In line with the behavior of the HHIn, there was a decrease of 12.2 percentage points (p.p.), or 14.3%, in the share of the top four acquirers (CR4)[9] in the total value of transactions processed between 2019Q1 and 2023Q3, as shown in Graph 2. The CR4 decreased from 84.8% to 72.7% during this period, despite an increase in this

5 The result of the Normalized HHI is obtained by summing the squares of each acquirer's or issuer's market shares relative to the total value of transactions in decimal form. An HHI between 0 and 0.10 indicates low concentration, above 0.10 to 0.18, moderate, and above 0.18, high concentration.

6 The EN reflects the number of institutions with equal market share that would generate the observed HHI; therefore, the higher the EN, the lower the concentration.

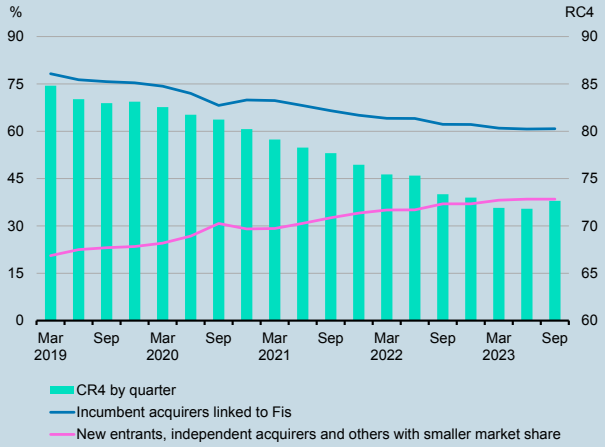
7 The CR4 is the percentage share of the top four acquirers or issuers in the total value of transactions.

8 An active merchant is defined as one that has had at least one transaction in the 180 days preceding the end of each reference quarter.

9 In 2023Q3, the top four acquirer acquirers by value of transactions processed, in descending order, were: Rede, Cielo, GetNet, and Stone.

index in the most recent quarter available. Graph 2 also shows the advancement of new entrants,[10] independent acquirers, and others with smaller market shares, alongside the decline in the market share of incumbent acquirers linked to FIs, which has contributed to the deconcentration. It is also important to note a recent change in the market leadership for acquiring.

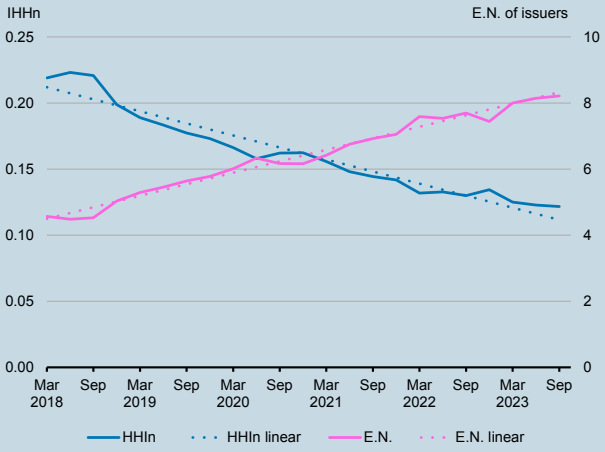
Graph 2 – Market share of acquirers in total processed value



Evolution of concentration in credit card issuing

Regarding the credit card issuing activity, the reduction in concentration can be observed through the decline in the HHIn between 2018Q1 and 2023Q3 (Graph 3). The level of concentration decreased from high (0.22) to moderate (0.12), representing a 44% deconcentration over the analyzed period. EN increased from 4.57 in 2018Q1 to 8.22 in 2023Q3, in a market with nearly 74 issuers.

Graph 3 – HHIn and E.N. in credit card issuance



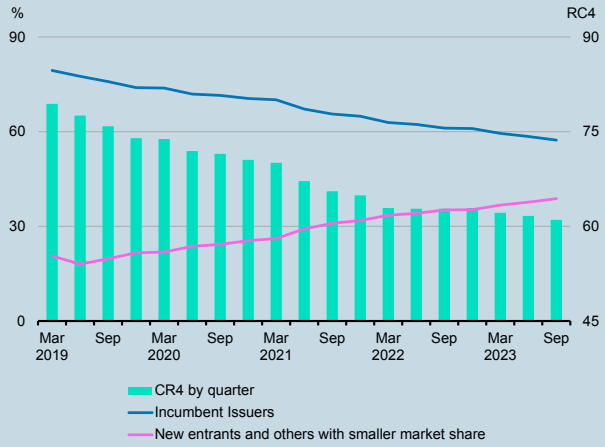
The deconcentration in credit card issuing is also observed through the evolution of the CR4, as shown in Graph 4. The share of the top four issuers[11] fell from 79.4% in 2019Q1 to 61.0% in 2023Q3, which means a decrease

10 New entrants are those competitors who have started providing the service more recently, such as Stone and PagSeguro, compared to institutions that were already offering the service, also known as incumbents. The decision to enter a new market depends on existing entry barriers and the reaction of incumbent firms.

11 In 2023Q3, the top four issuers by value of transactions, in descending order, were: Itaú-Unibanco, Nubank, Banco do Brasil, and Bradesco.

of 18.4 p.p. or 23.1%. Graph 4 also shows that the reduction in CR4 is largely due to the increased share of new entrants and others with smaller shares, as well as the decline in the share of incumbent issuers. Within the top four, the share of bank financial institutions as issuers decreased from 79.4% in 2019Q1 to 57.3% in 2023Q3, while the share of non-financial payment service providers increased from 0.78% to 13.7%.

Graph 4 – Market share of issuers in total value



Final remarks

The BCB has been adopting initiatives to eliminate entry barriers and balance competitive conditions between incumbents and new entrants, with the expectation that these benefits can be extended to consumers in the form of reduced acceptance costs of the payment instrument and more efficient service delivery. The data presented indicate that the regulatory actions undertaken by the BCB have created the right incentives to achieve these objectives, as there has been an entry of new participants and a consequent deconcentration in the activities of payment card acquiring and credit card issuing in recent years.

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Box 7 – Expansion of active users of financial services

This box analyzes the evolution of the number of active users in financial and payment systems. Payment and/or credit operations carried out by households and companies are considered. They are grouped according to specific segments of the institutions involved. The analysis covers the evolution of the relationship from June 2018 to December 2023. This box is part of a process of developing new indicators to monitor competition and efficiency in the National Financial System (SFN)/Brazilian Payment System (SPB), aiming to increase competition and promote the digitalization of financial operations.

An active user is defined as the household or company within a specific segment[1] that has carried out payment transactions and/or credit operations in the last three months. Payments made or received via Pix and/or Electronic Available Funds Transfer (TED) are considered active users in payment operations.[2] Active users in credit operations are those with an active position in the Credit Information System (SCR).[3] The active users' metric provides a more accurate assessment of the evolution of the relationship between financial consumers and the products and services offered in the SFN/SPB, since many clients open bank and/or payment accounts or receive credit cards but actually do not use them. Therefore, this metric better reflects the financial relationship.

The segments of financial and/or credit institutions are defined based on representation criteria, operating model, and customer service characteristics. The following segments are analyzed: the five largest incumbents; digital credit/services; traditional credit; non-bank credit; and the credit union system (Table 1).[4]

1 Segment is the grouping of conglomerates with similar characteristics to count unique Individual Taxpayer Register Numbers and Corporate Taxpayer Register Numbers. For example, a client who carried out operations in the last three months in two conglomerates within the same segment will be counted only once. If transactions occurred in conglomerates of different segments, the client will be counted once in each segment.

2 Users who only use debit or prepaid cards, as well as those who withdraw funds directly from ATM or bank branches, might not be considered, although most of these users are captured by the methodology when receiving funds in bank or payment accounts via Pix or TED.

3 Active operations in the SCR include both credit operations and payment transactions made via credit cards.

4 Two other segments were not considered in this box due to their lower representation: development/financing/industry and capital market/business.

Table 1 – Segmentation of financial and payment institutions in the SFN/SPB

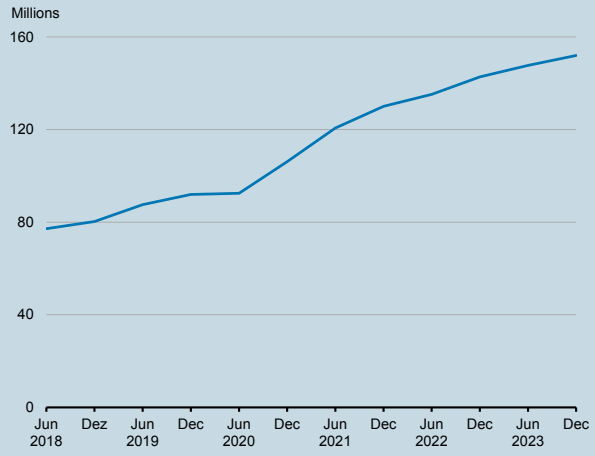
Segment	Description	Number of Conglomerates[1]
5 largest incumbents	5 largest multiple banks, public and private, by total assets	5
Digital credit/services	Banking and non-banking institutions that present a predominantly digital operating model or act in the provision of financial services, including payment institutions, commercial banks, direct credit companies, and peer-to-peer lending companies.	163
Traditional credit	Banking and non-banking institutions that operate with traditional business models in retail and wholesale, including commercial banks, public regional banks, foreign branches, and finance companies.	61
Non-bank credit	Non-banking institutions that act in credit promotion, including finance companies, microcredit companies, mortgage companies, real estate credit companies, savings and loan associations, and leasing companies.	78
Cooperative system	Cooperative banks and credit cooperatives	3

[1]For classification purposes in a given segment, the main activity of the leading institution of the prudential conglomerate is considered. The sample represents 69.8% of the conglomerates as of December 2023.

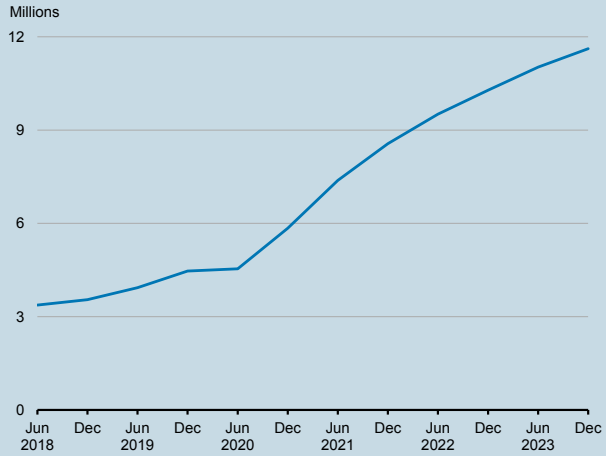
Financial inclusion numbers

The number of active users in the SFN/SPB has more than doubled since 2018, mainly due to increased digitalization of financial services, driven by the emergency aid during the pandemic, the Pix launch, and the entry of new institutions. Two milestones were crucial for this leap in financial inclusion: the opening of bank accounts through the emergency aid program via *Caixa Tem* during the Covid-19 pandemic and the Pix launch in November 2020. The number of active users grew 103.2% from June 2018 to December 2023. The number of households increased from 77.2 million (46.8% of the adult population[5]) to 152.0 million (87.7% of the adult population), representing a 97.0% increase in the client base. Among companies, including individual micro-entrepreneurs, the number expanded from 3.4 million to 11.6 million clients, a growth rate of 244.5% (Graphs 1 and 2).

Graph 1 – Active Customer Growth
Household



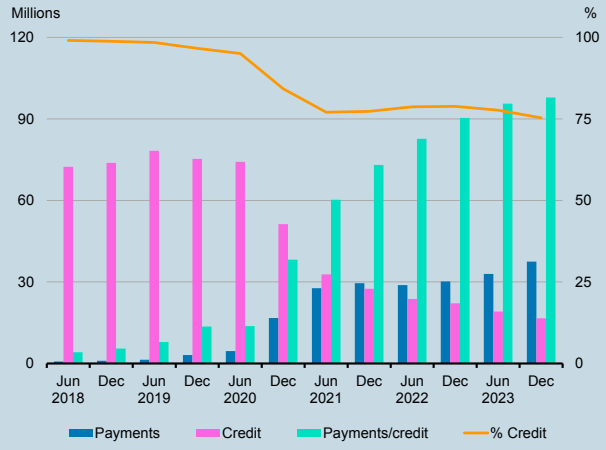
Graph 2 – Active Customer Growth
Corporate



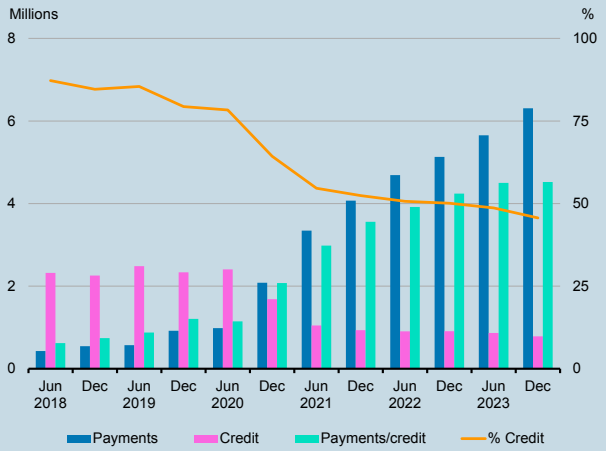
5 Population estimated by the IBGE aged 15 years or over, table 7358.

Households stand out for their extensive use of credit cards, while companies are more intensive in payment transactions via TED and Pix. About 75% of households had outstanding credit operations between July 2023 and December 2023,[6] including the balance of outstanding credit card operations.[7] At that date, of the 152 million active household clients, 10.9% had only credit operations in the SCR, 24.7% had only payment operations, and 64.4% had both credit and payment operations (Graph 3). Regarding active corporate clients, out of the 11.6 million active clients, 6.8% had only credit operations in the SCR, 54.3% had only payment operations, and 38.9% had both credit and payment operations (Graph 4).

Graph 3 – Active Customer Growth
Household, by activity

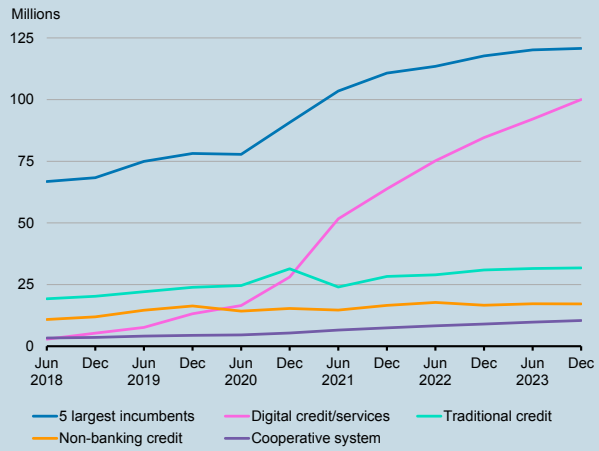


Graph 4 – Active Customer Growth
Corporate, by activity

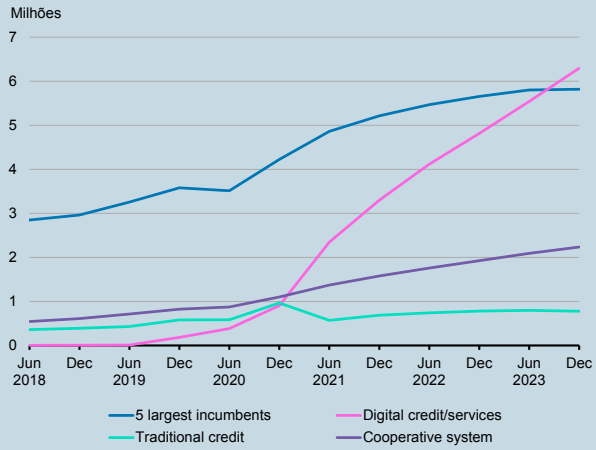


The total number of active users expanded significantly as of the second half of 2020 with the Pix launch, particularly in digital credit/services institutions. During this period, the growth of active household users was over 80%, and 3,000% for the segments of the five largest incumbents and digital credit/ services, respectively. The number of active corporate users exceeded 5.8 million for these two segments, with the digital credit/ services segment having more active clients than the five largest incumbents on the last reference date. The credit union system was also noteworthy, presenting an increase of more than 1.6 million active users during the same period (Graphs 5 and 6).

