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According to the Political Constitution of Colombia, *Banco de la República* is responsible for safeguarding the price stability of the economy. The proper implementation of this task depends crucially on maintaining financial stability. Financial stability is understood as a general condition in which the financial system (financial institutions, markets, and infrastructures):

1. Assesses and manages financial risks in such a way that it facilitates the performance of the economy and the efficient allocation of resources.
2. Is capable of autonomously absorbing, dissipating, and mitigating the materialization of the risks that may arise as a result of adverse events.

This Financial Stability Report (FSR) presents the Central Bank's appreciation on the recent performance of credit institutions and their debtors, as well as on the main risks and vulnerabilities that could affect the financial stability of the Colombian economy. The FSR intends to keep the participants in financial markets and the public informed, besides promoting public debate on the trends and risks related to the financial system. The results herein presented also serve as a basis for the monetary authority to make decisions that promote financial stability in the general context of the constitutional objectives of price and macroeconomic stability.

This FSR is complemented by the Payment Systems Report, published annually by *Banco de la República*, which reports on the performance of the financial infrastructures of the Colombian economy. Prepared by: Financial Stability Department Office for Monetary Operations and International Investments.

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Glossary

ACO: OMO placement agent
PFM: Pension Fund Managers
HQLA: High quality liquid assets
LAM: Liquid assets adjusted for foreign exchange and market risk
TLS: Temporary Liquidity Support
BAAAFS: Banking Sector Benchmark Curve for Simple Fixed Rate Securities and AAA Rating
BAS: Bid-ask spread
BOE: Bank of England
BIS: Bank of International Settlements
BVC: Colombia Stock Market
CP: Collective portfolios
SLC: Savings and Loan Cooperatives
CD: Certificates of Deposit
CDS: Credit default swap
IB: Investment banks
FC: Finance companies
NSFR: Net stable funding ratio
COP: Colombian pesos
CCRC: Central counterparty risk clearinghouses
CUD: System of deposit accounts managed by *Banco de la República*
CSD: Central Securities Depository
DSGE: Dynamic Stochastic General Equilibrium
DTF: Fixed term deposit rate
CI: Credit institutions
ECB: European Central Bank
EUR: Euros Fed: Federal Reserve of the United States
ASF: Available Stable Funding
RSF: Required Stable Funding
CIF: Collective investment funds
IMF: International Monetary Fund
FNA: *Fondo Nacional del Ahorro*
Frech: Reserve Fund for Portfolio Stabilization Mortgage
FSB: Financial Stability Board
ALC: Administrative and labor costs
GBP: Pounds sterling
NG: National government
CNG: Central National Government
BBI: Banking benchmark indicator
NPL: Quality indicator by default QIR: Quality indicator by risk
ICE: Indicator of consolidated short-term exposure
FDI: Foreign Direct Investment
IIE: Individual indicator of short-term exposure
NBFI: Non-bank Financial Institutions
FEMI: Foreign exchange market intermediaries
IPSA: Stock Index of Chile LRI: Liquidity Risk Indicator
CPI: Consumer Price Index
IRPR: Indicator of Risk Perception by Rating
IERR: Indicator of Exchange Rate Risk
LRI: Liquidity Risk Indicator
LIH: Low Income housing
BDBR: Board of Directors of *Banco de la República*

Libor: London Interbank Offered Rate
MADR: Ministry of Agriculture and Rural Development
MEXBOL: Mexican Stock Exchange Index
GFM: Gross Financial Margin
MHPC: Ministry of the Treasury and Public Credit
MSCI COLCAP: Colombian Stock Exchange Stock Market Index
IFRS: International Financial Reporting Standards
OIS: Overnight index swap
OMO: Open market operations
OPEC+: Organization of Petroleum Exporting Countries and allies
OPA: Takeover bid
PAD: Debtor Assistance Plan
PCMVR: National Plan for the Construction and Improvement of Low-Income Rural Housing
GDP: Gross Domestic Product
NLP: Net liquidity position
PCP: Proprietary cash position
LSRR: Liabilities subject to reserve requirements
TC: Technical capital
UAP: Unified Accounting Plan
FSR: Financial Stability Report
NLR: Net liquidity requirements
ROA: Return on assets
ROE: Return on equity
IMC: Investment management companies
SARC: Credit Risk Management System
SBF: Stock Brokerage Firms
FSC: Office of the Financial Superintendent of Colombia
TC: Trust Fund companies
SMMLV: Minimum legal monthly salary in effect
SPBLPGPT: Lima Stock Exchange Stock Market Index
SPBV: Retail payment system
SCA: Superintendency of Corporate Affairs
ST: Stress tests
Sysmo: Systemic stress model
TES: Public debt securities issued by the General Office of Public Credit and the National Treasury
TC: Trading companies
IMC: Investment management companies
PFM: Pension fund managers RI: Intraday repo
IBR: Interbank rate
MPR: Monetary Policy Interest Rate
MER: Market exchange rate
USD: US dollars
UVR: Real Value Units
VAR: Autoregressive vectors
VeR: Value at Risk
PH: Priority housing
LIH: Low-income Housing
WATM: Weighted average term to maturity
WEO: World Economic Outlook

Introduction

Banco de la República's main goal is to preserve the purchasing power of the currency in coordination with the general economic policy that is intended to stabilize output and employment at long-term sustainable levels. Properly meeting the goal assigned to the Bank by the 1991 Constitution critically depends on preserving financial stability. This is understood to be a general condition in which the financial system channels domestic savings and evaluates and manages the financial risks in a way that facilitates the performance of the economy and efficient allocation of resources while, at the same time, it is able to, on its own, absorb, dissipate, and mitigate the appearance of risks that may arise as a result of adverse events.

Banco de la República's Financial Stability Report provides a diagnosis of the financial system's and its debtors' recent performance and indicates the main risks and vulnerabilities that could have an effect on the stability of the Colombian economy. The objective is to share this information with the financial market participants and the public and encourage public debate on trends and risks that affect the system. The results presented here also serve the monetary authority as a basis for making decisions that will enhance financial stability.

The analysis presented in this edition of the Report makes it possible to conclude that the Colombian financial system has liquidity and capital adequacy levels that are not only above those required by internationally accepted parameters but would even be sufficient to face the occurrence of extreme low-probability risks. In particular, during the last six months, the aggregate capital adequacy of credit institutions rose 22 basis points and reached 18.1% in February 2023. The liquidity coverage ratio indicator and the net stable funding ratio, in turn, were 202.0% and 111% and thus well above the regulatory minimums of 100%.

The period of analysis in this Report includes the period of stress that occurred in the U.S. regional bank segment and at Credit Suisse and caused nervousness regarding possible risks to global financial stability. The characteristics and risks that generated problems in those entities are analyzed in this Report and the Colombian financial system is evaluated considering different sources of vulnerability. **Some characteristics that protect the Colombian financial system are: (i) a cautious balance sheet structure on both the asset and liability sides of the entities; (ii) the widespread practice of valuing the investment portfolio at market prices, and (iii) the appropriate management of liquidity risk.**

In line with a higher interest-rate scenario and a slowdown in local economic activity, the credit growth rate has slowed down in recent months while there have been signs of deterioration in the loan portfolios. Credit, which had been exhibiting excessively high growth levels last year, especially in the consumer category, has slowed down while past-due and risky loans have rebounded. This is also driven mainly by the consumer portfolio which is reflecting the growth in risks assumed by financial institutions in previous quarters.

In spite of the lower portfolio performance seen currently and projected for the future, the high level of household indebtedness in Colombia, especially in the consumer segment, continues to be considered a source of vulnerability for the Colombian financial system as was the case in the previous edition of this Report (see section 2.2.1). Nevertheless, the financial system continues to reflect sound-

ness and stability: credit institutions (CIs) are keeping liquidity and capital adequacy indicators well above the minimums established by regulation while non-banking financial institutions (NBFIs) have registered an increase in their profits. The adjustments in the monetary policy stance since September 2021, the effect of the macroprudential measures implemented by the Office of the Financial Superintendent of Colombia (FSC) at the end of last year associated with a higher requirement in terms of loan loss provisions, and stricter conditions in the allocation of loans by CIs are behind the projection of a loan portfolio growth rate that is likely to continue declining in the coming months.

In compliance with its constitutional objectives and in coordination with the financial system's security network, Banco de la República will continue to closely monitor the outlook for financial stability at this juncture and will make the decisions necessary to ensure the proper functioning of the economy, facilitate sustainable flows of sufficient credit and liquidity funds, and further the smooth functioning of the payment system.

Leonardo Villar Gómez
Governor

Executive Summary and Analysis of Vulnerability

High and persistent inflation levels have characterized the global macroeconomic environment during the last six months. Global inflation reached its highest levels in 27 years, a performance that was widespread in advanced and emerging economies at the close of 2022. In response to the above, some central banks raised their policy rates. International organizations such as the International Monetary Fund (IMF), analysts, and financial markets believe that inflation gradually will return to central bank targets.

Amid tighter financial conditions, certain vulnerabilities of some financial institutions in developed countries became evident during the first quarter of 2023. Excessive risk-taking due to a high concentration of deposits, the lack of prudential measures, and the previous relaxation of some regulatory requirements for regional banks in the United States led to a scenario of financial stress for some institutions in developed economies in the middle of the adjustment of monetary policy interest rates. In March 2023, the collapse of a few regional US banks as well as the takeover of Credit Suisse (a systemically important bank at the global level) by UBS in Switzerland, made some fragilities that were affecting the world's financial markets evident.

This situation of financial stress in some entities in developed economies has not had direct effects on the Colombian financial system. There was an increase in volatility in global financial markets and the perception of risk resulting in a tightening of financial conditions abroad. Days after the events in a few regional US banks, there were scenarios of high volatility and increased risk aversion. However, this situation also reduced expectations of further increases in monetary policy interest rates in advanced economies, and this affected risk-taking by international investors and, in part, boosted the appreciation of some financial instruments. Notably, the financing conditions granted by international banks to Colombian banks did not change during this period.

The direct effect of this situation on the Colombian financial system was almost nil due to its low exposure to the troubled institutions in the portfolios of local entities and their low exposure as counterparties to the banks in question. In addition, CIs in Colombia have a balance sheet structure different from that of the troubled entities in the United States, as well as stricter financial regulation in line with international best practices. For example, portfolio valuation at market prices and the proper management of short-term and structural liquidity risk means that the Colombian banking system is not exposed to a situation such as that in a few of the regional banks in the United States. This *Report* presents different stress tests that illustrate the resilience of the Colombian financial system when faced with events such as those that led to the bankruptcy of these entities.

Along with the slowdown in the local portfolio, which in some segments had been expanding at very high rates over the past year, lower profitability and greater materialization of credit risk have been seen. This is a trend that could consolidate during the first half of 2023. Concerning the changes in CI assets, there was a slowdown in growth due to the lower expansion of the loan portfolio and a reduction in the value of investments (mainly TES). There has been a slowdown in the pace of real growth of all categories of loans, especially consumer and

housing loans. The adjustments in the monetary policy stance since September 2021, the effect of the macroprudential measures implemented by the Office of the Financial Superintendent of Colombia at the end of last year associated with a higher requirement in terms of loan-loss provisions, and stricter conditions in the allocation of loans on the part of credit institutions are behind the projection of a loan portfolio growth rate that is likely to continue declining in the coming months.

Non-performing and risky portfolios for all types of loans except consumer loans continued to register real decreases, although these have declined since mid-2022. The consumer loan portfolio has deteriorated in a context characterized by a slow in economic activity, high debt, and household financial burden indicators. This trend could continue into the first part of 2023. In the same vein, corporate loan portfolio quality indicators could be affected by a possible deterioration in the performance of companies due to the expected economic slowdown (more marked in some economic sectors such as construction, commerce, and restaurants and hotels) and high financing costs. CIs have expressed their intention to raise their requirements for granting new credit transactions, especially for consumer loans, and reduce interest rates for some population segments. These factors, coupled with a lower demand for loans of all types, could continue to reduce portfolio growth during the first half of 2023.¹

The debtors' exposure to foreign exchange risk is kept under control. Approximately two-thirds of private companies' foreign-currency denominated loans continue to have mitigating factors such as financial or natural hedges. Public companies that mainly borrow in foreign currency, in turn, are primarily exporters, and this moderates their foreign exchange risk. The CIs continue to maintain low currency mismatches by the foreign currency exchange regulation defined by *Banco de la República*.

CIs in Colombia have high capital and appropriate liquidity indicators that will probably enable them to face the materialization of various risks. CI capital adequacy levels remained stable between September 2022 and March 2023, while aggregate liquidity indicators (both short-term and structural) rose because of the higher percentage of liquid assets on their balance sheet. In both cases, there is leeway with respect to regulatory limits. As for NBFIs,² their profitability has shown a recovery, although it remains below the levels seen before the onset of the pandemic. The liquidity indicators of the open-ended collective investment funds (FICASPP in Spanish), in turn, showed declines, although they remain above the regulatory minimums.

This Report also presents an analysis of the resilience of financial institutions that was done through stress tests that evaluated the response of CIs and OECIFs to hypothetical extreme adverse scenarios. The results indicated that the Colombian financial system can deal with large adverse shocks. Considering the vulnerabilities identified throughout the *Report*, exercises are presented that seek to measure the ability of the financial system to face adverse and unlikely scenarios and to continue to provide its financial intermediation functions normally in the short

1 For more information, see the March 2023 Survey of the Loan Situation in Colombia. <https://www.banrep.gov.co/es/reporte-de-la-situacion-del-credito-en-colombia>

2 Among these are pension fund managers, brokerage firms, trust companies, and insurance companies.

and medium term.³ In the adverse scenario under consideration, there could be a negative profitability, a shrinking of the portfolio, and a fall in the total and core capital adequacy ratios for the aggregate of the CIs. However, the results of the exercise suggest that the CIs will probably be able to keep their aggregate indicators of individual and consolidated capital adequacy above the regulatory minimum despite the severity of the adverse scenarios. This reflects the short-term resilience of the entities in a very unfavorable macroeconomic scenario such as the one considered in chapter 3 of this Report, which is mainly characterized by a drastic fall in Colombia's terms of trade (driven by a significant reduction in oil prices) and a marked deterioration of country risk, sharp falls in local asset prices, and liquidation of investments by foreign agents. The stress tests of the OECIFs presented in the Report have shown a drop in the liquidity of these investment vehicles, although their indicators remain well above the regulatory minimums. The importance of these agents maintaining sufficient liquidity buffers to face possible shocks is underscored.

Vulnerabilities Matrix

The identification and analysis of the main fragilities of the Colombian financial system are supplemented with a matrix of vulnerabilities faced by the financial system in which the status, mitigating factors, and the direction of the changes in each vulnerability over the last six months are presented (Table A).

In this edition, the vulnerabilities identified coincide with those documented in the previous issue of the *Report*: (I) exposure to sudden changes in international financial conditions given the uncertainty of the situation of the banking sector in the United States; (II) a credit risk that becomes relevant in a context of lower domestic economic growth prospects, high local interest rates for a longer period than initially expected to cope with inflation, and high levels of household indebtedness and financial burden, and (III) a deterioration in the performance indicators of financial institutions due to reductions in the profitability of CIs and NBFIs (although the latter have shown signs of recovery in recent months).

The vulnerability associated with sudden changes in global financial conditions has risen vis-à-vis the previous report in line with recent events in the U.S. banking system. Although the direct exposure of the Colombian banking system to the collapse of some banks in the United States is low, the indirect effects of such changes in the foreign financial conditions of the economy were reflected in a greater perception of sovereign risk and exchange rate volatility in a context of high fiscal and external deficits in Colombia. In addition, higher risk premiums (reflected in credit default swaps [CDS]) continue to be seen in comparison to those occurring in similar countries, and there has been volatility in foreign investors' holdings of public debt securities.

As for credit risk, the analysis in this edition suggests that the financial system's exposure to this source of vulnerability is stable given that, although a high financial burden on households, possible deterioration in the performance of companies, and a slowdown in the economic growth envisaged for 2023 are expected, the CIs' loan loss provisioning levels remain high, and there is a prospective and prudential regulation that mitigates this vulnerability. Additionally, the slowdown seen in household credit growth rates may reduce this exposure going forward.

³ Up to one year and between one and two years respectively.

The liquidity indicators of financial institutions, in turn, have risen and capital adequacy indicators have remained stable, and in both cases, they are well above their regulatory minimums, so no significant threats to the aggregate soundness of financial institutions are foreseen in the short term. Nevertheless, a reduction in the profitability of the CIs was noted and the assets of the OECIFs have registered a drop caused by a decrease in net contributions since mid-March. Therefore, the analysis suggests a moderate exposure to a deterioration in the performance of financial institutions.

Table A
Financial Stability Vulnerability Matrix

Vulnerabilities	State	Mitigating factors	Increase, stability or decrease compared to the previous edition
1. Exposure to sudden changes in global financial conditions	<ul style="list-style-type: none"> • Twin deficits. • High uncertainty about global financial conditions. • International interest rate uncertainty. • High volume of public debt in the hands of foreign investors. 	<ul style="list-style-type: none"> • Reduced direct exposure to U.S. banks that have experienced difficulties. • Expected reduction in the current account deficit and fiscal deficit in 2023. • Sound balance sheets of local financial institutions, appropriate portfolio valuation, and short-term and structural liquidity management. 	↑
2. Credit Risk	<ul style="list-style-type: none"> • Reversal of the recovery trend in risk indicators. • Slowdown in the growth rate of loans to households. • High debt to household disposable income ratio. • A few measurements of household financial health have deteriorated during the recent period. 	<ul style="list-style-type: none"> • The past-due and risky portfolio of households is at low levels. • Progress in measuring their financial burden allows monitoring and timely supervisory actions to be taken. • Appropriate levels of loan-loss provision coverage of the loan portfolio. • New loan loss provisions for consumer loans. 	→
3. Fragility of Financial Institutions	<ul style="list-style-type: none"> • The profitability of CIs declined. • The profitability of NBFIs remains low in spite of the observed recovery. • FICASPP's assets fell due to a reduction in net contributions. • In addition, the liquidity indicators are showing lower levels. 	<ul style="list-style-type: none"> • Proper capital adequacy and liquidity levels of the CIs. • The CI liquidity indicators, both short-term and structural, are above the regulatory minimums. • The majority of its investment portfolio is valued at market prices. • FICASPP's liquidity indicators are above the regulatory minimum levels. 	→

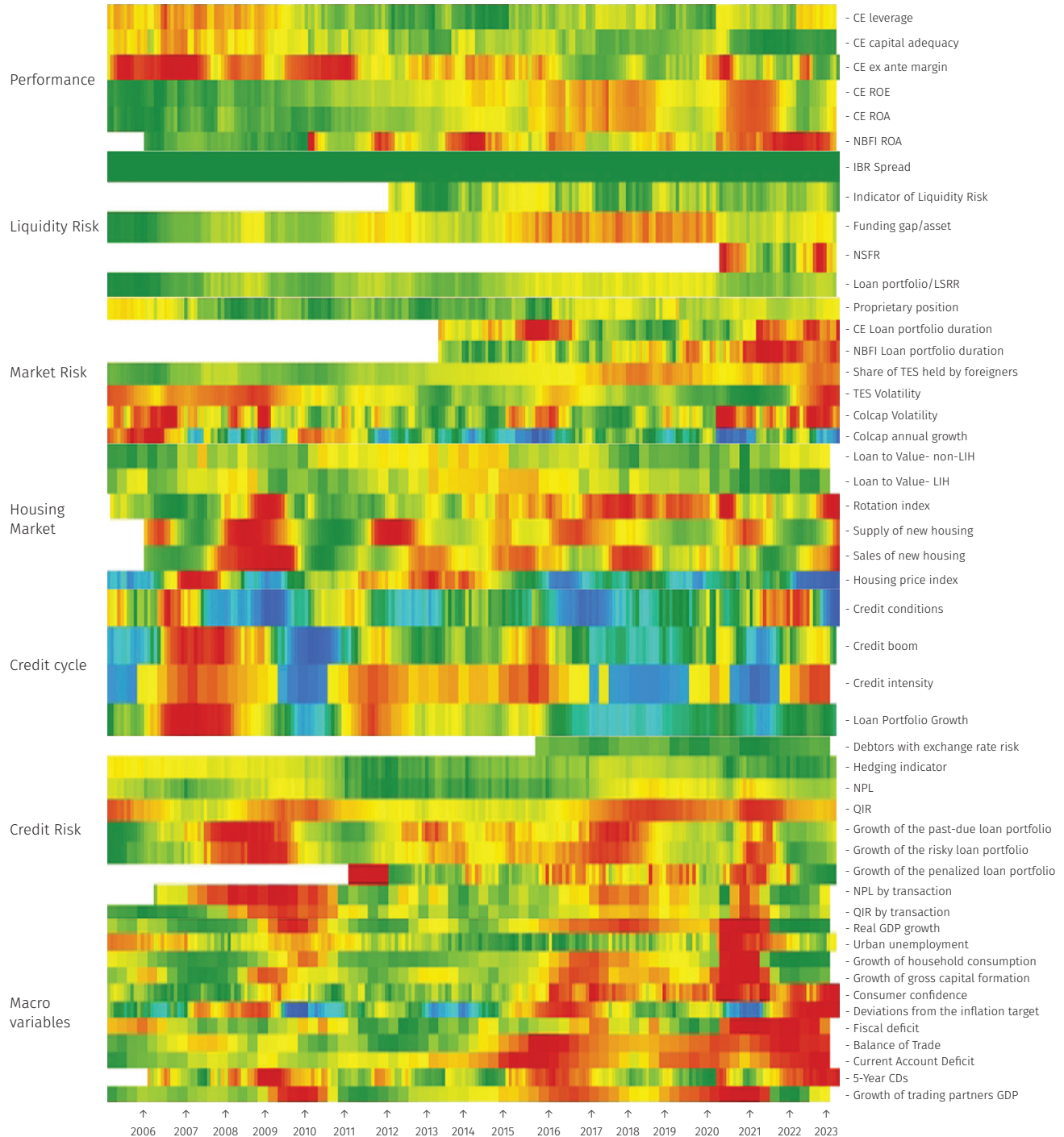
Source: Banco de la República.

Heat Map

The heat map is a tool that allows to simultaneously view the changes in different variables grouped into specific categories that reflect the performance of financial institutions, different financial risks, and macroeconomic risks over time. Each variable is represented using a color scale that assigns shades based on historical trends and some expert judgments. Thus, reddish tones indicate periods when a variable is at risky levels, while green tones indicate periods of lower risk. Yellow shades reflect an intermediate point. In the case of some variables, such as asset price indices or credit cycle indicators, that reflect risks when they exhibit both high values and low ones, blue shades are used to indicate the risk of low activity

in the respective markets⁴ (Graph A). The map seeks to show the changes in a set of indicators used in graphically and comprehensively assessing and describing risks in a cross-sectional and historical manner.

Graph A
Risk Map of the Colombian Financial System



Sources: Office of the Financial Superintendent of Colombia, DANE, Fedesarrollo, Bloomberg, and Banco de la República; calculations by Banco de la República

4 The technical details on the reading of, construction of, and variables used on the map are given in Box 1 of the September 2017 Financial Stability Report.

As can be seen, the indicators of macroeconomic variables have shown recent deterioration. The level of inflation, the current account deficit, and consumer confidence, in particular, are showing progressively worsening shades of red. Economic growth indicators, which had been showing green tones as a result of the positive recovery in the post-pandemic period, will likewise deteriorate in the context of the expected slowdown.

Increased vulnerability associated with sudden changes in global financial conditions is identified and highlighted by shades of red in the fiscal deficit and current account categories as well as by the deterioration of risk premiums (reflected in high levels of CDS). Significant holdings of public debt securities by foreign investors could be an amplifying factor in the event of sudden changes in global financial conditions.

In terms of credit risk, during the analysis period of this edition of the Report, yellow tones are seen in its variables as a result of the recent deterioration of the loan portfolio quality indicators. Nonetheless, the variables associated with loan-loss provisions, capital adequacy, and liquidity of CIs show shades of green that reflect the aggregate resilience of the entities to shocks. The variables related to loan portfolio growth, in turn, have reversed the upward trend they have been showing for some months (greener and bluer tones) and have thus reflected more sluggishness.

On the other hand, liquidity risk indicators have shown an improvement. The LRI of CIs has risen in the last six months as did the funding gap. The NSFR has led recoveries following the deterioration seen at the end of 2022, while the portfolio of liabilities subject to reserve requirements has been reduced, thus indicating that local lending institutions have improved their funding.

Last of all, the heat map shows that there has been pressure on the housing market recently. The significant drop in the pace of new housing sales that has resulted in an increase in the turnover rate (the time required to sell available units) could affect the construction sector companies' ability to pay. Therefore, it is necessary to continue monitoring these variables continuously.

1. Macroeconomic Environment⁵

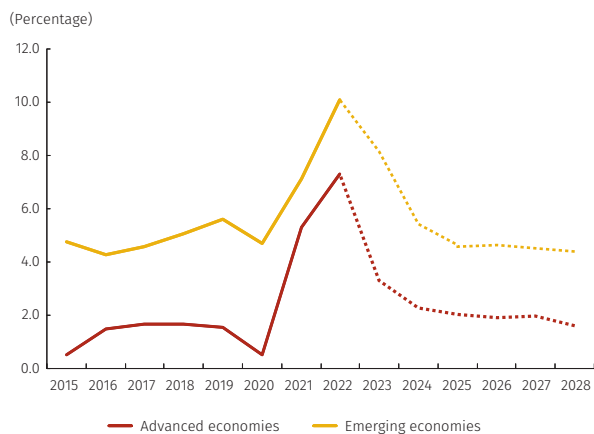
The global macroeconomic environment has been shaped in a context of high inflation levels that have been significantly higher than the central banks' targets. In response to the above, the latter continued to raise their monetary policy rates.

Inflationary trends that had been occurring since 2021 as a result of monetary and fiscal stimulus provided during the pandemic, supply chain disruptions as a result of covid-19 and, subsequently, the impact of Russia's invasion of Ukraine on energy and food prices were consolidated during the last six months. Overall inflation reached 8.9% at the close of 2022 and was higher than the 6.3% registered twelve months earlier and than the data for the last 27 years. This trend was widespread with inflation rates of 7.3% and 10.1% in advanced and emerging economies⁶ respectively by the end of 2022 (Graph 1.1). In the same sense, there was a global de-anchoring of short- and medium-term inflation expectations.

In response to the above, the main central banks raised their monetary policy rates. The Federal Reserve (Fed), in particular, raised their rate 125 basis points (bp) over the last six months in order to place it within a range of 5.0% to 5.25% at the beginning of May 2023. The European Central Bank, in turn, raised its benchmark rate 175 bp during the same period making it 3.25% in May 2023. Finally, the Bank of England has raised its monetary policy rate 150 bp in the last six months to bring it to 4.5%.

The latest data suggest that global inflation may have reached peak levels during the third quarter of 2022 although the underlying inflation rates in a significant proportion of countries do not yet appear to have peaked. According to International Monetary Fund (IMF) projections, world inflation will probably go from 8.9% in 2022 to 6.1% in 2023 and to 4.1% in 2024. This implies a slower decrease compared to the forecasts made by the entity six months ago (5.1% in 2023 and 3.8% in 2024). This decline will probably occur in response to increases in monetary policy rates along with lower crude oil and other commodity prices. These inflation levels are likely to remain above the levels seen prior to the onset of the pandemic and above the targets set by central banks in different jurisdictions. Thus, the IMF thinks it is unlikely that inflation will return to target before 2025.

Graph 1.1
Inflation in Advanced and Emerging Economies



Note: the dotted data in the graph correspond to International Monetary Fund forecasts.

Sources: *World Economic Outlook* (April 2023) and International Monetary Fund.

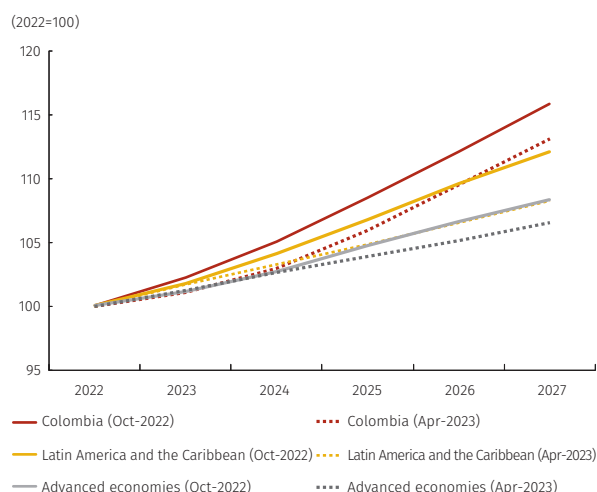
⁵ The data presented in this chapter are those available as of April 2023.

⁶ International Monetary Fund classification of emerging markets and developing economies.

Tighter financial conditions led major international economic agencies to revise the expected global economic growth for the next two years downward.

The IMF forecasts that global growth will go from 3.4% in 2022 to 2.8% in 2023 and then rise slightly to 3.0% in 2024 in its World Economic Outlook published in April 2023. This forecast is lower than the growth seen before the onset of the pandemic⁷ and lower than the forecast made by this entity six months ago when they expected growth of 2.9% in 2023 and 3.1% in 2024. Specifically, this slowdown would be concentrated in the dynamics of the advanced economies where growth is expected to slow down and go from 2.7% in 2022 to 1.3% the year after (Graph 1.2). This greater sluggishness is mainly due to contractionary monetary policies, the deterioration of international financial conditions and, to a lesser extent, the conflict between Ukraine and Russia. Emerging economies, in turn, are expected to show higher growth and expand 3.9% during 2023 and 4.2% in 2024.

Graph 1.2
Comparison of the World Economic Outlook's Perspective on Real GDP for October 2022 and April 2023



Note: actual data for 2022 and forecasts starting in 2023. The data correspond to indices based on 2022 when it takes a value of 100.

Sources: *World Economic Outlook* (October 2022 and April 2023) and International Monetary Fund.

In Latin America and the Caribbean, in particular, growth of 1.6% in 2023 and of 2.2% in 2024 is expected. According to the IMF's presentation of the *Western Hemisphere Economic Outlook Report* for the first half of 2023, although there will probably be a significant slowdown driven primarily by lower foreign demand, the majority of countries are not expected to face recessionary periods.⁸ This reflects the resilient performance of the region, which registered production and employment data that exceeded pre-pandemic levels.

The rapid adjustment in international monetary policy rates coupled with the relaxation of regulatory requirements for liquidity and interest rate risk management in regional banks in the United States as well as the weakness in the corporate governance of some European entities led to stress scenarios in the financial systems of some developed economies during the first quarter of 2023. Although the effect on emerging economies was limited, the risk of a tightening in international financial conditions was exacerbated and was accompanied by increased risk aversion. The recent collapse of Silicon Valley Bank and Signature Bank in the United States, and the takeover of Credit Suisse, a bank with global systemic importance, by UBS in Switzerland, highlighted some financial vulnerabilities. In the case of the first two, there were concentrations in fixed-income securities valued at maturity, so their valuation was not affected by the recent increase in interest rates. Moreover, their deposits were concentrated in the technology sector, and a large part of these deposits were

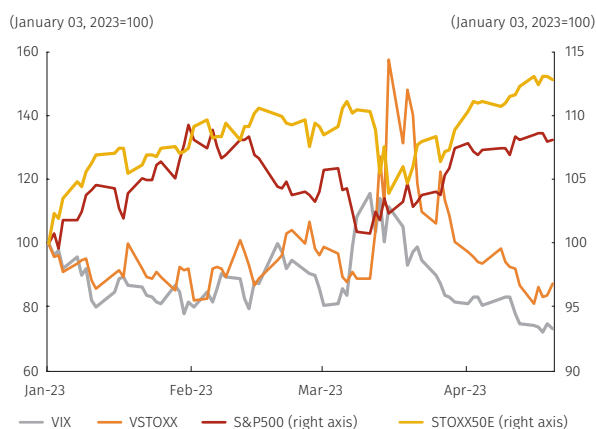
7 The world economy grew at an average annual rate of 3.7% between 2010 and 2019.

8 According to IMF projections, only Chile is likely to face a decrease (-1.0%) during 2023.

not protected by U.S. deposit insurance.⁹ Thus, these entities experienced heavy withdrawals from their deposits during the first days of March 2023 and had to liquidate their investments. Thus, they suffered the accumulated devaluations of the securities that led to their illiquidity and insolvency.¹⁰ The Fed's swift action prevented a contagion of the shock and a potential loss of confidence in the U.S. financial system. Credit Suisse, in turn, suffered severe devaluations in their market capitalization, mainly as a consequence of corporate governance and business model problems. This, given the uncertainty generated by the problems in the United States, led to its absorption by UBS, one of its main competitors.

This situation led to a fall in several global stock market indices, an increase in market volatility, and greater risk aversion on the part of investors (Graph 1.3). In spite of the fact that intervention on the part of the authorities reduced the effects of this shock, an exacerbation of stress in the banking systems of advanced countries could lead to a tightening of global financial conditions resulting in capital outflows, increases in risk premia, and pressure toward a further strengthening of the dollar. All of these factors could have an adverse effect on the performance of emerging economies.

Graph 1.3
Stock Market and Volatility Indices of American and European Markets



Note: data correspond to indices based on 03 January 2023 when they take a value of 100.
Source: Yahoo Finance.

Regarding the local macroeconomic performance, a slowdown in Colombia's economic growth is expected for 2023 in an environment of high monetary policy interest rates that are intended to reduce inflation and expectations of it. In spite of the fact that inflation has remained at high levels for a longer period than initially expected, analysts and financial markets, on average, anticipate that the process of adjusting towards the target range will begin in the first half of the year.

In terms of local economic performance, the inflationary trend has persisted during the second half of 2022 and the first half of 2023 and has reached levels not seen over the course of this century. Local prices have been affected mainly by the greater strength of domestic demand (especially consumption); the depreciation of the Colombian peso; the increase in agricultural supply prices due to the war between Russia and Ukraine; and weather conditions that have affected harvests and the consequent distribution of food supplies. Given the above, *Banco de la República* (BR) has acted decisively with increases in the monetary policy rate that reached 13.25% in April 2023 (325 basis points higher than the rate seen six months earlier). The technical staff at BR expects the process of decreasing prices to begin in the second quarter of 2023 and inflation to decrease to levels close to 9.5% in 2023 and 3.4% in 2024.

9 In the United States, deposit insurance covers up to USD 250,000 per depositor and institution.

10 For more information on the Silicon Valley Bank and Signature Bank stress scenarios, see Box 3 of this Report.

In a context of an expected slowdown in our main trading partners' economies and tightening foreign financial conditions, the Colombian economy will not be unaffected by global trends. The BR technical staff expects growth to slow down in 2023 as it goes from the 7.5% seen in 2022 to 1.0%, which is identical to the figure expected for 2024. The slowdown is expected to be driven primarily by lower private spending which would contribute to the expected reduction in local prices. Although the expected growth for the coming years is lower, note that the economy will probably continue to grow even in contrast to the very high levels of growth seen in 2021 and 2022 that, at the time, made Colombia one of the fastest-growing countries in the world.

With respect to local financial conditions, there have been considerable improvements over the last six months. Compared to the last version of this Report when there were strong devaluations in the TES market, increases in the exchange rate, and volatility in the market, improvements in these factors have been noted. In spite of the above, the high levels of local indebtedness and the twin deficits that Colombia has been suffering for some years could generate vulnerabilities on this front. Regarding the former, as has been stated in previous versions of this Report, households have high levels of debt to income as do the portfolios of public and private companies as a percentage of GDP. The national government's fiscal deficit remains above pre-pandemic levels while, at the same time, the current account deficit has risen in recent years. In a context of tightening financial conditions, it will be essential to monitor these vulnerabilities.

Some risks beyond those presented in the Executive Summary and an analysis of vulnerabilities in terms of macroeconomic performance and financial stability that could affect financial intermediation activities are identified in this Report. Among them are: 1) an exacerbation of foreign financial problems; 2) a sharp drop in the terms of trade driven by a reduction in crude oil prices; 3) lower growth of Colombia's trading partners, and 4) an increase in geopolitical tensions at the global level.

Some risk factors that require permanent monitoring by the country's economic authorities have been identified. First, although central banks and regulators in the United States and Europe acted effectively in the period of stress described above, a possible exacerbation of the registered financial stress or distrust in the banking system could affect the health of foreign financial intermediaries. This could generate, through direct and indirect channels, decreases in risk appetite and increases in international funding restrictions that could have a negative impact on local economic and financial activity.

Moreover, economic growth in our main trading partners could be lower than expected. In particular, an inverted yield curve has been registered for the United States in the recent past which could foreshadow recessions for this economy.¹¹ Although the U.S. labor market and private consumption have shown great strength, a reversal of these trends, foreign shocks or a greater-than-expected impact of higher interest rates could increase the likelihood of negative growth in the near future.

Lower global growth could also imply a fall in the demand for commodities and thus affect their prices. The above could have a particularly strong impact on emerging economies such as Colombia's, which is fiscally and externally depen-

¹¹ For more information on yield curve inversion in advanced economies, see *Banco de la República's Financial Markets Report* for the first quarter of 2023.

dent on the export of oil and other commodities. In its baseline scenario, the IMF expects an average drop of 23.8% in the average annual price of Brent crude oil¹² in 2023. Its impact could be amplified if lower than expected growth were to materialize.

Another risk factor is the increase in geopolitical tensions. The war between Russia and Ukraine has continued and no solution to the conflict is in sight in the short term. While the global economy has modified the supply lines that were affected, an exacerbation of the conflict could affect foreign trade, potential global growth, and local and international inflation. Other events, such as the trade tension between the United States and China, have had an impact on the flow of goods, leading to processes such as nearshoring whereby countries seek to concentrate production in their jurisdictions, or seek partnerships with countries that are geographically close and politically similar.

The stress tests prepared for credit institutions in this Report with respect to both their individual and consolidated balance sheets as well as the test done on open-ended collective investment funds evaluate an adverse macroeconomic scenario that accentuates the previously described vulnerabilities of the economy. The results suggest that these institutions could continue their normal functions in an adverse scenario without defaulting (in aggregate terms) on their prudential requirements. This underscores the broad strength of the Colombian financial system.

Chapter 3 of this Report evaluates the resilience of the financial system by using a hypothetical adverse scenario of a contraction of the Colombian economy that seeks to reflect a fall in local terms of trade, lower growth of our trading partners and a tightening of foreign, and domestic financial conditions. Furthermore, the consolidated stress test incorporated in the above scenario evaluates the resilience of local entities to a significant exchange rate depreciation shock, a scenario of higher country risk accompanied by a significant drop in international crude oil prices as well as the incorporation of different paths of devaluation of their investments in Central America. The usefulness of these tests lies in providing an estimate of the potential losses that might be seen in these scenarios and revealing the possible transmission channels through which the vulnerabilities identified could end up affecting financial stability.

The results indicate that, in an adverse scenario, there would be negative effects on aggregate indicators of total and core capital adequacy in both the individual and consolidated balance sheets although they would probably remain at levels above the regulatory limits throughout the period of the exercise.¹³ However, an analysis by entity shows a broad variation in the performance of these indicators. In addition, the loan portfolio and aggregate profitability of the credit institutions

12 Reference for Colombia.

13 The core capital adequacy ratio is defined as the ratio between the value of ordinary core equity net of deductions and the value of assets weighted by credit, market, and operational risk (AWRL). The additional core capital adequacy ratio is calculated as the ratio of the sum of the value of ordinary core equity net of deductions to additional core equity and the value of AWRL. The total capital adequacy ratio, in turn, is defined as the ratio between the value of technical equity (understood as the sum of ordinary core equity net of deductions, additional core equity, and additional equity) and the value of AWRL. With the regulatory change that required entities to begin convergence to the guidelines established in Basel III, the capital adequacy limits, including the conservation buffer, were established for 2021 (2022) at: 4.875%, (5.25%), 5.25% (6.0%), and 9.375% (9.75) for core capital adequacy, additional core, and total capital adequacy respectively. For systemically important institutions, an additional 25 bp (50 bp) is required (systemic buffer). It should be clarified that, in practice, non-compliance with capital buffers does not imply non-compliance with regulatory limits and, therefore, does not constitute a situation of insolvency.

are likely to show a significant deterioration, and this would reflect the impact that the hypothetical adverse scenario could have on the ability of the entities to grant loans and do their intermediation work.

With respect to the open-ended collective investment funds, it was found that as of April 2023, withdrawals of 4.0%¹⁴ of their managed funds could jeopardize compliance with prudential liquidity limits for a set of funds that represented close to 20.0% of the total assets of these investment and savings vehicles. This contrasts with what was found six months ago when withdrawals of 10.0% of total assets were required to obtain a similar effect. The increase in this vulnerability is due to the deterioration of the liquidity risk indicator (LRI) in the last two months that resulted from the reduction of available funds in demand accounts because of the increase in redemptions. However, these indicators were above the minimum regulatory levels.

The results of stress tests are obtained from hypothetical scenarios that use a set of restrictive assumptions and do not consider potential policy responses implemented by the various authorities who share a macroprudential objective. It is, therefore, to be expected that, given the active and timely policy response of the different entities that the financial system security network is made up of as well as the smaller magnitude of the shock, the impact on financial stability will presumably be lower.

14 A withdrawal shock of 4.0% of total assets is within the first percentile of the historical distribution.

2. Vulnerability of the Financial System

This chapter assesses the overall situation of financial institutions over the course of the second half of 2022 and beginning of 2023 in a context of persistent inflationary pressure, a tightening of financial conditions, and an outlook of economic slowdown. An overview of the financial system and an analysis of the credit, market, liquidity, and trading book interest rate risk levels that financial institutions are exposed to are presented below.

