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Glossary

OPA: OMO Placement Agent	OPEC+: Organization of Petroleum Exporting Countries and allies
PFM: Pension Fund Managers	PCMVR: National Plan for the Construction and Improvement of Low-Income Rural Housing
TLS: Temporary Liquidity Support	GDP: Gross Domestic Product
BAAAFS: Banking Sector Benchmark Curve for Simple Fixed Rate Securities and AAA Rating	NLP: Net Liquidity Position
BOE: Bank of England	PCP: Proprietary Cash Position
BIS: Bank of International Settlements	LSRR: Liabilities Subject to Reserve Requirements
BVC: Colombia Stock Market	TC: Technical Capital
SLC: Savings and Loan Cooperatives	UAP: Unified Accounting Plan
CDT: Certificates of Deposit	FSR: Financial Stability Report
NSFR: Net Stable Funding Ratio	ROA: Return on Assets
COP: Colombian Pesos	ROE: Return on Equity
CCRC: Central Counterparty Risk Clearinghouses	IMC: Investment Management Companies
CSD: Central Securities Depository	ORMS: Operating Risk Management System
DSGE: Dynamic Stochastic General Equilibrium	SBF: Stock Brokerage Firms
DTF: Fixed Term Deposit Rate	FSC: Office of the Financial Superintendent of Colombia
CI: Credit institutions	TF: Trust Fund companies
ECB: European Central Bank	SMMLV: Minimum Legal Monthly Salary in Effect
EUR: Euros	SCA: Superintendency of Corporate Affairs
Fed: Federal Reserve of the United States	ST: Stress Tests
CIF: Collective Investment Funds	Sysmo: Systemic Stress Model
FNA: <i>Fondo Nacional del Ahorro</i>	TES: Public Debt Securities issued by the General Office of Public Credit and the National Treasury
FRECH: Reserve Fund for Mortgage Portfolio Stabilization	IBR: Interbank Rate
FSB: Financial Stability Board	MER: Market Exchange Rate
GBP: Pounds sterling	USD: US Dollars
NG: National Government	UVR: Units of Real Value
BBI: Banking Benchmark Indicator	VAR: Autoregressive Vectors
QID: Quality Indicator by Default	VeR: Value at Risk
QIR: Quality Indicator by Risk	PH: Priority Housing
ICE: Indicator of Consolidated Short-Term Exposure	LIH: Low-income Housing
FDI: Foreign Direct Investment	WATM: weighted average term to maturity
IIE: Indicator of Individual Short-Term Exposure	
NBFI: Non-banking Financial Institutions	
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	
BDBR: Board of Directors of <i>Banco de la República</i>	
MADR: Ministry of Agriculture and Rural Development	
GFM: Gross Financial Margin	
MHCP: Ministry of the Treasury and Public Credit	
IFRS: International Financial Reporting Standards	
OIS: Overnight Index Swap	

Introduction

Banco de la República's main objective 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 assesses and manages the financial risks in a way that facilitates the economy's performance and efficient allocation of resources while, at the same time, it is able to, on its own, absorb, dissipate, and mitigate the shocks that may arise as a result of adverse events.

This Financial Stability Report meets the goal of giving *Banco de la República's* diagnosis of the financial system's and its debtors' recent performance as well as of the main risks and vulnerabilities that could affect the stability of the Colombian economy. In this way, participants in financial markets and the public are being informed, and public debate on trends and risks affecting the system is being encouraged. The results presented here also serve the monetary authority as a basis for making decisions that will enhance financial stability in the general context of its objectives.

In recent months, several positive aspects of the financial system have preserved a remarkable degree of continuity and stability: the liquidity and capital adequacy of financial institutions have remained well above the regulatory minimums at both the individual and consolidated levels, the coverage of past-due loans by loan-loss provisions remains high, and the financial markets for public and private debt and stocks have continued to function normally. At the same time, a surge in all the types of loan portfolios, a sharp downturn in the non-performing loan portfolio, and a rise in the profitability of credit institutions can be seen for the first time since the beginning of the pandemic.

In line with the general recovery of the economy, the main vulnerability to the stability of the Colombian financial system identified in the previous edition—uncertainty about changes in the non-performing loans portfolio—has receded and remains on a downward trend. In this edition, the main source of vulnerability identified for financial stability in the short term is the system’s exposure to sudden changes in international financial conditions; the results presented in this Report indicate that the system is sufficiently resilient to such scenarios.

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 the flow of sufficient credit and liquidity resources, and further the smooth functioning of the payment system.

Leonardo Villar Gomez
Governor

Executive Summary and Vulnerability Analysis

Between the second and third quarters of 2021, a new stage in credit trends in the Colombian economy began. For the first time since the beginning of the pandemic, an upswing for all types of portfolios, a sharp downturn in the risky portfolio, and rising profitability for credit institutions (CI) were seen simultaneously. These trends have occurred in a context of changes in economic and financial policy. At the end of August, the Office of the Financial Superintendent of Colombia brought the Debtor Assistance Plan (PAD) to an end; *Banco de la República*, in turn, raised the benchmark interest rate at the end of September and, although the Bank has largely preserved extraordinary liquidity facilities, the financial system has made little use of them.

Several essential components have preserved a remarkable degree of continuity and stability in this new phase. The liquidity and capital adequacy of financial institutions have remained well above the regulatory minimums at both the individual and consolidated levels. The coverage of non-performing loans by loan-loss provisions is still high. The financial markets for public and private debt and stocks, in turn, have continued to function normally, and this has contributed to the stability of collective investment funds (epicenter of the financial volatility at the beginning of the pandemic).

The credit recovery, in turn, reflects both increased demand for and supply of credit. Banks' lending requirements have been reduced in recent quarters, a trend that is likely to continue in the short term. Credit disbursements are very close to those seen prior to the pandemic. In the case of the housing segment, they are at all-time highs. Although commercial credit is the weakest among the portfolio types, it began, as of the first half of 2021, to flow strongly to those companies that saw their access to credit curtailed in 2020.

The results of this Financial Stability Report allow to conclude that, in line with the general recovery of the economy, the main vulnerability for the stability of the Colombian financial system identified in the previous edition, i.e., uncertainty about the non-performing loans portfolio and credit risk, has receded and remains on a downward trend. This is reflected in the lower growth of the risky portfolio and in the higher reimbursements of loan-loss provisions and loan recoveries. In any case, credit institutions now have a weaker starting point than in the past. Although profitability and portfolio quality are improving, they are still at low levels. In addition, the percentage of companies considered fragile remains at high levels. This is relevant in view of the main vulnerability for financial stability that has emerged in the short term and been identified in this edition: the exposure of credit institutions to sudden changes in international financial conditions in a context of fiscal deficit and current account deficit (expected to increase in the short term).

In order to study the ability of financial institutions to cope with these vulnerabilities, this Financial Stability Report performs stress tests that assess the response of credit institutions and open-ended collective investment funds to extreme hypothetical scenarios that reflect the vulnerabilities described. The results indicate that, in spite of the decline in profitability, the increase in the risky portfolio, and the reduction in liquidity that is likely to be seen in these scenarios, the aggregate financial system still has the ability to absorb additional shocks. Nonetheless, the weaker starting point for credit institutions implies that the impact of the extreme hypothetical scenario would be relatively high. The greater liquidity of mutual funds, in turn, makes them more resilient to extreme scenarios.

1. Analysis: heat map and vulnerability matrix

Table A and Graph A, respectively, show the vulnerability matrix and the risk map of the financial system. The vulnerability matrix presents a detailed summary of the evolution of the main vulnerabilities faced by CIs. The table shows the direction of the change in each of the vulnerabilities, their origin, and mitigating factors during the past six months. The risk map, in turn, enables to simultaneously view the changes in different variables grouped into specific categories that include the performance of financial institutions, different financial risks, and macroeconomic risks over time. Each variable is represented using a color scale that assigns colors and shades based on the historical behavior of the variables and some expert judgments. Thus, reddish tones indicate times when a variable is at risky levels while green tones indicate periods of lower risk. For some variables, such as asset price indices or credit cycle indicators, which reflect risks both when they exhibit




high values and when they show low ones, blue shades are used to indicate the risk of low activity in the respective markets.¹

First, the fragility of financial institutions is low and has remained stable since the last edition of the Report. This is due in particular to the fact that the capital adequacy and liquidity of CIs remain at high levels, which can be seen in the green shades for CI capital adequacy and the liquidity risk category on the risk map. Although in terms of profitability indicators for both CIs and NBFIs are close to their lowest levels since 2005, they have been showing signs of recovery in recent months, as indicated by migrations from reddish to orange tones.

With respect to credit risk, this vulnerability is at historically high levels and is reflected in the reddish tones of most of the indicators in the credit risk category, although the provisioning made by CIs during the Covid-19 crisis is an important mitigating factor for this risk (green tones in the coverage indicator). However, the incidence of this risk is decreasing as suggested by the most recent evolution of the risky and non-performing loan portfolios and is reflected in the increasingly lighter shades of red in this category of the risk map.

Lastly, the vulnerability of the financial system to sudden changes in international financial conditions is on the rise. This can be seen in the reddish tones in the macroeconomic variables category that reflect the deterioration of economic activity during the crisis, the high external deficit, and the high fiscal deficit. In addition, the orange tones under foreign participation in the public debt market indicate that the functioning of this market is highly exposed to international financial conditions.

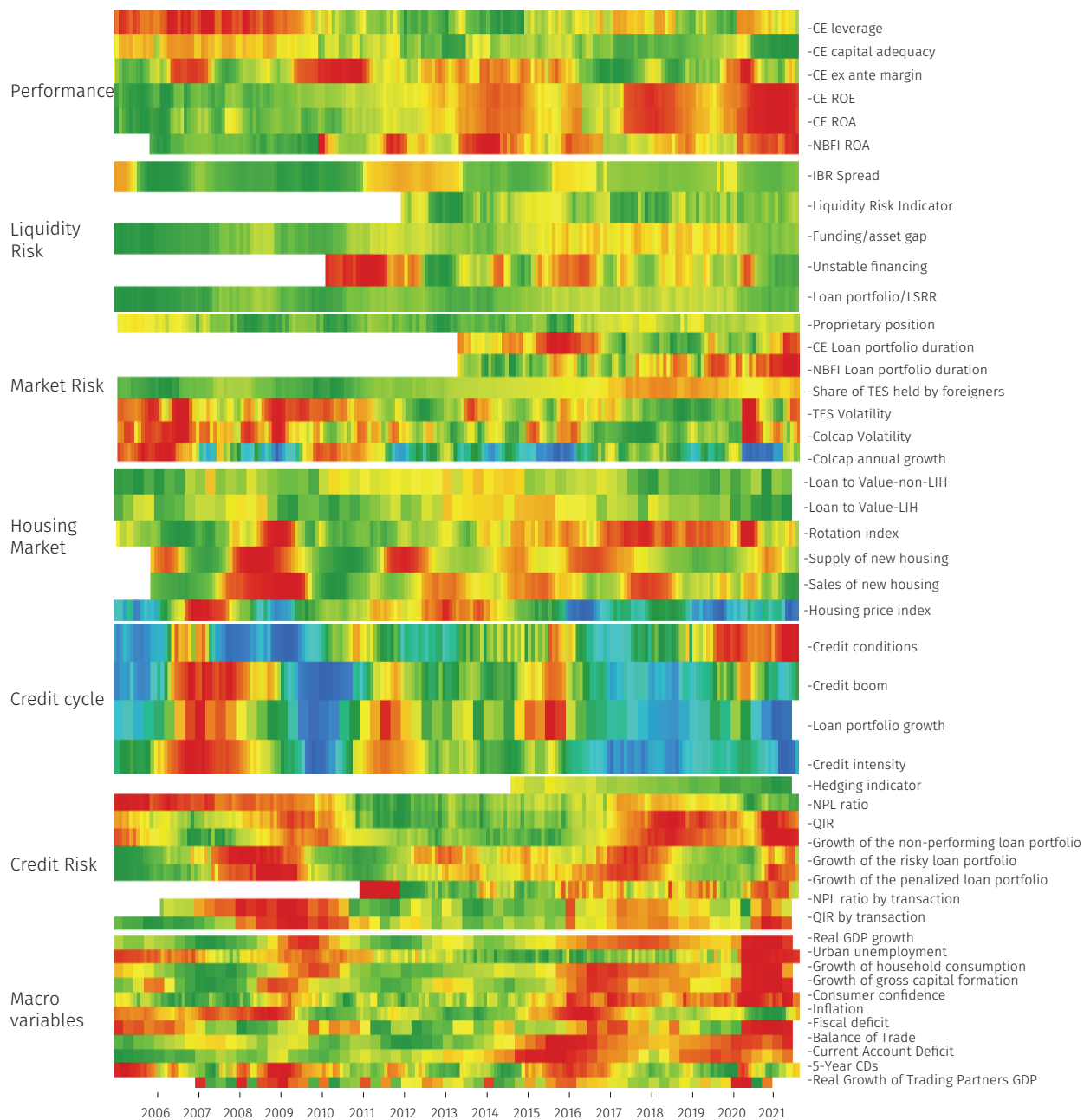
Table A
Financial Stability Vulnerability Matrix

Risks	Origin	Mitigating factors	Direction
1. Fragility of Financial Institutions	<ul style="list-style-type: none"> • Low profitability levels 	<ul style="list-style-type: none"> • High capital adequacy levels • High liquidity levels • Rising profitability 	
2. Credit Risk	<ul style="list-style-type: none"> • High default levels 	<ul style="list-style-type: none"> • Slowdown in the Non-Performing and Risky Portfolios • High level of portfolio loan-loss provisioning 	
3. Exposure to sudden changes in international financial conditions	<ul style="list-style-type: none"> • Large external deficit • Large fiscal deficit • High volume of public debt in the hands of foreigners 	<ul style="list-style-type: none"> • Recovery of the economy • Resilience of the financial system to a stress test under a scenario of a foreign funding cut-off 	

Source: Banco de la República

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

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.

01

Macroeconomic Environment

The outlook for global economic growth is still being framed within a context of recovery although it is beginning to lose momentum in some jurisdictions, and several factors have been identified that could lead to lower-than-expected growth.

The real global economic growth rate projected by the International Monetary Fund (IMF) in its October 2021 World Economic Outlook (WEO) report stands at 5.88% for this year (Graph 1.1, panel A). This value is equivalent to a downward correction of 10 basis points (bp) with respect to the April 2021 update of the report and reflects a weakening of the recovery mainly due to the resurgence of infections caused by the delta variant of the virus as well as disruptions in the supply chains.

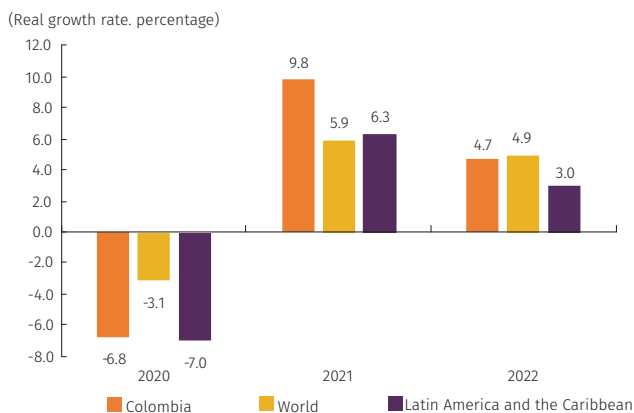
In addition, the short-term growth outlook is facing downturn risks in a context where the possibility of a virus mutation that is more transmissible and lethal before vaccination is widespread persists. This is in a context in which low-income countries have only succeeded in immunizing 5.0% of their population on average by the third quarter of 2021.

Moreover, the potential persistence of disruptions in supply chains, inflationary pressure that may cause a faster-than-anticipated rise in interest rates, greater social unrest, climate shocks, less fiscal space as well as market volatility due to idiosyncratic factors in establishing the U.S. debt ceiling, and the dynamics of the real estate sector in China are some of the risks that the consolidation of the expected economic recovery faces.

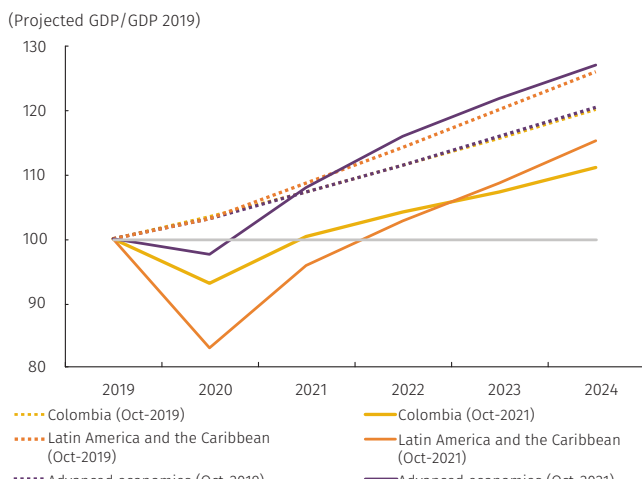
In contrast to the downward correction of the global outlook, the IMF raised the projected short-term growth for the Latin American and Caribbean region. Nevertheless, the medium-term outlook suggests that the pandemic will have

Graph 1.1

A. Growth Rates for Colombia, Latin America and the Caribbean, and the World



B. Medium-Term GDP Outlook



Note: the projections for Colombia in panel A were prepared by the technical staff at Banco de la República. The figures for the world and Latin America and the Caribbean come from the World Economic Outlook.
Source: World Economic Outlook (October 2019 and 2021).

lasting effects on production levels in addition to the slow recovery of employment and reduced fiscal space.

The region is expected to exhibit a 6.34% real growth rate for 2021 (Graph 1.1, panel A), which corresponds to an increase of 1.7 percentage points (pp) in this forecast with respect to the April 2021 projection. The medium-term outlook, in turn, indicates that the Covid-19 shock will have lasting effects on the production levels in these economies (Graph 1.1, panel B). While the advanced economies are likely to resume their pre-pandemic growth trend in 2022, this is not expected to happen in the economies of the region during the period under analysis (2021-2024).

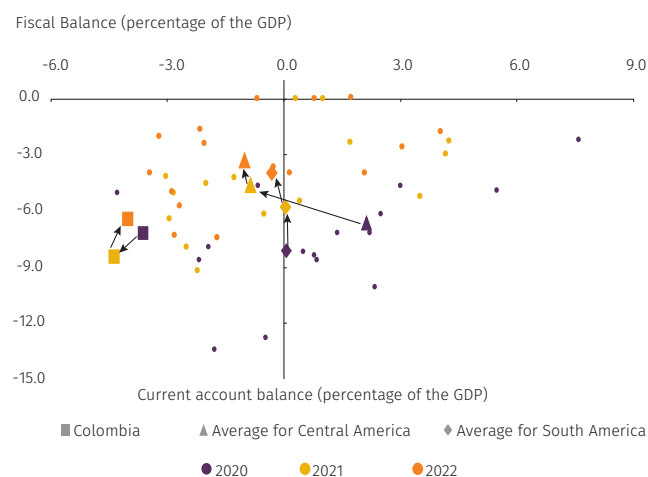
Reduced fiscal space and inflationary pressure pose significant challenges in the quest for a sustained recovery and a reduction in the adverse effects of the pandemic on medium-term growth. In addition to the above, there is the potential materialization of the risk factors mentioned before that may affect global growth and the conditions of access to financing.

An economic recovery is also expected in Colombia in the short term: the technical staff at Banco de la República estimates an 9.8% growth rate for 2021. However, in addition to the aforementioned risk factors for the region, there has also been an increase in the economy's external deficit.

The IMF outlook suggests that Colombia's growth in 2021 will be higher than the average for the economies in the region (Graph 1.1, panel A). Nevertheless, the IMF's medium-term forecasts indicate that by 2024 the level of local production is likely to be 11.08% below the expected level in the October 2019 WEO for that same year.

Moreover, the combination of high fiscal and external deficits in comparison to the economies in the region makes these variables a key factor for understanding changes in the cost of financing and the flow of these resources to the economy (Graph 1.2). In line with this, Colombia's long-term foreign currency debt was downgraded from investment grade by the rating agencies Standard and Poor's (S&P)

Graph 1.2
Fiscal (General Government) and Current Account Balances in Latin America and the Caribbean



Note: the points correspond to South American countries (excluding Suriname and Guyana) and Central American countries in which Colombian banks have a stake: Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, and the Dominican Republic. Each of the 2020 values and the outlook for 2021 and 2022 are presented with a different color: orange corresponds to 2020, violet to 2021, and yellow to 2022. Note also the figures with different shapes, where the squares illustrate Colombia; the rhombi, the South American mean; and the triangles the Central American mean. The X axis shows the current account balance as share of GDP, which represents transactions between the economy and the rest of the world in goods and services, income, and current transfers. The Y-axis shows the fiscal balance as a share of GDP and is calculated as the difference between general government revenues and expenditures.

Source: World Economic Outlook Database, October 2021.

and Fitch Ratings² during 2021 while Moody's Investors Service³ maintained its investment grade status in a communiqué issued after the approval of the fiscal reform, called *Ley de Inversión Social*, which seeks to improve the country's fiscal metrics.

The poor profitability and higher exposure to credit risk suggest that the financial system is in a weaker position compared to the pre-pandemic period.

Credit institutions (CIs) in the aggregate have liquidity and capital buffers that are well above their regulatory limits despite the observed deterioration on their profitability, and on the credit quality and non-performing loans indicators. The latter indicators have improved over the last half of the year but are still far from the values seen at the end of 2019. Specifically, during this window of time the return on assets (ROA) index went from 1.84% to 1.39%, the non-performing loans (NPL) from 4.80% to 4.94%, and the quality indicator by risk (QIR) from

9.16% to 10.33%. This takes place in a context in which the recovery of employment and investment are lagging behind that of the GDP, the Debtor Assistance Plan (PAD in Spanish) was brought to an end in August 2021, and the Clean Slate Law (*"Borrón y cuenta nueva"*, in Spanish), which makes it difficult to classify debtors in the system at the outset, went into effect.

The stress tests exercises elaborated in this report on CIs and open-ended collective investment funds suggest that these institutions could continue with their usual functions in an adverse scenario without falling short of their prudential requirements in aggregate terms.

The resilience of the financial system is evaluated in Chapter 3 of this report using a hypothetical adverse scenario that, in accordance with the risks described, emphasizes the high vulnerability arising from the Colombian economy's dependence on external sources of

2 S&P and Fitch Ratings downgraded the country's long-term foreign currency debt rating from BBB- to BB+ with a stable outlook in May and July 2021 respectively. Fitch Ratings also downgraded the long-term local currency debt rating from BBB- to BB+.

3 In the report issued on 06 October 2021, the rating agency held Colombia's sovereign rating at Baa2 and changed the outlook from negative to stable.

financing. This is modeled by an abrupt change in the risk appetite of international investors for local assets, which materializes in a cut-off of external financing for the economy together with a slower-than-expected pace of recovery in 2021 and a reduction in the production level in 2022.

The usefulness of the exercise lies in providing an estimate of the potential losses that could be seen in this scenario and revealing the possible transmission channels through which the vulnerabilities identified could end up affecting financial stability. The results indicate that, in this stress scenario, there would be negative effects on aggregate indicators of total and core capital adequacy ratios although they would remain at levels above the regulatory limits during the period of the exercise. However, at the individual level, there will probably be a broad range of heterogeneity in the performance of these indicators. In addition, the loan portfolio and aggregate profitability of the CIs could present significant deterioration which would reflect the impact that the hypothetical adverse scenario could have on the ability of these entities to grant loans and do their intermediation work.

Regarding open-ended collective investment funds, there has been a recovery on the assets under management by these funds and an improvement in their liquidity metrics in the recent period. The latter is in line with the results of the reverse stress testing exercise which suggest that, by September 2021, withdrawals of 10% of their managed resources could jeopardize compliance with prudential liquidity limits for a set of funds representing 20% of the total assets of these investment vehicles. The above represents an improvement over what was reported six months ago. A 6.0% withdrawal of assets would have had a similar impact.

The results of the stress testing exercises are obtained from hypothetical scenarios that use a set of restrictive assumptions and do not consider potential policy responses that the various authorities who share a macroprudential objective could implement. Therefore, it is 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 and a smaller magnitude of the shock, the impact on financial stability will presumably be lower.

02

Vulnerabilities of the Financial System

This chapter assesses the general situation of financial institutions over the course of 2021 in a context of economic recovery. An overview of the financial system and an analysis of its exposure to credit, market, liquidity, and interest rate risks is presented below.

2.1 Current Situation of the Financial System

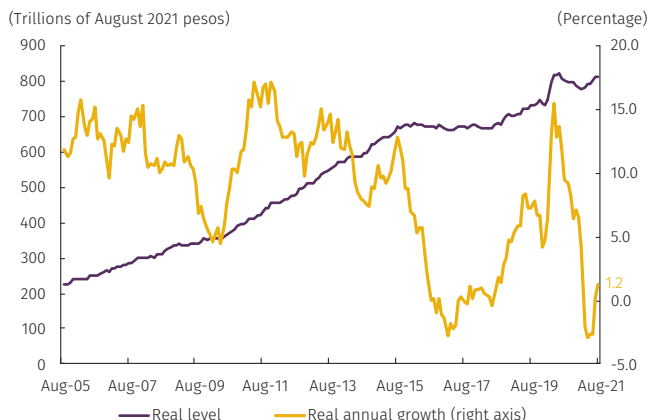
Since the beginning of the second quarter in 2021, the dynamics of the balance sheet of credit institutions (CIs) has rebounded, mainly due to the performance of the loan portfolio, particularly of the commercial and consumer loans.

As of August 2021, the CI assets came to COP 810.6 trillion (t) and, starting April 2021, their real annual growth rate reversed the downward trend they had been presenting since the same month in 2020⁴ and returned to positive levels (Graph 2.1, panel A). The greater growth of assets over the last few months of analysis was mainly due to the performance of the loan portfolio, which accounted for 66.5% of total assets (Graph 2.1, panel B).

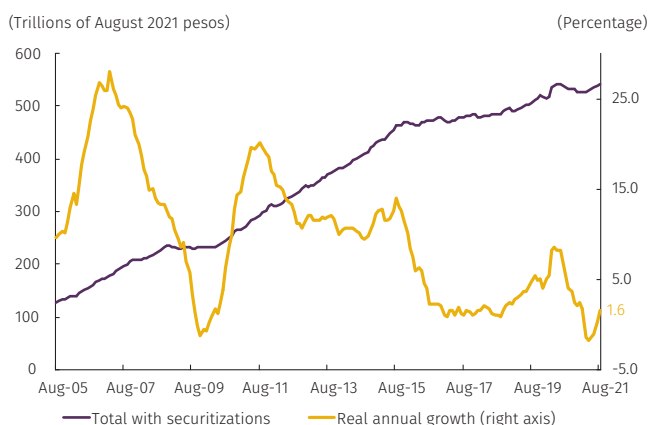
The recovery in the expansion rate of the total loan portfolio was due to greater upswings in all loan types, especially commercial and consumer loans which

⁴ The real growth was calculated by using the consumer price index (CPI) excluding food.

Graph 2.1
A. Credit Institutions' Assets



B. Total Loan Portfolio



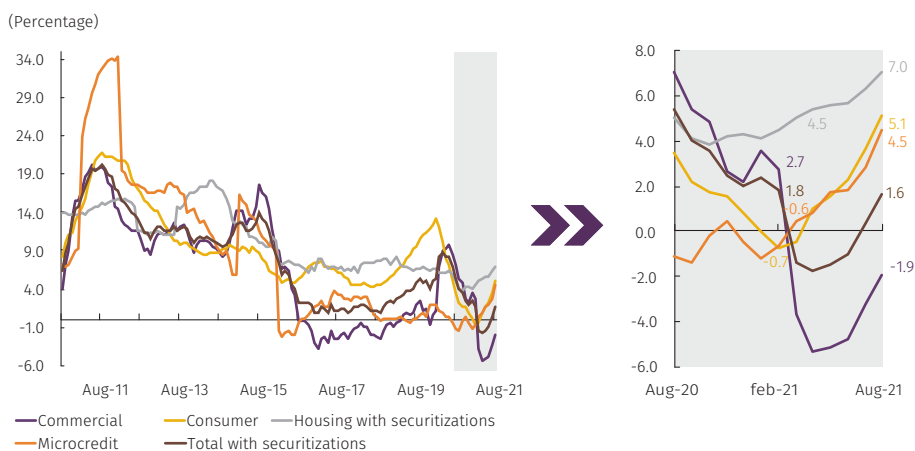
Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

together account for 82.6% of the total portfolio (Graph 2.2). Although the commercial portfolio has begun to show an upturn, it is the only one that is still registering a negative growth rate.

The credit risk indicators for all loan categories experienced declines after peaking at the end of 2020 and beginning of 2021.

In a context of economic recovery where the gross loan portfolio is growing at a faster pace and the risky and past-due portfolios are slowing down, traditional credit risk indicators (QIR and NPL) have improved after reaching their peak at the end of 2020 and the beginning of 2021 (Graph 2.3, panels A and B). This trend has been widespread across all types of loans. The consumer loan portfolio stands out since its indicators have declined the most after having experienced the greatest deterioration. In spite of the observed decreases, the levels of the indicators are still above those registered prior to the onset of the pandemic (February 2020), except for the NPL of the commercial and housing loan portfolios. When write-offs net of recoveries are included to calculate the indicator, it is clear that the reduction of the total loan portfolio NPL between February and August is greater than the one seen for the NPL that does not take this item into account, due to a slowdown in write-offs and an increase in recoveries (Graph 2.3, panel C).

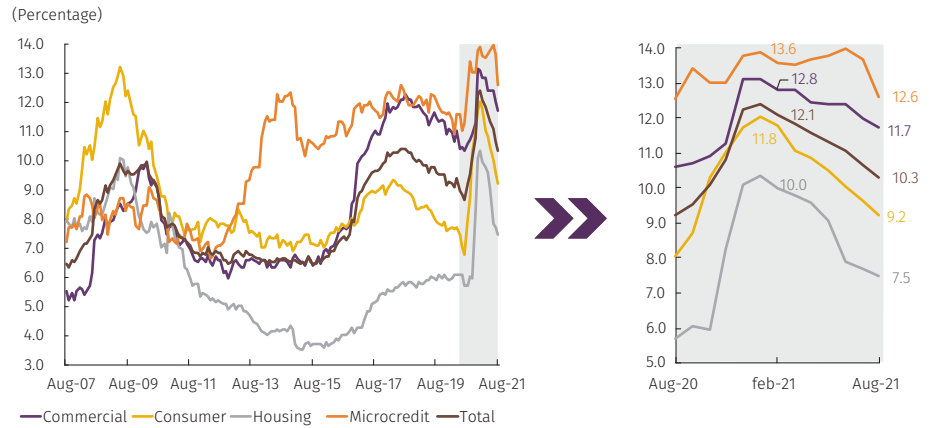
Graph 2.2
Real Annual Growth of the Gross Loan Portfolio



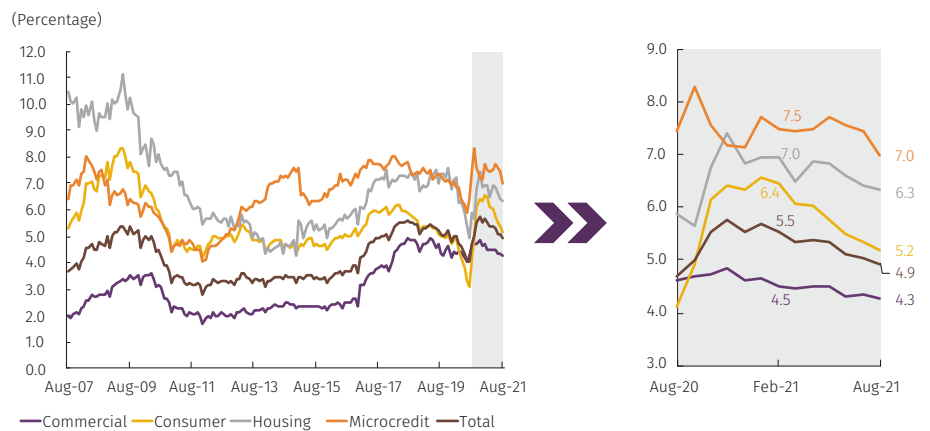
Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

Graph 2.3
Credit Risk Indicators

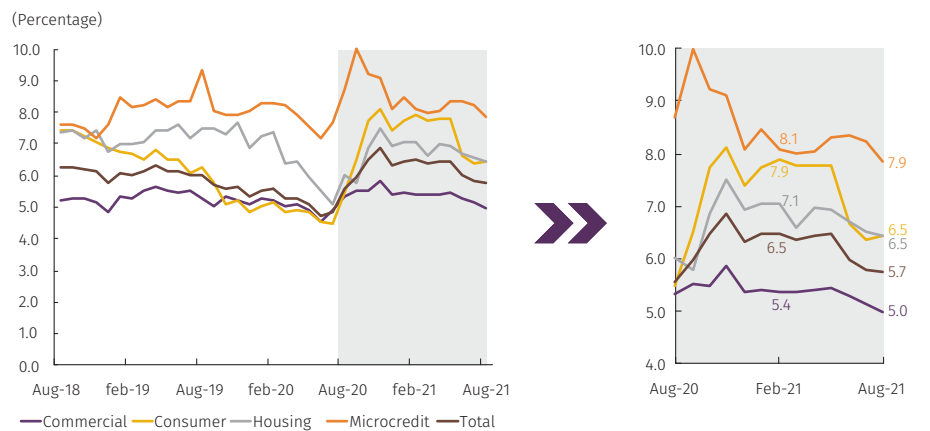
A. Quality Indicator by Risk (QIR)



B. Non-Performing Loans Indicator (NPL)



C. NPL with 12-Month Cumulative Write-Offs Net



Note: NPL with write-offs = (past-due loan portfolio + accumulated write-offs in the last 12 months net of recoveries) / (gross loan portfolio + accumulated write-offs in the last 12 months net of recoveries).
Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

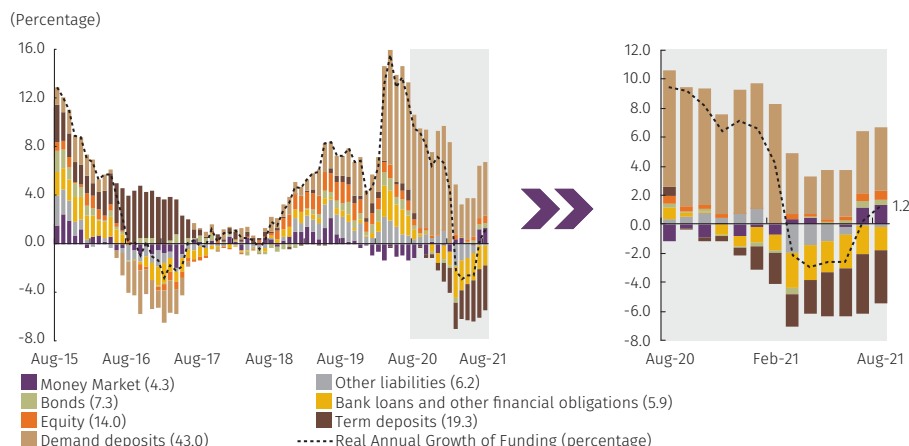
The improvement in credit risk indicators coincided with the culmination of the Debtor Assistance Program (PAD in Spanish) in August 2021. PAD, created by means of the External Circular 022/2020 published by the Office of the Financial Superintendent of Colombia (SFC) and renewed by External Circulars 039/2020 and 012/2021, functioned as a mechanism for credit risk management by supporting the design of structural solutions for debtors through redefining the terms of their loans and thus recognizing differences in the degree to which their income or payment capacity was affected as a result of the Covid-19 shock. Under PAD, more than 2.2 million debtors, including households and companies, redefined the terms of their loans. This represented 6.7% of the total loan portfolio balance as of September 2021.