Graph 5 – Active Users
Household



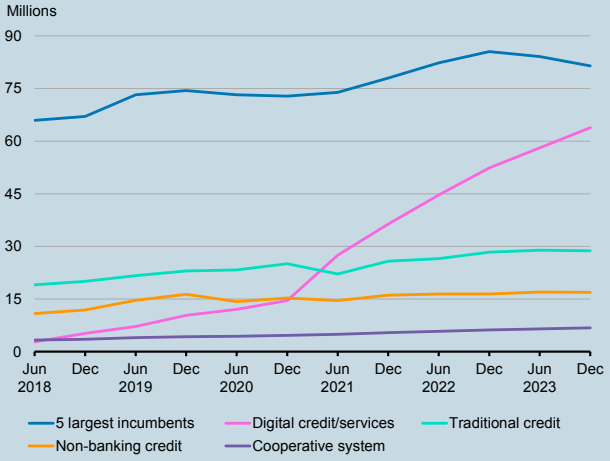
Graph 6 – Active Users
Corporate



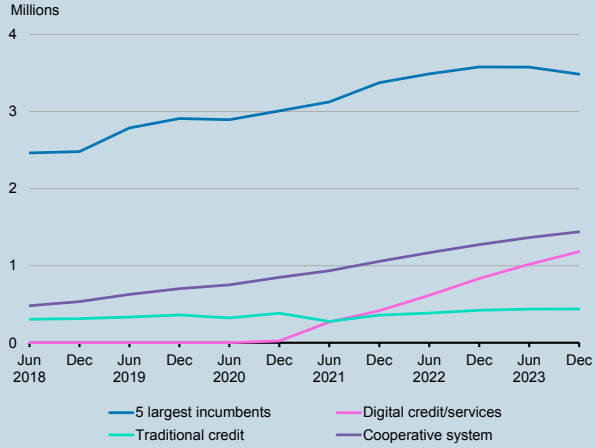
6 The postpaid payment instrument represents approximately 68% of the number of active household clients in the SCR.
7 For the purposes of this study, three major groups of SFN/SPB operations are considered: payments (operations via TED and Pix), credit (active portfolio in the SCR), and payments/credit (clients carried out operations via TED/Pix and still had an active portfolio on the reference date).

Active users in credit operations alone were more than 63 million households and more than 1 million companies in December 2023, highlighting the wide difference in growth of the digital credit services segment compared to others. This growth may reflect an increase in credit card operations in this segment. For households, the traditional credit and non-bank credit segments reached almost 30 million and 17 million active credit users, respectively, on the same reference date. For companies, the credit union segment increased its base of active credit users by nearly 200.0% from June 2018 to December 2023, while the incumbents segment grew at a slower rate (41.5%) during the same period (Graphs 7 and 8).

Graph 7 – Active Users
Household, credit only

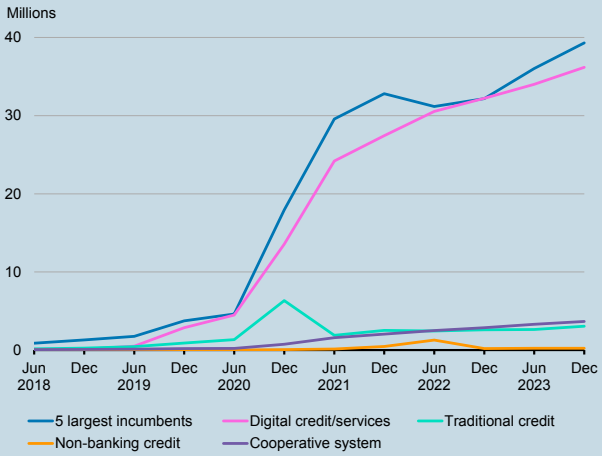


Graph 8 – Active Users
Corporate, credit only

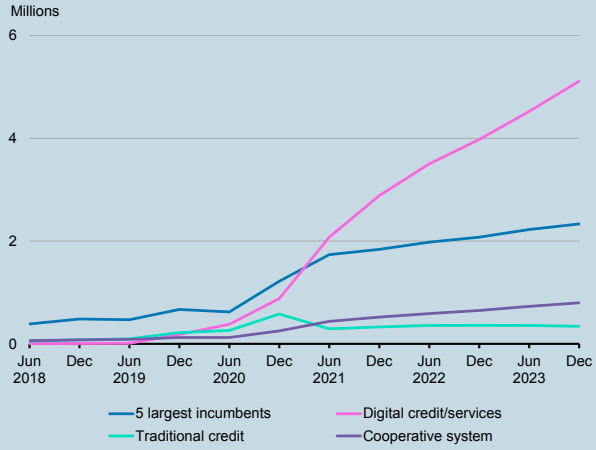


The number of active users in payment operations alone increased significantly between June 2020 and June 2021. In the segments of the five largest incumbents and digital credit/services, 39.3 million and 36.2 million active household users, respectively, performed at least one payment transaction in the last three months. For companies, the number of active users performing payment transactions also grew, especially in the digital credit/services segment, which has outpaced incumbents in the number of active clients since the first half of 2021 (Graphs 9 and 10).

Graph 9 – Active Users
Household, payments only

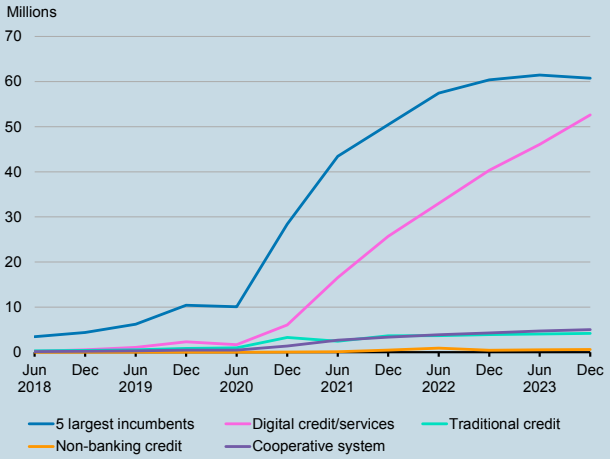


Graph 10 – Active Users
Corporate, payments only

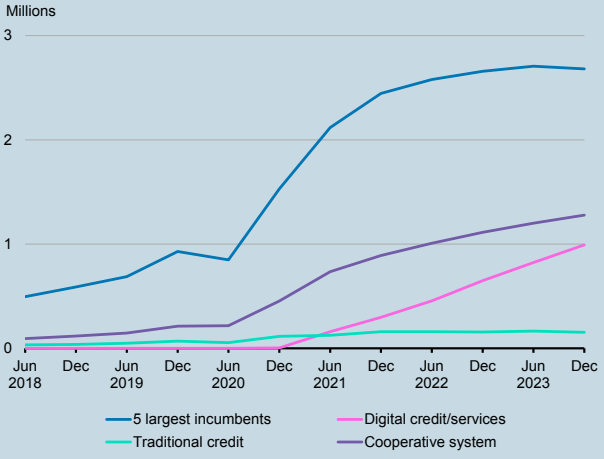


The number of active users using both credit and payment operations also grew significantly. For households, the growth was higher in the segments of the five largest incumbents and digital credit/services. For companies, the highlights were the five largest incumbents and the credit union system. This accelerated growth in active users was a result of both the Pix launch and an increased availability of credit cards.

Graph 11 – Active Users
Household, payments and credit



Graph 12 – Active Users
Corporate, payments and credit



Conclusion

This box analyzed the evolution of active users in the SFN/SPB, considering credit operations (SCR), payment operations (Pix and TED), and both activities combined, segregating the information by different segments of SFN/SPB institutions. A keen expansion in active users of financial and/or payment institutions across all analyzed segments was observed. In payment operations, the growth of active users was driven by the Pix launch, while credit card operations boosted active credit users.

The digital credit/services segment showed the greatest increase in its total base of active users. This growth was primarily driven by new market entrants during the analyzed period, due to the offer of Pix and credit cards. The incumbents segment also showed significant growth, due to, among other reasons, public policies implemented through the opening of household digital accounts. The credit union system experienced important growth in active corporate users. The remaining segments showed stability in the number of active clients.

Box 8 – Results of the BCB liquidity supply – 2020-2023

From 2020 to 2023, the Banco Central do Brasil (BCB) implemented liquidity measures in response to the economic and financial impacts caused by the Covid-19 pandemic. These measures, which ended in the second half of 2023, restored the functionality and effectiveness of the typical BCB's role in providing liquidity financial assistance to the National Financial System (SFN). This box provides a summary of the results achieved by these measures and the optimized risk management of the BCB's balance sheet.

Temporary liquidity support measures resulting from the Covid-19 pandemic

During the Covid-19 pandemic, the BCB adopted two measures to support liquidity in BRL: the creation of the Special Liquidity Temporary Facilities (LTEL-Debentures), and the Special Liquidity Temporary Facilities for the acquisition of Guaranteed Financial Letters (LTEL-LFG). Operationally, both facilities followed the system of loans against fiduciary guarantees[1] used by the BCB in its new liquidity financial assistance model.

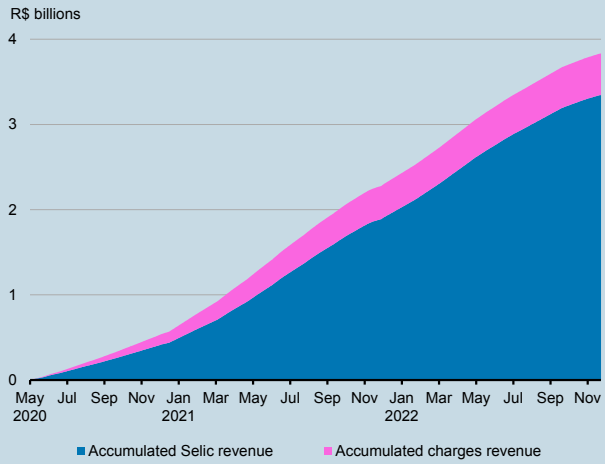
The Special Liquidity Temporary Facilities (LTEL-Debentures), which was in effect from April 6 to April 30, 2020, aimed to maintain the regular functioning of the secondary market for debentures and was based on a dual guarantee system. The first system required potential borrowers to pledge debentures acquired in the secondary market to the BCB. The second system required borrowers to maintain reserve requirements on time resources and savings deposits equal to the total amount raised. Operations under this facility, which had its last remaining balance closed on October 16, 2020, involved three financial institutions and totaled approximately BRL 1.4 billion, generating revenues of around BRL 766,000.00 for the BCB.

The LTEL-LFG aimed to maintain adequate liquidity levels in the credit market, preventing possible disruptions. Unlike LTEL-Debentures, the LTEL-LFG accepted not only debentures but also commercial papers and credit operations registered in the SCR as collateral for the financial bills backing the loan operations.

Initially, this facility was scheduled for only one phase of contracting in successive tranches from April to December 2020. However, due to strong demand, it had an additional phase from December 2021 to December 2022. Considering both phases, 245 operations were carried out with 51 financial institutions. The total contracted amount reached approximately BRL 121 billion, resulting in BCB revenues of BRL 3.83 billion, with BRL 3.34 billion regarding the Selic Rate and BRL 0.49 billion from other charges.

1 In this system, assets previously deposited by financial institutions form a collateral pool, based on which the BCB sets credit limits for future credit operations.

Graph 1 – LFG – Accumulated Selic revenue and charges



Regarding the BCB's risk management for the temporary facilities available to financial institutions from 2020 to 2022, the system of granting loans against collateral pools proved to be a robust instrument for safeguarding the BCB from operational risks. This is corroborated by the absence of losses, defaults, or payment delays in this period. Furthermore, although not being the primary objective of these facilities, their financial balance was positive and did not burden the BCB's balance sheet.

New financial liquidity facilities

In November 2021, the BCB began to implement new Financial Liquidity Facilities (LFLs) designed to establish permanent tools for providing liquidity to the SFN. In its current phase, the assets accepted as collateral for LFLs are debentures and commercial papers.

This process has an evolving agenda with phases that include, among other improvements, expanding the range of collateral assets for credit operations with financial institutions. Bank Credit Notes (CCBs) will be accepted as collateral in LFLs operations starting in July 2024. The inclusion of CCBs will occur in phases, by credit operations type, starting with the incorporation of CCBs representing credit to companies for working capital, foreign trade, and rural financing operations. Subsequently, operations with households guaranteed by CCBs will be included.

The initial inclusion of this new asset class is expected to create an additional credit limit of up to BRL 100 billion for financial institutions.

In general terms, LFLs follow the system of loans against fiduciary guarantees, and access to resources can be done through two types of facilities: the Immediate Liquidity Facility (LLI) and the Term Liquidity Facility (LLT). The LLI is a Standing Facility[2] for managing cash flow mismatches of financial institutions for up to 45 business days. The LLT, in turn, requires a discretionary decision[3] by the BCB and aims to address unforeseen liquidity needs due to asset-liability mismatches. Operations under this facility can be contracted for up to 359 calendar days.

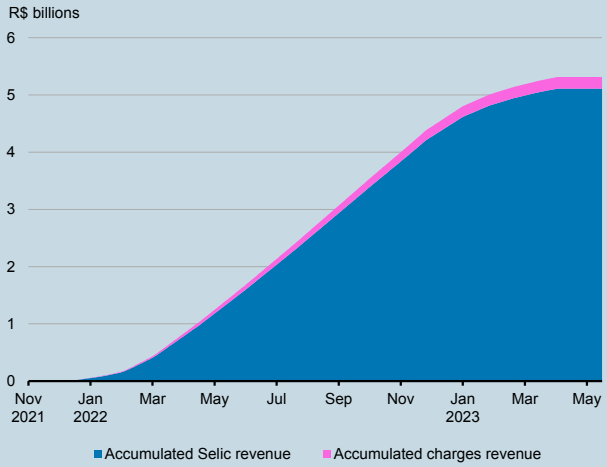
2 A facility with regular validity without the need for specific authorization per operation, established, in Brazil, in the form of loan against assignment of guarantees, made up of high-quality private bonds. Loan operations are automatic as long as there is sufficient collateral to support them. In terms of deadlines, releases can be intraday (at zero cost) or up to 45 business days (at the cost of Selic + spread).

3 The release of resources requested by financial institutions depends on prior authorization from the BCB.

Although access to LLTs resources is discretionary by nature, it is expected that, in situations considered exceptional, it may be done automatically based on the attribution of a prior authorization limit, established on the initiative of the BCB, with the aim of providing liquidity to LFLs participants in a comprehensive way.

The total value of contracted operations since the LFLs became fully operational, including both LLI and LLT modalities, was BRL 64.9 billion, involving seven financial institutions. From November 2021 to June 2023, accumulated revenues from interest and charges reached BRL 5.3 billion, with approximately BRL 5.1 billion (96% of the total) regarding the Selic Rate and BRL 200 million (4% of the total) coming from additional charges (Graph 2).

Graph 2 – LFL – Accumulated Selic revenue and charges



Conclusion

The economic effects of the Covid-19 pandemic required central banks worldwide to act to maintain financial stability and effectively implement monetary policy. Although the BCB had not actively supplied liquidity to the financial market for over two decades, the Brazilian monetary authority demonstrated the ability to respond effectively to market dysfunctions.

The temporary facilities adopted from 2020 to2022 not only helped mitigate the economic and financial effects from the pandemic but also generated revenue for the BCB without incurring losses. Furthermore, these provisional operations served as a testing ground for the subsequent implementation of the Liquidity Financial Facilities, a permanent tool for the BCB's liquidity provision to the financial system.

As part of the evolving agenda, the inclusion of CCBs as collateral starting in July 2024 enhances the LFL and strengthens the BCB's liquidity provision mechanisms.

Box 9 – A Personalized, free, and scalable financial education solution: *Meu Bolso em Dia* Platform

The *Meu Bolso em Dia* Financial Education Platform, launched in November 2021, is the result of the technical cooperation agreement (ACT) between the BCB and the Brazilian Federation of Banks (Febraban) and the commitment of financial institutions to extend financial education to an increasing number of citizens. The ACT and the Platform are part of the BCB Strategic Agenda, the Agenda BC#, under its Education dimension.