2.1 Current Situation of the Financial System

2.1.1 Credit institutions: individual balance sheets^{15, 16}

In a context of tighter local financial conditions and an increase in household debt and financial burden, there was a contraction in the balance sheet of credit institutions (CIs) in real terms. This was due to lower levels of expansion registered in the total loan portfolio and persistent contractions seen in investments.

The individual assets of CIs amounted to COP 988.7 trillion (t) as of April 2023, and their real annual growth rate¹⁷ began to show a reduction starting in July 2022, ultimately reaching a level of -0.1% at the end of the fourth month of 2023 after having presented a relatively stable performance during the first half of 2022. The trend assets are showing has been mainly due to the performance of the portfolio which accounts for 67.5% of total assets. Investments, in turn, which represent 19.3% of the assets, continued to show annual declines and reached a level of -9.5% in December 2022. This represents the largest drop seen since January 2008 although, in the first few months of 2023, they have shown increasingly smaller contractions in line with an increase in the value of local financial assets (Graph 2.1).

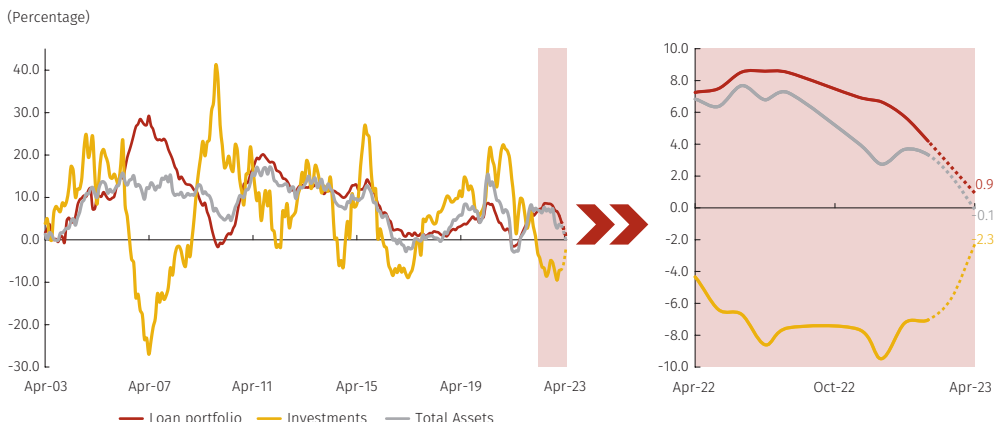
In line with the perception of a lower supply and demand for credit and higher requirements for granting new loans expressed by CIs in the Report on the Credit Situation in Colombia for the first quarter of 2023 (Graph 2.2, panel A) as well as a few more restrictive financial conditions, the upward cycle of the monetary policy rate and high inflation rates (mentioned in chapter 1 of this Report), all categories of loan portfolio have shown a downturn in their pace of real expansion. This has been more pronounced for consumption and housing which, as of April 2023, began to register contractions (Graph 2.3). The lower performance of the commercial loan portfolio, in turn, is consistent with a perception on the part of companies in

15 The regulations require credit institutions to report their financial statements on an individual basis (that is, encompassing only the business of the credit establishment considered as an individual legal entity) and on a consolidated basis (that is, including the business of other financial institutions supervised by the Office of the Financial Superintendent of Colombia, FSC, with which they maintain ownership links) for those institutions required to do so. This section shall include a separate analysis of vulnerabilities, using the balances reported individually and those reported on a consolidated basis.

16 As of the date of publication of this Report, official information regarding the monthly balance sheets of the CIs was available as of February 2023. Therefore, a majority of the graphs and analysis presented in this subsection have this cut-off date. However, for total asset, investment, and portfolio balances, preliminary data from March and April 2023, FSC form 281 are presented and analyzed. This has weekly information on some of the accounts on the IC balance sheets.

17 The real growth shown in this Report was calculated by using the consumer price index (CPI) excluding food.

Graph 2.1
Real, annual growth of credit institution assets and their main components



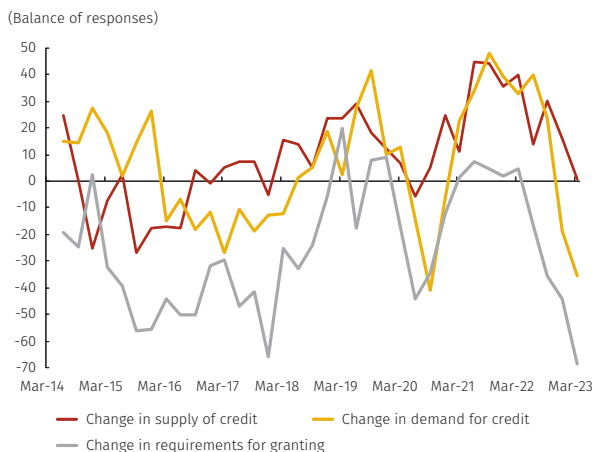
Note 1: The dotted lines correspond to preliminary data for March and April 2023 from format 281 of the Office of the Financial Superintendent of Colombia which has weekly information on some accounts of the balance sheets of credit institutions.
 Note 2: The real growth shown in this graph was calculated by using the consumer price index excluding food.
 Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

the productive sector regarding the availability of credit which, in spite of having improved, is at levels below the historical average (Graph 2.2, panel B).

The performance presented by all the loan portfolio categories contrasts with what was described in the last edition of this Report, especially for the consumer loan portfolio, when it was noted that it had reached its highest real annual growth rate in the last nine years in June 2022. When the figures are analyzed in nominal terms, the slowdowns are milder for all categories of loans, with the exception of micro-credit, which is relatively stable.

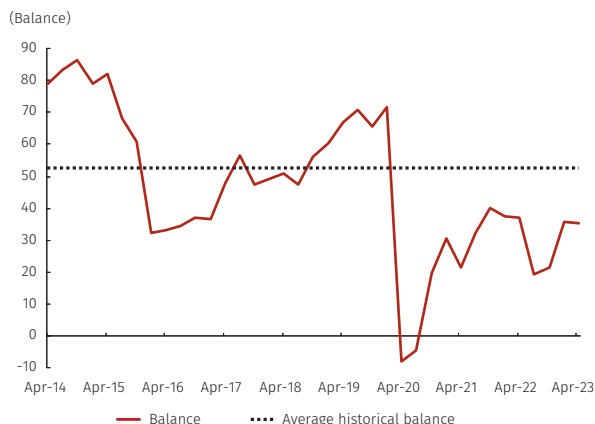
Graph 2.2
Credit market perception

A. Change in the perception of credit institutions regarding supply, demand, and requirements for granting new loans



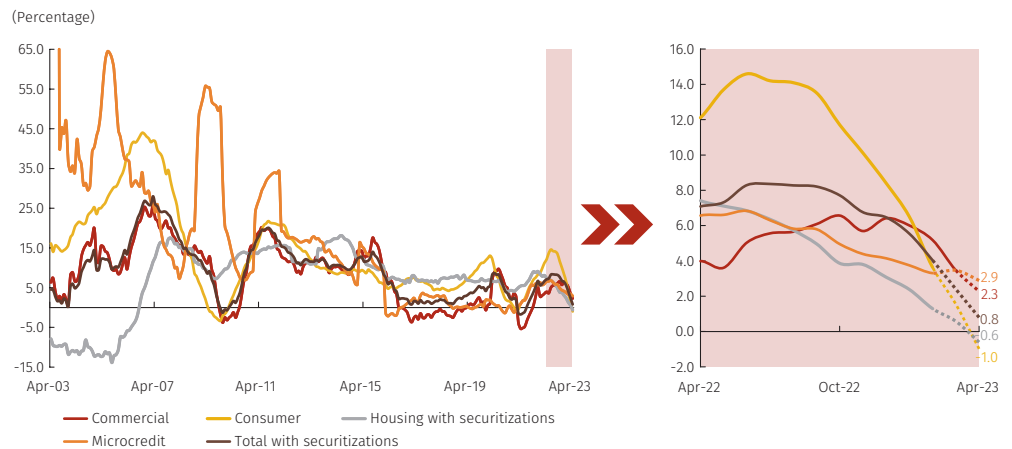
Note: A positive result in the balance of responses in the case of a change in requirements is interpreted to mean that lending institutions are becoming less restrictive in granting new loans, and vice versa.
 Source: Survey of the loan situation in Colombia, March 2023; calculations by Banco de la República.

B. Current perception of companies in the productive sector on credit availability



Note 1: Calculations considering only the following sectors: manufacturing and mining, large chain stores, and transportation and communications.
 Note 2: Balance = perception (high + none - low).
 Source: Banco de la República (Quarterly survey of expectations); author's calculations.

Graph 2.3
Real annual growth of credit institutions' gross loan portfolio



Note 1: The dotted lines correspond to preliminary data for March and April 2023 from format 281 of the Office of the Financial Superintendent of Colombia which has weekly information on some accounts of the balance sheets of credit institutions.

Note 2: The real growth shown in this graph was calculated by using the consumer price index excluding food.

Source: Office of the Financial Superintendent of Colombia; calculations by *Banco de la República*.

The non-performing and risky portfolios for all types of loans, except consumer loans, continued to register decreases, and this has been reflected in declines in the credit risk indicators. It should be noted that for microcredit and housing there is a growing trend in the dynamics of the risky and non-performing loan portfolios. As for consumer loans, there has been a marked upswing in the growth of the risky and non-performing portfolios recently. This has resulted in a rise in their credit risk indicators.

In line with the last edition of this Report, the risky and non-performing loan portfolios in all categories continued to show real annual decreases with the exception of the consumer loan portfolio which had registered a change in trend as of January 2022 (Graph 2.4, panels A and B). It should be noted that since the second half of that same year, risky and non-performing loans in the housing and microcredit loan portfolios have begun to show an upward trend in their rate of expansion. The trend observed in non-performing and risky loan portfolios granted to households is consistent with the vulnerabilities identified for these agents in past editions of this *Report*. In nominal terms, a similar trend has been seen in the risky loan portfolio while the non-performing commercial portfolio is the only category that has not yet shown positive annual growth.

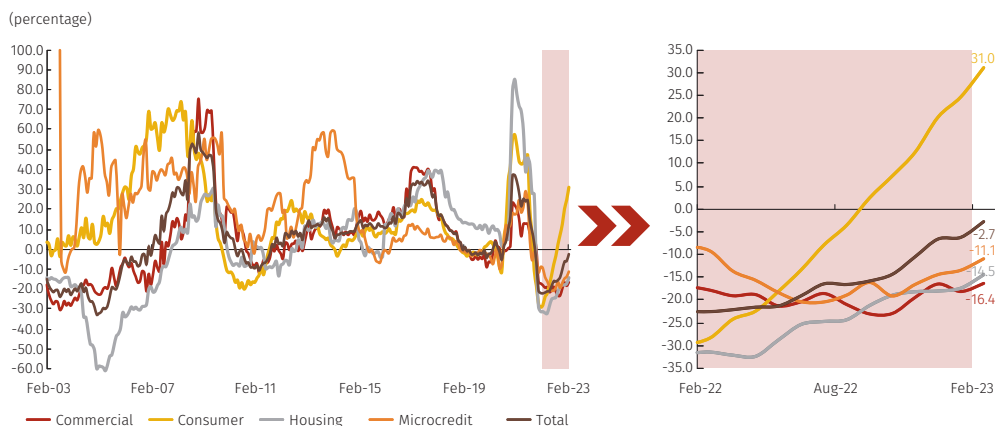
The traditional credit risk indicators for the total loan portfolio – quality indicator by risk (QIR)¹⁸ and quality indicator by default (NPL)¹⁹ – during the second half of 2022, in turn, showed a reversal of the downward trend they had been registering since the beginning of 2021 after having reached the lowest level since December 2016, in the case of ICR, and since January 2017, in the case of ICM (Graph 2.5, panels A and B). By category, in line with the performance of the non-performing and risky loan portfolios, the consumer portfolio continued the upward trend it began to register during the second quarter of 2022. Microcredit, in turn, showed a rever-

18 This is calculated as the ratio between the risky and the total gross loan portfolio (the risky loan portfolio corresponds to the balance of the loans with ratings other than A on a scale from A to E where A is the best rating).

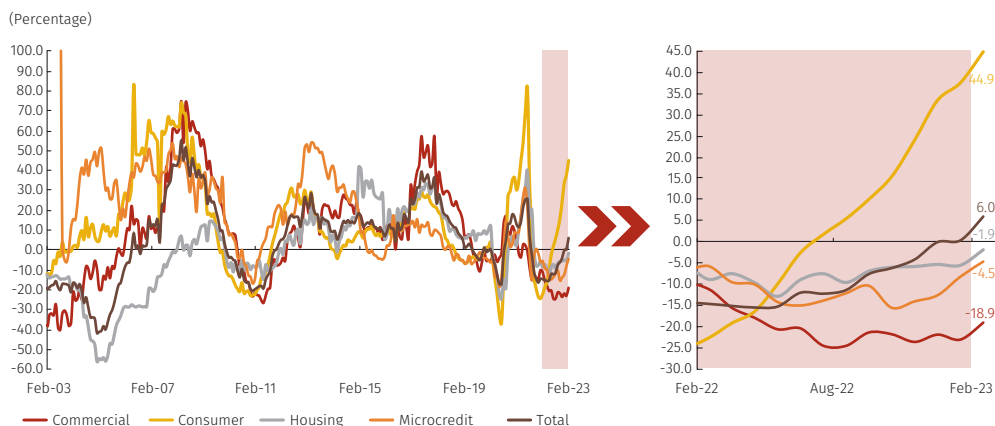
19 This is calculated as the ratio between the non-performing and the total gross loan portfolio (the non-performing portfolio includes the balance of the loans that have not been paid for a period of more than 30 days).

Graph 2.4
Non-performing and risky loans

A. Real annual growth of the risky loan portfolio



B. Real annual growth of non-performing loan portfolio



Note: The real growth shown in this graph was calculated by using the consumer price index excluding food.
Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

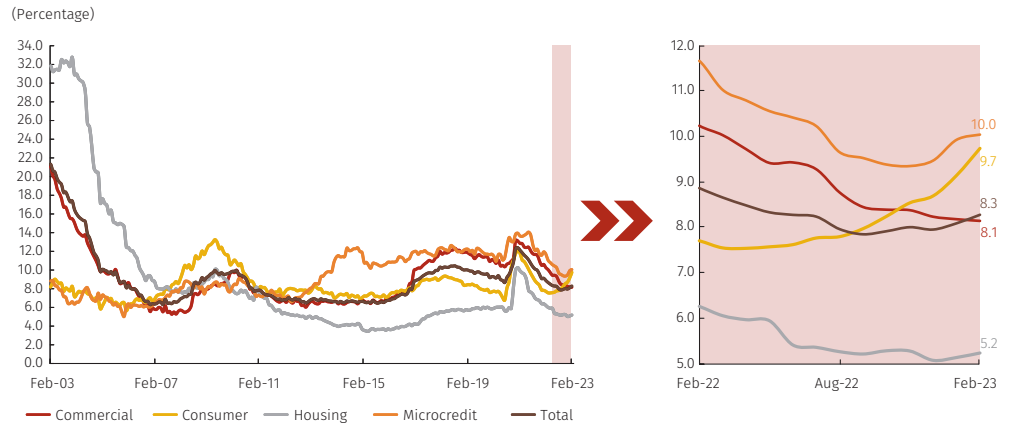
sal of the downward trend it had been on since the beginning of 2023 while housing and commercial loans continued to show levels that were lower or similar to those registered six months ago. In the case of housing, the downturn in its gross portfolio, together with the upswing in its risky and past-due loan portfolios, gives indications that the QIR and NPL could deteriorate in the coming months.

The constant monitoring of these indicators becomes even more relevant in an environment of economic slowdown, tighter financial conditions, and high inflation levels. It is to be expected that the measures taken by the FSC through External Circular 026/2022 for the constitution of loan-loss provisions to cover the consumer loan portfolio in order to address the eventual materialization of risks as well as the increase in the monetary policy interest rate and the tightening of credit conditions by CIs will help to mitigate the negative impacts of the macroeconomic context. The measures taken by several CIs up to this point in 2023 to reduce their interest rates in some specific consumer, housing, and microcredit segments may also help to mitigate such negative impacts on some particularly vulnerable households and firms.

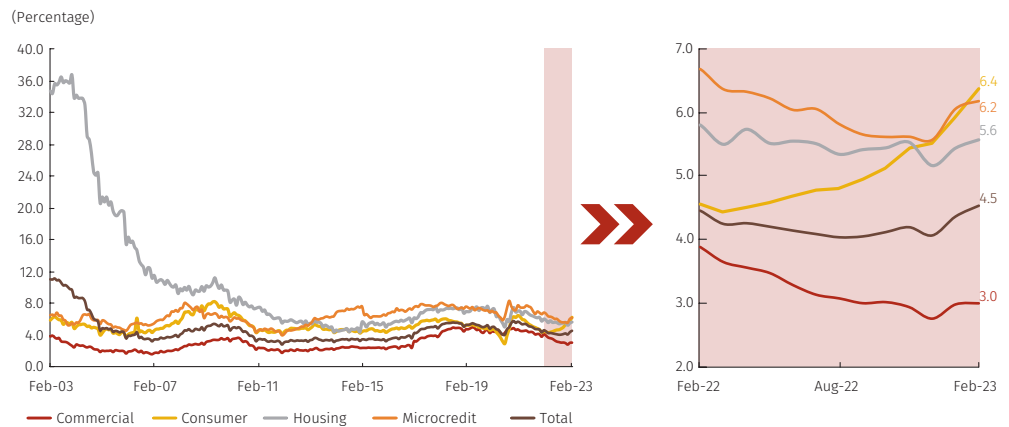
The funding of CIs slowed down due to the decrease in demand deposits, which, in spite of their trend, continued to be the most relevant item. This, together with a

Graph 2.5
Portfolio quality indicators

A. Quality indicator by risk



B. Non-performing loans indicator



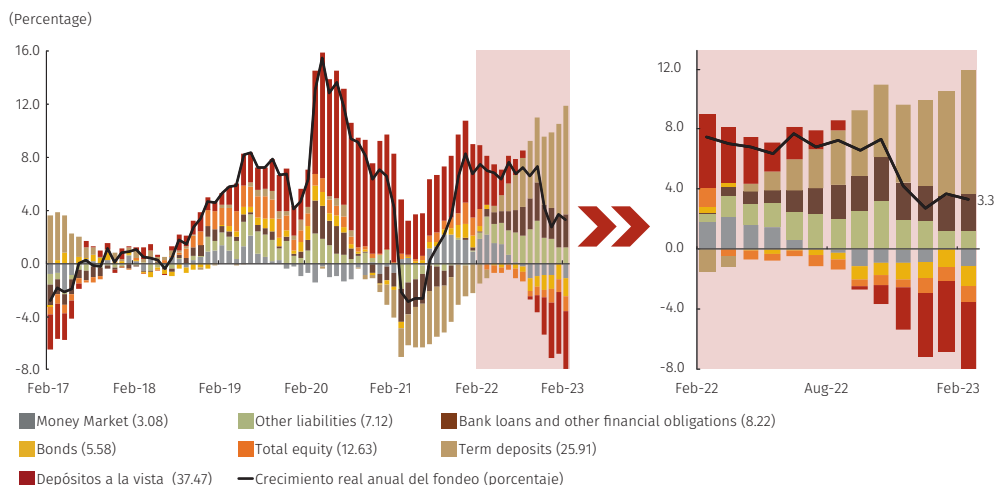
Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

persistent expansion of term deposits, has resulted in an increase in the share of the latter instruments in the funding of institutions. This is in line with the current upward cycle of the monetary policy rate.

The funding of institutions, understood as the sum of their liabilities and equity, declined between August 2022 and February 2023, especially due to the fact that demand deposits showed a real annual decrease not seen during this century (-11.5% as of February 2023, Graph 2.6). In line with the increase in the monetary policy rate, the fact that NSFR has gone into effect, a greater perception of risk, along with other factors that have been reflected in an increase in the returns on term deposits offered by CIs,²⁰ the depositors' preference for these instruments has increased, and this has led to a change in the components of the institutions' funding to the detriment of demand deposits, especially savings accounts. In spite of the above, demand deposits continue to be the item that has the largest share in the funding of CIs (37.5%).

20 For more details on the influence these factors have on CD yields, see Box 1 of the Financial Markets Report for the first quarter of 2023 published by Banco de la República.

Graph 2.6
Real, annual growth of funding and contribution to growth of their components



Note 1: The share each item has in funding is in parenthesis (liability + equity) with February 2023 as a cut-off date.
 Note 2: Term deposits include CDs and CDATs.
 Note 3: Other liabilities include other deposits and payables, accounts payable, and *Bocas* and *Boceas*.
 Note 4: The real annual growth of funding was calculated using the consumer price index excluding food.
 Source: Office of the Financial Superintendent of Colombia; calculations by *Banco de la República*.

Aggregate liquidity and total and core capital adequacy indicators remain well above their regulatory minimums. The profitability of CIs, in turn, continued the downward trend it has been registering since the beginning of the second half of 2022 and has reached levels below the average for the last five years.

In terms of liquidity, the thirty-day liquidity risk indicator (LRI)²¹ rose for banks and, consequently, for the aggregate of CIs between October 2022 and April 2023. This is in contrast to the trend presented in the previous edition of this Report where a decline in risk for these types of entities and for the total number of CIs was shown.²² Bank liquidity has recovered in recent months as a result of larger holdings and small increases in the value of high-quality marketable securities while the available balance and net liquidity requirements have remained stable. The cooperatives and finance companies, in turn, kept the indicator at relatively stable levels, and investment banks showed declines. Regardless of the performance presented, liquid assets continue to significantly exceed the value of the net liquidity requirements both at the aggregate level and by type of entity (Graph 2.7).

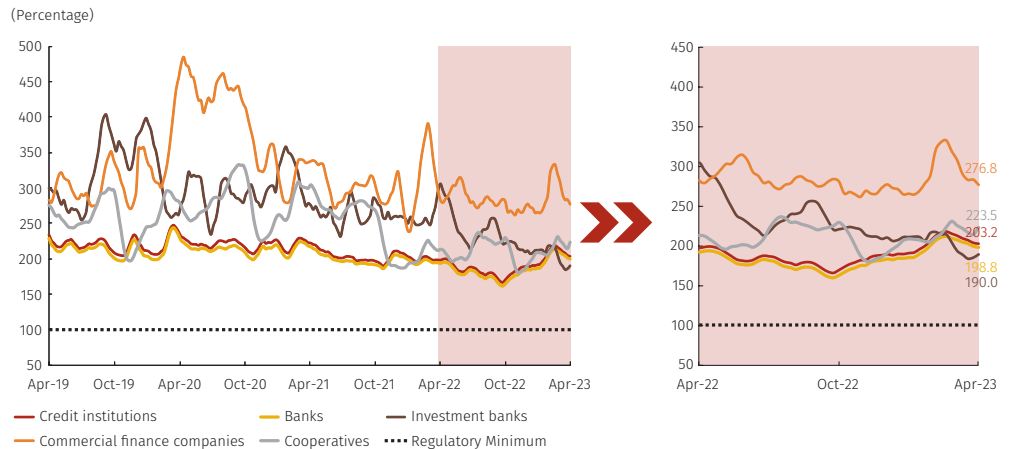
Likewise, the net stable funding ratio (NSFR),²³ a Basel III structural funding liquidity indicator implemented in 2020 and which completed its transition phase in March

21 The LRI presented for the total and each CI is calculated as the ratio of the average of the last four weeks of the month of liquid assets adjusted for market liquidity and foreign exchange risk (AML) to the average of the last four weeks of the month of net liquidity requirements (NLR). Given the above, higher levels of the indicator are positive since they indicate that the entities are in better liquidity positions or that there is greater liquidity in the system.

22 See section 2.4.1 for more details on the LRI trend.

23 The NSFR is calculated as the ratio between the available stable funding (ASF) and the required stable funding (RSF). Considering the fact that the ASF corresponds to the weighted sum of the funded positions (liabilities and equity) while the RSF is the weighted sum of the assets that are funded, CIs must classify the positions of these two components as on-balance sheet and off-balance sheet. In the case of ASF, the weightings used are measured in terms of the stability of the funding sources while, in the RSF, these are intended to approximate the amount of the asset that would have to be financed by stable sources either because it will be renewed, or because it could not be easily liquidated.

Graph 2.7
Average 30-day liquidity risk indicator (LRI) for credit institutions

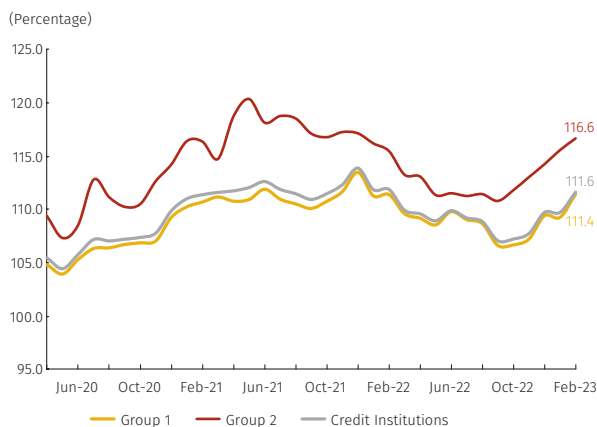


Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

2023²⁴ registered rises for the CI in the last few months due to the upward trend of the indicator for groups 1 and 2 as a result of a more pronounced growth of the available stable funding (ASF) with respect to what is presented by the required stable funding (RSF) (Graph 2.8).

In terms of entities' financial soundness, the levels of total capital adequacy, Common equity tier 1 ratio and leverage ratio have remained relatively stable since March 2022 and also register levels that are well above their regulatory minimums (Graph 2.9).

Graph 2.8
Credit institutions' net stable funding ratio



Note 1: The information for building this graph came from form 238 of the Office of the Financial Superintendent of Colombia.

Note 2: The NSFR of CIs as of March 2022 is calculated using the information corresponding to groups 1, 2 and 3. Prior to this date, in turn, only the information corresponding to groups 1 and 2 was used. This is because there was a retransmission of the entity's information as of March 2022 plus the NSFR of CIs has been calculated using the information corresponding to groups 1, 2 and 3 since March 2022. Prior to this date, in turn, only the information corresponding to groups 1 and 2 was used. This is due to the fact there has been a retransmission of information from the most representative entity of Group 3 since March 2022. The indicator series for this group is not presented in the graph because its component entities do not have to comply with a NSFR regulatory limit. This group had registered a NSFR of 98.0% as of February 2023.

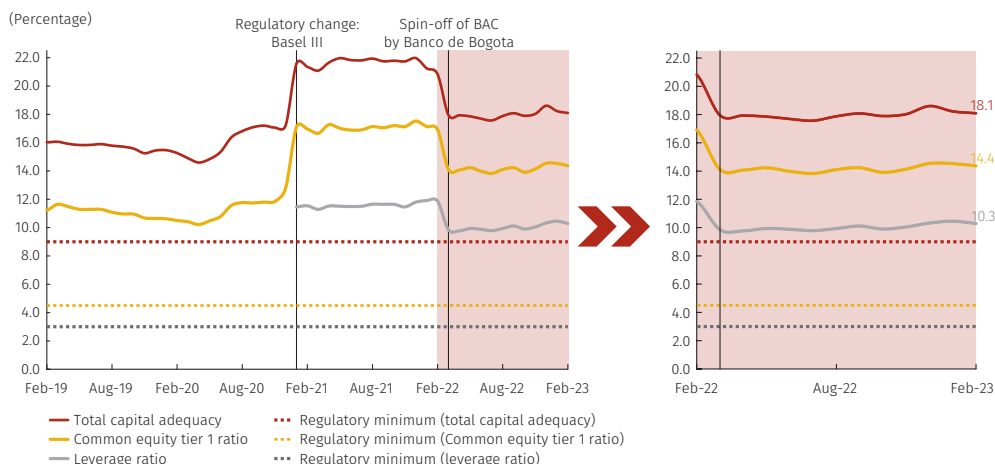
Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

Between August 2022 and February 2023, the return on assets (ROA)²⁵ of CIs maintained the downward trend that appeared at the beginning of the second half of 2022 and reached a level that was slightly lower than the average of the last five years (Graph 2.10, panel A). The decrease in profitability resulted mainly from higher interest expenditures on deposits and an increase in loan-loss provisions due to the sharp build-up of the risky and non-performing loan portfolios for the total loan portfolio (Graph 2.10, panel B). When the distribution of ROA among entities is analyzed, there is evidence of great variability in which, since the end of 2022, the gap between the mean and the median has been narrowing with both measurements of the central tendency showing lower values (Graph 2.10, panel

24 The NSFR, in accordance with international best practices, has become one of the most relevant indicators within the set of tools available to supervisors for monitoring the liquidity risk of CIs. Since it went into effect, the indicator has been adjusted progressively in terms of the minimum regulatory level, the classification of certain liability accounts, and how these accounts are weighted. Specifically, as of 31 March 2023, demand deposits with counterparties that are other entities supervised by the FSC and open-ended collective investment funds will not be considered among the items that provide stable funding. In other words, within the available stable funding, their weightings will be 0% (to date they have been weighted at 25%).

25 ROA is calculated as the ratio of the CI's annualized profit to the value of its total assets.

Graph 2.9
Capital adequacy indicators



Note 1: The capital adequacy and common equity tier 1 ratio figures reported since January 2021 are not comparable to the historical series due to the regulatory change that required entities to start converging to the guidelines established by Basel III.
 Note 2: The regulatory limits for total and common equity tier 1 ratio are 9.0% and 4.5% respectively. In 2023 (2024) the limits, including the conservation cushion are 10.125% (10.5%), 6.75% (7.5%), and 5.625% (6.0%) for the total, additional core, and common equity tier 1 ratio respectively. For systemically important institutions, an additional 75 bp (100pb) is required. In practice, failure to comply with capital buffers does not imply non-compliance with regulatory limits and, therefore, does not constitute a situation of insolvency.
 Note 3: With the issuance of Decrees 1477/2018 and 1421/2019 entities had to start complying with the regulatory leverage ratio requirement as of January 2021. This ratio is defined as the sum of the value of ordinary basic equity net of deductions and additional basic equity, divided by the leverage value defined as the sum of assets net of loan-loss provisions, net exposures in repurchase/resell agreements, sell/buy backs and TTS, credit exposures in derivatives and contingency exposures. The regulatory limit for the leverage ratio is 3.0%.
 Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

C). This trend was partly explained by the increase in the number of entities that registered negative returns that has gone from five in August 2022 to thirteen in February 2023. As of the last cut-off date, the institutions that showed a negative ROA value accounted for 5.2% of the total assets of the CIs, and nine of them had more than 50% of their total portfolio placed in consumer loans. Given the lower economic growth outlook for 2023 and the recent downward trend in the portfolio, the negative trend in profitability could be expected to persist in the short term.

Based on what has been presented in this section, and considering the current macroeconomic context (characterized by tighter local financial conditions and the prospect of a slowdown in the Colombian economy in 2023), it is likely that the negative trend in the profitability of the institutions will continue in the coming months due to a persistent downturn in the loan portfolio and greater deterioration in credit risk indicators, especially for loans granted to households due to the trend in their financial burden. In spite of the above, CIs have ample liquidity and capital buffers to deal with the possible consequences of this scenario.

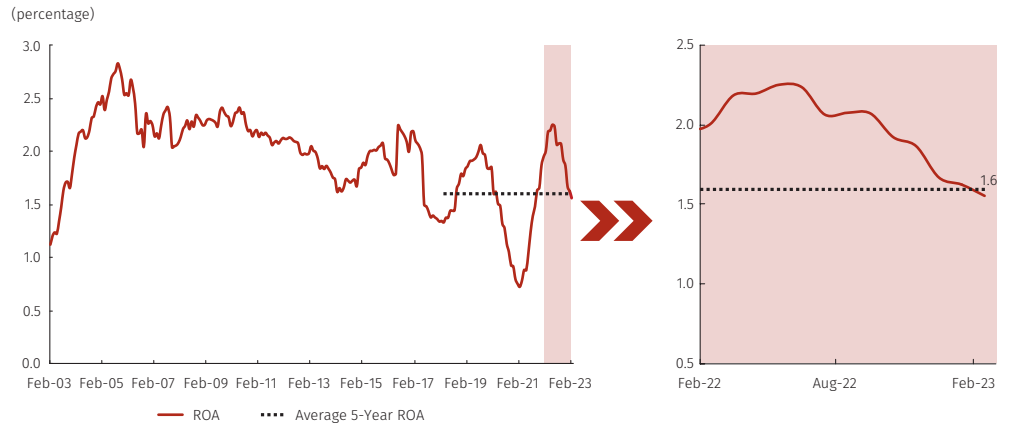
2.1.2 Current situation of the financial system at the consolidated level²⁶

In the last few years, the Colombian financial system has expanded its operations not only locally but also in different countries around the region. The presence of Colombian subsidiaries and affiliates abroad creates a more complex and dynamic scenario in which the supervision and monitoring of consolidated results acquire relevance from a financial stability perspective. Therefore, an analysis of the consolidated figures of Colombian credit institutions is presented below.

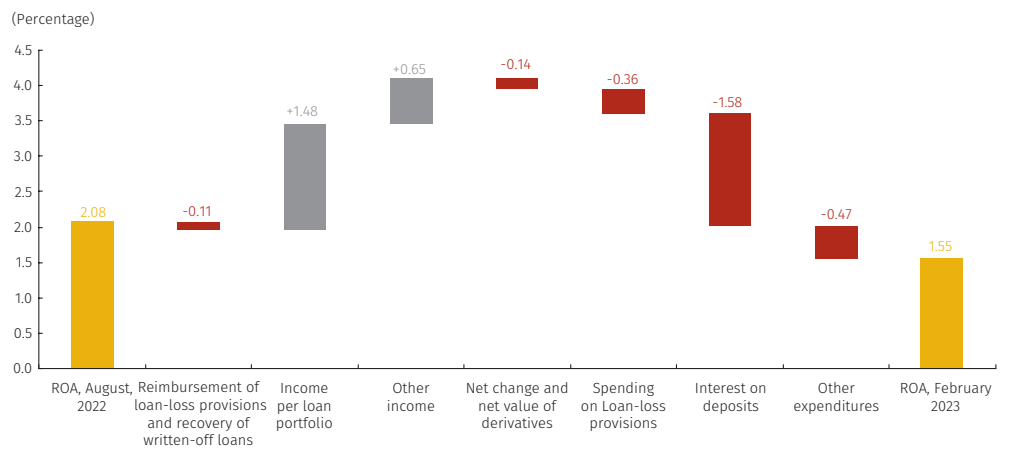
²⁶ For more information on the presence of Colombian banks abroad and the importance of supervising the financial system at the consolidated level, see Shaded area 1 of the Financial Stability Report for the first half of 2022 and the supplementary special report on the "Macroeconomic and financial situation in Central America," in that report.

Graph 2.10
Performance of credit institutions

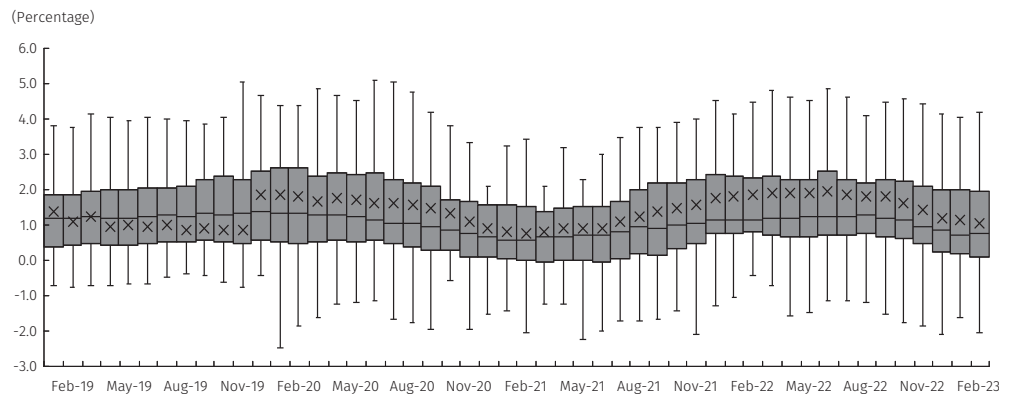
A. Return on assets (ROA)



B. Breakdown of ROA



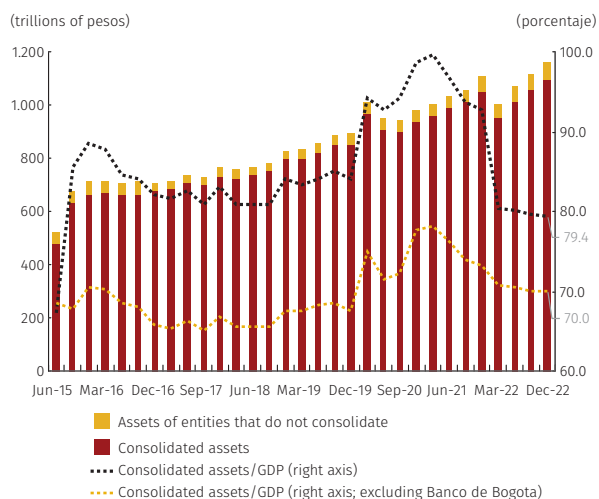
C. ROA distribution



Note: The lower and upper limit of each box denotes the 25th and 75th percentile, in that order, of the distribution of the ROA of the CIs on each date. The horizontal line inside the box and the X correspond to the median and mean respectively.
Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

In a context of tightening financial conditions, economic slowdown, and greater uncertainty, CIs continued to carry out their intermediation activity without significant setbacks at the consolidated level. The NPL indicator for the total loan portfolio continued to show improvements and, in spite of the slight decline in assets and the moderate reduction in profitability, the total capital adequacy ratio showed a modest increase and remained at levels comfortably above the regulatory minimum.

Graph 2.11
Consolidated and individual assets of credit institutions



Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

The consolidated assets of the Colombian CIs amounted to COP 1.096,4 t as of December 2022²⁷ and represented 79.4% of the GDP while six months ago, this depth indicator amounted to 80.3% (Graph 2.11). This small decrease was partly due to the fact that the real corrected growth²⁸ of the consolidated assets as well as the individual ones registered a decline as they reached 6.5%, a figure that is lower than the 8.0% registered six months ago.

The downturn in assets over the last six months of analysis was mainly driven by the performance of the investments, a segment that accounted for 14.4% the assets and reached a corrected, real, annual decline of 4.0%. In contrast, the loan portfolio, which represents 69.5% of the assets, has shown an upswing and has reached a corrected real annual growth rate of 9.0% (vs. 8.3% in June 2022). This trend differs from what was seen in the individual balance sheets for the same period.

The corrected surge of the loan portfolio was primarily due to the growth of the commercial portfolio, which grew 9.8%, after having been expanding at a rate of 8.1%. At the consolidated level, although the consumer loan portfolio is showing a slight slowdown, it registered a corrected real annual growth rate of 10.1% that is higher than the individual growth rate for the same period.

The corrected NPL showed trends similar to those seen for individual balance sheets: the consumer loan portfolio has experienced sustained increases since March 2022, and stood at 5.7% in December of the same year while the other types of loans have shown an improvement.

In terms of profitability, CIs have presented a rising trend in ROA since the beginning of 2021 and reached a level of 1.5% in June 2022, the highest since December 2016. However, during the second half of 2022, this trend reversed itself and, as of December of that year, the figure was 1.3%. Last of all, the total corrected consolidated capital adequacy was 6.8 pp above the regulatory minimum as it increased slightly over the last six months and thus reflected an appropriate level of capital. The gap with respect to the 9.0% regulatory minimum is smaller than what is seen when the indicator is calculated with individual information and reflects the fact that, at the consolidated level, the same capital is backing a greater volume of activity. Table 2.1 gives a summary of the main financial indicators of the CIs at the consolidated level.

27 The figures contained in this section are the combined consolidated balance sheets reported by CIs and the individual balance sheets of those CIs that do not consolidate as of 31 December 2022.

28 The corrected indicators analyzed in this section do not include Banco de Bogota in order to provide a more accurate comparison that does not include the effect of the spin-off of BAC Holding International.

Table 2.1
Key financial indicators of credit institutions at the consolidated level

Indicator	Consolidated			Consolidated excluding Banco de Bogota			Consolidated	Consolidated excluding Banco de Bogota
	Jun-22	Dec 22	Change (percentage points)	Jun-22	Dec 22	Change (percentage points)	Change Dec 19 to Dec 22	Change Dec 19 to Dec 22
Real growth of assets	-3.2	-4.5	-1.3	8.0	6.5	-1.5		
Real growth of investments	-10.8	-11.7	-0.9	-4.9	-4.0	0.9		
Real growth of the total loan portfolio	-2.3	-2.0	0.3	8.3	9.0	0.7		
Real growth of the commercial loan portfolio	-1.6	-0.4	1.2	8.1	9.8	1.7		
Real growth of the consumer loan portfolio	-2.0	-2.9	-0.9	10.4	10.1	-0.3		
Real growth of the housing loan portfolio	-6.4	-6.3	0.2	5.0	5.1	0.2		
Real growth of the microcredit loan portfolio ^{a/}	9.2	5.7	-3.5	9.9	6.1	-3.7		
NPL of the total loan portfolio	4.1	4.0	-0.1	4.1	4.0	-0.1		
NPL of the commercial loan portfolio	2.9	2.7	-0.2	2.7	2.4	-0.3		
NPL of the consumer loan portfolio	5.1	5.7	0.6	5.1	5.7	0.6		
NPL of the housing loan portfolio	5.8	5.0	-0.7	5.9	5.1	-0.8		
NPL of the microcredit loan portfolio	6.4	6.1	-0.3	6.2	6.0	-0.2		
ROA	1.9	1.4	-0.4	1.5	1.3	-0.2		
Total capital ratio	15.2	15.4	0.2	15.6	15.8	0.2		
Common equity tier 1 ratio	12.3	12.2	-0.1	12.6	12.5	-0.1		

Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

In a context of slower growth in the local economy and in the countries where Colombian banks are present through affiliates and subsidiaries, more restrictive financial conditions and high inflation levels, a slowdown in the growth of the consolidated balance sheet of the institutions, pressure in terms of profitability, and in the quality of the loan portfolio could be expected.