Following the slowdown experienced since April 2020, growth in CI funding has picked up since July 2021, mainly due to higher growth in demand deposits and money market operations.

During the first half of 2021, the growth of CI funding reached negative levels, mainly due to a slowdown in demand deposits and a greater reduction in term deposits. However, after having registered a downward trend in its rate of expansion since April 2020, it rebounded in July and August 2021 due to a higher growth in demand deposits, money market operations, equity, and bonds.

In the midst of a situation in which the economy is recovering, the profitability of CIs has been improving, while both capital adequacy and aggregate liquidity continued to stay well above their regulatory minimums.

Graph 2.4
Real Annual Growth of Funding and Contribution of its Components

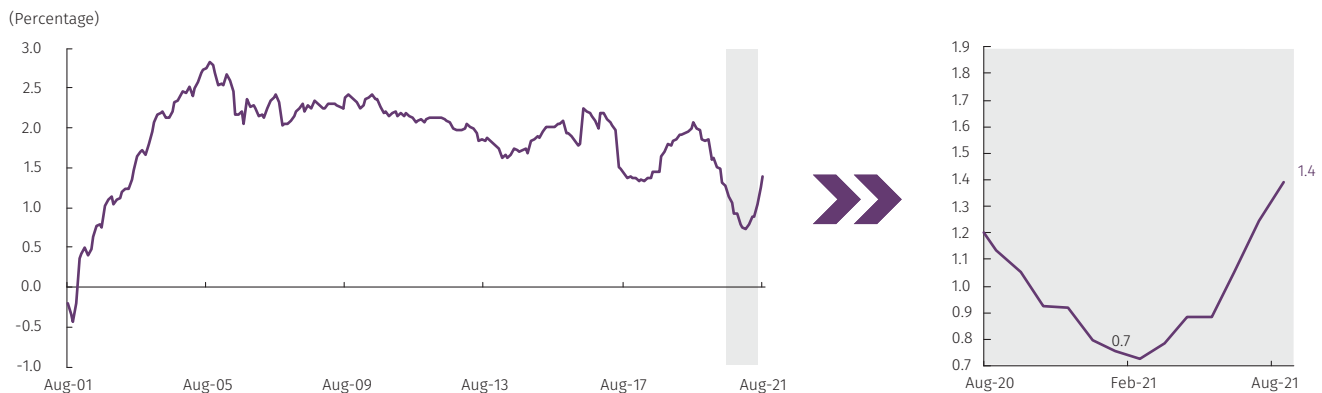


Note: the share of each component in funding (liabilities + equity) is in parenthesis with August 2021 as a cut-off date.
Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

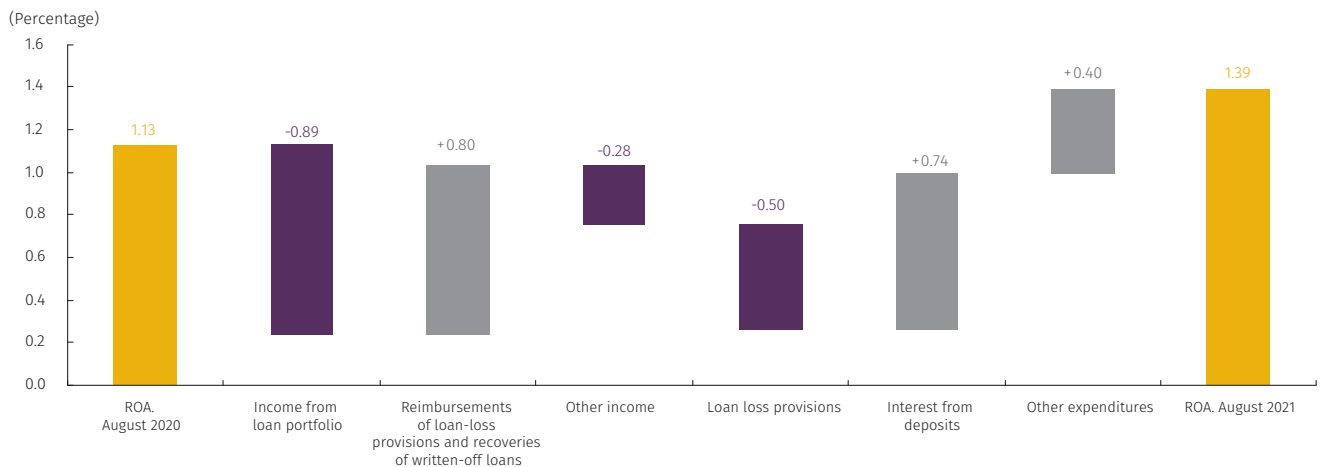
Between February and August 2021, the CIs' return on assets (ROA) reversed the downward trend it had been on since September 2019 although it still registers levels below the ones observed previous to the onset of the pandemic (Graph 2.5, panel A). The increase in profitability mainly resulted from an increase in the reimbursement of loan loss provisions and recoveries from written-off loans as well as a reduction in interest paid on demand deposits (Graph 2.5, panel B).

Graph 2.5

A. Return on assets (ROA)



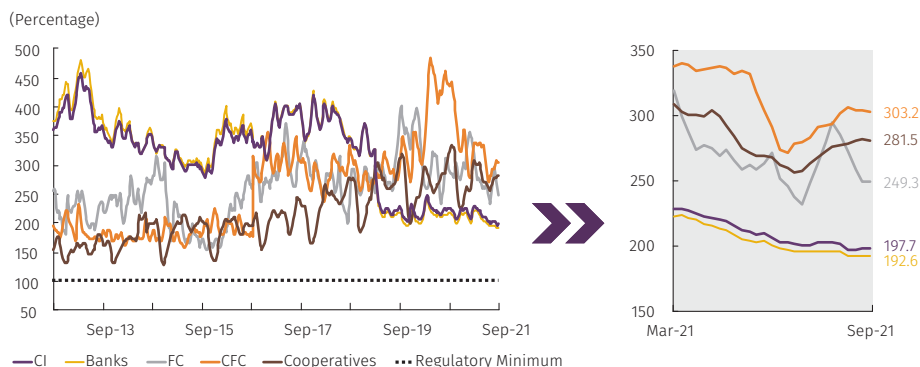
B. ROA Breakdown



Note: other income includes commissions and fees, net valuation of derivatives, net changes, among others. Other expenses include administrative and labor expenses, taxes, among others.
 Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

In terms of liquidity, the 30-day risk indicator (LRI) declined for all types of entities between March and September 2021, but did so to a greater extent for financial corporations (FCs) and financing companies (CFCs). Despite the above, aggregate liquid assets continue to significantly exceed the value of net liquidity requirements (Graph 2.6). Regarding the institutions' equity soundness, total capital adequacy and Common Equity Tier 1 ratios are still well above their regulatory minimums and have remained relatively stable since February 2021. The consolidated

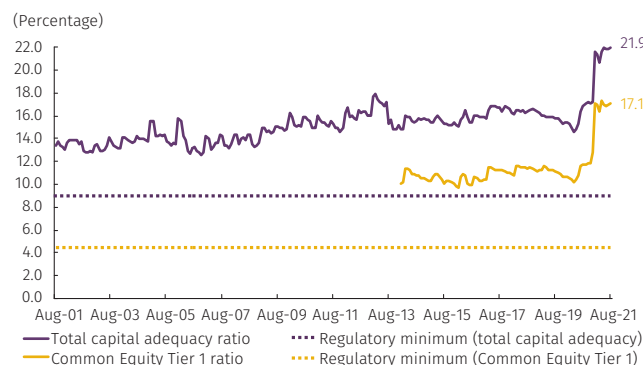
Graph 2.6
Simple Average 30-day Liquidity Risk Indicator (LRI) for CIs^{a/}



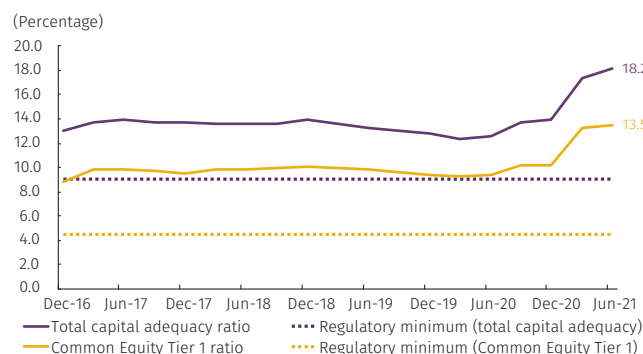
a/ Simple average of the last four weeks.
Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

Graph 2.7
Total Capital Adequacy and Common Equity Tier 1 Indicators

A. Individual capital adequacy



B. Consolidated capital adequacy



Note 1: the 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. In addition, as part of this process, the FSC allowed these to be adopted early by the entities on a voluntary basis starting in the second quarter of 2020. Based on the above, BBVA initiated early alignment in June, Banco Agrario and Tuya in July; Credifinanciera, Bancompartir, GM, Coltefinanciera, and Bancoldex in August; and Banco Falabella in September 2020.

Note 2: with the introduction of the new regulations in 2021 (2022), the limits, including conservation buffers for total, additional Common Equity Tier 1, and Common Equity Tier 1 adequacy ratios are: 9.375% (9.75%), 5.25% (6.0%), and 4.875% (5.25%) respectively. For systemically important entities, an additional 25 bps (50 bps) are required. 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.

Note 3: consolidated capital adequacy data are quarterly and, therefore, are presented in a separate graph from individual capital adequacy data.
Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

and Common Equity Tier 1 consolidated capital adequacy ratios, in turn, have a similar trend to the individual ones, although at lower levels (18.2% and 13.5% respectively as of June 2021, Graph 2.7, panel B).

2.1.1 Non-banking Financial Institutions

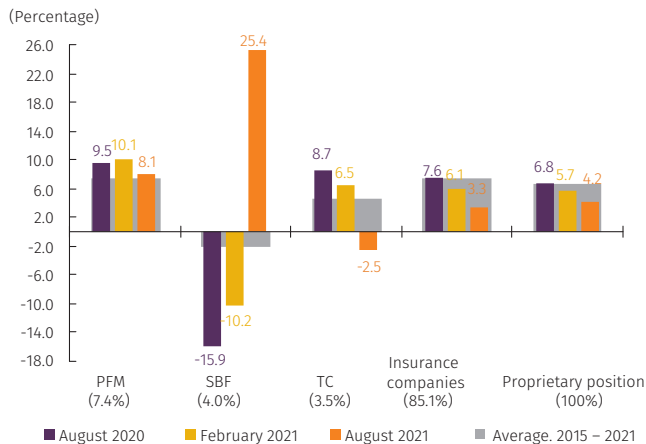
During the past year, the assets in the proprietary position and in the managed portfolio by non-banking financial institutions experienced a slowdown.

In August 2021, the assets of the non-banking financial institutions (NBFI) in their proprietary position, which represented 5.0% of the financial system’s total assets, were still following the downward trend they have been on since the pandemic began (Graph 2.8, panel A). By type of institution, the growth rate of insurance companies and trust companies (TC) s slowed down with the latter showing negative rates. In contrast, the pension fund managers (PFM) have been showing stable growth and the stock brokerage firms (SBF), a recovery trend.

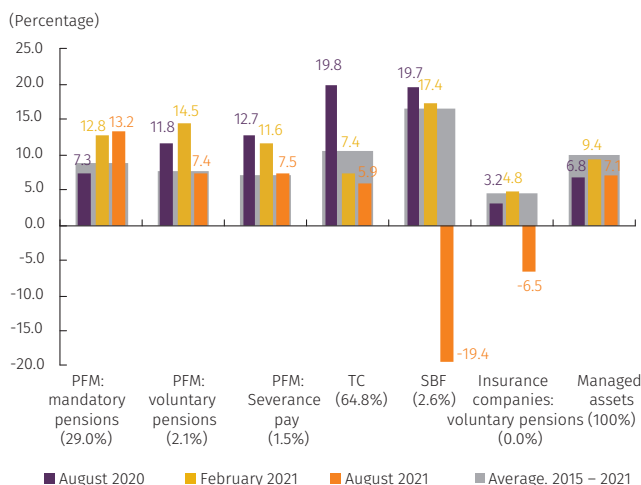
The portfolio managed by NBFIs, which represents 51.3% of the total financial system assets is showing a slight downturn (Graph 2.8, panel B). Reductions in the growth rate have been seen for most types of institutions since

Graph 2.8
Change in Real Annual Growth of NBFi Assets

A. In proprietary position



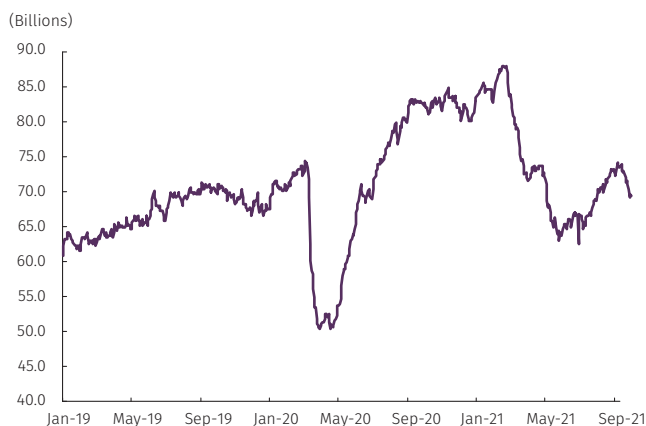
B. In managed assets



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

Graph 2.9
Open-ended Collective Investment Funds

A. Total Assets



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

April 2021 with the exception of mandatory pensions, which have been on an upswing since July 2020.

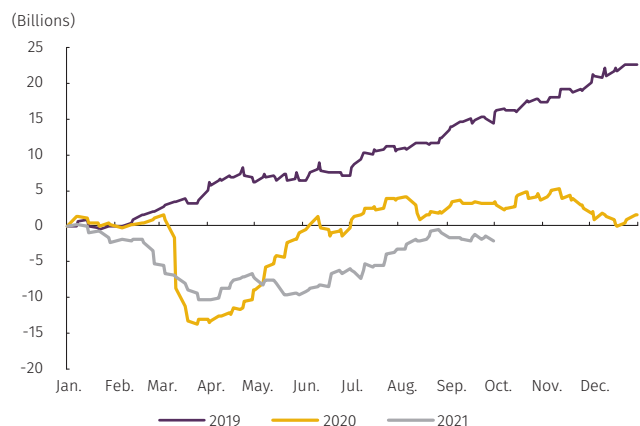
After a period of significant withdrawals, the asset of collective investment funds began to show signs of recovery, although it remains at levels below those observed prior to the coronavirus pandemic.

After reaching a record high (COP 87.9 b), the assets of open-ended collective investment funds (CIF) managed by TC, SBF, and IMC decreased between February and May 2021 to levels that have not been seen since the beginning of 2019. Recently, they have been showing signs of recovery and have reaching pre-pandemic levels. The reduction in assets is mainly due to redemptions, whose maximum value in 2021 represented 74.6% of the withdrawals experienced in the worst week of 2020. By September 2021, cumulative net contributions were close to the levels registered at the beginning of 2021.

The NBFi's investment portfolio presented slowdowns that are mainly due to the performance of fixed-income securities.

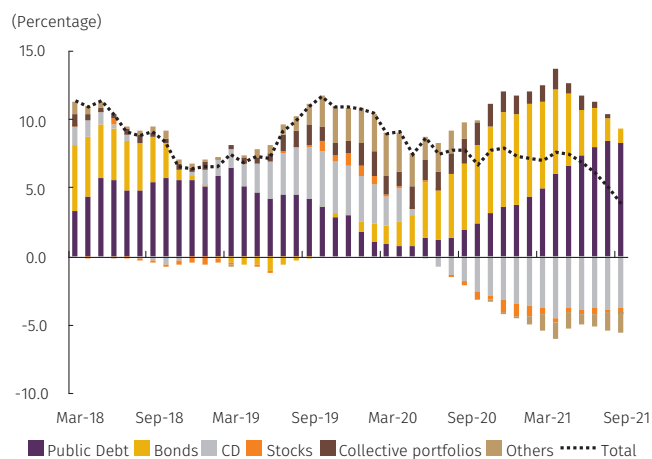
The insurers' proprietary portfolio registered lower growth rates. Life insurance reacts to the trend of bonds and CDs and are slightly offset

B. Cumulative Net Contributions

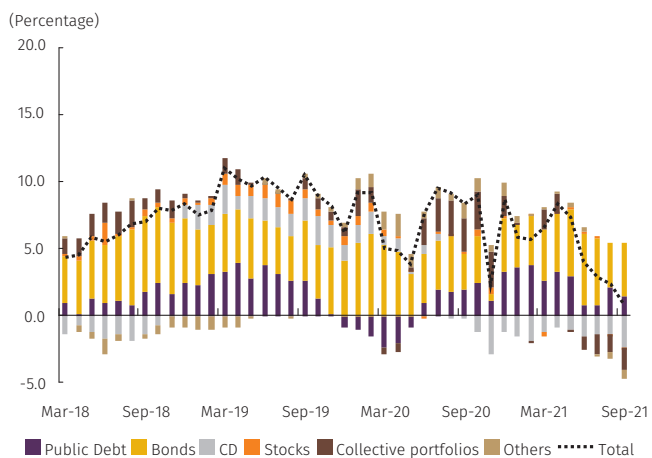


Graph 2.10
Real, Annual Growth of Loan Portfolio in Proprietary Position

A. Life Insurance



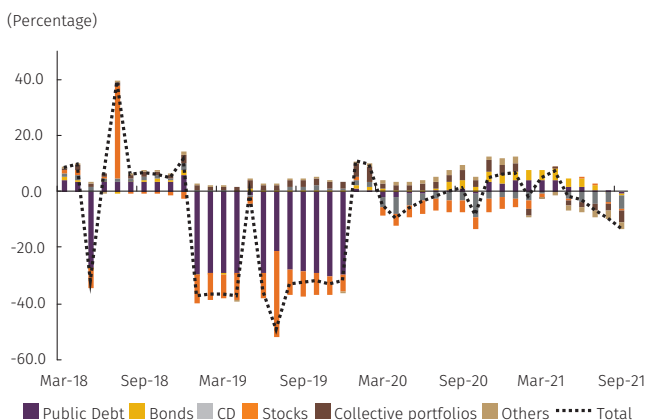
B. General Insurance



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

Graph 2.11
Real Annual Growth of Managed Portfolio

A. Trust Companies



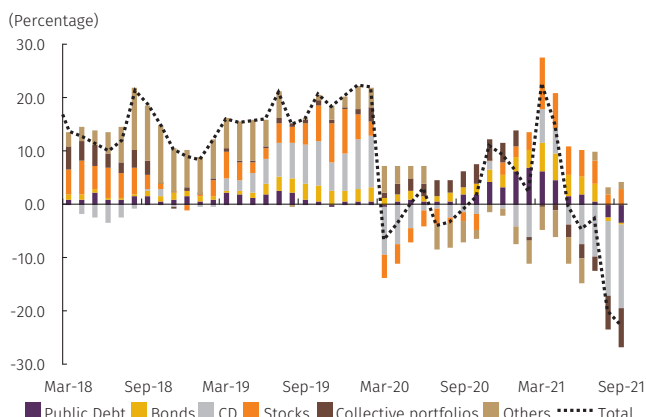
Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

by surges in the TES portfolio. Meanwhile, for general insurance companies, public debt explains the sluggishness of the investment portfolio (Graph 2.10). The portfolio managed by TC and SBF, in turn, shows negative growth rates spurred by reductions in investments in CDs and collective portfolios (Graph 2.11). In contrast, investments managed by the PFM are showing high growth rates due mainly to the collective portfolios and other investments. These offset the shrinking of investments in TES, one of the most representative items in this portfolio.

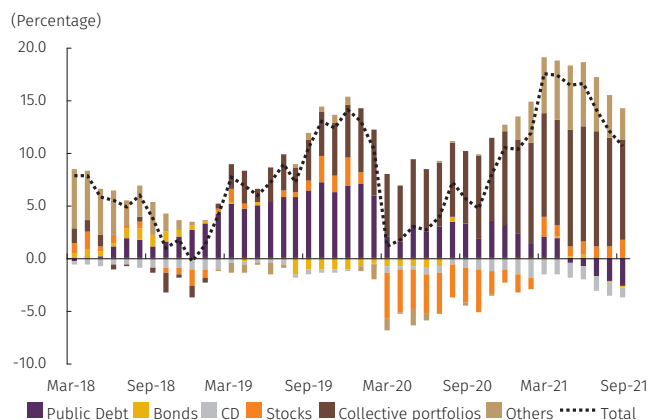
Over the course of the year, the profitability of insurance companies continued to decrease, and for institutions that manage investment portfolios, there was a reversal in the positive trend they had been exhibiting.

Graph 2.11 (continued)

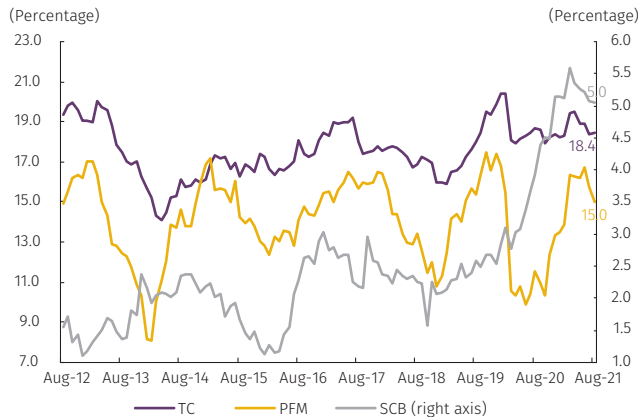
B. Stock Brokerage Firms



C. Pension Fund Managers

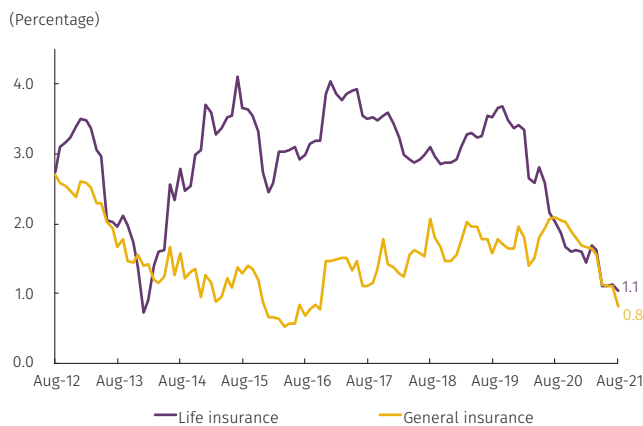


Graph 2.12
ROA of TC, SBF, and PFM



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

Graph 2.13
ROA of Insurance Companies



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

The growth trend in the profitability of the PFM and the SBF reversed itself in April 2021 while ROA for TC kept fluctuating around 18%. In any case, during the last five months, all three types of institutions showed reductions in their profitability. This was mainly due to increases in administrative and labor expenses (ALC) and lower valuation of the investment portfolio.

With respect to insurance companies, profitability continued its negative trend (Graph 2.16). In the case of life insurance, this is explained by a significant increase in claims payments, and in general insurance, the main contributors to this reduction were higher reinsurance costs, lower investment valuation income and a higher ALC (Graph 2.13).

2.2 Credit Risk

The analysis of credit risk presented below is divided between the corporate sector and households. In the first sub-section, the development of corporate sector indebtedness, the perception and materializing of credit risk for private companies, and their financial situation are analyzed by economic sector. 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.

2.2.1 Corporate Sector⁵

2.2.1.1 Change in corporate sector indebtedness

In the first half of 2021, the corporate sector lowered its indebtedness as a percentage of GDP. This was explained by the economic recovery seen during this period. Nevertheless, this indebtedness remains at historic highs. The percentage of private corporate sector debt in foreign currency with foreign exchange risk mitigation mechanisms had decreased as of June 2021.

⁵ Due to the availability of information from the FSC Format 341, "Individual Information by Debtor: Active Credit Transactions," the figures in this section are presented as of June 2021.

As of June 2021, the total indebtedness of the corporate sector as a share of annualized GDP stood at 62.8%, which represented a 0.8 pp reduction with respect to what had been seen in December 2020. This reduction is a result of the economic recovery seen during the first half of 2021.⁶ Nevertheless, indebtedness remains at historic highs.

The private corporate sector⁷ contributed 53.6 pp of the total debt while the public sector contributed the remaining 9.2 pp. Between December 2020 and June 2021, the former presented a decrease characterized by a lower share of indebtedness with domestic financial institutions and bonds issued in the local market. The public corporate sector saw a reduction in a context of a lower share of loans with foreign financial institutions.

When indebtedness is analyzed by type of currency, private companies continued to keep the majority of their debt in pesos (62.0%). The decrease in the aggregate debt as a percentage of GDP occurred in a context in which the share of debt in local currency decreased (1.7 pp) and the share of debt in foreign currency rose (1.0 pp). The increase in debt denominated in foreign currency is due to the effect of the depreciation of the peso in the first half of 2021. If the representative market rate (MER) had remained constant at the value seen in December 2020, the debt in foreign currency as a share of the GDP would have declined 0.5 pp.

Debt denominated in foreign currency may be a source of vulnerability for the corporate sector to the extent that it exposes the CIs to fluctuations in the exchange rate. Nevertheless, the exposure to exchange rate risk is mitigated if the company is an exporter, if it is hedged (through the use of exchange rate derivatives), or if it has the backing of a foreign entity (*i.e.*: foreign direct investment, FDI).⁸ Graph 2.15 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 June 2021. As can be seen there, the percentage of debt in foreign currency that has some mechanism to mitigate exchange rate risk has decreased (1.3 pp) in the last six months. However, debt with these mechanisms continues to represent the largest share (68.7%).

6 If the level of economic activity had remained at December 2020 levels, indebtedness would have stood at 67.2%.

7 Throughout the entirety of this section, the term "private corporate sector" refers to private companies and excludes those that are monitored by the FSC.

8 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 exchange mismatch of the group as a whole.

Graph 2.14
Corporate Sector Financial Debt as a Percentage of GDP by Instrument

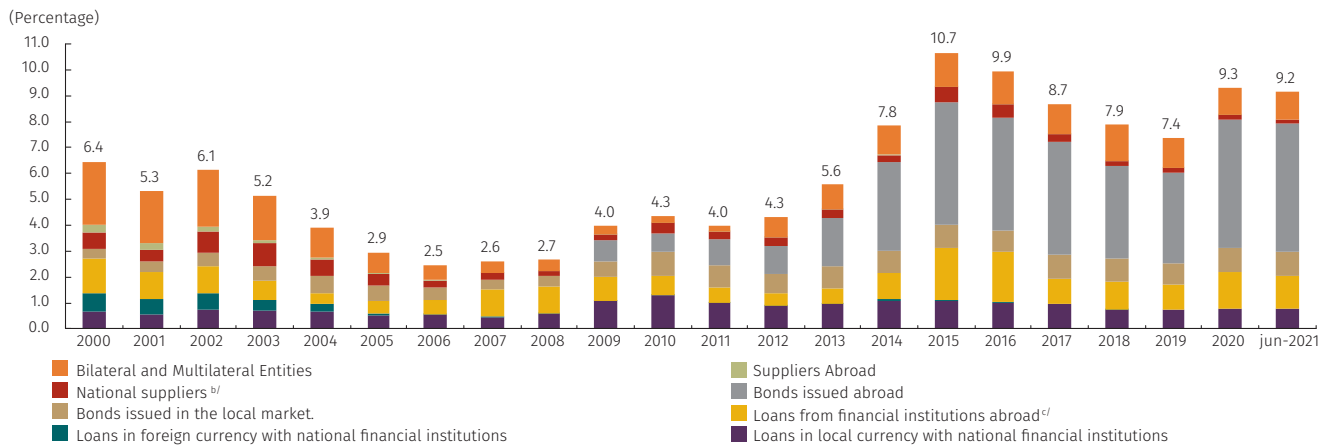
A. Private Corporate Sector



a/ This only includes information from companies that report their financial statements to the Superintendency of Corporate Affairs. In 2016, all of the companies registered their financial statements using IFRS and, as a result, it was not possible to determine the balance of debt owed to national suppliers. 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 in 2016 was assumed. Since the financial statements for 2021 have not yet been published, the information for 2020 is used.

Sources: Office of the Financial Superintendent of Colombia, Superintendency of Corporate Affairs, and Banco de la República, calculations by Banco de la República.

B. Public Corporate Sector

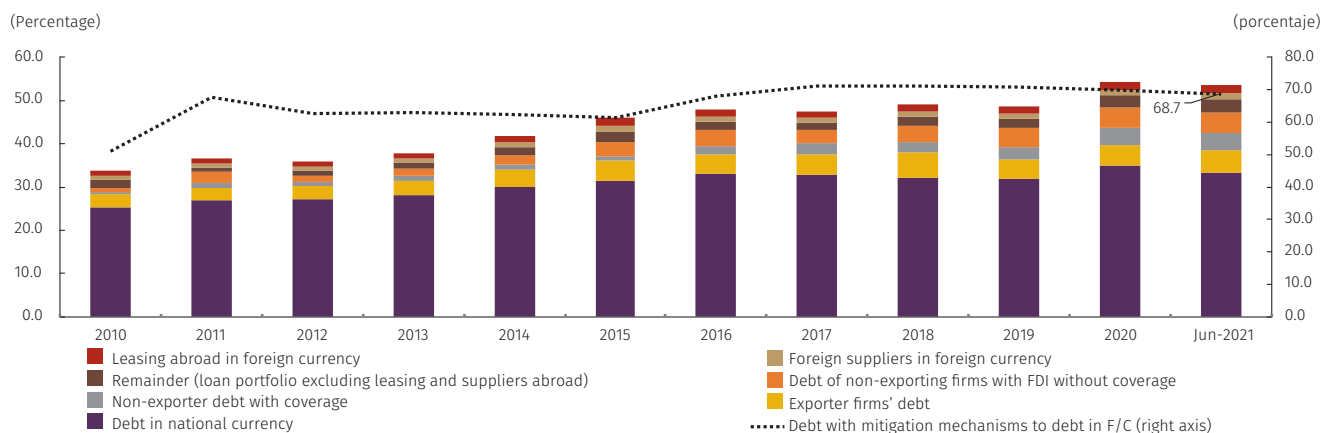


b/ Includes information on the balance of accounts payable of the main non-financial companies in the public sector.

c/ Financial leasing transactions are not included.

Sources: Office of the Financial Superintendent of Colombia, the General Accounting Office, Ministry of the Treasury and Public Credit; calculations by Banco de la República.

Graph 2.15
Private Corporate Sector Financial Debt as a Share of GDP by Exchange Rate Coverage, FDI, and Debtor Foreign Trade

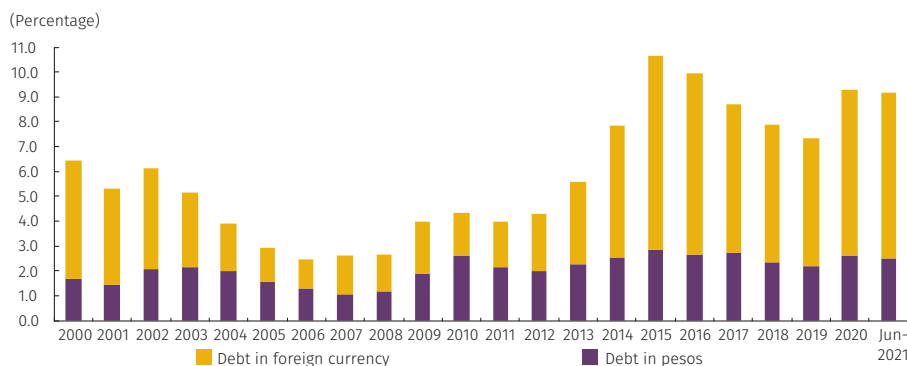


Note: the debt of suppliers in foreign currency and leasing with entities abroad is not available by NIT and, therefore, it is not possible to identify whether or not this debt belongs to hedged companies.