One of the fundamental challenges of this type of project is customized financial education to meet individual needs. Experience shows that "one size fits all" financial education projects have a limited reach and usually do not achieve the stipulated objectives. Citizens' needs regarding their financial situations depend on several factors such as income, level of indebtedness, life cycle, prior knowledge and personal objectives, among others. Therefore, the premise for developing the tool was to create personalized learning solutions. For this purpose, the Brazilian Financial Health Index (I-SFB) was developed.

The I-SFB is a tool built to assess a citizen's financial health. Based on this assessment, the artificial intelligence tools embedded in the Platform can suggest personalized learning paths to improve each user's financial health. In addition to personalized trails, users are free to explore all the content and tools available according to their interests, affinities, and learning styles. The stimuli to which users are exposed are personalized by artificial intelligence based on factors such as duration, content, modality (text, animation, audio), and activities (extra tests, use of calculators, simulators).

Besides the development and dissemination of the methodology and individual financial health assessment, the I-SFB has been measured annually since 2020, with a sample of 5,000 individuals, generating public reports for various stakeholders. Both the methodology and results from different measurements can be accessed on the website (Portuguese only) Financial Health Index – Febraban.

In addition to this personalization, the Platform has a series of unique features. The first are the guiding principles of the platform: a) to generate value for citizens through useful and relevant learning trails for their financial life; b) to promote access to all Brazilian citizens; and c) to provide content and tools in language and formats suited to the users profiles and their financial education needs. The second unique feature is the platform's free access, facilitating low-income individuals' participation.

The technical quality of educational and technological resources is also a significant feature. The platform is game-based, that is, characterized by the strategic use of game logic, and includes the insertion of new learning trails and periodic improvements to its architecture, based on continuous learning through the interaction with users.

The *Meu Bolso em Dia* Platform also stands out for its content aimed at improving users financial health, rather than focusing on selling financial products or branding for a financial institution. Independent experts in areas

related to financial health, such as financial planners, educators, psychologists, and specialists in assisting over-indebted people were hired.

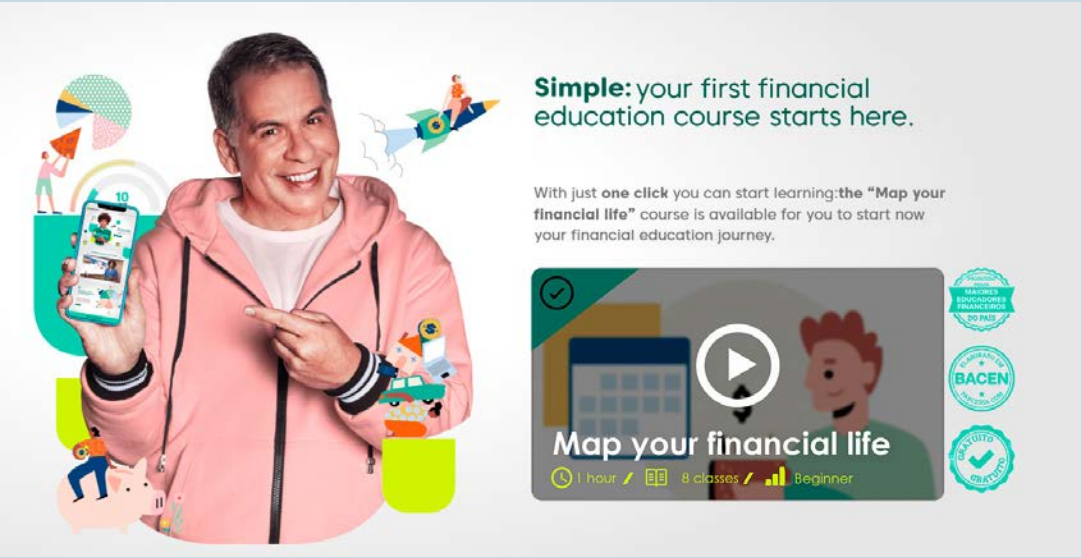
The platform was developed to encourage achievements, allowing users to exchange progress for "incentives" offered by banks. This exchange takes place within the platform and represents an innovation within the financial education ecosystem.

The platform development process went through several phases. In 2020, the project governance model was established. Subsequently, several product development phases were deployed, such as technology and access structure architecture, profiling and modeling for user's engagement, the design of learning paths, and the platform's piloting. The testing phase included guerrilla testing,[1] beta testing with users with lower I-SFB levels (indebted people), adjustments based on the testing phase, integrations, and new tests. Finally, the platform was approved and officially launched in November 2021.

In parallel with the investment in the technical development of the tool, a communication strategy was drawn up. Two national campaigns were launched: the first, in 2022, featuring the wellness influencer Marcio Atalla, as well as smaller local influencers and the Digital Favela channel, reaching[2] over 61 million people. In 2023, a new campaign was launched with actor and influencer Leandro Hassum, a team of small local influencers, and Digital Favela, impacting over 89 million people through broadcast and cable television and social media.

From its official launch to February 22, 2024, the Platform has had over 3.3 million hits, when 950 thousand unique users accessed the first page of the platform (Picture 1) and over 170 thousand people registered to have access to trails that were personalized according to the I-SFB assessment and the stated goals (e.g., getting out of debt, buying a home). Of the total registered users, 84% are classified within the lowest financial health range: poor, very low, and low. The platform has a section called "*nossos números*" ("our numbers") that shows the tool's main statistics and is updated daily (Pictures 2 and 3).

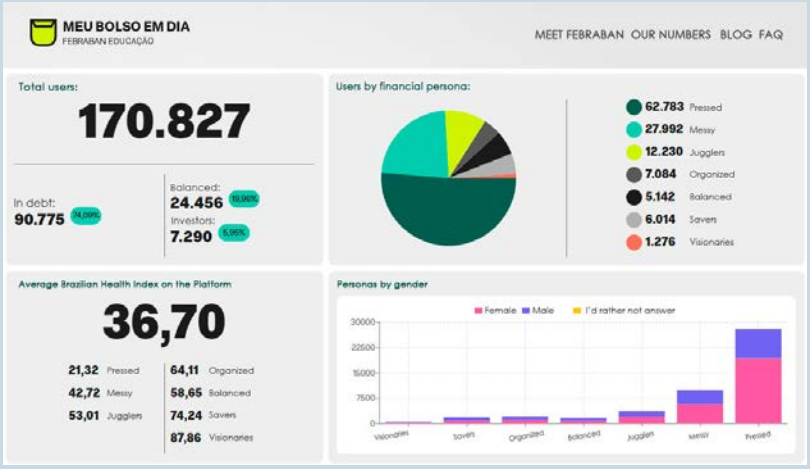
Picture 1 – First page of the "*Mapeie sua vida financeira*" ("Map your financial life") trail



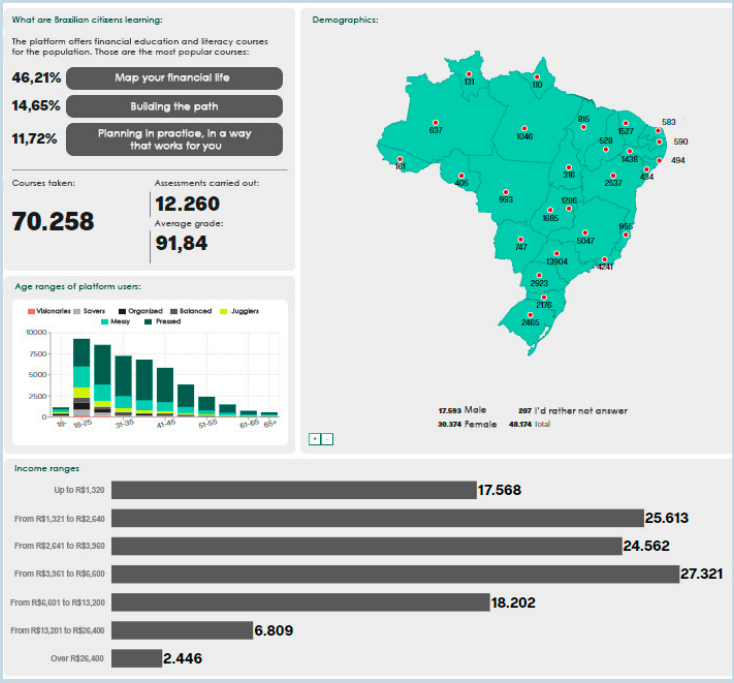
1 The guerrilla testing intended to validate the concept of the Platform and its navigation flow with selected indebted users. In-depth interviews were conducted with these users, and the navigation flow was analyzed. The research pillars were comprehension, navigation, attractiveness, and usability.

2 Number of viewers of the advertising campaigns, reported by Febraban.

Picture 2 – "*Nossos números*" ("Our numbers") area



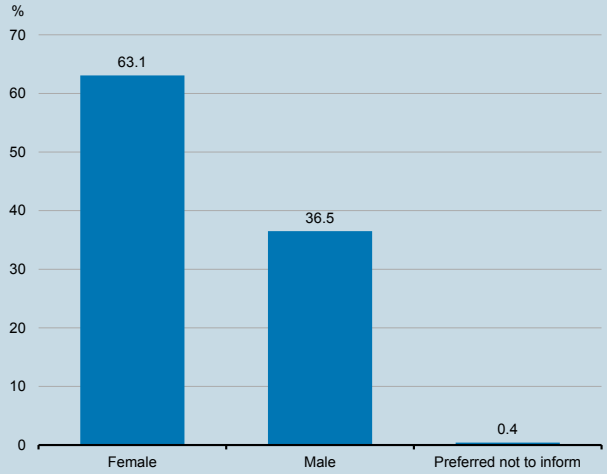
Picture 3 – "*Nossos números*" ("Our numbers") area (cont.)



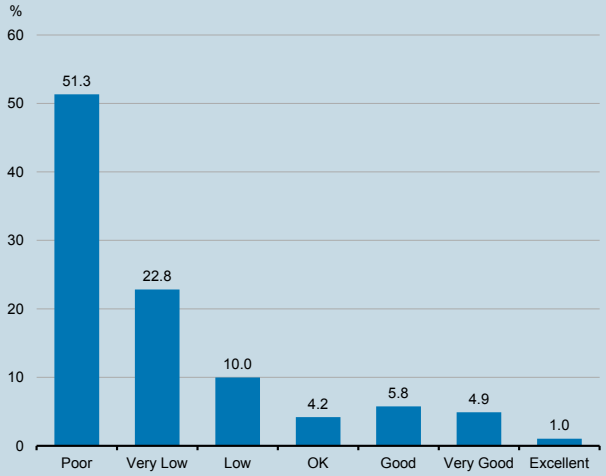
Other data[3] reveal that there is a prevalence of female users (Graph 1). Regarding users' I-SFB (Graph 2), a large share of users have low financial health. Regarding age distribution (Graph 3), although users are concentrated in the age range between 18 and 45 years old, the tool reaches people of all ages, mainly adults. As for the average use time (Graph 4) data show that users, on average, spent four minutes logged in per day, with desktop users staying logged in for longer and those accessing via mobile phones staying logged in for less time.

3 Data as of February 22, 2024.

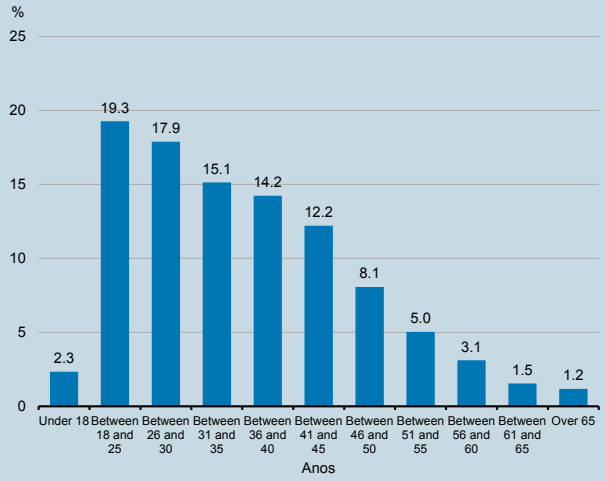
Graph 1 – Users' Gender



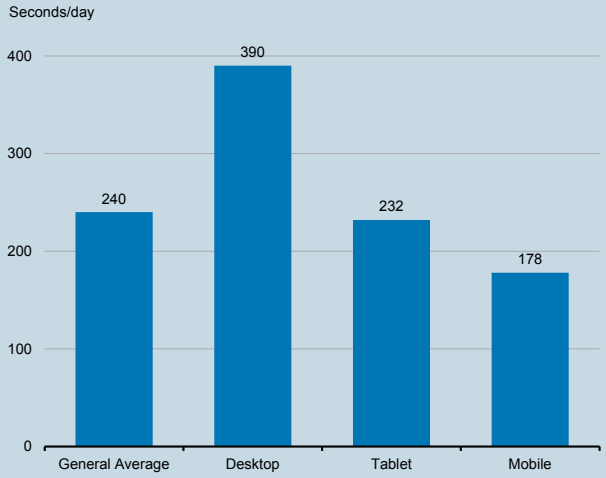
Graph 2 – I-SFB Profile



Graph 3 – Age Range of Users



Graph 4 – Average Usage Time



The platform, in general, offers courses on all areas of personal finance, especially debt, planning, and investments. However, there was a greater interest in some of the available courses. The most accessed course was "*Mapeie sua vida financeira*"[4] ("Map your financial life") (46.21%), followed by "*Construindo o caminho*"[5] ("Building the path") (14.65%) and "*Planejamento na prática, de um jeito que funcione para você*"[6] ("Planning in practice, in a way that works for you")(11.72%). Therefore, these data show that users prefer "financial planning" courses.

Considering the initial data obtained and the existing analysis possibilities, the objective for the coming years is to conduct an in-depth impact assessment. By definition, an impact assessment helps to understand to what extent and for what reason an intervention is promoting change. Evaluating the *Meu Bolso em Dia* Platform will provide practical conclusions to improve its design and and the design of similar financial education solutions aimed at promoting the financial health of its users.

Therefore, the objectives for the coming years include: i. expanding the platform's reach through communication campaigns, improving the tool's usability, and continuously adding new content aligned with users needs; and ii. carrying out an impact assessment of the platform through a specific protocol, enabling adjustments and improvements.

4 Financial planning course that helps users to understand their finances and start organizing their expenses.
5 Course that guides users to organize and plan their financial life.
6 Course that teaches users how to find a method associated with their individual routines in order to make it easier to manage their money.

Box 10 – The short-term impact of the *Aprender Valor* program on the financial literacy of children and youth

Introduction

The *Aprender Valor* (Value Learning) program is an initiative of the Banco Central do Brasil (BCB) aimed at supporting public schools and education networks in developing financial education as a cross-cutting theme in primary and middle education (ages 6-14) in Brazil. Since 2020, the program has provided participating schools with teacher training; educational projects that present financial education embedded within compulsory subjects; and financial literacy assessment instruments.[1] The choice of which resources to use is up to the school, so engagement levels can vary from school to school.

There are many challenges in implementing a nationwide educational program such as *Aprender Valor*, especially given the characteristics of our continental-size country. In this context, the first challenge is to publicize the *Aprender Valor* to schools all over the country and encourage them to voluntarily join the program. The second challenge is to encourage school managers and teachers to get involved and take advantage of all the available educational resources. A third challenge is to measure the program's effectiveness to identify whether it is achieving the planned results.

In 2022, the BCB set out to address the latter challenge. To measure the short-term impact of the training courses and school projects on student learning, an impact assessment was carried out. Financial literacy tests were applied on students from a sample of schools that had recently joined the program.

The sample consisted of 3rd, 5th, 7th and 9th grade students from 783 state and municipal public primary and middle schools. All schools were,[2] drawn from those that had voluntarily joined the program between November 2021 and February 2022. The 52,078 students who composed the sample came from 2,064 different classes.[3] The schools in the sample were divided into two groups – a control group and a treatment group. The control group (386 schools) did not have access to the educational resources offered on the program's platform throughout 2022.

1 Further details on the *Aprender Valor* are available at (Portuguese only): Aprender Valor.

2 Students in multistage classes were excluded. Multistage classes are those that bring together students from more than one school year. Exclusive special care (students enrolled in specific educational needs classes, such as students with disabilities), indigenous schools, and schools with differentiated location were also excluded. This exclusion was due to the small number of schools with these profiles in the population and the specific educational needs of these students, which would probably require a separate assessment. For operational reasons, only schools with ten or more students were considered eligible, according to the 2020 School Census – the more recent available at the time – were considered eligible.