2.1.3 Non-banking Financial Institutions

Proprietary and third-party assets of non-banking financial institutions had grown as of February 2023 driven by insurance and trust companies. However, the entities with lower participation in the two classifications showed the opposite trend.

Non-banking financial institutions (NBFIs) are essential in the analysis of local financial stability. In addition to accounting for 54.3% of the financial system's assets as of February 2023, they are a crucial counterparty to CIs in different markets (such as certificates of deposit, CDs) in which they have gained an important share. In addition, their role and performance are important in the price formation of financial assets.

The share of NBFIs' proprietary account assets as a share of the total assets of the financial system was 5.0% as of February 2023.²⁹ Assets in proprietary position registered a positive trend mainly due to the performance of the stock brokerage companies (SCB) and the insurance companies' sector. The assets of the latter represent

²⁹ In this Report, unless otherwise indicated, trust companies (TC), stock brokerage firms (SBF), pension and severance fund managers (PFM), and general and life insurance companies are included in the non-banking financial institutions category.

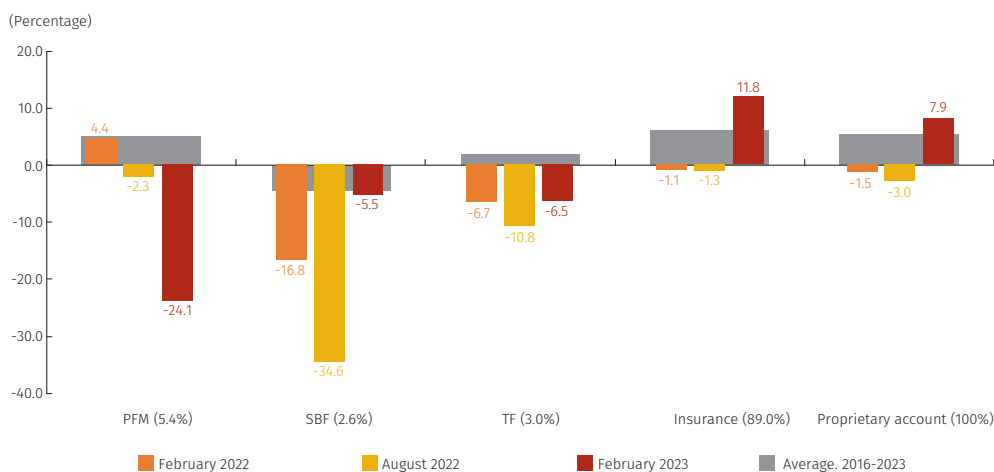
89.0% of the sector and reached a real annual growth rate of 11.8% that is higher than its historical average (Graph 2.12, panel A). Pension and severance fund managers (PFM) and trust companies (TC), in turn, registered historically large declines.

The portfolio managed by NBFIs, which represents 49.3% of the total assets of the financial system, continued to show a downward trend in spite of the recovery of the portfolios managed by the TC which have the largest weight in the aggregate (65.4%, Graph 2.12, panel B). The portfolios managed by the SBFs and the voluntary pensions of PFMs and insurance companies have completed a year of declines, a tendency that could begin to turn around in the second half of the year given the trend shown by the most recent monthly data. This has been correlated with the trend in foreign and local assets that suffered devaluations during the second half of 2022 and corrections over the course of 2023.

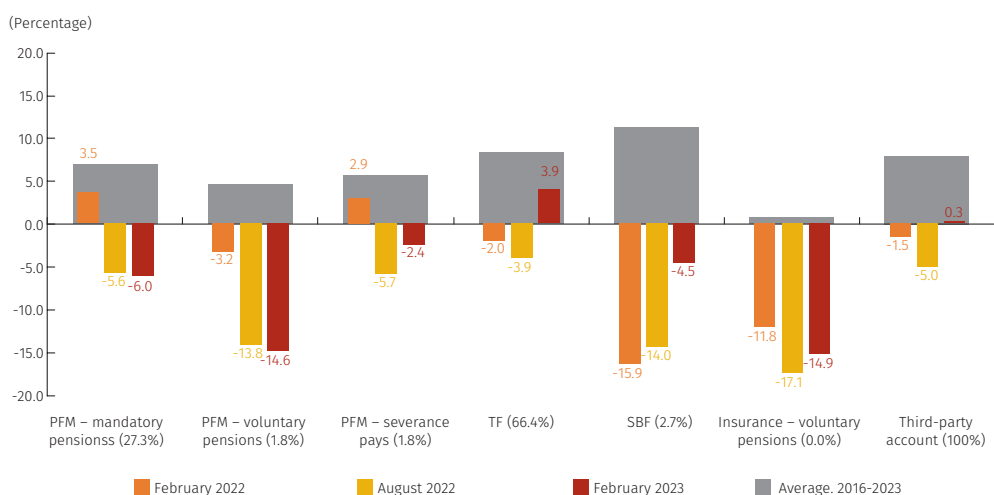
The NBFi investment portfolio continued to show a downward trend in 2022 while at the same time it registered a slight correction during the first quarter of 2023 which was driven by life insurance companies.

Graph 2.12
Change in Real Annual Growth of NBFi Assets

A. In Proprietary Account



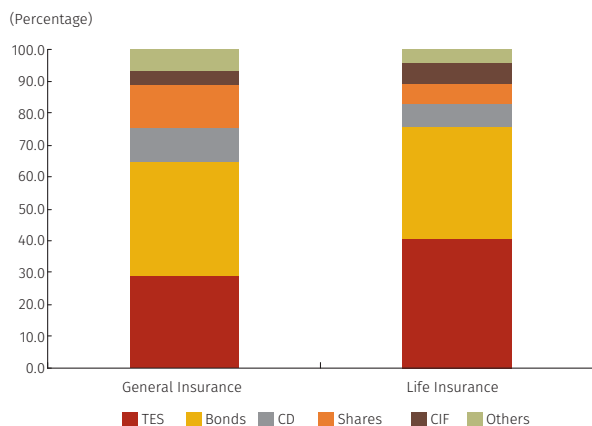
B. In Third-party Account



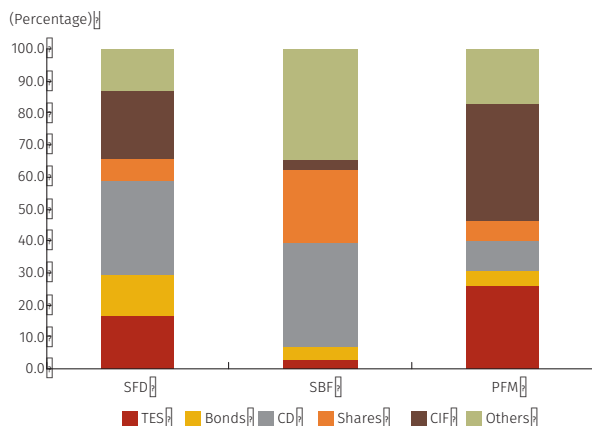
Note: the parentheses in the legend indicate the share of each type of entity in the corresponding total portfolio. Acronyms: trust companies (TC), brokerage firms (SBF), pension and severance fund administrators (PFM). Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

Graph 2.13
Breakdown of the NBFi Portfolios

A. In Proprietary Account



B. In Third-party Account



Note: trust companies (TC), brokerage firms (SBF), pension and severance fund administrators (PFM).
Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

The components of the NBFIs' proprietary portfolio remained relatively stable. In the case of general and life insurance, the real annual growth of the portfolio was 5.2% and 18.4% respectively. In these portfolios, the preference for TES and CD rose while the share in stocks decreased a more prominent trend in the case of life insurance (Graph 2.13, panel A). The third-party account portfolios of TC, SBF, and PFM also registered a mixed performance as it grew at a real annual rate of 19.7%, -7.2%, and -3.0% respectively. In terms of its structure, its performance was relatively stable (Graph 2.13, panel B). All these three businesses shared the same trend: a decrease in the preference for TES and shares, and an increase in the participation of CDs although these changes were more pronounced for portfolios managed by SBFs. This behavior is consistent with the positive performance of these instruments: CDs benefited from high funding rates while TES appreciated over the course of 2023. In the future, in the expectation of a stabilization or relaxation of monetary policy, could make shorter-duration TES gain share.

The profitability of most NBFIs has recovered since mid-2022 from the lows they reached last year. The only exception is in the brokerage sector, which has been around 5.0% for two years. An analysis of the breakdown of NBFi profitability shows that a greater burden of administrative and labor expenses has affected these entities and caused the recovery of their profitability indicators to be slow.

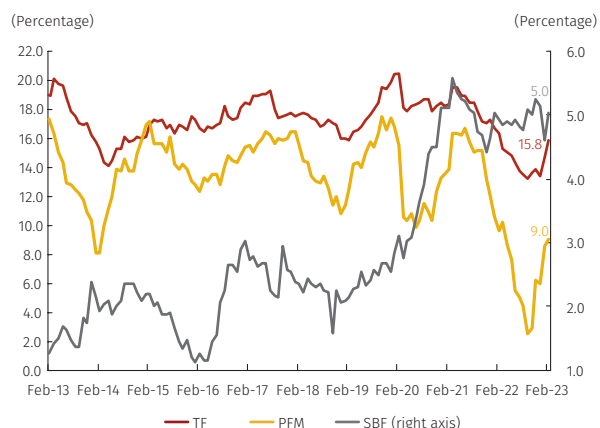
The ROA of the PFM and TC has recovered in the last six months with the former, which had registered a historic low in this indicator in September 2022, demonstrating a more pronounced improvement. Moreover, the ROA of the SBF is around 5.0%, after having peaked in January 2021, despite a slight weakening in January 2023 (Graph 2.14, panel A). The insurance sector showed a strong recovery in profitability throughout 2022 (Graph 2.14, panel B). After reaching their lowest point of profitability at the end of 2021, these entities have recovered rapidly and are close to reach the profitability levels they had prior to the covid-19 pandemic shock. This trend can be explained by the performance of its investments.

The ROA for NBFIs has been affected primarily by a higher burden of administrative and labor expenses (ALE) since the significant rise in revenue over the last year has not been enough to offset their expenses. For the TCs, the ALEs, along with other expenses, put downward pressure on earnings (Graph 2.15, panel A). Meanwhile, for SBFs and PFMs, income from net investment valuation and other income pushed profits up (Graph 2.15, panel B and C). In spite of the fact that, for the PFMs, the ALE was the expense that most affected their profits, ROA has registered a significant recovery in the last six months.

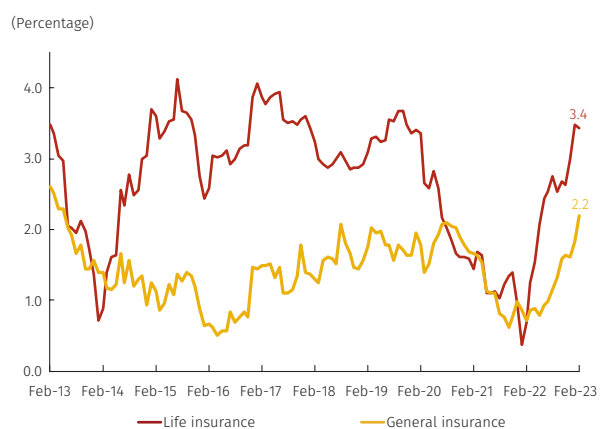
With respect to insurers, both investment valuation income and premiums issued boosted revenues. In the general insur-

Graph 2.14
Return on Assets (ROA)

A. TC, SBF, PFM



B. Life and General Insurance



Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

ance sector, investment valuation and issued premiums have grown significantly since August 2022. However, higher reinsurance expenses slowed down the pace of profit recovery (Graph 2.16, panel A). In the case of life insurance companies, a similar trend was seen on the income side although on the expense side, it was the lower net provisioning of reserves that prevented a better result as of January 2023. Nevertheless, the increase in profit during the last six months is noteworthy (Graph 2.16, panel B).

In spite of the deterioration in the combined index of insurance companies that shows higher claims and expenses as a percentage of earned premiums, the profitability of these entities rose due to the appreciation in the value of their investments. The profitability of trust companies by cluster, in turn, has shown mixed trends.

The combined index of insurance companies (Graph 2.17) is defined as the ratio of incurred claims³⁰ plus net expenses to earned premiums³¹ of entities in the life and general insurance segments. The combined indices have historically been above 1 (with the exception of the period between mid-2018 and early 2020 for general insurance). This means that the premiums issued have not been sufficient to cover expenses and claims incurred. Insurance companies must, therefore, draw on their investment returns to cover this differential.

During the last six months, the aggregate indicator for the insurance sector has been on an upward trend and reached an all-time high of 1.39 in December 2022. This performance was primarily driven by life insurance, which reached a combined index of 1.89 in the same month after showing strong growth in the recent past. The increase in claims incurred in life insurance, together with the recent sluggishness in premium growth in the same segment, which reached 2.8% growth in 2022 compared to 13.5% growth in incurred claims and net expenses, explain this performance. The general insurance indicator, in turn, showed increments in the last two months of 2022, but the trend was corrected in January 2023. In spite of the deterioration of these indicators, the positive results of net income from the valuation of investments drove the observed increase in the profitability of these entities.

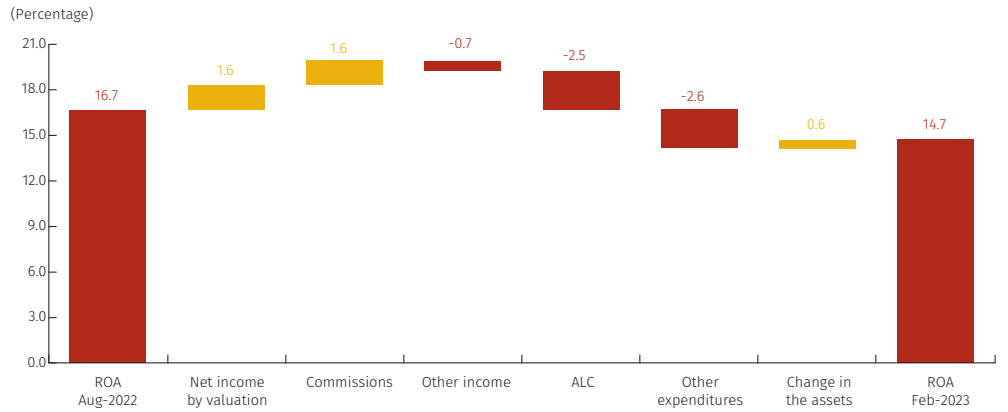
To further analyze the profitability of TCs, Graph 2.18 shows the ROA for the three fiduciary clusters that were identified in Box 2 of the Report for the first half of 2020 through machine learning techniques. This methodology is relevant given the high heterogeneity of these entities in terms of market experience and operations in different trust businesses. Cluster 1, made up of entities dedicated to management and real estate

30 The total amount in claims after deducting the reinsurance portion and including claims reserves.

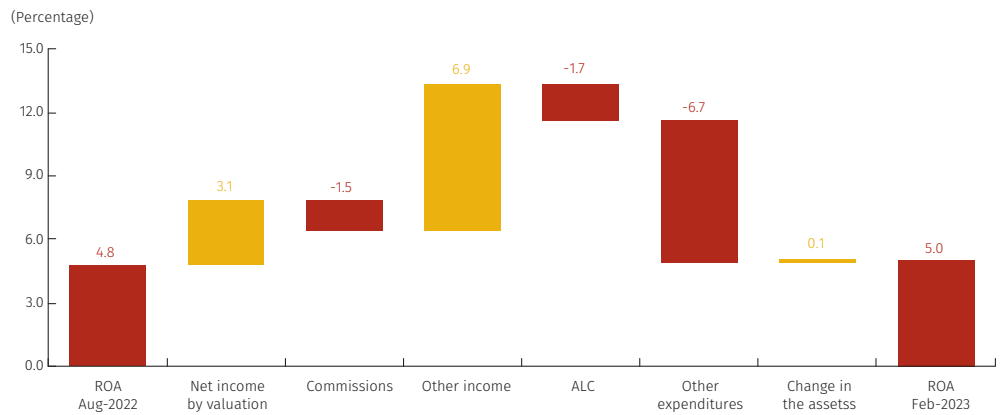
31 Net value earned by the insurer after deduction of reinsurance and technical reserves.

Graph 2.15
Breakdown of ROA

A. TF



B. SBF



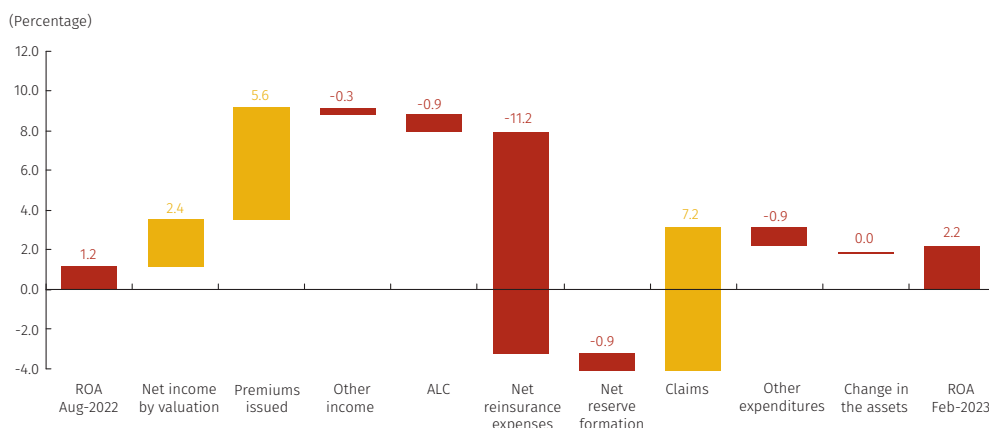
C. PFM



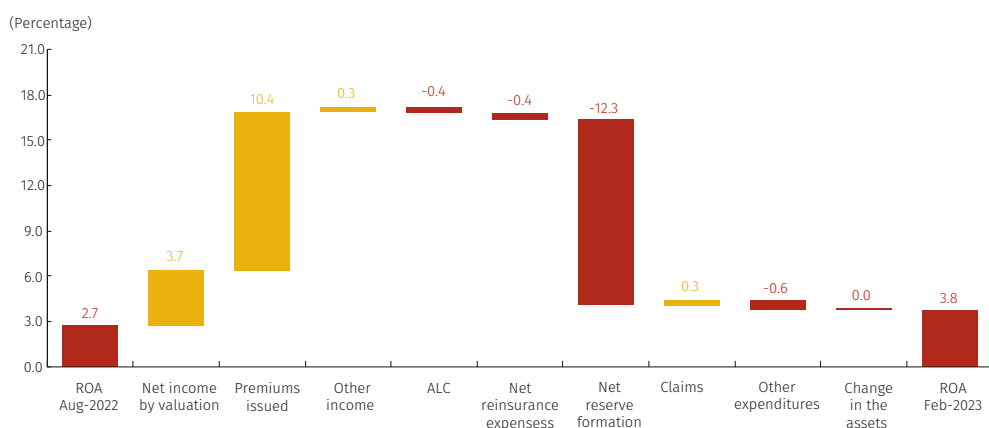
Note: other income mainly consists of the foreign exchange account.
 Acronyms: trust companies (TC), brokerage firms (SBF), pension and severance fund administrators (PFM).
 Source: Office of the Financial Superintendent of Colombia; calculations by *Banco de la República*.

Graph 2.16
Breakdown of ROA of Life and General Insurance

A. General Insurance



B. Life Insurance



Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

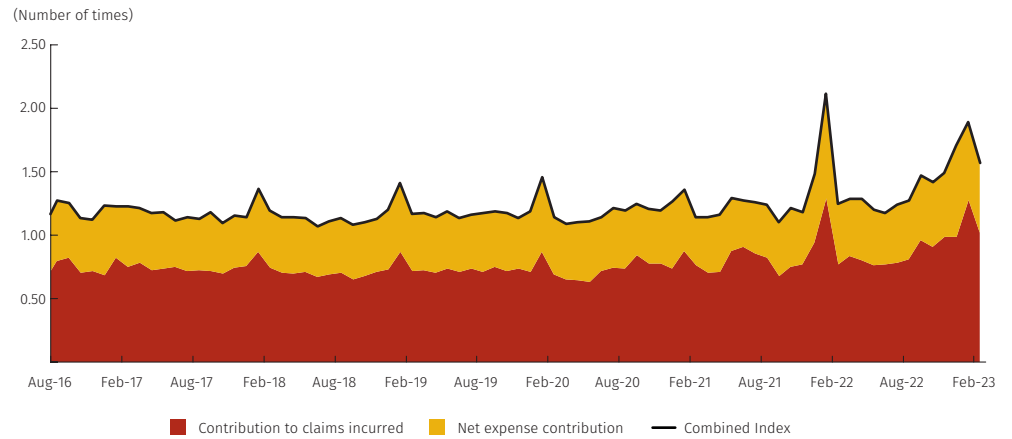
trusts, performed quite similarly to the aggregate since it represents 85.2% of TC assets. Cluster 2, which consists of entities focused on the management of social security funds, is the one that has shown the highest growth rate. Historically, its profitability has been lower than that of cluster 1. However, in the recent past, the differential between the two has narrowed. Last of all, the TCs grouped in cluster 3, which includes recently created entities, have managed to register profits since 2021 after a prolonged period of negative returns and started an upward trend that stabilized in mid-2022.

2.1.3.1 Open-end Collective Investment Funds

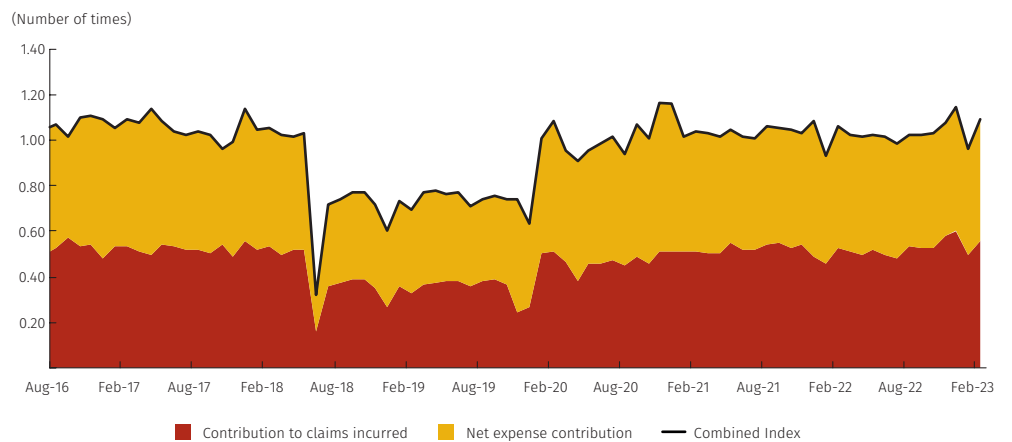
Collective investment funds (CIFs) are financial savings and investment vehicles managed by specialized companies in which funds from the contributions of several investors are invested in a portfolio of assets. These management entities correspond to TC, SBF, and the investment management companies (IMC). These funds are classified as: 1) open-end, with or without a permanence clause, where the investor may redeem his shares at any time; 2) closed, where deadlines for re-

Graph 2.17
Combined Index

A. Life Insurance

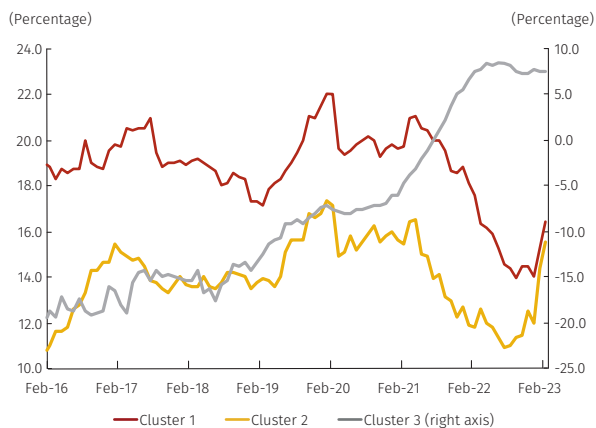


B. General Insurance



Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

Graph 2.18
ROA of TC by Cluster



Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

demptions are established, and 3) exchange-trade,³² in which case the withdrawal policy will depend on what is established in the fund's regulations.

The objective of open-end CIFs (OECIFs) is to provide investors with liquidity, profitability, and capital stability through investments in high quality short-term securities. Given their nature, they are susceptible to withdrawals which are dealt with in normal times by using what is available in demand accounts and the maturity of their securities. However, in the face of massive withdrawals by their investors, funds could resort to overselling their assets, and this could generate greater

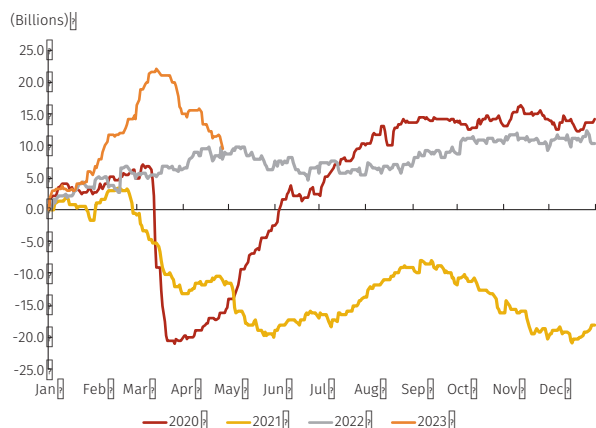
32 These funds can be open end or closed end and seek to partially or fully duplicate a stock market index.

Graph 2.19
Open-ended Collective Investment Funds

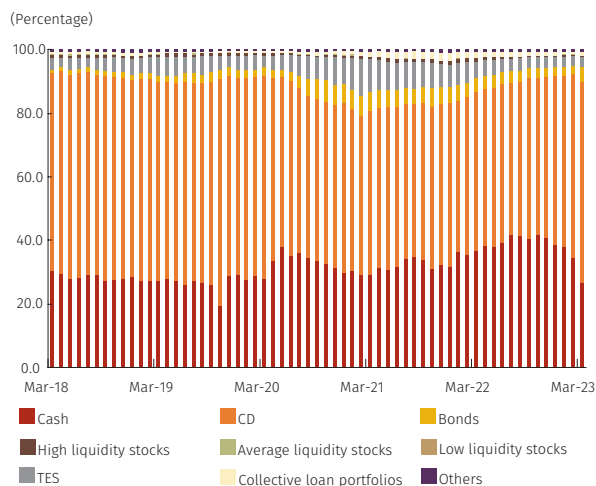
A. Total Assets



B. Cumulative Net Contributions



C. Breakdown of Total Assets



Source: Office of the Financial Superintendent of Colombia (SFC); calculations by Banco de la República.

price pressure and market volatility. Consequently, this section analyzes their performance over the last six months.

During the previous half-year, OECIFs assets showed very rapid growth for most of the period in response to their high profitability. However, this trend reversed at the end of March 2023 due to an increase in withdrawals.

The total assets of OECIFs rose approximately COP 25.4 t between September 2022 and mid-March 2023, and registered their highest historical value ever (COP 91.1 t,³³ Graph 2.19, panel A). This performance was the result of the increase in contributions that occurred in an environment of high profitability of these funds. Specifically, cumulative net contributions³⁴ totaled COP 21.3 t during the first few months of 2023 (Graph 2.19, panel B). Nevertheless, due to an increase in withdrawals (COP 11.5 t) that coincided with a decrease in profitability given the reduction in CD rates, total assets fell COP 10.5 t between mid-March and the end of April 2023.³⁵

The performance of the CD market mainly affects these investment vehicles since they represent nearly 63.1% of total assets followed by cash, which accounts for 26.7% of the total (Graph 2.19). In line with the upward trend in interest rates, there has been a restructuring of the portfolio of these funds since September 2022: an increase in CD holdings to the detriment of cash.

OECIFs have liquidity well above the regulatory limit although they have registered reductions over the course of the year. The decrease in the liquidity indicator up to mid-March 2023 was due to the increase in assets and the recomposition of the portfolio. The drop in liquidity was accentuated between the last weeks of March and April 2023 because of a decline in the funds available in demand accounts to meet the increase in the number of redemptions registered.

Since September 2022, the liquidity risk indicator (LRI) of the OECIFs has shown significant reductions due to a more than proportional increase in the value of funds compared to liquid assets (Graph 2.20, panel A). This indicator reached its lowest level in March 2023 for the first time in three years.³⁶ This situation was caused by the reduction in funds available

33 This balance represents 3.1% of the total assets of the financial system and 5.8% of the total assets managed by NBFIs as of February 2023.

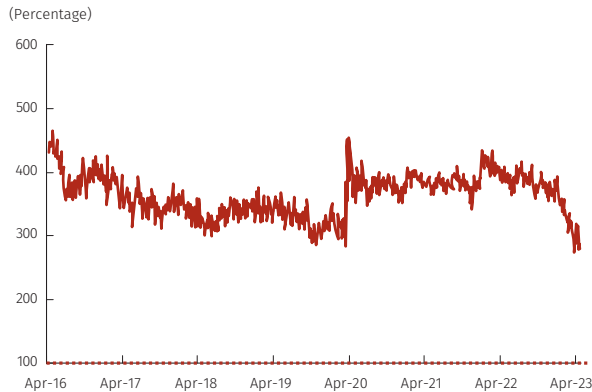
34 Net accumulated contributions correspond to total contributions minus total accumulated withdrawals.

35 For further details, see section 2.4.1 of this Report.

36 Following the economic shock of the covid-19 pandemic in March 2020, OECIFs faced massive investor withdrawals in the wake of a widespread decline in equity markets and devaluations in the local public debt market. As a result, total assets declined 31.3% between 06 March and 31 March 2020 as did liquidity indicators on account of redemptions. During this period, some funds failed to comply with regulatory liquidity limits.

Graph 2.20
Liquidity Risk Indicator for Open-ended Collective Investment Funds

A. Liquidity Risk Indicator (LRI)

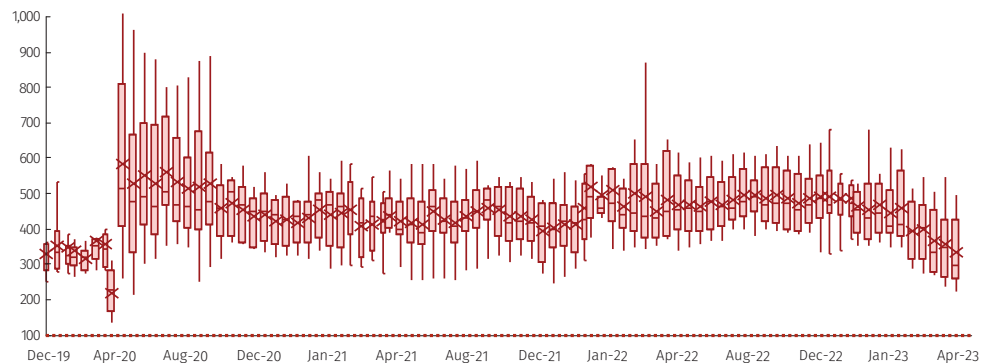


Note: the horizontal lines correspond to the regulatory limit of the liquidity risk indicator for OECIFs.

in demand accounts to meet the increase in withdrawals. Nevertheless, the aggregate LRI remains above the regulatory minimum (100%) although individual heterogeneities are observed. For the ten largest OECIFs, which account for 56.6% of the total assets, the indicator has shifted downward, but compared to the beginning of 2020, a greater dispersion is noted (Graph 2.20, panel B). For the other OECIFs, in turn, which represent the remaining 43.4%, the liquidity of some of them is close to the minimum. This is characteristic of this group of funds (Graph 2.20, panel C).

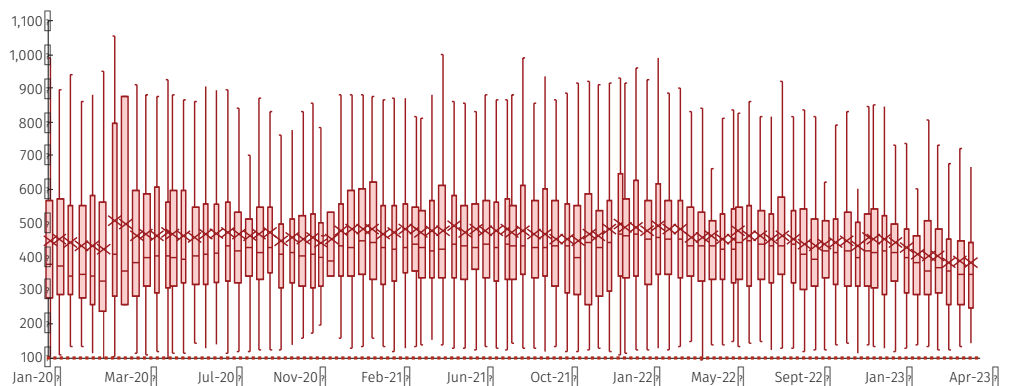
In view of the above, the downward trend in net contributions can be expected to continue in the coming months given the environment of lower rates and profitability. This trend would be gradual as financial conditions normalize in an orderly fashion. Along the same lines, a restructuring of the OECIFs portfolios in favor of cash may be expected. This would increase the liquidity of the funds and make it possible to meet withdrawals. In any case, Chapter 3 presents the results of a stress test that evaluates the impact of hypothetical mass withdrawals on the IRL of the funds without considering any adjustments that could be made to the portfolio.

B. LRI Distribution 10 Open-end CIFs of the Largest Size



Note: the lower and upper limit of each box denotes the 25th and 75th percentile respectively of the LRI distribution of the funds on each date. The horizontal line inside the box and the X correspond to the median and mean respectively. The red dotted line corresponds to the regulatory limit of 100% that applies to all funds.

C. LRI Distribution Other Open-end CIF



Note: the lower and upper limit of each box denotes the 25th and 75th percentile respectively of the LRI distribution of the funds on each date. The horizontal line inside the box and the X correspond to the median and mean respectively. The red dotted line corresponds to the regulatory limit of 100% that applies to all funds.

Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

2.2 Credit Risk

The analysis of credit risk that is presented below is divided between the corporate sector and households which are the main debtors of the financial system. The financial fragility of companies, development of corporate sector indebtedness, and the perception and materializing of private companies' credit risk is analyzed in the first subsection. The indebtedness of households is analyzed in the second sub-section and some risk indicators are presented that are related to the performance of this loan portfolio.³⁷

2.2.1 Corporate Sector³⁸

Starting in 2021, driven by the rapid pace of post-pandemic GDP recovery, most credit and financial risk indicators for the private corporate sector improved as was noted in the previous edition of this *Report*. Nevertheless, in the medium term, corporate sector firms face lower income growth and higher financing costs as the main source of risk in a context of persistent inflationary pressure, tighter financial conditions, a slowdown in economic activity, and high levels of indebtedness.

Based on the balance sheets as of December 2021, a simulation of the companies' financial statements of December 2022 indicates that the percentage of fragile companies could increase due to a lower ability to cover financial costs with net operating income. In spite of the above, the exposure of CIs to loans granted to these companies has decreased.

The previous version of this *Report* showed that the percentage of fragile firms³⁹ had declined in December 2021 in line with the post-pandemic economic recovery. In addition, most of the companies' financial and risk indicators improved. However, a slower pace of economic growth, cost increases, and tighter financial conditions may put some pressure on the financial capacity of debtors in the corporate sector in the medium term. This is particularly relevant given that the majority of the CIs' commercial loan portfolio is at variable rates (81.4% as of the end of March 2023).

In order to evaluate the current state of fragility of the companies in the described context while keeping the fact that the most recent financial information from the Private Corporate Superintendence is available as of 2021, a simulation exercise of the companies' balance sheets as of December 2022 was carried out using sta-

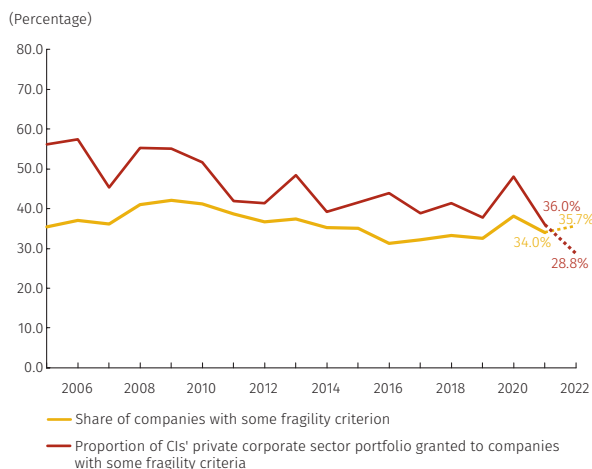
37 As a supplement to this credit risk analysis, the *Special Credit Risk Report* accompanying this semester's *Financial Stability Report* will be published in June 2023.

38 Due to the availability of quarterly information from the Office of the Financial Superintendent of Colombia Report 341, "Individual Report by Debtor: Active Credit Transactions," the information of the figures presented in this section are as of December 2022. The most recent financial information available from companies that report annual financial statements to the Private Corporate Superintendence has a cut-off date as of December 2021. Last of all, the information from the Private Corporate Superintendence on insolvency processes is from September 2022. The percentage of companies with balance sheets reported to the Private Corporate Superintendence that overlapped with the Office of the Financial Superintendent's database was 64.0% as of December 2022 and represented 43.3% of the total loans of private companies.

39 A company is defined as fragile if it meets any of the following criteria (the label associated with Graph 2.21, panel B is in parentheses): 1) it enters into a status of insolvency with the Private Corporate Superintendence (*insolvency*); 2) has a credit rating other than A or 30 or more days in arrears (*default*); 3) registers negative equity (*negative equity*); 4) incurs a net worth loss (bankrupt), and 5) shows an interest coverage ratio that is calculated as the ratio of before-tax earnings to interest expense that is less than 1 in the period under analysis (*ICI less than 1*) or for two consecutive years (*consecutive ICI*).

Graph 2.21
Development of Fragile Companies that Report to the Private Corporate Superintendence

A. Exposure of Fragile Companies



tistical methods and accounting assumptions.⁴⁰ Based on the results, an increase in the percentage of fragile companies where the criterion that best explains this increase is the reduced ability to cover the financial costs with net operating income can be expected to appear at this date (criteria ICI less than 1 and consecutive ICI, Graph 2.21). Nevertheless, the percentage of fragile companies is unlikely to reach the high value seen during the pandemic, nor the historical maximum noted in 2009. Furthermore, a decrease in the ratio of loans to fragile companies will probably be noted, and this will reduce the exposure of Cls to these companies.

Based on figures as of December 2022, the corporate sector increased its indebtedness as a share of the GDP and was close to historical highs. This increase is a result of the increase in private sector indebtedness, particularly debt denominated in foreign currency. Most of this debt has foreign exchange risk mitigation mechanisms.

With respect to their indebtedness, at the end of 2022⁴¹ companies presented high levels of leverage measured as the ra-

40 Specifically, balance sheets were simulated using accounting rules and regressions with the main financial indicators (sales growth, indebtedness, costs) as dependent variables and macro financial variables (GDP growth, credit boom indicator) as independent variables. The starting point was the 2021 balance sheets and the macroeconomic and financial data seen at the close of 2022. For more details on this type of methodological approach, see Tressel and Ding (2021). "Global Corporate Stress Tests—Impact of the Covid-19 Pandemic and Policy Responses," International Monetary Fund.

41 The corporate sector indebtedness presented in graphs 2.22, 2.23, and 2.24 is constructed with figures obtained from various sources such as the

B. Distribution of fragile companies by criterion



Notes: A company is defined as fragile if it meets any of the following criteria (the legend of the graph in panel B in parentheses): i) it enters into an insolvency proceeding with the Private Corporate Superintendence (*insolvency*); ii) has a credit rating other than A or 30 or more days in arrears (*default*); iii) registers negative equity (*negative equity*); iv) incurs a net worth loss (bankrupt); v) shows an interest coverage ratio calculated as the ratio of before-tax earnings to interest expense that is less than 1 in the period under analysis (*ICI less than 1*) or for two consecutive years (*consecutive ICI*). A firm may meet more than one criterion, and thus, the height of the bars may be higher than the total criterion. Specifically, the ICI criteria below 1 and loss contain the consecutive ICI and negative equity criteria respectively. The dotted line in panel A and the a/ in panel B refer to projected data. Specifically, the ICI criteria of less than 1, consecutive ICI, bankruptcy, and negative equity for 2022 are not observed and were defined by simulating the companies' balance sheets and the macroeconomic and financial variables seen in 2022. The non-performing loan criterion was updated as of December 2022 and the insolvency criterion was updated as of September 2022. The red line in panel A only considers the private corporate sector portfolio granted to companies that report accounting information to the Private Corporate Superintendence. Sources: Private Corporate Superintendence, Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

tio between the total debt of the corporate sector and the annualized GDP. The total indebtedness of the corporate sector stood at 63.8% of the GDP as of December 2022, slightly lower than the historical maximum reached in 2020. The increase in the leverage of companies is mainly due to the increase in the indebtedness of the private corporate sector.⁴² This contributes 54.3 pp to total indebtedness (Graph 2.22, panel A). The public corporate sector, in turn, which contributes the remaining 9.5 pp, presented a reduction between 2021 and 2022 (Graph 2.22, panel B).