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

The public companies continued to keep the majority of their debt in foreign currency. The reduction in debt as a share of GDP for public firms occurred in a context in which the share of debt denominated in local currency decreased (Graph 2.16).

Graph 2.16
Public Corporate Sector Financial Debt as a Percentage of GDP by Currency

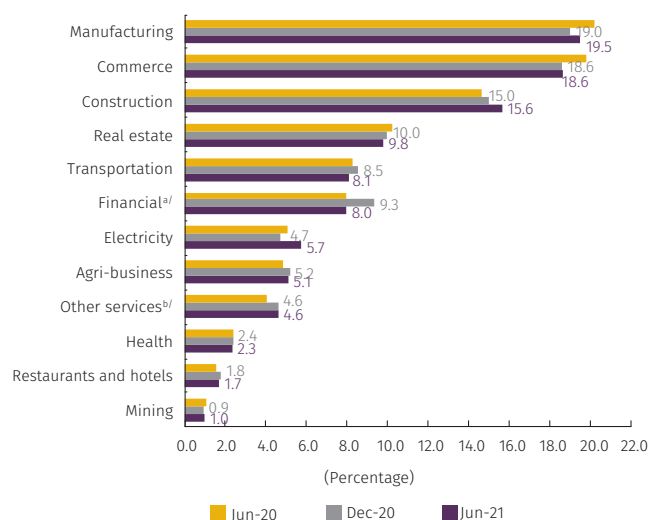


Note: prepared using the same information as on Graph 2.14, panel B.
Sources: Office of the Financial Superintendent of Colombia, the General Accounting Office, Ministry of the Treasury and Public Credit; calculations by Banco de la República.

2.2.1.2 Sector Analysis

During the first half of 2021, the traditional credit risk indicators analyzed have remained relatively stable or have begun to show an improvement for most economic sectors, including the three that account for more than half of the portfolio granted to the private corporate sector (manufacturing, commerce, and construction). The hotels and restaurants sector continues to have the largest deterioration in the QIR but has begun to show a decrease in its NPL.

Graph 2.17
Breakdown of the Private Corporate Sector Portfolio Balance by Economic Sector



a/ The financial and insurance sector excludes the loan portfolio granted to entities supervised by the Office of the Financial Superintendent of Colombia.

b/ 'Other services' groups firms belonging to the following economic sectors: public administration and defense; education; other community, social and personal service activities; private households with domestic servants; and the organizations and extraterritorial entities.

Sources: Office of the Financial Superintendent of Colombia, Superintendency of Corporate Affairs, and Banco de la República, calculations by Banco de la República.

The economic sectors with the largest share of the loan portfolio granted to the private corporate sector were still manufacturing, commerce, and construction which, as a whole, accounted for 53.7% of this portfolio as of June 2021. There was an increase in the share held by the electricity, construction, and manufacturing sectors between December 2020 and June 2021 while the share held by the financial and transportation sectors decreased the most (Graph 2.17).

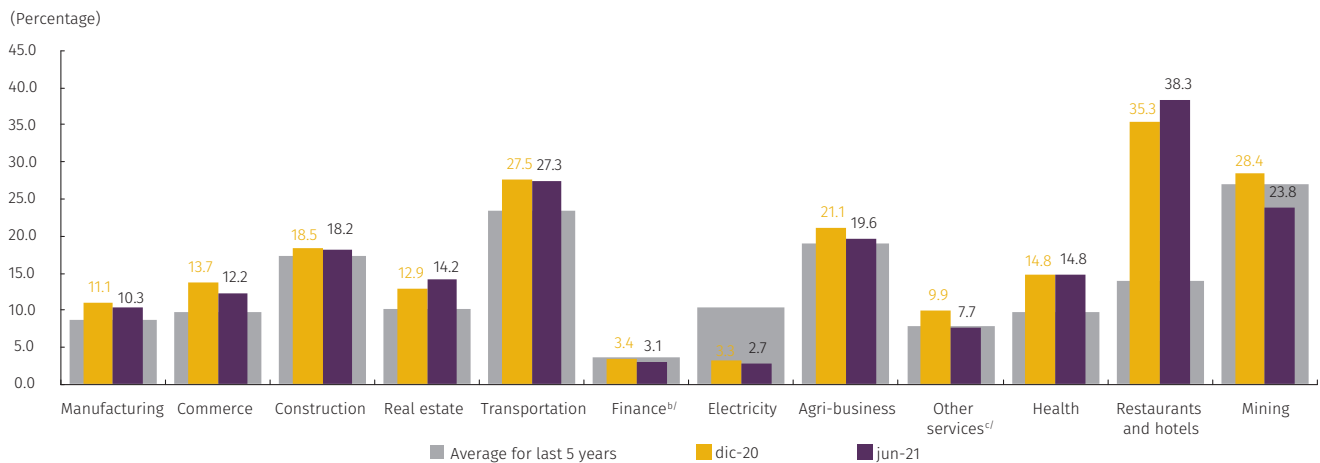
When the QIR is calculated by economic sector, it is clear that the indicator for all sectors except hotels and restaurants, real estate, and health declined during the six months under

analysis. The situation for hotels and restaurants stands out, in that, on top of being the branch with the highest levels of the indicator, it continues to see the most deterioration (Graph 2.18, panel A). In line with the above, the contribution of most sectors to the commercial loan portfolio's QIR declined while that of real estate and hotels and restaurants rose (Graph 2.18, panel B).

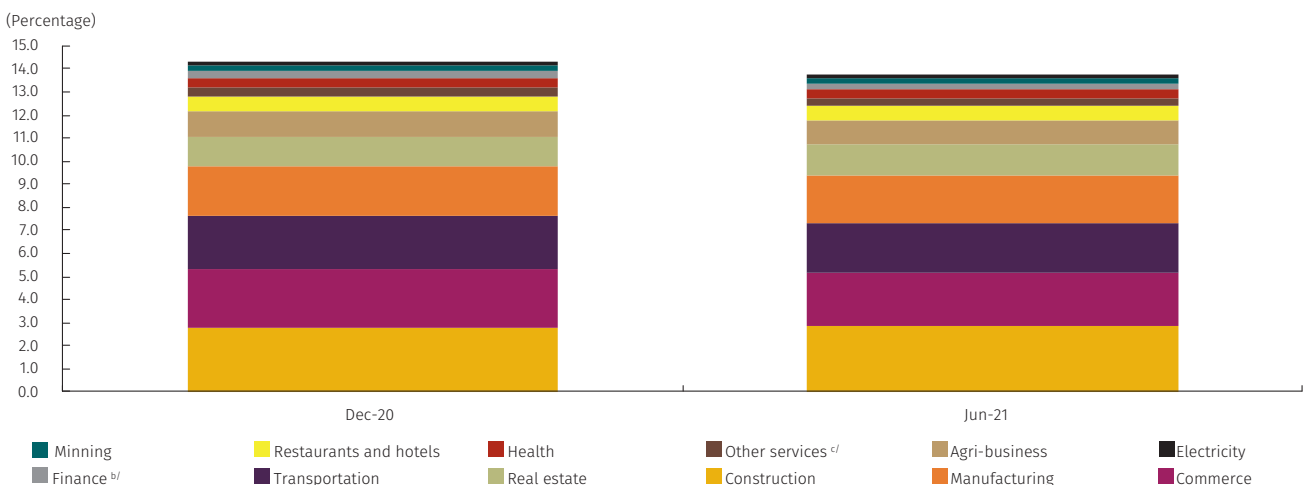
When the sectoral NPL is evaluated, a less generalized trend is observed in comparison to the QIR. On this indicator, seven of the twelve sectors experienced a decline, one remained stable and the remaining four suffered deterioration with transportation and real estate showing the largest increases. In the case of hotels and restaurants, even though the CIs' risk perception of this economic sector is still rising, its materialization has begun to decrease. In

Graph 2.18
QIR of the Private Corporate Sector

A. Quality Indicator by Risk (QIR) by Economic Sector^{a/}



B. Contribution to QIR by Economic Sector



a/ The sectors are organized horizontally from the most to the least representative.

b/ The financial and insurance sector excludes the loan portfolio granted to entities supervised by the Office of the Financial Superintendent of Colombia.

c/ 'Other services' groups firms belonging to the following economic sectors: public administration and defense; education; other community, social and personal service activities; private households with domestic servants; and the organizations and extraterritorial entities.

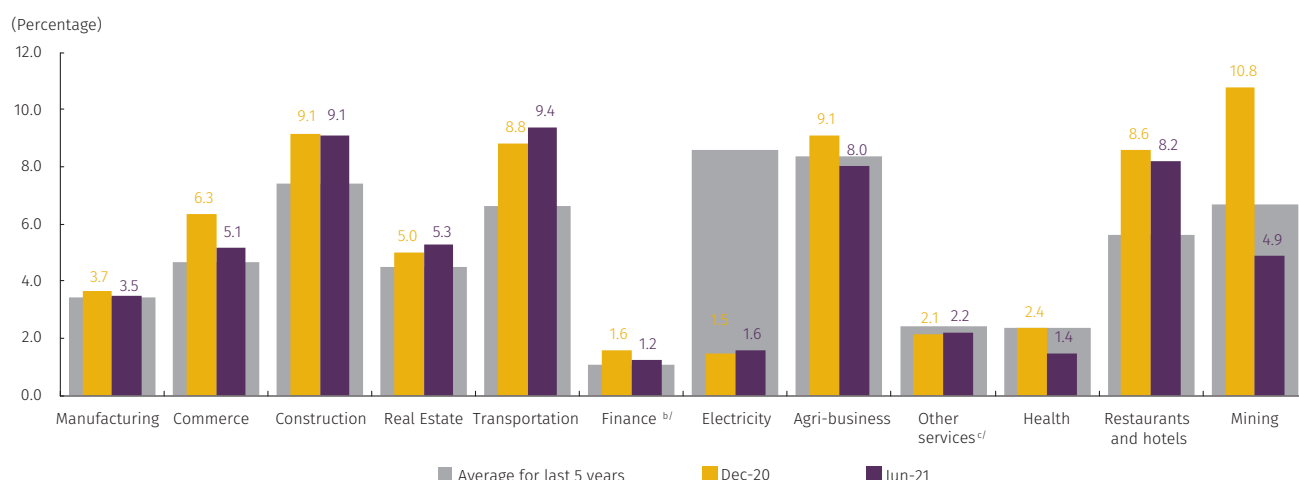
Sources: Office of the Financial Superintendent of Colombia, Superintendency of Corporate Affairs, and Banco de la República, calculations by Banco de la República.

terms of the contribution to the commercial loan portfolio’s NPL, no sector showed sizable increases. In contrast, it decreased the most in the cases of commerce and agri-business (Graph 2.19, panel B).

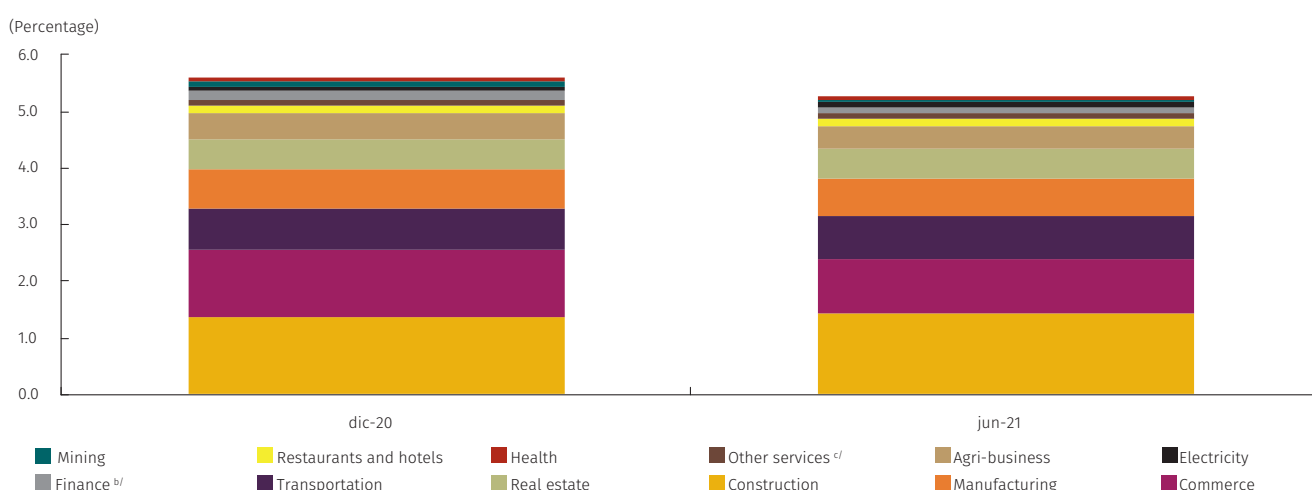
In addition to the risk indicators reported, the credit balance over GDP was calculated for each sector, and the recent history of this indicator was compared with its long-term trend⁹. Calculations reveal that after having been above their long-term trend during 2020, most sectors have returned to values below and close to their trend as of June 2021. The exceptions to the above pattern have been construction and electricity, sectors in which indebtedness is above its long-term trend.

Graph 2.19
NPL of the Private Corporate Sector

A. NPL by Economic Sector^{a/}



B. Contribution to NPL by Economic Sector



a/ The sectors are organized horizontally from the least to the most representative.

b/ The financial and insurance sector excludes the loan portfolio granted to entities supervised by the Office of the Financial Superintendent of Colombia.

c/ 'Other services' groups firms belonging to the following economic sectors: public administration and defense; education; other community, social and personal service activities; private households with domestic servants; and the organizations and extraterritorial entities.

Sources: Office of the Financial Superintendent of Colombia, Superintendency of Corporate Affairs, and Banco de la República, calculations by Banco de la República.

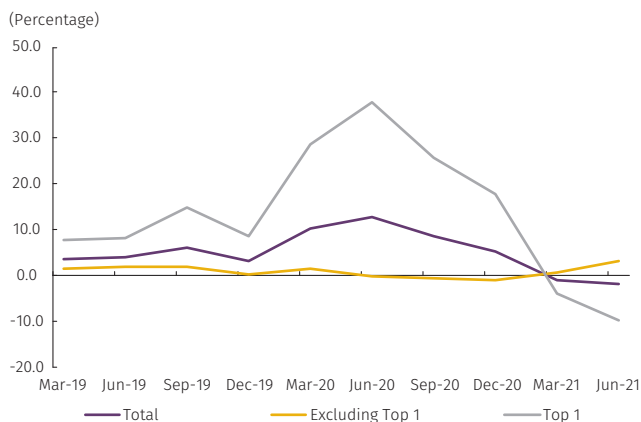
9 This trend is calculated using a Hodrick and Prescott filter.

2.2.1.3 Financial situation of the companies in the private corporate sector¹⁰

Changes in the activity, profitability, indebtedness, and liquidity indicators of companies were mixed. The companies that drove commercial loan portfolio growth in 2020 had higher sales prior to the pandemic but were in a less favorable financial position than their counterparts.

As mentioned in section 2.1, commercial credit has recently surged although it continues to show negative growth rates. This contrasts with the expansion of this portfolio during the first half of 2020. However, this behavior is due to a small group of companies that took on significant debt between December 2019 and June 2020. Indeed, when 1.0% of the companies that increased their credit balance the most between the above dates (top 1)¹¹ are excluded, a relatively stable portfolio is seen in 2020 and an upswing in 2021 (Graph 2.20).

Graph 2.20
Nominal Annual Portfolio Growth by Credit Access Group for the First Half of 2020



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

When the changes in activity, profitability, indebtedness, and liquidity indicators of the corporate sector are analyzed while differentiating between these groups of companies, similar trends are seen. As for the annual change in sales, the income shock substantially affected both groups and placed the median of the indicator at the lowest level for the sample analyzed (Graph 2.21, panel A). Despite the above, the change in profitability was not homogeneous across groups, rather, the top 1 showed the largest changes between 2019 and 2020 (Graph 2.21, panel B).

¹⁰ In this subsection, the databases of the companies that report their balance sheets to the Superintendency of Corporate Affairs (SCA) are used together with the data on the FSC's Form 341. The SCA information is annual and the companies that report information are mainly large and medium-sized ones. By the end of 2020, these companies accounted for 75% of the total. Likewise, the proportion of firms that overlapped with the SFC base was 67.3%.

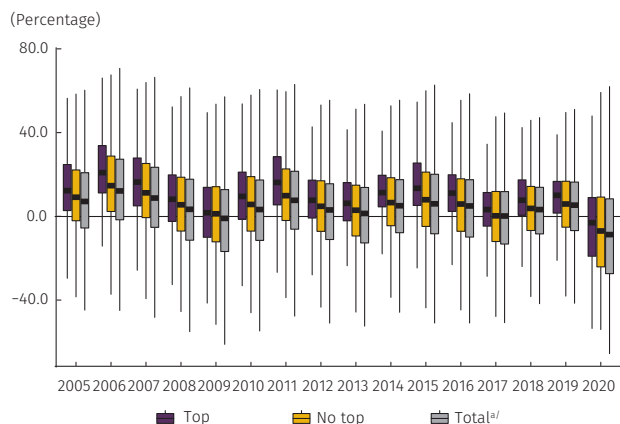
¹¹ The 1.0% group of companies that drew on their credit between the above-mentioned dates is made up of 846 companies, 809 of which are large ones, and these accounted for 41.3% of the commercial portfolio as of June 2020. A company is classified in this group if its disbursements in the December 2019 to June 2020 period exceed COP 5.9 thousand million.

The greater access of the top 1 to credit is reflected in their financial indebtedness ratio which is consistently higher than the one for the rest of the corporate sector, and the median was at historically high levels in 2020¹² (Graph 2.21, panel C). In terms of liquidity management, liquidity, in turn, showed increases for both groups of companies (Graph 2.21, panel D).

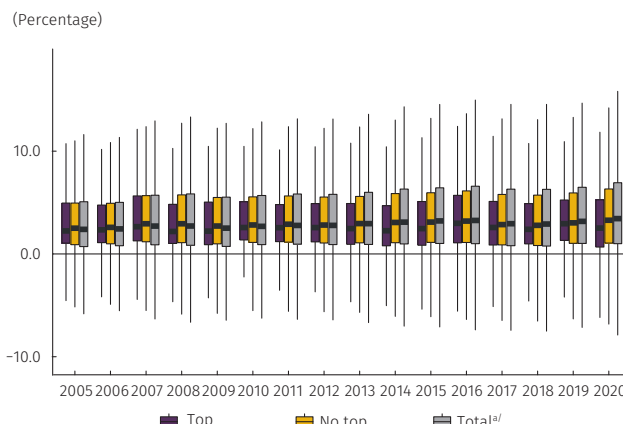
In this sense, the analysis makes it possible to deduce that the recent loans made by CIs to companies in the private corporate sector has been focused on companies (excluding the top 1) whose financial situation is no less favorable than that of the top 1.

Graph 2.21

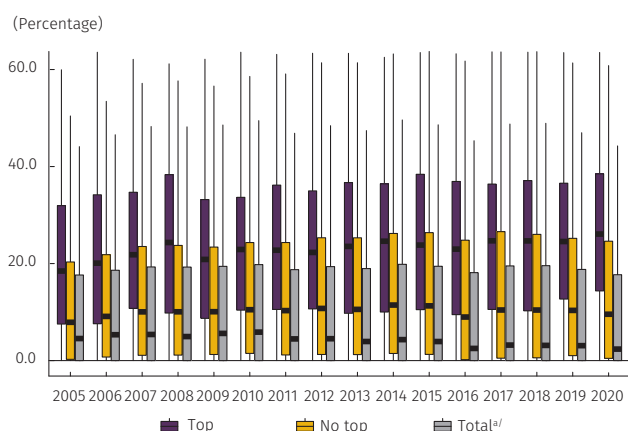
A. Annual Change in Sales



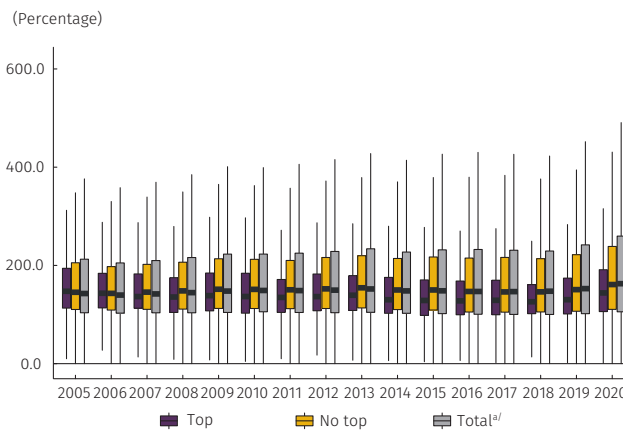
B. Net margin (profit/operating income)



C. Debt Ratio (financial obligations/assets)



D. Current Ratio (current assets/current

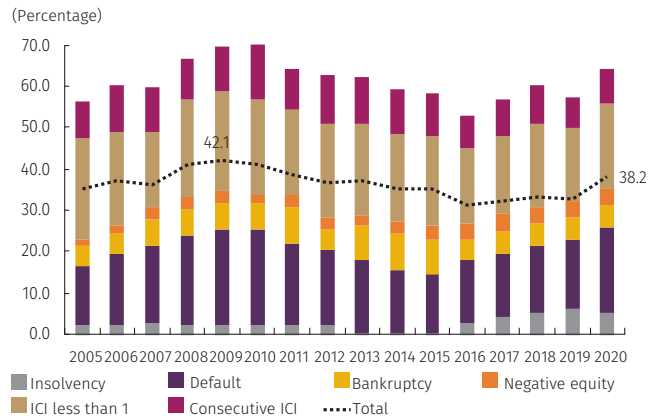


Note: the total includes companies that acquire indebtedness with the financial system as well as others in the private corporate sector.
 Source: Superintendency of Corporate Affairs, Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

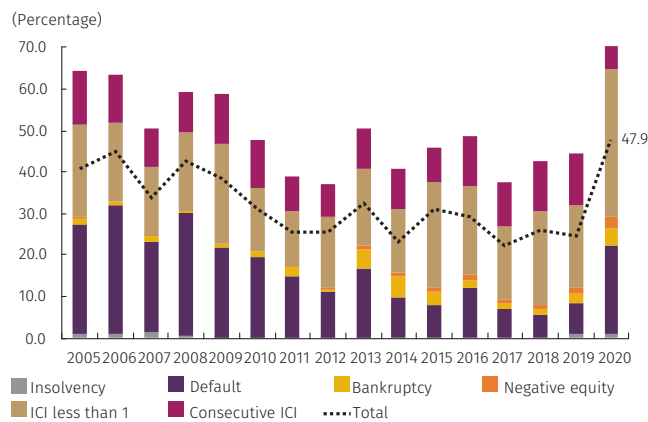
12 When indicators of indebtedness are analyzed with instruments other than loans from the financial system (e.g., leverage), the top 1 have historically shown higher levels than those of other companies, but not ones that are significantly different between groups.

Graph 2.22
Share of Fragile Companies

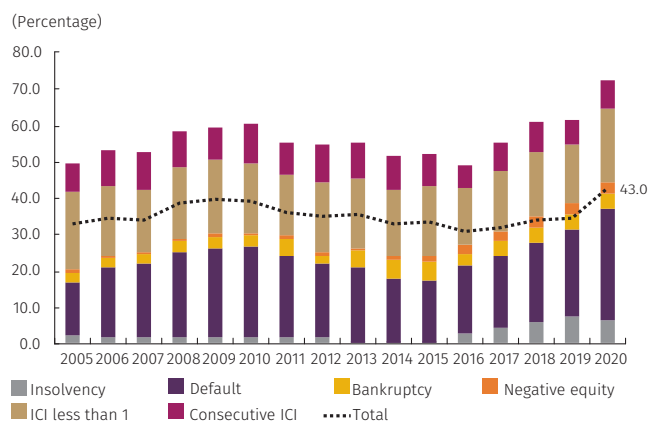
A. Total for the Private Corporate Sector



B. Top 1



C. No top 1



Note 1: definitions of the criteria can be found in footnote 13.
 Note 2: a firm may meet more than one criterion, and thus, the height of the bars may be higher than the total criterion.
 Source: Superintendency of Corporate Affairs, Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

As a consequence of the shock to the economy in 2020, the percentage of fragile companies increased and reached levels close to the peak seen in 2009. However, the pace of recovery shown in 2021 could indicate that this share will decline by the end of the year.

Graph 2.22 shows the share of fragile companies seen based on five classification criteria.^{13,14} The results show that this share increased in 2020 for the total corporate sector and reached a level close to the maximum recorded in 2009 (panel A). When differentiating between debt groups, the analysis shows that for the top 1, there was a strong increase over the last year, mainly associated with higher delinquency and difficulty in covering financial costs with operating income (ICI criteria less than 1; panel B).

Based on the credit risk analysis presented in previous subsections, the proportion of fragile companies may be expected to gradually decrease in 2021 as the economy continues its adjustment process.

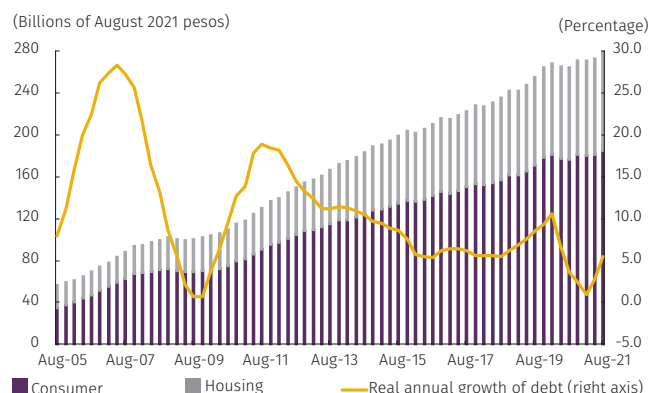
2.2.2 Households

As of August 2021, Colombian household indebtedness showed an expansion rate that contrasts with what was seen six months earlier when the lowest growth rate in more than a decade had been registered.

13 A company is defined as fragile if it meets any of the following criteria (the label associated with Graph 2.22 is in parentheses): 1) it enters into an insolvency proceeding with the SCA (*insolvency*); 2) has a credit rating other than A or is thirty or more days in arrears (*default*); 3) registers negative equity (*negative equity*); 4) incurs in a net worth loss (bankrupt), or 5) shows an interest coverage indicator, calculated as the ratio of operating income to interest expense, that is less than 1 in the period under analysis (*ICI less than 1*) or for two consecutive years (*consecutive ICI*).

14 The delinquency criterion evaluates two cases because a commercial loan must be rolled from A to B, by regulation, if it is thirty or more days past due. Nonetheless, in the SFC Form 341 database, there are some cases in which the credit is A and is more than 30 days old.

Graph 2.23
Breakdown and Real Annual Growth of Household Indebtedness



Sources: Office of the Financial Superintendent of Colombia, Superintendency of Economic Solidarity, Titularizadora de Colombia.

The household loan portfolio stood at COP 278.3 b as it presented a real annual growth rate of 5.5% as of August 2021, a figure that contrasts with what was seen six months ago (0.9%, Graph 2.23). Of the total indebtedness, approximately two thirds correspond to consumer loans and the remaining to housing loans. The two categories of loans showed growth of 5.3% and 5.9% respectively.¹⁵

During the last few months, disbursements have been closer to those seen prior to the pandemic, with housing disbursements being the most significant as they have reached all-time highs.

Real annual growth in disbursements to households reached an all-time high in April 2021 due, in part, to the base effect of the pandemic shock one year before. Both the consumer and housing portfolios have recovered and, as of September 2021, the amount of total disbursements is similar to the one observed in February 2020. In addition, new housing loans reached their highest level¹⁶ during 2021 in both the non-LIH segment (March 2021) and the LIH category (September 2021, Graph 2.24, panels A and B). This may be due to low interest rates, government programs, and greater willingness of households to purchase these assets.

Historically high housing disbursements coincide with lower lending requirements and an increase in loans to borrowers with a higher risk profile.

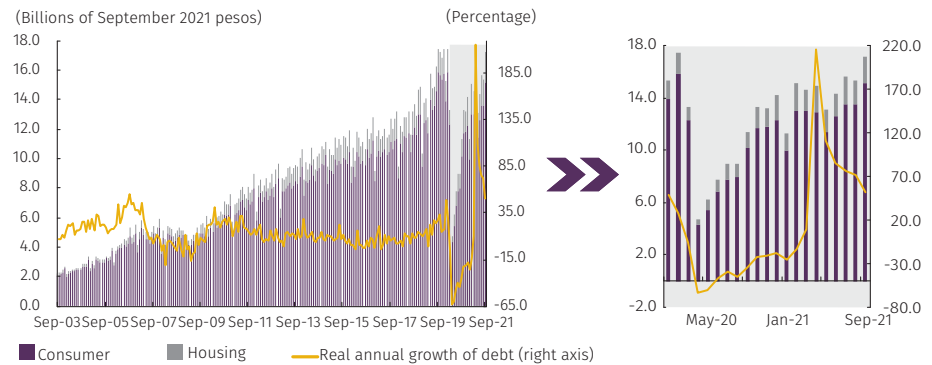
Along with the increase seen in housing disbursements, the banks' stance on new housing loans has become less restrictive.¹⁷ According to the September 2021 Credit Situation Survey in Colombia, no institution has said it will tighten its requirements and the percentage of banks surveyed that said they would keep them unchanged reached 80% (Graph 2.25). This is in line with credit approval figures: the average number of applications approved between July 2020 and

15 These growth rates differ from the ones presented in section 2 since, to build Graph 2.23, households' obligations to savings and loan cooperatives and employee funds were also considered.

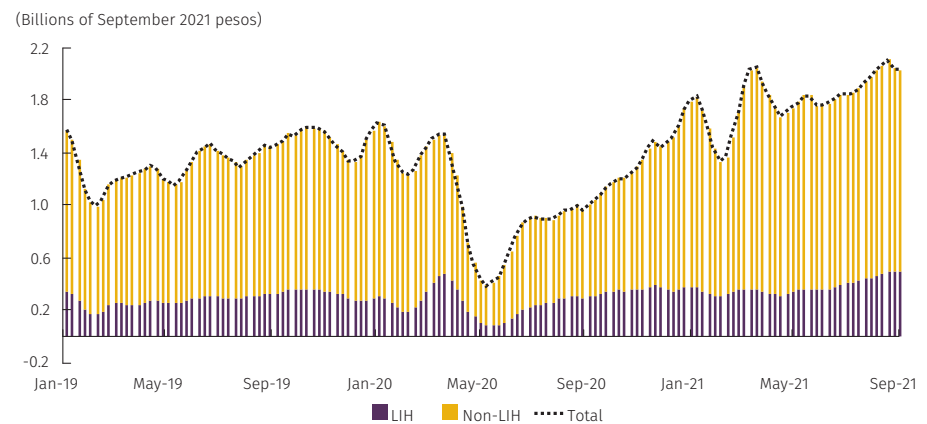
16 The information on portfolio disbursements comes from FSC Form 88, which has been available since 2002.

17 In contrast, there was an increase in lending requirements for the consumer portfolio as of March 2020, and these remained high up to September 2021.

Graph 2.24
A. Loan Portfolio Disbursements to Households



B. Disbursements of the Housing Loan Portfolio



Note: data are presented as four-week moving averages.
Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

September 2021 is 66.2% for the housing loan portfolio in contrast to 31.7% for consumer loans.¹⁸

Of the total housing disbursements granted during the period after the Covid shock (2020Q2 to 2021Q2), 56.1% were disbursed to borrowers who had already acquired a housing loan in the past (i.e.: former borrowers¹⁹). When the historical credit profile of these types of borrowers is contrasted based on the maximum delinquency and rating levels they have presented in the past,²⁰ former borrowers who were granted disbursements in the post-pandemic period are found to have a slightly lower credit profile than former borrowers who

18 Figures calculated from the FSC’s Report on the Financial System during the mandatory quarantine for life.

19 A former borrower is one who is not a new debtor. The latter is defined as a person who received a new loan during one of the periods under analysis and has no previous credit history in the housing portfolio (2007Q1 up to the date of the credit disbursement).

20 The historical maximum and average number of past due days and credit ratings of former borrowers are calculated based on the FSC Form 341 data from 2007Q1 to the date of disbursement of the new loan.

were granted disbursements in the pre-pandemic period (2018Q4 to 2019Q4; Table 2.1).