3 The sample size was calculated to allow the identification of a difference of 20 points in the average changes of the financial literacy proficiency score, on a single scale proposed for the entire primary and middle education with a range of 0 to 1,000 points, at a significance level of 5% and with a power of 80%. A standard deviation of 100 points, an average class size of 25 students, and an intraclass correlation of 0.30 were considered. Based on information on the program implementation and participation in formative evaluations in 2021, an increase of 50% was applied to absorb likely losses. The sampling plan for the impact assessment comprised a stratified sample, whose strata were combinations of Brazil's five geographic regions (North, Northeast, Central-West, Southeast, and South) and the municipality location (whether metropolitan region or interior). In each of the ten strata, schools were split into groups, one eligible to offer the program in the early stages of primary education (1st through 5th grades) and the other eligible to offer the program in the lower secondary education (6th through 9th grades). The schools in each group were randomly selected into treatment or control using a simple random sample. In each primary school 3rd and one 5th grade class were selected. In each middle school, one 7th and one 9th grade class were selected. All the students in these selected classes were observed. After drawing the sample, the treatment and control groups were drawn, dividing the numbers in each stratum evenly between the groups.

This means schools in the control group were not offered teacher training in financial literacy or educational projects that integrated financial education into compulsory subjects. In turn, the treatment group (397 schools) had full access to these resources on the platform. Access to the educational resources was granted to all schools in the control group after the impact assessment was completed (November 2022).

The financial literacy tests were designed specifically for the program participants to measure the assimilation of the contents covered in the educational projects. Different tests were administered to the 3rd, 5th, 7th, and 9th grade classes, with 24, 27, 30, and 33 test items, respectively. Some common items and some different ones between the tests guarantee the progression of the level of difficulty and also support the proposal for a single scale of financial literacy proficiency for the entire primary and middle education.

The first assessment (entry test) was carried out between April and May 2022. The second (exit test), between October and November 2022.

Assessment results

Overall, information was obtained from 48,613 students (93.3% of the sample).[4] However, due to the mobility of students between schools and logistical difficulties in the field, only 25,420 students (52.3%) had proficiency test scores identified at both assessment moments. There were no distinct distributions of region-area of location ($p = 0.727$) and grade ($p = 0.810$) between the groups.

The score on the financial literacy proficiency test was obtained via Item Response Theory (IRT).[5]

Initially, to assess the effect of time (difference between entry and exit tests) and treatment (access or non-access to *Aprender Valor* teaching resources), were used multilevel longitudinal models[6] that assess the existence of three components: time, group, and interaction between group and time. The results point to a similar average evolution in financial literacy proficiency for the sample as a whole ($p = 0.329$) and by school year. Time effects were observed for the overall sample and by school year: there was an average increase from the first to the second assessment for the overall sample, 3rd, 5th, and 7th grades. The opposite pattern was observed for the 9th grade, probably associated with the test design.[7] Considering the overall sample, there were no group effects when comparing control and treatment, i.e., it was not possible to capture the effect of the treatment applied.

To better understand the reasons that could have led to this result, additional data analyses were carried out. A first conclusion of these analyses was that the treatment was quite heterogeneous, i.e., the level of engagement, or effective use of the educational resources made available, by the schools in the treatment group varied greatly. For this reason, it was decided to investigate whether the level of engagement of schools in the program interfered with student performance. To this end, the following information was collected from the *Aprender Valor* platform:

4 The difference between the planned and the actual sample is due to field losses, caused by difficulty in accessing the school to administer the tests, impossibility to find the class due to not updated school census, or non application of the financial literacy test by the school/class or the selected student. Furthermore, some school managers considered their students unprepared to take the tests, other students did not sign the answer cards or could not read and write, or school attendance on the days of the tests was affected by rain, among other reasons.

5 This methodology aims to produce a single scale for the students being assessed. The raw score generated by the IRT does not have a standard lower or upper limit. However, to facilitate interpretation, the score was rescaled in such a way that the minimum and maximum values observed in the sample of this study correspond to zero and one thousand, respectively.

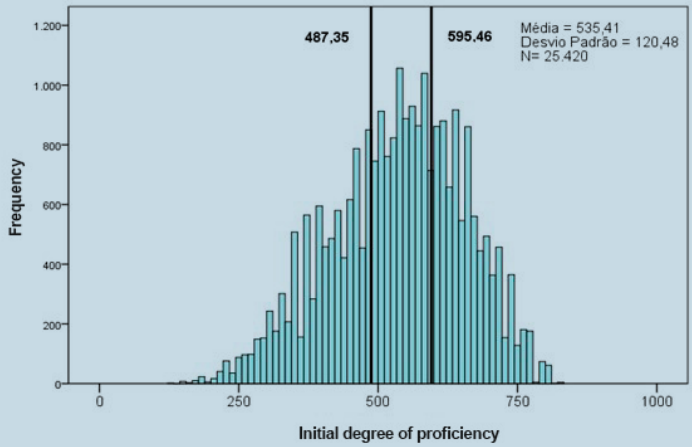
6 In this model, students correspond to the first level, classes to the second, and schools to the third, incorporating the effect of students, classes, and schools in the form of random effects, accommodating possible dependence between observations of the same student (at different times), as well as between students in the same class, or between classes in the same school.

7 Two descriptors with a low percentage of correct answers were only included in the 9th grade exit test, i.e., the exit test was more difficult than the entry one.

- Training courses for teachers or school managers carried out at the school, with three possible levels of engagement:
    - » no training started (i.e., school professionals were not engaged in the courses);
    - » with training started (course in progress but not completed);
    - » with training completed (course finished).
- Application of school projects in the classroom by the school's teachers, with three possible levels of engagement:
    - » no project selected (i.e., no engagement in school projects);
    - » with a selected project (teacher downloaded the school project from the program's platform);
    - » with completed project (teacher downloaded the project, taught the lesson, and added annotations on the lesson on the platform).

In addition, the complementary analysis led to the conclusion that there could also be heterogeneity in the initial degree of proficiency in financial literacy, i.e., the students' level of knowledge as measured by the initial assessment (entry test). Therefore, to control for the effect of this possible heterogeneity, the sample was segmented into three groups of similar sizes (tertiles) according to this variable (Graph 1). The variation in scores on the financial literacy proficiency test between the two moments was assessed for each of the three groups.

Graph 1 – Histogram of the financial literacy proficiency score in the initial assessment



Based on this information, another data analysis was proposed, using decision trees, with the **variation in proficiency test scores** between the initial assessment (entry test) and the final assessment (exit test) as the dependent variable. **Teacher and manager engagement status and the implementation of school projects** were used as predictor variables.[8] The decision tree makes it possible to assess the interrelationships between the predictor variables to identify groups with greater and lesser average variations in proficiency.

The decision trees identified that the variation between the initial and final assessment scores tended to be greater in more engaged schools, i.e., where teachers and managers had started or completed the training and where the implementation of the educational projects had actually been completed. Regarding the tertiles of proficiency

8 The analysis from this point considers the information from the 25,420 students who took part in the two assessment periods.

in the initial assessment, the group in the first tertile showed the greatest variation between the initial and final assessments, whereas the group in the third tertile, the least variation.

To compare the groups formed in the decision trees, adjusted by school year, region, and localization area, a multilevel linear regression model was used with three components: time, group, and interaction between group and time.[9] Based on this model, the average variations per group were estimated (Table 1).

Table 1 – Estimate of means and respective 95% confidence interval estimated via multilevel linear model

Groups	Description	Estimate via multilevel linear model	
		Mean (95% CI)	p
T1: **P-SI** and G-SI[B]	1st Tercile – Teacher and manager without training started	47,61 (45,10 a 50,13)	<0.001
T1: **P-SI** and G-I+A	1st Tercile – Teacher without training started and manager with training started or approved	55,13 (45,49 a 64,77)	<0.001
T1: **P-I+A** and Proj-NS+S	1st Tercile – Teacher with training started or graduated and without selected project or selected but not completed	52,78 (46,23 a 59,33)	<0.001
T1: **P-I+A** and Proj-C[A]	1st Tercile – Teacher with training started or graduated and with completed project	67,49 (53,47 a 81,50)	<0.001
T2: **G-SI+I**[C]	2nd Tercile – Manager without training started or started	5,59 (3,40 a 7,78)	<0.001
T2: **G-A** + P-SI+I[C]	2nd Tercile – Approved manager and teacher without training started or started	16,12 (6,18 a 26,07)	0.002
T2: **G-A** + P-A[C]	2nd Tercile – Approved manager and graduated teacher	8,97 (2,48 a 15,47)	0.007
T3: **P**-SI + I[D]	3rd Tercile – Teacher without training started or started	-28,73 (-31,03 a -26,43)	<0.001
T3: **P**-A[D]	3rd Tercile – Graduated teacher	-25,60 (-34,64 a -16,57)	<0.001

N=25,420 students.
(A), (B), (C), and (D) in different colors represent distinct means according to multiple comparisons with Bonferroni correction.
T1, T2, and T3 – First tercile, second tercile, and third tercile, respectively.
P – Teacher, G – Manager, and Proj – Project.
SI – No training started; I – Training started, A – Approved/Graduated; NS+S – Not selected or selected but not completed; C – Completed.

Groups showed different average variations in the sample considering all school grades (column 2) when adjusted by region, localization area, and school year. Again, the groups in the first tertile had higher average variations than those in the second tertile, which, in turn, had higher averages than those in the third tertile. Among the groups in the first tertile, the subgroup with the highest engagement in the program (T1:P-I+A and Proj-C) had a higher average variation than that of the group with no engagement (T1: P-SI and G-SI). The averages between groups in the second tertile were not different. A similar pattern was observed for the groups in the third tertile.

Conclusions

The impact assessment of *Aprender Valor* enabled the collection of data that will help not only to analyze the effectiveness of the program, but also to design strategies to its strengthening and monitoring.

In general, it was possible to conclude that **the impacts of the program regarding students' financial literacy vary according to the student's performance in financial literacy at the beginning of the year and the degree of engagement of schools in the program.**

9 In this model, students correspond to the first level, classes to the second, and schools to the third, incorporating the effect of students, classes, and schools in the form of random effects, accommodating possible dependence between observations of the same student (at different times), as well as between students in the same class, or between classes in the same school.

The **greatest variations in financial literacy performance between the entry and exit tests were observed among students with weaker knowledge at the start of the year.** These students showed a higher average increase in financial literacy between the beginning and end of the year.

Another factor that influenced the variation in financial literacy proficiency between the initial and final assessments was the **effective engagement of schools.** The average difference between the entry and exit tests was greater for students from schools in which managers and teachers took part in the training courses and in which the educational projects were applied in the classroom, i.e., the school's engagement in the program contributed to improve the students' financial literacy throughout the year.

In addition to the conclusions regarding the program's effectiveness, it is worth noting that all the aforementioned challenges to implement a nationwide educational initiative became very clear during the impact assessment herein reported. In practice, although the sample of schools was large and representative and an adequate number of entry and exit tests were applied, the criterion for distinguishing between control and treatment was not fully met.[10]

Thus, despite the challenges involved in the program's implementation and the assessment itself, it is possible to conclude that data indicate that *Aprender Valor's* **educational resources do indeed seem to contribute to the evolution of the financial literacy of students reached by the program**.

As a challenge to be overcome in the pathway to the future, it is worth mentioning, firstly, the effective engagement of the professionals in the schools that are already participating with the training courses, the implementation of the school projects, and the financial literacy assessments. Secondly, continuing to monitor the program's results, to support the constant evolution of Aprender Valor and the financial literacy of children and youth involved.

10 By assessing information from teachers, managers, and students, due to the mobility of teachers and managers between schools, it was possible to observe a partial contamination in the control group, as well as a lower than expected level of engagement from schools in the treatment group. The contamination of the control group was moderate: the percentages of students with trained teachers (17.1% versus 0.6%), trained managers (12.5% versus 0.2%), and completed school projects (21.5% versus 0.9%) were higher in the treatment group compared with the control group. Regarding the schools in the treatment group, a significant proportion were not fully engaged in the program. One possible explanation is that most public schools were still going through an atypical year of return to normality in 2022 after the Covid-19 pandemic. Managers and teachers faced an overload due to difficulties in readapting students to face-to-face classes and restoring learning, as a result of the deficits left by the pandemic period. It should also be borne in mind that the large number of schools involved in the assessment and their wide geographic dispersion made it difficult for the BCB team to closely monitor the application of the program in schools in the treatment group.

Box 11 – Climate risk and the National Financial System: A Proposal for Indicators

Introduction

In Brazil, legal measures are being adopted to combat climate change, such as the proposal by the Brazilian Chamber of Deputies (2023)[1] to create a carbon market. This raises the question of how exposed the National Financial System (SFN) is to these transition risks. One of the tools to assess this exposure is the concept of carbon dioxide equivalent (CO_2e), as it can be used to quantify the total impact of greenhouse gases on global warming. In practice, various gases are converted, such as methane and nitrous oxide, into their carbon dioxide equivalent, based on their global warming potential.

The November 2022 edition of the Financial Stability Report (FSR) presented the first estimate of the SFN exposure to transition risk, which is now part of the Social, Environmental, and Climate Risk Matrix (MRSAC) used by the BCB for planning supervisory actions.[2] This box aims to present three different indicators available in the literature that can be used to analyze the SFN exposure to risks associated with climate change and new environmental regulations. The first indicator is the direct and indirect greenhouse gas emission coefficient for each economic sector (Gg of CO_2e per million).[3] The second indicator is the "carbon footprint" for the SFN, and the third is the proportion of loans allocated to low-carbon and high-carbon sectors.

Methodology

The methodology for creating the indicators was the same used by Maza (2022) to analyze the exposure of the Spanish financial system to climate risks. Consider an economy where each firm produces a single corresponding good j, and in the year t, the firm j produces the amount $y_{t,j}$. To do this, it demands intermediate goods $Y_{t,j} = \{y_{t,j}^1, y_{t,j}^2, \dots, y_{t,j}^K\}$, where K represents the total of firms in the economy. At the end of production, this firm j generates an amount of pollution,[4] which will be referred to as direct pollution $e_{t,j}^d$, proportional both to the amount produced and to the technological level used (type and amount of inputs used). Intermediate products consumed by j also produce pollution during their creation; thus, this pollution constitutes the indirect pollution of firm j (e_j^{ind}).

1 Law Bill 2,148, of June 30, 2015.

2 The sector transition risk metric was constructed by weighting three indexes: sectoral emissions by production value, sectoral emissions by total emissions, and share of exported production. The methodology for mapping sectoral emissions used in the FSR differs from the methodology presented in this box.

3 The unit (Gg/mi) was used because it is the standard adopted in other international publications on the subject. In terms of national currency, this unit is equivalent to Kg/BRL.

4 For this work, pollution was limited to atmospheric pollution, i.e., that generated by greenhouse gases (GHG).

Therefore, the production function for firm j can be represented as:

$$y_{t,j} = f(Y_{t,j}, e^{d}_{t,j}, e^{ind}_{j})$$

To make this problem more manageable, the K firms were aggregated into 68 activity sectors,[5] hereafter indexed by the letter i:

$$y_{t,i} = f(Y_{t,i}, e^{d}_{t,i}, e^{ind}_{i}) \vee (i \in 1,2,3, \dots ,68)$$

Total emissions data for each sector i for the year t, from 1990 to 2020, were obtained using aggregated data from the Ministry of Science, Technology, and Innovations (MCTI). Based on these data, the direct emission coefficients for each activity $q^{d}_{t,i}$ are estimated, i.e., the amount of emissions (in Gg of CO_2e) per total product ($P_{t,i}$ in million BRL):

$$q^{d}_{t,i} = \frac{e^{d}_{t,i}}{P_{t,i}}$$

Thus, the total emission coefficient, $q^{total}_{t,i}$, can be estimated as the product of the Leontief matrix,[6] $(I - A_t)^{-1}$, by the vector of direct emission coefficients:

$$q^{total}_{t} = (I - A_t)^{-1} \cdot q^{d}_{t}$$

Unlike Maza (2022) methodology, which uses a fixed matrix of coefficients A_{2016}, this work updates the inverse Leontief matrix $(I - A_t)^{-1}$ annually.[7]

The third coefficient, the indirect emission coefficient, is estimated by the difference between the total emission coefficient and the direct emission coefficient:

$$q^{ind}_{t} = q^{total}_{t} - q^{d}_{t}$$

Total emission coefficients $q^{total}_{t,i}$ are used to calculate the amount of emissions per activity per loan stock, which is conventionally referred to as the carbon footprint of loans CF_t:

$$CF_t = \frac{\sum_{i=1}^{68} L_{t,i} q^{total}_{t,i}}{\sum_{i=1}^{68} L_{t,i}}$$

where $L_{t,i}$ represents the loan stock of sector i on December 31 of the year t.