Debt denominated in foreign currency may become a source of vulnerability for the corporate sector to the extent that it exposes the entities to fluctuations in the exchange rate. In fact, the increase in total private corporate sector indebtedness is partly due to the depreciation of the peso in 2022 and its effect on debt denominated in foreign currency (41.8% of the debt and 22.7% of the GDP). Based on the results of an exercise, the study showed that if the exchange rate had remained at the value it had on 31 December 2021 (COP 3,981 vs. COP 4,810), the total indebtedness of the private corporate sector would have been lowered by about 2.9 pp in 2022 and stood at 50.8% of the GDP. However, there are mitigators of foreign exchange risk exposure for the corporate sector. For example, if a company that is indebted in foreign currency is an exporter, a depreciation of the peso also affects its income, and this generates a natural hedge. Alternatively, if the company uses financial hedging instruments (through the use of exchange rate derivatives) or if it has a foreign entity backing it (i.e.: foreign direct investment, FDI⁴³)⁴⁴ it reduces the level of exposure to this type of risk.

In the Colombian corporate sector, the percentage of debt in foreign currency that has some mechanisms to mitigate exchange rate risk remained relatively stable during 2022. Graph 2.23 shows the private corporate sector's financial debt as a share of the GDP by currency hedging, FDI, and the debtor's foreign trade as of December 2022. It also emphasizes the fact that corporate debt that has mitigation mechanisms continues to account for the largest share of foreign currency debt.

The reduction in total debt of public companies as a percentage of GDP occurred in a context in which the share of foreign currency debt, which accounts for most of the debt, increased (78.3% of debt and 7.4% of GDP, Graph 2.24). Despite this, the two companies that account for close to 80% of the public corporate sector foreign debt are exporters and, therefore, have mitigation mechanisms against exchange rate movements.

Given the companies' elevated leverage in a context of tighter financial conditions and a slowdown in the economy, the financial capacity of these agents in the event of extreme scenarios must be measured. To this end, a stress test was done departing from the simulated balance sheets as of 2022. Based on the results, 5.0%

FSC and *Banco de la República* as of December 2022. This information is not part of the simulation exercise presented in Graph 2.21.

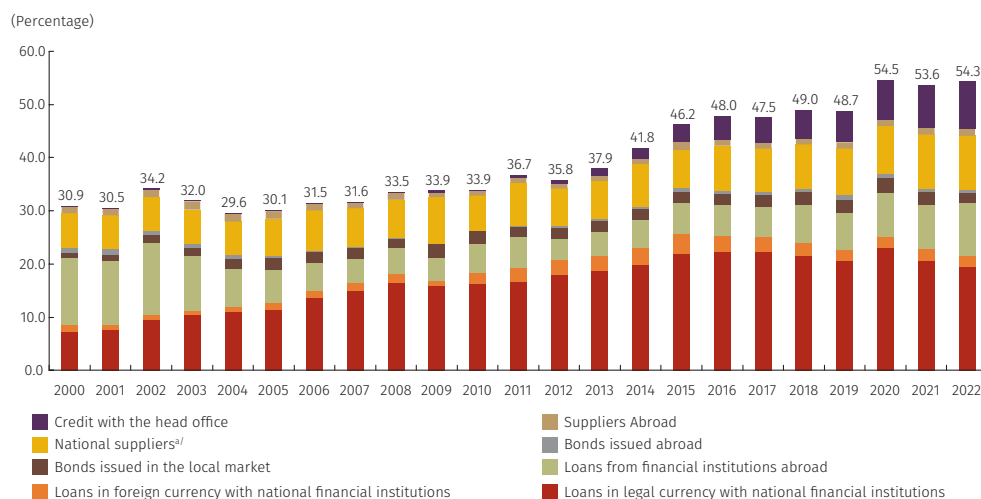
42 The term "private corporate sector" refers to private companies and excludes those that are monitored by the FSC.

43 When a foreign entity has FDI in a local company, the foreign exchange risk for the latter is mitigated due to the fact that it is assumed that the investor has an incentive to support the company in the case of a depreciation in the exchange rate. In addition, the structure of the local firm's foreign currency balance sheet may be a strategy used by the economic group to which the company belongs to reduce the foreign exchange mismatch of the group as a whole.

44 For further discussion on the vulnerability of companies to exchange rate mismatches, see Box 1 of this *Report*.

Graph 2.22
Corporate Sector Financial Debt as a Percentage of the GDP by Instrument

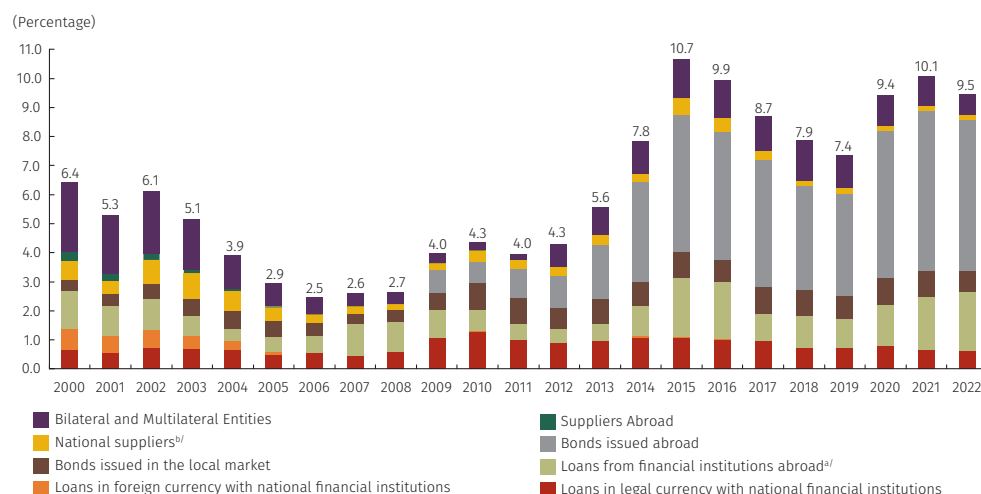
A. Private Corporate Sector



a/ This only includes information from companies that report their financial statements to the Private Corporate Superintendencia. In 2016, all of the companies registered their financial statements using IFRS which did not make it possible to determine the balance of debt owed to national entities. Therefore, in order to do an approximation of the data from these companies, the average percentage that the short and long-term providers reported under current and non-current liabilities respectively during this period for the companies that reported between 2007 and 2015 using the UAP was calculated, and an equal percentage for the entities that submitted financial statements as of 2016 was assumed. Since the financial statements for 2022 have not yet been published, annual GDP growth is used to project December 2022 value.

Sources: Office of the Financial Superintendent of Colombia, Private Corporate Superintendencia, and Banco de la República; calculations by Banco de la República.

B. Public Corporate Sector



a/ Financial leasing transactions are not included.

b/ Includes information on the balance of accounts payable of the main non-financial companies in the public sector.

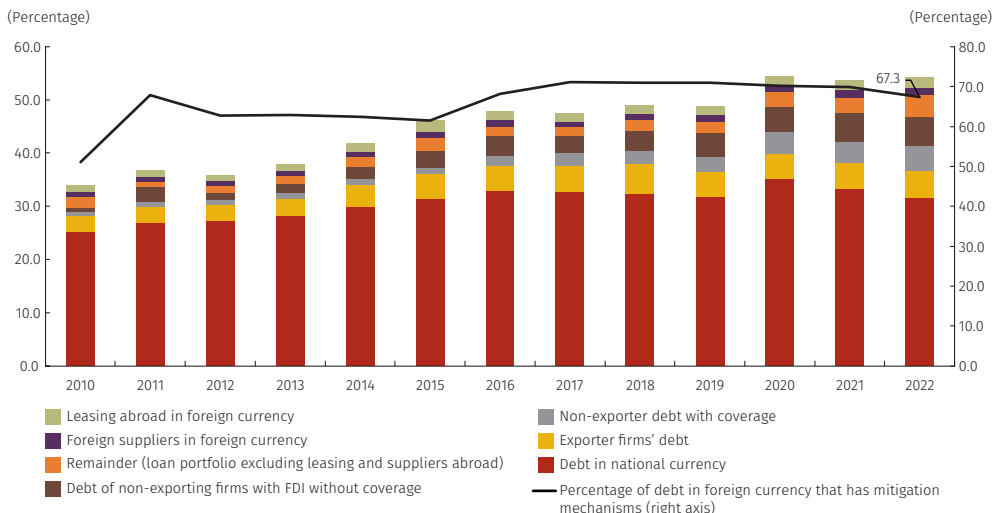
Note: the portfolio data with the national financial system has come from the 409 format of the Office of the Financial Superintendent of Colombia as of June 2022.

Sources: Office of the Financial Superintendent of Colombia, General Accounting Office (Contaduría general de la Nación), Ministry of the Treasury and Public Credit (Ministerio de Hacienda y Crédito Público); calculations by Banco de la República.

of the companies would find it difficult to cover their financial costs with their net operating income during a financial stress scenario.

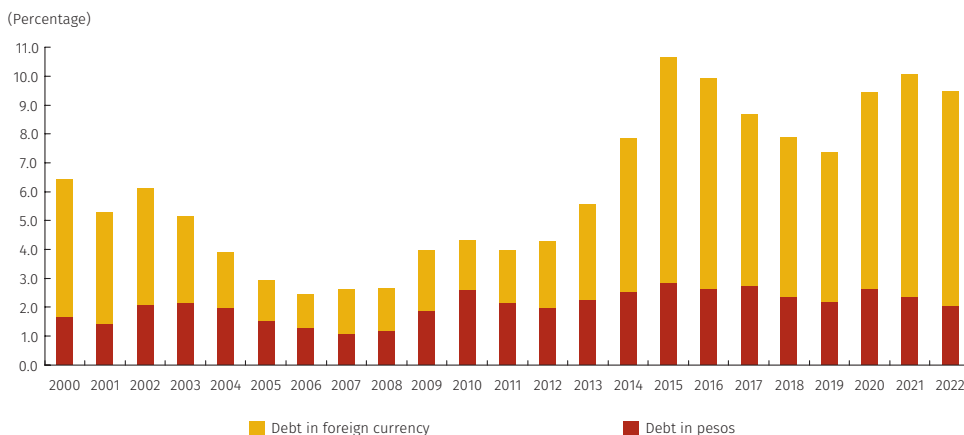
Based on the data simulated as of December 2022 and presented above, a stress test was done on the companies' balance sheets for an additional two-year horizon based on the adverse macroeconomic scenario presented in Chapter 3 of this Report. This scenario could be interpreted as a hypothetical, extreme, and unlikely exacerbation of the risks identified for debtors in the corporate sector. Based on the previous results, the companies were classified as vulnerable if they went on

Graph 2.23
Private Corporate Sector Financial Debt as a Share of GDP by Exchange Rate Coverage, FDI, and Debtor Foreign Trade



Note: the debt of suppliers in foreign currency and leasing with entities abroad is not available by TIN and, therefore, it is not possible to identify whether or not this debt belongs to hedged companies.
 Sources: Office of the Financial Superintendent of Colombia, DANE, and Banco de la República; calculations by Banco de la República.

Graph 2.24
Public Corporate Sector Financial Debt as a Percentage of GDP by Currency



Note: This graph uses the same information as Graph 2.22, panel B.
 Sources: Office of the Financial Superintendent of Colombia, Office of the Comptroller General of Colombia, and Ministry of Public Finance and Credit; calculations by Banco de la República.

to have an interest coverage ratio of less than 1 over the entire stress horizon (consecutive ICR criterion). According to the results of this exercise, 5.0% of the companies that account for 3.9% of the portfolio held by companies that report to the Superintendency of Corporate Affairs would experience the vulnerability described in the adverse scenario.

The most affected sectors⁴⁵ in the aforementioned stress test would be hotels and restaurants, commerce, and construction (Graph 2.25). In accordance with the above and based on information available as of December 2022, a deterioration

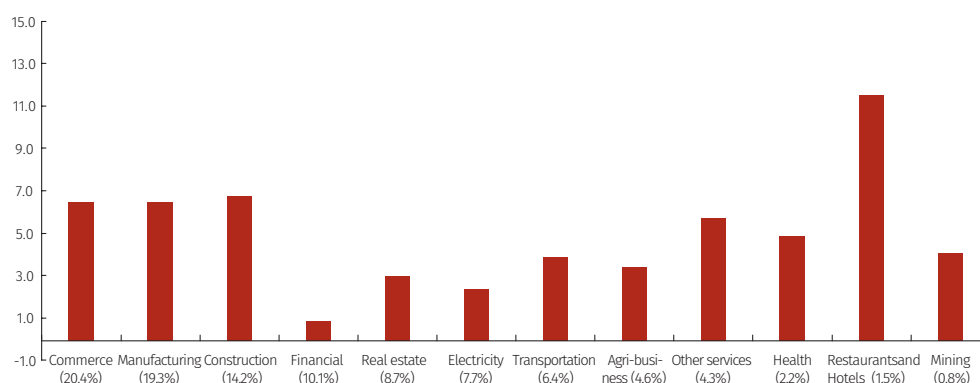
⁴⁵ In this section, abbreviations will be used to refer to the following sectors: (1) real estate, rentals, and business as real estate; (2) agriculture, animal husbandry, hunting, forestry, and fishing as *agribusiness*; (3) mining and quarrying as *mining*; (4) electricity, gas, and water as *electricity and*

has been perceived in the credit risk indicators (QIR and NPL) of the hotel and restaurant sector and the commerce sector between September and December 2022 (Graph 2.26). In the case of the construction sector, although credit risk indicators for the sector have been on the decline, a deceleration of household income, high construction costs and lower sales of new housing are elements that may put pressure on the financial health of companies, particularly those belonging to the *residential construction* and *non-residential construction* subsectors, in 2023⁴⁶ (Graph 2.27).

The results of the above analysis are considered in the stress test presented in Chapter 3 of this Report where the exposure of CIs to the credit risk of the companies identified as vulnerable is evaluated. The results of this exercise show that the financial system is sound enough to deal with a potential default of the riskiest segments.

Graph 2.25
Share of Vulnerable Companies by Stressed ICR by Economic Sector

(Percentage of companies)



Note: the sectors are organized horizontally from the most representative to the least representative in the private corporate sector portfolio. In the financial sector, entities supervised by the Office of the Financial Superintendent of Colombia are excluded. The companies that belong to the following economic sectors are grouped under 'other services': public administration and defense, education, health and social services, other community, social, and personal services, private households with domestic help, and extraterritorial organizations and entities. The share of each sector in the total CI portfolio with the private corporate sector is shown in parentheses.

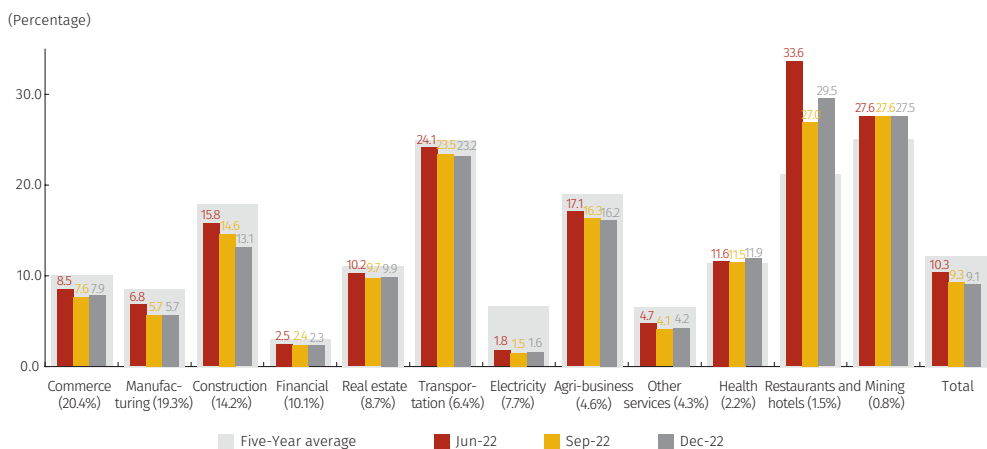
Sources: Private Corporate Superintendence, Office of the Financial Superintendent of Colombia; calculations by *Banco de la República*.

utilities; (5) transportation, warehousing, and communications as *transportation*, and (6) financial intermediation as *finance*.

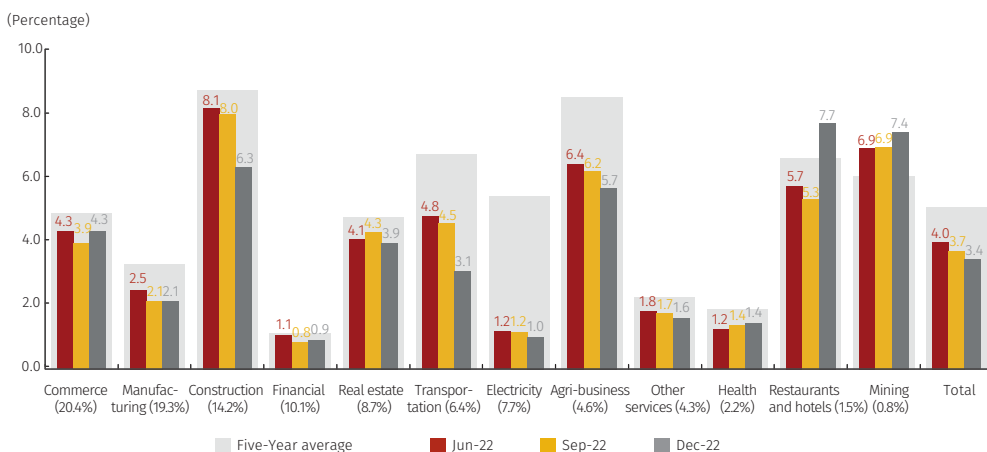
46 Both subsectors represent 7.8% of the private corporate sector loan portfolio as of December 2022. Non-residential construction excludes public works.

Graph 2.26
Private Corporate Sector Credit Risk Indicators

A. Quality indicator by risk (QIR)



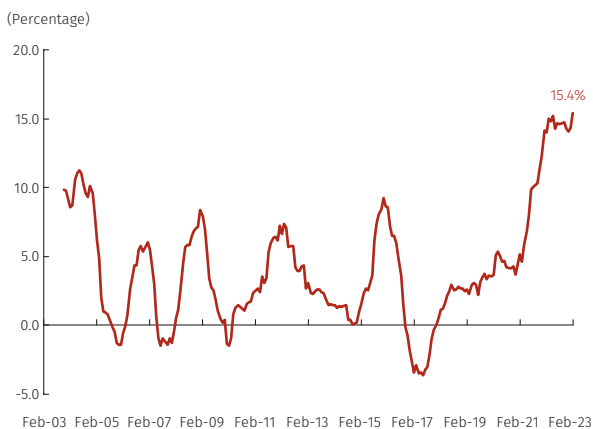
B. Quality indicator by default (NPL)



Note: the sectors are organized horizontally from the most representative to the least representative. In the financial sector, entities supervised by the Office of the Financial Superintendent of Colombia are excluded. The companies that belong to the following economic sectors are grouped under 'other services': public administration and defense, education, health and social services, other community, social, and personal services, private households with domestic help, and extraterritorial organizations and entities. The share of each sector in the total is shown in parentheses.
Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

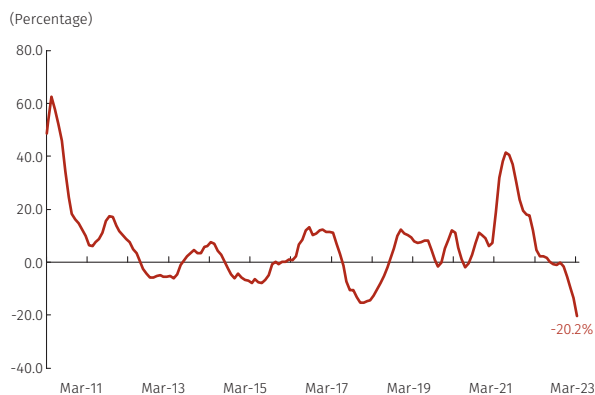
Graph 2.27
Construction and Housing Sector Indicators

A. Annual change in producer price index - construction materials



Source: Colombian Chamber of Construction (Camacol).

B. New housing units sold at twelve months Bogotá, Medellín, and Cali (annual change)



Source: Galería Inmobiliaria (Galería Real Estate).

2.2.2. Households

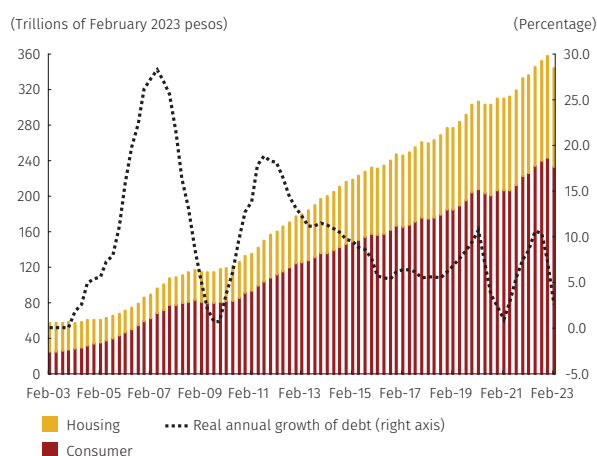
This section presents the main vulnerabilities that affect the ability of households to meet their financial obligations. In short, indebtedness has slowed down in the recent past even though the debt-to-income ratio of these agents remains close to historical highs. The debt-service ratio, in turn, has shown increases in the recent past. In this context, credit risk indicators have deteriorated in the last six months, and this has led CIs to tighten their requirements for granting new loans. The most recent trends suggest that the portfolio deterioration and slowdown will continue for the foreseeable future.

Household indebtedness showed a downturn as of February 2023, thus halting the trend seen during 2021 and the first half of 2022. The level of leverage these debtors have also decreased as a share of their disposable income, even though it remained close to historical highs while their financial burden, defined as the percentage of disposable income allocated to the payment of financial obligations, rose over the last six months.

The household loan portfolio stood at COP 344.8 t, and this presented a real annual growth rate of 2.6% as of February 2023, which was the lowest expansion since May 2021 (Graph 2.28). Of the total indebtedness, approximately two thirds correspond to consumer loans and the remainder to housing loans, where both types of loans grew 3.3% and 1.1% respectively in real terms.⁴⁷ The growth of the household loan portfolio halted the upward trend it had been on since the beginning of 2021 as it showed a real 8.4 pp expansion as of February 2023. This rate is lower than what was seen in June 2022 when a growth of 11.1% was registered.

The positive trend in household disposable income⁴⁸ (which grew 18.6% in December 2022) and the recent downturn in their loan portfolio led to a decrease in the debt to disposable income ratio of these agents⁴⁹ even though it remained near historical highs. The consumer loan portfolio accounted for the largest share of the total indicator (Graph 2.29). In order to anticipate short-term changes in the indicator, a forecast was made in accordance with *Banco de la República's* base macroeconomic scenarios and a trajectory of low loan portfolio growth in line with the most recent data. Should this low growth materialize, further declines in the household debt-

Graph 2.28
Breakdown and Real Annual Growth of Household Indebtedness



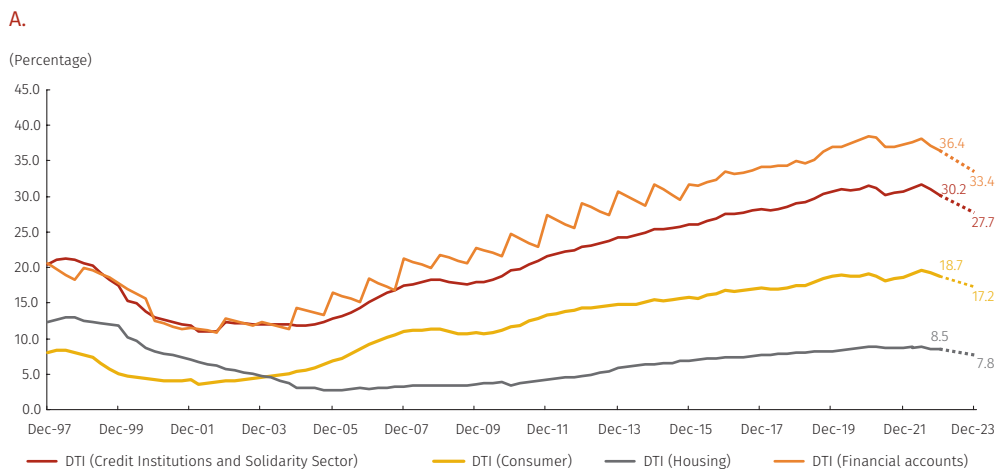
Sources: Office of the Financial Superintendent of Colombia, Superintendency of Economic Solidarity, *Fondo Nacional del Ahorro* and *Titularizadora Colombiana*; calculations by *Banco de la República*.

47 These growth rates differ from the ones presented in section 2.1 since, in order to build Graph 2.2, households' obligations to savings and loan cooperatives, employee funds, *Fondo Nacional del Ahorro* and *Titularizadora Colombiana*, were also considered. The weight of the latter is 9.9% of total household indebtedness.

48 Disposable income refers to income net of taxes, social contributions, and other current transfers.

49 Household disposable income comes from DANE's quarterly national accounts classified by institutional sector.

Graph 2.29
Debt to Available Household Income



Note: the graphs present the debt-to-income indicator (DTI). The gross adjusted disposable income of households from the national accounts by institutional sector is used for this. The dotted segments correspond to forecasts of the indicator based on the base macroeconomic scenarios of the technical staff at Banco de la República and a path of low credit portfolio growth. Four measures of indebtedness are presented in the graph:

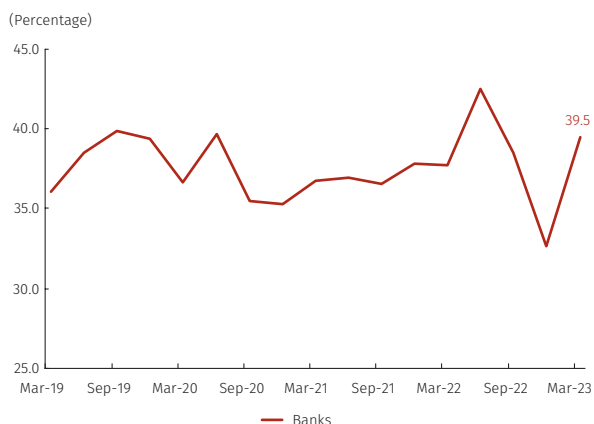
1. Red line: household debt with credit institutions, savings and credit cooperatives, employee funds, and *Titularizadora Colombiana*.
2. Orange line: household debt derived from the financial account balances published by Banco de la República. In addition to what is included in the red line, microcredits and commercial loans to individuals are included as are obligations with other financial institutions.
3. Grey line (yellow): housing loans (consumer) from credit institutions

Source: Office of the Financial Superintendent of Colombia and DANE; calculations by Banco de la República.

to-income ratio are to be expected towards the end of 2023 that would reach levels not seen since 2017.

The weighted average financial burden for households with new loans, in turn, as reported by banks in the *Survey on the Banks Situation in Colombia*, which reflects changes in the ratio between debt amortizations and interest payments together with available income, showed an upswing for banks as they reached an indicator of 39.5% as of March 2023 (Graph 2.30).

Graph 2.30
Weighted Average Debt Service Ratio of Households that Took out New Loans

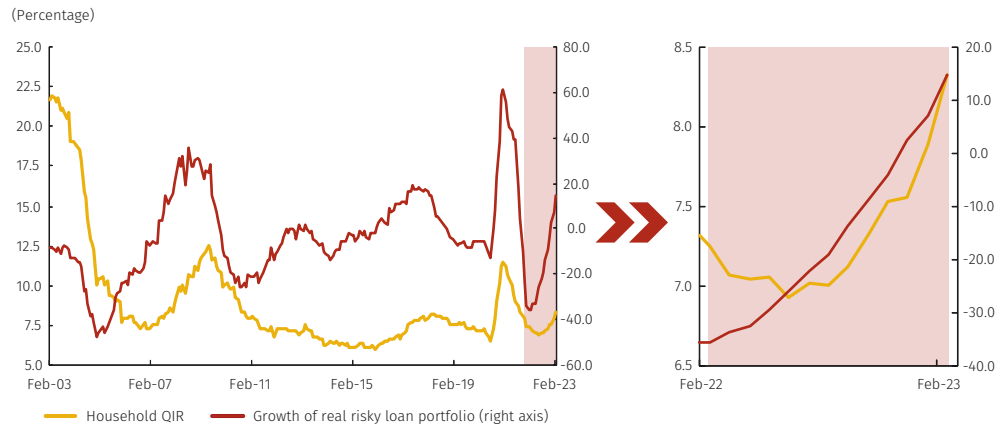


Source: Survey of the loan situation in Colombia, March 2023.

The risky and non-performing household loan portfolios have accumulated a year of upswings that have resulted in a deterioration of credit risk indicators. This has led CIs to increase their requirements for granting new loans.

The risky portfolio granted to households continued to surge during the second half of 2022 and the first half of 2023. After having presented real contractions since October 2021, this loan portfolio started to show positive growth in December 2022. This situation has been driven by the performance of the risky consumer loan portfolio, which reached a real growth of 31.0% as of February 2023 while the housing portfolio, although it has shown some growth, has continued to contract at a rate of -14.5%. This performance led to a deterioration in the household QIR which had reached its highest value since August 2021 in February 2023 (8.3%, Graph 2.31).

Graph 2.31
Trend of Risky Loan Portfolio and Household QIR



Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

Consistent with the above, the growth rate of non-performing loans to households registered a real 27.6% growth, the largest one registered since July 2021. In line with this result, the NPL reached a level of 6.1% in February 2023 by which time it had accumulated six consecutive months of decline. When the accumulated flow of write-offs net of recoveries for the last twelve months is included, the indicator reached a value of 5.2% due to the net recoveries of written-off loans in the consumer portfolio or sales of them during the last twelve months⁵⁰ (Graph 2.32). In a context of expected slowdown, the growth trend in household delinquency could be expected to continue in the short term. Despite the above, the level of loan-loss provisions is sufficient to mitigate the increase in these risks with coverage indicators of 132.2% and 60.0% in the consumer and housing loan portfolios respectively.⁵¹

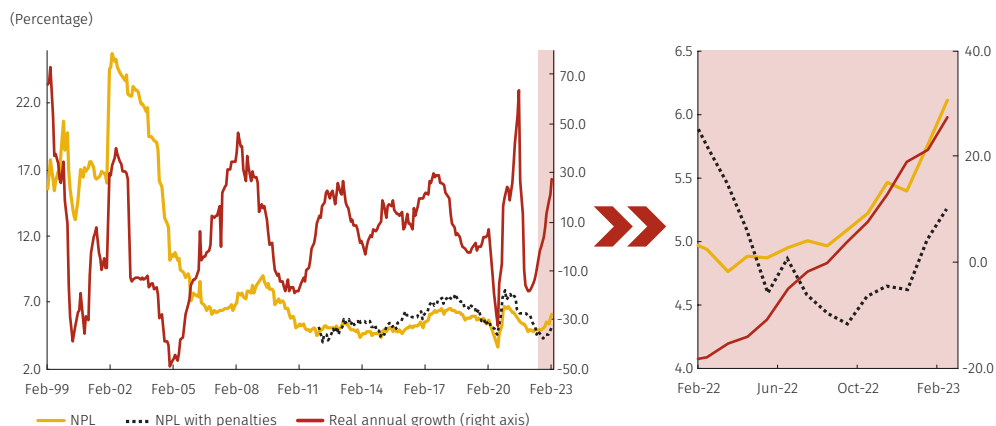
When these are analyzed by type of credit, the NPLs of the consumer portfolio segments were found to have risen across the board during the second half of 2022 and the first half of 2023 led by the unspecified use loans and credit cards (9.1% and 7.4% respectively, Graph 2.33, panel A). In the case of the housing NPL, this has been stabilizing since mid-2022 as a result of the performance of the non-LIH category which accounts for 70.4% of this portfolio (Graph 2.33, panel B). In contrast, the LIH category has shown deterioration since September 2022.

In the persistent inflationary context identified in chapter 1 of this Report, it is important to monitor the exposure of CIs to UVR-denominated housing loans since their debt service has been affected by the increase in prices. Graph 2.34 shows the NPL of the housing categories by denomination, pesos, and UVR. While the aggregate indicator for UVR-denominated loans has shown stability in the recent past, the LIH category has shown deterioration since mid-2022. Given that lower-income borrowers are the most affected by inflation, it is not surprising that

⁵⁰ The quality indicator for nonperforming loans with write-offs is defined as the ratio between the past-due portfolio, added to the flow of write-offs net of recoveries for the last twelve months, and the total portfolio added to the same flow of write-offs net of recoveries for the last twelve months.

⁵¹ The coverage ratio is defined as the ratio of provisions to past-due loan portfolio. In the case of the housing portfolio, it is natural for the indicator to be lower than 100% due to the importance of the value of the property as collateral for the loan.

Graph 2.32
Trend of Non-performing Loan Portfolio and Household NPL



Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

this sub-group is the most affected by price increases. It is noteworthy that UVR-denominated LIH loans represent 7.6% of the housing portfolio, and therefore, do not generate significant increases in the aggregate NPL of this portfolio. Despite the above, some entities that represent about 0.1% of the financial system’s assets are highly exposed to loans denominated in UVR. Therefore, this risk will continue to be monitored in the future.

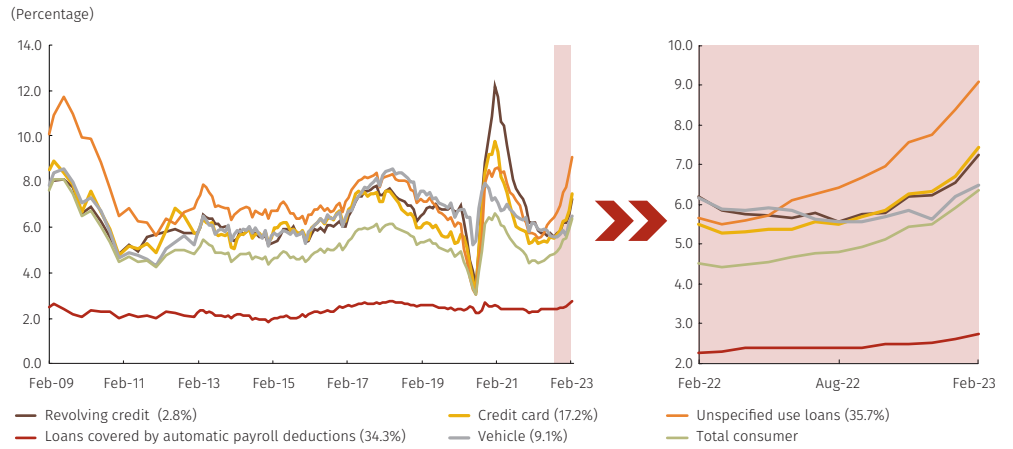
Graph 2.35 depicts the analysis of loan vintages, which consists of monitoring the changes in quality indicators for a group of loans that originated in a specific month. The analysis shows the speed at which loans deteriorated from the time they were placed and the change in the quality at different points in time. In the case of the consumer portfolio, the most recent loans have been showing a decrease in the quality due to delinquency relative to what had been registered previously at equivalent levels and have reached the worst deteriorations in the history of the indicator (Graph 2.35, panel A). The deterioration of the recent consumer loan portfolio harvests is the result, in particular, of the performance of unspecified use loans (Graph 2.35, panel B) and credit cards (Graph 2.35, panels C and D).⁵² For the latter, it should be noted that the deterioration has been higher for debtors with higher incomes. This situation may be partially explained by the reduction in interest rates implemented by some financial institutions in the lower-income segment.

In this context of greater materialization and perception of credit risk, the banks’ stance on new allocations became more restrictive. According to the March 2023 *Survey on the Credit Situation in Colombia*, the trend of raising the requirements for granting new loans that was noted in the previous version of this Report has consolidated (Graph 2.36). For both the housing and consumer loan portfolios, the CIs surveyed showed increases in their requirements and had reached all-time highs for the latter. For the next quarter, CIs anticipate increases or stability in the level of demands. In line with the above, *Banco de la República’s* March 2023 quarterly survey on economic expectations showed the perception of lower availability of credit in the future (only 16.1% of the respondents expect greater availability in the next six months). The increase in requirements makes it possible to anticipate

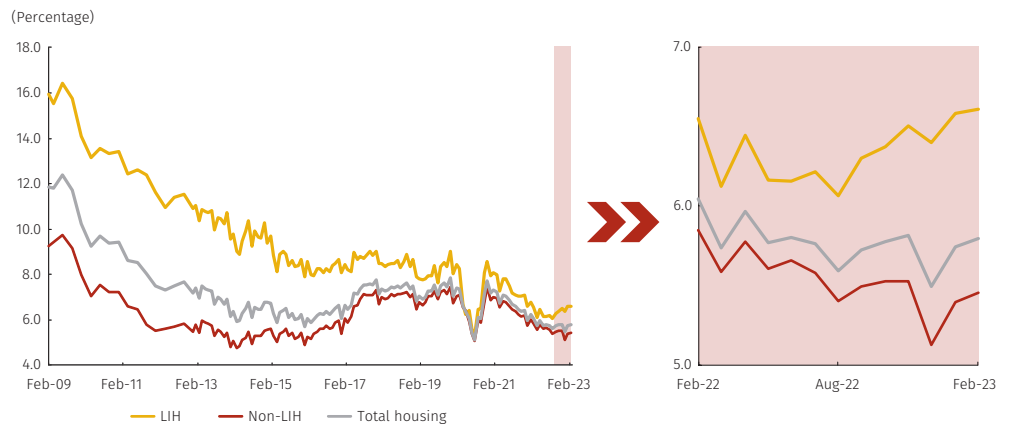
⁵² The share of the categories of unspecified use loans and credit cards in the total consumer loan portfolio is 35.4% and 17.9% respectively.

Graph 2.33
NPL by Segment

A. Consumer

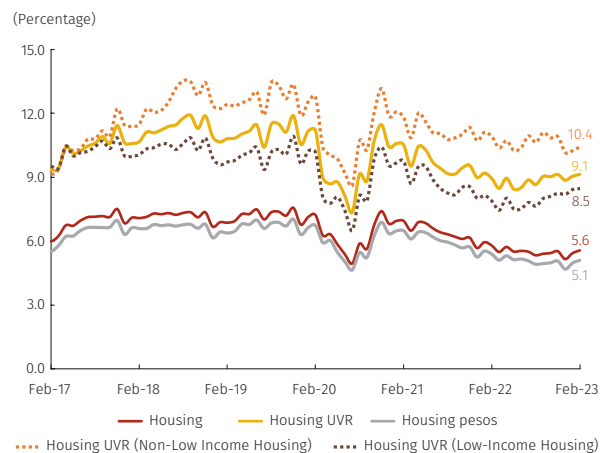


B. Housing



Source: Office of the Financial Superintendent of Colombia; calculations by *Banco de la República*.

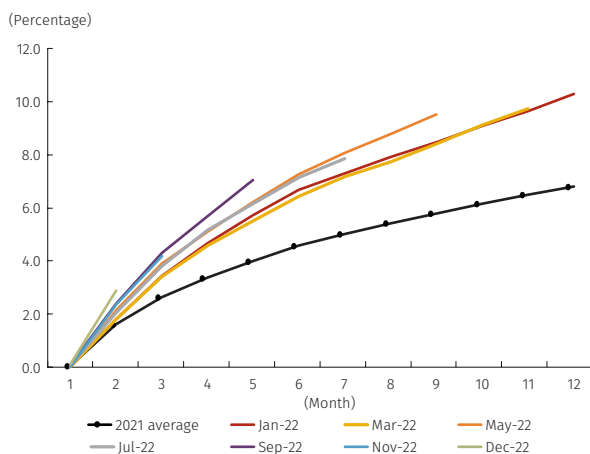
Graph 2.34
Quality Indicator for Housing Default by Denomination



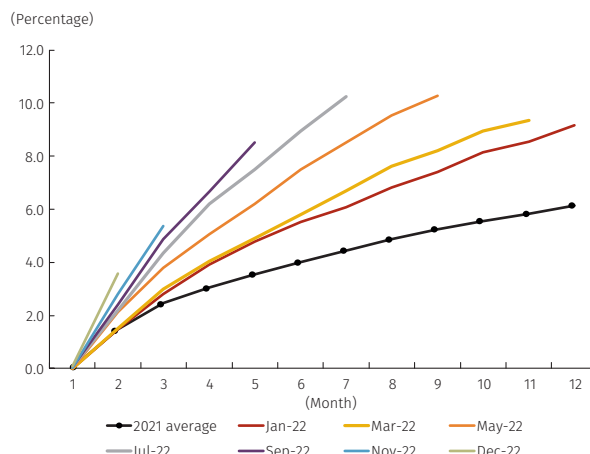
Source: Office of the Financial Superintendent of Colombia; calculations by *Banco de la República*.