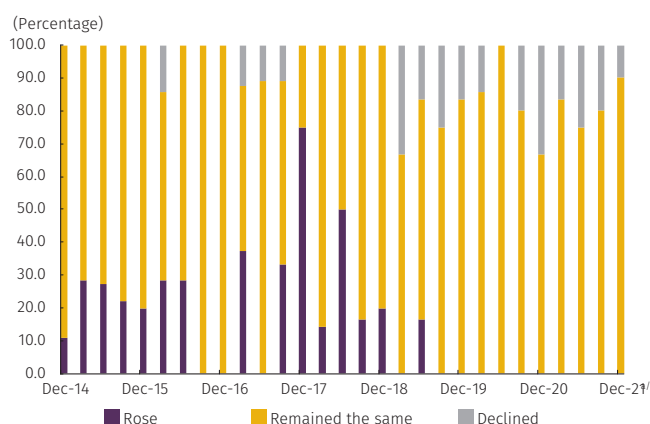
Table 2.1
Historical Credit Profile of Longstanding Borrowers Receiving Housing Disbursements (average)

Period	Historical Maximum		Historical Average	
	Days Overdue	Grading	Days Overdue	Grading
Pre-Covid (2018Q4-2019Q4)	2.09	1.23	0.86	1.12
Post-Covid (2020Q2-2021Q2)	2.26	1.30	0.87	1.16

Note: the "rating" field corresponds to the numerical value of the risk rating, where A is 1 and E is 5. In this respect, a higher numerical value represents a worse rating.
Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

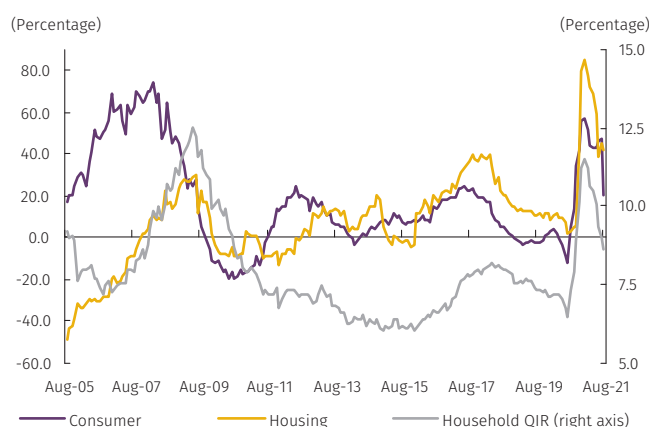
After the high growth of the risky and nonperforming loans up to January 2021, their progressive slowdown has generated a reduction in the QRI and NPL ratio of the portfolio granted to households. However, the NPL with write-offs is still at historically high levels.

Graph 2.25
Change in Requirements for Allocating New Housing Loans



a/ Expectations for the coming quarter.
Source: Survey of the loan situation in Colombia, September 2021, calculations by Banco de la República

Graph 2.26
Real Annual Growth of the Risky Loan Portfolio and Household QIR

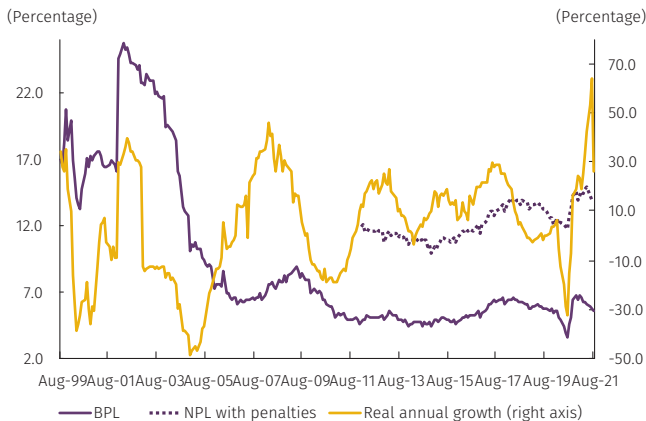


Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

In terms of credit risk indicators, after the high growth observed since the second half of 2020, the risky portfolio granted to households has slowed down. This has resulted in a reduction of the QRI for this sector to 8.6% in August 2021, compared to 11.5% in January of the same year (Graph 2.26). Nevertheless, the real annual growth rate of risky loans in the housing portfolio remains at historically high levels, compared to what was registered before the coronavirus crisis. The latter, together with the expectations of lower requirements for granting housing loans that intermediaries have for the last quarter of the year, could suggest a greater appetite for risk in this segment (Graph 2.25).

The growth rate of the non-performing loan portfolio peaked at 63.5% in July 2021, the highest value seen since the Colombian financial crisis at the end of 1999. This could be related to the fact that the household loan portfolio was the one that most benefited from the containment and structural adjustment measures ordered by the SFC and, after the completion of the measures, some debtors were unable to meet their obligations. As a result, the non-performing loan portfolio began to rise starting in the second half of 2020. Although the NPL dropped after November of the same year, the indicator including write-offs has remained at

Graph 2.27
Trend of Non-performing Loan Portfolio and Household NPL



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

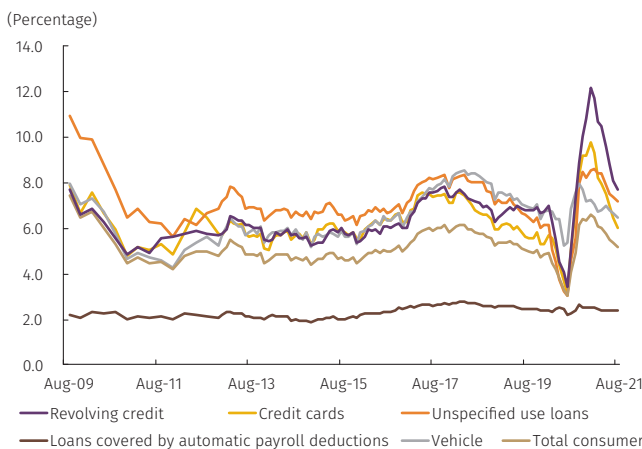
historically high levels, and the gap between the two indicators reached its historical maximum in May 2021. (Graph 2.27).

Although the perception of risk is higher for the housing portfolio, NPLs for housing segments has declined. In contrast, consumer segments showed significant increases at the beginning of 2021,²¹ and although this was corrected as of August, the levels remain above those seen in the period prior to the pandemic (Graph 2.28).

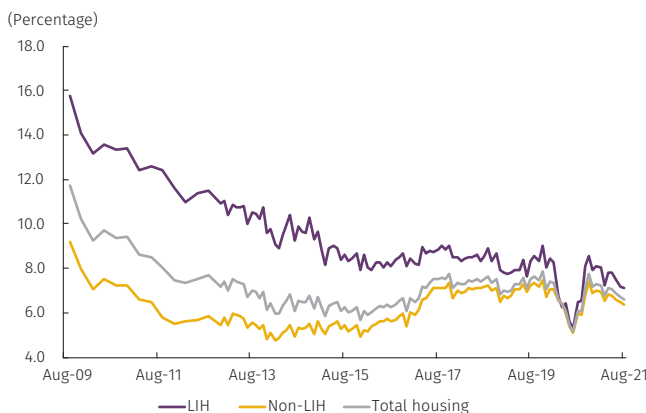
In line with the gradual recovery of economic activity, household income has improved. This has had a positive impact on the debt-service ratio, which is at lower levels than those recorded a year ago.

Graph 2.28
Quality Indicator by Default for each Segment

A. Consumer



B. Housing



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

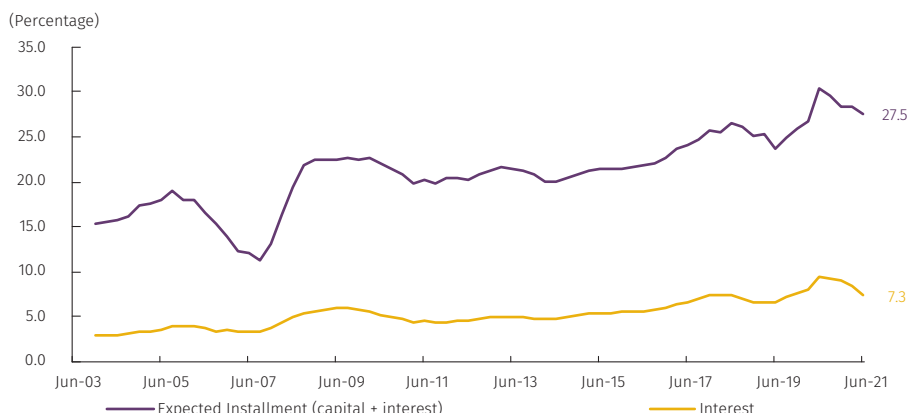
The household's debt-service ratio,²² which represents the proportion of income that these agents allocate to the payment of financial obligations, stood at 27.5% at the end of June 2021. This represents an improvement from the peak reached in mid-2020, mainly due to the recovery of household's income in 2021. However, the indicator is at historically high levels and close to the risk threshold according to international standards,²³ and this could imply a greater vulnerability to household's payment capability (Graph 2.29).

21 Specifically, credit cards and unspecified use loans, which represent close to 50% of the consumer loan portfolio, registered a historically high NPL at the beginning of the year.

22 This indicator is calculated as the ratio between the amount CIs expect to receive in consumer and housing loan installment payments (principal and interest) and households' disposable income. The numerator is adjusted for 1-month credit card use while the missing data in the denominator are projected in line with the GDP growth rate given the lag in income information available from DANE's national accounts.

23 According to the IMF and the Bank of Canada, a financial burden level of 30% is considered risky and 40% vulnerable.

Graph 2.29 Household Debt-Service Ratio

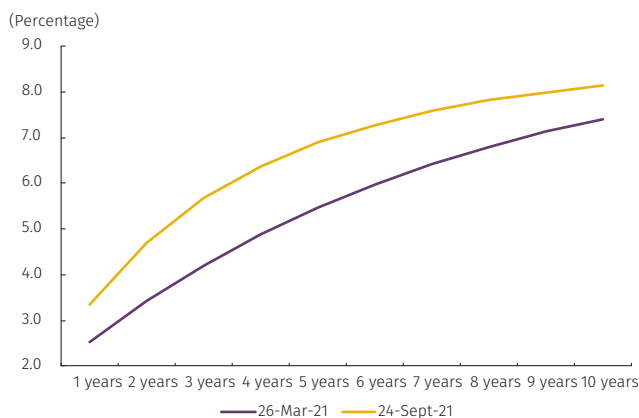


Sources: Office of the Financial Superintendent of Colombia and DANE, calculations by Banco de la República.

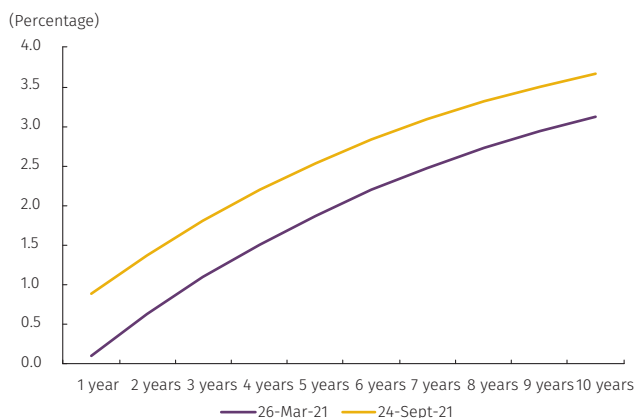
2.3 Market Risk

Graph 2.30 Yield Curve

A. Peso-denominated TES Market



B. UVR-denominated TES Market

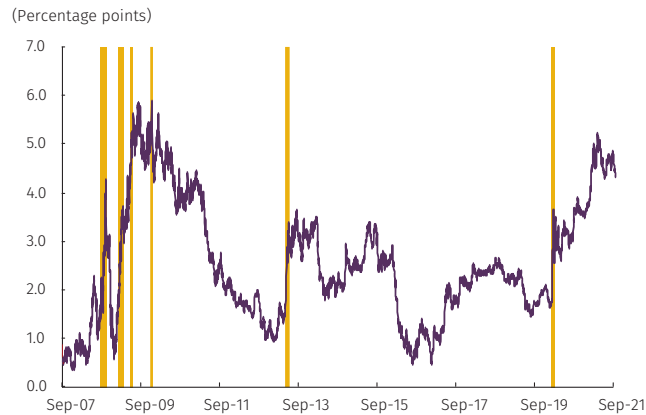


Sources: DCV and Precia, calculations by Banco de la República.

The public debt market is showing devaluations across all maturities.

Between March and September 2021, the peso-denominated public debt yield curve showed devaluations in all maturities, reflecting the increase in country risk associated with fiscal uncertainty, the loss of investment grade status for issuing long-term sovereign debt in foreign currency, and the increase in monetary policy rate. This occurs in a context of rising inflation and a tightening of monetary policy rate due to inflationary pressure (Graph 2.30, panel A). Likewise, in the inflation - linked (UVR-denominated) public debt market, there was a parallel shift in the yield curve across all maturities due to devaluations (Graph 2.30, panel B). These devaluations are consistent with the movement of other emerging markets, given the expectation of a slowdown in the Fed asset purchase program. Moreover, the steepening of the peso-denominated yield curve, measured as the difference between the 1- and 10-year yields, reached values in May 2021 that have not been seen since 2009. This latter was explained by an increase in the long-term rate due to greater global risk aversion and lower oil prices. Subsequently, the steepness was reduced somewhat due to an upward in short-term interest rates (Graph 2.31).

Graph 2.31
Differential for 1- to 10-year Interest Rates

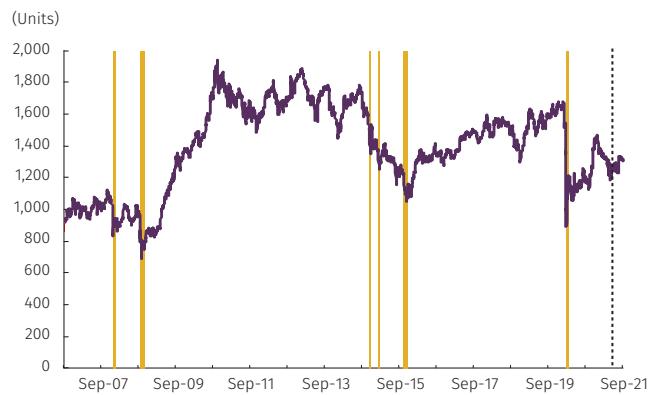


Note: the yellow bars indicate the periods in which the change in the differential is greater than 100 bp with respect to the previous month.
Sources: DCV and Precia, calculations by Banco de la República.

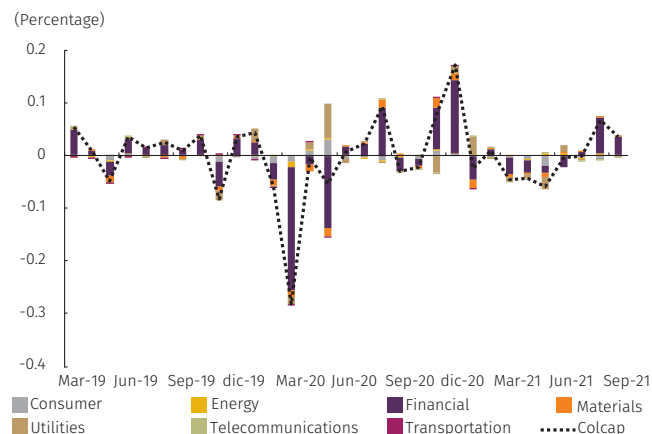
The stock market has shown recoveries driven by the financial sector although it has not yet recovered from the shock caused by the coronavirus pandemic. Following the loss of the investment grade status, volatility in the government bond market peaked but has been stabilizing since.

Graph 2.32
Variable Income Market

A. Change of Colcap



B. Breakdown of Colcap Growth



Note: The yellow bars indicate the periods in which the monthly devaluation of Colcap is greater than 10% with respect to the previous month. The dotted line marks 28 May 2021, the date on which the MSCI Colcap began trading.
Sources: BVC and Yahoo Finance; calculations by Banco de la República.

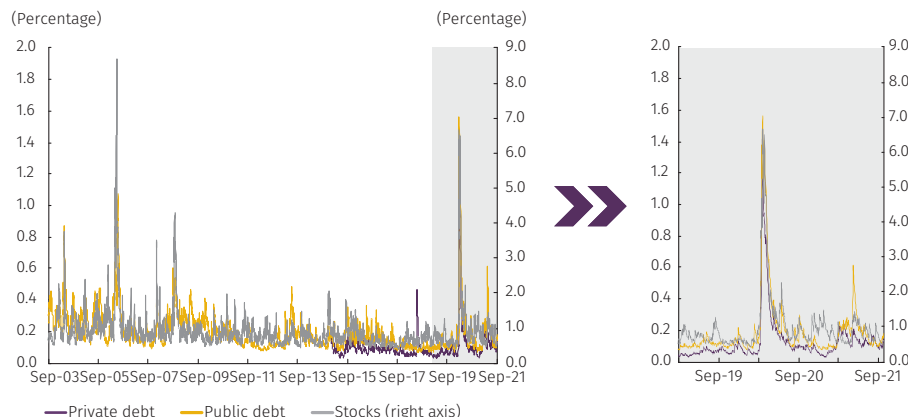
The stock market prices, measured with the Colcap Index (MSCI Colcap Index since May 2021), after decreasing during the first few months of 2021 due to social tensions and political uncertainty, showed slight recoveries that coincided with the launch of the MSCI Colcap (Graph 2.32, panel A). Since August 2021, the market has shown a good performance, mainly due to the recovery of profits reported by the financial sector (Graph 2.32, panel B). However, the stock index is still at levels below those reached before the coronavirus pandemic.

Market volatility, especially in the government bond market, exhibited a peak in May 2021 due to roadblocks and supply chain restrictions linked to social tensions, the withdrawal of the tax reform and the downgrading of the Colombia’s long term sovereign debt rating. Thereafter, the volatility levels in the three markets showed a downward trend. However, they have not returned to the values registered before the coronavirus pandemic (Graph 2.33).

As of September 2021, the share held by foreigners in the Treasury market is similar to the levels registered at the beginning of the year. Concerning the policy interest rate, a contractionary monetary policy is expected during the coming year.

Despite the loss of investment grade status for issuing long-term sovereign debt in foreign currency, which became official in July 2021 with the decision made by the Fitch Ratings agency, the share held by foreigners in the Treasury market recovered and stood at 25.5% (Graph 2.34, panel A). In general, the cumulative variation of foreigners was positive between

Graph 2.33
Conditional Volatility of Colombia's Fixed Income and Variable Income Markets

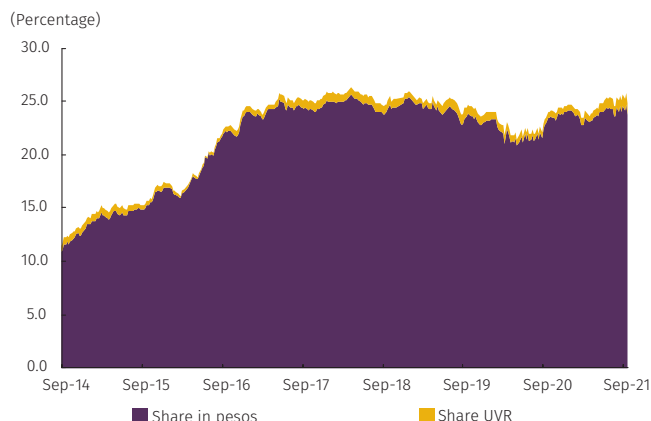


Source: Precia; calculations by Banco de la República.

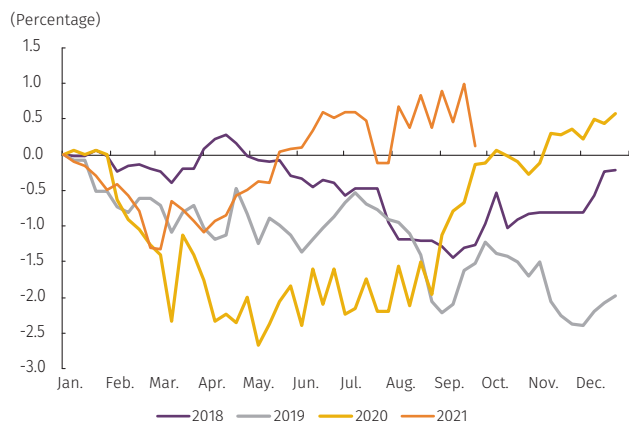
June and September 2021, a trend that contrasts with the outflows seen during this quarter over the last three years. As of the cut-off date, the trend has reversed (Graph 2.34, panel B).

Graph 2.34
Share of TES held by Foreigners

A. Historical Performance



B. Cumulative Change



Source: DCV, calculations by Banco de la República.

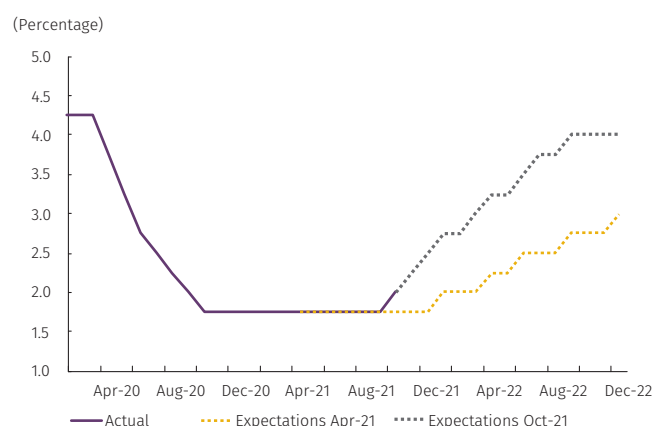
Regarding the policy interest rate, market analysts have modified their forecasts due to inflationary pressures (Graph 2.35). Compared to April 2021 expectations, the new forecasts suggest a prolonged contractionary monetary policy stance until a 4.0% policy rate is reached in September 2022.

Finally, the market risk exposure of financial institutions to public debt securities has risen due to portfolio repositioning.

Exposure to fixed and variable income markets measured as an investment in securities exposed to market risk,²⁴ is concentrated in the fixed income securities where the government bond market represents the largest share (Table 2.2). For banks there was a shift from private debt to Treasury bonds, and for FCs there was a shift from equities to Treasury bonds. For the other CIs, growth was recorded for all items.

24 This balance is at market prices and is calculated according to the guidelines of the Basic Accounting and Financial Circular. The balance in shares was analyzed for the equity instruments of domestic issuers while, for debt securities, the ones that are marketable and available for sale were analyzed.

Graph 2.35
Expectations for Benchmark Rate



Source: Banco de la República (Survey of Economic Analysts' Expectations)

For NBFIs, there is an aggregate growth in securities exposed to market risk, which is mainly caused by insurance and capitalization companies. In terms of breakdown, there were decreases in private debt securities and increases in public debt securities for all entities. Meanwhile, PFM and insurance companies were the only ones to increase their exposure to variable income. Finally, for the managed position, there was a restructuring of the variable income portfolio towards fixed income, mainly public debt securities.

Table 2.2
TES Balances (in pesos and UVR), Financial Institutions' Private Debt Securities and Shares Exposed to Market Risk

Type of Entity	TES ^{b/}				Private debt				Stocks				Total			
	(balance in billions of pesos)				(percentage change in the last six months)											
Credit Establishments	51.16	4.87	15.73	71.76	7.90	-1.00	7.81	7.23								
Commercial banks	47.54	4.35	0.00	51.89	7.78	-3.64	0.00	6.72								
Investment banks	2.74	0.30	15.71	18.76	-16.09	21.96	7.94	3.79								
Finance companies	0.88	0.17	0.02	1.06	2291.54	40.79	21.79	523.06								
Financial cooperatives	0.00	0.05	0.00	0.05	0.00	30.30	0.00	30.30								
Non-banking Financial Institutions (NBFI)	12.41	10.21	6.58	29.20	27.57	-12.16	0.52	4.67								
Pension Funds: proprietary position	0.29	0.90	0.15	1.34	100.78	-5.69	13.41	8.89								
Stock Brokerage Firms: proprietary position	1.36	0.13	0.12	1.61	3.45	-22.52	-16.48	-1.08								
Trust Fund Companies: proprietary position	0.34	0.29	1.01	1.65	44.49	-17.94	-7.86	-2.66								
Insurance and Capitalization Companies	10.42	8.88	5.30	24.60	29.69	-12.39	2.45	5.38								
System in Proprietary Position	63.56	15.08	22.31	100.96	11.25	-8.84	5.55	6.48								
Managed Position																
Stock-brokerage firms: third-party position	2.07	8.52	7.97	18.56	103.72	-26.15	-7.48	-12.31								
Trust Fund Companies: third-party position ^{a/}	113.91	38.96	13.04	165.91	23.79	-6.27	-5.36	12.59								
System	179.55	62.56	43.32	285.43	19.56	-10.18	-0.48	8.38								

a/ Pension liabilities managed by trust companies are excluded.

b/ The value of the proprietary position is obtained from "Investment Portfolio" on format 351. The value of the managed position is obtained from CSD data.

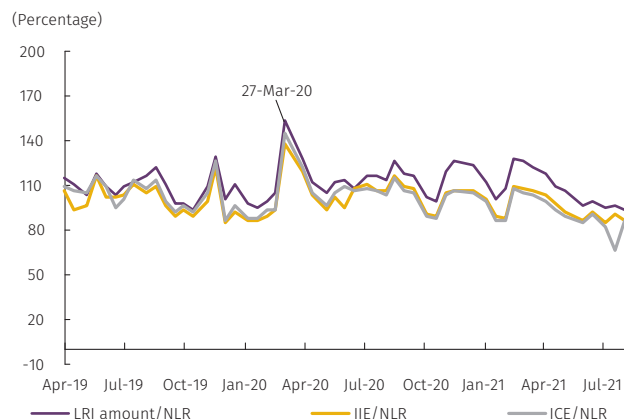
Sources: Central Securities Depository (CSD), Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

2.4 Liquidity and Trading Book Interest Rate Risk

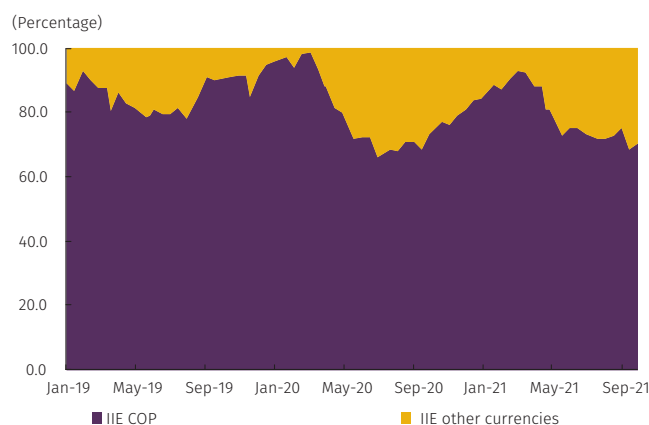
2.4.1. Liquidity Risk

Graph 2.36
30-day Short-term Liquidity for CEs Acting as FXMI^{a/}

A. Indicators



B. IIE Distribution by Currency^{b/}



NLR: Net liquidity requirements for 30-day LRI.
 Note: when the amount liquidity indicators in the numerator of this measure are used, the regulatory limit in the graph corresponds to zero.
 a/ Foreign exchange market intermediaries.
 b/ The 30-day IIE is calculated as the sum of net overages and shortfalls by currency. The distribution of the sum of these amounts is shown in this graph while the net overages and shortfalls between Colombian pesos and the remainder of the currencies in which the CIs have positions are differentiated.
 Source: Office of the Financial Superintendent of Colombia, calculations by *Banco de la República*.

The CIs continue to have a strong aggregate short-term liquidity position in local and foreign currencies.

Aggregate 30-day liquidity measures for CIs (the indicator of individual exposure, IIE; the indicator of consolidated exposure, ICE;²⁵ and the liquidity risk indicator, LRI) suggest that entities are holding enough funds to cover their net 30-day liquidity requirements and, at the same time, they far exceed the regulatory minimum. These indicators, scaled on the net 30-day LRI liquidity requirements, show a decrease since March 2021 which is a result of lower holdings of liquid assets in pesos (Graph 2.36).

Following the increased preference for liquidity that took place with the arrival of the health crisis and the consequent expansion of liquid assets, the latter have shown a stabilization in their growth rate during the last six months. At the same time, there has been a recent spike in liquidity requirements.

By component, this resulted from the fact that the most liquid investments (ALAC; item representing 29.8% of the liquid assets) slowed down and have started to decrease in real terms since June 2021²⁶. In addition, cash began to show signs of recovery although it has been contracting for six months (Graph 2.37, panel A). Net liquidity requirements (NLR) have risen as of July 2021 due to an expansion of 30-day contractual outflows (Graph 2.37, panel B).

25 The IIE and the ICE indicators make it possible to measure the liquidity risk of the foreign exchange market intermediaries (FXMI) while keeping in mind the currency mismatches over a horizon of thirty days. For more information on the calculation of these indicators see *Banco de la República's* External Regulatory Circular DODM-361.

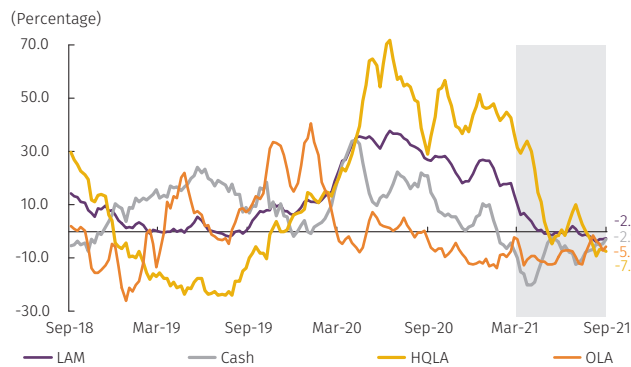
26 The drop in these investments has been seen for most large banks and few small banks. In addition, all the components of this item have slowed down: marketable and available-for-sale investments in TES and other debt securities.

In terms of structural liquidity, the net stable funding ratio (NSFR) shows leeway with respect to regulatory limits. In annual terms, the indicator continued to show growth due to a decline in the long-term portfolio.

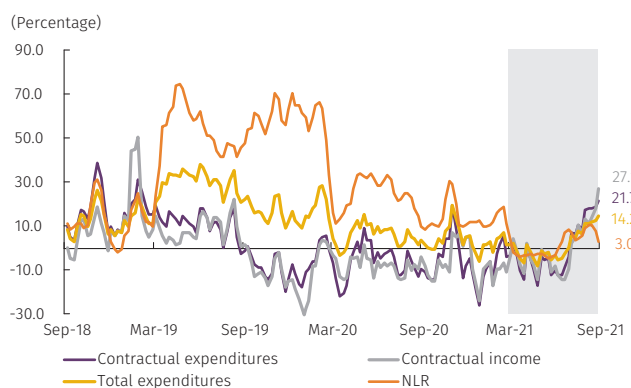
The net stable funding ratio (NSFR)²⁷ rose as a result of the reduction in the required stable funding (RSF) so far in 2021. The drop in this requirement was due to the real sector portfolio component with a maturity of more than one year (Graph 2.38, panel A). The available stable funding (ASF), in turn, showed a downward trend in the same period under analysis, but in

Graph 2.37
30-Day LRI Components
(three-week moving average)

A. Change in Cls' LAM



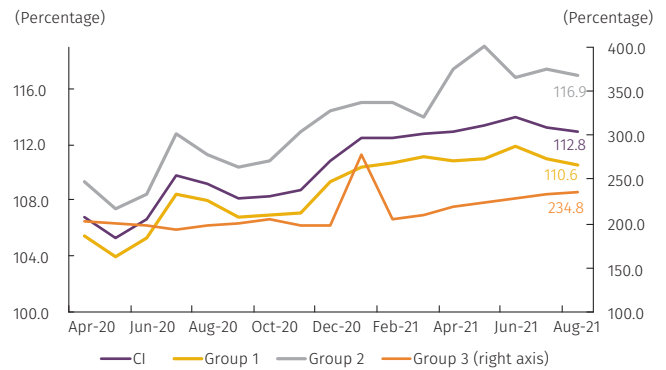
B. Change in CE's NLR



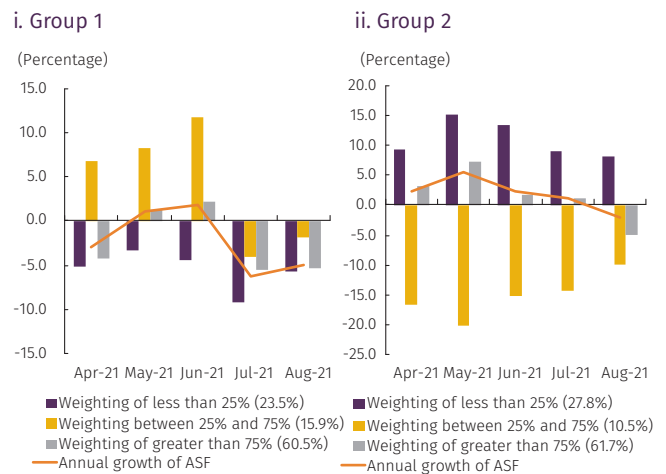
LAM: Liquid assets adjusted for foreign exchange and market risk.
HQLA: Investments in high quality liquid assets.
OLA: other liquid assets.
NLR: net liquidity requirements.
Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

Graph 2.38
Net Stable Funding Ratio (NSFR)

A. Change of Indicator



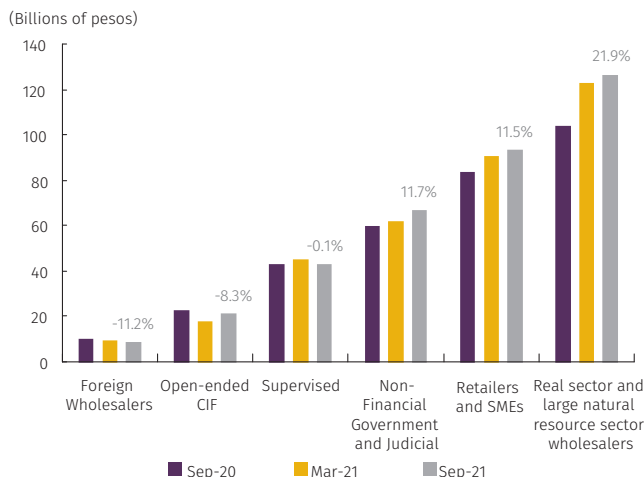
B. ASF Stability Trend (annual growth)



Note 1: in panel B, the labels in parentheses represent the share of the item in the unweighted ASF total.
Note 2: in panel B, the analysis of the ASF is based on the unweighted values of each item.
Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

27 NSFR is an indicator that makes it possible to identify the structure and strategic management of the Cls' balance sheet in terms of their stability in order to limit the heavy dependence on unstable or illiquid sources of financing. For more information, see Shaded section 2 of the *Financial Stability Report* for the second half of 2020.