An increase in the CF means an increase in emissions (in Gg of CO_2e) per million BRL in loans, indicating a concentration of loans in more polluting activities.

Finally, the sectors were classified into low-carbon and high-carbon emission sectors. Low-carbon emission sectors are those that emit less CO_2e per value produced (total emission coefficient) than the average emission of

5 The 68 activities correspond to the same segmentations presented in the resources and use table published by IBGE (IBGE, 2020).

6 The Leontief matrix aims to present the interdependence between productive activities in relation to production inputs. It is generally used in national accounts to transform the final product vector into the total product vector. In this model, production was replaced by emission coefficients.

7 For further details about the methodology for constructing this matrix, see Guilhoto and Sesso (2010).

all sectors.[8] Thus, if in the year t sector j had a lower coefficient than the average of all sectors, it is considered a low-carbon emission sector.

Data

To calculate the new indicators, four sets of data will be needed:

1. $P_{t,i}$: monetary value of the product of activity i in the year t;

2. $(I - A_t)^{-1}$: inverse Leontief matrix for each year t;

3. $L_{t,i}$: loan balance for activity i at the end of the year t;

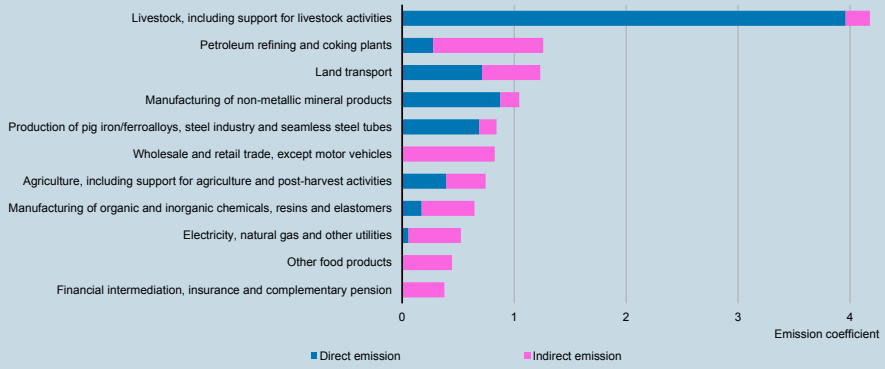
4. $e^{d}_{t,i}$: emissions of activity i during the year t in CO_2e.

Total product is published annually by the Brazilian Institute of Geography and Statistics (IBGE) in the resources and use tables (IBGE, 2020). Although IBGE also provides the Leontief matrix for 2016, the methodology of Guilhoto and Sesso (2010) was used to obtain annual data for this matrix. Loan balance by activity was obtained through the Credit Information System (SCR) (BCB, 2023a) and the System of Rural Credit and Proagro Operations (Sicor) (BCB, 2023b). All monetary values are deflated relative to 2011. Emission data are released by MCTI (MCTI, 2020a; MCTI, 2020b; MCTI, 2020c).

Results

Graph 1 presents, in two panels, the emission coefficients of the ten most polluting activities in 2019. In Graph 1a, emissions from the Land Use, Land Use Change, and Forestry (LULUCF) sector are excluded, meaning that emissions from deforestation are not considered.[9] In Graph 1b, LULUCF effects are included. The major contribution of livestock to emissions in Brazil stands out in both cases, far exceeding other sectors. The first case, which reflects emissions from livestock, including animals and their waste, accounts for 35.31% of emissions. When LULUCF effects are also considered, this share rises to 61.01%.

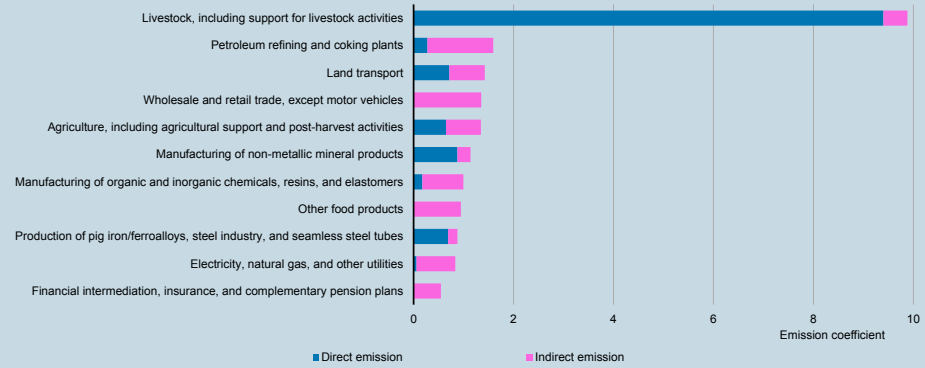
Graph 1a – Emission coefficients by TRU68 activity (2019)
Excluding LULUCF emissions



8 The Guilhoto and Sesso (2010) method allows calculating the intermediate demand matrix at basic prices for any year, covering 68 sectors, as long as data from the Resources and Use Table (TRU) are available. The public and private education sectors, as well as the public and private health sectors, were unified into one sector. As a result, the number of activities dropped to 66, but this merging only occurs when data are combined with that of the SFN.

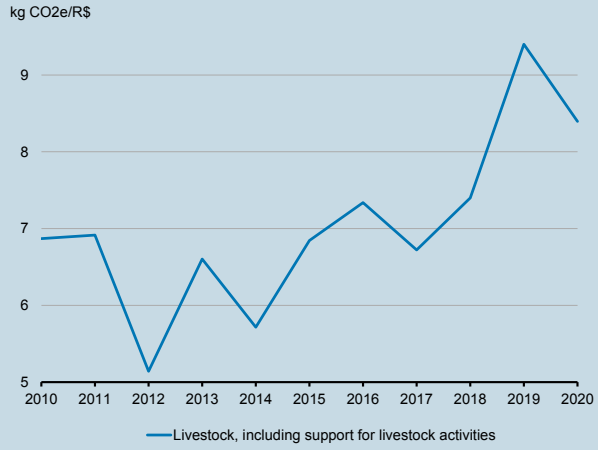
9 In Brazil, emissions from the LULUCF sector primarily result from deforestation across major Brazilian biomes, including the Amazon, *Cerrado*, Atlantic Forest, *Caatinga*, *Pampa*, and *Pantanal*.

Graph 1b – Emission coefficients by TRU68 activity (2019))
Including LULUCF emissions

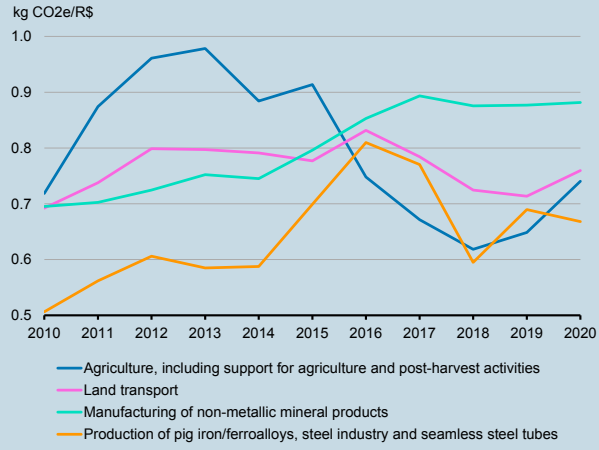


Evaluating the evolution of these coefficients over time can indicate the efforts of these activities to reduce emissions (Graphs 2a to 2c). For most highly polluting activities, there is no well-defined trend, except the coefficients for the Manufacturing of Non-Metallic Minerals, with an upward trend, and the coefficients for the Manufacturing of Organic and Inorganic Chemicals, with a downward trend. Another important information is that livestock emission coefficients are historically high and have increased over the last decade.

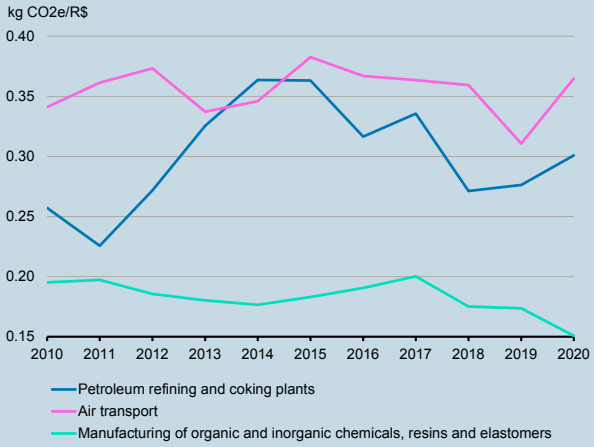
Graph 2a – Direct emission coefficient
Some of the most polluting TRU68 activities



Graph 2b – Direct emission coefficient
Some of the most polluting TRU68 activities

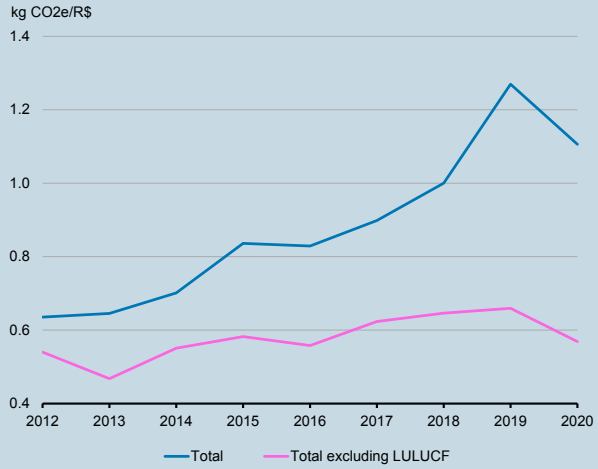


Graph 2c – Direct emission coefficient
Some of the most polluting TRU68 activities

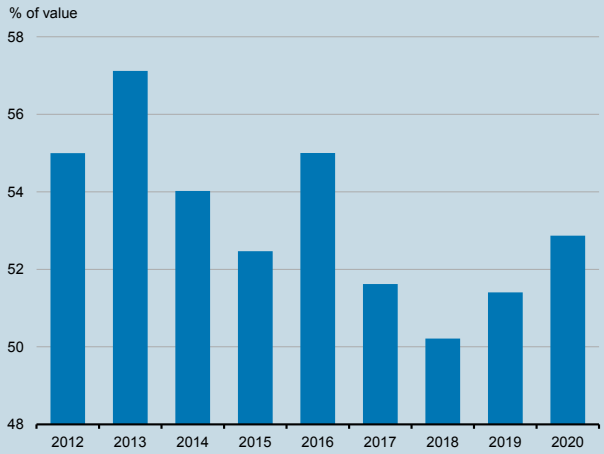


Analysis of the carbon footprint of the SFN reveals distinct trends depending on the inclusion or exclusion of the LULUCF sector. Including LULUCF emissions, there is a significant increase in the carbon footprint of the SFN between 2012 and 2020 (Graph 3a). In contrast, the exclusion of the LULUCF sector from the analysis shows relative stability in the carbon footprint of the SFN in the same period.

Graph 3a – Carbon Footprint of the SFN (total)



Graph 3b – Proportion of loans to low-carbon sectors



The increase in the carbon footprint may simply reflect the growth of a more polluting sector, but which also demands credit, such as agriculture.[10] To address this issue, a new indicator was developed: the share of loans to the low-carbon sector. The sectors were divided into "low-carbon" and "high-carbon". Low-carbon sectors have total emission coefficients below the average, and high-carbon sectors have coefficients above the average. Next, the share of low-carbon sector in total loans was calculated. Graph 3b shows a slight downward trend in loans to the low-carbon sector.[11]

Conclusion

Due to the risks associated with climate change and the need for environmental regulations, it is important to define a set of indicators that allow analyzing the SFN exposure for financial stability purposes. Currently, the BCB already uses estimates of exposure to transition risk in its supervision processes, as presented in the November 2022 FSR. This study presents the application of three indicators developed by Maza (2022) for Brazil, from 2012 to 2020.

Livestock activity is responsible for the majority of Brazilian emissions, both due to deforestation and the emissions from animals and their waste.

Some sectors produce more (in real terms) and emit less, such as in the production of organic and inorganic chemicals.

The carbon footprint of the SFN showed an upward trend from 2012 to 2020, but only when considering the LULUCF sector, reflecting the central problem of emissions from deforestation intrinsically related to the agricultural sector.

10 There are discrepancies regarding sector classification, as scope 3 emissions/deductions were disregarded. For example, a sector that produces wind turbines might be considered emission-intensive, but only because the deductions it generates are not being considered.

11 Total emissions were used to calculate this indicator. When classifying sectors as low or high carbon, using the average of the entire period, the share of credit for low-carbon sectors shows a similar dynamics.

There is a slight downward trend in loans to low-carbon sectors compared with high-carbon sectors, indicating the need for future investigation.

In this box, the sectors were divided according to the emission level of each one. Future studies can separate these sectors into those that, regardless of their emission levels, are investing in the reduction of their emissions. This will provide further information for the SFN carbon footprint indicator.

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Box 12 – Impacts of Drex and "Programmable Finance" on the industrial organization of the National Financial System

In the modern economy, digital business environments are increasingly interconnected with people's daily lives, providing gains through data analytics tools based on the purchasing, credit borrowing, and investment decisions of a wide network of customers. With the advent of new tools, such as Digital Ledger Technology (DLT), the relationship between providers and customers of financial products and services can take on a new dimension, impacting the organization of the National Financial System (SFN).

As a result of the DLT advancements, several central banks worldwide have been working, individually or cooperatively, on the development of Central Bank Digital Currencies (CBDCs).[1] In general, developed countries have focused on developing wholesale CBDCs to reduce transaction costs in cross-border payments. Emerging market economies, in turn, have sought to use this new tool for retail transactions between governments, households, and companies, promoting financial inclusion, an efficient instant payment system, cheaper international remittances, and a stimulus for financial digitalization.

In Brazil, the BCB has been attempting to offer the national fiat currency in digital format and in an intermediated way – the BRL in digital format, nicknamed Drex. It is a wholesale currency on a programmable platform operated by the BCB that allows the development of innovative business models in a safe, supervised, and stable manner. The BCB's initial choice to test Drex on a DLT platform is based on two characteristics inherent to such technology, programmability[2] and composability.[3]

This box aims to present how the introduction of Drex and the dissemination of financial products and services based on smart contracts[4] in a programmable environment can boost innovation and the entry of new players into the financial industry. These innovations can bring gains in efficiency, security, and financial inclusion in the trading of credit, investments, and other products. In addition, the Brazilian digital currency will be able to guarantee the convertibility and settlement of assets traded in tokenized digital environments. Furthermore, operating as an infrastructure, Drex should guarantee interoperability between these programmable ecosystems and traditional financial market infrastructures, so that they coexist in harmony and security.

1 According to the latest Bank for International Settlements (BIS) annual survey, until 2022, four countries had launched retail CBDCs, while there could be another fifteen in place by the end of the decade. The same survey indicated that nine countries expected to realize their wholesale CBDCs by 2030 (Kosse; Mattei, 2023).

2 Programmability is the ability to program the behavior or composition of a system in such a way as to allow its interaction with future changes in a predictable way and reach one or more expected states.

3 Composability allows systems to be programmed in a modular way, combining standardized parts to achieve the desired whole. The main advantage is that it is easier to add new parts or new participants, and that the same code can be reused in different systems.

4 Smart contracts refer to self-executing codes that are triggered when pre-specified events occur (Aldasoro *et al*., 2023).

Industrial organization of the SFN – the impact of tokenized digital asset platforms

The phenomenon of financial digitalization is not new. Digital financial assets have existed for decades. Today, transfers, payments, investments, and credit operations with financial institutions and payment institutions are done mostly electronically.[5] In the capital market, financial assets and securities have also been held in custody, traded, and settled in digital format for a considerable time.