Graph 2.35
Quality Indicator by Default per Consumer Loan Harvest

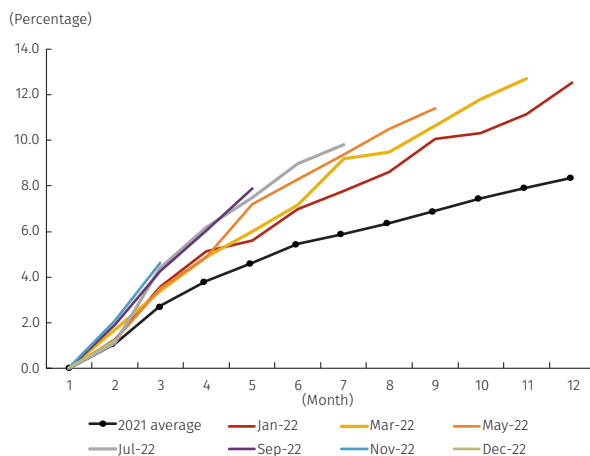
A. Total consumption



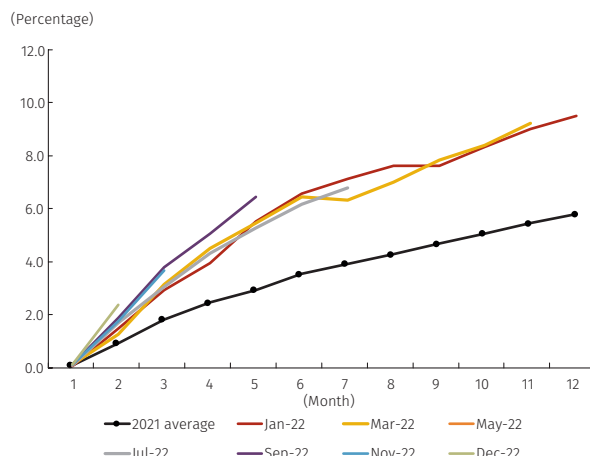
B. Unspecified Use Loans



C. Credit Cards for Clients with Incomes Less than 2 SMMLV



D. Credit Cards for Clients with Incomes Above 2 SMMLV



Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

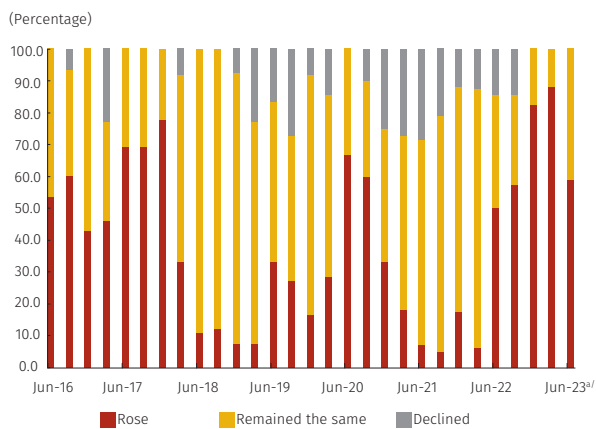
that the trend of a real downturn in household portfolios will continue in the near future.

Household savings showed partial recoveries following the sharp declines seen after the pandemic. The current ratio, in turn, has shown slight declines although in the aggregate liquid assets continue to be sufficient to cover short-term obligations.

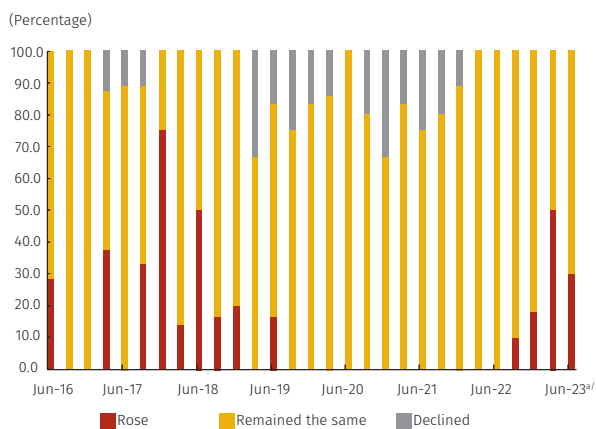
Graph 2.37 presents the annualized gross household savings and its components, reported in DANE’s quarterly national accounts by institutional sector. After the rapid drop between mid-2021 and 2022, savings have shown rises in the last two quarters, mainly as a result of the positive performance of households’ disposable income. In spite of the above, household savings levels remain well below those noted in 2020 before the impact caused by the lockdown periods.

Graph 2.36
Change in Requirements for Allocating New Loans

A. Housing Loans

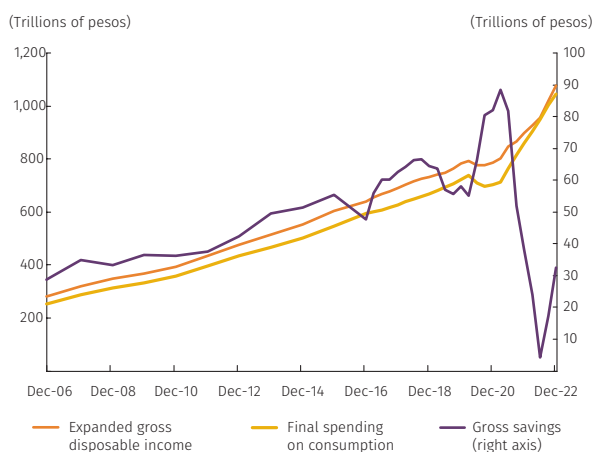


B. Consumer Loans



a/ next quarter expectations.
Source: Survey on the situation of credit in Colombia, March 2023; calculations by Banco de la República.

Graph 2.37
Gross Household Savings and their Components



Source: DANE; calculations by Banco de la República.

The current ratio for households, in turn, calculated on the basis of *Banco de la República's* financial accounts and defined as the ratio of deposits and cash to short-term indebtedness and accounts payable showed a slight drop in the last six months. Yet, households' liquid assets cover approximately three times their short-term commitments, which shows sufficient liquidity (Graph 2.38). Despite the above, the aggregate indicator was able to ignore disparities across the distribution of the individual indicator for Colombian households, especially for the most vulnerable ones.

In an environment of tighter financial conditions, high inflation, expectations of economic slowdown, high levels of indebtedness together a weakening of credit risk indicators, it is believed that some households may face more difficulties in paying their financial obligations in the future. The continuous monitoring of household indebtedness indicators takes on greater relevance under these circumstances.

2.3 Market Risk

Although the six-month period from October 2022 to May 2023 was marked by high levels of volatility, these did not result in increases in the value-at-risk of the financial system. Likewise, in spite of the fact that investment flows of TES held by foreigners have been lower since the third quarter of 2022, there was no significant impact on the public bond yield curve in pesos or in UVR. However, between January and April 2023, there were appreciations for both types of public debt securities, mainly due to net purchases by local agents and a greater perception of risk in the global market that made local securities more attractive. Moreover, the local stock market continued to show low liquidity and a performance lower than the region's driven particularly by idiosyncratic events. Finally, the events in which market risk materialized in the United States with the collapse of Silicon Valley Bank and Signature Bank did not have a direct impact on the local market due to the low exposure of the Colombian market to these institutions and the effect of the timely response of the U.S. authorities. Furthermore, when the potential effect of a similar event on the Colombian market was estimated, it was found to be resilient.

During the first quarter of the year, local financial markets registered high levels of volatility because of different sources of uncertainty in an environment of tighter local and global financial conditions. The recent collapse of some regional banks in the United States and the purchase of Credit Suisse by UBS had a negative impact on global risk perception. Locally, the source of uncertainty has been the recent announcements by the national government regarding the reform agenda and the cabinet.

Graph 2.38
Current Household Ratio



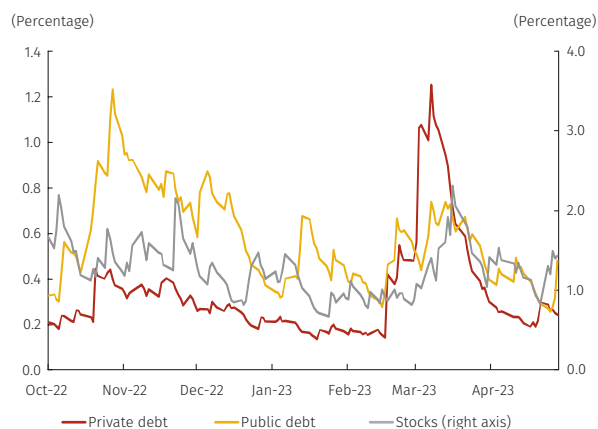
Note: all household accounts payable are assumed to be short term.
Source: Banco de la República; calculations by Banco de la República.

Three episodes of increased volatility in local financial markets took place between October 2022 and April 2023. In the first one, volatility in the public debt market rose during the week of October 24-28 when the final details of the tax reform and the future of oil exploration were being discussed while the market was discounting an increase in the monetary policy rate.⁵³ In the second episode, volatility in the three markets was correlated with the maturity of a bond TES in UVR that temporarily increased market liquidity, a significant outflow of TES held by foreigners, the announcements of restrictive monetary policy (hawkish) by the world’s main central banks as they noted a positive economic performance but still persistent inflation, and the collapse of Signature Bank, Silicon Valley Bank, and the absorption of Credit Suisse by UBS. This led to appreciations in the emerging markets. The third episode stemmed from the uncertainty caused by the change in the Colombian cabinet on April 26 (Graph 2.39).

Despite these episodes of volatility, there has been no increase in the value-at-risk (VaR) of the financial system’s TES holdings, both in proprietary and third-party position (Graph 2.40). In the case of the VaR of the financial system’s proprietary position after the increase registered in August 2022, it has remained at a higher level than that of the third-party position.

There was a significant monthly outflow of TES holdings by foreign investors in the first quarter of 2023 that was led by mutual funds and pension funds. However, the effect on the performance of local public debt was low.

Graph 2.39
Conditional Volatility of Colombia's Fixed Income and Stock Markets



Source: Precia; calculations by Banco de la República.

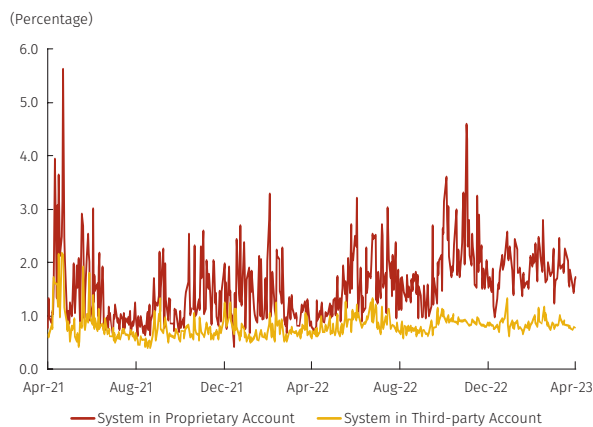
In line with the higher levels of international and local volatility, foreign investors, who are the second largest holder of local public debt after pension funds, had reduced their TES holdings at the end of April 2023 by close to COP 5.5 t with respect to the historical maximum seen at the end of September 2022 (COP 122.9 t). This represented a decrease of 4.5% in its position. The beginning of this period of selling off holdings coincided with a notable increase in the perception of local risk, made evident by the increase in five-year CDS rates and the *emerging markets bonds index* (EMBI). These reached 15-year and 7-year highs respectively in the last quarter of 2022. In this regard, the recent performance of these indicators for Colombia contrasts with what has been seen for other countries in the region, where both fell.⁵⁴

Likewise, these investors’ highest monthly outflows, amounting to COP 4.3 t, were seen in February 2023. This is equivalent

53 The latter materialized with a 100 bp increase on October 28.

54 See the *Financial Markets Report* for the first quarter of 2023 prepared by the Operations and Market Development Department of Banco de la República.

Graph 2.40
Value-at-risk (VaR) of the Public Debt Market



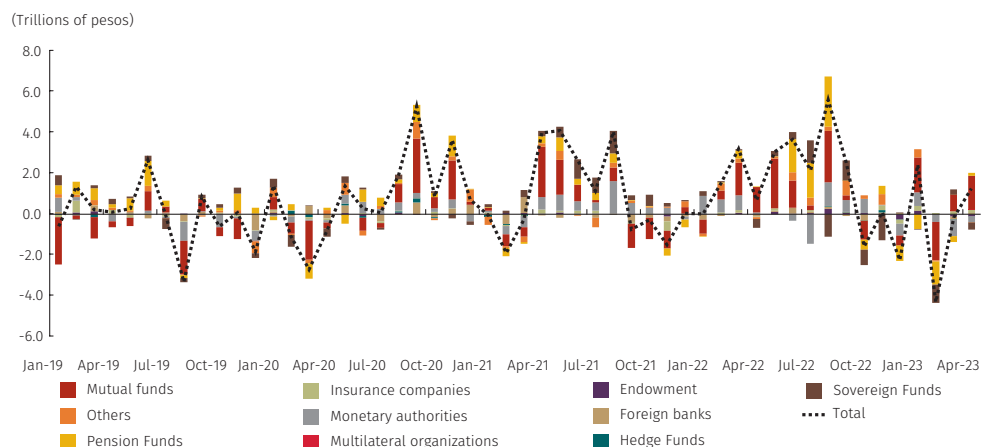
Note: The series are estimated with the GARCH model of conditional volatility.
Source: Precia and Deceval; calculations by Banco de la República.

to a 3.6% reduction in the TES portfolio with respect to January of the same year. These foreign investor outflows coincided with a new period of increases in CDS and EMBI rates and with the maturity of COP 13 trillion in UVR-denominated TES. However, in line with the correction of the aforementioned risk perception indicators, there was a net inflow of COP 1.26 t to the foreigners’ portfolio during April.

Furthermore, by type of foreign investor mutual funds and pension funds account for more than 60% of total foreign TES holdings (42.8% and 23.2%, respectively). Therefore, as shown in Graph 2.41, the changes of these types of investors in the portfolios have a significant impact on the net flow of TES to the foreigners’ portfolios. Between September 2022 and the end of April 2023, pension funds had raised their position by 1.0% while foreign pension funds had reduced it by 10.3%. In terms of monthly flow, mutual funds presented the largest accumulations of COP 1.7 t in April, followed by the insurance companies with COP 0.16 t and the pension funds with COP 0.15 t.

That said, the negative effect of the aforementioned dynamics on the performance of Colombian public debt was offset by

Graph 2.41
Net Flow of TES Holdings (type of foreign investor)



Source: Deceval; calculations by Banco de la República.

a greater appetite for debt assets, both international and local, in line with a greater perception of risk derived from the events that took place in U.S. and European banks between March and April. Likewise, increases in TES purchases by the PFM also favored the valuation of these instruments. Although there was an intraday devaluation of around 6 bp on 21 February 2023 (the day of the month in which the balance of foreigners in TES fell the most) for all the vertices of the curve, by the end of February (seven days later), the curve had risen about 30 bp. At the end of March, when foreign holdings continued to shrink – albeit to a lesser extent (-0.17 t) – and international banking events were triggered, the curve

appreciated by an average of 162 bp. Finally, the curve had appreciated as of the end of April and moved in parallel downward 153 bp on average.

Therefore, although it is relevant to monitor the foreign investors’ balances, there is no sign that the magnitude of their recent outflows and the reduction of their local debt market holdings have had significant repercussions on the performance of this market. Rather, local public debt appreciated more than that of other countries around the region during the first months of the year.

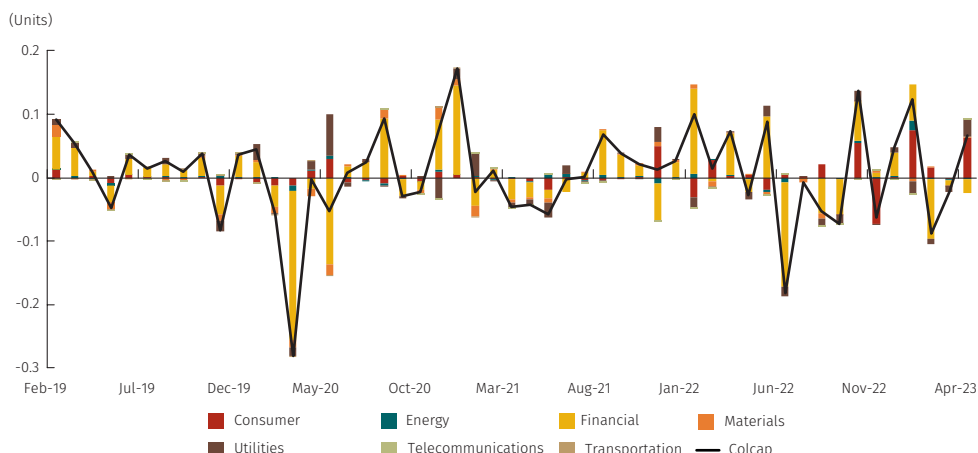
The local stock market underperformed its peers in the region. Financial sector stocks underperformed the local stock market average and completed a year on a downward trajectory.

In terms of the local stock market, Latin America continues to be the region with the lowest performance since the 2020 health crisis. When the MSCI Colcap is compared to the region’s indices, it shows persistent declines since June 2022, and as of March 2023, it was at a level close to the one registered in March 2020 (see *Financial Markets Report*). The financial sector has the largest share in the stock market and, except for the fourth quarter of 2022, has completed a year of declines in its market capitalization (Graph 2.42) which may be associated with the spin-off of subsidiaries and the low liquidity that the market is showing in general. Nevertheless, its performance indicators (see section: Current Situation of the Financial System) are acceptable, and therefore, no vulnerability from the stock market has been identified.

According to market analysts’ expectations, no additional increases in the monetary policy rate are foreseen and the current levels are expected to be held for a few months in line with the objective of facilitating the convergence of inflation and expectations to the Bank’s target.

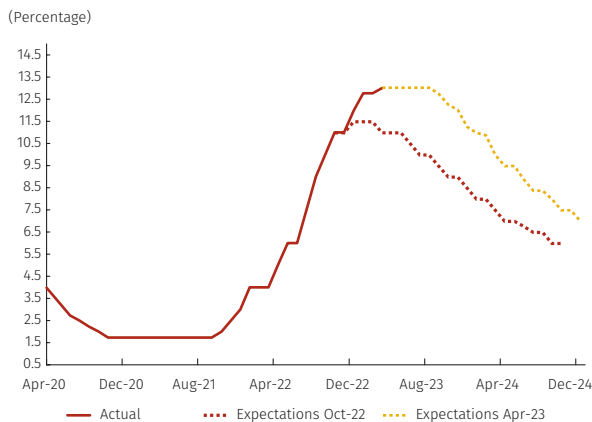
Regarding the trend and expectations of Banrep’s monetary policy rate and given its relationship with the inflation rate and its expectations, when the implied inflation derived from the spread between the April zero-coupon curve of the fixed rate TES and the UVR TES is estimated, it is clear that the market continues to discount one inflation level above the target at close to 7.95% for a one-year period. Likewise, in comparison to what was seen in October 2022, market analysts modified their expectations in April 2023 regarding the speed at which the monetary policy rate

Graph 2.42
Breakdown of MSCI Colcap Growth



Sources: BVC and Precia; calculations by Banco de la República.

Graph 2.43
Expectations for Banrep's Benchmark Rate



Source: Survey of Economic Analysts' Expectations, Banco de la República.

would begin its reduction cycle and now estimate that it will occur in September of this year (Graph 2.43). In line with the performance of *overnight index swap* rates and survey results, the market does not anticipate further increases in the monetary policy rate for the time being.⁵⁵

When an unrealized loss materialization exercise is done by valuing all securities at market prices and devaluing the curve in parallel by 200 bps, a low estimated loss on equity is found for the financial system with the exception of insurance and capitalization companies.

As of 28 April 2023, the main TES holders by type of entity were banks (CI; COP 59.2 t), insurance and capitalization companies (proprietary position; COP 37.5 t), and trust companies in the third-party position (COP 164.9 t, of which COP 107.4 t correspond to the foreign portfolio and COP 10.2 t to pension liabilities). With this information, a devaluation exercise was done based on a 200 bp increase in the yield curve and the losses that each type of entity could suffer as a percentage of its equity were determined (Table 2.2). Specifically, the entire portfolio was valued at market prices, including the securities at maturity, and a 200 bp devaluation was assumed in order to determine the magnitude of the losses that would be likely to materialize through these securities in the event that they had to be liquidated.

The results show that, in the extreme scenario considered, the financial system would incur losses of COP 34.3 t, of which COP 3.8 t would result from the liquidation of non-negotiable securities that would have to be valued at market prices. Although the magnitude of losses from held-to-maturity securities would be small and would represent only 0.4% of the financial system's equity, for insurance and capitalization companies the losses would be equivalent to 22.2% of their equity and when the losses of their entire balance of TES are combined, this percentage would rise to 27.4%. However, due to the operating structure of insurance and capitalization companies, the materialization of unrealized losses is not considered a source of risk for these types of entities since their investments are long-term and their redemptions are primarily a function of claims. For the other CIs, this risk is mitigated by the practice valuing loan portfolios at market prices and the fact that this is reflected in regulatory capital requirements. Finally, considering that the cycle of monetary policy rate increases is coming to an end, no further tightening of financial conditions is expected to exacerbate this source of risk.

⁵⁵ See the *Financial Markets Report* for the first quarter of 2023 prepared by the Operations and Market Development Department of Banco de la República.

Table 2.2
Balances and Losses on TES Write-downs (financial system)

Type of Entity	Nominal balance corrected for sell/buy-backs ^{a/}	Balance of marketable securities (exposed to market risk)	Balance of securities at maturity (not exposed to market risk)	200bp downgrade in the curve		Losses from marketable securities	Losses from non-marketable securities
				Losses from marketable securities	Losses from non-marketable securities		
trillions of pesos						percentage of equity (February 2023)	
Credit Institutions							
Commercial banks	56.38	47.80	8.57	2.01	0.69	1.9%	0.6%
Investment banks	5.12	2.16	2.96	0.31	0.00	2.0%	0.0%
Finance companies	0.91	0.03	0.88	0.03	0.00	1.3%	0.0%
Financial cooperatives	0.01	0.00	0.01	0.00	0.00	0.0%	0.0%
NBFI							
System in Proprietary Position							
Pension Funds	0.17	0.06	0.10	0.02	0.00	0.3%	0.0%
Stock Brokerage Firms	1.26	0.54	0.72	0.06	0.00	4.6%	0.0%
Trust Funds	0.27	0.14	0.13	0.02	0.00	0.7%	0.0%
Insurance and Capitalization Companies	38.26	16.66	21.60	1.02	4.35	5.5%	23.2%
Third-party position							
Pension Funds	124.40	124.40	0.00	13.66	0.00	3.4%	0.0%
Stock Brokerage Firms	2.29	2.27	0.02	0.15	0.00	0.4%	0.0%
Trust Funds ^{b/}	148.59	148.59	0.00	11.96	0.00	2.6%	0.0%
System	377.66	342.67	34.99	29.23	5.03	2.8%	0.5%

a/ In sell/buy-back transactions, the title to the security is transferred, so there is no market risk for the entity that delivers the securities in sell/buy-backs.

b/ Pension liabilities account for 6.8% of the nominal balance.

Source: Trust and Securities Department; calculations by Banco de la República.

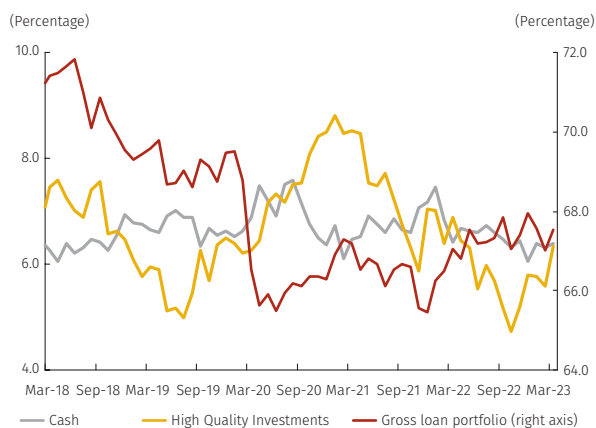
2.4 Liquidity and Trading Book Interest Rate Risk

2.4.1. Liquidity Risk

The appreciation of public debt securities in the first few months of 2023 and the slowdown in the growth of the loan portfolio have allowed CIs to rebuild their loan portfolios in favor of high-quality assets, thus improving their liquidity coverage ratio (LCR). The NSFR, in turn, reflects sufficient levels of structural liquidity, encourages CIs to maintain an appropriate funding structure, and the March 2023 regulatory adjustment⁵⁶ was not associated with increases in term deposit rates.

⁵⁶ As of this date, the weighting of demand deposits with supervised financial entities and with OECIFs went from 25% to 0% within the ASF.

Graph 2.44
Changes in Components of CI Assets (percentage of assets)



Note: portfolio and asset data for March 2023 were obtained via CI preliminary balance sheets and weekly balance sheets.
Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

There were market devaluations of government debt securities and loan portfolio expansion in real terms in the second half of 2022, and this pushed the LCR of CIs to historical lows. During the first three months of the year, there was a slowdown in the loan portfolio and appreciations in the value of investments. This has meant a restructuring of the CIs' assets that favored the system liquidity and, therefore, the strength of the LCR (Graph 2.44). Meanwhile, liquidity requirements remained stable during the period under analysis.

The collapse of Silicon Valley Bank in the United States was due, in part, to a problem of concentration of its demand deposits to wholesalers in the technology sector: an initial wave of withdrawals resulted in the entity having to liquidate some investments at a loss, thus leading to a capital adequacy breach on 10 March 2023. In addition, only 6.2% of the deposits were covered by U.S. deposit insurance. In response, that insurance immediately guaranteed the funds of all depositors of this institution (see Box B.1). The above shows the importance of analyzing and monitoring the diversification of deposits held by financial institutions.

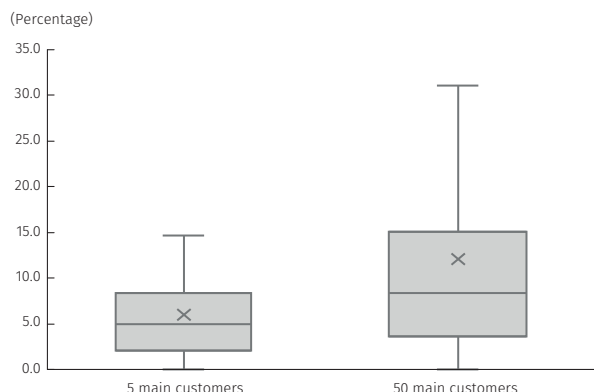
The net stable funding ratio (NSFR), in force in Colombia since April 2020, leads entities to maintain a limited balance sheet in terms of concentrations and maturities. In addition, from an ex-post point of view to an episode of financial stress, financial deposit insurance acts as a protection mechanism for savers, by protecting up to COP 50 m per financial institution per depositor (Fogafin), or up to COP 25 m (Fogacoop)⁵⁷ in the event that an institution goes into liquidation. Using data as of January 2023, the coverage provided for credit institutions by insurance has an average value of 19.4% with a variability between entities associated with their line of business. Regarding the concentration of CIs' deposits from their main clients, this is varied (Graph 2.45). On average, the top five customers account for 6.0% of liabilities while the top fifty demand customers account for 12.1%.

CI term deposits, currently the fastest growing funding item, has been driven by deposits from NBFIs. The preference for these deposits has decreased but remains high to the extent that market rates for deposits have declined since March 2023 after having reached historic highs.

The main boost to the growth of CI funding comes from a higher stock of term deposits (see section: Current situation of the financial system), which reached a 25.9% share in February 2023. This was to the detriment of demand deposits, an item that has completed six months of real contraction. Considering recent events in the United States, this deposit sub-

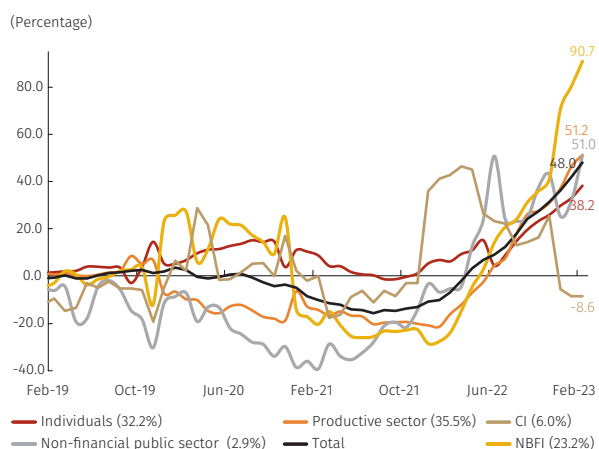
⁵⁷ The deposits covered are: checking account, simple deposits, CDs, savings deposits, special savings accounts, mortgage bonds, special deposits, collection banking services, small deposits, and ordinary deposits. Deposits in CIs other than cooperatives are covered by Fogafin while deposits in cooperatives are covered by Fogacoop.

Graph 2.45
Main Customers' Share of Demand Deposits (percentage of liabilities)



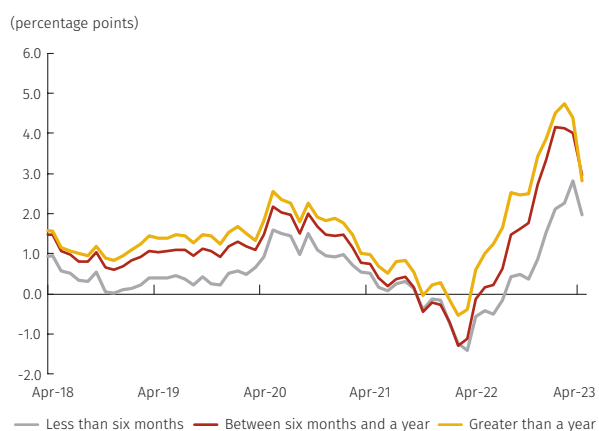
Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

Graph 2.46
Real Growth Rates of Term Deposit Balance (by counterparty)



Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

Graph 2.47
Spread between CD and TES Rates



Sources: Precia and Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

stitution is a positive element that strengthens the funding of financial institutions, reduces the maturity mismatch in their intermediation business, and is in line with the objectives of the NSFR. As of February 2023, NBFIs⁵⁸ are the fastest growing counterparties as the main holders of CDs issued by CIs (Graph 2.46).

The expansion of term funding has been mediated by deposit rates that, for all maturities, have surpassed the policy rate and expectations for it as well as other market rates (see Box 1 of the Financial Markets Report 2023-I). This indicates a high preference and competition from CIs for term deposits. Based on information as of April 28, the reversal seen in the spread between CD issuance rates and nominal TES rates (Graph 2.47) could, if consolidated as a trend, reflect a cooling in the time deposit market in the coming months in line with the real slowdown currently shown by CI assets and the greater recent appetite on the part of CIs and NBFIs for TES securities.

Stress tests show that NSFR incentivizes CIs to maintain an adequate balance sheet structure. In addition, the March 2023 regulatory change did not imply an increase in the spread between CD issuance rates and policy expectations for CIs.

In a liquidity situation such as the one with Silicon Valley Bank (SVB) where there was a concentration in demand deposits from the technology sector, the existence of a structural funding liquidity indicator such as the NSFR prevents such situations to the extent that demand deposits from local and foreign wholesalers have a 90% and 25% weighting, respectively in the available stable funding (ASF). In other words, the indicator penalizes these deposits by only accounting for a fraction. Furthermore, illiquid assets held to maturity imply that a financial institution must fund them with liabilities of similar characteristics, otherwise its NSFR will be reduced.

In order to study the degree of flexibility of the NSFR to perceive a CI in a situation similar to the SVB, two counterfactual stress tests were done. The first one analyzes the NSFR that the CIs would register if wholesaler's demand deposits (local and foreign) were not penalized in the ASF.⁵⁹ The second calculates what the ratio of other assets to liquid assets⁶⁰ would have to

58 In particular, collective investment funds, and deposits of trust companies, and pension funds.

59 That is, if its weighting were 100%. In this regard, a more acidic exercise could be done if the demand deposits of SMEs and medium-sized individuals, counterparties that are similar to those who made withdrawals from the SVB, are also included.

60 Liquid assets correspond to non-cash HOLAs and reserve requirements which have a 5.0% weighting in the RSF while other assets correspond to other assets not included in the above categories that have a 100% weighting. The idea behind this exercise is to see how much a CI could reallocate its investments to those held to maturity without seeing a NSFR default.

be for a CI's indicator to fall to its regulatory minimum level (100% for Group 1 and 90% for Group 2).⁶¹

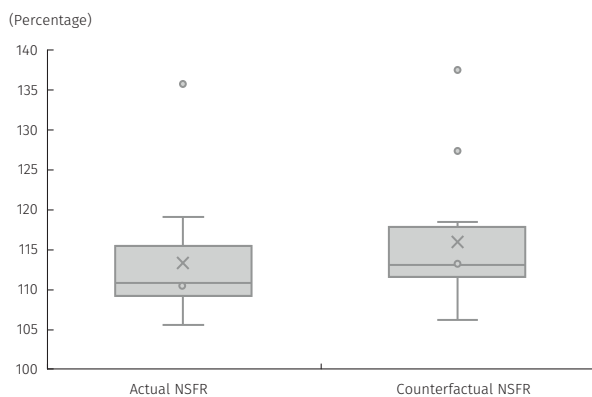
If the stability of wholesale demand deposit sources were not penalized, the NSFR for CIs would be, on average, 3.6 pp higher for Group 1 institutions and 2.1 pp higher for Group 2 institutions (Graph 2.48). As for the second test, Group 1's median ratio would have to go from 61.9% to 169.1% while Group 2's median ratio would go from 271.8% to 1,378.8%⁶² (Graph 2.49). These results show that, although the NSFR gives CIs some leeway in managing their funding and portfolio allocation strategy, risk-taking that is similar to that of the SVB is monitored and constrained by the indicator. Thus, both the current regulatory framework and the relatively simple balance sheet structure of CIs (see section: The current situation of the financial system) means that an increase in the concentration of deposits with a particular sector of the economy that could expose CIs to vulnerabilities in the event of unexpected withdrawals is not expected.

Following the introduction of the NSFR in 2020, the indicator underwent a transition that culminated in March 2023.⁶³ During this period, financial institutions have alluded to term deposits as the mechanism for increasing NSFR and complying with the different transition phases. In order to analyze whether there was a relationship between the NSFR and the term funding strategy during the last regulatory transition period, an exercise was done for Group 1 entities in which their NSFR as seen two months before⁶⁴ was related to the change in the spread between CD issuance rates and overnight indexed swap (OIS) rates⁶⁵ up until the regulatory transition (Graph 2.50).

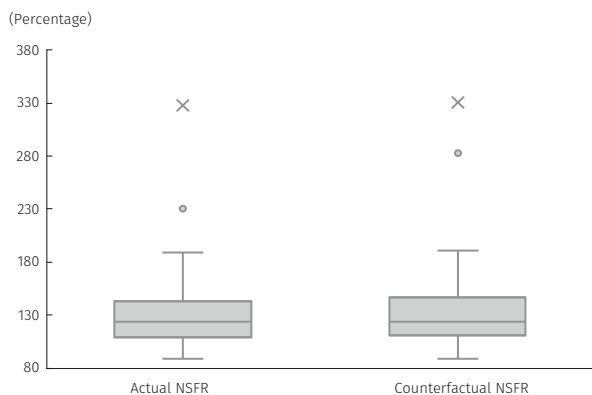
Results show that the entities that were closest to the current regulatory limit (100%) in January 2023 were not the ones whose spread increased the most during the two subsequent months before the new ASF weightings took effect. This suggests a low relationship between being close to the

Graph 2.48
Actual NSFR and with No Penalty for Wholesale Depositors

A. Group 1



B. Group 2

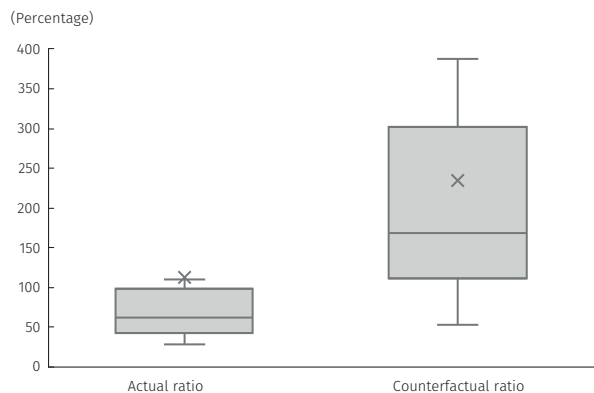


Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

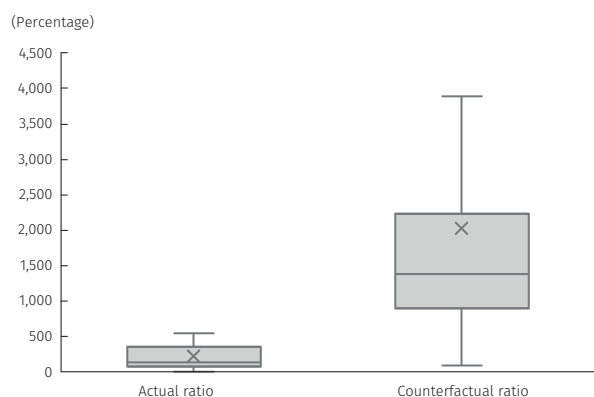
- 61 Group 1 entities are those whose assets represent at least 2.0% of the total CI assets while those in Group 2 are entities for which the portfolio is their most important asset, but whose assets do not reach 2.0%. The cut-off date for both exercises was February 2023.
- 62 Since these are institutions whose regulatory limit is lower (90%), but their observed indicator is, at the same time, higher on average than that of Group 1 entities, a greater recomposition is required to reach a counterfactual indicator of 90%.
- 63 As of this date, the weighting of demand deposits with supervised financial entities and with OECIFs went from 25% to 0% within the ASF.
- 64 The last regulatory transition phase took place in March 2023. Therefore, the NSFR seen in January 2023 (two months earlier) is analyzed with the change in the rate spread between January 2023 and March 2023 (when the new regulation went into effect).
- 65 This is an interest rate swap where the variable rate is determined by the capitalization of an overnight rate, instead of the price of a forward rate. Thus, it gathers the monetary policy rate expectations of economic agents at certain maturities.

Graph 2.49
Ratio of Other Assets to Liquid Assets (actual and counterfactual)

A. Group 1

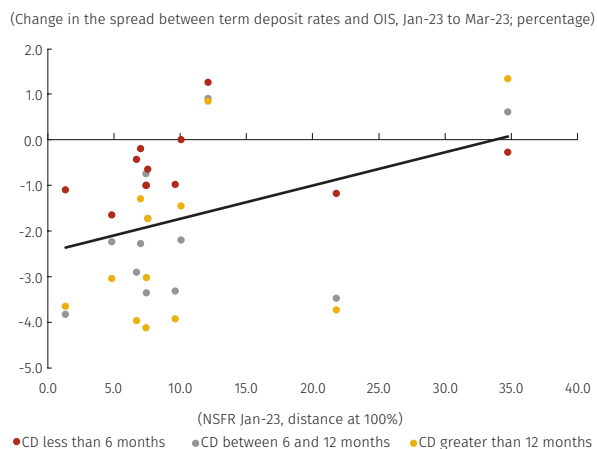


B. Group 2



Note: x represents the mean of the distribution.
Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

Graph 2.50
CDT-OIS Spread Rates vs. NSFR (group 1)



Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

regulatory limit and adopting a funding strategy to increase participation in the term deposit market in order to improve their structural liquidity.⁶⁶

2.4.2. Interest rate risk in the banking book

In this section, we analyze the structure of interest rates on the CIs balance sheet and present a measure of the exposure to the interest rate risk in the banking book (RTILB in Spanish).⁶⁷ The measurement of this risk seeks to estimate how changes in the interest rates for assets and liabilities affect the entities' net income from interest and capital.⁶⁸ Quantifying RTILB is of utmost importance because its materialization can have a significant effect on a bank's liquidity and capital. Since banks usually have a maturity mismatch due to their intermediation activity (they lend long term and fund short term), the increase in interest rates may negatively affect net interest income if banks do not adjust their balance sheet to the interest rate cycle. This situation was observed during the failure of Silicon Valley Bank and Signature Bank in the United States in early March 2023 given that these entities did not adjust their balance sheets to the upward cycle of the Fed policy rates, and this led to a devaluation of long-term investments. The devaluation had to materialize when investments were sold to comply with the withdrawals of some of its main depositors.⁶⁹

CIs registered a reduction in their exposure to RTILB between September 2022 and March 2023 that was mainly due to a smaller maturity mismatch.

To measure the exposure to RTILB, the *weighted average term to maturity (WATM) gap* was calculated. This is defined as the difference between assets and liabilities that are sensitive to changes in interest rates for different periods. This measurement of interest rate risk depends primarily on two factors: the proportion of assets and liabilities contracted at variable rates and the maturity of assets and liabilities.

- 66 CIs term funding strategy has also been influenced by cyclical factors associated with the tight global financial conditions.
- 67 The interest rate risk has two dimensions: the first is analyzed in the section on market risk and refers to the risk of devaluations of the assets in the treasury ledger in the event of interest rate movements; the second, which is analyzed in this section, corresponds to the risk of interest rate changes to the entities' net income from interest based on the information in the trading book.
- 68 RTILB refers to the current or prospective risk to an entity's capital and earnings arising from adverse movements in interest rates that affect the trading book positions. When interest rates change, the present value and timing of future cash flows may be affected. This, in turn, impacts the underlying value of the entity's assets, liabilities, and off-balance sheet items and, therefore, the economic value of the equity (EVE). Changes in interest rates also affect an entity's earnings by altering income and expenses that are sensitive to interest rates and that impact its net interest margin (NIM).
- 69 See the Macro Environment section and Box 3: "Financial System Stress in the U.S. Banking System and a Stress Test of Credit Institution Capital Adequacy in Colombia."