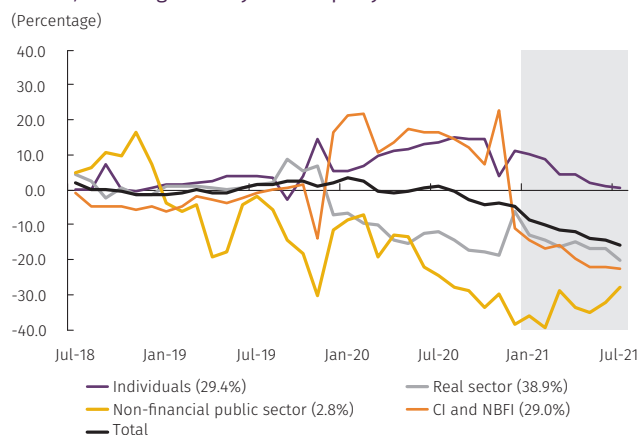
Graph 2.39
Distribution of Demand Deposits by Counterparty



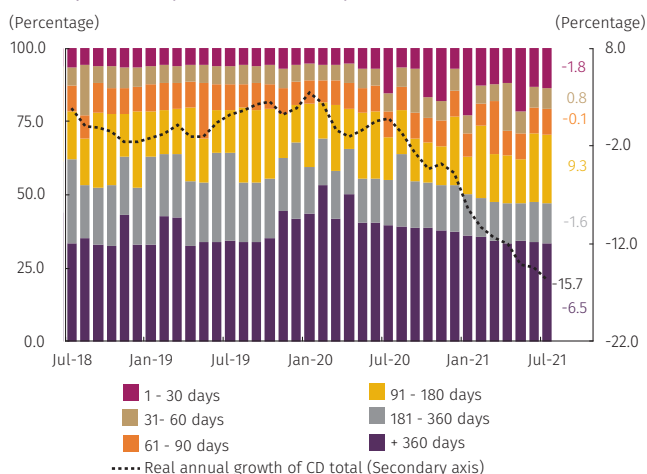
Note 1: the orange label represents the real annual growth of deposits for each counterparty.
 Note 2: the balances are presented in billions of pesos as of September 2021.
 Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

Graph 2.40
Breakdown of the CIs' CDs

A. Real, annual growth by counterparty



B. Composition by residual maturity



Note: the share of each counterparty in the total is shown in parentheses.
 Note: The labels at the bottom of the graph represent the annual delta of the share per maturity.
 Source: Office of the Financial Superintendent of Colombia, calculations by Banco de la República.

a smaller proportion than the RSF. In the case of group 1 CIs,²⁸ this is the result of a shrinking of all their sources of funding, especially those with less stability, while in the case of group 2, the most stable sources of funding are those that have lost share (Graph 2.38, panel B).

By instrument, the decrease in the funding of CIs was caused by a slowdown in demand deposits and a further decline in term deposits.

The CI funding, understood as the sum of liabilities and equity, has decreased in real terms since March 2021 in line with the performance of the portfolio. This was due to a lower contribution from demand deposits and a fall in term deposits (see Graph 2.4, Current Situation of the Financial System). In the first case, demand instruments, which had been supporting the growth of funding since last year, slowed down in recent months with the exception of non-financial government and judicial, real sector wholesalers, and high-net worth individuals (Graph 2.39).

In the case of term deposits, CDs of all counterparties, with the exception of the non-financial public sector, continued their downward trend over the course of the year. Moreover, like demand deposits, CDs belonging to individuals slowed down, thus reversing the upward trend seen in 2020 (Graph 2.40, panel A). Based on maturity, the reduction is due to a lower balance of CDs with residual maturities of more than 180 days while the most representative drop for CDs is in residual maturities of more than 360 days. In addition, CDs with maturities of more than 90 and less than 180 days showed greater relevance (Graph 2.40, panel B).

28 Group 1 includes CIs with assets exceeding 2.0% of total banking assets. Group 2 includes entities that have a portfolio as a significant asset, but do not qualify for Group 1, and Group 3 includes all other entities. The regulatory limits that the entities must comply with based on their group will be progressively raised. Thus, starting March 2021, these are 90% and 70% for groups 1 and 2 respectively and will be 100% and 80% starting March 2022. Entities belonging to group 3 calculate their indicator as informative for the supervisor.

2.4.2 Trading Book Interest Rate Risk

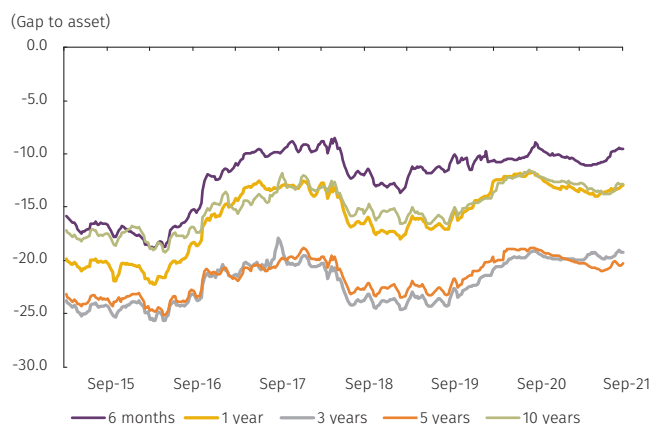
The structure of the interest rates on the CIs' balance sheet is analyzed in this section as is their exposure to the trading book interest rate risk.²⁹ The measurement of this risk seeks to estimate how changes in the interest rates for assets and liabilities affect net interest income.

The reduction in asset duration and their higher exposure to variable interest rates gradually lowered the exposure to the trading book's interest rate risk.

The *weighted average term to maturity (WATM) gap* was calculated in order to measure the exposure of the trading book to interest rate risk. 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 mainly depends on two factors: the share of assets and liabilities contracted at variable rates and the maturity of fixed-rate assets and liabilities. The indicator is

generally negative because the maturity of the assets is much greater than that of the liabilities (almost three times, Graph 2.44). This reflects the transformation of maturities carried out by financial intermediaries. Meanwhile, the size of the gap 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.³⁰ Under a negative WATM gap, an increase in lending and deposit rates of the same magnitude would generate a reduction in the net interest income. In this context, a reduction in the interest rates would lead to an increase in the net income from interest.

Graph 2.41
WATM gap by Maturity^{a/}



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

29 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 ratio of the risk of interest rate changes to the entities' net interest income based on the information in the trading book.

30 The indicator is defined as: $WATM\ Gap_t = \sum RSA_i \left(\frac{T-D_i}{T} \right) - \sum PSR_j \left(\frac{T-D_j}{T} \right)$, where RSA_i corresponds to assets i subject to interest rate risk and PSR_j 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 Establishments' Trading Book" in the September 2015 Financial Stability Report.

Graph 2.41 presents the *WATM gap* for different maturities following the observed 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.³¹ There has been a gradual reduction in the *WATM gap* compared to the levels seen six months ago for all maturities. This has become more pronounced since the end

of July and in maturities of less than one year. This trend is partly due to the higher exposure of assets to variable rates (as opposed to the stability of liabilities tied to variable rates) and to the reduction in the duration of assets in recent months. *Banco de la República's* expectation of interest rate increases may explain the changes in the balance sheet exposure of CIs and, therefore, the reduction seen in the *WATM gap* in recent months.

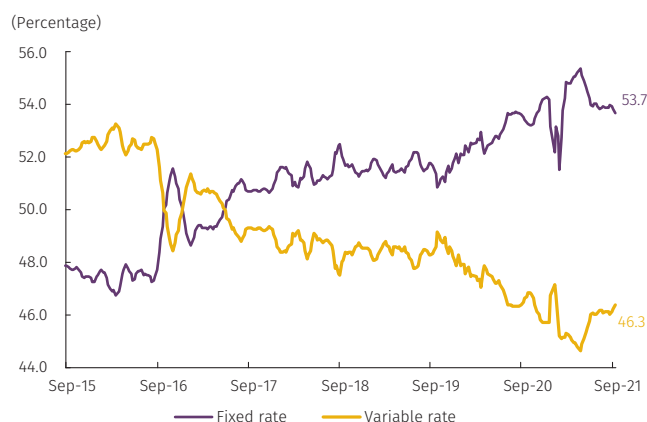
The proportion of variable-rate assets has increased in the last six months while liabilities have remained the same.

Between March and September 2021, the share of the CI assets contracted at variable rates gradually increased compared to the percentage contracted at fixed rates. Liabilities, in turn, have remained at levels similar to those seen six months ago. The increase in the exposure of the CIs' assets to variable rates may be due to the expectation of interest rate hikes that the market was anticipating at the end of September (Graph 2.42).³²

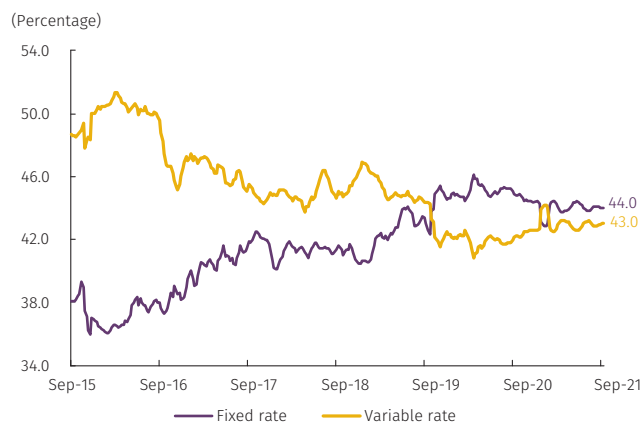
When the structure and breakdown of the balance sheet items contracted at variable rates are analyzed, it is evident that the asset positions indexed at the benchmark rates are more relevant than the ones associated with inflation which is the opposite of what happens with liabilities contracted at variable rates. In September 2021,

Graph 2.42
Change in Breakdown of Assets and Liabilities by Type of Interest Rate^{a/}

A. Assets



B. Liabilities



a/ The balances of liabilities at fixed rates and at variable rates are shown as a share 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*.

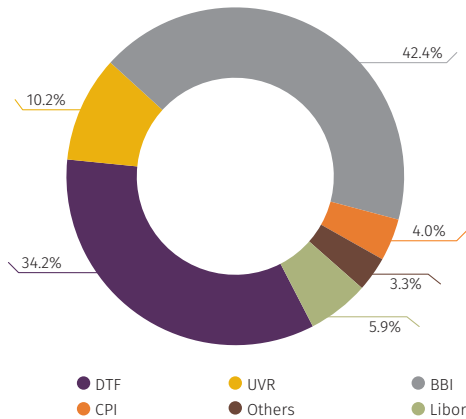
31 The *WATM gap* assumes a greater transmission of the policy rate to the BBI and DTF benchmark rates and a partial transmission to UVR and the CPI. The transmission is based on the calculation of the short-term elasticities between each interest rate and the IBR (taken as a proxy for the monetary policy rate). See details in the Financial Stability Report for the first half of 2021.

32 In *Banco de la República's* July 2021 Monthly Survey of Economic Expectations, the market expected a 25 bp increase in the benchmark rate for October, a forecast that was brought forward to September as reported in the August 2021 survey (Graph 2.35).

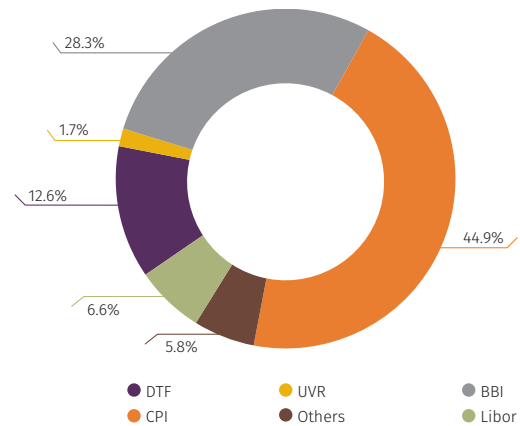
Graph 2.43
Breakdown of Balance Sheet Contracted at Variable Rates by Type of Rate

A. September 2021

i. Assets

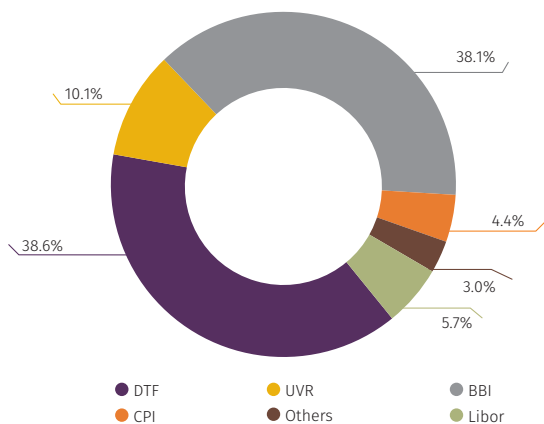


ii. Liabilities

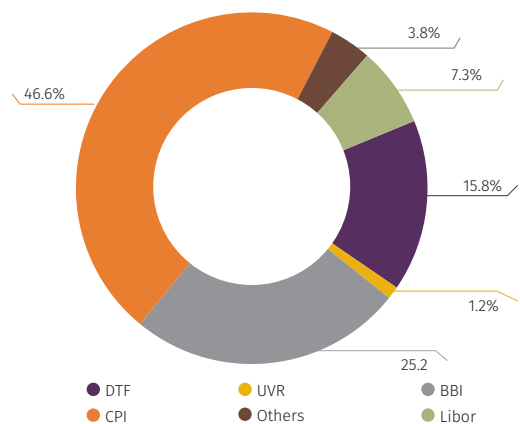


B. April 2021

i. Assets



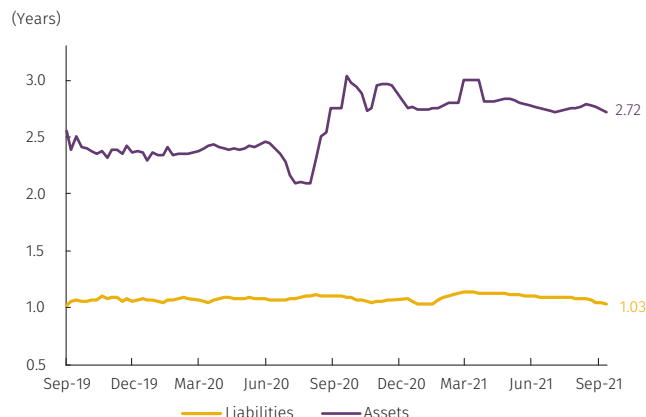
ii. Liabilities



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

76.6% of the asset positions were indexed to benchmark rates (BBI and DTF) while 46.6% of liabilities depended on inflation (CPI and UVR) and, to a lesser degree, the benchmark rates (41.0%) (Graph 2.43). Between March and September 2021, the CIs lowered the exposure of their assets to DTF and increased their share in instruments indexed to the BBI. With respect to liabilities, there was an increase in the instruments indexed to the BBI and a reduction in the share of the instruments tied to the DTF, CPI, and Libor. Just as in the previous six months, there was, for liabilities, an increased exposure to foreign interest rates compared to assets. However, the share of liabilities and assets tied to Libor remains at relatively low levels and has decreased in the case of

Graph 2.44
Average Duration of CE Assets and Liabilities^{a/}



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

liabilities compared to the level seen six months ago (panel A vs. panel B).³³ The participation of the BBI in lending and deposit transactions has been gaining representation with respect to instruments tied to the DTF since March 2020. The increase in CI exposure to BBI on both sides of the balance sheet suggests a greater adjustment of their balance sheet to the performance of short-term interest rates.

The average life for CI assets went from 2.54 years in August 2020 to 3.0 years in March 2021 and then started to decrease gradually until it stood at 2.72 years in September 2021. The duration of liabilities in September 2021 stood at 1.03 years and has shown a gradual reduction since March 2021 although of a lesser magnitude compared to the one seen on the assets side (Graph 2.44).

33 See Box 4 of this Report: “Transition of Libor and other international benchmark rates.”

Box 1 Decomposition of the Net Interest Margin in Colombia and Chile

Wilmar Cabrera
Daniela Rodríguez-Novoa*

This box contains the results of an approximation to the decomposition of the net interest margin based on an industrial organization model¹ of the Colombian and Chilean banking sectors. The choice of these countries obeys the fact that, historically, there has been a significant gap between their interest margin.

The model makes it possible to breakdown the *ex-post* margin ($MI_{ex-post}$) into a range of factors associated with the structure of the system. Conceptually, the *ex-post* margin refers to the intermediaries' income and outflow or expenses from their credit portfolio and deposit operations. Accordingly, in this sense, it is a measure of the return on banking activity. The later implies the *ex-post* margin is *after* the materialization of credit risk. Therefore, in principle, it is not an element that is part of the breakdown.

The analysis is based on the simplified structure of the banks' balance sheets presented in Table B1.1. To calculate the theoretical *ex-post* margin of the banking system, it is assumed banks maximize a utility function that does not consider credit risk (equation 1) subject to their balance sheet structure (equation 2), a minimum level of capital (equation 3), and a liquidity requirement² (equation 4).

* The authors belong to the Financial Stability Department at *Banco de la República*. The opinions expressed herein are the sole responsibility of the authors and imply no commitment on the part of Banco de la República or its Board of Directors.

1 A general description of the model can be found in Freixas and Rochet (1998).

2 The level of investments set by the institution must be in line with the maximum possible withdrawal it can face (FR), assuming such withdrawals follow a uniform distribution; i.e., that $INV = FR \times D \times E[0, \max(0, \tilde{x} - a)]$ with $\tilde{x} \sim U(0, 1)$.

Table B1.1
Structure of the Bank Balance Sheet

Assets	Liabilities
Reserves Requirement αD	Deposits D
Net Position in the Interbank market M	
Credit Portfolio L	Equity
Investment INV	E

Note: α represents the percentage of deposits and liabilities that banks must establish as a reserve at the Central Bank.
Source: Prepared by authors.

$$\max_{L,D} \pi(D,L) = r_{L,ex\ post} L + r_{INV} INV + rM - r_D(D) - r_E E - C(D,L) \quad (1)$$

$$M = (1-\alpha)D + E - L - INV \quad (2)$$

$$E = (CAR)(RWA)(L) \quad (3)$$

$$INV = \left[\frac{D(1-\alpha)^2}{2} \right] * FR \quad (4)$$

Where $r_{L,ex\ post}$, r_D , r_{INV} and r_E represent the cost or yield from credit, deposit, investment and equity operations, respectively, and r is the monetary policy rate (*TPM*), $C(D,L)$ are the administrative and labor costs (*GAL*) of granting credit or taking deposits, CAR is the capital adequacy ratio, RWA is the risk weighted assets associated with the credit portfolio, given the solvency ratio, and FR is the withdrawal factor the institution may experience with respect to its deposits.

The first-order conditions of this problem (*CPO*) establish the relationship between the interest rates intermediaries would accept under perfect competition and the costs associated with granting credit and taking deposits (equations 5 and 6). Specifically, γ_L and γ_D are the parameters that pertain to the marginal operating cost of granting a new loan and deposits, in that order.

$$\frac{\partial \pi}{\partial L} = 0 \rightarrow r_{L,ex\ post}^P = r + \gamma_L + (r_E - r)(CAR)(RWA) \quad (5)$$

$$\frac{\partial \pi}{\partial D} = 0 \rightarrow r_D^P = (r_{INV} - r) \frac{(1-\alpha)^2}{2} (FR) + r(1-\alpha) - \gamma_D \quad (6)$$

The exercise consists of using balance sheet information to calibrate each of the *CPO* parameters and, in doing so, to obtain a calibration of the theoretical interest rates under perfect competition ($r_{L,ex\ post}^P$ and r_D^P). In parallel, the observed implicit interest rates are calculated from the banks' balance sheets (equations 7 and 8).

$$r_{L,ex\ post} = \frac{\text{Interest Income}}{L} \quad (7)$$

$$r_D = \frac{\text{Interest Outflows}}{D} \quad (8)$$

Once the theoretical interest rates under perfect competition have been calibrated and the implicit interest rates calculated, the observed ($MI_{ex-post}$) is broken down into the theoretical components associated with perfect competition and an error term (equation 9). This does not imply the exercise assumes the loan market operates under perfect competition, but that it uses the interest rate approximation under this competitive structure to relegate to the error term all those elements that cause a difference between the implicit rates that are found, and the theoretical approximation being used, including the market structure. Therefore, the error term can be understood as the conjunction of the market power of the banks, the differences in loan portfolio composition and the business structure in each jurisdiction, among other factors not explicitly modeled. Consequently, the *observed ex – post margin* can be written as the sum of the theoretical margin and the error term (ϵ):

$$MI_{ex\ post} = r_{L,ex\ post} - r_D = r_{L,ex\ post}^P - r_D^P + \epsilon \quad (9)$$

Using the CPOs, the observed *ex-post* margin can be broken down as follows:

$$MI_{ex\ post} = \underbrace{(r)}_{MPR} + \underbrace{(y_L + Y_D)}_{GAL} + \underbrace{((r_E - r)(CAR)(RWA))}_{Capital\ Cost} - \underbrace{\left((r_{INV} - r) \frac{(1-\alpha)^2}{2} (FR) \right)}_{Liquidity\ Risk} + \underbrace{(ar)}_{Reserve\ Requirement} + \underbrace{\epsilon}_{Error}$$

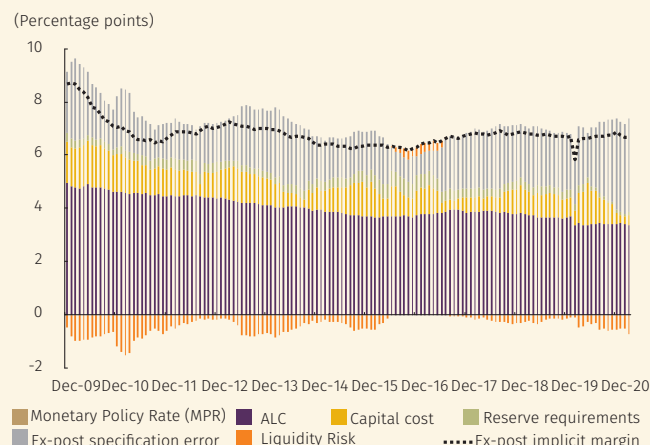
Where, the term *MPR* corresponds to the monetary policy rate and *GAL*, to the operating costs of granting a new loan and deposit-taking operations. The cost of capital refers to the cost derived from the need for institutions to have sources of funding other than deposits, given the solvency requirement. Liquidity risk refers to the cost associated with maintaining investment reserves to deal with possible withdrawals or to meet short-term obligations, while the reserve requirement refers to the cost of maintaining deposits as a reserve at *Banco de la República*.

Graph B1.1 shows the results of this exercise for Chile and Colombia. They suggest *ex-post* intermediation margins have remained stable in recent years (at around 7% in Colombia and 4% in Chile) and that a large part of the difference in size between these margins can be attributed to labor and administrative costs. Finally, the unexplained component of the *ex-post* margin is relatively larger in Chile than in Colombia.

The observation that emerges with respect to the high share of bank operating costs has been a constant in studies that have broken down the intermediation margin using different empirical approaches and other periods of analysis.³

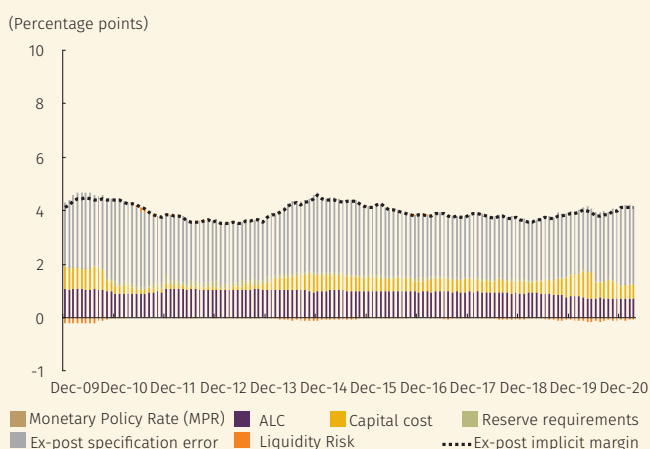
Graph B1.1
Breakdown of Intermediation Margin

A. Colombia



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

B. Chile



Source: Financial Market Commission of Chile, authors' calculations

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3 Steiner, S., Barajas, A. and Salazar, N. (1997), Urrutia, M. (2000) and Estrada, D., Gómez, E. and Orozco, I. (2007).

Box 2

Spatial Analysis of New Home Prices in Bogota, Medellín, and Cali Using a Geostatistical Approach

María Fernanda Meneses
Camilo Eduardo Sánchez*

The housing market has been one of the sectors of the economy that has performed favorably despite the health crisis: new home sales have reached historic levels so far in 2021. However, the momentum observed in demand has not been accompanied by a similar response on the supply side. This, in turn, has generated pressure on prices.¹

Monitoring the level of housing prices in Colombia has focused on analyzing this market in different dimensions: for example, by considering the type of housing (LIH and non-LIH), the city and the socio-economic bracket, among other factors. However, this type of analysis may hide some of the heterogeneities within a city. Therefore, this box outlines a spatial analysis tool that uses georeferenced information for the first time to estimate the growth in new home prices in those areas of Bogota, Medellín and Cali where no information is available.² The objective is to represent the dynamics of the annual variation in home prices, in their entirety, on maps of the three cities.³

* Los autores pertenecen al Departamento de Estabilidad Financiera del Banco de la República. Sus opiniones no representan las del Banco de la República ni las de los miembros de su Junta Directiva. Los autores agradecen a Eduard Felipe Mora por la facilitación de los polígonos y conversión de coordenadas necesarios para este trabajo.

1 See the special report: *Análisis de la cartera y del mercado inmobiliario en Colombia*, first half of 2021.

2 These are the three main cities in Colombia. Together, they account for 68.9% of the total sales of *La Galería Inmobiliaria's* base at September 2021.

3 This exercise does not estimate a new home price index.

1. Methodological Approach

This exercise in geostatistical analysis is based on new housing project information from *Galería Inmobiliaria* to September 2021. Spatial location data (measured in coordinates) and the real annual percentage change in prices per square meter in the urban areas of Bogota, Medellín and Cali are used. From this database, we extract the projects that were in the sales phase, both in September 2020 and September 2021. In other words, we work with the same projects in both periods.⁴

The change in price at a point without information is calculated as the weighted average of the closest observed data. This spatial interpolation technique is known as Kriging and the weights are obtained based on three elements: 1) the distance between observed points, 2) the prediction location and 3) the defined spatial structure. Accordingly, the prediction function corresponds to:

$$z^*(s_0) = \sum_{i=1}^n \lambda_i z(s_i)$$

where $z^*(s_0)$ is the predicted growth of price per square meter at coordinates s_0 and λ_i is the weight of observation $z(s_i)$. The variance of the prediction error is minimized⁵ to obtain parameters λ_i , which ensures the predictor is unbiased and of the lowest possible variance among the linear predictors. The expression that is minimized to find λ_i is, in turn, a function of the spatial covariance of the data, which comes from the spatial structure in each city.

1.1. Spatial Structure of the Data

It is assumed that the growth in price level follows a stationary process, that is, the mean is constant and the covariance is a function of the spatial distance between the observations. Therefore, the location or address of a project does not add information about the variation of its price. Under this assumption, there is a relationship between spatial covariance and a function known as **semivariance**, which is defined as the variance of price growth spread between two points:

$$\gamma(s_r, s_j) = \frac{1}{2} \text{var}(z(s_r) - z(s_j))$$

Where $z(s_i)$ is the price growth per square meter observed at point s_i ; and $\gamma(\cdot)$ is the semivariance function. In this paper, the spatial structure of each city is identified from the semivariance function, and then the covariance function used in the prediction exercise is cleared.

4 Working with the same active projects in both periods prevents results on home price growth from being due to the launching of new projects.

5 The prediction error variance is defined as: $\text{Var}(z(s_0) - z^*(s_0))$.

The theoretical semivariance models have the **nugget effect**, the **range** and the **saddle** as parameters. The first refers to the semivariance that two points in very close proximity should have. The second refers to the distance beyond which two observations are no longer considered to have a spatial relationship, while the latter indicates the value of the semivariance (or covariance) beyond that distance.⁶ Theoretical models with different initial parameters were estimated in this way with different econometric techniques to determine, through the mean squared error, those that best fit the data (Table B2.1).

With these semivariance models for each of the cities, their corresponding covariance function is introduced into the prediction error expression, their variance is minimized to obtain each λ_p , and, finally, the prediction exercise is carried out.

2. Results and Considerations

Graph B2.1 shows the estimated real annual growth in prices per square meter for the cities under analysis as of September 2021. The shading in the maps near purple and black represents the areas of the city where housing projects became more expensive, while the yellow areas indicate projects with no major changes in price. The blue shading reflects areas where prices declined.

In the case of Bogota,⁷ the increase in prices per square meter was observed to a greater extent in the southern part of the city, although sectors such as Usaquén (the most expensive neighbor, after Chapinero) also observed increases (Graph B2.1, panel A). In general, the largest rise in housing project prices occurred in areas with relatively low home prices, such as Kennedy, Ciudad Bolívar, Tunjuelito, Usme and Rafael Uribe, and some parts of Fontibón.

After the spatial estimation exercise and to complement the study of prices per square meter, a descriptive analysis is performed with variables observed in this market, to infer characteristics by locality or sector. It is found that in the areas of Bogota where prices increased the most, there were also large sales. In the case of Usaquén, there was no increase in demand. On the other hand, in some sectors such as Ciudad Bolívar and Usme the greatest change in the price per square meter was evidenced for LIH-type projects, which account for more than 80% of the housing projects in those areas. The opposite is the case in Usaquén, where LIH real estate accounts for a low percentage.

For Medellín,⁸ the acceleration in prices was observed in the northwestern sectors and in some parts of the south. By sector, this occurred in Guayabal,⁹ Belén, Robledo and Poblado (the most expensive area of the city; Graph B2.1, panel B). Moreover, 69 active housing projects were registered in Medellín, with less than 5% being LIH projects. Therefore, the rise in prices was mostly for non-LIH projects.

In Cali,¹⁰ the largest increase in prices was observed in the southwest part of the city, particularly in communes 18, 19 and 22, which are characterized as having a socio-economic bracket equal to or higher than bracket four (Graph B2.1, panel C). While the projects in commune 18 maintain relatively lower prices and register a high share of LIH projects, in the case of housing projects in communes 19 and 22, the real estate is mostly non-LIH housing and registers one of the highest prices in the city. On the other hand, more than 30% of the projects in Cali are located in the commune 2 (north zone) and are mostly non-LIH. Finally, although communes 4 and 16 register few housing projects, the most home units were sold in these areas of during the last few months.

Table B2.1
Summary of Semivariogram Models

City	Theoretical model	Mean squared error		
Bogota	Powered exponential	MCO: 2.05	MCP1: 2.13	MCP2: 2.25
Medellin	Exponential	MLE: 10.35	REML: 11.41	
		MCO: 18.91	MCP1: 19.09	MCP2: 20.44
Cali	Wave	MLE: 349.67	REML: 349.67	
		MCO: 95.92	MCP1: 95.52	MCP2: 115.01
		MLE: 114.39	REML: 126.45	

OLS: ordinary least squares, WLS1: weighted least squares by the number of pairs of points seen at each distance.
WLS2: weighted least squares by the number of pairs and semivariance seen at each distance.
MLE: maximum likelihood, REML: restricted maximum likelihood.
Source: Banco de la República

8 At the time of analysis, there are no data on new residential housing projects in communes 1 (Popular), 2 (Santa Cruz), 3 (Manrique), 4 (Aranjuez), 5 (Castilla), 6 (12 Octubre), 8 (Villa hermosa) and 13 (San Javier).

6 For a better understanding of the theoretical models, see Cressie, N. (1991).

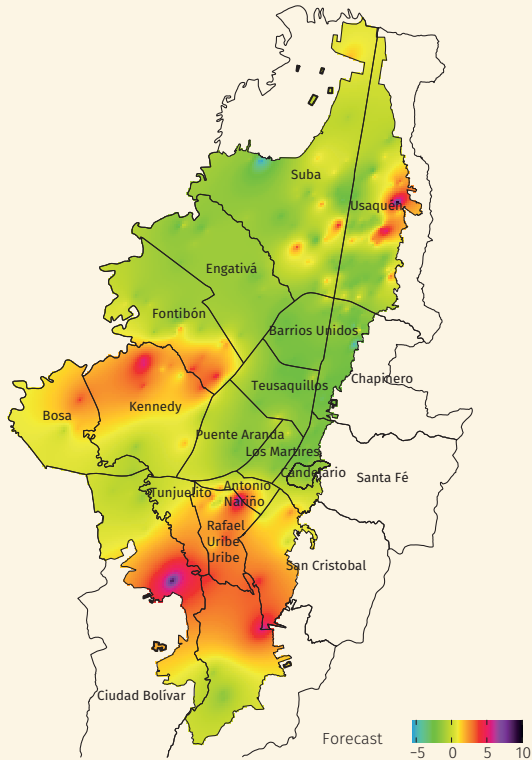
9 In some areas of Medellín, such as Guayabal and Robledo, this increase occurred in large housing projects.