However, current financial digitalization is carried out in a so-called "centralized" environment, either in the books of financial or payment institutions, or in financial market infrastructures (FMIs), provided directly by a public institution[6] or authorized to operate by it.[7] Thus, electronic assets (including cash) reside in isolated proprietary systems (which constitute information silos) that communicate via messages, leading to the need to reconcile transactions before they can be definitively settled.

Asset tokenization[8] can bring a new dynamic to the SFN, since in a programmable environment the asset and the respective platforms where it is traded play a central role, as shown in Figure 1. This is because information on ownership, collaterals, settlement, among others, is stored in the asset's own records and managed by the respective platform.

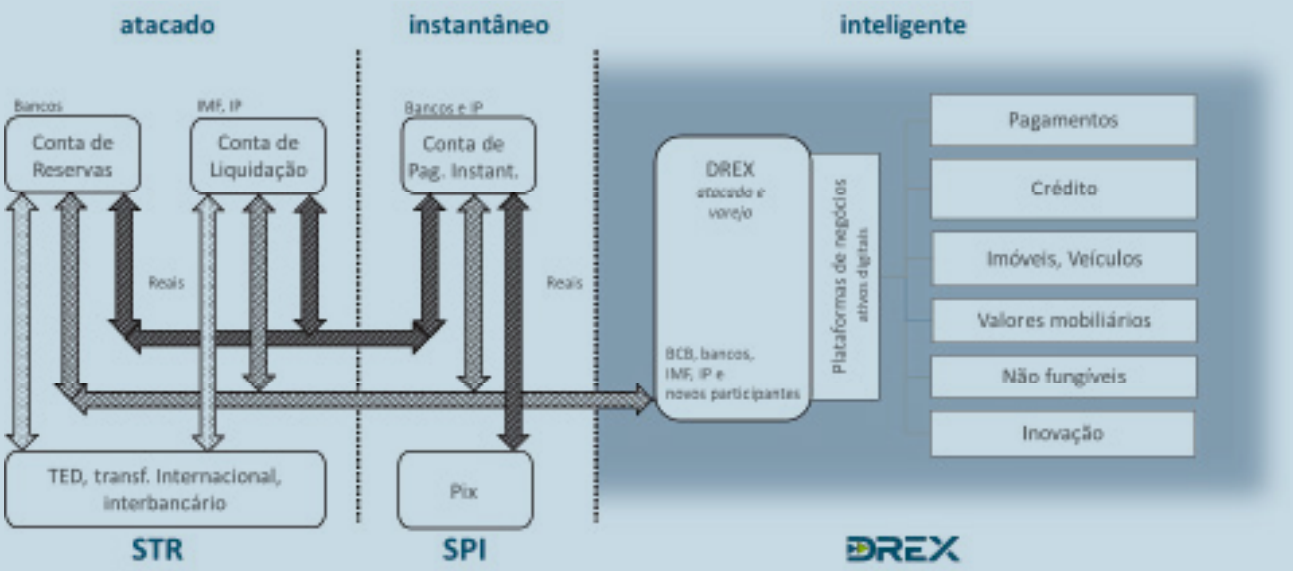
Figure 1 – Assets and platforms as central elements

Asset tokenization involves different layers in a programmable digital platform (Schär, 2021). The most basic layer is where Drex is issued and settled. On top of this layer, there is one that allows the issuance of tokens, and the representation of financial instruments denominated in the native token.[9] From these two layers, different protocols can be created, either primitive (created by the BCB itself) or created by the market, on which applications would be developed according to the business models of each platform or service provider.[10] This opens up space for various functionalities, such as automating transactions, recovering collaterals, and combining contracts (composability) through smart contracts (Aldasoro *et al*., 2023).

5 More information can be found in Box 9 – "Evolution of digital means of payment transactions in Brazil", available in the Banking Report – 2022 (bcb.gov.br).
6 Examples of public infrastructures include the Reserves Transfer System (STR), the National Financial System Network (RSFN), the Instant Payments System (SPI), the Special Settlement Custody System (Selic), among others.
7 Examples of private infrastructures are depository institutions, custodians, securities registrars and custodians, clearing and settlement houses, among others.
8 Tokenization refers to the process of creating a unique identifier in a DLT environment in the form of a token. This unique and everlasting reference can be established to digitally represent anything ranging from financial assets and goods to other high-value resources (Heines *et al*., 2021)
9 Native tokens are tokens created on the platform where they are issued and transferred, representing part or all of a digital asset on the same platform. In the case of Drex, the native tokens are the tokenized deposits of the Brazilian CBDC held by individuals and companies.
10 More information in "Box 9 – Real Digital: a platform for 'tokenized' finance", available at Banking Report – 2022 (bcb.gov.br).

With the introduction of this new infrastructure in the financial market, the "programmable" finance environment, based on tokenized assets, must be interconnected with the public infrastructures of the traditional environment and, indirectly, with private infrastructures, through Drex (Figure 2). Drex, in turn, will use an intermediated distribution strategy: the BCB will provide banks and payment institutions with the wholesale digital currency (wholesale Drex), while these will allow households and companies to hold and operate with the retail version (retail Drex) issued by authorized institutions, such as banks and payment institutions, through custodial wallets.[11]

Figure 2 – A new infrastructure for the financial market



This connection and complementarity between the traditional and programmable environments could transform the way market players and their clients make business. Banks, payment institutions, and FMIs, depending on their business models, can create, use, or associate with tokenized digital platforms. These, in turn, will be able to specialize in different products and services, such as payments, credit operations, multi-ownership of real estate, vehicle trading, and a range of new possibilities through innovation (Brunnermeier, 2019). The development of a tokenized economy should therefore be based on digital platforms, whose asset transactions within their ecosystems can now be settled directly through Drex.

Thus, in a tokenized economy, financial intermediaries, whether financial or payment institutions, could be replaced by digital platforms as the main link connecting individuals through payments and transfers. With the centrality exercised by platforms in commercial and financial activities, payment services (money as a means of exchange) could come to play a central role in individuals' choices. In contrast, competition over currency as a store of value (banking) may lose relevance (Brunnermeier *et al*., 2019). In this same scenario, the addition of sovereign currencies to the digital ecosystem facilitates the transition between these platforms (private currencies). Moreover, this addition mitigates the risks to financial stability that can be generated by its absence.

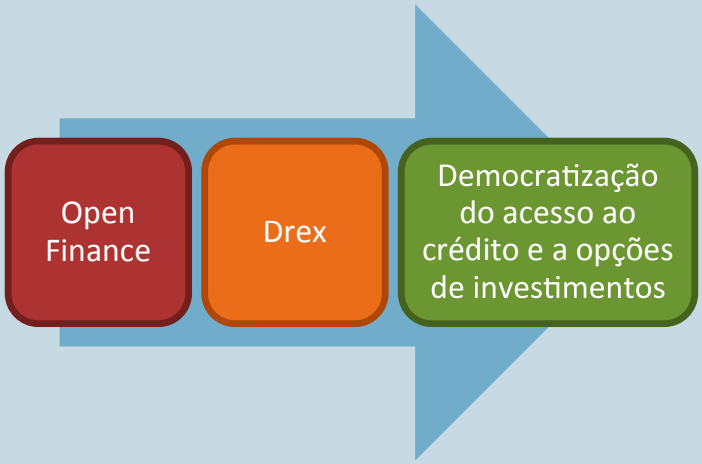
In these ecosystems, financial transaction data can be associated with information on income, location, consumption preferences, etc. As a result, competition in the SFN could focus on obtaining and monetizing clients' data, including through artificial intelligence. As long as users' privacy and current regulations are respected, managers and members of digital platforms will be able to develop new products and services to fill gaps and reach audiences not yet served.

11 Digital portfolios of Drex tokens, financial assets, and securities, held in custody at an institution authorized to do so by the BCB.

Drex and Open Finance as catalysts for a new transformation in the SFN

In Open Finance, customers of financial services can share their personal data with all SFN operators. By combining Drex with Open Finance, the BCB will stimulate the democratization of access to credit, as well as new investment options, insurance, etc. Due to the lower costs and greater efficiency in trading, storing, and settling tokenized assets, small companies and people with low volumes of funds available to invest will be able to access investment options that are still difficult for them to reach. The expansion of options could allow for greater diversification and better matching of risks and returns to each investor's risk profile (Figure 3).

Figure 3 – Democratizing access to credit and investment options



Conclusion

The gains that digital technology innovations can bring will only be experienced in their full magnitude with the provision of an infrastructure under the governance of the BCB (Drex), which guarantees the settlement of different tokenized assets (including bank deposits) as well as the integration of these digitalized environments with current traditional infrastructures.

The creation of the BCB's digital liabilities will ensure the maintenance of the autonomy and independence of the Brazilian fiat currency, as well as making the supervision of transactions carried out on tokenized digital platforms more effective, thus guaranteeing the SFN's stability. Furthermore, in a tokenized economy, the introduction of Drex can reduce the harm to the monetary policy efficiency that could result from a potential loss of relevance of sovereign currency vis-à-vis private digital currencies.

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Annex A – Definitions – Chapter 1

The definitions below were used in Chapter 1 and are based on data of the Credit Information System (SCR) from the BCB, considering the period between December 2021 to December 2023.

Credit

Original lender: Institution with which the client already has the operation.

Delinquency: the ratio of the sum of operations with installments overdue for more than 90 days to the sum of all credit operations granted. The sum of credit – including overdue and not yet due installments – is deemed to be delinquent if installments are more than 90 days overdue. This process, called hauling (*arrasto*), assumes that the debtor in such a situation will not pay the not-yet-due installments while there are installments overdue for more than 90 days.

Credit type: subtypes of credit within the SCR, whose description may be found in the document "*Instruções de Preenchimento do Documento 3040*" (Document 3040 filling instructions) at: <https://www.bcb.gov.br/content/estabilidadefinanceira/Leiaute_de_documentos/scrdoc3040/SCR_InstrucoesDePreenchimento_Doc3040.pdf>. Related subtypes were grouped, for the sake of simplicity.

Identified operations: when the same client operations sum up an amount over BRL 200.00[1] in a single FI, the operation is identified at the SCR, meaning that both client and operation are individualized, and their information is detailed. When the sum does not surpass BRL 200.00, the information is aggregated without identification of client or operation. The indicators herewith presented were built based on identified operations, which comprise most of the credit operations within the SFN.

Credit portability: The client may request the transfer of credit operations (loans and financing) and leasing from one financial institution to another, upon early settlement of the operation at the original institution by the new financial institution. The terms of the new transaction must be negotiated between the customer himself and the institution that will grant the new credit.

Proposer: Institution offering new credit to which the operation will be ported.

Number of loans granted: a number of loans contracted and effectively realized, which have outstanding installments at the reference date, both overdue and not yet due. The number of loans encompasses not only grants performed on the reference date, but also the outstanding credit stock on that date, regardless of the date the loan was granted.

1 In force since June 2016, as per Circular 3,567 of December 12, 2011, modified by Circular 3,786 of March 10, 2016.

Number of borrowers: number of clients with outstanding credit operations (outstanding portfolio, as aforementioned). Individuals or corporations that: i) reside abroad; or ii) do not have a Corporate Taxpayer Register Number (CNPJ) or an Individual Taxpayer Register Number were disregarded.

Reimbursement of Loan Origination Fees (RCO) is a compensation paid by the proposer to the original creditor when portability is granted. The value is defined by the Portability Management Committee (self-regulation), in accordance with the credit type and value ported. The cost for payroll-deducted loans is relatively higher than the other loan types in all the delimited bands of outstanding debt balance, taking the band's average value as reference.

Credit portfolio balance: is equivalent to the total of the outstanding portfolio, and includes both overdue and not yet due installments, excluding operations accrued as losses. The active portfolio encompasses not only grants performed on the reference date, but also the outstanding credit stock on that date, regardless of the date the loan was granted.

Granting segment: a segment of financial institutions that grant credit.

Banking segment: independent banks (excluding credit unions) and financial institutions that grant credit and are part of a conglomerate bank.

Non-banking segment: credit unions, cooperative banks, and financial institutions that are not part of a bank conglomerate (the so called "independent FI"): economic development agencies, saving and loans associations, mortgage companies, leasing companies, credit companies to micro-entrepreneurs and small business, credit, financing, and investment companies, and on-lending real estate financing companies.

Origin of resources

Non-earmarked resources: refer to loans granted with interest rates agreed between financial institutions and borrowers (market interest rates). In non-earmarked operations, the financial institutions decide how to apply the funds raised in the market.

Earmarked resources: operations regulated by the National Monetary Council (CMN) or linked to budgetary resources to foster the long-term and mid-term production of goods and investment in the real estate, housing, rural and infrastructure segments. Resources come from a part of the on-demand deposits and savings accounts, and from public funds and programs. The Production-Oriented Microcredit National Program (PNMPO) is an example.

Annex B – Statistical annex – Chapter 1

Table A - Balance of household credit operations by state

BRL millions

	Dec 2021	Dec 2022	Dec 2023	Variation %			
				2021	2022	2023	Average
Total Brazil	2,710,829	3,190,981	3,521,487	21.0	17.7	10.4	16.3
North	150,786	188,450	215,723	30.2	25.0	14.5	23.1
Acre	7,495	9,409	11,107	29.0	25.5	18.0	24.1
Amapá	7,044	8,458	9,757	28.6	20.1	15.4	21.2
Amazonas	24,909	30,628	33,470	25.6	23.0	9.3	19.1
Pará	57,435	72,361	82,463	31.5	26.0	14.0	23.6
Rondônia	28,865	35,914	41,058	32.1	24.4	14.3	23.4
Roraima	5,704	7,119	8,615	28.0	24.8	21.0	24.6
Tocantins	19,333	24,561	29,253	31.9	27.0	19.1	25.9
Northeast	433,120	513,841	560,494	21.7	18.6	9.1	16.3
Alagoas	25,112	29,672	32,348	20.6	18.2	9.0	15.8
Bahia	111,919	132,636	144,322	21.5	18.5	8.8	16.1
Ceará	63,995	76,439	83,432	21.9	19.4	9.1	16.7
Maranhão	48,340	59,359	66,715	25.9	22.8	12.4	20.2
Paraíba	37,152	43,269	46,501	19.2	16.5	7.5	14.3
Pernambuco	71,351	84,511	90,797	21.8	18.4	7.4	15.7
Piauí	23,188	27,036	29,886	23.1	16.6	10.5	16.6
Rio Grande do Norte	31,746	36,848	39,753	19.8	16.1	7.9	14.5
Sergipe	20,317	24,072	26,740	19.4	18.5	11.1	16.3
Central-West	372,487	445,585	504,080	23.4	19.6	13.1	18.7
Distrito Federal	70,611	78,538	84,350	17.7	11.2	7.4	12.0
Goiás	138,121	170,450	195,899	26.0	23.4	14.9	21.3
Mato Grosso	101,758	122,270	139,809	24.1	20.2	14.3	19.5
Mato Grosso do Sul	61,997	74,327	84,023	23.7	19.9	13.0	18.8
Southeast	1,212,495	1,403,972	1,534,251	19.7	15.8	9.3	14.8
Espírito Santo	40,660	47,744	54,010	17.5	17.4	13.1	16.0
Minas Gerais	254,719	301,545	334,132	20.0	18.4	10.8	16.3
Rio de Janeiro	198,157	223,540	234,869	21.2	12.8	5.1	12.8
São Paulo	718,960	831,143	911,241	19.3	15.6	9.6	14.8
South	539,934	637,071	704,878	19.3	18.0	10.6	15.9
Paraná	207,585	245,823	271,441	20.5	18.4	10.4	16.4
Rio Grande do Sul	200,883	239,022	264,556	17.9	19.0	10.7	15.8
Santa Catarina	131,466	152,227	168,881	19.6	15.8	10.9	15.4
Unidentified	2,008	2,061	2,061	6.3	2.7	-0.0	3.0

Table B - Household credit density by state (per capita credit volume)