Meanwhile, the size of the gap, in turn, is determined by the variable-rate-tied component on both sides of the balance sheet that captures the effect of changes in benchmark rates on the CI balance sheet.⁷⁰ The *WATM gap* tends to be negative because bank assets, due to the nature of their intermediation (lending and deposit-taking) have a longer duration relative to their liabilities. Under a negative *WATM gap*, an increase in lending and deposit rates of the same magnitude could generate a reduction in the net interest income. Likewise, the *WATM gap* tends to be more negative (*i.e.*, bank exposure to interest rate risk increases) to the extent that the breakdown of assets (*i.e.* portfolio) is kept constant, the banks increase their liabilities (*i.e.* deposits) indexed to variable rates compared to the share indexed at fixed rates. In contrast, the *WATM gap* is reduced when there is a higher indexation of the asset side while the breakdown of the liability side is kept constant.

As was mentioned in the Financial Stability Report for the second half of 2022, the FSC announced the new regulation on RTILB that incorporates the explicit measurement of this risk and its quantification in terms of the impact on the economic value of equity (EVE) and the net interest margin (NIM) in November of that year. The current regulation, which will be in force in December 2024, incorporates aspects such as optionality, off-balance sheet transactions, and various interest rate shock scenarios that affect the RTILB.⁷¹ CIs estimate the RTILB in order to quantify potential losses associated with interest rate fluctuations and manage this risk.⁷² In our case, the *WATM gap* is used as a proxy for the RTILB measurement. This indicator focuses on gap risk and does not include optionality or basis risk both of which require a greater breakdown of information, and which are included in current regulations.

The Graph 2.49 presents the *WATM gap* for one, three, and ten years following the actual duration of the assets and liabilities of the CIs. This measure remains at negative levels for all time horizons in line with the balance sheet interest rate structure and the longer duration of assets compared to liabilities. Notably the *WATM gap* narrowed between September 2022 and April 2023 for all time horizons

70 The indicator is defined as: $WATM\ Gap_{t,T} = \sum RSA_i \left(\frac{T-D}{T} \right) - \sum PSR_j \left(\frac{T-D}{T} \right)$ where *RSA* corresponds to assets *i* subject to interest rate risk and *PSR* are liabilities *j* subject to interest rate risk. *D* is the duration of both the asset *i* and the liability *j* and *T* is the period over which the indicator is evaluated (six months to ten years). In the calculation of the indicator, assets and liabilities at variable rates are weighted at 100% while those at fixed rates are weighted based on the duration of each period. For more detail on the calculation of the *WATM gap*, see the box “Interest Rate Risk of the Colombian Credit Institution Trading Book” in the September 2015 Financial Stability Report. The *WATM gap* assumes a greater transmission of the policy rate to the BBI and DTF benchmark rates and a partial transmission to UVR and the CPI. The transmission is based on the calculation of the short-term elasticities between each interest rate and the IBR (taken as a proxy for the monetary policy rate). For more details, see section 4.2 of the *Financial Stability Report* for the first half of 2021.

71 The regulations were announced through External Circular 25/2022 issued by the FSC and the following dates were established: individual testing: August 2024; consolidated testing: June 2025; individual reporting: December 2024; consolidated reporting: December 2025. The methodology incorporates six interest rate shock scenarios to capture parallel and non-parallel gap risks for the EVE and two interest rate scenarios for the NIM that models parallel shocks based on the methodology proposed in Basel II. The new regulation incorporates a greater breakdown of the CI balance sheet information by including off-balance sheet transactions, core and non-core liabilities, exposure based on currency, and optionality. The latter is important when measuring RTILB since CIs may enter into interest rate swaps to reduce their exposure to changes in long-term interest rates. See BIS (2019). “Interest Rate Risk in the Banking Book, Supervisory Review Process, SPR31,” Basel Committee on Banking Supervision, Basel.

72 In 2019 Asobancaria surveyed CIs on the management of risk associated with interest rate fluctuations (*i. e.*: RTILB) and found that 47.4% see it as an option to avoid losses through constant risk monitoring, 31.6% stated that managing it allows them to adopt strategic relative value positions, 15.5% recognize it as a way to adopt tactical positions for short and medium-term value generation, and 5.3% as a risk neutralization measure; see: Asobancaria (2019). “Integrated Risk Management System: a step towards international best practices,” Asobancaria.

and stood at levels similar to those seen in March 2022. The largest reduction occurred in the ten-year horizon when the level dropped 11% below the level observed in September 2022. As explained below, the reduction of the WATM gap in CIs is partly due to the decrease in the duration of assets versus the lengthening of liabilities which reduced the maturity mismatch for CIs.

There was a gradual increase in the proportion of assets tied to fixed rates compared to those tied to variable rates along with a relative stability in the breakdown of liabilities between September 2022 and April 2023.

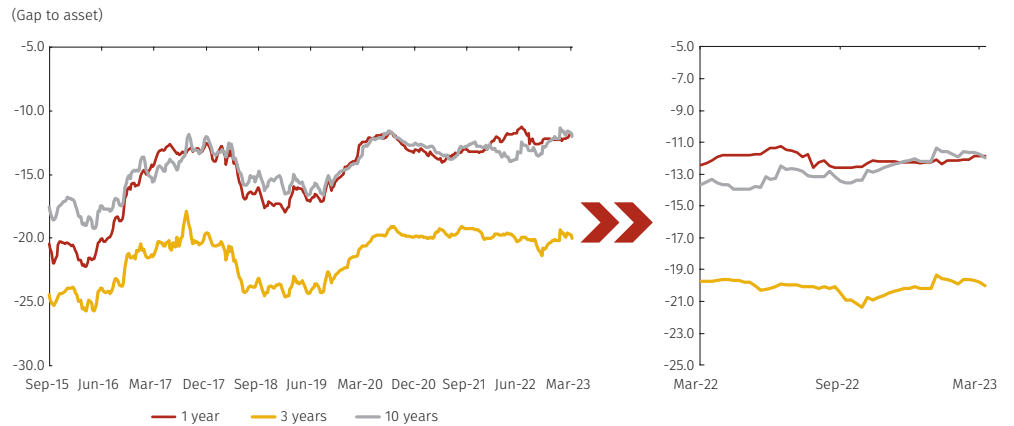
The share of assets at variable rates gradually decreased between September 2022 and April 2023 compared to the share of assets at fixed rates, deepening the trend registered since June 2022. The share of liabilities tied to variable rates and those tied to fixed rates, in turn, show levels that are relatively similar to those seen six months ago (Graph 2.50). In a scenario of rising interest rates, a lower exposure of assets to variable rates reduces profitability and, therefore, the WATM gap becomes more negative. However, given that the majority of liabilities are indexed to fixed rates (45.0%) compared to the component tied to variable rates (42.0%), the effect of interest rate increases on funding costs is lower. This last factor explains, in part, the decrease seen in the *WATM gap* in the last few months. This trend may be due to a demand factor given that, in a scenario of rising interest rates, depositors prefer to get loans at fixed rates. As shown below, the decrease in average asset duration may be supporting this hypothesis.

The analysis of the structure and composition of balance sheet items agreed at variable rate shows that the positions indexed to reference rates are more relevant than those associated with inflation on both sides of the balance sheet, but especially on the asset side. In April 2023, 77.2% of the asset positions were indexed to benchmark rates (BBI: 53.6%, and DTF: 23.5%) while 13.8% depended on inflation (CPI and UVR). On the liabilities side, 47.6% was tied to the benchmark rates and 36.2% to inflation (Graph 2.51). The CIs lowered the exposure of their assets to DTF and gradually raised their share in instruments indexed to the BBI between September 2022 and April 2023. As for liabilities, the participation in instruments indexed to the BBI was raised while the share of those tied to the DTF and CPI was lowered. Exposure to foreign interest rates shrank on both sides of the balance sheet and continues to remain low (panel A vs. panel B). The increase in CI exposure to BBI on both sides of the balance sheet suggests a greater reaction of their balance sheet to the performance of the monetary policy rates.

The average duration of liabilities went from 0.93 years in September 2022 to 1.16 years in April 2023, suggesting a lengthening of 0.23 years. This is consistent with the higher participation of deposits in term instruments (see section 2.1.1). The average duration of assets, in turn, declined 0.27 years as it went from 3.21 years to 2.94 years during the same period (Graph 2.52). The lengthening in liability duration and reduction in asset duration for CIs suggests a smaller maturity mismatch and explains the reduction seen in the *WATM gap* which also implies a lower exposure to interest rate risk in the trading book.

To summarize, CIs registered a reduction in the *WATM gap* during the last half of the year that suggests an exposure to RTILB and is mainly attributable to a smaller maturity mismatch. The analysis indicates that CIs have adjusted the duration and makeup of their balance sheet in line with the MPR cycle to reduce exposure to RTILB. Although the regulation on liquidity risk (LRI and NSFR) reduces liquidity risk in the short term by maintaining a level of liquid assets that is higher than net requirements, it is necessary for CIs to continue monitoring the RTILB given the

Graph 2.51
WATM gap by Maturities^{a/}



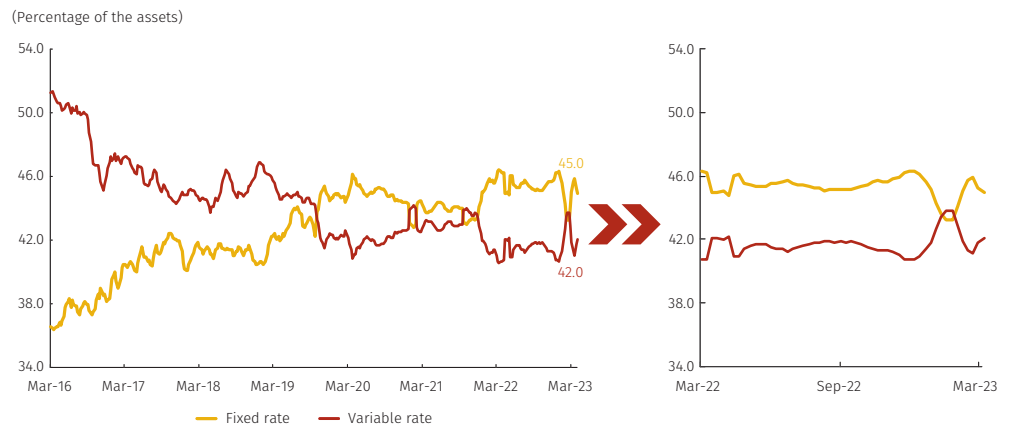
a/ Corresponds to the total value for the CI5 4-week moving average.
Source: Office of the Financial Superintendent of Colombia; calculations by *Banco de la República*.

Graph 2.52
Evolution of the composition of assets and liabilities by type interest rate^{a/, b/}

A. Assets



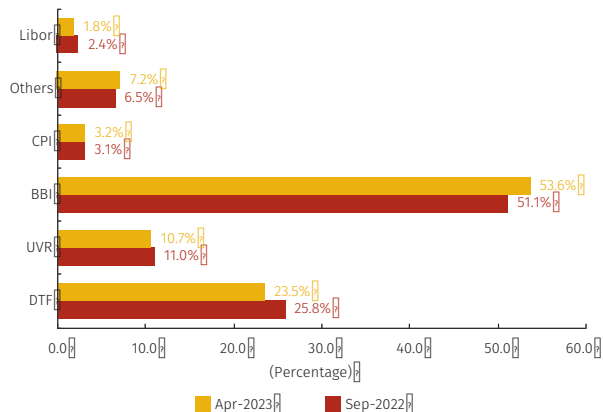
B. Liabilities



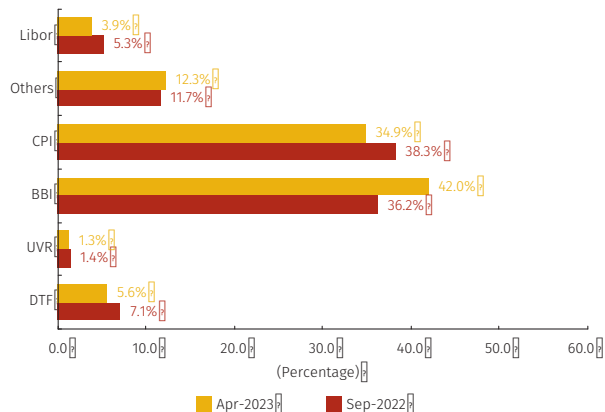
a/ The balances of liabilities at fixed rates and at variable rates are presented as a proportion of the total assets.
b/ The balance of liabilities at a fixed rate incorporates demand deposits of individuals while the demand deposits of legal entities and government entities are included in the liabilities contracted at variable rates.
Source: Office of the Financial Superintendent of Colombia; calculations by *Banco de la República*.

Graph 2.53
Composition of balance agreed at variable rate by type of rate

A. Assets

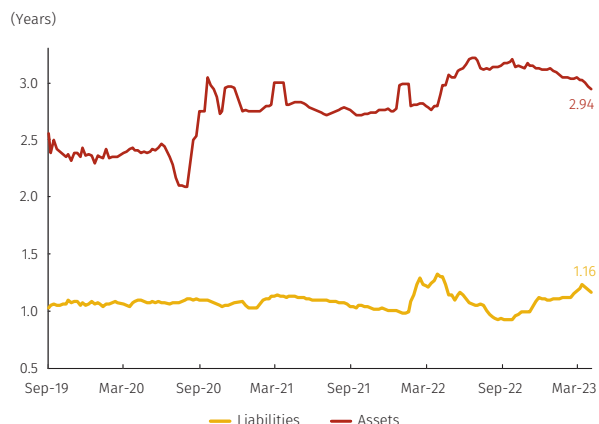


B. Liabilities



Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

Graph 2.54
Average Duration of CI Assets and Liabilities^{a/}



a/ Corresponds to the total value for the CIs 4-week moving average.
Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

scenario of tighter financial conditions and economic slow-down in the macroeconomic scenario. The FSC’s new RTILB regulation that will be implemented in 2024 incorporates interest rate shocks along the yield curve together with optionality and quantifies RTILB in terms of principal and net interest margin. This will allow a more accurate and prospective measurement of this risk.

3. Stress Tests

Considering the vulnerabilities identified throughout the Report, this chapter presents three exercises that measure the ability of the financial system to face extreme, adverse, and low probability scenarios while continuing to provide its core functions over a short- and medium-term horizon.

This chapter presents three exercises to assess the resilience of the financial system in the event of a hypothetical materialization of relevant sources of risk is evaluated in line with the analysis of vulnerabilities presented in previous chapters. The first exercise, which is known in international literature as a stress test, is intended to measure the ability of credit institutions (CI) to deal with a hypothetical, adverse, and improbable scenario by using a model that considers both capital adequacy and liquidity risks together.

The second and third exercises, in turn, focus on the financial system's ability to meet its liquidity obligations in the short term under a stress scenario. On the one hand, the effect that an extreme withdrawal of major depositors from CIs could have on their liquidity is estimated. On the other, the level of massive daily withdrawals that would have an impact on compliance with the liquidity requirements of the OECIFs is quantified.

3.1 Capital and Liquidity Stress Test of CIs

This section describes the scenario and the results of the stress test on the CIs that *Banco de la República* carries out every six months. It seeks to measure their resilience to a hypothetical, adverse, and unlikely scenario. The aggregate results show that CIs have enough capital to absorb the potential losses arising from the extreme scenarios considered. Nevertheless, the results by entity are heterogeneous.

The stress test evaluates the impact that a hypothetical, adverse scenario of a contracting Colombian economy might have on CIs. This exercise seeks to reflect an extreme situation of global economic contraction that could be associated with a greater than expected impact of higher interest rates and increased geopolitical tensions that could negatively affect the demand for commodities. It also considers a scenario of tightening local financial conditions due to a higher perception of country risk.

The combination of these elements could lead to a sharp fall in local terms of trade, foreigners' sales in the local public debt market, and a sharp depreciation of the Colombian peso against the U.S. dollar. In addition, the deterioration in the quality of the loan portfolio granted to debtors in the corporate sector and households that are vulnerable to the risks associated with the scenario in question is also considered.

The results suggest that higher loan-loss provisions and a decrease in net interest income could be the main sources of the decline in CI aggregate profitability in the adverse scenario under consideration. The above would be likely to generate negative effects on aggregate common equity tier 1 and 2 ratios, but they would remain at levels above the regulatory limits during the entire horizon of the exercise. Although the impact on the individual institutions is heterogeneous, the above

implies that the system currently has enough capital to absorb the potential losses in the adverse scenario.

Furthermore, based on these results and considering the exchange rate shock of the adverse scenario described above, the consolidated resilience of those entities that have positions in Central America is evaluated with respect to various scenarios of asset devaluation for their subsidiaries in that region. The exercise suggests that, in the wake of this additional shock, the institutions remain resilient in their consolidated capital adequacy.

These tests do not constitute any prediction regarding the future development of the economy or the financial system since the scenarios considered reflect a hypothetical, adverse situation. Therefore, the results should be interpreted as quantitative evaluation of the resilience of the CIs in the event of adverse scenarios based on their current financial conditions and under restrictive assumptions. Likewise, the tests do not consider possible policy reactions to the deterioration in the entities' financial statements nor preventive actions to follow up on their risk management.

The usefulness of the tests lies in providing an estimate of the potential losses that would be seen if the adverse scenario were to materialize. Furthermore, it helps shed light on the possible transmission channels by means of which the vulnerabilities identified could affect financial stability.⁷³

3.1.1 Macroeconomic Scenario and Materializing Risks

The adverse scenario trajectories assume a contraction of the economy in a pessimistic context of global economic performance and tightening financial conditions.

The stress test is intended to capture the effects of an adverse and hypothetical macroeconomic context⁷⁴ that reflects shocks to local terms of trade and aggregate demand that could be caused by a sharp slowdown in the world economy given a greater impact of high interest rates and an increase in geopolitical tensions. Furthermore, the scenario includes shocks to the risk premium that could result in restrictive financial conditions for the local economy and thus reflects a situation of high uncertainty for the Colombian economy.

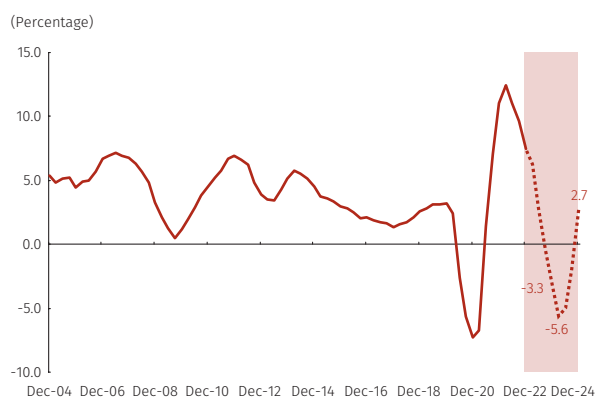
The combination of these elements is likely to generate an economic slowdown that could result in an annual contraction of output up to the third quarter of 2024⁷⁵ (Graph 3.1, the shaded area corresponds to the analysis horizon of the exercise). This would lead to an increase in unemployment. Besides, given the tight financial conditions and inflationary pressures on account of a sharp depreciation of the Colombian peso, the monetary policy rate would remain at high levels over

73 The technical details of the model used in this test which include a description of the performance of the entities in a hypothetical scenario and the channels through which their financial health could be affected are presented in the series *Borradores de Economía* No. 1028: "SYSMO I: A Systemic Stress Model for the Colombian Financial System," *Banco de la República*.

74 A semi-structural model that follows a New-Keynesian approach with rational expectations for a small, open, oil-exporting economy and corresponds to one of Banrep's core forecasting models was used to construct the macroeconomic context paths.

75 This scenario was constructed using the distribution of future GDP growth based on the GDP-at-risk methodology. The 1st percentile, in particular, of the distribution of future GDP growth was taken. For more detail on this methodology see Box 1 of the *Financial Stability Report* for the first half of 2018.

Graph 3.1
Real Annual Growth of the GDP in the Hypothetical Adverse Scenario



Source: DANE (up to December 2022); calculations by Banco de la República (March 2023 to December 2024).

the stress horizon. In line with the above and reflecting an adverse scenario of high uncertainty, it is assumed that interest rates on loans and deposits are likely to increase at a faster rate than the monetary policy rate.⁷⁶

From the point of view of financial intermediation, this scenario could cause an increase in loan portfolio defaults and value losses of public debt portfolios.

A hypothetical scenario of economic shrinking could imply the appearance of credit and market risk for the CIs during the first stage. Their endogenous response to such scenario could, at a second stage, unleash the materialization of additional risks that would depend on the financial statements of each entity (financing, liquidity, interest rate, and contagion risks).

Concerning credit risk, two elements are incorporated. First, the natural consequence of a macroeconomic deterioration would be to lower the ability of economic agents to make their payments and thus increase the default rates. Second, the adverse scenario is assumed to trigger a two-level rating downgrade⁷⁷ of vulnerable debtors in the commercial, housing, and consumer loan portfolios.

In the corporate sector, the restrictive financial conditions and the fall in output in the adverse scenario could generate the deterioration of companies that have a low stressed interest coverage indicator, which is calculated by using the stress test on the balance sheets of the companies presented in section 2.2.1 of this Report.⁷⁸ In addition, the fall in the price of crude oil and its effect on the income of mining sector companies⁷⁹ would probably generate a deterioration in the quality of the loan portfolio. At the same time, funding difficulties and depreciation would probably cause a deterioration in the credit rating of a number of companies exposed to exchange rate risk.⁸⁰ Finally, the drop in sales due to lower

⁷⁶ Details of the interest rate models used are presented in Box 4 of the *Financial Stability Report* for the second half of 2021.

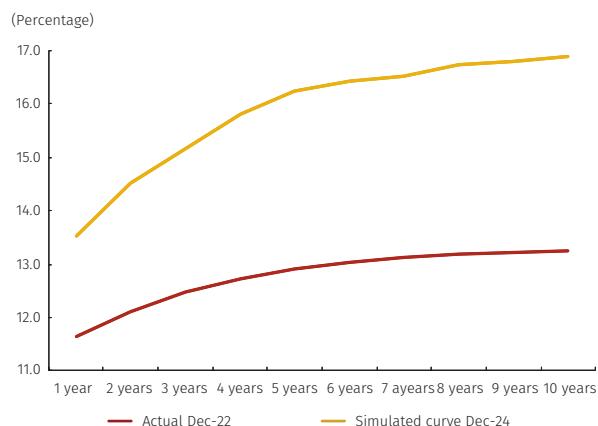
⁷⁷ In Colombia, loans granted by the institutions supervised by the FSC are rated on a scale ranging from A to E, where A is the best rating.

⁷⁸ The stressed interest coverage indicator (ICI) is calculated as the ratio of operating income to interest expenses where the numerator follows the trajectory for output growth in the adverse scenario, and the denominator follows the interest rate trajectories. Companies with a stressed ICI of less than 1 represented 1.6% of the commercial loan portfolio as of December 2022.

⁷⁹ Companies in the mining sector represent 0.6% of the commercial loan portfolio as of December 2022.

⁸⁰ The companies exposed to exchange rate risk are the ones that show a negative exchange rate mismatch (liabilities in foreign currency greater than assets in foreign currency) and, taking three indicators into account, are classified as vulnerable: 1) the value of the currency mismatches to total assets, 2) trade balance to operating income and 3) share of foreign capital in the total capital of the company. Each one of these indicators is classified from 1 to 3 based on specific thresholds for each with 1 being

Graph 3.2
Peso-denominated TES Curve in the Hypothetical Adverse Scenario



Sources: DCV and Precia; calculations by Banco de la República.

economic growth and high costs of supplies will probably affect the profits of the residential and non-residential construction sector, and this could lead to difficulties in meeting their credit obligations.^{81, 82} With respect to households, taking into account the historically high levels of indebtedness (see section 2.2.2 of this *Report*), it is assumed that debtors with a highly stressed financial burden will stop repaying their loans.⁸³

Concerning market risk, two elements are considered. First, the macroeconomic variables and the interest rates in the stress scenario will lead to shifts in the TES zero-coupon curve and the private fixed-income curve. Moreover, since the literature traditionally considers foreign investors to be more susceptible to liquidating their positions in the event of a deterioration in the country's economic conditions or in the international financial conditions,⁸⁴ a gradual and permanent liquidation of 50% of their holdings in the local public debt market⁸⁵ (COP 59.1 t as of December 2022) is assumed. This would probably cause a direct impact on the prices of securities. The combination of these factors will probably result in an almost parallel shift of the curve with a greater impact on the ten-year securities (360 bp, Graph 3.2).

the highest risk level. Finally, the risk levels for each indicator are averaged. If the average for a company is less than or equal to 2.5 and the exchange rate mismatch is less than or equal to -20.0% of the total assets, the company is considered to be vulnerable. For companies without public accounting information, those with the largest gross mismatch that have accumulated 90% of the total mismatch for this group are taken. As of December 2021 (most recent accounting information available), 1,099 companies that are vulnerable to foreign exchange risk and which represented 8.0% of the commercial loan portfolio as of December 2022 were identified. For more detail on the calculation of exchange rate mismatch see Box 3 of the *Financial Stability Report* for second half of 2022.

- 81 In particular, small, and medium-sized residential and non-residential construction companies that represent 1.0% of the commercial loan portfolio as of December 2022, are considered vulnerable.
- 82 Overall, the exercise assumes a drop of two rating levels for 11.0% of the commercial loan portfolio. The displacement assumptions do not consider possible second round effects that may be observed between sectors.
- 83 The stressed financial burden analysis was done in conjunction with the FSC. In the case of those debtors with a stressed financial burden of more than 30%, displacements are considered. These account for 1.7% of the consumer loan portfolio and 4.6% of the housing portfolio as of December 2022.
- 84 See Ebeke, M. C.; Kyobe, M. A. (2015). "Global Financial Spillovers to Emerging Market Sovereign Bond Markets". International Monetary Fund; y D. Park, K. Taniguchi y G. Tian (2018). "Foreign and Domestic Investment in Global Bond Markets". ADBI Working Paper 535.
- 85 The 50% of net sales by foreign investors corresponds to the average annual foreign outflows of local public debt from different emerging countries and is close to the maximum annual outflow Colombia has experienced (56% in February 2009). Arslanalp, S.; Tsuda, T. (2019). "Sovereign Debt Investor Base for Advanced Economies" [Database], Washington, D. C.: International Monetary Fund, Monetary and Capital Markets Department.

3.1.2 Results

In the adverse scenario considered for the aggregate of the CIs, there could be a negative profitability, a shrinking of the loan portfolio, and a fall in total and core capital adequacy ratios although the latter are likely to remain above the regulatory minimums.

The results of the stress test of the CIs' aggregate trajectories are given in Graphs 3.3 to 3.7. Based on the adverse scenario described above, two possible scenarios are analyzed in order to assess the magnitude of the credit risk shock: 1) scenario 1 considers only the deterioration associated with the macroeconomic scenario (dotted red line), and 2) scenario 2 considers not only the macroeconomic deterioration but also the idiosyncratic effect of vulnerable debtors on the commercial, consumer, and housing loan portfolios, (dotted grey line).

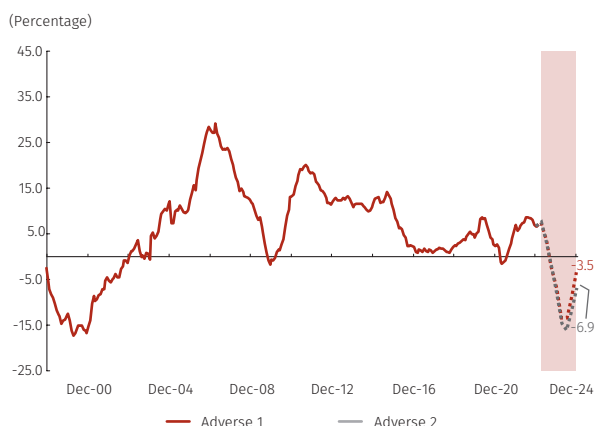
In line with the output, the real annual growth of the loan portfolio would show significant contractions with a slight correction at the end of the period. This performance is likely to deepen in scenario 2 due to the higher volume of losses which would limit the capacity of CIs to disburse loans (Graph 3.3).

In scenario 1, the deterioration of the loan portfolio is comparable to what was seen during the pandemic shock while, in scenario 2, the QIR will probably reach levels close to what was registered during the period after the financial crisis at the end of the century (Graph 3.4). Given the severity of the macroeconomic shocks considered and the initial level of the return on assets (ROA) this indicator is likely to reach negative values in the second quarter of the simulation. In scenario 1, a minimum of -2.3% will probably be registered while, in scenario 2, a level of -2.9% is likely to be seen (Graph 3.5).

In line with the high materialization of credit risk, the items in both scenarios that contributed the most to the drop in the profitability indicator are loan-loss provision costs and the reduction in net income from interest (Graph 3.6). The additional default by vulnerable debtors in scenario 2 could accentuate the above effects due to a less productive portfolio. Moreover, the second-round effects associated with the risk of intermediary contagion⁸⁶ would probably be more pronounced.

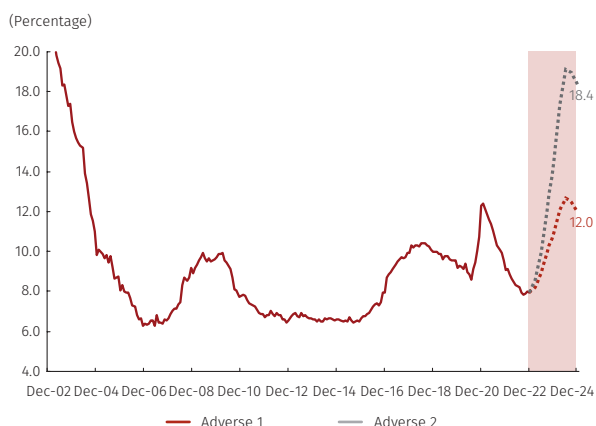
The accumulated losses for the year are likely to cause reductions in the aggregate capital adequacy indicators with a greater impact on the most severe scenario in terms of credit risk (Graphs 3.7). Nevertheless, the aggregate capital adequacy ratios will probably stand at levels above the regulatory lim-

Graph 3.3
Real Annual Growth of the Loan Portfolio



Source: Office of the Financial Superintendent of Colombia (up to December 2022); calculations by Banco de la República (March 2022 to December 2024).

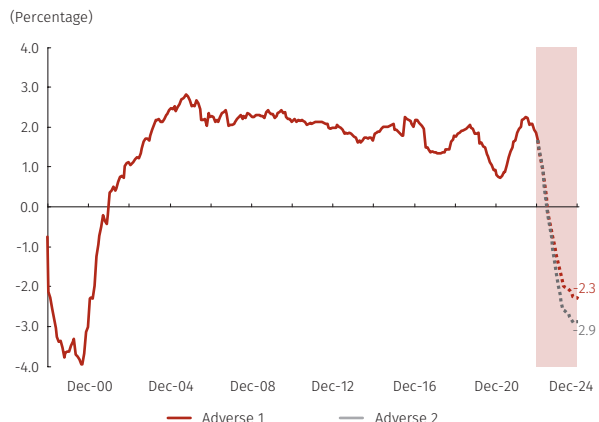
Graph 3.4
Quality indicator by Risk (QIR)



Source: Office of the Financial Superintendent of Colombia (up to December 2022); calculations by Banco de la República (March 2022 to December 2024).

⁸⁶ The contagion component of the exercise includes two elements. The first corresponds to direct contagion and is determined by direct exposures between CIs. The second element corresponds to indirect contagion, which involves the losses due to devaluation that generate the abrupt sale of assets by institutions that are close to the regulatory capital adequacy limits.

Graph 3.5
Return on Assets (ROA)



Source: Office of the Financial Superintendent of Colombia (up to December 2022); calculations by Banco de la República (March 2022 to December 2024).

its⁸⁷ although, in the most adverse scenario, total capital adequacy will probably fall to levels close to 11%.⁸⁸

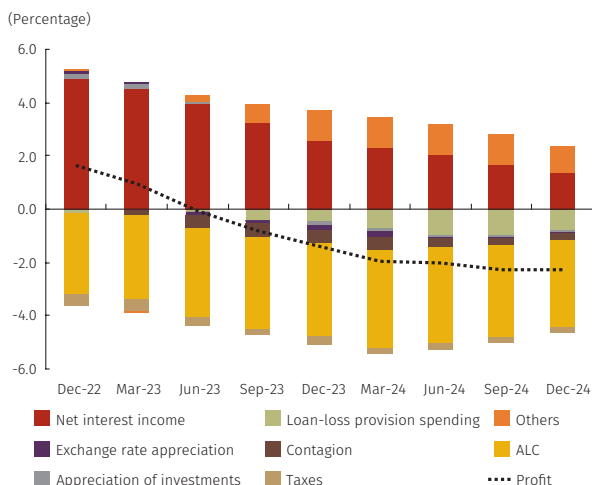
Finally, although the aggregate indicators of CIs will probably remain above the minimum regulatory requirements, the results per entity are uneven. At the individual level, it may be difficult for some of them to meet these levels in the scenario under consideration. With respect to total capital adequacy, in scenario 1, the group of entities that are likely to have a level of less than 9.0% accounted for almost 33% of the total loan portfolio as of December 2022 (Graph 3.8, panel A) and, in

87 The regulatory limits for total and core capital adequacy are 9.0% and 4.5% respectively.

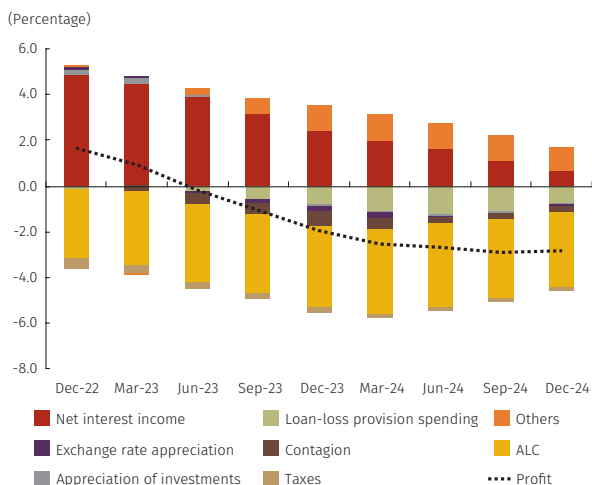
88 Threshold considered as a prudential limit in this stress exercise.

Graph 3.6
ROA Breakdown

A. Adverse 1



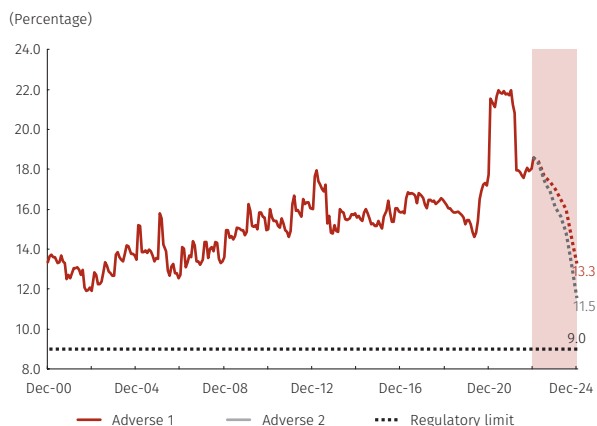
B. Adverse 2



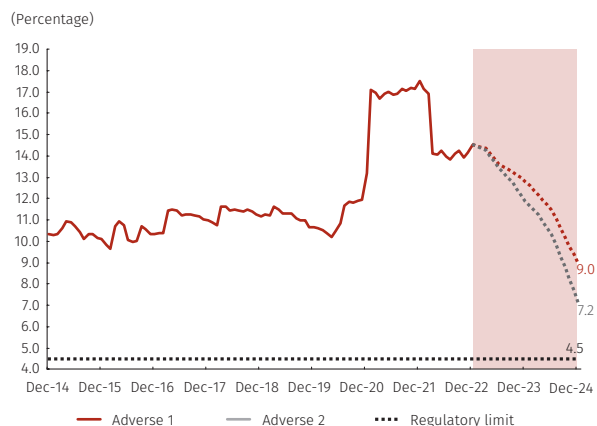
Source: Office of the Financial Superintendent of Colombia (up to December 2022); calculations by Banco de la República (March 2022 to December 2024).

Graph 3.7
Aggregate Capital Adequacy Ratio at the Individual Level

A. Total capital adequacy



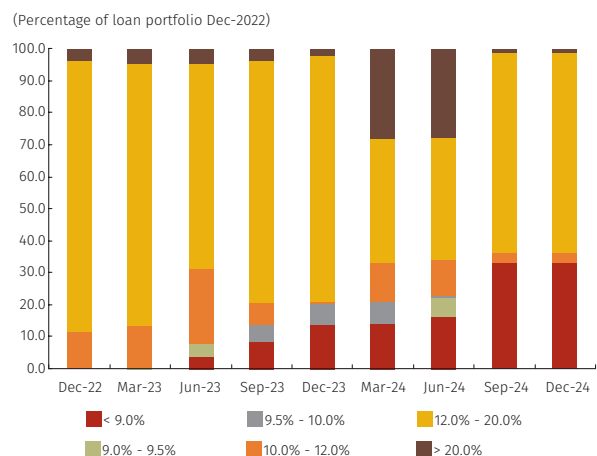
B. Core capital adequacy



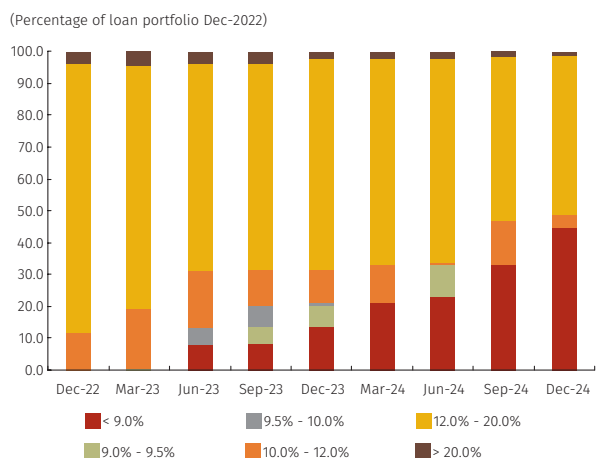
Source: Office of the Financial Superintendent of Colombia (up to December 2022); calculations by Banco de la República (March 2022 to December 2024).

Graph 3.8
Distribution of Individual Capital Adequacy by Share of Loan Portfolio

A. Adverse 1

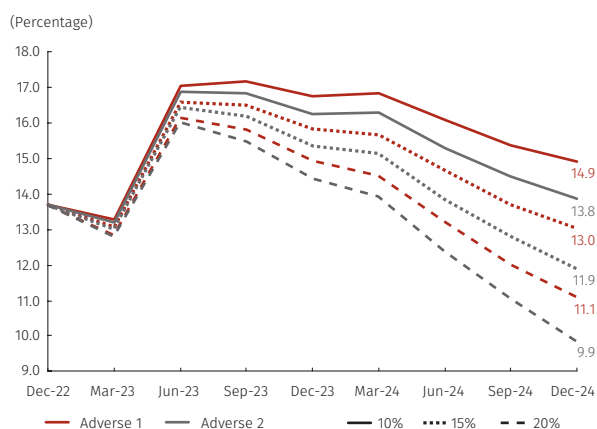


B. Adverse 2



Source: Office of the Financial Superintendent of Colombia (up to December 2022); calculations by Banco de la República (March 2022 to December 2024).

Graph 3.9
Total Consolidated Capital Adequacy Ratio



Source: calculations by Banco de la República (March 2023 to December 2024).

the most stressed scenario, this percentage could rise to 44% (Graph 3.8, panel B). In both scenarios, systemically important entities are resilient to the aforementioned shocks.

Last of all, in order to keep the entire financial system solvent and in compliance with the capital buffers required⁸⁹ in these extreme scenarios, a capital injection of COP 22.0 t could be required in scenario 1 and COP 27.9 t in scenario 2 for eight simulated quarters.

3.1.3 Stress test of investments in Central American subsidiaries

The Colombian financial system has experienced a significant expansion in the last decade in terms of the participation of the main financial conglomerates abroad. Specifically, in Central America, the assets of subsidiaries in this region accounted for 20.9%⁹⁰ of the aggregate consolidated assets as of December 2022. This shows the importance of evaluating the resilience of the CIs to devaluations of these investments in adverse scenarios.

Considering the above, an additional stress test was done for CIs that have subsidiaries in Central America and monthly report consolidated financial statements. For this exercise, the results presented in section 3.1.2 are used as a starting point. Two specific shocks are considered: 1) devaluations between 10% and 20% of the dollar-denominated assets of the CIs' subsidiaries in Central America; and 2) the depreciation of the Colombian peso considered in the adverse scenario, which has a positive effect on peso-denominated assets. The exercise assumes that the materialization of the first shock occur gradually from the first quarter of the simulation horizon.

Graph 3.9 depicts the total consolidated aggregate capital adequacy in the face of an exchange rate shock and different magnitudes of devaluation. In both scenarios, the entities are resilient to any of the exercises considered. The results also show that, for low magnitude devaluations, the positive effect of depreciation could enhance the aggregate consolidated capital adequacy. In the event of major devaluation shocks, reductions in the capital adequacy ratio would be observed to levels close to 10%.

89 The regulatory limits for total and core capital adequacy are 9.0% and 4.5% respectively, and the limit on the net worth loss is 50%. The limits for additional core capital adequacy in 2023 and 2024 are modified to 5.625% and 6.0% in that order.