7 At the time of analysis, there are no data on new residential housing projects in Tunjuelito and Sumapaz.

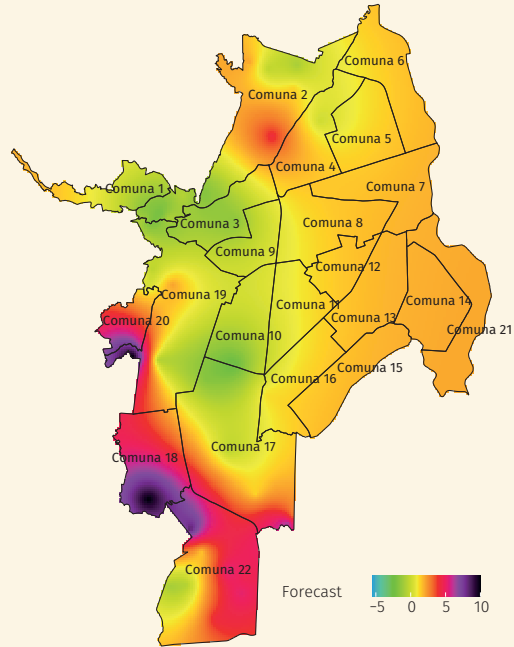
10 At the time of analysis, there are new housing projects only in communes 2, 3, 4, 10, 16, 17, 18, 19 and 22.

Graph B2.1
Forecast of Price per Square Meter Growth

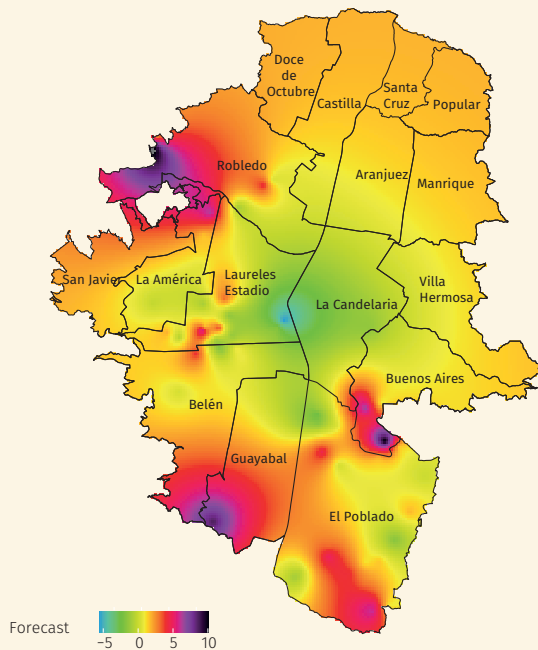
A. Bogotá



C. Cali



B. Medellín



In summary, this exercise offers a tool other than a price index, specifically one that takes advantage of georeferenced information to estimate the growth in new home prices per square meter in areas of the cities analyzed for which no information is available. The purpose is to graphically represent the dynamics in prices within a given city. Future research could refine this methodology by including other housing market variables in the estimate to make the prediction more accurate.

References

Cressie, N. (1991). *Statistics for Spatial Data*. John Wiley & Sons.

Source: *Galería Inmobiliaria*, calculations by Banco de la República.

03

Stress Test

Considering the vulnerabilities identified throughout the Report, this chapter presents three exercises that measure the capacity of the financial system to face adverse scenarios in terms of credit and liquidity risk, and to continue providing its basic 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, in line with the analysis of vulnerabilities presented in this Report. The first exercise, which is known in international literature as a stress test, is intended to measure the ability of CIs to deal with a hypothetical, adverse, and improbable scenario by using a model that considers both solvency and liquidity risks together.

The second exercise measures the impact that a scenario of funding with less stable sources would have on CIs' NSFR based on the balance sheet structure resulting from the first exercise. The third one estimates the effect that different withdrawal shocks would have on the liquidity position of open-end mutual funds. This test aims to evaluate the capacity of these institutions to meet their short-term obligations under a stressful scenario.

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. This test seeks to measure the resilience of the CIs in the event of an unlikely, hypothetical, adverse scenario.

This section seeks to calculate the impact that a hypothetical adverse scenario in which the Colombian economy faces a sudden stop of external financing

and grows at a slower-than-expected rate between 2021 and 2023 would have on CIs. The scenario considered reflects a situation in which output does not return to the levels seen before the pandemic until 2023Q2.

The results of this exercise do not constitute any forecast about the future development of the economy or the financial system since the scenario considered is intended to reflect a hypothetical adverse situation. Therefore, these should be interpreted as a quantitative evaluation of the resilience of the CIs in the event of an adverse scenario based on their current financial conditions and under restrictive assumptions. Likewise, the exercise does not consider policy reaction to the deterioration in the entities' financial statements nor preventive actions to follow up on their risk management.

The usefulness of the test 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.³⁴

Results suggest that market and credit risks would be the main sources of losses in the adverse scenario. The above would generate negative effects on aggregate common equity tier 1 and tier 2 ratios, but they would remain above regulatory minimums during the whole horizon of the exercise. Although individual analysis is heterogeneous, the above implies that the system currently has sufficient buffers to absorb potential losses in the adverse scenario.

3.1.1 Macroeconomic Scenario and Materializing Risks

The trajectories of the adverse scenario consider a sudden stop of foreign financing and an economic recovery that is slower than expected by the technical staff at Banco de la República.

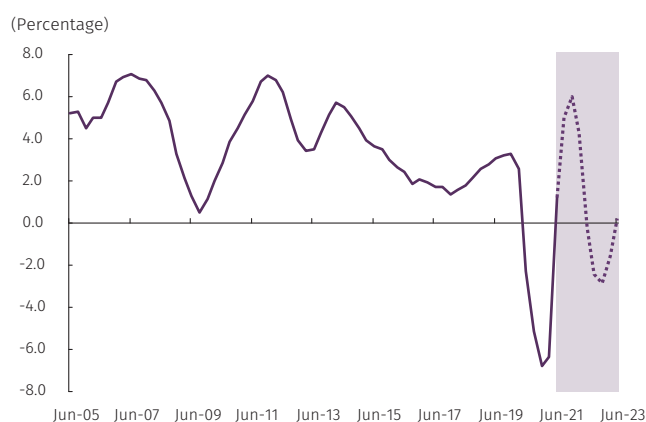
The stress test seeks to capture the effects of an adverse and hypothetical macroeconomic context that assumes a gradual and permanent stop of external financing for the Colombian economy and a slower-than-expected recovery over the next two years starting in 2021Q3. This scenario was built using the central GDP forecast of the technical staff at *Banco de la República* that was published in the

³⁴ The technical details of the stress test model, including 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*.

October 2021 *Monetary Policy Report* and the distribution of future GDP growth based on the GDP-at-risk methodology.³⁵

In terms of the magnitude of the sudden stop, it is assumed that the flow of portfolio and other investment (including financing to the government and decentralized sector) would cease during the two years of the scenario. Based on annual information from Colombia's balance of payments between June 2020 and June 2021, this funding amounted to USD 12.2 b and corresponds to 4.2% of GDP. In addition, the sale of 50% of foreign investors' holdings in the public debt portfolio is included. The scenario does not consider the impact of declines in international financing through FDI or financial derivatives.

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



Source: DANE (up to June 2021), calculations by Banco de la República (September 2021 to June 2023).

The adverse scenario assumes a GDP growth of 5.9% for 2021 and -2.9% for 2022 (Graph 3.1), which corresponds to 3.7 pp less than *Banco de la República's* central forecast for 2021 and 7.5 pp for 2022. An average unemployment rate of 17.0% is also included over the horizon of the exercise, rising inflation that reaches 7.7% in June 2023, and a monetary policy rate that does not respond to the macroeconomic stress due to inflationary pressures. In addition, in a sudden stop context as described above, a 74.9% depreciation of the peso's exchange rate with respect to the US dollar is assumed during the period under analysis. Finally, given an adverse scenario of high uncertainty, interest rates on loans and deposits are assumed to increase at a faster rate than the monetary policy rate.³⁶

This scenario would cause an increase in loan portfolio defaults and losses in the public debt portfolios.

A hypothetical scenario of low economic growth and a sudden stop of external financing would increase credit and market risk for the CIs in a first stage. Their endogenous response to such scenario would generate, at a second stage, the materialization of additional risks that would depend on the financial statements starting point for each entity (funding, liquidity, interest rate, and contagion risks).

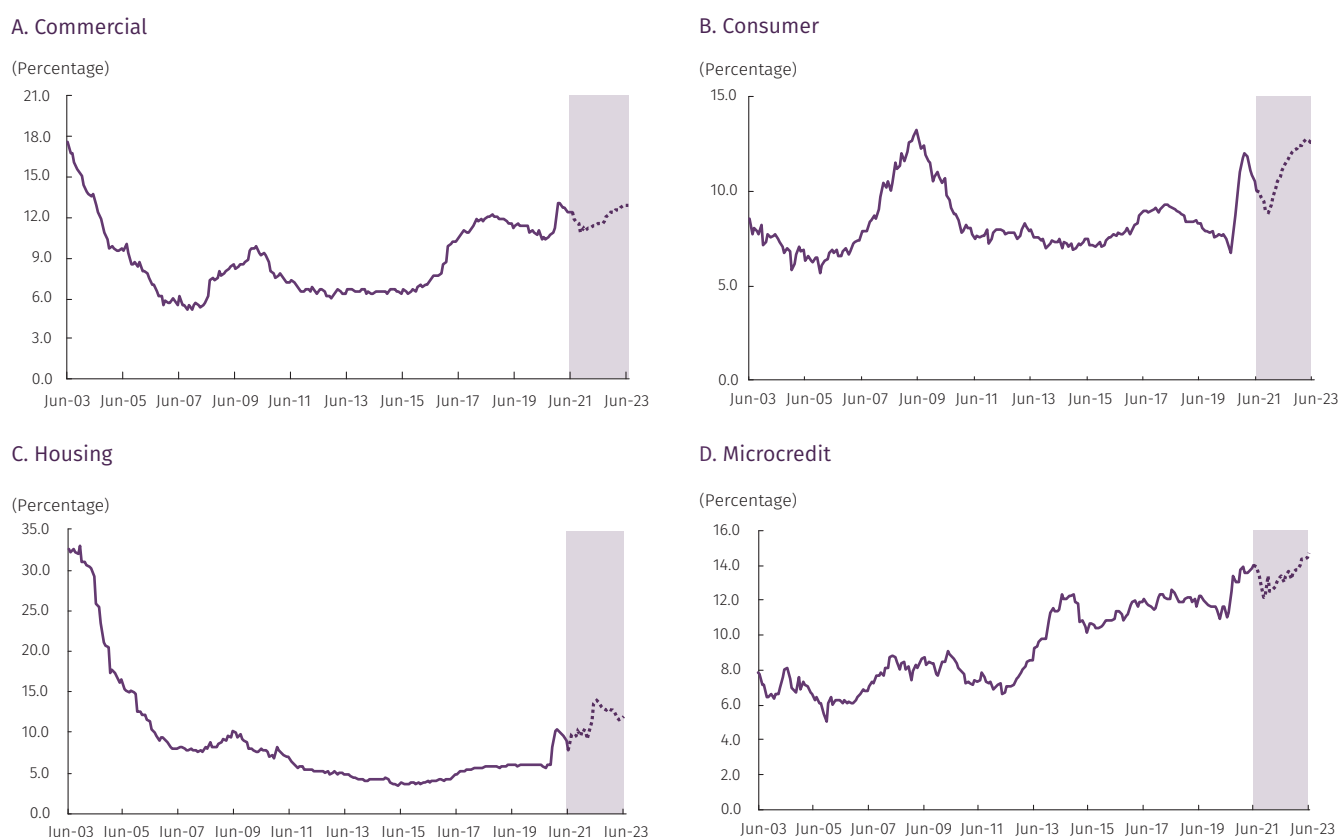
35 Specifically, *Banco de la República's* central forecast is taken, and the difference between the median and the 5th percentile of the distribution of future GDP growth is subtracted based on the GDP-at-risk methodology. For more detail on this methodology see Box 1 of the *Financial Stability Report* for the first half of 2018.

36 Details of the interest rate models used in this model are presented in Box 3 of this *Report*.

Regarding credit risk, two elements are incorporated. First, the natural consequence of a macroeconomic deterioration would impact the ability of economic agents to repay their loans and thus an increase in default rates would be observed. The hypothetical trajectories of quality risk indicators for the four types of loan portfolios are presented in Graph 3.2: the shaded area corresponds to the stress test horizon.

The second element is determined by the sudden stop of external financing which would have two immediate impacts on the banking system: first, funding difficulties and depreciation would probably cause the bankruptcy of a number of companies exposed to exchange rate risk^{37,38}. Second, economic agents (government, decentralized

Graph 3.2
QIR Trajectory by Type of Loan Portfolio in the Hypothetical Adverse Scenario



Source: Office of the Financial Superintendent of Colombia (up to June 2021), calculations by Banco de la República (September 2021 to June 2023).

37 The companies exposed to exchange rate risk are those showing a negative currency mismatch (liabilities in foreign currency greater than assets in foreign currency) and, taking into account three indicators, 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 with 1 being the highest risk level. Finally, these indicators are averaged. If the average for a company is less than or equal to 2.5 and the currency mismatch is less than or equal to -20.0% of the total assets, the company is classified as vulnerable. For firms without public accounting information, the most mismatched that have accumulated 90% of the total mismatch for this group are taken as vulnerable.

38 As of June 2021, 1,024 firms exposed to foreign exchange risk, which represented 6.5% of the commercial portfolio, were identified.

sector, and real sector firms) that obtained external resources prior to the sudden stop would meet their funding needs with the local banking system. It is assumed that, by having access to external credit, these agents would have high credit quality, so they would get local funding expeditiously and would generate a reduction in the supply of credit to other sectors of the economy – a crowding out - with a potentially negative effect on their financial health.

The impact of this crowding out effect on the supply of credit incorporates the following modules. First, the total volume of credit that would be crowded out is estimated. The exercise assumes that all local companies with foreign indebtedness as well as the decentralized and territorial entities would be forced to replace it completely with commercial credit from the local banking system. The Central National Government (CNG) would seek to partially replace its external financing, since it is assumed that those funds provided by multilateral agencies and governments would not be affected. The remainder of the CNG's external financing would be replaced by issuing public bonds (Colombian Treasuries - TES) in the local market. This additional issuance would be purchased by CIs based on their share in the local TES market (20.2%)³⁹ and, therefore, would reduce the resources available for commercial loans disbursements in proportion to the share of this portfolio in the total loan portfolio (51.8%). These same proportions apply to both the flow of financing and the portfolio of public bonds that would be liquidated by foreign investors, who would stop financing the CNG selling half of their positions in the local market.

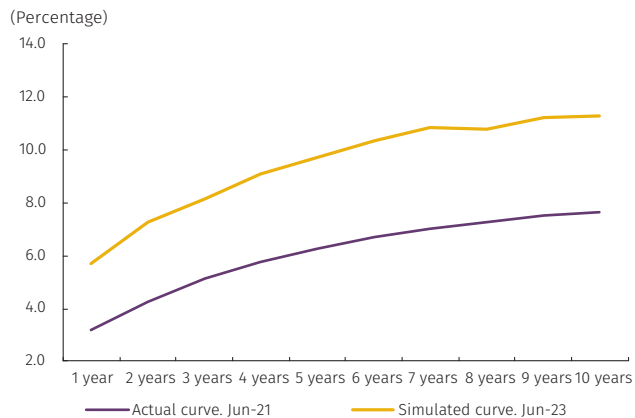
The second module identifies those companies to which the banking system would restrict financing due to the crowding-out effect. In this regard, it is assumed that CIs would stop granting credit, first, to smaller firms (by asset level) and those belonging to the economic sectors with the greatest credit risk deterioration according to chapter 2 of this *Report*.⁴⁰ Finally, the third module considers that firms with financial dependence,⁴¹ whose credit would be restricted,

39 The fact that banks purchase public bonds in proportion to their market share implies that the distribution of demand for government securities among local agents remains constant. Furthermore, this share is calculated considering that foreigners sell half of their holdings, which would be consistent with the sudden stop of external financing.

40 Hotels and restaurants, transportation, and mining.

41 Rajan and Zingales (1998) identify those companies that, for technical or life-cycle reasons, require a continuous flow of financing to meet their normal operations using the following financial dependence indicator: $\frac{CG}{FO + CT}$, where FO is the net cashflow from operating activities, CG the expenditures on capital investment and CT is working capital. It is assumed that, in a scenario of macroeconomic stress, companies do not demand resources for capital investment. This implies that a company is considered financially dependent only if the net cashflow from operating activities is negative.

Graph 3.3
TES Curve in the Hypothetical Adverse Scenario

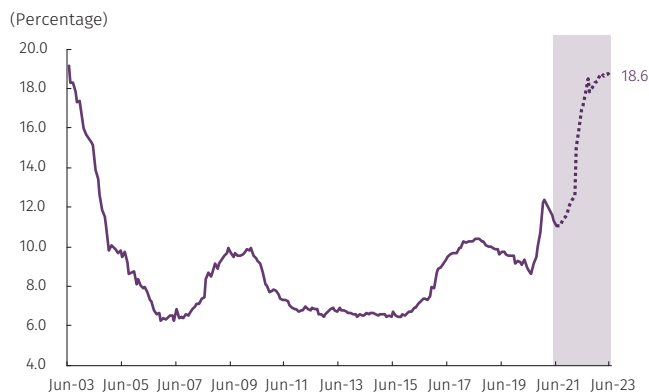


Sources: DCV and Precia, calculations by Banco de la República.

would end up in a situation of financial vulnerability which would cause them to default on their current loans.

Concerning market risk two elements are considered. On one hand, in line with a sudden stop, the country risk premia would rise, which would generate shifts in the zero-coupon TES curve and the corporate fixed income curve. On the other hand, the gradual and permanent exit of foreign holders from the local public debt market would have a direct impact on bond prices. Therefore, a widespread shift of the curves would probably be generated with the highest magnitude in the longer terms (Graph 3.3).

Graph 3.4
Aggregate Quality Indicator by Risk (QIR)



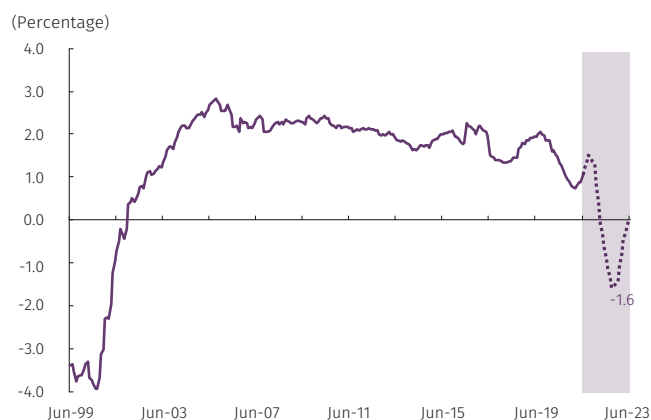
Source: Office of the Financial Superintendent of Colombia (up to June 2021), calculations by Banco de la República (September 2021 to June 2023).

3.1.2 Results

In the adverse scenario, there would be a negative aggregate profitability for CIs, a shrinking of the loan portfolio, and a fall of the capital adequacy ratio although it is likely to remain above the regulatory requirements.

The trajectories of the aggregate CI variables in the stressed scenario would follow the behavior shown in Graphs 3.4 to 3.8. In the described scenario, there would be a deterioration in loan portfolio quality that has not been seen since the period after the 1999 crisis. Given the severity of the macroeconomic scenario, the results indicate that, regarding profitability, the ROA would reach negative values as of the first quarter of 2022. The minimum ROA in the stressed scenario would be registered in September of the same year (-1.6%; Graph 3.5).

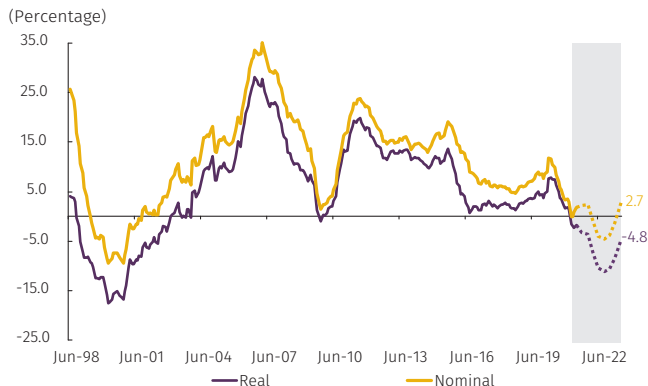
Graph 3.5
Return on Assets (ROA)



Source: Office of the Financial Superintendent of Colombia (up to June 2021), calculations by Banco de la República (September 2021 to June 2023).

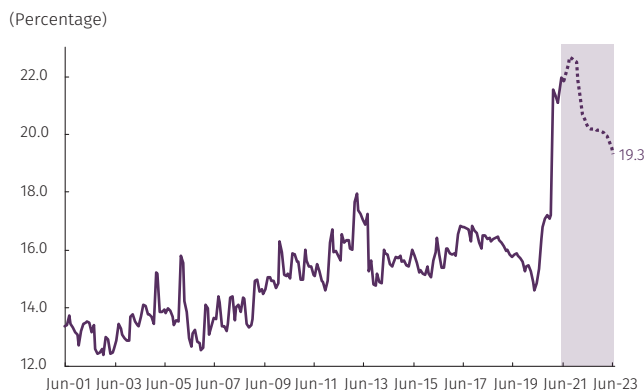
Regarding loan portfolio annual growth, there would be reductions in line with the lower rate of economic recovery and the partial replacement of loan portfolio with TES investments. The latter would be a result of the sudden stop in which the government would replace external funding with local financing (Graph 3.6). Beginning in the second quarter of the exercise, losses from spending on loan-loss provisions and the valuation losses of CI investments would reduce

Graph 3.6
Annual Growth of the Loan Portfolio



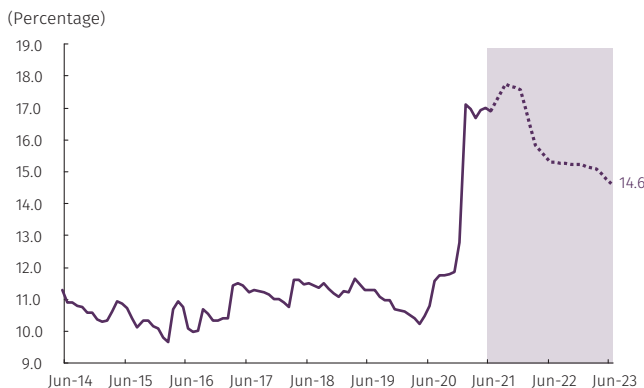
Source: Office of the Financial Superintendent of Colombia (up to June 2021), calculations by Banco de la República (September 2021 to June 2023).

Graph 3.7
Total Capital Adequacy Ratio



Source: Office of the Financial Superintendent of Colombia (up to June 2021), calculations by Banco de la República (September 2021 to June 2023).

Graph 3.8
Core Capital Adequacy Ratio

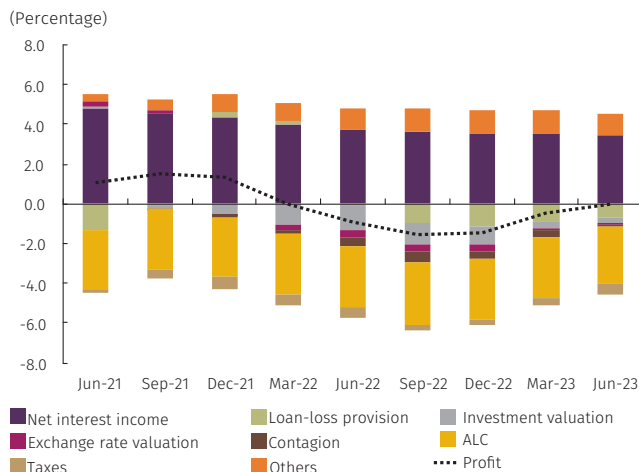


Source: Office of the Financial Superintendent of Colombia (up to June 2021), calculations by Banco de la República (September 2021 to June 2023).

the aggregate total and core capital adequacy ratios. However, these indicators would be located at levels above regulatory limits (Graphs 3.7 and 3.8).

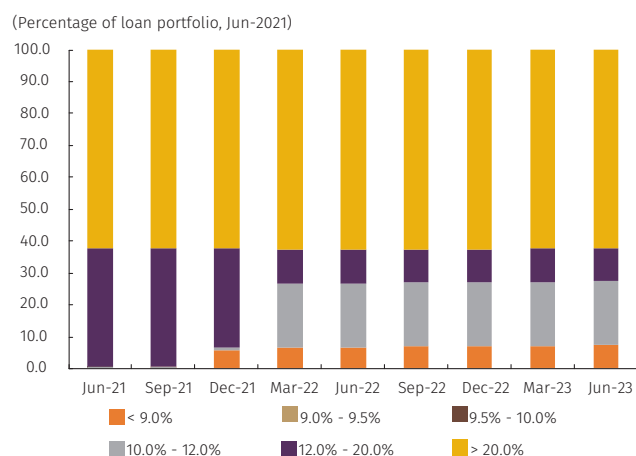
Graph 3.9 shows the breakdown of ROA. For this scenario, given that CIs are increasing their exposure in TES and these securities loose value due to the sale of the portfolio held by foreigners and the increase in country risk, valuation losses of investments are the item that contributes the most to the fall in ROA. The second item with the highest contribution is the loan-loss provisions because of the greater deterioration of the portfolio in the macro scenario and the impact on companies that are vulnerable to exchange rate mismatches and financially dependent with funding restrictions. Finally, the contagion component deepens the

Graph 3.9
Breakdown of ROA



Source: Office of the Financial Superintendent of Colombia (up to June 2021), calculations by Banco de la República (September 2021 to June 2023).

Graph 3.10
Distribution of Capital Adequacy by Share of Loan Portfolio



Source: Office of the Financial Superintendent of Colombia (up to June 2021), calculations by Banco de la República (September 2021 to June 2023).

losses for the financial system, largely due to the direct contagion component.⁴²

Finally, even though the aggregate indicators of the CIs may have presented moderate levels of deterioration with respect to the regulatory requirements, the results per institution are mixed. With respect to total capital adequacy, the group of institutions that would present a level of less than 9.0% in an adverse scenario accounted for 7.3% of the total loan portfolio as of June 2021 (Graph 3.10). Based on these results, to keep the entire financial system solvent and in compliance with the capital buffers required,⁴³ a capital injection of COP 12.3 b could be required throughout the eight simulated quarters.

3.1.3 Final Comments

The results of the exercise suggest that most of the CIs would be able to keep their aggregate indicators of total and core capital adequacy above the regulatory minima in spite of the severity of a scenario like a sudden stop and the resulting reduction in the institutions' profitability and ability to grant credit. That reflects the resilience of the entities in the short term in the event of a macroeconomic scenario like the one described above.

As it 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, reflects an extreme and adverse situation for the Colombian economy. For one thing, it assumes that the economic authorities do not take any additional action in response to the deterioration of the CIs' financial situation. At the same time, the institutions' shareholders are presumed to

⁴² 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 valuation losses generated by the abrupt sale of assets by entities that are close to the regulatory solvency limits.

⁴³ 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%. In 2021 (2022) the limits, including the conservation buffer, are 9.375% (9.75%), 5.25% (6.0%), and 4.875% (5.25%) for the total, additional core, and core capital adequacy respectively. For systemically important institutions, an additional 25 bps (50 bps) buffer 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.

be excessively passive to the degree that they only capitalize the profits without taking any other kind of strategic initiative in order to face the financial stress.⁴⁴ If 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. Last of all, the starting point for the analysis is the capital adequacy ratio of these individual entities' apart from any consolidated capital adequacy. Therefore, the consolidated results may differ from those presented here.

3.2 NSFR Stress Test

This section evaluates the change in the structural liquidity of CIs, measured by NSFR as of June 2023. In particular, it assumes that the performance of loans and Tier II comes from the exercise in section 3.1 (stress testing) while the funding behavior constitutes an adverse scenario, because it would be determined by demand and time deposits that are considered less stable.⁴⁵

Just as in the other exercises in this chapter, the results presented come from a hypothetical, adverse, unlikely scenario and are designed under restrictive assumptions. Thus, the analysis provides an estimate of the exposure that CIs would face if the scenario described above materialized.⁴⁶

The exercise identifies the entities that would register a stressed NSFR that is below the regulatory limit and determines their proportion in terms of the system's loans. This is because NSFR below the regulatory limit could present a difficulty for the entities in their ability to maintain the flow of credit to the economy, under the proposed funding strategy.

The results indicate that entities with a NSFR below the regulatory limit as of June 2023 would account for 47.9% of total loans as of June

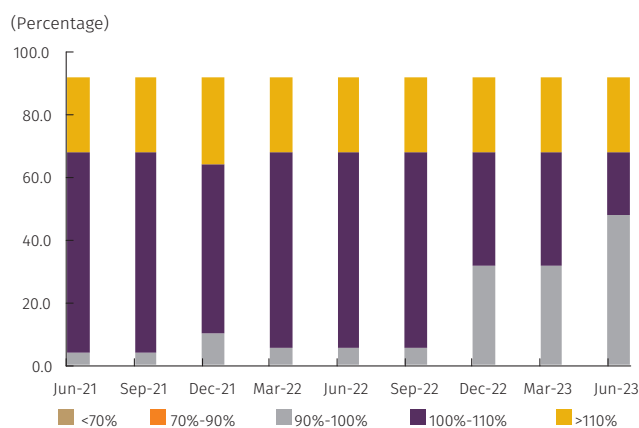
44 Specifically, the shareholders do not inject outside capital into the business operations, they do not seek synergies or mergers between the entities, nor manage them in order to increase the efficiency of their operations.

45 The items in the NSFR that are part of the funding are weighted according to their stability. For example, demand deposits from medium-sized individuals and SMEs are weighted at 95%, while those from foreigners are weighted at 25%. This exercise assumes that CIs fund their assets with items that have a stability weighting factor of less than 50%. For more information on the NSFR, see Shaded section 2 "Measurement of Credit Establishments' Structural Liquidity: the Net Stable Funding Ratio" in the *Financial Stability Report* for the second half of 2020.

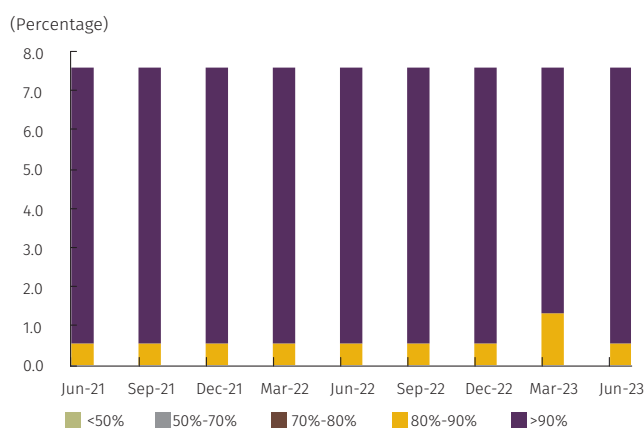
46 Considering the fact that the NSFR regulatory limits at the starting point are lower than those that will be in force at the end of the test, this analysis does not assume that the entities will take this regulatory change into account as they manage their balance sheets.

Graph 3.11
Distribution of NSFR by proportion of loans

A. Group 1



B. Group 2



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

2021 (Graph 3.11). Based on these results, an amount of stable funding of COP 10.7 b would be needed at the end of the analysis horizon to reach an NSFR above the regulatory limit, assuming that they maintain the same required stable funding (RSF).⁴⁷

3.3 CIF Sensitivity Test

Collective investment funds (CIFs) have a higher percentage of liquid resources compared to the first half of 2021.

The open-ended CIFs are susceptible to withdrawal shocks; therefore, it is relevant to simulate hypothetical withdrawal scenarios that they might face. A static stress test has been designed to determine the resilience of these funds to several withdrawal shocks, without considering mitigation measures or second-round effects.

Based on cash level information for each of the funds,⁴⁸ different withdrawal shocks were simulated to calculate the LRI that the CIFs would present in each scenario. For each level of withdrawal, those funds that would be likely to register non-compliance⁴⁹ on their liquidity indicator were identified, and their share of total assets was calculated. Thus, higher values

correspond to the level of withdrawals having a greater impact on the CIF market (Graph 3.12).

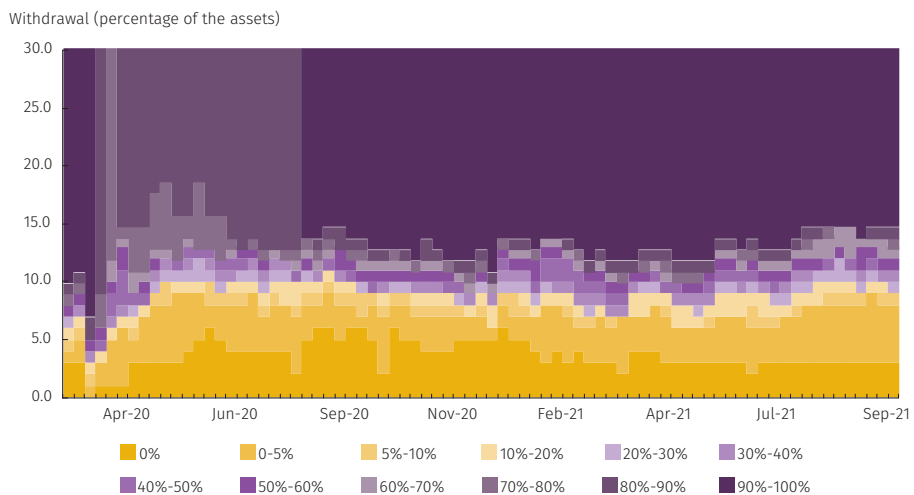
The results indicate that, during the first half of 2021, the resilience of the funds was mainly affected by the redemptions (chapter 2). When the sensitivity was evaluated in May 2021, it was noted that in the case of withdrawals of 6.0% as a percentage of assets (24% as a percentage of cash), the funds that would have failed to meet the liquidity requirement accounted for 20% of total assets. As of

⁴⁷ The exercise does not include policy actions in the event of deterioration of the entities' liquidity, nor preventive actions by the entities to comply with the regulatory limit. This is why the amount in resources required would likely be less than the amount indicated in the exercise.