BRL per inhabitant

	Credit Density			Variation %			
	Dec 2021	Dec 2022	Dec 2023	2021	2022	2023	Average
Total Brazil	13,443	15,713	17,225	20.1	16.9	9.6	15.4
North	8,794	10,859	12,288	28.6	23.5	13.2	21.6
Acre	9,152	11,336	13,210	27.2	23.9	16.5	22.5
Amapá	9,773	11,527	13,073	26.2	17.9	13.4	19.1
Amazonas	6,411	7,770	8,376	23.8	21.2	7.8	17.4
Pará	7,141	8,911	10,062	30.2	24.8	12.9	22.4
Rondônia	18,439	22,713	25,718	30.8	23.2	13.2	22.2
Roraima	9,236	11,180	13,171	23.9	21.0	17.8	20.9
Tocantins	12,924	16,250	19,162	30.6	25.7	17.9	24.6
Northeast	7,963	9,401	10,207	21.1	18.1	8.6	15.8
Alagoas	8,060	9,487	10,304	20.2	17.7	8.6	15.4
Bahia	7,941	9,379	10,174	21.0	18.1	8.5	15.7
Ceará	7,317	8,691	9,436	21.2	18.8	8.6	16.1
Maranhão	7,171	8,759	9,795	25.2	22.2	11.8	19.6
Paraíba	9,394	10,886	11,644	18.6	15.9	7.0	13.7
Pernambuco	7,922	9,329	9,968	21.0	17.8	6.8	15.1
Piauí	7,104	8,265	9,118	22.8	16.3	10.3	16.4
Rio Grande do Norte	9,681	11,157	11,954	18.9	15.2	7.1	13.7
Sergipe	9,268	10,892	12,006	18.4	17.5	10.2	15.3
Central-West	23,139	27,354	30,597	21.9	18.2	11.9	17.3
Distrito Federal	25,374	27,876	29,588	16.2	9.9	6.1	10.6
Goiás	19,821	24,155	27,432	24.4	21.9	13.6	19.8
Mato Grosso	28,129	33,419	37,803	22.7	18.8	13.1	18.1
Mato Grosso do Sul	22,718	26,959	30,179	22.4	18.7	11.9	17.6
Southeast	14,386	16,548	17,971	18.8	15.0	8.6	14.1
Espírito Santo	10,718	12,454	13,947	16.3	16.2	12.0	14.8
Minas Gerais	12,466	14,681	16,187	19.3	17.8	10.3	15.7
Rio de Janeiro	12,407	13,923	14,556	20.5	12.2	4.5	12.2
São Paulo	16,309	18,715	20,374	18.4	14.8	8.9	13.9
South	18,156	21,280	23,396	18.5	17.2	9.9	15.2
Paraná	18,261	21,480	23,567	19.7	17.6	9.7	15.6
Rio Grande do Sul	18,524	21,963	24,229	17.5	18.6	10.3	15.4
Santa Catarina	17,473	20,003	21,951	18.2	14.5	9.7	14.1

Table C - Delinquency on household credit operations by state

%

	Dec 2021	Dec 2022	Dec 2023	Variation p.p.		
				2021	2022	2023
Total Brazil	3.0	3.9	3.7	0.1	0.9	-0.2
North	3.1	4.1	4.0	0.0	1.0	-0.1
Acre	2.8	3.6	3.5	0.2	0.8	-0.1
Amapá	3.7	4.6	4.4	-0.5	0.9	-0.2
Amazonas	4.2	6.1	5.8	0.5	1.8	-0.3
Pará	3.4	4.6	4.5	0.1	1.1	-0.1
Rondônia	1.9	2.4	2.8	-0.1	0.5	0.3
Roraima	3.2	4.0	4.1	-0.3	0.8	0.1
Tocantins	2.4	2.8	2.7	-0.3	0.5	-0.2
Northeast	4.0	5.4	5.0	0.2	1.4	-0.4
Alagoas	4.3	5.6	5.1	0.3	1.3	-0.5
Bahia	3.9	5.4	5.0	0.2	1.5	-0.4
Ceará	4.1	5.6	5.1	0.4	1.5	-0.5
Maranhão	3.4	4.3	4.5	-0.4	0.9	0.1
Paraíba	4.0	5.3	4.7	0.4	1.3	-0.5
Pernambuco	4.8	6.3	5.7	0.5	1.5	-0.5
Piauí	3.8	5.0	4.5	0.4	1.2	-0.5
Rio Grande do Norte	4.1	5.5	5.1	0.2	1.4	-0.4
Sergipe	3.3	4.6	4.4	0.2	1.2	-0.1
Central-West	2.3	2.8	2.9	0.0	0.6	0.1
Distrito Federal	2.9	4.1	3.9	0.3	1.2	-0.2
Goiás	2.4	3.1	3.1	0.0	0.6	0.0
Mato Grosso	1.7	1.9	2.1	-0.1	0.1	0.3
Mato Grosso do Sul	2.1	2.6	2.8	0.1	0.5	0.2
Southeast	3.2	4.1	3.8	0.2	0.9	-0.3
Espírito Santo	3.0	3.8	3.4	0.0	0.8	-0.5
Minas Gerais	2.6	3.4	3.2	0.2	0.7	-0.2
Rio de Janeiro	4.9	6.5	5.6	0.3	1.6	-0.9
São Paulo	2.9	3.7	3.6	0.1	0.9	-0.2
South	2.3	2.8	2.8	0.1	0.5	-0.1
Paraná	2.4	2.9	2.8	0.2	0.5	-0.1
Rio Grande do Sul	2.2	2.6	2.6	0.0	0.5	0.0
Santa Catarina	2.3	3.0	2.9	0.2	0.7	-0.1
Unidentified	2.5	3.5	3.0	-8.0	1.0	-0.5

Table D - Balance of corporate credit operations by state

BRL millions

	Dec 2021	Dec 2022	Dec 2023	Variation %			
				2021	2022	2023	Average
Total Brazil	1,970,605	2,170,267	2,272,481	10.7	10.1	4.7	8.5
North	70,981	83,114	94,651	22.4	17.1	13.9	17.8
Acre	3,087	3,536	4,210	6.6	14.6	19.1	13.3
Amapá	3,883	4,264	4,838	6.0	9.8	13.5	9.7
Amazonas	19,379	20,960	23,792	15.5	8.2	13.5	12.3
Pará	26,142	32,052	36,590	27.8	22.6	14.2	21.4
Rondônia	7,775	9,131	10,173	35.6	17.4	11.4	21.1
Roraima	2,056	2,669	2,911	13.5	29.8	9.1	17.1
Tocantins	8,658	10,502	12,137	30.7	21.3	15.6	22.4
Northeast	190,430	223,113	246,702	14.6	17.2	10.6	14.1
Alagoas	8,134	9,941	12,421	19.8	22.2	25.0	22.3
Bahia	56,338	67,020	76,655	12.3	19.0	14.4	15.2
Ceará	38,023	42,247	44,125	7.2	11.1	4.4	7.5
Maranhão	15,269	18,773	20,818	23.7	23.0	10.9	19.0
Paraíba	8,729	9,902	10,979	14.0	13.4	10.9	12.8
Pernambuco	31,835	38,401	40,779	11.3	20.6	6.2	12.5
Piauí	12,884	15,599	18,775	39.8	21.1	20.4	26.8
Rio Grande do Norte	12,833	14,437	14,607	15.7	12.5	1.2	9.6
Sergipe	6,386	6,793	7,542	31.8	6.4	11.0	15.9
Central-West	192,795	220,905	246,679	8.6	14.6	11.7	11.6
Distrito Federal	59,029	65,404	69,601	5.4	10.8	6.4	7.5
Goiás	59,740	64,996	70,872	15.0	8.8	9.0	10.9
Mato Grosso	51,932	64,459	75,810	0.6	24.1	17.6	13.7
Mato Grosso do Sul	22,093	26,045	30,397	23.5	17.9	16.7	19.3
Southeast	1,118,122	1,191,468	1,217,543	7.7	6.6	2.2	5.5
Espírito Santo	31,182	35,407	38,490	21.9	13.5	8.7	14.6
Minas Gerais	174,468	187,216	197,451	17.8	7.3	5.5	10.0
Rio de Janeiro	248,855	258,512	261,995	-5.2	3.9	1.3	-0.1
São Paulo	663,618	710,334	719,606	10.3	7.0	1.3	6.1
South	390,469	445,375	462,294	17.8	14.1	3.8	11.7
Paraná	146,036	166,193	171,645	16.4	13.8	3.3	11.0
Rio Grande do Sul	120,317	138,666	141,968	16.0	15.3	2.4	11.0
Santa Catarina	124,117	140,516	148,681	21.5	13.2	5.8	13.3
Unidentified	7,807	6,291	4,613	-15.8	-19.4	-26.7	-20.8

Table E - Delinquency on corporate credit operations by state

%

	Dec 2021	Dec 2022	Dec 2023	Variation p.p.		
				2021	2022	2023
Total Brazil	1.3	1.7	2.5	0.1	0.4	0.8
North	1.8	2.4	3.3	0.5	0.6	0.9
Acre	1.5	2.1	3.8	-0.6	0.6	1.7
Amapá	1.5	2.8	4.7	0.8	1.4	1.8
Amazonas	1.5	2.5	2.7	0.4	1.0	0.2
Pará	2.2	2.5	3.5	0.7	0.3	1.0
Rondônia	2.2	2.5	3.2	0.7	0.2	0.7
Roraima	1.1	1.6	3.5	0.4	0.5	1.9
Tocantins	1.5	2.1	3.1	0.5	0.6	1.0
Northeast	1.9	2.4	2.9	0.6	0.5	0.5
Alagoas	1.7	2.2	2.4	-0.6	0.5	0.2
Bahia	1.9	2.2	2.7	0.7	0.4	0.5
Ceará	1.4	2.2	2.5	0.8	0.7	0.3
Maranhão	1.7	2.5	4.1	0.1	0.8	1.6
Paraíba	2.2	3.4	3.2	-1.0	1.2	-0.2
Pernambuco	2.2	2.2	3.1	0.7	0.1	0.8
Piauí	1.5	1.9	2.2	0.5	0.4	0.3
Rio Grande do Norte	2.4	3.1	3.3	0.9	0.6	0.3
Sergipe	2.9	3.3	3.9	0.8	0.4	0.7
Central-West	1.2	1.9	2.3	0.0	0.7	0.4
Distrito Federal	0.9	1.4	1.7	0.2	0.5	0.3
Goiás	1.4	2.8	3.1	0.1	1.4	0.3
Mato Grosso	1.2	1.4	1.9	0.1	0.2	0.5
Mato Grosso do Sul	1.2	1.9	2.6	-0.9	0.7	0.7
Southeast	1.3	1.5	2.5	0.1	0.2	1.0
Espírito Santo	1.3	1.7	2.3	0.4	0.4	0.6
Minas Gerais	0.9	1.5	2.4	0.2	0.6	0.8
Rio de Janeiro	1.3	1.3	3.8	0.6	0.0	2.6
São Paulo	1.4	1.6	2.0	-0.1	0.2	0.4
South	1.1	1.6	2.3	-0.1	0.4	0.7
Paraná	1.3	1.8	2.2	-0.2	0.5	0.4
Rio Grande do Sul	1.2	1.6	2.5	-0.3	0.4	0.9
Santa Catarina	0.9	1.2	2.2	0.1	0.4	1.0
Unidentified	2.1	6.1	3.1	0.6	4.0	-3.0

Table F - Balance of corporate credit operations by activity sector

BRL millions

Sector	Dec 2021	Dec 2022	Dec 2023	Variation %			
				2021	2022	2023	Average
Total	1,970,605	2,170,267	2,272,481	10.7	10.1	4.7	8.5
Agriculture, livestock, forestry production, fishing and aquaculture	38,663	45,126	49,314	19.9	16.7	9.3	15.2
Extractive industries	14,891	19,480	23,763	-10.1	30.8	22.0	12.8
Manufacturing industries	454,442	475,248	466,561	4.7	4.6	-1.8	2.4
Food products manufacturing	126,505	132,149	126,573	13.8	4.5	-4.2	4.4
Beverage manufacturing	8,502	9,074	8,255	11.5	6.7	-9.0	2.7
Tobacco products manufacturing	2,385	3,365	3,351	31.9	41.1	-0.4	22.8
Textile products manufacturing	8,908	9,219	8,448	5.8	3.5	-8.4	0.1
Manufacture of wearing apparel and accessories	11,246	12,695	12,799	5.5	12.9	0.8	6.3
Preparation of leather and manufacture of leather goods, travel items and footwear	5,952	6,380	5,944	10.8	7.2	-6.8	3.4
Wood products manufacturing	9,227	10,275	9,366	22.5	11.4	-8.8	7.5
Pulp, paper and paper products manufacturing	23,514	25,249	28,385	10.0	7.4	12.4	9.9
Printing and reproduction of recordings	3,508	3,840	3,667	8.9	9.5	-4.5	4.4
Manufacture of coke, petroleum products and biofuels	25,544	28,524	32,856	-42.8	11.7	15.2	-9.7
Chemical products manufacturing	26,250	30,677	29,375	2.4	16.9	-4.2	4.6
Manufacture of pharmaceutical chemicals and pharmaceuticals	6,815	6,632	6,169	-2.5	-2.7	-7.0	-4.1
Manufacture of rubber and plastic products	18,663	19,444	19,724	2.3	4.2	1.4	2.6
Manufacture of non-metallic mineral products	14,030	16,596	16,419	13.7	18.3	-1.1	10.0
Metallurgy	39,561	43,406	42,423	9.5	9.7	-2.3	5.5
Manufacture of metal products, except machinery and equipment	21,987	23,451	22,490	28.9	6.7	-4.1	9.6
Manufacture of computer equipment, electronic and optical products	7,598	6,162	4,854	29.3	-18.9	-21.2	-6.2
Manufacture of electrical machines, appliances and materials	13,792	14,218	12,502	9.2	3.1	-12.1	-0.3
Manufacture of machinery and equipment	18,477	19,264	18,490	19.9	4.3	-4.0	6.2
Manufacture of motor vehicles, trailers and semi-trailers	41,765	31,117	27,724	-4.6	-25.5	-10.9	-14.1
Manufacture of other transport equipment, except motor vehicles	3,215	4,317	6,969	-5.4	34.3	61.4	27.0
Furniture manufacturing	7,271	7,979	8,105	16.6	9.7	1.6	9.1
Manufacture of miscellaneous products	4,741	5,285	5,300	10.8	11.5	0.3	7.4
Maintenance, repair and installation of machinery and equipment	4,984	5,931	6,373	22.1	19.0	7.5	16.0
Electricity and gas, water, sewage and waste management	217,669	234,554	238,089	4.3	7.8	1.5	4.5
Electricity and gas	195,282	210,654	209,375	5.1	7.9	-0.6	4.1
Water, sewage, waste management and decontamination activities	22,387	23,900	28,714	-2.6	6.8	20.1	7.7
Construction	84,584	104,314	123,134	9.7	23.3	18.0	16.9
Trade, repair of motor vehicles and motorcycles	496,626	559,260	552,176	20.7	12.6	-1.3	10.3
Trade and repair of motor vehicles and motorcycles	54,137	70,315	74,572	19.7	29.9	6.1	18.1
Wholesale trade, except motor vehicles and motorcycles	216,209	240,112	237,505	20.4	11.1	-1.1	9.8
Retail trade	226,280	248,834	240,098	21.1	10.0	-3.5	8.7
Transportation, storage and mail	183,551	207,164	213,507	8.0	12.9	3.1	7.9
Land transport	115,958	138,863	149,861	15.8	19.8	7.9	14.4
Water transport	21,899	19,330	16,753	-4.3	-11.7	-13.3	-9.9
Air transport	1,492	2,062	927	-56.1	38.2	-55.1	-35.2
Storage and auxiliary transport activities, postal services and other delivery activities	44,202	46,910	45,967	1.6	6.1	-2.0	1.9
Public administration, defense and social security	165,256	167,332	182,088	1.4	1.3	8.8	3.8
Other services	305,644	324,770	362,334	15.1	6.3	11.6	10.9
Accommodation and food	24,952	26,180	26,695	13.2	4.9	2.0	6.6
Information and communication, except telecommunications	13,150	14,642	16,295	12.4	11.3	11.3	11.7
Telecommunications	11,897	7,022	7,358	18.5	-41.0	4.8	-9.8
Financial, insurance and related service activities	79,585	77,129	97,872	22.6	-3.1	26.9	14.7
Real estate, professional, scientific, technical, administrative and complementary services activities	128,129	147,478	158,542	12.0	15.1	7.5	11.5
Education	13,468	13,872	14,660	6.9	3.0	5.7	5.2
Human health and social services	29,080	32,185	34,030	15.4	10.7	5.7	10.5
Arts, culture, sports and recreation	5,383	6,261	6,882	13.8	16.3	9.9	13.3
Corporate entities headquartered abroad or not classified	9,279	33,019	61,515	433.0	255.8	86.3	228.1