90 This share is calculated as the sum of the foreign banking assets of the banking subsidiaries of Colombian banks over the total consolidated assets. In this calculation, the operations between the subsidiaries and the parent company are not included in the numerator. The distribution of this participation by country is as follows: Panama 12.01%; El Salvador 3.77%; Guatemala 2.35%; Costa Rica 1.71%; Honduras 0.79%, and Puerto Rico 0.23%.

3.1.4 Final Comments

The results of the exercise suggest that the majority of the CIs will probably be able to keep their individual and consolidated capital adequacy indicators above the minimum regulatory requirement in spite of the severity of the adverse scenarios considered. This reflects the resilience of the institutions in the short term to an extremely adverse macroeconomic scenario like the one described above.

As has been discussed, the stress test presented in this section is built on the basis of a set of assumptions that, by incorporating various shocks that occur simultaneously, reflect an adverse situation for the Colombian economy. It is assumed that neither the economic authorities nor the entities take any additional action in response to the deterioration of the CIs' financial situation. Furthermore, the assumption is that the entities' shareholders are excessively passive to the degree that they only capitalize the profits without taking any other kind of strategic initiative to face the financial stress⁹¹. If, however, any one of these assumptions is eliminated, the size of the losses to the system would be expected to be cushioned so that the impact of the adverse scenario would presumably be smaller.

3.2 LRI Stress Tests of Hypothetical Withdrawals from Demand Deposits

LRI stress tests of hypothetical withdrawals from demand deposits suggest that at the aggregate level, the indicator is likely to be above the regulatory minimum. At the individual level, short-term liquidity vulnerabilities will likely be registered for some CIs.

In order to assess the resilience of CIs the actual LRI of each CI as of 28 April 2023 is taken and their new levels are determined under two hypothetical stress scenarios while considering the concentration in their demand depositors (Graph 2.45): 1) withdrawal of the five largest customers' demand deposits, and 2) withdrawal of the fifty largest customers' demand deposits.⁹²

CIs are divided between those that registered an actual LRI above 400%⁹³ and those with an LRI below 400% as of 28 April 2023 due to the fact that most non-bank CIs register high levels of liquidity because of their business structure. In the first scenario, two CIs in the lower group that held 2.1% of total assets would fail to meet the regulatory minimum while, in the second scenario, the number would rise to eight and would account a 17.4% share (Graph 3.10). In a hypothetical scenario of extreme preference for liquidity, these results indicate that some CIs would not be likely to have sufficient high-quality assets.

In spite of the fact that the LRI, by construction, poses a stress scenario for demand deposits by making CIs assume a heavy withdrawal of these deposits within the NLR calculation, these results show the importance of monitoring the per-

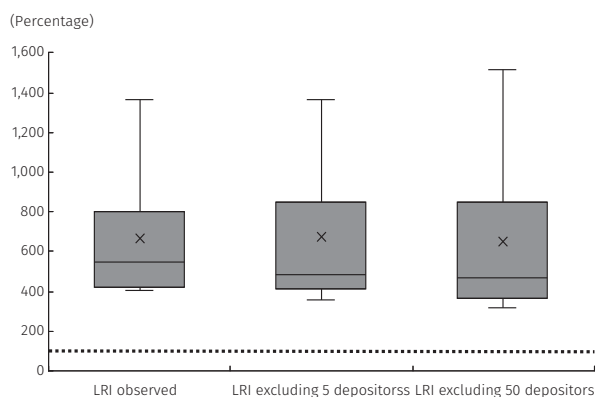
91 Specifically, the shareholders do not inject outside capital into the business operations, they do not seek synergies or mergers between the entities, nor manage them in order to increase the efficiency of their operations.

92 This is based on the behavior of each depositor in terms of the variation of their balance sheets during the last two years. Thus, the shock per depositor is assumed to be a withdrawal in a proportion equivalent to the 5th percentile of the distribution of withdrawals during this period. This means that the depositors withdraw 64.0% of their balance in the first year and 68.6% in the second year.

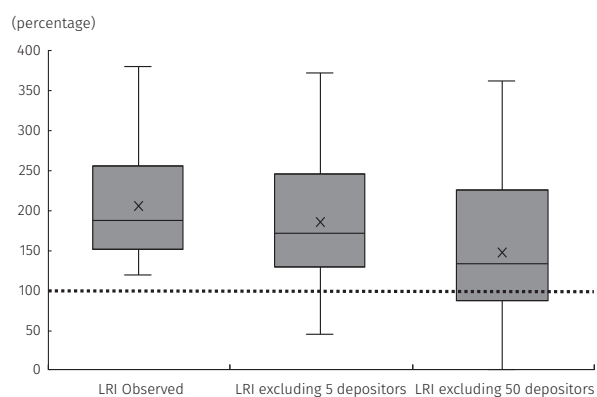
93 Some CIs have a different business structure, so their LRI is substantially high. This category includes most of the non-bank CIs.

Graph 3.10
LRI Stress Test (withdrawal of demand deposits)

A. Entities with an actual LRI greater than 400%



B. Entities with an actual LRI lower than 400%



Note: the dotted line represents the regulatory minimum (100%). The "x" represents the mean of the distribution.

Source: Office of the Financial Superintendent of Colombia; calculations by the authors.

formance of the main counterparties of CIs, especially during transitory episodes of financial stress that are accompanied by the high uncertainty that economic agents are experiencing.

3.3 Stress Test for Open-end Collective Investment Funds

During the last six months, OECIFs lowered their liquidity indicator and therefore, their capacity to face extreme scenarios of massive daily withdrawals decreased. This reduction in the liquidity indicator is associated with a decrease in cash, an increase in investments in term deposits and a recent increase in redemptions.

The nature of the OECIFs that makes them susceptible to withdrawals by their investors together with their recent behavior, which is characterized by a reduction in liquidity as a result of a decrease in cash, an increase in investments in term deposits, and a recent increase in redemptions⁹⁴ makes it relevant to simulate hypothetical and extreme scenarios of redemptions that they could face. A reverse stress test that seeks to quantify the level of daily withdrawals that could cause funds representing 20% of total assets to fail to comply with the regulatory liquidity limit is presented in this section. This analysis provides a prospective view of the resilience of these funds to different levels of withdrawals without considering possible mitigation measures or second round effects.

Based on information with respect to the cash level of each of the funds,⁹⁵ different daily withdrawal shocks that ranged between 1.0% and 60% of the cash available were simulated in order to calculate the LRI⁹⁶ that the OECIFs would probably present in each scenario. The exercise assumes that funds meet withdrawals with only their demand deposits and thus reduce their high-quality liquid assets (HQLA).

For each level of withdrawal, those funds that would be likely to register a delinquency⁹⁷ on their liquidity indicator were identified, and their share of total assets was calculated. The results of the stress test are presented in Graph 3.11. Each color represents the share of total assets of the OECIFs that could not meet the liquidity requirement and thus higher values

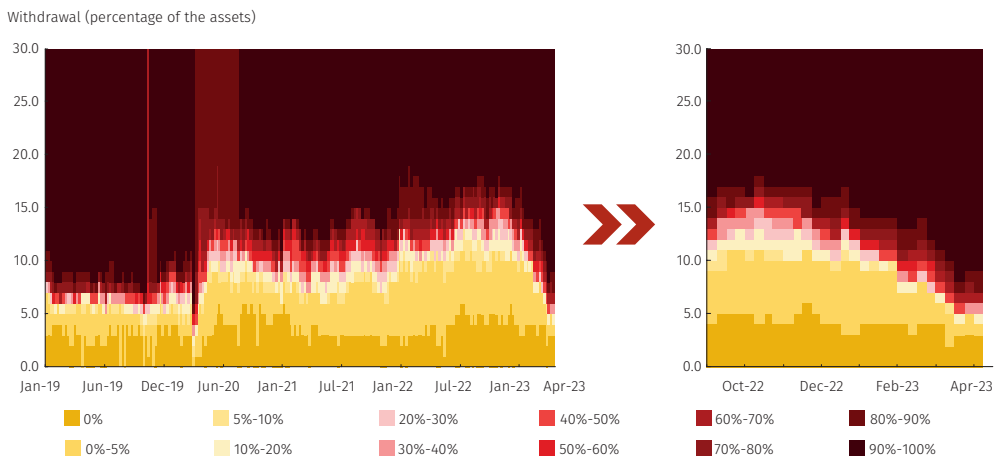
94 See section 2.1.3 of this Report.

95 The information on cash is obtained from Office of the Financial Superintendent of Colombia's form 519.

96 The calculation of the liquidity risk indicator (LRI) corresponds to the ratio between the high-quality assets (HQLA) and the maximum liquidity requirement that results from multiplying the net value of the CIF by the maximum probable net withdrawal.

97 A default corresponds to an LRI value of less than 100% which is the regulatory limit according to the Office of the Financial Superintendent of Colombia.

Graph 3.11
Results of the Stress Test of Open-ended Collective Investment Funds



Note: The shades in the graph correspond to the share in total assets of the OECIFs that do not meet with the LRI regulatory limit in the event of different withdrawal shocks (vertical axis). Thus, the darker red indicates that the non-complying funds represent between 90% and 100% of total assets.

Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

(dark red shades) correspond to a greater impact of the level of withdrawals on their liquidity.

The results show that a daily withdrawal shock of 4.0%⁹⁸ as a percentage of assets (16.0% as a percentage of cash) would be required as of April 2023 so that funds representing 20.0% (yellow shading) of total assets would be in noncompliance with the LRI. This contrasts with the exercise in the previous Report, where a value of 10.0% as a percentage of assets was required to obtain a similar effect. Among the funds that could be likely to fail to comply with the liquidity requirement, one variable income fund, one monetary fund, and ten balanced funds⁹⁹ managed by two SBFs and six TCs might be found.

This analysis suggests that the liquidity of funds has declined as a result of a restructuring of the portfolio and an increase in withdrawals in spite of the fact that, at the aggregate level, it is well above their minimum regulatory requirement. Although the level of withdrawals necessary to generate an LRI default effect is highly unlikely, going forward, greater liquidity in the funds is desirable.

98 This value is within the 1st percentile of the distribution of net contributions (contributions minus withdrawals) over assets.

99 As of April 2023, money market funds represented 48.7%, balanced funds 50.9%, and variable income funds 0.4% of the total assets of OECIFs. Since money market instruments offer immediate liquidity, they must comply with more than one liquidity indicator and, therefore, have a greater ability to face massive withdrawals.

Box 1: A Measurement of the Level of Negative Foreign Exchange Mismatches of Real Sector Companies in Colombia in 2022

Álvaro David Carmona Duarte
Adrián Martínez Osorio
Jorge Niño Cuervo

1. Introduction

During 2022, Colombian companies that resorted to international financing sources faced interest rate increases and a sharp depreciation of the peso against the dollar (21%).¹ This may have important implications for the balance sheets of real sector companies with a negative exchange rate mismatch² since this raises the foreign vulnerability of the economy through its effects on investment, growth, liquidity, and solvency.³

In order to typify this phenomenon and have a general overview of the private and public real sector companies that show it, this box describes the recent results⁴ of this phenomenon. The second stage of this exercise quantified the impact that the negative exchange rate mismatch could have on companies' balance sheets and on the risk they could transmit to the financial sector. For this stage, it is necessary to have the information from the 2022 financial statements. However, at the time this box was prepared that information was not available. That is why an update of the exercise will be presented in the next *Financial Stability Report*.

This box consists of three parts: the first is this introduction; the second describes the results with the analysis divided between private sector companies (section 2.1) and public sector companies (section 2.2), and the third corresponds to the conclusion. The main results of this overview show a growth in the negative exchange rate mismatch for real private sector companies driven mainly by higher long-term debt and it's mostly held by companies operating in the transportation, warehousing, and communications; manufacturing; commerce, and services sectors. With respect to public sector firms, there was a reduction in their negative mismatch in 2022 with respect to 2021 which was due, in particular, to the establishment of financial investments abroad by these companies in the hydrocarbon sector.

2. Results of negative exchange rate mismatches

2.1. Real private sector companies in Colombia.

The results of private companies in the real Colombian sector with negative mismatches are described below. This analysis does not include companies in the financial sector, neither depository (banks) nor non-depository (other financial companies). It also excludes some

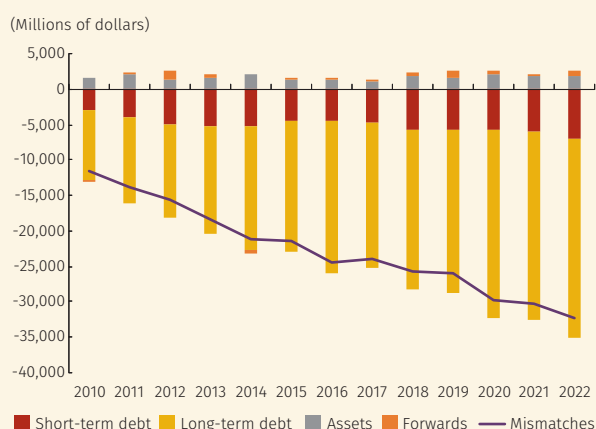
1 Market exchange rate (MER) at the end of 2022 versus the one at the end of 2021.

2 A company has a negative exchange mismatch when their liabilities in foreign currency are greater than their assets in foreign currency.

3 Box 1 of the Financial Stability Report for the first half of 2021 (Carmona, Osorio, and Niño, 2022) provides a brief overview of the literature on the subject.

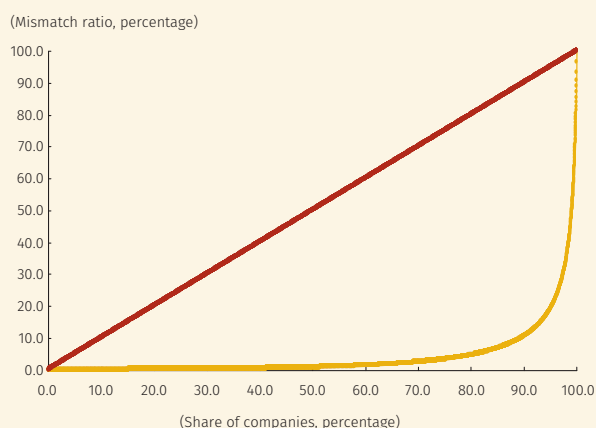
4 Box 1 of the Financial Stability Report for the first half of 2021 (Carmona, Osorio, and Niño, 2022) details the sources of information and the calculation methodology.

Graph B1.1
Recent Developments and General Overview of Negative Exchange Rate Mismatches



Source: Banco de la República, DANE, DIAN, MHCP; calculations by Banco de la República.

Graph B1.2
Real Private Sector Companies Negative Exchange Rate Mismatch Lorenz Curve



Source: Banco de la República, DANE, DIAN, MHCP; calculations by Banco de la República.

companies that have financial leasing liabilities because they are secured by a real asset (capital asset) of the same value. The inclusion of the latter could bias the analysis of the effects of the exchange rate risk.

In the last twelve years, the negative currency exchange mismatch measured in dollars has shown a rising trend (a greater negative mismatch). This value is expressed in nominal terms and without scaling to some measurement of company size. This growing negative mismatch is mainly the result of the growth in economic activity, which means that companies require more working capital and have greater financing needs to make productive investments. Given the above together with the greater ability of Colombian companies to get access to international financial markets, the foreign currency debt they have incurred has been rising but their foreign currency assets have not been increasing to the same extent in the same currency.⁵

In 2022, 8,491 Colombian companies were estimated to have had USD 32,436 billion (b) in negative foreign exchange mismatches. This figure rose USD 2,037 b with respect to 2021 when 8,243 companies accumulated a negative mismatch of USD 30,399 b (Graph B1.1). Around 90% of the value of the negative mismatch is accounted for by 10% of the companies (Graph B1.2), which suggests a high degree of concentration in recent years.

Based on the components, this annual upswing in the negative mismatch is mainly the result of the increase in long-term debt (USD 1,369 b) and the short-term debt (USD 1,013 b) that was partially offset by the rise in foreign currency financial assets⁶ (USD 184 m) and the higher net forward position⁷ (USD 162 m) (Graph B1.1).

The foreign currency debt that is part of the negative mismatch these companies have can be classified into three groups based on the type of lender. Fifty-seven percent of this debt corresponds to what has been contracted between companies with a direct investment link.⁸ In terms of risk, this debt implies a lower level of vulnerability since there is greater flexibility in the financial conditions. Secondly, there is the debt with foreign financial institutions (non-resident banks) that totals 37%. Last of all, 6.0% of this balance has Colombian banks as counterparties.

When the negative mismatch is distributed by economic sector, transportation, warehousing, and communications with 22.6% of the total are in first place. This sector includes port and airport operating companies as well as mobile telecommunications companies. The second largest sector is commerce, hotels and restaurants with 14.1%. In this sector, the main companies are large supermarkets and marketers of imported products. The manufacturing industry sector is in third place with 14.0%, and here the producers of supplies for the construction industry and food and beverages are the most noteworthy. With 13.6% of the total, the services sector, where the main compa-

5 Foreign currency assets do not necessarily grow at the same rate as foreign currency debt to the extent that such flows are destined to the local economy for investment, working capital, or other uses.

6 Loan assets, bonds, and deposits.

7 Purchase minus sale.

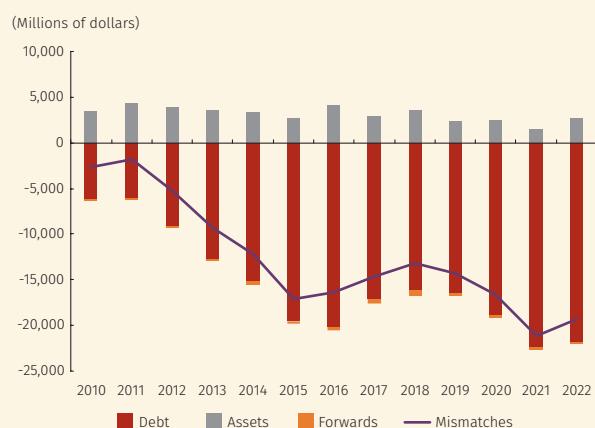
8 The lender is the parent company or subsidiary of the debtor company.

Table B1.1
Negative Exchange Rate Mismatch
by Economic Sector

Economic Sector	Negative mismatch (millions of dollars)	Negative mismatch share (percentage)	Percentage of companies with FDI (percentage)
Transportation, Warehousing, and Communications	7,333	22.6	3.9
Commerce, hotels, and restaurants	4,571	14.1	3.6
Manufacturing Industry	4,555	14.0	7.9
Community, social and personal services	4,417	13.6	1.2
Remaining sectors	11,560	35.6	8.4

Source: Banco de la República, DANE, DIAN, MHCP; calculations by Banco de la República.

Graph B1.3
Negative Mismatch for Public Sector Companies



Source: Banco de la República, DANE, DIAN, MHCP; calculations by Banco de la República.

nies are engaged in business services, is in fourth place. Companies operating in the listed sectors accounted for 64% the total value of the negative exchange rate mismatch in 2022 (Table B1.1).

Companies in the transportation, warehousing, and communications sector have very little export and import activity since this is a mostly non-tradable activity, and this makes the risk associated with their mismatch level higher since they do not have possible natural hedges. In spite of the above, these companies have a high degree of power and a high market share in their respective markets. This allows them to pass the higher costs associated with a depreciation of the peso on to their consumers. Furthermore, due to their link to international trade, transportation companies have a high percentage of their revenue denominated in dollars. This counteracts the effect of an exchange rate depreciation. As for the remainder, companies in the other sectors have a high participation in export and import markets (manufacturing industry and commerce).

2.2. Public sector Colombian companies

The negative mismatch of public sector companies, which total sixteen corporations, amounted to USD 19,343 billion in 2022, 96% of which is concentrated in three conglomerates that belong to the mining-energy and electricity, gas, and water supply sectors. The companies that account for the mismatch are actively involved in the export of goods, and therefore have natural hedges. In general, these companies have significant direct investments abroad, particularly in Central and South America, and have a high market share in their respective markets. This allows them to pass the higher costs associated with a depreciation of the peso on to their customers.

With respect to 2021, the reduction in the mismatch was 8.3% (USD 1,760 b) and was mainly due to foreign financial investments made by these companies in the hydrocarbon sector.

Regarding the description of foreign currency debt, the maturity for which it is mainly contracted is greater than one year (99%). Of these instruments, 61% correspond to bonds issued in international markets, 32% to foreign commercial banks, and the remaining 7.0% correspond to obligations with bilateral and multilateral banks. In terms of foreign exchange earnings, net exports of public sector companies account for about half of the amount of their negative foreign exchange mismatch.

3. Conclusion

The main results of this overview show a growth in the negative exchange rate mismatch of real private sector companies that is driven mainly by higher long-term debt and mostly held by companies operating in the transportation, warehousing, and communications; manufacturing; commerce; and services sectors. Regarding public sector companies, there was a reduction in their negative mismatch in 2022 with respect to 2021 that was primarily due to these companies setting up financial investments abroad in the hydrocarbon sector.

In order to analyze the economic implications of the nominal increase in the negative mismatch in depth, it is necessary to calculate indicators that show these levels relative to the size of

the companies and their foreign trade imbalances relative to their income also. This is the objective of the second stage of this exercise which will be published in a box in the *Financial Stability Report* for the second half of 2023.

References

Carmona-Duarte, A.; Martínez-Osorio, A.; Niño-Cuervo, J. (2022). "Box 1: Negative exchange rate mismatch of the real sector in Colombia in 2021," first half-year Financial Stability Report.

Box 2: Indicator of Cybernetic Risk

Mariana Escobar Villarraga
María Fernanda Meneses
Eduardo Yanquen*

The increasing digitization of financial services has increased the system's exposure to cyber-attacks. This could compromise the security of the information, its operability and, therefore, its stability. The materialization of a cyber-risk event that affects the payment system could disrupt the flow of transactions, and this would affect confidence in the system and might trigger events that are even more serious for the stability of the financial system such as bank runs. Although the occurrence of these risks has currently been limited, the continuous monitoring and measurement of the entities' exposure represents both a challenge and a necessity for both international and local competent authorities.

This box presents the methodology for calculating the cyber risk indicator (CRI), which is one of the indicators monitored by *Banco de la República* to measure this risk and analyze its results for the entities that make up the Colombian financial system with information as of 15 March 2023. In the next *Financial Stability Reports*, this indicator will be included in the risk analysis for the Credit Institutions (CI). The box is divided into four sections: the first presents the perspectives and occurrence of some recent cyber risk events and their international and local monitoring; the second describes the CRI and the methodology for its calculation; the third presents the data and its analysis; and the fourth corresponds to the conclusions.

1. International and local cyber risk monitoring

The materialization of cyber risk events has shown the importance of this issue.¹ Recent attacks on central banks such as the hacking of the Central Bank of Denmark's website in January of this year (Reuters, 2023) and the attack on more than thirty government entities in Costa Rica including the Ministry of Finance in April 2022 led the latter country to take measures and declare a state of emergency. In this context, the Committee on Payments and Infrastructure Markets (CPIM) and the International Organization of Securities Commissions (Iosco) (Central Banking, 2023) recently warned about vulnerabilities in key global financial infrastructures. This is in addition to reports published by the Financial Stability Board (FSB), the International Monetary Fund (IMF), and the Bank for International Settlements (BIS).

Because of the above, cyber risk has gained importance as a systemic risk in the analysis of the financial system. At the international level, the Systemic Risk Barometer survey, which was developed and implemented by the Depository Trust and Clearing Corporation (DTCC, 2023) and collects information from U.S. and foreign entities, ranked cyber risk as the third most important since it was chosen by 47.0% of the respondents as very relevant for 2023.² Likewise, the Systemic Risk Survey done by the Bank of England in the first half of 2023 placed cyber risk second in importance only to geopolitical risk when it was cited by 75.0% of respondents as the one that, if it materialized, would be among the most damaging to the UK financial system and by 9.7% as their main concern (Bank of England, 2023). Fur-

* The authors are members of the Financial Stability Department (DEFI). We would like to thank the Information Security Department of *Banco de la República* and Daniela Vargas, intern at the DEFI, for their support in the preparation of this box.

1 For the financial system, the main risks related to cybersecurity include ransomware, malware, attacks on web platforms, and phishing, etc.

2 The first risk chosen by respondents as "very relevant" was geopolitical along with trade tensions while the second was inflation.

thermore, there are other indicators such as the global cybersecurity index (GCI) published by the United Nations International Telecommunication Union (2023), which presents, by member country, the strengths and opportunities for improvement in the monitoring of cyber risk. In the GCI ranking, Colombia ranked 81 out of 183 in the most recent report with data as of 2020.³

In contrast, at the local level, the results of the Survey of Perception of Financial System Risks, developed by *Banco de la República* (2023), show an increase in the number of entities that consider cyber risk to be one of the five risks which would have the greatest impact on the financial system if they occurred.⁴ However, its share remains low (2.8% in the December 2022 version). Furthermore, the compromise of the information systems of a health company at the end of last year set off alarms in the country.

The Office of the Financial Superintendent of Colombia (FSC) issued two documents, External Circular 007/2018 and External Circular 033/2020 which provide instructions on the minimum requirements for cybersecurity risk management and guidelines for reporting metrics and incidents related to information security and cybersecurity, respectively. In addition, the FSC published the Box “Measuring maturity in operational risk management in banking entities,” in which it analyzes the level of maturity of the entities with respect to the adoption of policies to combat cyber risk in January 2023. Furthermore, the Banking Association of Colombia (Asobancaria) has a Security Incident Response Team (CSIRT, 2023) that is responsible for fostering collaboration among its members and the exchange of information to effectively deal with cyber threats in addition to providing periodic refresher courses.

2. Scoring Methodology

The CRI is calculated with information provided and collected by the company Security Scorecard.⁵ Data from ten factors that represent different dimensions of cyber risk is used for its construction. These are aggregated by a weighted average where the weight of each factor is determined by Security Scorecard using machine learning techniques and is categorically illustrated as high, medium, and low (Diagram B2.1). The CRI has a scale of zero to one hundred where a score of one hundred indicates that no cybersecurity issues were detected at the time of the measurement, and a score of zero indicates that multiple issues have been detected that could compromise the security of the assessed entity.

3. Analysis of the score

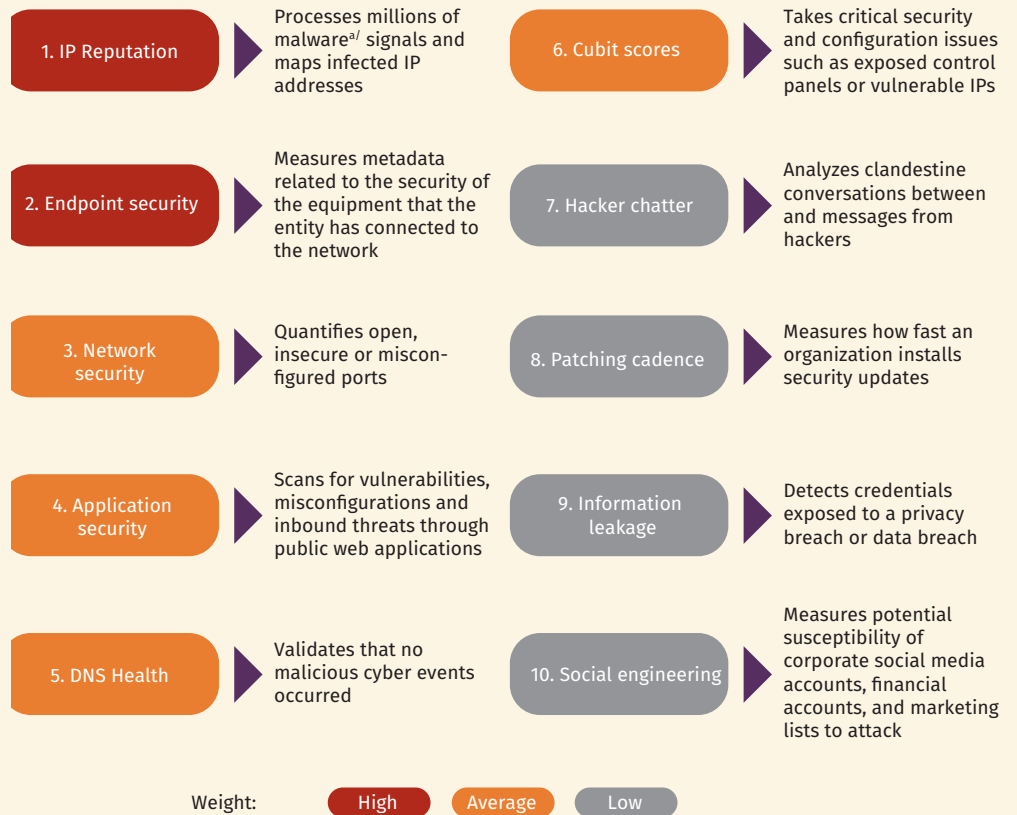
In its function of ensuring the stability of the financial system, *Banco de la República* considers it relevant to monitor the measures taken by credit institutions to protect themselves against cyber risk. The factors that make up the CRI and the overall CRI rating given by Security Scorecard are used to determine the level of protection the entities have. When the rating of each of the factors that make up the CRI is analyzed, the components that show the greatest variation in the case of banks are endpoint security and IP reputation. The former was the lowest rated for this sector in November 2022 (Graph B2.1). This means that a percentage of the equipment used by these types of entities is exposed and should be subjected to security checks. Factors such as the cubit score, hacker chatter and network security have excellent ratings throughout the year. Nevertheless, the performance of factors such as patching cadence, which has been consistently decreasing throughout the

³ According to the publication (International Telecommunication Union, 2023), the country showed strength in the technical indicator, which measures the implementation of technical strategies by national and sector-specific entities, and opportunities for improvement in the organizational indicator, which measures national and organizational cybersecurity strategies.

⁴ The two main risks mentioned by the entities in the survey are: deterioration in Colombia’s economic outlook and materialization of credit risk.

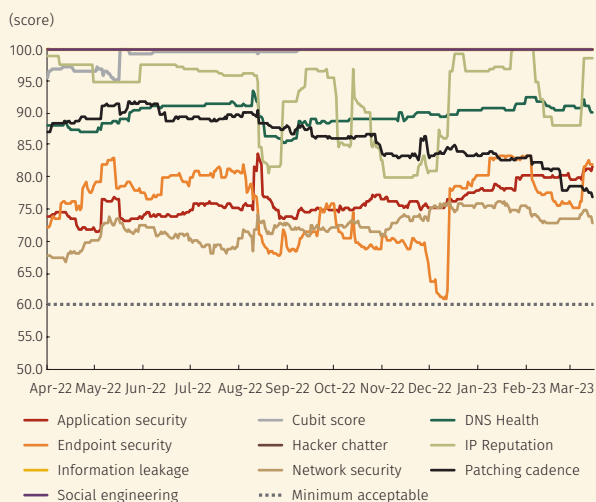
⁵ Security Scorecard is an information security company that rates cybersecurity positions through threat analysis for third-party management and IT risk management purposes.

Diagram B2.1
Cybersecurity Indicator Modules



a/ Malware is a term for any malicious software created to damage or exploit vulnerabilities in information networks, services, or devices. Acronyms: Domain Name System (DNS) Internet Protocol Address (IP). Source: Security Scorecard.

Graph B2.1
Cybersecurity Factors of the Banks



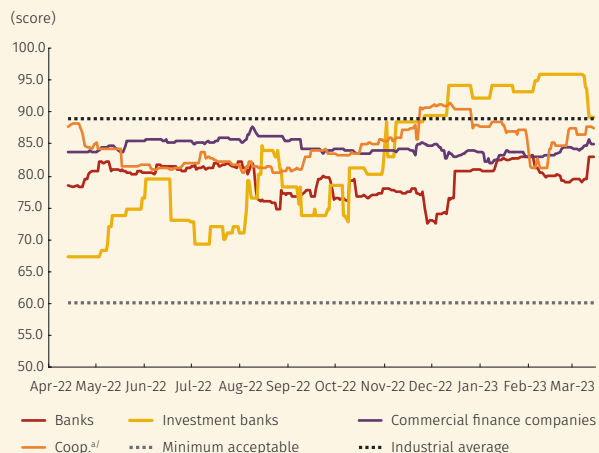
Source: Security Scorecard; calculations by Banco de la República.

year and in the latest measurements has a score of 76.8 points, is the lowest performing factor after network security which is in the last position with 72.9 points.

To construct the CRI by type of entity, the rating given to each entity by the Security Scorecard was taken. The individual figure was weighted by the share of assets of the respective institution within its reference group, and the average was calculated with this data. For banks and cooperatives, the total number of entities that make up these groups was considered while for investment banks (IB) and financing companies (FC), the entities that represent 92.4% and 78.9% of the assets, respectively, were taken into account due to the availability of information.

First of all, the most volatile CRI and, at the same time, the one that has shown the greatest improvement over the last year and gone from 67.4 to 89.2 points, is the one corresponding to the FCs and is currently the best among the CIs. This increase has been driven primarily by improvements in endpoint security and DNS health factors. There have been variations in the CRI for banks and cooperatives, but it has remained stable over the last year; However, it is important to pay attention to the lowest rated factors for banks (Graph B2.2), as this sector is currently the one with the lowest CRI in the system. Last of all, the rating for the FCs has remained relatively stable over the

Graph B2.2
Weighted Average of Rating by Type of Entity



a/ Financial cooperatives

Source: Security Scorecard; calculations by Banco de la República.

past year. These data are around the average rating of the financial services industry which, according to Security Scorecard data, was 88 points as of the cut-off date.

4. Conclusions

Cyber risk monitoring continues to evolve and gain importance. At the local level, the CRI used by *Banco de la República* makes it possible to measure the status of the policies and measures implemented by the entities in the Colombian financial system. The most recent CRI figures show that all the factors used to calculate it have a score above 70 points which indicates that the entities are managing their cyber risk well, especially the CFs who have improved their indicators significantly. However, indicators such as network security and endpoint security could be strengthened. As for the CRI by type of entity, all of them are above 80 points. This indicates that the financial system has taken the necessary steps to protect itself against cyber vulnerabilities.

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Box 3: Financial Stress in the U.S. Banking System and a Stress Test of Credit Institutions' Capital Adequacy

Diego Cuesta
Camilo Gómez
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After the 2008 financial crisis, the U.S. Federal Reserve (Fed) drove the benchmark interest rate to historically low levels that became more pronounced in the wake of the covid-19 pandemic. At the same time, starting in March 2020 several measures to provide the market with liquidity were adopted, including the expansion of the asset purchase program in treasury and mortgage-backed securities. As a result, the Fed's balance sheet rapidly enlarged.¹ Given this expansionary monetary policy stance, the global financial system experienced high levels of liquidity until 2021. However, in a context of a global recovery in output and employment during 2021 and 2022 in which inflation levels and expectations for it exceeded policy targets, a sustained increase in global benchmark interest rates has been seen. Specifically, the Fed moved the rate from a range of 0% to 0.25% in March 2022 to a range of 4.75% to 5.0% in the same month in 2023. It also reduced liquidity facilities gradually by reducing the value of asset purchases as of the end of 2021 and beginning the process of reducing its balance sheet as of April 2022.² This rapid tightening of monetary policy has been accompanied by destabilizing events in regional banks in the United States due to the materialization of interest rate and market risks associated with the devaluations of their portfolios.

This box recounts the events that led to the closure of Silicon Valley Bank (SVB), Signature Bank (SB), Silvergate Bank (SGB), and First Republic Bank (FRB) in the United States. Following this, it delves into the direct and indirect consequences that said banking stress events had and could have on the Colombian financial system. Finally, a static stress test of the capital adequacy of credit institutions (CIs) in Colombia is presented to assess their resilience to the materialization of losses associated with interest rate and market risks similar to the ones that occurred in the abovementioned U.S. banks. In conclusion, when the problems of the regional banks in the United States materialized in March 2023, the CIs in Colombia were not highly exposed directly. Nevertheless, there could be indirect effects on the financial markets that might affect them. The static stress test of capital adequacy, which assumes losses due to the valuation of held-to-maturity TES at market prices in the case of a hypothetical need for liquidity on the part of CIs, shows that the system is resilient. This result is related to the fact that all CIs maintain a low exposure to TES at maturity in their portfolios since, as of February 2023, these securities only represent 6.3% of the assets of the entities exposed to these investments. Furthermore, these exposed entities represent only 19.2% of the total assets of CIs. Notwithstanding the above, the impact on the local financial system should continue to be monitored in the coming months in case of further disruptions to the international financial market.

* The authors are part of the Financial Stability Department of *Banco de la República*. The opinions expressed here are the sole responsibility of the authors and do not imply any commitment on the part of *Banco de la República* or its Board of Directors.

1 The process of balance sheet expansion through asset purchases is popularly known as quantitative easing (QE).

2 The process of balance sheet reduction is popularly known as quantitative tightening (QT).

1. Banking stress in the United States

Prior to the bank failures of SVB and SB, the U.S. bank SGB, which had USD 11.353 billion (b) in assets at the end of 2022,³ announced the closure of their operations and their voluntary liquidation as of 08 March 2023 (Silvergate Capital Corporation, 2023a). This bank, which had specialized in the crypto sector, faced problems during the last quarter of 2022 due to losses of USD 1.049 b (9.2% of its assets).⁴ This was mainly due to the sale of held-to-maturity debt securities at market prices to obtain liquidity⁵ in a context of unfavorable results in the crypto-asset markets, the bankruptcy of FTX,⁶ and the massive outflow of depositors given the reduced confidence in this institution that resulted from these disruptions. Total deposits from digital asset clients went from USD 11.9 billion (b) in the third quarter to USD 3.8 b in the fourth quarter. In addition, during that period, approximately USD 150 m of the entity's deposits belonged to customers who had filed for bankruptcy (Silvergate Capital Corporation, 2023b).

As for SVB, their assets amounted to USD 209.026 b as of December 2022 thus making it the sixteenth largest bank in the United States (Federal Reserve System, 2022). Compared to the last quarter of 2020 when the assets registered USD 113.839 b (Federal Reserve System, 2020), the December 2022 value represented a significant growth that was accompanied by an increase in holdings of long-term treasury bonds and mortgage-backed securities, which accounted for about 55.0% of its assets at the end of 2022 (Silicon Valley Bank, 2023a). The asset trend was driven by the increase in deposits which totaled USD 175.4 b at the end of 2022 (Federal Deposit Insurance Corporation, 2023). The growth in deposits, in turn, was explained by the strong performance of SVB's depositors who were mostly non-traditional clients, such as technology-related startups and venture capital firms. However, less favorable results in the technology and cryptocurrency sector, the drying up of venture capital funding for this sector and the increased liquidity needs of depositors in a context of high interest rates resulted in the entity facing an accelerated process of bank withdrawals.

To raise cash to cover deposit outflows, SVB attempted to raise new capital through a public share offering for an estimated USD 2.25 b on 08 March 2023,⁷ but this was not successful. At the same time, the company reported the sale of USD 21 b in fixed-income securities, which represented losses of USD 1.8 b (Silicon Valley Bank, 2023a). In addition, the potential losses for the total securities held-to-maturity if valued at market prices during the fourth quarter of 2022 were estimated to be around USD 15 b (Federal Reserve System, 2023b). This revealed a deficient management of interest rate risks since the entity did not have hedges to mitigate its wide exposure to fixed rate, long-term bonds. This, together with the high concentration of deposits made by wholesale customers, 93.8% of which were not insured by the Federal Deposit Insurance Corporation (FDIC) (Standard & Poor's, 2023),⁸ intensified depositors' widespread concern about the institution's liquidity and capital adequacy position. This occurred although, even after the sale of securities for USD 21 b, SVB complied

3 Federal Reserve System (2022). By asset size, the entity ranked 128th in the U.S. banking system.

4 Investing.com (2022). According to Silvergate Capital Corporation (2023b), the sale of assets and derivatives (available-for-sale and held-to-maturity) totaling USD 5.2 b during the fourth quarter represented a loss of USD 718 m.

5 In accordance with Chapter 1, paragraph 3 of the Basic Accounting and Financial Circular (SFBC) of the Office of the Financial Superintendent of Colombia (FSC), "bonds or securities and, in general, any type of investment for which the investor has the intention and the legal, contractual, financial, and operating capacity to hold to maturity are classified as held-to-maturity investments. The purpose for holding the investment corresponds to the positive and unequivocal intention to not dispose of the security." In contrast, available-for-sale securities are those that are available for market transactions and their balance sheet value must be recorded daily in accordance with their market valuation (mark-to-market).

6 FTX, one of the world's largest cryptocurrency trading platforms, entered bankruptcy proceedings in the U.S. court system as of 11 November 2022 after being exposed to liquidity problems due to customer withdrawals in the wake of alleged fraudulent fund handling and risk management deficiencies. In response, the U.S. Securities and Exchange Commission (SEC) charged founder and CEO Sam Bankman-Fried with fraud in a statement issued on 13 December 2022.

7 In SVB's letter to investors (2022b), a public share offering was announced to raise USD 1.750 b between common shares (USD 1.250 b) and mandatory convertible preferred shares (USD 500 m). In addition, the USD 500 m capital increase by the General Atlantic equity fund in common shares was announced.

8 The amount covered by FDIC deposit insurance is up to USD 250,000.

with the regulatory minimum capital adequacy indicators.⁹ Thus, according to the IMF (2023), only one day after the two announcements, SVB faced a bank run of around USD 4.2 b via electronic withdrawals by depositors among a wide dissemination of the bank's problems through social networks. In the midst of these problems, the California Department of Financial Protection and Innovation (DFPI) intervened on March 10 and placed SVB under the receivership of the FDIC. Thus, SVB's closure at that time was the second largest bank failure in U.S. history.¹⁰

The event described above highlights the catalytic role that social networks played in the development and speed of the bank run. This reveals a new channel through which panic events can occur and be amplified given the natural communication and coordination of depositors interconnected through such networks. In this regard, Cookson et al. (2023) found evidence that the pre-existing exposure of U.S. banks in Twitter conversations intensified the effect of market price losses and exposure to uninsured deposits on stock price declines during the SVB bank run. Furthermore, the authors noted that tweets coming from alleged startup community members and their references to possible contagion as well as the negative sentiment of the messages also reinforced the effect not only at SVB but across the U.S. banking industry.