⁴⁸ The information on cash is obtained from FSC's Form 519.

⁴⁹ A default corresponds to an LRI value of less than 100% which is the regulatory limit according to the FSC.

Graph 3.12
Results of CIF Stress Test



Note: each color represents the share of open-end CIF assets that would be affected by defaults in their LRI.
Source: Office of the Financial Superintendent of Colombia; calculations by *Banco de la República*.

24 September 2021, in turn, this shock should be 10% (27% as a percentage of cash) to obtain similar results. This indicates that the funds have reinforced their positions in liquid assets in line with the recovery of accumulated net contributions.

Box 3

Interest Rate Model for the SYSMO Stress Test Exercise

Wilmar Cabrera
Diego Cuesta
Santiago Gamba
Camilo Gómez*

This box introduces the structure of the interest rate models to be used in the sensitivity exercise presented in the third chapter of this Report, starting with the current edition. According to the findings in local and international literature,¹ the interest rates on each type of loan, CDT and savings account are modeled separately. Additionally, the commercial portfolio is divided between ordinary and preferential loan segments to capture the differences in their dynamics and the heterogeneous response to changes in the policy rate set by *Banco de la República* (Banrep). Preferential and ordinary commercial loans are divided, in turn, between the rates of disbursements granted by the largest banks in terms of assets and the rest of the credit institutions (CIs), given the differences observed in the way these variables react to changes in the monetary policy rate. On the other hand, the estimation does not include micro-credit or the interest rate on deposits by individuals, given the low relationship observed between these rates and the policy rate.²

1 For the Colombian case, see Chavarro-Sánchez *et al.* (2015), Cristiano-Botia *et al.* (2017), Galindo and Steiner (2020), Huertas *et al.* (2005), July

* The authors are part of the Financial Stability Department at *Banco de la República*. The opinions expressed herein are solely the responsibility of the authors and imply no commitment on the part of *Banco de la República* or its Board of Directors.

(2001) and Vargas *et al.* (2010). For the international case, see Apergis and Christou (2015).

2 In the sensitivity exercises usually presented in chapter 3 of the *Financial Stability Report*, it is assumed the microcredit rate spread reaches historical highs and the deposit rate for individuals remains constant.

The proposed models combine two elements. First, they consider the cointegration that has been documented between consumer, commercial and CDT rates with the interbank rate (TIB), as well as the relationship between the mortgage loan rate and the yield on government bonds (TES) with ten-year maturity. Secondly, the models distinguish the response of the different interest rates according to the monetary policy cycle (periods of increases or reductions in the Banrep rate) and consider the different response speeds that rates may exhibit at specific contexts by estimating these coefficients by quantiles.

Considering the forgoing, the models estimated have the following structure:

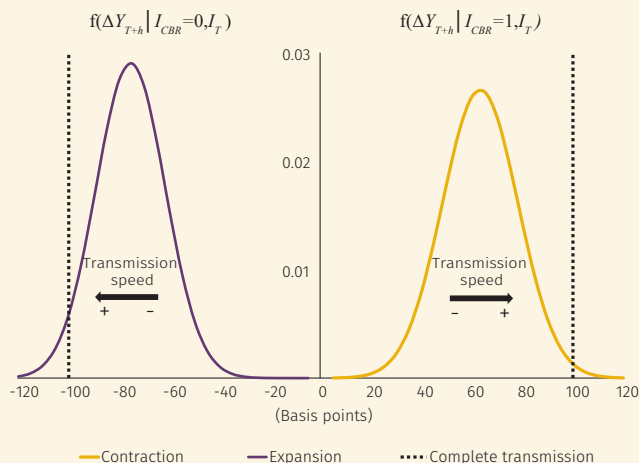
$$Y_t = \alpha_0 + \alpha_1 X_t + \epsilon_t \quad (1)$$

$$\Delta Y_t^\tau = \beta_{2,1}^\tau \epsilon_{t-1} + I_{CBR} \beta_{2,2}^\tau \epsilon_{t-1} + \psi(p)^\tau \Delta Y_{t-p} + \Psi(q)^\tau \Delta X_{t-q} + \Phi(r)^\tau \Delta Z_{t+1-r} + \mu_t^\tau \quad (2)$$

Where Y represents the interest rate, X is the variable for which evidence of cointegration with Y has been found, and Z is a set of macroeconomic variables (inflation, unemployment, the economic monitoring index (EMI) and NHPI are considered). Equation (1) can be understood as the long-term average relationship found among the variables analyzed, and equation (2) is the one that establishes the relationship between the monthly variation in interest rates and the adjustment to their long-term relationship, as well as the relationship with own lags and lags of the other variables included in the model. In addition, this equation captures the differential effect in the response of rates according to the monetary policy cycle through the interaction between the error term and a dichotomous variable, I_{CBR} which takes the value of 1 in periods of increases in the policy interest rate. Lastly, p , q and r are the maximum lag that can be taken by the lag operators $\psi(\cdot)$, $\Psi(\cdot)$ y $\Phi(\cdot)$, respectively.

Equation (2) is estimated with the quantile regression method, where the superscripts indicate the quantile of the conditional distribution of the change in interest rates. The combined use of quantile estimation and the distinction in the response of rates according to the monetary policy cycle makes it possible to find the conditional distribution of the change in interest rates in each phase of the cycle. Graph B3.1 illustrates, in a general way, the results that can be extracted from the model when there is a policy rate change of 100 basis points (bp) in the direction of the policy phase under study for analysis period $T+h$. The resulting conditional distribution in the expansion phase is shown in purple, while the distribution associated with the contraction phase is shown in yellow. The dotted lines show a complete transmission of the change in the policy rate, while the arrows indicate the direction of the quantiles in which a greater transmission of the shock is observed.

Graph B3.1
Schematic of Conditional Distributions Generated by a Quantile Regression of Changes in Interest Rates



Note: The distribution of the variation in Y , $f(\Delta Y_{T+h} | I_{CRR}=0, I_T)$ conditional on being in the expansion phase and the set of information available for the estimate in period T , I_T , is shown in violet. The distribution of the variation in Y , $f(\Delta Y_{T+h} | I_{CRR}=1, I_T)$ conditional on being in the contraction phase and with the same set of information, in turn, is shown in yellow. The vertical dotted line on each side of the graph reflects the full transmission of a change in the policy rate (100 bp in the contraction phase and -100 bp in the expansion phase). Source: calculations by Banco de la República.

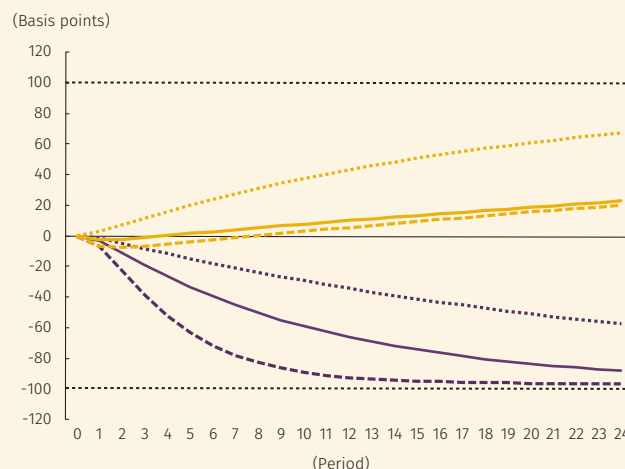
With respect to the transmission of monetary policy shocks, Graph B3.1 shows the high quantiles in the contraction phase are those that are closer to the dotted line, which represents full transmission, while the low quantiles show low transmission. In contrast, the low quantiles in the conditional distribution of interest rate changes in the expansion phase are those that show the highest transmission of the shock, and the high quantiles are those that reflect a low variation in the interest rate.

The selected models match the most parsimonious specifications with a low out-of-sample forecast error for two-year horizons. The results are synthesized in the impulse-response functions shown in Graph B3.2, which contain the reaction of interest rates to a 100 bp drop (purple lines) and an increase of the same size (yellow lines) in the monetary policy rate. Three quantiles of the conditional distributions drawn from equation 2 are presented for analysis horizons that range from one to 24 months. The results show these specifications capture the different responses to monetary policy changes, with preferential commercial lending rates reacting faster and to a larger extent, while the rate on corporate deposits shows a lower reaction to policy decisions.

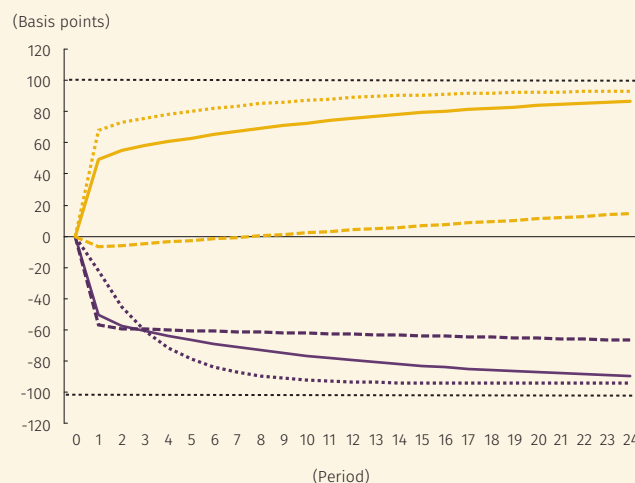
As mentioned, the quantile estimation captures different monetary policy transmission speeds, depending on the policy cycle. For example, panel D in Graph B3.2 shows a reduction in the policy rate is transmitted almost fully after 24 months in the median, while such transmission in quantile 75 would not occur in this time horizon. On the other hand, when faced with an increase in the policy rate, quantile 25 is the one that shows an incomplete transmission of the policy shock.

Graph B3.2
Impulse-Response Functions of the Interest Rates

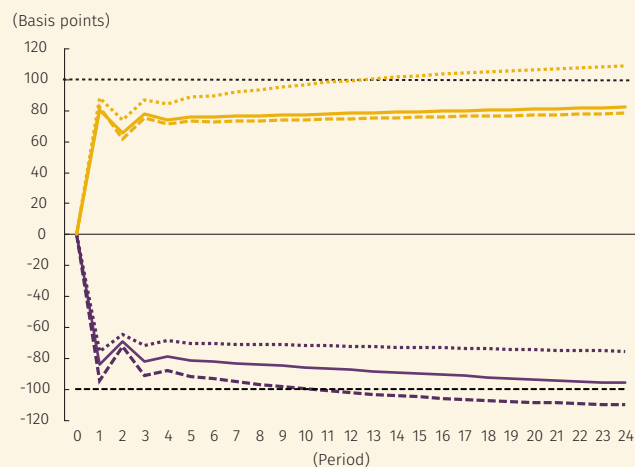
A. Mortgages



B. Consumer Credit

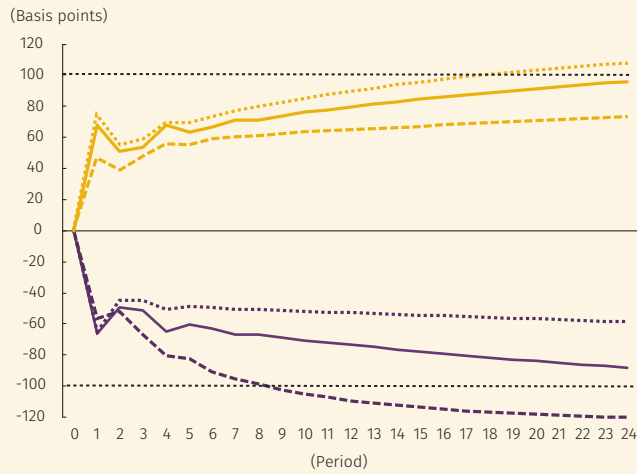


C. Ordinary Commercial Credit of Large Cls

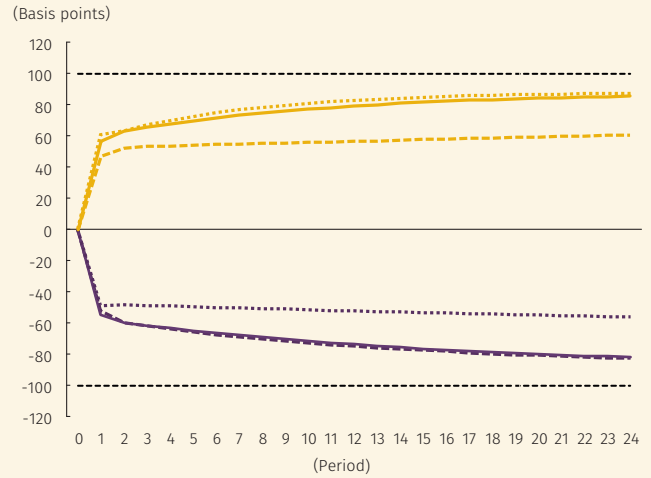


Graph B3.2 (Continuation)
Impulse-Response Functions of the Interest Rates

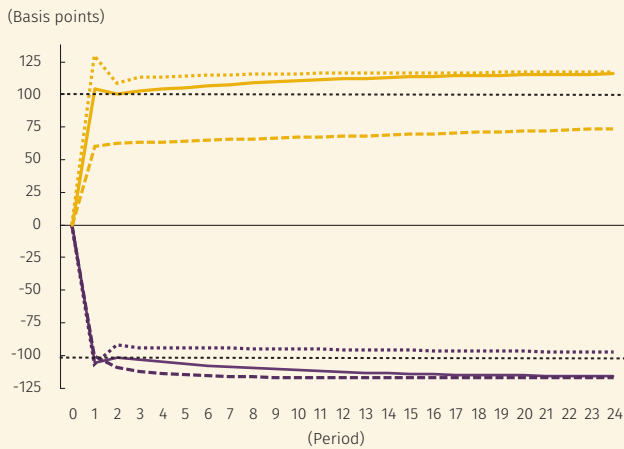
D. Ordinary Commercial Credit of the Remaining CIs



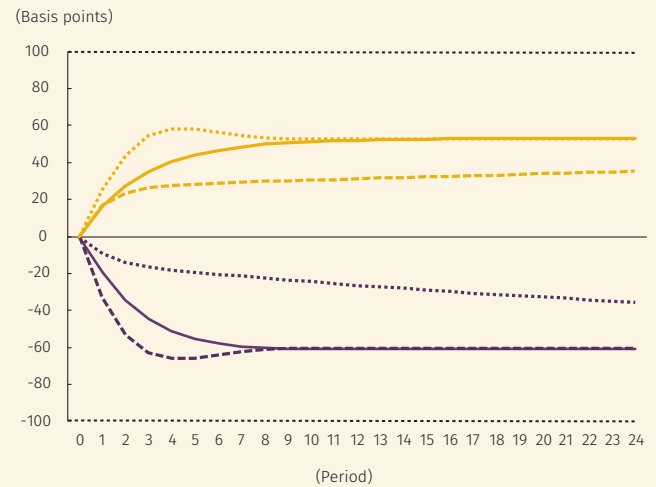
G. CD



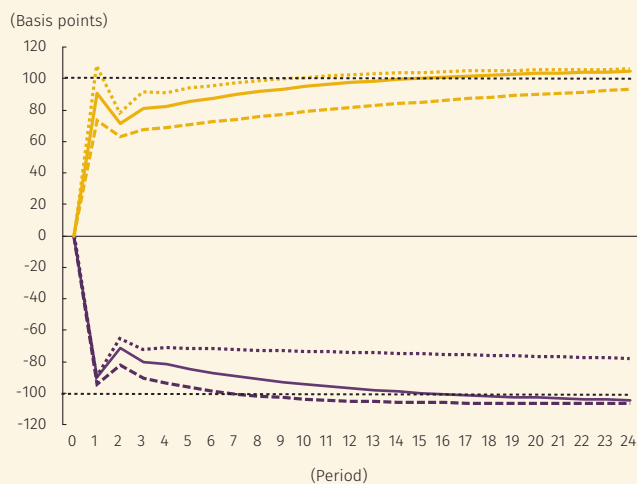
E. Preferential Commercial Credit of Large CIs



H. Judicial Entity's Savings Accounts



F. Preferential Commercial Credit of the Remaining CIs



Finally, there are some asymmetric reactions to monetary policy cycles. For example, the model suggests the mortgage rate reacts faster to reductions than to increases. Moreover, this asymmetric behavior varies depending on the quantile considered in the simulation of the model.

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Note: the impact of the rates in the event of positive and negative variations of 100 bp in the IBR (10-year TES rate for the Panel A. Mortgages) is shown.
Source: Office of the Financial Superintendent, calculations by Banco de la República.

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04

Financial Regulation

This chapter presents the main legal changes with respect to financial regulatory standards enacted between April and October 2021. First, there are the standards that relate to the financial stability vulnerabilities described in this report. Second, measures to encourage economic reactivation in some sectors are outlined as well as regulatory changes that encourage economic development and facilitate convergence to international standards in the areas of risk management, financial inclusion, and capital market development. Last of all, other regulatory adjustments and issuances are presented.

4.1 Regulations Related to Financial System Stability Vulnerabilities

Based on the results of the analysis throughout this report, the main vulnerabilities for the stability of the financial system are associated with credit risk and the internal and external imbalances of the economy. Compared to the previous edition of this report, concerns regarding credit risk have eased while those associated with imbalances have intensified. This situation is reflected in some of the regulatory developments published during the last six months, including: changes in the Debtor Assistance Plan (PAD) and the approval of a tax reform respectively. The Financial Habeas Data Act, in turn, could generate vulnerabilities on credit matters in the future.

PAD (created through External Circular 022/2020 and extended through External Circulars 039/2020 and 012/2021) functioned as a mechanism for credit risk management by fostering the design of structural solutions for debtors through the redefinition of the terms of their loans and recognizing differences in the degree to which their income or payment ability was affected as a consequence of the shock caused by Covid-19. This program sought to maintain a sustainable supply of credit and allowed debtors to implement an orderly transition in their payment habits under conditions of financial viability.

Through External Circular 012/May 2021, the FSC decided to extend the duration of PAD until 31 August 2021,⁵⁰ because of the persistence of Covid-19 and the need to provide the financial conditions to secure the reopening and economic reactivation processes. The termination of PAD showed that the vulnerability associated with credit risk has been attenuated.

With respect to this, the process of reconstituting the countercyclical component of the individual loan-loss provisions for the consumer and commercial loan portfolios and of the general loan-loss provisioning of the housing and microcredit portfolios was started as of September 1, 2021.⁵¹ Furthermore, the general interest provision on uncollected accrued interest (UAI) must be set up while the grace periods and extensions granted under External Circulars 007 and 014/2020 and the implementation of the PAD measures remain in effect.

Under PAD, more than 2.2 million debtors, including households and companies, redefined the terms of their loans. This represented 6.7% of the total loan portfolio in September 2021.

The approval of the tax reform in Colombia, in turn, became the focus of the legislative agenda for the period under analysis since it sought to achieve fiscal consolidation and reduce the fiscal deficit which had been aggravated by the measures that the Government had to take to sustain the social programs introduced in the framework of the Covid-19 health emergency.

Following the withdrawal of the tax reform bill in early May 2021 and the removal of investment grade by two rating agencies,⁵² Act 2155/2021 (Social Investment Law) was approved in September 2021, which provides instructions on spending, austerity, and efficiency of the State; the fight against evasion, revenue, and fiscal sustainability. The intention is to provide continuity and strengthen social spending as well as to contribute to economic reactivation, job creation, and fiscal stability for the country.

50 The duration of PAD was extended on two occasions: i) on 15 December 2020, it was extended until 30 June 2021, and ii) on 31 May 2021, it was finally extended to 31 August 2021.

51 CIs must undertake this reorganization over a maximum period of two years and, once they return to the accrual phase, they must establish loan-loss provisions in accordance with the provisions of the Basic Accounting and Financial Circular, Chapter II, paragraph 1.3.4.1.1.1.1. The use of this mechanism was not massive. As of August 2021, only 11 CIs have made use of this possibility, having disposed of 34.5% of the stock constituted up to February 2020.

52 Both S&P Global Ratings and Fitch Ratings downgraded the country's long-term foreign currency debt rating from BBB- to BB+ with a stable outlook in May and July 2021 respectively. Fitch Ratings also downgraded the long-term local currency debt rating from BBB- to BB+.

An annual collection of around COP 15.2 billion is expected, and the government is expected to implement an austerity plan that would generate savings of around COP 1.9 billion per year between 2022 and 2032. According to Ministry of Finance calculations, this would reduce the fiscal deficit of the Central National Government (CNG) to 2.7% of the GDP by 2026 after this indicator had stood at 7.8% of the GDP in December 2020.

With the approval of the reform, Moody's Investors Services decided to upgrade the country's outlook from negative to stable and to maintain Colombia's long-term foreign currency rating at Baa2, thus maintaining its investment grade rating with this rating agency.

In terms of regulatory changes that may create vulnerabilities in the future, Act 2157, which seeks to grant relief to persons with negative reports at credit bureaus by defining new rules regarding the permanence of information and the granting of amnesties, was issued on 29 October 2021. Among the most important points are: 1) the elimination of negative information in credit bureaus after six months in the event that the debtor catches up with his/her financial obligations during the twelve months following the enactment of the law; 2) the immediate elimination of negative information in the credit bureaus in the event that the debtor has cancelled his obligations, and this negative information has remained in the data banks for at least six months; 3) all those obligations that were subject to negative reporting during the health emergency decreed by the Ministry of Health and up to 31 December 2020 will not be reported during this same period provided that the holders of the obligation have approached the respective entities and sought a restructuring of their obligation, and 4) persons with debts of less than 15% of the minimum wage will receive two notifications before being reported.

According to the box, "Considerations Regarding a Negative Credit History in the Credit Bureaus" in the Financial Stability Report for the 1st half of 2019, Act 2157/2021 generates changes that could cause increases in credit risk and the cost of credit by exacerbating the problem of asymmetric information in credit markets.

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

During the period analyzed, regulations were also issued to stimulate economic reactivation in the face of the adverse effects of the Covid-19 health emergency. Regulations also continued to be adopted on issues tangential to the context of the pandemic such as financial inclusion, capital market development and risk management. These changes are presented in Table 4.1 below.

Table 4.1
Compendium of Main Standards Issued in the Area of Financial Regulation

Entity	Rule	Topic
Congress of Colombia	Act 2104 (16 July 2021)	Under this law, the agreement between Colombia and the European Investment Bank (EIB) regarding the establishment of a regional representation of the EIB in Colombia is approved. The EIB provides financing for strategic projects to boost growth and employment, mitigate climate change, and promote policies related to democracy, equity, human rights, and the environment. Thus, the EIB offers the Colombian government financing alternatives to meet budgetary challenges.
	Act 2112 (29 July 2021)	The purpose of the law is to encourage entrepreneurship and the growth of the Colombian business community through the reinforcement of private equity funds. The pension funds of the individual savings system are required to invest a minimum of 3% in the Colombian business community.
	Act 2115 (29 July 2021)	Bajo esta ley se crean garantías de acceso a servicios financieros para mujeres y hombres cabeza de familia. Específicamente, el Gobierno Nacional (GN) deberá diseñar instrumentos y estrategias que faciliten y permitan el acceso de esta población a servicios financieros, brindando acompañamiento y capacitación permanente. En particular, los EC de carácter público o con participación de recursos públicos que otorguen préstamos para adquisición de vivienda nueva o usada, garantizados con hipotecas de primer grado constituidas sobre las viviendas financiadas, priorizarán en la asignación a esta población luego de realizar el estudio del crédito respectivo.
	Act 2115 (29 July 2021)	Under this law, guarantees of access to financial services for female and male heads of household are created. Specifically, the National Government (NG) should design instruments and strategies to facilitate and enable this population to get access to financial services and provide ongoing support and training. In particular, public or publicly funded CEs that grant loans for the purchase of new or used housing, secured by a first-degree mortgage secured on the financed housing, will prioritize the allocation to this population after carrying out the respective credit study.
FSC	External Circular 007 (26 April 2021)	In accordance with the provisions of Decree 1393/2020, instructions were issued regarding the processes for investing the resources of mandatory pension and severance funds, and the reserves of insurance companies and capitalization companies. Specifically, instructions were given on the governance of the investment, and management process which includes: 1) investment policies, strategic asset allocation and functions of the PFM's risk and investment committees; 2) computation of limits on restricted investments; 3) investment policy and governance of the portfolio that backs the technical reserves of insurance companies and capitalization securities of capitalization companies, and 4) management of environmental, social, governance (ESG), and climate risks of the assets.
	External Circular 008 (10 May 2021)	In accordance with Decree 1207/2020, whereby new regulations for voluntary pension funds were adopted, this external circular issued instructions related to the management of voluntary pension funds (VPF). The modifications are made in order to: 1) adopt high standards of professionalism for management companies; 2) implement suitable mechanisms for the disclosure of information to stakeholders for informed decision making; 3) adjust the procedures for the incorporation and authorization of VPF, and 4) integrate ESG and climate issues as risk factors into investment management.
	External Circular 010 (13 May 2021)	The Basic Legal Circular (BLC) was amended to incorporate the new methodology for calculating the profitability of the short-term portfolio of severance pay funds established in Decree 270 of 2021. Likewise, the instructions related to the provider of the indices that are part of the aggregate index of local variable income for the calculation of the minimum return of the long-term severance and mandatory pension fund portfolio were modified based on the change of provider of the Colcap index. Furthermore, the market risk sensitivity factors and credit factors used to calculate the credit exposure that derivative financial instruments and structured products have were modified.
	Circular Letter 40 (09 July 2021)	Institutions supervised by the FSC that have transactions with the Libor rate must continue to make progress in implementing the technological, operational, financial and legal planning to mitigate the possible impacts derived from the cessation of this rate. The circular letter sets out the supervisor's expectations for such a transition.
	External Circular 016 (26 August 2021)	Decree 1234/2020 provided the regulatory framework of the controlled test area (regulatory sandbox), in which innovative technological developments related to the services provided by the entities supervised by the FSC may be tested. In accordance with said decree, this circular provides instructions related to the requirements for entering the temporary test area, the procedure for evaluating applications to obtain the temporary operating certificate (TOC), evaluating the results of the temporary test, the grounds for revoking the TOC, and the requirements for promoting and marketing financial products and services in the controlled test area.
	External Circular 017 (01 September 2021)	Modified the instructions related to the know-your-customer procedures set forth in External Circular 027/2020 (Sarlaft 4.0). In particular: 1) supervised entities are exempted from verifying the identity of the final beneficiaries and shareholders or associates of potential clients when they are listed on international stock exchanges that have disclosure requirements equivalent to those registered in the RNVE; 2) rules related to the simplified know-your-customer procedure for legal entities are defined, and 3) special rules are defined within the simplified know-your-customer procedure for mandatory insurance and affiliation of severance payments.

Table 4.1 (continued)
Compendium of Main Standards Issued in the Area of Financial Regulation

Entity	Rule	Topic
FSC	External Circular 018 (22 September 2021)	In order to converge with the standards and best practices established by the Basel Committee on Banking Supervision with respect to risk management and supervision, the FSC established the Comprehensive Risk Management System (<i>Sistema Integral de Administración de Riesgos</i> , SIAR). This gives financial institutions a global view of the risks to which they are exposed since it integrates the management of credit, market, operational, liquidity, counterparty, guarantee, insurance, and country risks. Thus, the FSC created Chapter XXXI in the Basic Accounting and Financial Circular (CBCF in Spanish) on the SIAR. The chapter consists of four parts: 1) SIAR general information: provisions applicable across the board to all risks to which the institutions supervised by the FSC are exposed; 2) risk management: instructions for the specific management of each of the risks that the RAIS is made up of; 3) standard risk measurement and reporting: standards for proper measurement and reporting of the different risks, and 4) definitions. Moreover, chapter XXXII on the Risk Management System for Entities Exempted from the SIAR (SARE) ^{a/} was created in the CBCF and deadlines for complying with the instructions were established. ^{b/}
	External Circular 025 (29 October 2021)	The decision was made to keep the 25% weighting for available stable funding (ASF) in the demand and term deposits (less than six months) of financial entities and for open-ended collective investment funds until 31 March 2023 without affecting the convergence schedule and compliance with the NSFR regulatory minimum under the terms established in External Circular 019/2019. Previously, this weighting should have been 0% as of 31 March 2022. In addition, the minimum percentage required in the event of noncompliance with the NSFR was adjusted to the minimum established plus 1 percentage point. This was previously the established minimum plus 5 percentage points. Furthermore, the entities covered by this circular must submit a plan to the FSC for compliance with the NSFR regulatory minimum given the convergence to the 0% weighting applicable to demand and time deposits (less than six months) of financial entities and for open-ended collective investment funds in March 2023. The deadline for submitting the aforementioned plan is 31 March 2022.
	External Circular 026 (02 November 2021)	Under this circular: 1) Investments classified as held-to-maturity were included among the securities eligible for temporary liquidity support; 2) the use of investments classified as held-to-maturity, which are deposited in the Central Securities Depository of <i>Banco de la República</i> , was allowed in order to implement liquidity operations in the event of disasters, and 3) in order to verify compliance with the SFC's stipulations on dematerialization or immaterialization of promissory notes, CIs must take the following indicator into account: $\text{Coverage Ratio}_i = \frac{\text{Value at receipt}_i}{\text{Maximum quota established by the BR for access to the TLS}}$
		Within the calculation of Value at receipt, investments classified as held-to-maturity eligible for temporary liquidity support (TLS) may be considered with the exception of those that in accordance with Chapter 1-I of the CBCF may be used in money market operations. In addition, CIs must ensure that the quarterly moving average of the coverage ratio is equal to or greater than 100%.
MHCP (Ministry of the Treasury and Public Credit)	BVC Regulation 018 (04 June 2021)	The possibility of registering bonds linked to sustainable development at the BVC was established. To do this, the issuer must submit an independent opinion showing the alignment of the bond with the United Nations Development Program, or any other internationally recognized standard.
BVC (Colombia Stock Market)	Normativo BVC 018 (04 de junio de 2021)	The possibility of inscribing sustainable performance bonds in the BVC was established. For this purpose, the issuer must submit an external concept evidencing the alignment of the bond with that defined by the United Nations Development Program or any other internationally recognized standard.
	BVC Regulations 032 and 033 (29 September 2021)	New criteria for admitting other fixed and variable income securities in addition to those already admissible (short term Treasury Securities (TES), shares, and cash) in the temporary transfer of securities operations in the over-the-counter market were defined.
Ministry of Housing, City, and Territory	Decree 951 (19 August 2021)	The possibility for family compensation funds and entities involved in economic solidarity to grant interest rate coverage (subsidies) ^{c/} to borrowers of LIH housing loans was authorized and regulated.
Ministry of Agriculture and Rural Development	Decree 596 (01 June 2021)	Agreements were established for the recovery and reorganization of agricultural portfolios of small and medium-sized producers with outstanding debts to Banco Agrario and/or Finagro and private banks that voluntarily join the program and that were in default t before 30 November 2020. Depending on the number of days in arrears (default), and whether the producer is small or medium-sized, different percentages of principal and interest may be waived. In addition, special relief measures were granted to Agricultural Solidarity Fund and National Agricultural Reactivation Program debtors.

a/ SARE should be applied by entities that are primarily exposed to operational risk with respect to the significant operations they carry out.

b/ Before 22 December 2021, entities must submit an internal implementation plan to the FSC for compliance with the instructions contained in the two chapters created in the CBCF. The instructions set forth in these chapters, in turn, will go into effect as of 01 June 2023 with the exception of certain aspects related to the addition of risk data and reporting, which will go into effect no later than 31 December 2023.

c/ Interest rate hedging is a CNG program in which a portion of the interest to be paid on a mortgage loan installment is contributed by the CNG.

Table 4.1 (continued)
Compendium of Main Standards Issued in the Area of Financial Regulation

Entity	Rule	Topic
Ministry of Commerce, Industry, and Tourism	Decree 890 (10 August 2021)	The specific rules for risk bonds were established. In general, any company affected by the circumstances that led to the declaration of the State of Economic, Social and Ecological Emergency may convert its credits into risk bonds, whether ordinary or convertible. This is the case provided that the issue is contained in the respective reorganization agreement. Credits for conversion may contain extensions, waivers, ^{d/} forgiveness, new guarantees, or any other modification to the characteristics of the original credit. These bonds will be recognized under liabilities or equity depending on their nature and in accordance with the financial reporting frameworks in effect. In addition, in the event of judicial or simplified liquidation of the company, the convertible risk bonds subscribed in compliance with the reorganization agreement will be paid after the other external liabilities and before any reimbursement in favor of the internal creditors.
Banco de la República	External Resolution 4/2021 (28 May 2021)	The prohibition on foreign indebtedness with non-resident individuals by residents and foreign exchange market intermediaries was eliminated.
	External Resolution 5/2021 and Bulletin 31 (28 May 2021)	The central counterparty risk clearinghouses were authorized to clear and settle FX-Swaps transactions as counterparties as well as to settle peso-dollar contracts with the exchange of legal currency and dollars.

d/ Capital reductions are agreements between the creditor and debtor in which part of the debt is forgiven.