Table G - Delinquency on corporate credit operations by activity sector

%

Sector	Dec 2021	Dec 2022	Dec 2023	Variation p.p.		
				2021	2022	2023
Total	1.3	1.7	2.5	0.1	0.4	0.8
Agriculture, livestock, forestry production, fishing and aquaculture	0.9	0.8	1.2	-0.5	-0.1	0.4
Extractive industries	10.4	1.0	0.9	10.2	-9.4	-0.1
Manufacturing industries	0.6	1.0	1.6	-0.2	0.4	0.6
Food products manufacturing	0.5	0.8	1.5	0.0	0.3	0.7
Beverage manufacturing	0.3	0.5	2.4	0.1	0.2	1.9
Tobacco products manufacturing	0.0	0.1	0.1	0.0	0.1	0.0
Textile products manufacturing	0.6	1.5	3.1	-1.1	0.9	1.6
Manufacture of wearing apparel and accessories	3.5	3.8	5.9	-0.2	0.3	2.1
Preparation of leather and manufacture of leather goods, travel items and footwear	4.4	2.4	7.5	-0.1	-2.0	5.1
Wood products manufacturing	0.5	1.2	1.9	-0.3	0.7	0.7
Pulp, paper and paper products manufacturing	0.4	0.2	0.6	0.2	-0.2	0.4
Printing and reproduction of recordings	3.4	6.4	4.2	1.9	3.0	-2.2
Manufacture of coke, petroleum products and biofuels	0.1	0.0	0.0	-0.6	-0.1	0.0
Chemical products manufacturing	0.3	0.4	0.7	0.0	0.1	0.3
Manufacture of pharmaceutical chemicals and pharmaceuticals	0.2	0.1	0.2	-0.5	-0.1	0.1
Manufacture of rubber and plastic products	0.7	1.3	1.9	0.0	0.6	0.6
Manufacture of non-metallic mineral products	0.5	1.1	2.3	-0.4	0.6	1.2
Metallurgy	0.0	0.1	0.2	-0.3	0.1	0.1
Manufacture of metal products, except machinery and equipment	0.9	1.4	2.5	-0.3	0.5	1.1
Manufacture of computer equipment, electronic and optical products	0.2	1.4	1.4	-0.2	1.2	0.0
Manufacture of electrical machines, appliances and materials	0.4	3.1	2.1	-1.8	2.7	-1.0
Manufacture of machinery and equipment	0.8	1.1	1.6	-1.8	0.3	0.5
Manufacture of motor vehicles, trailers and semi-trailers	0.1	0.4	0.3	-0.2	0.3	-0.1
Manufacture of other transport equipment, except motor vehicles	0.3	0.2	0.4	-2.3	-0.1	0.2
Furniture manufacturing	1.7	2.5	4.0	0.1	0.8	1.5
Manufacture of miscellaneous products	1.6	2.5	3.0	0.5	0.9	0.5
Maintenance, repair and installation of machinery and equipment	2.9	4.0	5.7	0.7	1.1	1.7
Electricity and gas, water, sewage and waste management	0.1	0.1	0.1	-0.4	0.0	0.0
Electricity and gas	0.0	0.0	0.0	0.0	0.0	0.0
Water, sewage, waste management and decontamination activities	0.5	0.4	0.7	-3.6	-0.1	0.3
Construction	2.9	2.8	3.0	-0.8	-0.1	0.2
Trade, repair of motor vehicles and motorcycles	1.8	2.6	4.8	0.2	0.8	2.2
Trade and repair of motor vehicles and motorcycles	1.8	2.2	3.4	0.4	0.4	1.2
Wholesale trade, except motor vehicles and motorcycles	1.0	1.4	2.3	-0.4	0.4	0.9
Retail trade	2.6	3.8	7.6	0.8	1.2	3.8
Transportation, storage and mail	1.4	1.3	1.4	0.5	-0.1	0.1
Land transport	1.8	1.6	1.8	1.0	-0.2	0.2
Water transport	0.0	0.4	0.1	-0.1	0.4	-0.3
Air transport	7.9	0.3	0.3	3.1	-7.6	0.0
Storage and auxiliary transport activities, postal services and other delivery activities	0.9	1.1	0.7	-0.4	0.2	-0.4
Public administration, defense and social security	0.0	0.0	0.0	0.0	0.0	0.0
Other services	2.0	2.6	2.9	0.4	0.6	0.3
Accommodation and food	6.9	7.7	7.2	3.1	0.8	-0.5
Information and communication, except telecommunications	1.6	2.5	2.3	-0.4	0.9	-0.2
Telecommunications	0.7	2.4	2.0	0.4	1.7	-0.4
Financial, insurance and related service activities	0.6	0.6	0.8	-1.1	0.0	0.2
Real estate, professional, scientific, technical, administrative and complementary services activities	2.0	2.5	3.2	0.8	0.5	0.7
Education	2.7	2.8	3.3	0.9	0.1	0.5
Human health and social services	1.0	1.9	2.2	0.2	0.9	0.3
Arts, culture, sports and recreation	2.2	3.6	3.4	0.5	1.4	-0.2
Corporate entities headquartered abroad or not classified	1.7	2.3	2.9	0.7	0.6	0.6

Annex C – Statistical annex – Chapter 5

Table A - Credit Stock Concentration Indicators

Rural and Agricultural Financing - Households and Corporations

	2021	2022	2023
Participation (%)			
By segment type			
b1+b2	81.9	82.6	83.2
b3	15.6	15.3	14.4
b4	2.2	1.9	2.2
n1+n2	0.3	0.2	0.2
n4	0.0	0.0	0.0
By control type			
Public	61.4	64.3	63.5
Private	38.6	35.8	36.5
By source of funds			
Non-earmarked	12.5	15.4	16.8
Earmarked	87.5	84.6	83.2
Concentration indices			
IHH	0.2860	0.2740	0.2500
EN	3.5	3.7	4.0
RC4 (%)	64.2	65.6	64.0
Top four institutions' share (%)			
	Banco do Brasil	Banco do Brasil	Banco do Brasil
	52.7	51.3	48.7
	Bradesco	Caixa Econômica Federal	Caixa Econômica Federal
	5.4	7.0	7.9
	Caixa Econômica Federal	Bradesco	Bradesco
	3.1	4.4	4.3
	Bco Cooperativo Sicredi	Bco Cooperativo Sicredi	Bco Cooperativo Sicredi
	3.0	2.9	3.1

Table B - Credit Stock Concentration Indicators

Housing Financing - Households and Corporations

	2021	2022	2023
Participation (%)			
By segment type			
b1+b2	99.7	99.7	99.6
b3	0.1	0.2	0.2
b4	0.0	0.0	0.0
n1+n2	0.1	0.2	0.2
n4	0.0	0.0	0.0
By control type			
Public	73.1	72.7	73.8
Private	26.9	27.3	26.2
By source of funds			
Non-earmarked	0.8	0.8	0.8
Earmarked	99.2	99.3	99.2
Concentration indices			
IHH	0.4654	0.4660	0.4795
EN	2.1	2.1	2.1
RC4 (%)	92.2	92.6	92.6
Top four institutions' share (%)			
	Caixa Econômica Federal	Caixa Econômica Federal	Caixa Econômica Federal
	66.2	66.3	67.4
	Itaú	Itaú	Itaú
	10.4	11.5	11.1
	Bradesco	Bradesco	Bradesco
	9.2	8.9	8.6
	Santander	Santander	Santander
	6.4	5.9	5.5

Table C - Credit Stock Concentration Indicators

Infrastructure and Development Financing - Corporations

	2021	2022	2023
Participation (%)			
By segment type			
b1+b2	34.6	34.7	35.4
b3	0.0	0.0	0.1
b4	64.7	64.6	63.8
n1+n2	0.7	0.6	0.7
n4	0.0	0.0	0.0
By control type			
Public	95.6	95.9	95.6
Private	4.4	4.2	4.4
By source of funds			
Non-earmarked	2.0	2.1	2.4
Earmarked	98.0	97.9	97.7
Concentration indices			
IHH	0.4457	0.4428	0.4303
EN	2.2	2.3	2.3
RC4 (%)	94.0	93.2	93.7
Top four institutions' share (%)			
	BNDES	BNDES	BNDES
	62.7	62.3	61.3
	Caixa Econômica Federal	Caixa Econômica Federal	Caixa Econômica Federal
	21.5	22.1	22.1
	Banco do Brasil	Banco do Brasil	Banco do Brasil
	7.7	7.0	7.1
	Bradesco	Bradesco	B D Regional do Extremo Sul
	2.1	1.8	1.6

Table D - Credit Stock Concentration Indicators

Operations with Acquired Receivables - Corporations

	2021	2022	2023
Participation (%)			
By segment type			
b1+b2	99.8	99.9	99.6
b3	0.0	0.0	0.0
b4	0.0	0.0	0.0
n1+n2	0.2	0.1	0.4
n4	0.0	0.0	0.0
By control type			
Public	1.1	1.4	1.5
Private	98.9	98.6	98.5
By source of funds			
Non-earmarked	100.0	100.0	100.0
Earmarked	0.0	0.0	0.0
Concentration indices			
IHH	0.1287	0.1230	0.1013
EN	7.8	8.1	9.9
RC4 (%)	65.8	63.0	55.5
Top four institutions' share (%)			
	Bradesco	Bradesco	Bradesco
	21.1	22.9	16.9
	Santander	Itaú	Santander
	17.6	16.2	16.3
	Itaú	Santander	Itaú
	17.4	14.4	14.8
	Safra	Safra	Safra
	9.7	9.5	7.5

Table E - Credit Stock Concentration Indicators

Working Capital - Corporations

	2021	2022	2023
Participation (%)			
By segment type			
b1+b2	87.0	85.5	83.2
b3	12.3	13.7	15.7
b4	0.4	0.3	0.3
n1+n2	0.4	0.5	0.7
n4	0.0	0.0	0.0
By control type			
Public	27.2	30.2	32.7
Private	72.8	69.8	67.3
By source of funds			
Non-earmarked	100.0	100.0	100.0
Earmarked	0.0	0.0	0.0
Concentration indices			
IHH	0.0928	0.0906	0.0881
EN	10.8	11.0	11.4
RC4 (%)	57.0	57.4	57.0
Top four institutions' share (%)			
	Bradesco	Bradesco	Banco do Brasil
	16.9	16.1	16.4
	Itaú	Banco do Brasil	Bradesco
	15.5	14.6	13.8
	Caixa Econômica Federal	Itaú	Itaú
	12.5	14.1	13.7
	Banco do Brasil	Caixa Econômica Federal	Caixa Econômica Federal
	12.1	12.6	13.1

Table F - Credit Stock Concentration Indicators

Payroll-Deducted Personal Loans - Households

	2021	2022	2023
Participation (%)			
By segment type			
b1+b2	96.3	96.3	96.3
b3	3.2	2.9	2.9
b4	0.0	0.0	0.0
n1+n2	0.5	0.7	0.8
n4	0.0	0.0	0.0
By control type			
Public	44.6	44.3	44.0
Private	55.4	55.7	56.1
By source of funds			
Non-earmarked	100.0	100.0	100.0
Earmarked	0.0	0.0	0.0
Concentration indices			
IHH	0.1234	0.1203	0.1200
EN	8.1	8.3	8.3
RC4 (%)	65.2	64.6	63.6
Top four institutions' share (%)			
	Banco do Brasil	Banco do Brasil	Banco do Brasil
	21.6	20.3	21.0
	Bradesco	Caixa Econômica Federal	Caixa Econômica Federal
	15.6	16.4	15.6
	Caixa Econômica Federal	Bradesco	Bradesco
	15.2	14.9	14.8
	Itaú	Itaú	Itaú
	12.8	13.0	12.2

Table G - Credit Stock Concentration Indicators

Non-Payroll-Deducted Personal Loans - Households

	2021	2022	2023
Participation (%)			
By segment type			
b1+b2	77.2	76.0	72.3
b3	17.3	17.3	18.4
b4	0.0	0.0	0.0
n1+n2	5.5	6.6	9.3
n4	0.0	0.0	0.0
By control type			
Public	27.5	26.1	24.9
Private	72.5	73.9	75.1
By source of funds			
Non-earmarked	100.0	100.0	100.0
Earmarked	0.0	0.0	0.0
Concentration indices			
IHH	0.0796	0.0765	0.0708
EN	12.6	13.1	14.1
RC4 (%)	49.7	47.5	46.6
Top four institutions' share (%)			
	Banco do Brasil	Banco do Brasil	Banco do Brasil
	18.4	18.0	18.1
	Bradesco	Bradesco	Bradesco
	14.9	14.6	11.5
	Itaú	Itaú	Itaú
	9.1	8.9	9.7
	Santander	Santander	Nu Pagamentos
	7.3	6.0	7.3

Table H - Credit Stock Concentration Indicators

Vehicle Financing - Households

	2021	2022	2023
Participation (%)			
By segment type			
b1+b2	94.7	94.3	94.3
b3	3.7	4.1	4.4
b4	0.0	0.0	0.0
n1+n2	1.6	1.6	1.3
n4	0.0	0.0	0.0
By control type			
Public	2.0	1.7	1.6
Private	98.0	98.3	98.4
By source of funds			
Non-earmarked	100.0	100.0	100.0
Earmarked	0.0	0.0	0.0
Concentration indices			
IHH	0.1263	0.1160	0.1089
EN	7.9	8.6	9.2
RC4 (%)	65.1	61.5	58.3
Top four institutions' share (%)			
	Santander	Santander	Santander
	24.4	22.9	22.0
	Votorantim	Bradesco	Votorantim
	14.1	14.2	12.5
	Bradesco	Itaú	Itaú
	13.9	12.6	12.0
	Itaú	Votorantim	Bradesco
	12.7	11.8	11.8

Table I - Credit Stock Concentration Indicators

Credit Card - Global Analysis - Households and Corporations

	2021	2022	2023
Participation (%)			
By segment type			
b1+b2	85.5	82.6	77.9
b3	1.7	2.0	2.5
b4	0.0	0.0	0.0
n1+n2	12.4	15.1	19.3
n4	0.4	0.3	0.3
By control type			
Public	16.5	15.7	14.7
Private	83.5	84.4	85.3
By source of funds			
Non-earmarked	100.0	100.0	100.0
Earmarked	0.0	0.0	0.0
Concentration indices			
IHH	0.1338	0.1248	0.1135
EN	7.5	8.0	8.8
RC4 (%)	66.0	62.4	59.5
Top four institutions' share (%)			
	Itaú	Itaú	Itaú
	27.5	26.2	23.9
	Bradesco	Bradesco	Bradesco
	14.0	14.3	13.3
	Banco do Brasil	Banco do Brasil	Banco do Brasil
	13.0	12.3	11.2
	Santander	Santander	Nu Pagamentos
	11.5	9.6	11.1

Table J - Credit Stock Concentration Indicators

Overdraft - Households and Corporations

	2021	2022	2023
Participation (%)			
By segment type			
b1+b2	86.8	85.1	82.1
b3	13.2	14.9	17.9
b4	0.0	0.0	0.0
n1+n2	0.0	0.0	0.0
n4	0.0	0.0	0.0
By control type			
Public	20.7	19.8	20.8
Private	79.4	80.2	79.2
By source of funds			
Non-earmarked	100.0	100.0	100.0
Earmarked	0.0	0.0	0.0
Concentration indices			
IHH	0.1557	0.1491	0.1395
EN	6.4	6.7	7.2
RC4 (%)	73.5	71.1	68.0
Top four institutions' share (%)			
	Itaú	Itaú	Itaú
	28.2	28.3	28.1
	Santander	Bradesco	Santander
	17.5	16.9	15.0
	Bradesco	Santander	Bradesco
	16.8	15.5	14.2
	Caixa Econômica Federal	Caixa Econômica Federal	Caixa Econômica Federal
	11.0	10.4	10.7


BANCO CENTRAL DO BRASIL