The SVB bankruptcy event and the aforementioned effects of social networks put pressure on the liquidity of other banks with similar business profiles (IMF, 2023). SB in particular, an entity with assets of USD 110.364 b (Federal Reserve System, 2022) that specialized in the crypto sector and had exposure to the technology sector that was also facing withdrawals since the end of 2022, was largely affected by deposit runs on March 10. Faced with a loss of investor confidence in the entity and rapid declines in share value during the same day, the New York State Department of Financial Services closed SB on 12 March 2023 and made it subject to FDIC receivership. This collapse became the third largest bankruptcy in U.S. history at the time.

In the wake of SVB's failure, the FDIC initially announced that only those deposits that were insured would be protected. However, given the latent possibility of a contagion effect on the rest of the system, the Treasury Department, the Fed, and the FDIC designed a joint package of measures to address the stress scenario. Initially, the authorities declared a "systemic risk exception," which allowed the FDIC to protect all SVB and SB deposits—Treasury Department, Federal Reserve System, and Federal Deposit Insurance Corporation (2023). Subsequently, the Fed, to mitigate market risk, introduced the USD 250 b Term Bank Funding Program which makes liquidity available to institutions based on the par value of their fixed income portfolio as collateral (e.g., Treasury bonds and mortgage-backed assets), for a maximum term of one year (Federal Reserve System, 2023a).¹¹

The stress events described above have generated an environment of uncertainty that has manifested itself in additional disruptions to the international financial system. For example, Credit Suisse, a systemically significant institution at the global level, faced a loss of public confidence.¹² This, coupled with other factors, such as corruption scandals and losses as a result of poor business decisions led to its closure and subsequent acquisition by UBS, one of its main competitors, for a total of USD 3.25 b on 19 March 2023.

9 Capital adequacy indicators as of 2022 adjusted by the impact of the 08 March 2023 sale of available-for-sale securities were above regulatory limits (Silicon Valley Bank, 2023a): common equity tier 1 (13.88% vs. 7.0%), tier capital (13.88% vs. 8.5%) and total capital (14.68% vs. 10.5%). In terms of liquidity risk management, in turn, SVB was not required to comply with the regulatory limit of 100% liquidity coverage ratio (LCR) under the Dodd-Frank Act.

10 The largest U.S. bankruptcy was the failure of Washington Mutual bank in September 2008. While SVB's fall in March 2023 was the second largest, it was recently surpassed by First Republic Bank's fall on 01 May 2023.

11 Using the par value of the securities, the guarantee granted is higher than what might be seen with the market prices that these securities currently have.

12 Credit Suisse experienced a significant loss of confidence after Saudi National Bank, the bank's largest shareholder (with a 10% stake) said they would not increase their investment. This resulted in a significant drop in the value of the shares (up to 30%). To support the entity, the Swiss National Bank provided emergency liquidity.

Finally, on 01 May 2023, First Republic Bank (FRB), an entity that had USD 229.1 b in assets¹³ and USD 103.9 b in deposits as of April 13 (Federal Deposit Insurance Corporation, 2023), was closed by the DFPI and placed under the receivership of the FDIC, which entered into a purchase agreement with JPMorgan Chase Bank. This institution, which suffered the second largest bank failure in U.S. history, was highly exposed to deposit withdrawals due to the fear of contagion from the events at SGB, SVB, and SB upon the rest of the U.S. banking system. Specifically, excluding the USD 30.000 b that the entity received on 16 March 2023 in uninsured deposits from large US banks to strengthen its liquidity position, FRB faced a USD 102.024 b drop in its deposits during the first quarter of 2023 (First Republic Bank, 2023).

The stress conditions in the United States reflect the vulnerabilities to which the global financial system may be exposed in an environment of rising monetary policy rates. Although the events described above did not have a direct impact on most emerging countries, and thus contagion seems limited, the need for greater supervision and monitoring by regulatory entities to strengthen risk management and ensure confidence in the system is evident given the context of high interest rates and the catalytic role of social networks (IMF, 2023).

2. Impacts on the Colombian financial system

As for the direct impact on the Colombian financial system, Colombian banks did not have direct equity investments in the affected entities in the United States. The available information also indicates that the portfolio granted to foreign financial sector entities,¹⁴ where U.S. companies would be classified, is low. Specifically, this portfolio amounts to COP 3.4 billion (b) as of December 2022, which represents 1.0% of the commercial portfolio of CIs.¹⁵ The CIs' foreign funding, in turn, had no lines of credit with any of the affected entities in the United States as of 31 March 2023,¹⁶ and no significant deposits related to these entities were identified. Last of all, non-banking financial institutions had no direct investments in anything issued by the affected banks in the U.S. as of March 2023.¹⁷ In summary, the direct impact of SVB, SB, and SGB bankruptcies is small.

However, it is possible that the disruptions seen in the U.S. financial market may have an indirect impact on the Colombian system through second-round effects on market conditions, on other foreign entities, or on increased risk aversion. Financial instability events have affected expectations about the Fed's rate hike cycle which could affect future market conditions. With respect to the second-round effects on other financial institutions, the announcements of support by the authorities in the United States have made it possible to limit such effects. Regarding the possible increase in the perception of risk, the results of the Survey of external debt and credit lines done by *Banco de la República* focused on a representative sample of banks that contract foreign debt, showed that local banks continued to perceive that foreign institutions were highly willing to grant them credit during the first quarter of 2023.¹⁸ Moreover, in this version of the survey, entities were asked whether they perceived any effect on market liquidity in March due to the events in the United States and Europe. In response, 87.5% of those surveyed stated that they were not affected. Nonetheless, this is a situation that should be continuously monitored in the com-

13 The bank had USD 212,639 m in assets at the end of December 2022, which made it the fourteenth largest bank in the United States (Federal Reserve System, 2022).

14 Defined as companies belonging to the sector and without a TIN in Colombia.

15 Information from format 341, "Individual Report by Debtor: Active Credit Transactions" of the FSC as of December 2022.

16 In accordance with External Circular 025/23 April 2002 issued by the FSC, financial entities must report their foreign debt to *Banco de la República* by counterparty.

17 Information from format 351, SFC's "Breakdown of investment portfolio" as of 31 March 2023.

18 See the Report on the recent change in the foreign indebtedness of Colombian banks for March 2023 at the following link: <https://www.banrep.gov.co/es/informe-sobre-evolucion-reciente-endeudamiento-externo-bancos-colombianos-marzo-2023>.

ing months in case of new disturbances in the international financial market.¹⁹

3. Static Stress Test of CI Capital Adequacy

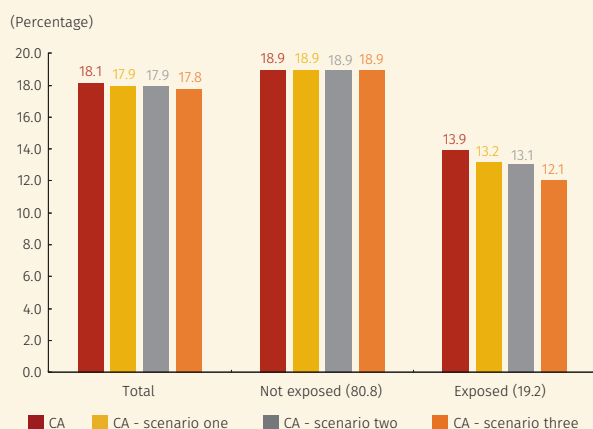
In line with the bank failures in the United States and the financial uncertainty in a context of high interest rates, a static stress test was done for CIs to quantify the impact on total capital adequacy in the event that interest rate and market risks materialize. Specifically, three adverse scenarios of varying intensity were considered in which the entities had to realize the losses caused by the valuation of non-tradable TES (investment at maturity) at market prices. This would increase the value of the market risk incorporated into the calculation of total capital adequacy. Furthermore, the devaluation of securities caused by the effect of their transfer to the accounts of marketable securities would affect the equity level. For this exercise, the CI balance sheet information as of February 2023 was used as were devaluation shocks that were built based on the shift of the zero-coupon TES curve seen during the second half of 2022, a period characterized by historically high devaluations. The scenarios of devaluation of TES holdings along the curve are as follows:

- Scenario 1: The CIs experienced a devaluation in line with the average seen in the period under review (-3.0%).
- Scenario 2: The CI's devaluation is in line with the maximum for the period under consideration (-4.4%).
- Scenario 3: The CIs experienced a devaluation of 15.0%. This scenario is the most severe and represents an unlikely event.

The results suggest that, in the scenarios analyzed, the aggregate total capital adequacy (CA) is likely to remain well above the regulatory limit (9.0%, Graph B3.1). With respect to the most adverse scenario this might represent only a slight drop of 0.3 percentage points (pp) in the indicator. For the group of exposed CIs, the impact would be 1.8 pp in the most severe scenario and would remain above the regulatory limit. The above results are due to the low participation of held-to-maturity TES with respect to the assets of the exposed entities (6.3% as of February 2023) and to the fact that these entities represent 19.2% of the total assets of the CIs as of February 2023.

These results reflect the low exposure of CIs to these types of assets, which has been consistent with liquidity risk management because held-to-maturity investments are not part of the liquid assets that are quantified for the calculation of short-term liquidity through the liquidity risk indicator (LCR) and structural liquidity through the net stable funding ratio (NSFR). Thus, CIs have less incentive to increase their investments to maturity in TES since these do not favor their liquidity position.

Graph B3.1
Total Capital Adequacy of CIs in the Context of
Non-negotiable TES Devaluations (February 2023)



Note: "Exposed entities" refers to the CIs that had held-to-maturity TES within their asset portfolio as of February 2023. The percentage of assets the entities hold with respect to the total number of CIs classified in the "Not exposed" and "Exposed" groups is shown in parentheses.

Source: Office of the Financial Superintendent of Colombia; calculations by Banco de la República.

19 See the "Market risk" section in Chapter 2 of this Report.

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4. Financial Regulation

This chapter presents the main legal changes with respect to financial regulatory standards enacted between 29 November 2022 and 16 May 2023. First, regulatory changes to encourage economic and financial development as well as facilitate convergence to international standards in the areas of risk management, financial inclusion, and capital market development are presented. After that, other regulatory adjustments and issuances are presented.

For the period under analysis, the tax reform and the pension reform project stand out. Other developments related to risk management regulations, credit derivatives, capital adequacy of third-party fund managers, and new credit categories are also presented.

4.1 Regulations Related to Structural Changes and Issues of Interest in the Medium and Long Term.

4.1.1 Regulations issued by the FSC

Circular Letter 075 (30 November 2022): as per the methodology that follows international metrics to identify systemically important financial institutions, SIFI as per the methodology that follows international metrics to identify systemically important financial institutions (SIFI) which is based on the criteria of size¹⁰⁰ interconnectedness¹⁰¹ substitutability¹⁰² and complexity¹⁰³ the following SIFIs were identified for 2023: Bancolombia, Banco Davivienda, BBVA Colombia, and Banco de Bogotá. These SIFIs should:

- Establish an additional capital buffer equivalent to 1.0% of the value of credit, market, and operating risk-weighted assets (AWRL) that must be maintained in the ordinary core equity net of deductions (CED).¹⁰⁴
- Continue to comply with the instructions on resolution plans established in the Basic Legal Circular (BLC),¹⁰⁵ which seek to promote the stability of the financial system and prevent a systemic impact in situations of material financial stress.

¹⁰⁰ Size is the traditional measurement of systemic importance since the larger the entity is, the more difficult it is for others to take over its activities quickly and, therefore, the greater the likelihood that its failure will disrupt the functioning of the market.

¹⁰¹ The degree of interconnectedness reflects the likelihood that the financial difficulties of one institution may cause other entity(ies) to experience difficulties also as a result of the network of contractual obligations in which these institutions operate.

¹⁰² The more systemically important an entity is, whether in a particular line of business or as a provider of infrastructure services (e.g., payment systems), the more market dislocations or disruptions will cause it to fail.

¹⁰³ The complexity criterion refers to the difficulty in terms of cost and time to resolve issues for an entity in trouble.

¹⁰⁴ Under the terms provided for in Decree 1477/2018 as amended by Decree 1421/2019 and incorporated into Decree 2555/2010, External Circular 020/2019 and Chapter XIII-16 "Capital Adequacy Margin and Other Equity Requirements" of the Basic Accounting and Financial Circular.

¹⁰⁵ Chapter VII, Title 1, Part 1 (resolution mechanisms)

External Circular 027 (09 December 2022) provides the insurance companies with instructions in relation to: 1) risk management in the compliance business line (BL),¹⁰⁶ 2) insurance pricing, and 3) reinsurance underwriting in all BL.

In order to control the maximum net retention limit for the compliance BL, insurance companies must: 1) calculate the amount corresponding to 10% of the technical equity of the quarter immediately preceding the month in which the respective valuation of the portfolio in force or the issuance or modification of a policy, etc. was done and 2) do the calculation for each individual holder¹⁰⁷ independently. Entities must also inform the FSC when the amount of the net retention exceeds 10% of the technical equity within the next ten working days along with the measures to be taken to remedy the aforementioned excess as well as the timetable to implement said measures.

In order to ensure that the pricing of insurance in the different BL is adjusted to technical criteria that properly reflect the risks assumed by the insurance companies, the instructions applicable to the setting of rates when such companies rely on the experience and information of the reinsurers were modified. In this case, when the pure risk rate¹⁰⁸ is established by the reinsurer, the technical note must state the reinsurer's retention percentage, the rate defined by the reinsurer, and the technical guidelines on the basis of which segmented rates may be applied based on the characteristics of the risks insured against. The information on the rates must expressly indicate the time period for which it applies. The rate and other applicable technical guidelines must be consistent with the reinsurance contract.

Finally, in order to reinforce the instructions for contracting reinsurance, it has been established that insurance companies must: 1) do actuarial loss modeling exercises to verify whether or not the reinsurance program is reasonable; 2) assess whether the current capacity of the reinsurance program supports the potential losses of the insured portfolio and those arising from the underwriting of new risks; and 3) take into account the risk appetite established by the board of directors of the insurance company so that the conditions of the reinsurance program conform to that guideline. These instructions will be applicable to reinsurance contracts entered into or renewed after 30 June 2024.

Circular Letter 081 (27 December 2022): The CIs, Bancoldex, Findeter, Finagro, FDN, Titularizadora Colombiana, insurance companies, PFM, TC, SBF, risk rating companies, and the Colombian Stock Exchange are requested to complete the biennial survey of climate risks and opportunities. The purpose of the latter is to identify the degree to which environmental, social, and corporate governance issues, including climate issues, are incorporated into the development of the activities authorized for these supervised entities as well as to capture information on some metrics such as: absolute emissions of greenhouse gases.

¹⁰⁶ Insurance in this BL guarantees the fulfillment of obligations contained in the law or in a contract.

¹⁰⁷ The following are considered individual holders: 1) the policyholders who are not plural figures or are not part of plural figures, and 2) in the case of policies which have a policyholder who is a plural figure, each one of the parties to the policy. Plural figures are understood to mean consortiums, temporary associations, and any other type of contractual or legal plan that allows the collaboration of several individuals or legal entities in order to sign and implement one or more contracts.

¹⁰⁸ Refers to the actual cost of the risk assumed by the insurer and excludes the insurer's management expenses.

The above considers the fact that the FSC published the update of its strategy for the greening of the financial system in August 2022.¹⁰⁹ The purpose of this is to promote a more transparent¹¹⁰ and climate-resilient financial system that incorporates the management of financial risks and opportunities arising from environmental and climate issues.

External Circular 001 (01 February 2023): provides instructions on how to comply with the provisions of *Banco de la República's* External Resolution 10/16 December 2022 (see numeral 4.2.6 of this chapter) whereby the entities supervised by the FSC were allowed to enter into types of credit derivatives with authorized foreign agents provided they are contracts issued in foreign or legal currency by foreign issuers on foreign or local assets. In line with the above, the Circular issued instructions on market risk management for those cases in which the supervised entities enter into the aforementioned credit derivatives.

External Circular 003 (03 February 2023): provides instructions for the calculation of the individual and consolidated capital adequacy ratio of companies that manage third party assets¹¹¹ in accordance with the provisions of Decree 175/2022 that were incorporated into Decree 2555/2010. In this respect, the FSC established guidelines for the proper management of the funds held by these entities in their proprietary position to standardize the requirements for the risk weighting of credit assets, and technical criteria were established to improve the quality and quantity of the technical equity instruments these entities hold. The purpose of the foregoing is to standardize the technical criteria for capital adequacy ratios with that of the CI in accordance with the Basel Committee's guidelines.

To this effect, in the Basic Accounting and Financial Circular (BAFC): 1) the chapter "Capital Adequacy Margin of Companies that Manage Third Party Assets"¹¹² was created and the reports on the information corresponding to the ownership requirements for capital instruments and the weighting methods for investments in autonomous funds or patrimonies were produced, and 2) the instructions applicable to financial conglomerates¹¹³ with respect to the calculation of the minimum technical equity levels of subordinate entities abroad that manage third-party funds and that use a separate information base or that are consolidated through an entity that does not have technical equity requirements are adjusted.¹¹⁴

For the new formats, there will be a mandatory testing period between 23 October and 03 November 2023 using the figures of the individual and consolidated financial statements as of June 2023. The first official transmission will be with the financial information as of February 2024.

109 The document "Hacia el enverdecimiento del sistema financiero colombiano: estrategia de finanzas verdes y cambio climático" is available on the FSC website.

110 This refers to the provision of greater transparency to the markets with respect to the status and level of progress in the incorporation of climate issues into the financial sector.

111 These entities are TC, PFM, SBF, IMC, and financial holdings.

112 Chapters XIII-17 of the BAFC. Chapter XIII-12 "Relación de Solvencia de las entidades que administran activos de terceros: Sociedades Comisionistas de Bolsa de Valores, Sociedades Administradoras de Inversión, Sociedades Fiduciarias y Sociedades Administradoras de Fondos de Pensiones y Cesantías" shall be repealed as of 01 February 2024.

113 Chapters XIII-15 of the BAFC.

114 Established by Decree 2555/2010.

The entities must submit their request for classification of capital instruments to the FSC¹¹⁵ and report the weighting method to be used for each of the funds or autonomous assets in which they have a share.

Entities must submit the implementation plan to the SFC no later than 28 April 2023 and it must include, at a minimum, the following: 1) the monthly work schedule, including the tasks to be carried out, the deliverables and those responsible for each activity as well as the monitoring of their progress; 2) the activities to be undertaken in order to classify the technical equity resources, calculate the AWRL, and select the weighting method for investments in autonomous funds and assets; and 3) an analysis of the estimated impact of the implementation of the new regulations including the adjustments required at the financial, technological, and operational levels. In the case of financial holding companies, this impact analysis must quantify the effects of applying the new regime to both local subordinated companies and foreign entities or investment vehicles that are part of the conglomerate and that are assimilated into entities that manage third-party funds.

External Circular 005 (22 March 2023): instructs supervised entities to adopt the latest version of the EMV® QR Code Specification for Payment Systems (*EMV QRCPS Merchant-Presented Mode or Consumer-Presented Mode*) standard when carrying out all types of monetary transactions using QR codes (*quick response code*). This seeks to encourage secure transactions through the use of QR codes, comply with international standards, foster access to financial services, and contribute to financial inclusion as well as to the efficiency and formality of the economy. In the case of non-cash transactions using QR codes, supervised entities may decide whether or not to adopt the new standard.¹¹⁶

Circular Letter 019 (31 March 2023): establishes that when the indicator associated with the real quarterly variation of individual provisions of the risky portfolio reaches a level greater than or equal to 9.0% for the consumer and/or commercial category, the supervised entities may submit a plan to the FSC to activate the corresponding provision in which compliance with the aforementioned indicator on an individual basis and with the other indicators and requirements set forth in the BAFC for the decumulative phase is shown. For this phase, compliance with the aforementioned requirements was previously required but only when they were presented for the total portfolio and financial leasing.

Note that under External Circulars 022/2020 and 026/2022, the FSC had implemented preventive actions to incorporate additional risk provisions.

External Circular 006 (30 March 2023): creates format 424 in Appendix 1 of the BAFC to capture information on the rates or costs of the main financial products and services provided by CI, special official institutions, and companies specializing in electronic deposits and payments. The above is intended to improve the financial consumer's experience and provide clear, truthful, timely, and verifiable information on the characteristics of the products or services offered by the supervised entities. This external circular also adjusted the instructions regarding the basic service package in order to update the number of transactions available at no additional cost given the increase in the use of digital channels.

¹¹⁵ This is in accordance with BAFC Chapter XIII-17, Appendix 1, and Appendices 2 and 2.1 in the same chapter must be completed.

¹¹⁶ The supervised entities shall have a maximum term of two years from the date of issuance of this circular to migrate all codes to the new standard. In any case, the migration plan must be submitted to the FSC no later than 01 January 2024.

Circular Letter 026 (21 April 2023): provides instructions on the baseline and adverse scenarios under which credit institutions must carry out stress tests in 2023. Likewise, it established that, based on the adverse scenarios described, the credit institutions must define the mitigating actions to reestablish the financial soundness and viability of the business after the simulated impairment. It states that such actions must be consistent with the nature, size, complexity, and diversity of the activities carried out by the entity, its risk profile, its ability to react, its connection with the financial system, the economic environment, and the markets in which it operates. Furthermore, such actions must be feasible and timely.

Likewise, it has been determined that the definition of the actions must allow the entities: 1) to strengthen and preserve the levels of technical equity; 2) to improve the liquidity position; 3) to reduce operating costs, and 4) to make adjustments to the business model. In any case, credit institutions should not consider extraordinary support with State resources that go beyond those framed in the current regulations and should be recognized as a mechanism of last resort.

External Circular 008 (16 May 2023): modifies the internal control instructions in order to continue the convergence towards international best practices and to further the development of robust corporate governance structures.

External Circular 009 (16 May 2023): modifies the instructions related to the creation procedure of bridge banks¹¹⁷, particularly to their corporate nature, in order to speed up their creation when needed.

4.1.2 Regulations issued by the Ministry of the Treasury and Public Credit

Resolution 3608 (31 December 2022): Designates the market makers in the Public Debt Securities Market Makers Program for the 2023 period. Fourteen market making entities (twelve banks, one FC and one SBF) were designated for this year.¹¹⁸ The purpose of this program is to promote appropriate financing conditions for the Nation in the capital market through the development of the public debt securities market.

Decree 0347 (09 March 2023): Amends the Unified Regulatory Decree of the Treasury and Public Credit Sector in order to establish that the National Guarantee Fund (FNG) will grant guarantees to both mortgage bonds issued for the purpose of financing mortgage and residential leasing portfolios and to the securitization of this type of portfolio and leasing (applies to loans generated by the CIs), issued between 09 March 2023 and 31 December 2025 in accordance with the availability of funds earmarked for this purpose.

Decree 455 (29 March 2023): The purpose of this decree is to foster access to formal financing through efficiency in financial costs that make viable and boost the productive processes of the country's most vulnerable people. Thus, five credit categories have been created with interest rates certified by the FSC in order to facilitate access to formal financing through efficiencies in financial costs that make the productive processes of the country's most vulnerable people viable and enhance them.

¹¹⁷ Mechanism to safeguard and protect financial activity in the event of the liquidation of a CI.

¹¹⁸ The complete list of entities can be found in the resolution in the regulatory section of the Investor Relations Colombia (IRC) website at the following [link](#).

The five new credit categories are: rural productive people's credit, urban productive people's credit, rural productive credit, urban productive credit, and productive credit. The classification of loans, following the order above, depends on the purpose (to finance activities in rural or urban areas) and the amount, which in any case may not exceed 120 SMMLV.

In accordance with this decree, the FSC certified the current bank interest rate differentiated for the five subcategories mentioned above, so that the usury rate is different based on the type of microcredit.

Decree 626 and 627 (27 April 2023): These decrees amend Decree 2555/2010 and Decree 1068/2015 in order to regulate the procedure and rules for cooperatives that carry out financial activity¹¹⁹ to implement SME associations. The above considers the fact that under Act 2069/2020,¹²⁰ cooperatives were authorized to associate these types of companies.

4.1.3 Regulations issued by the Ministry of Health and Social Protection

Decree 2497 (16 December 2022): in order to improve access to the Compulsory Traffic Accident Insurance (SOAT in Spanish) and combat evasion, this Decree established a differential rate for some types of vehicles¹²¹ of approximately 50% over the value of the SOAT in force as of 14 December 2022. Since the value of the premium is reduced, Adres¹²² (and not the insurer) will be in charge of recognizing health service expenses exceeding 263.13 UVT and up to 701.68 UVT generated by claims caused by vehicles that have a differential rate.

4.1.4 Regulations issued by the Ministry of Housing, City, and Territory:

Decree 490 (04 April 2023): partially amends Decree 1077/2015 in relation to the conditions of Mi Casa Ya, the program for furthering access to low-income housing, along with other provisions. Specifically, interested parties were able to review the status of their process and the steps to start or continue their process under the program as of April 10. Among other points, the Sisbén IV classification requirement was adjusted so that more households could apply.

4.1.5 Regulations issued by the Congress of Colombia

Act 2277 (13 December 2023): the tax reform bill “for equality and social justice” was approved through this law, which seeks to finance social spending on education, health, environment, and energy transition, etc. as well as to include sustainability criteria in order to maintain compliance with the fiscal regulation.

The reform contains 96 articles and seeks to raise COP 19.7 t in 2023, and about COP 20 t annually in the coming years. The following points stand out:

119 Includes financial cooperatives, specialized savings and loan cooperatives, and multi-activity and comprehensive cooperatives with a savings and loan section.

120 By means of which entrepreneurship is promoted in Colombia.

121 Vehicles in the following categories: mopeds, motorcycles of less than 100 cc, motorcycles of 100 cc and up to 200 cc, tricycles and quadricycles, five-passenger motorcycles, business cars, urban cabs and vans, urban public service, buses and minibuses and public service vehicles.

122 Administrator of Resources of the General System of Social Security in Health.

- Income tax for individuals: 25% of the total value of labor payments was set as exempt income, limited annually to 790 tax value units (TVU).
- Tax on equity: The minimum amount of the taxable income is 72,000 TVU, definitively adopted as of January 1 of each year.
- Taxable income: Financial institutions, insurance, and reinsurance companies, SBFs, agricultural brokerage firms, agricultural commodity and product exchanges, agro-industrial or other commodity exchanges and stock market infrastructure providers that have a taxable income equal to or greater than 120,000 TVU must pay a surtax of 5 additional points of income tax annually until 2027.
- Taxable income for legal entities engaged in mining anthracite, lignite coal and crude oil: If this taxable income is equal to or greater than 50,000 TVU, a few points must be added to the income tax rate that range between 5.0% and 15%, depending on the average price of coal or crude oil for the respective taxable year.
- Modification of the non-causation regulation of the carbon tax¹²³ established by Decree 926/2017 that stipulates that the non-causation may not exceed 50% of the tax caused in any case.
- Creation of the tax on single-use plastic products for packaging, wrapping, or packing goods. The producer or importer shall be liable for the tax. The tax rate shall be 0.00005 TVU for each gram of the container, packaging, or packing. The tax will not be levied when the circular economy certification is presented. This will be regulated by the Ministry of Environment and Sustainable Development within six months from the date of issuance of the Tax Reform.
- Creation of a tax on ultra-processed sweetened beverages. The producer or importer shall be liable for the tax. The tax rate will be expressed in pesos per hundred milliliters of beverage, and the unit value will be based on the sugar content in grams per hundred milliliters of beverage.
- Creation of a tax on ultra-processed food products. The producer or importer shall be liable for the tax. The taxable base is composed of the sales price. In the case of donation or withdrawal of inventory, the taxable base will be the commercial value. The tax rate will be 10% for 2023, 15% for 2024, and 20% starting in 2025.

Crime of omission of assets or inclusion of nonexistent liabilities: Applies when the fraud or evasion in tax returns is equal to or greater than 1,000 legal monthly minimum wages in force (SMMLV) - previously it corresponded to a value equal to or greater than 7,250 SMMLV - and will incur a prison term of 48 to 108 months.¹²⁴

Pension reform bill project “Change for the Elderly” (filed on 22 March 2023 in Congress): This project seeks to correct the currently existing pension deficit, guarantee the viability of the system, and correct inequities present under the current model. The markets, financial system entities, and different associations have been attentive to the implications and discussions surrounding this project given its importance for the markets and total savings in the economy.

¹²³ The carbon tax includes all petroleum derivatives, fossil gas and solids that are used for combustion.

¹²⁴ Prior to the current Tax Reform, it was punishable with imprisonment for 48 to 108 months and a fine of 20% of the value of the omitted assets, of the value of the misstated assets, or of the value of the non-existent liabilities.

The Colombian pension system is currently based on the existence of two competing regimes, regulated by Law 100/1993: the average premiums regime, which is managed by the official entity Colpensiones,¹²⁵ and the individual savings regime with solidarity (RAIS in Spanish),¹²⁶ which is managed by the private PFMs. Contributors decide under which regime they will contribute, and which entity will manage their pension funds during their working life and after retirement. Members of both regimes have the possibility of transferring from one to the other based on certain factors.¹²⁷

In addition, the *Colombia Mayor* program, operated by the Department of Social Prosperity, grants a monthly economic subsidy of COP 80,000 to people over 60 years of age who are in extreme poverty or who do not have a pension.

In contrast, the pension reform project is based on the existence of four non-competing pillars:

- **Pillar of solidarity:** those over 65 years of age, in a situation of extreme poverty or one of poverty and vulnerability,¹²⁸ will be granted a basic monthly income above the poverty line of COP 223,000.¹²⁹
- **Semi-contributory pillar:** Those over 65 years of age who have contributed between 150 and 1,000 weeks to either of the two existing regimes, and whether or not they are eligible for the solidarity pillar, will be granted a basic life annuity, the value of which will be determined on the basis of the value of the contributions made. If they are eligible for the solidarity pillar, they will also be granted the basic income corresponding to that pillar.
- **Contributory pillar:** the persons affiliated with the pension system will contribute up to three SMMLV to Colpensiones (under the current regime), and the remaining SMMLV will be administered by the PFMs.¹³⁰ The amount of the old-age pension will consist of a single pension recognized and paid considering both types of contributions. The age requirements are maintained and a minimum of 1,300 weeks of contributions is required.

125 Under this regime, contributors pay 16% of their base salary each month to a common fund (12% paid by the employer and 4.0% paid by the worker) and once the legal requirements are met, Colpensiones calculates an income or base liquidation salary (BLS) and the amount of the pension allowance is defined between 65% and 80% of the BLS. Thus, current contributors are expected to finance the pensioners' monthly pensions, but since the resources contributed by the workers are not enough to cover this financing, the Government covers the deficit.

126 Under this regime, contributors also pay 16% of their monthly income (12% paid by the employer and 4.0% paid by the worker), but in this case to an individual savings account (ISA) that only and exclusively finances the contributor's pension. The ISA pays the quarterly returns generated, an administration fee is paid to the PFM and the requirement for the pension is that the ISA must have an accumulated capital that makes it possible to obtain a monthly pension of more than 110% of one SMMLV. At the time the person retires under the RAIS, the member can choose between three pension options: life annuity, programmed withdrawal, and programmed withdrawal with deferred life annuity.

127 1) have been in Colpensiones or in one of the PFMs for at least five years before making the transfer; 2) if you are 37 years of age or older in the case of women, or 42 years of age or older in the case of men, you must request and receive double counseling with the managers of both regimes. 3) the maximum age for transfer is 52 for men and 47 for women.

128 Based on the targeting established by the national government.

129 This figure is higher than the subsidy currently granted under the *Colombia Mayor* program.

130 The multi-fund plan established by Act 1328/2009 is still in place.

- **Voluntary individual savings pillar:** people can voluntarily save extra funds for their pensions.

In addition, the project proposes the following points:

- Creation of a contributory pillar savings fund: this is financed with a percentage of the income contributed under the average premium regime of the contributory pillar. In order to prevent the value transferred from the Nation to Colpensiones from exceeding 1.2% of GDP, this fund will cover the corresponding surplus. The national government will regulate the operation and administration of the fund and its investment regime.
- Increase in the percentage of additional contributions to be made by contributors with base salaries higher than four SMMLV¹³¹ to the Pension Solidarity Fund.¹³²
- The amounts contributed so far by members under the RAIS will continue to be managed by the PFM's and will be taken into account when calculating the value of the pension.
- Reduction of fifty weeks per child to the minimum number of weeks of contribution required for women who meet the minimum age to receive a pension and do not have the minimum number of weeks required to retire. The benefit is granted for up to three children, i.e., the maximum reduction is 150 weeks. This seeks to compensate for the unpaid care work done by mothers.
- Under the transition regime, the rules of the current pension system will continue to apply to individuals who have at least 1,000 weeks of contributions at the time the law goes into effect.

In addition to the pension reform bill, the Colombian Congress is reviewing two other bills: health reform (filed on 13 February 2023) and labor reform (filed on 16 March 2023).

National Development Plan 2022-2026 (approved on 05 May 2023): the National Development Plan (NDP): Colombia World Power of Life (*Colombia Potencia Mundial de la Vida* in Spanish) presents five axes of transformation: human right to food, land-use planning around water, human security, productive economy for life and the fight against climate change, and regional convergence. In relation to the financial system, the NDP presents strategies such as: 1) pact with the people's and community economy (PCE): mechanisms for financing and promotion of the PCE; 2) promote financial inclusion and sustainable business financing through programs to eliminate gender discrimination and other barriers to getting access to credit; 3) implementation of loans intended for women and young people from public banks; 4) implementation of housing subsidies; 5) creation of the basic value unit (UVB in Spanish) that would be readjusted annually based on the CPI

¹³¹ Currently the plan is as follows (in terms of SMMLV): the additional contribution for 4 to 16 SMMLV is 1.0%; for 16 to 17, it is 1.2%; for 17 to 18, it is 1.4%; for 18 to 19, it is 1.6%; for 19 to 20, it is 1.8%; and for more than 20 it is 2.0%. The reform proposes to increase the additional contribution by 100 bp for all ranges.

¹³² This fund is a special national account attached to the Ministry of Labor. Its resources are allocated to: 1) subsidize pension contributions for groups of the population that do not have access to social security systems; and 2) grant economic subsidies for the protection of individuals in a state of destitution or extreme poverty.

excluding perishable or processed food, or regulated products, certified by DANE; 6) *Banco de la República* is empowered to create benchmark indicators, etc.

4.1.6 Regulations issued by *Banco de la República*

External Resolution 10 (16 December 2022): amends External Resolution 1/2018,¹³³ to allow entities supervised by the FSC to enter into any type of credit derivative with authorized foreign agents that is issued in foreign currency or in legal currency by foreign issuers on foreign or local assets. Previously, this trade was restricted to credit default swap (CDS) contracts only. The purpose of this amendment is to generate symmetries in the regulation applicable to credit derivative transactions and the general principles of the current authorization regime for derivative transactions that allows any instrument to be traded.

As a result, External Regulatory Circular (ERC) DOAM-144¹³⁴ and ERC DODM-398¹³⁵ were updated for: 1) adjust the definition of foreign agents who are authorized for credit derivative transactions; 2) establish the requirements for providing information and the corresponding reports to *Banco de la República* in accordance with the provisions of External Resolution 10/2022; 3) update certain instructions related to the reporting of derivative transactions; and 4) eliminate the exclusion of CDS in the proprietary position and the gross leveraged position, so that all foreign exchange exposures in credit derivatives are part of these calculations.

4.2 Other Regulatory Developments

In addition to the standards described above, other operational standards were issued during the period under analysis to improve the efficiency of regulatory processes and to align current standards with directives from higher levels. The main changes are listed below.

4.2.1 Regulations issued by the FSC

Circular Letter 76 (06 December 2022): requests insurance companies to fill out insurance financial inclusion forms¹³⁶ in order to collect information on the total number of policies issued which, due to their characteristics, can be classified as microinsurance, mass insurance and mass microinsurance.¹³⁷

This information will be useful for the measurement, supervision, and subsequent design of public policies on financial inclusion in insurance and will be part of the Annual Financial Inclusion Report prepared and published by the FSC together with the Bank of Opportunities Program.

¹³³ By which the international exchange regime is compiled and modified. Specifically, Article 65 (credit derivatives) was amended.

¹³⁴ Subject 6: Derivative transactions.

¹³⁵ Subject 22: Macroprudential measures.

¹³⁶ The forms request information on branch (premiums issued by marketing channel); policyholders (basic policyholder variables, number of policyholders by channel and by Sarlaft—*Sistema de Administración de Riesgo de Lavado de Activos y de la Financiación del Terrorismo*, in Spanish—linkage procedure); and access (number of in-person access points to purchase policies, policy characteristics: individual, group, mandatory, voluntary; and level of rurality).

¹³⁷ Microinsurance refers to insurance for low-income individuals or SMEs; mass insurance refers to mass-marketed policies that meet the universality, simplicity, and standardization requirements of Decree 2555/2010, Article 2.31.2.2.2.1, and mass microinsurance includes policies that could meet the characteristics of both microinsurance and mass insurance at the same time.

Circular Letter 13 (13 February 2023): entities supervised by the FSC are reminded of their obligation to accept the certification of the temporary protection permit (TPP)¹³⁸ as a valid identification document for the provision of financial products or services to Venezuelan migrants in Colombia while the TPP is being decided and granted. It also states that as of 01 March 2023, the entities supervised by the FSC may not continue to accept Venezuelan citizens as clients based on the following documents: 1) special residence permit (PEP in Spanish); 2) Special residence permit for the purpose of formalization (PEPFF in Spanish); or 3) special supplementary residence permit.

It also establishes that the entities supervised by the FSC must update the identification document corresponding to those Venezuelan customers who were connected with the entity up to 28 February 2023 using the aforementioned documents. Last of all, it states that the supervised entities must continue to diligently and strictly manage the risk management systems that they are required to comply with.

External Circular 004 (23 February 2023): updates the current instructions related to the information that cooperative entities registered with the Cooperative Entities Guarantee Fund (Fogacoop in Spanish) must provide to financial customers regarding information on Fogacoop's deposit insurance. This is in response to the amendment made by Fogacoop to its Resolution 025/2015 "Unified rule for the corporate purpose" to increase the value of the deposit insurance coverage (maximum insured value per person of COP 25,000,000), and to modify the covered and uncovered claims, along with other provisions.

Circular Letter 014 (07 March 2023): A clarification is made regarding the treatment of interdependent operations and lease subaccounts in the NSFR that applies to CIs, Bancóldex, Findeter, and Finagro.

With respect to interdependent transactions, External Circular 026/2022 establishes that "the maturity and capital amount of both the liability and its interdependent asset must be the same. Consequently, the liability cannot be settled as long as the asset remains on the credit institution's balance sheet."¹³⁹ In this regard, it should be clarified that transactions for which the maturity of the asset is less than or equal to that of the liability in accordance with international standards comply with this requirement. Notwithstanding the above, entities must report the details of interdependent transactions excluded from the indicator.

Furthermore, note that the calculation of the required stable funding (RSF) does not include the CUIF (Unified Financial Information Catalog, in English) 180200 sub-account: "Property, plant and equipment by right of use".

With respect to calculating the NSFR, it is important to note that as of 31 March 2023, the transition regime of weighting factors applicable to some of the items of the available stable funding (established through external circulars 19/2019, 25/2021 and 21/2022) ended.

¹³⁸ Certification adopted under Resolution 4278/2022 by the Special Administrative Unit of Migration Colombia that is granted to Venezuelan nationals while the TPP is being issued.

¹³⁹ Chapter VI, Appendix 4, numeral 2.1, paragraph b, of the BAFC.

4.2.2 Regulations issued by the BVC (Colombian Stock Exchange)

Derivatives Regulation 002 (02 February 2023): adjusts the TES Futures Derivatives Liquidity Providers Program of the Unified Circular of the Derivatives Market in order to modify the program cycles for the year 2023 and the securities subject to the program (TES).

4.2.3 Regulations issued by the Ministry of Housing, City, and Territory:

Resolutions 2223 and 2224 (29 November 2022): decreased the value of the future provisions¹⁴⁰ for interest rate hedging of loans disbursed in 2020 and 2021 for both the hedging program of the Mortgage Portfolio Stabilization Reserve Fund (Frech in Spanish) and the Mi Casa Ya program. In the case of the latter, they raised the 2022 future provision value (approximately COP 6.4 billion).

4.2.4 Regulations issued by Banco de la República

External Regulatory Circular DCIP-83 (16 March 2023): An account is created in the name of foreign financial entities that have the status of banking establishments for exclusive use in Colombian pesos. The funds deposited in these accounts may only be used to make payments in Colombian pesos for the export of services contracted by non-residents who are customers of the account holder (foreign bank). In addition, a monthly report of payments for service exports from Colombian pesos accounts has been created for FEMI to report these transactions.

External Regulatory Circular DCIP-83 (30 March 2023): foreign currency transfers by means of debit and credit cards issued by entities supervised by the FSC have been enabled in order to send workers' remittances. Furthermore, a monthly report of workers' remittance income through debit and credit cards (RMR) has been created for card issuers to report these transactions.

¹⁴⁰ Under the future provisions, territorial entities commit fiscal resources from the budgets of future fiscal years to carry out certain expenditures.

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