Sources: Websites of the Presidency of the Republic of Colombia; Financial Superintendency of Colombia; Ministry of the Treasury and Public Credit; Colombian Stock Exchange; Ministry of Housing, City, and Territory; Ministry of Agriculture and Rural Development; Ministry of Commerce, Industry, and Tourism; and *Banco de la República*.

4.3 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. These changes are shown in Table 4.2.

Table 4.2
Compendium of Additional Rules Issued in the Area of Financial Regulation

Entity	Rule	Topic
FSC	External Circular 009 (12 May 2021)	Instructions were issued regarding the rules for authorizing financial holding company capital investments. This is intended to streamline the FSC's authorization process for direct capital investments made by financial holding companies in financial, insurance, and securities market entities abroad as well as the authorization of indirect investments made by holding companies through their affiliates and subsidiaries abroad.
	External Circular 011 (27 May 2021)	By means of Decree 1813/2020, the CNG amended Decree 1833/2016 which compiled the rules for the General Pension System (GPS) in order to facilitate the process of linking and transferring affiliates or potential affiliates to the GPS. Given this, External Circular 011 amends the BLC and a proforma related to the affiliation to the entities that manage the GPS and the requests for withdrawal of affiliation to such entities.
	External Circular 014 (26 July 2021)	Instructions were issued related to crowdfunding through securities incorporated in Decree 2555/2010, specifically in terms of operating regulations, internal control body, additional criteria for classifying productive projects, and rules for implementing donation, advertising, and management of registration systems. In addition, rules were established regarding the provision of information to contributors and recipients, the adoption of the Financial Consumer Service System (SAC in Spanish), and the management of operational, money laundering, and terrorist financing risks.
	External Circular 015 (25 August 2021)	Instructions were issued regarding the prospectus and information reports for the temporary registration of securities in the RNVE. This was done to acknowledge the particularities and specific conditions under which this registration of securities with the RNVE takes place.
	External Circular 020 (08 October 2021)	Decree 1692/2020 modernized the rules for the low value payment system (SPBV in Spanish), defined the different tasks carried out within the SPBV, and the duties of the stakeholders of the system subject to this regulation. In line with this, External Circular 020 reinforced the regulations for carrying out the tasks of: 1) merchant acquiring activities (<i>actividad de adquirencia</i> in Spanish) ^{a/} by CIs and companies specializing in electronic deposits and payments, and 2) provision of payment services enabled for SPBV management entities.

a/ Decree 1692/2020 defines merchant acquiring activities as an activity consisting of the carrying out and completion of the following responsibilities: 1) linking businesses to the low-value payment system; 2) providing businesses with access technology that enables them to use payment instruments; 3) processing and handling payment or fund transfer orders that were initiated through access technology; 4) paying the business or the aggregator the proceeds from the sales made through the access technologies supplied to them under the terms agreed upon as well as managing the adjustments arising from disputes, refunds, claims or chargebacks, and notifying the user of the confirmation or rejection of the payment or transfer order.

Table 4.2 (continued)
Compendium of Additional Rules Issued in the Area of Financial Regulation

Entity	Rule	Topic
FSC	External Circular 021 (11 October 2021)	The FSC repealed the pro forma and instructions for formats 338 and 339 and created a new pro forma for reporting information on the CEs' main asset and liability accounts by sector. This was due to the changes in the designation of CEs' transactions and financial products resulting from the decrees issued by the NG and the new economic sectors that are relevant for the reporting of information. Given this, the pro forma F.1000-143 (format 409) "Sectorization of main asset and liability accounts" was created, the first official transmission of which will be as of the cut-off date of May 2022.
	External Circular 022 (19 October 2021)	The FSC modified a prohibition applicable to SBFs that act as liquidity builders. These SBFs were specifically authorized to create liquidity with respect to securities as long as it is not done simultaneously with the placement of such securities. Previously, SBF were prohibited from creating liquidity on securities they had placed at any time. The amendment seeks to promote liquidity in the securities market.
FSC and the National Public Procurement Agency	Joint Circular 001 (20 August 2021)	The FSC issued instructions to the entities it supervises regarding the mechanisms to reinforce the due diligence of the beneficiaries of insurance policies, guarantees and bank sureties, autonomous assets, and the mechanisms for verification in accordance with these documents. The National Public Procurement Agency - <i>Colombia Compra Eficiente</i> , in turn, issued instructions to public entities regarding the mechanisms for verifying the validity, suitability, and sufficiency of the documents that are delivered as support for the guarantees that cover state contracts.
BVC (Colombia Stock Market)	BVC Regulations 016 and Derivatives Regulations 008 (27 May 2021)	The BVC and MSCI Inc. have agreed on a strategic alliance for the management of the MSCI Colcap stock index which is the successor and replacement for the Colcap stock index. The index transition was completed in a single step on 28 May 2021. In view of this change, amendments were made to the Stock Exchange's Unified Circular. Furthermore, there were amendments to the Unified Derivatives Circular related to the change in stock futures pertaining to the former Colcap index, the Colcap index future, the Colcap index mini-futures ^{b/} and stock options pertaining to the Colcap index.
	BVC Regulations 027 (04 August 2021)	As of February 2021, the possibility of a buy-back transaction of shares classified as instruments for continuous use through the transactional systems was enabled/c. Given the need to clarify aspects of the mechanism, the regulatory framework related to the price rule for the reacquisition of shares was amended.
	Derivative Regulations 018 (09 September 2021) and Derivative Regulations 016 (06 September 2021)	The BVC announced that the maximum Bid-offer Spread (BAS) condition that will apply to the Exchange Rate Futures Liquidity Providers program will be COP 8. This maximum range will be in effect indefinitely. Along the same lines, a reduction of the maximum BAS to the TES Futures Liquidity Providers program was established which will be 15 bps for TES futures on securities identified as T24, T27, and T31.
	Derivative Regulations 017 (09 September 2021)	The Exchange Rate Futures Derivatives Liquidity Providers program, which had been suspended in 2013, was adjusted and reactivated.
	MEC Update 130 (29 September 2021)	The announcement has been made that, as of September 29, 2021, green TES securities maturing in March 2031 may be traded and registered. Green bonds are securities that back environmental or climate change-related projects.
	Derivative Regulations 020 (01 October 2021)	The Unified Circular of the Derivatives Market related to the cancellation of inflation futures was amended.
	Derivative Regulations 021 (07 October 2021)	The Unified Derivatives Market Circular was amended in line with the reactivation of the exchange rate futures liquidity providers program established in Derivatives Regulation 017 as explained above. In addition, the new Overnight Index Swap (OIS) Futures Liquidity Providers Program ^{d/} was included in this circular.
Ministry of Commerce, Industry, and Tourism	Decree 938 (19 August 2021)	The technical framework of the Financial Reporting Standards for Group 1 ^{e/} of the Single Regulatory Decree of the Accounting, Financial Reporting, and Information Assurance Standards, Decree 2420/2015, was amended and other provisions were issued.
Banco de la República	Bulletin 27 (30 April 2021) and Bulletin 45 (16 September 2021)	Asset-backed securities backed by credit cards and car loans were included as eligible financial investment securities of foreign issuers for TLS. In addition, the admission of instruments issued by the entity that celebrates the operation was restricted in repo operations and TLS with <i>Banco de la República</i> .
	Bulletin 36 (29 June 2021)	The updated list of shareholders or associates with a more than 1% share in the entity's capital and the management report presented to the general shareholders' meeting were eliminated as a requirement for joining the group of OMO placement agents (OPA). Likewise, an updated list of shareholders or associates with a more than 1% share in OPA capital was eliminated as an annual compliance requirement. Furthermore, different formats were created to unify the signatures of the legal representative and the statutory auditor so that only one file with both signatures must be sent for quarterly and consolidated capital adequacy compliance.

b/ The new MSCI Colcap Index mini-future, or MSCI Colcap Equity Index mini-futures contract is a futures contract similar to the MSCI Colcap Index futures contract, but with a smaller contract size. Specifically, each mini-futures contract has a nominal value of COP 2,500 multiplied by the value of the index while in the case of the futures contract, this value is COP 25,000 multiplied by the value of the index.

c/ Continuous instruments are those that have visibility throughout the trading floor as is the case with the securities that are part of the Colcap index (now MSCI Colcap).

d/ The OIS Future is a contract whose trading conditions duplicate those of the Overnight Index Swap on the BBI overnight rate traded in the OTC market and incorporates features such as: trading at specific maturities, rate quotation, and settlement at maturity. The contract allows for short-term interest rate risk management.

e/ Group 1 includes: 1) issuers of securities, 2) public interest entities, and 3) entities that have total assets greater than thirty thousand (30,000) SMMLV or a staff of more than two hundred employees that are not issuers of securities or public interest entities.

Table 4.2 (continued)
Compendium of Additional Rules Issued in the Area of Financial Regulation

Entidad	Norma	Tema
Banco de la República	Bulletin 38 (01 July 2021) and Bulletin 46 (30 Sept 2021)	The maximum time of 15 to 45 minutes for registering the foreign currency transactions subject to that obligation was extended on a transitory basis from 06 July 2021 to 01 October 2021 and then from 04 October to 31 December 2021. The above was due to the operational difficulties that the entities subject to the obligation of registering could have in the midst of the isolation measures.
	Bulletin 42 (27 August 2021)	External Regulatory Circular DCIN-83: procedures applicable to foreign exchange operations was replaced in its entirety. This modification was made to adjust the procedures and provisions to the new features incorporated by the implementation of the first phase of the new Foreign Exchange Information System. The new circular is designated DCIP-83.
	External Operational and Service Circular DOIV-271 (15 September 2021)	The temporary transfer of Mortgage Portfolio Stabilization Reserve Fund (<i>Fondo de Reserva para la Estabilización de la Cartera Hipotecaria</i> , FRECH) securities ceased due to the expiration of the framework agreements entered into with <i>Banco de la República</i> for carrying out these transactions in accordance with the provisions of the FRECH Investment Committee.
	External Resolution 6 (30 September 2021)	The corresponding regulations were adapted to implement the principle of finality in securities transactions. ^{f/} This was done in order to comply with the instructions in Decree 151/2021 ^{g/} to guarantee continuity in carrying out payments initiated or ordered, and to protect the compliance of transactions during the clearing and settlement process in the event of insolvency, liquidation, or when there is a judicial or administrative decision. The CSD Regulations, the DSP External Operating and Service Circulars for Deposit Accounts and the CUD Deposit Account System were amended.
	External Resolution 7 (September 30, 2021) and Bulletin 47 (September 30, 2021)	In order to modernize the foreign exchange regulations for the professionals involved in the purchase and sale of foreign currency and traveler's checks: 1) the electronic sales invoice was authorized to serve as an exchange declaration, 2) foreign currency purchase and sale services may be provided through automatic cash dispensers (provided that the transactions include the issuance of electronic sales invoices), 3) the fingerprint requirement was eliminated in 18 (Exchange Declaration for the Professional Purchase and Sale of Foreign Currency in Cash and Traveler's Checks), and 4) approval was given for the copy of the exchange declaration to be delivered in physical form or as an electronic representation of the physical document.
	Bulletin 51 (05 October 2021)	Changes were made to External Regulatory Circular DCIP-83: procedures applicable to foreign currency exchange operations. Specifically: 1) in inter-bank transactions (between FEMI) clarification was given that no exchange declaration is required to be submitted to the BR even if the transaction is settled bilaterally or through a CCRC authorized by the FSC. 2) the procedure for portfolio sales to a portfolio FEMI or payment instruments derived from transactions between residents (domestic transactions) whose payment is authorized in foreign currency was regulated, and 3) The "SOFR" and "ESTR" rates were included in Form 6 "Information on external indebtedness granted to residents" and Form 7 "Information on external indebtedness granted to non-residents", since they were not among the rates that could be selected by the party reporting the external credit.
	Bulletin 53 (26 October 2021)	External Regulatory Circular DCIP-83 included a presumption for cases in which the User acting under power of attorney or as legal representative must act jointly with other representatives of the Stakeholder in the New Currency Exchange Information System. ^{h/}
	Bulletin 54 (02 November 2021)	The conditions under which the settlement and clearing of <i>Banco de la República</i> foreign currency exchange intervention transactions are carried out through a central counterparty risk clearinghouse were established. In addition, the FX Swap auction rate was changed to the rate at the beginning of the operation.

f/ Act 964/2005, Article 10, defines the principle of finality in securities transactions as follows: "The orders for the transfer of funds or securities derived from securities transactions as well as any act that, under the terms of the regulations of a transaction clearing and settlement system must be carried out so as to comply with them, shall be firm, irrevocable, binding and enforceable against third parties starting from the moment in which such orders have been accepted by the clearing and settlement system."

g/ Decree 2555/2010 was amended through this in order to bring Colombian regulations closer to international standards and to the real objective of the principle of finality: 1) determining that orders for the transfer of money or securities that enter a clearing and settlement system for securities transactions shall be deemed accepted "when they have been entered into the system and confirmed by the participants", and 2) delegating the implementation and application of the rules of the principle of finality to the infrastructure regulations.

h/ The User is the individual who is authorized to enter and interact with the system. The stakeholder, in turn, is the investor or the recipient of the investment.

Sources: Websites of the Office of the Financial Superintendent of Colombia; Colombian Stock Exchange; Ministry of Commerce, Industry, and Tourism; and *Banco de la República*.

Box 4

The Transition from LIBOR and other International Benchmark Rates

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The recent experience of some countries in transitioning from their old benchmark rates (collectively known as **interbank offered rates**, IBOR) to new rates is discussed in this box within the context of Legislative Bill 413 in Colombia. Among other provisions, this regulation establishes guidelines to complete an orderly migration from the DTF benchmark interest rate to the benchmark banking indicator (IBR).

1. General Information on the LIBOR transition

The London Interbank Offered Rate (LIBOR) has been the most important international benchmark interest rate for several decades. It is calculated based on the simple arithmetic average of the answers by a panel of banks to a survey about the rates they could borrow funds to a survey about the rates they could borrow funds in the wholesale market on an uncollateralized basis.¹ LIBOR is calculated for a set of five currencies with maturities ranging from overnight to twelve months.²

After the LIBOR manipulation scandal in 2012, the authorities focused on improving the robustness of its calculation.³ However, in mid-2017, the head of the UK's Financial Conduct Authority (FCA) suggested the possibility

of permanently ceasing to publish LIBOR at the end of 2021. On March 5, 2021, the FCA formally announced the end or loss of representativeness of LIBOR for non-USD currencies at all maturities and LIBOR for USD currency at one-week and two-month maturities by the end of December 2021. The announcement stated the publication of LIBOR for the US dollar will end immediately after June 30, 2023.

In response to the foregoing and pursuant to the recommendations of the Financial Stability Board (FSB) and the International Organization of Securities Commissions (IOSCO), national authorities identified so-called "risk-free" rates (RFR) to replace LIBOR in the five currencies for which it was calculated.⁴ In all cases, they opted for rates based on transactions in the uncollateralized money market or in the repo market. Some principal factors considered by the authorities when defining the type of market were the depth, breadth, and liquidity of the markets in which the rate is generated. Overnight maturity was chosen in each case, due to the difficulty of finding robust rates at longer maturities.

In defining RFRs, the authorities have had to address several challenges that emerged because of the different nature of LIBOR and RFRs. Specifically, LIBOR is forward looking while RFRs are backward-looking.⁵ Also, LIBOR has a variety of maturities compared to the single maturity with RFRs. In other words, with a LIBOR-linked contract, the rate can be known ex ante, while it can be known only towards the end of the period with a RFR-linked contract.⁶

Although RFRs have an overnight term, there are alternatives to knowing the rate in advance and to completing the term structure of the yield curve based on them. This can be accomplished by using averages or a composite rate with the RFRs observed in past periods. To do so, the authorities need to define conventions to facilitate the conversion (e.g.: treatment of weekends and holidays, ways of rounding off, time conventions, etc.). Similarly, overnight index swaps (OIS) referencing the RFR can be used as well.⁷

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1 This average excludes the highest and lowest quartile in order to eliminate the effect of outliers in the calculation.

2 The currencies for which LIBOR is calculated are the U.S. dollar, the pound sterling, the euro, the Swiss franc and the yen.

3 Details on the conclusions and recommendations that were considered at the time to improve the robustness of the LIBOR calculation can be found in the document known as the *Wheatley Review*, which was commissioned by the Financial Conduct Authority (FCA) of the United Kingdom.

4 The document summarizing the FSB's main recommendations for setting benchmark rates was published in 2014 under the title "Reforming Major Interest Rate Benchmarks". The IOSCO document on this topic was published in 2013 under the title "Principles for Financial Benchmarks".

5 The difference between a forward-looking rate and a backward-looking rate is that the former has an expectations component, while the latter is made up entirely of realized transactions.

6 Knowing the interest rate at the end of a contract linked to an RFR with a longer period than overnight implies calculating the accrued interest using the rollover of the obligation for each day until the end date of the contract.

7 In this context, an OIS contract would allow exchanging daily payment flows tied to the RFR with flows at a fixed rate during the contract period.

In cases where it is not possible to replace LIBOR with some other rate, fallbacks⁸ are needed in contracts to indicate the path to follow the moment LIBOR is no longer published. In the case of derivatives, the International Swaps and Derivatives Association (ISDA) created a protocol with clauses that has been in force in derivative contracts since January 25, 2021.⁹ In the case of unregulated securities, loans and contracts, further progress is needed, as not all of them have such clauses yet. The same is true for loans denominated in multiple currencies, which present even greater challenges due to the different nature of the two rates (collateralized vs. uncollateralized), the different publication schedule and the different methodologies used to calculate them.¹⁰

In this context, financial institutions in Colombia have been working to prepare the transition for contracts and operations indexed to LIBOR. Accordingly, the SFC issued Circular Letter 40 in July 2021 indicating that financial institutions that maintain operations with LIBOR must continue to move forward with technological, operative, financial and legal planning to mitigate the possible impact of the transition process. The same circular also outlines expectations with respect to the status of this planning for the second half of 2021.

The expectation is that, by the end of 2021, institutions will have identified the existing contracts maturing after 2021 that are tied to LIBOR, in addition to having assessed the features and applicability of alternative benchmark rates, disclosed information to clients about the risks associated with the transition process that have been identified, planned the business aspects to which the institutions are exposed (strategies, products, processes, reports, accounting, etc.), and updated their risk policies after identifying the impact the use of new benchmark rates might have on the valuation of financial instruments, hedge accounting, etc.

2. International Experience

The following is a summary of some of the progress made by jurisdictions whose currencies were referenced to LIBOR. Also outlined is the experience of other countries that opted to change the way their national benchmark rates

are calculated or to migrate to new rates, in accordance with the LIBOR transition, new international standards and the recommendations of multilateral organizations.

2.1 European Union

The European Union currently has three main benchmark rates: Euribor, Eonia, and Euro Libor. The methodology for calculating Euribor, previously based on values estimated by market participants, was modified at the end of 2019 and is now based on a hybrid methodology that prioritizes the use of information on real transactions.¹¹ For its part, Eonia went from being an overnight rate formed in the uncollateralized interbank market by a restricted panel of banks to being calculated based on a new reference rate, plus a fixed spread of 8.5 bp. This new uncollateralized rate, known as the Euro Short-Term Rate (€STR), will replace the Eonia rate and Euro Libor on a permanent basis as of 2022.

It has yet to be formally decided if Euribor will cease to be published. So, the new scheme will be a multi-rate one, since Euribor will coexist with €STR. The European Central Bank, which manages the new rate, has been working to develop forward-looking rates based on €STR and to publish guidelines and recommendations to help market participants adopt the new rate.

2.2 United Kingdom

The new rate that will replace LIBOR in the United Kingdom is called the Sterling Overnight Index Average (Sonia). Created in 1997 and reformed in 2018, it is uncollateralized and calculated based on the rates banks must pay to other financial institutions and institutional investors for sterling-denominated funds.¹² The FCA and the Bank of England have determined several objectives and priorities to be accomplished before LIBOR ends. The following are some of the most important ones: 1) the issue of LIBOR-tied loans, bonds, securitizations and linear derivatives was to end by the first quarter of 2021; 2) all new or refinanced loans after the third quarter of 2020 are to include contractual clauses to facilitate the transition; and 3) all LIBOR-tied contracts expiring after 2021 that can

8 These clauses or fallbacks determine the procedure whereby the parties to a contract will proceed to replace the rate at which the contract is indexed.

9 The ISDA protocol contains clauses that rely primarily on the use of historical adjustment spreads based on the historical difference between LIBOR and RFR rates. The rates, plus the spread, are published by Bloomberg Index Services. If the foregoing is not available, the ISDA protocol establishes a waterfall fallback scheme whereby alternative rates are proposed and to be used in a hierarchical way.

10 A multi-currency denominated loan is a type of credit in which the lender may receive the proceeds in more than one currency, doing so at its discretion.

11 This is known as the waterfall methodology and defines three levels for calculating the rate in each of its terms. The first level is based purely on transactions in a particular infrastructure, the second is based on a wider range of transactions and data from past days, while the third is based on transactions in markets related to the European money market and includes modeling techniques or expert judgment. The level chosen should be applied progressively. In other words, if the conditions for using the level-one methodology are not met, the level-two methodology should be used, and if it cannot be used either, the level-three methodology should be applied.

12 The Sonia reform expanded the set of transactions on which it was based by including OTC-traded transactions and not only those in the trading market. The timetable for its publication was modified as well.

be converted to another rate are to be identified and, if feasible, converted by the third quarter of 2021.

According to the Bank of England, there has been significant progress in terms of adherence to ISDA protocols (these clauses have been applied to more than 80% of the bilateral derivatives market and to more than 97% of the derivatives cleared through clearing houses), and in defining procedures for settling contracts not covered by clauses and methodology for calculating a synthetic LIBOR for specific contracts in which no changes can be made in the denomination of the rate. On the other hand, there are still problems with the conversion of certain instruments such as bonds, securitizations, credits and non-linear derivatives.

2.3 United States

The Alternative Reference Rate Committee (ARRC), which is the entity in charge of implementing the transition plan, proposed the Secured Overnight Financing Rate (SOFR) as an alternative to the LIBOR calculated in USD (USD Libor). The SOFR, created in 2018, is calculated entirely on the basis of transactions carried out in the treasury repo market.¹³

One of the main concerns about the transition was because SOFR is only calculated for an overnight term. To address this drawback, the New York Federal Reserve (NYFed) began to publish SOFR averages in March 2020 for 30, 90 and 180-day tenors based on the observed overnight rate. Additionally, in May 2021, the ARRC brought out the *Guide to Published SOFR Averages*,¹⁴ which functions as a manual on how to use these averages and outlines the factors market participants should consider before selecting one of these rates as an alternative to USD LIBOR.

The ARRC also established a strategy in 2018 called the *Paced Transition Plan for Developing SOFR Markets*.¹⁵ The objective is to promote the use of SOFR and create a liquidity base for SOFR derivatives. To encourage liquidity in the market for these derivatives, the use of SOFR in the spot market has been encouraged as well. For example, ARRC members¹⁶ and non-members have issued more than USD300 billion in floating rate notes (FRN) indexed to SOFR.

2.4 Switzerland

Switzerland will replace the Swiss franc-denominated LIBOR (CHF LIBOR) with the new Swiss Average Overnight Rate (Saron), which was established in 2009. It is based on transactions conducted in the repo market and is managed by a market infrastructure.

The Saron rate had already replaced the benchmark rate for tomorrow/next overnight indexed swaps (TOIS) since 2018. TOIS was a transaction-based rate calculated with information provided by a group of reference banks, which had begun to lose members as of 2013. This being the case, there were fewer and fewer transactions to support the benchmark rate. Efforts by the National Working Group on Reference Interest Rates (NWG) to increase the number of participating banks by, for example, changing the calculation of the rate, were not satisfactory. Consequently, the NWG decided to stop calculating the TOIS rate and recommended it be replaced by the Saron rate.

With respect to the transition from CHF LIBOR and even before the decision to discontinue it, the NWG had been preparing the transition based on three main recommendations for market participants: 1) subscribe to the ISDA protocol (explained in section one of this box); 2) subscribe to other protocols designed for other contracts; e.g., the amendment agreement for the Swiss Master Agreement contracts for OTC derivatives (SMA);¹⁷ and 3) ensure robust language is used in the clauses for other contracts. In addition, the Swiss supervisory authority (Finma) published a document setting out deadlines and targets to be achieved by its supervisees prior to December 31, 2021.¹⁸

2.5 Japan

The case of Japan is like that of the European Union: it currently has three reference rates (JPY Libor, JPY Tibor¹⁹ and EuroYen Tibor) and is looking to apply a multi-rate scheme. Once LIBOR is no longer being published, the scheme would be comprised of JPY Tibor, calculated for one-week, one-month, three-month, six-month and twelve-month maturities, and the Tokyo Overnight Average Rate (TONA). TONA is the uncollateralized RFR introduced in 2016 and is calculated for the overnight term.

13 The volume of overnight treasury repo transactions, which are used to calculate the SOFR rate, had already exceeded USD 1 trillion by 2019.

14 Available at: <https://www.newyorkfed.org/medialibrary/Microsites/arrc/files/2021/20210511-guide-to-published-sofr-averages>

15 Available at: <https://www.newyorkfed.org/medialibrary/microsites/arrc/files/paced-timeline-plan.pdf>

16 ARRC members are banks and private sector entities with a significant presence in the markets affected by the rate transition.

17 This protocol establishes four clauses: i) incorporation of ISDA protocol in case the SMA contract references an IBOR, ii) a protocol in case a rate other than an IBOR ceases to be published (in this case a waterfall protocol is also defined to choose the new rate), iii) guidelines on how to incorporate RFRs into SMA contracts, and iv) a specific protocol for contracts that reference EONIA.

18 Document available at: <https://www.finma.ch/en/~media/finma/dokumente/dokumentencenter/myfinma/4dokumentation/finma-aufsichtsmittelungen/20201127-finma-aufsichtsmittelung-10-2020.pdf?la=en>

19 TIBOR is an acronym for *Tokyo InterBank Offered Rate*.

The committee in charge of the transition has chosen to use OIS as the main strategy to generate rates on the curve for terms longer than overnight in the case of TONA. It also published a timetable with deadlines and objectives for ceasing to issue debt referenced to the rates that are going to disappear and for developing the systems and operations that are necessary for the new TONA rate to operate. Progress has also been made toward defining clauses for some products and creating a methodology for calculating adjustment spreads applicable to the new rates.

2.6 Australia

Unlike the countries that will discontinue publication of their IBOR rates, Australia decided to adopt a multi-rate scheme that will make it possible to choose between the current IBOR (bank bill swap rate, BBSW) and the uncollateralized overnight interbank rate (also known as Aonia).²⁰ In 2018, the BBSW calculation methodology was modified to be transaction-based (waterfall methodology).²¹ However, due to the lack of transactions for calculating the one-month rate, the Reserve Bank of Australia (RBA) advises that alternative reference rates be used in this case.

Despite the decision by the authorities in Australia, the ISDA issued clauses for derivative contracts as a form of prudential risk management in case the BBSW ceases to be published. These clauses replace the BBSW with Aonia, plus a spread based on the historical difference between the two rates. Accordingly, the RBA announced it will require that instruments tied to the BBSW include robust clauses to be eligible as collateral in its open market operations.

2.7 Canada

The decision in this country also was in favor of adopting a multi-rate scheme that uses the existing Canadian Dollar Offered Rate (CDOR)²² and a version of the Canadian Overnight Repo Rate (Corra) that was enhanced in early 2019 (and is based on transactions in the overnight repo market). The purpose in upgrading that rate was to increase the set of transactions on which it is based, thereby making it more reliable, robust and representative, as well as to adjust it to the IOSCO guidelines.

The authorities expect the adoption of Corra on a mass scale will diminish the importance of CDOR. Some maturities ceased to be calculated for CDOR in May 2021

and were replaced by clauses that included an adjusted version of Corra calculated by Bloomberg.

2.8 Hong Kong

Like Australia, this jurisdiction chose not to discontinue its IBOR (Hong Kong Interbank Offered Rate, Hibor). It will coexist with the Hong Kong Dollar Overnight Index Average (Honia) and market participants will be free to choose between the two. Honia is an uncollateralized overnight rate, while Hibor is calculated based on a methodology like LIBOR.

As there is no plan to discontinue Hibor, the Hong Kong Central Bank (HKMA) is working continuously, in partnership with the Treasury Markets Association (TMA), to revise the term structure and calculation methodology for this rate to ensure it follows the IOSCO principles. In this case, the authorities have focused their efforts on improving market conditions for OIS and encouraging the adoption of clauses in contracts to avoid disruptions if one or more of the reference rates are not available at any point in time.

2.9 Singapore

The decision in this country was to transition from Sibor (Singapore Interbank Offered Rate) and SOR (Swap Offer Rate) to SORA (Singapore Overnight Rate Average). The methodology for calculating the Sibor rate is like that of LIBOR; it is calculated by surveying a panel of twenty banks. The six-month Sibor rate will be discontinued in March 2022, while the one-month and three-month Sibor rates (more commonly used) will be discontinued after 2024. The SOR rate is calculated using the USD LIBOR rate and information on the USD/SGD exchange rate.²³ In accordance with the disappearance of USD LIBOR, the SOR rate will be discontinued definitively after June 30, 2023.

On the other hand, the SORA rate uses the transactions in the overnight uncollateralized SGD interbank market as input. In terms of transition risk management and recommendations, the Steering Committee for SOR & Sibor Transition to SORA (SC-STs) published a report in July 2021 establishing the guidelines for the transition.²⁴ For example, to reduce the risks involved in the rate change, the report states that a gradual transition of contracts should be made starting with 20% by September 30, 2021. The SC-STs also determined adjustment spreads to be implemented in the clauses on transition from the old rates to SORA.

20 Aonia is calculated based on interbank loan transactions.

21 The BBSW is calculated for maturities of one, two, three, four, five and six months.

22 CDOR is a measure of the rate at which a group of banks are willing to issue bankers' acceptances in the primary market. The CDOR rate is calculated for terms of one, two and three months.

23 SGD is the abbreviation for the Singapore dollar.

24 Documento disponible en: <https://abs.org.sg/docs/library/sc-sts-recommendations-for-transition-of-legacy-sor-contracts.pdf>

2.10 Mexico

Banco de México (BdM) began to calculate and publish a new RFR in January 2020 called the interbank equilibrium funding rate (Tiief) (overnight and collateralized). The objective is to transition to the Tiief from the interbank equilibrium benchmark rates (Tiie) which, unlike the Tiief, are based on quotes submitted by credit institutions and not on actual transactions.

Although no transition schedule has been established and there are no plans for an early disappearance of the Tiie rates, measures have been taken to promote the use of Tiief. For example, in October 2021, BdM held the first auction of development bonds indexed to Tiief (Bondes F). Likewise, in February of the same year, the Mexican Derivatives Exchange, together with BdM, launched a futures contract with Tiief as the underlying asset.

2.11 Brazil

The CDI rate (certificate of interbank deposit) is the main rate at which financial instruments are indexed in Brazil and is calculated based on the transactions carried out in the overnight uncollateralized interbank market. The problem in using this rate stems from the fact that there is very little activity in the market. So, the CDI rate is not considered representative of the real cost of funding.

This being the case, institutions such as the IMF believe reforming the CDI benchmark is an urgent requirement. In fact, transition to Selic is its main recommendation.²⁵ The Selic (overnight) rate is calculated using repo transactions collateralized with government debt instruments.

As such, a contingency mechanism has been implemented since October 2018 for contracts tied to the CDI rate. If certain terms of transactions in the market underlying the CDI rate are not met, the CDI rate is matched to the Selic rate on that day.

3. Implications for Financial Stability

While both local and foreign authorities have taken steps to ensure an orderly transition in rates, there are risks that may impact the system. These arise from the need to put in place new infrastructures, processes and regulations, as well as the timing in adopting new rates and their characteristics. In general, transition risks can be classified as operational, liquidity, risk management and valuation risks.

Operational risk arises because the rate transition will require the calculation of new interest payments, valuations and collateral requirements for many contracts tied to the rate to be replaced. It is also a process that needs coordination among the various areas involved in defining and implementing the contracts. Moreover, there is a legal risk that may materialize if there are ambiguities in the legal terms of the transition programs. Hence the importance of achieving sufficiently clear and robust clauses.

In terms of liquidity, the main concern deals with the time it will take for different market participants (both issuers and investors) to adopt the new reference rates as benchmarks. Also, although several jurisdictions have implemented measures to generate the long-term curve, there is a risk that it may not be completed due to a lack of operations in the OIS market or a lack of long-term transactions. This could have an impact on valuation, especially for products with longer settlement dates.

On the other hand, the limited supply of products to hedge the risks associated with the new rates also could make risk management more difficult.²⁶ Finally, there is a risk the adjustment spreads defined in the clauses of the contracts do not reflect the reality of the market (including credit risk), thereby distorting price formation.

²⁵ Document available at: <https://www.imf.org/en/Publications/CR/Issues/2018/12/11/Brazil-Financial-Sector-Assessment-Program-Technical-Note-on-Fund-Management-Regulation-46449>

²⁶ There is a circular causality problem in this case: the supply of hedging products depends positively on the mass issue of assets tied to the new rate. In turn, a mass issue of this sort depends on the supply of hedging products.

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