FINANCIAL STABILITY REPORT

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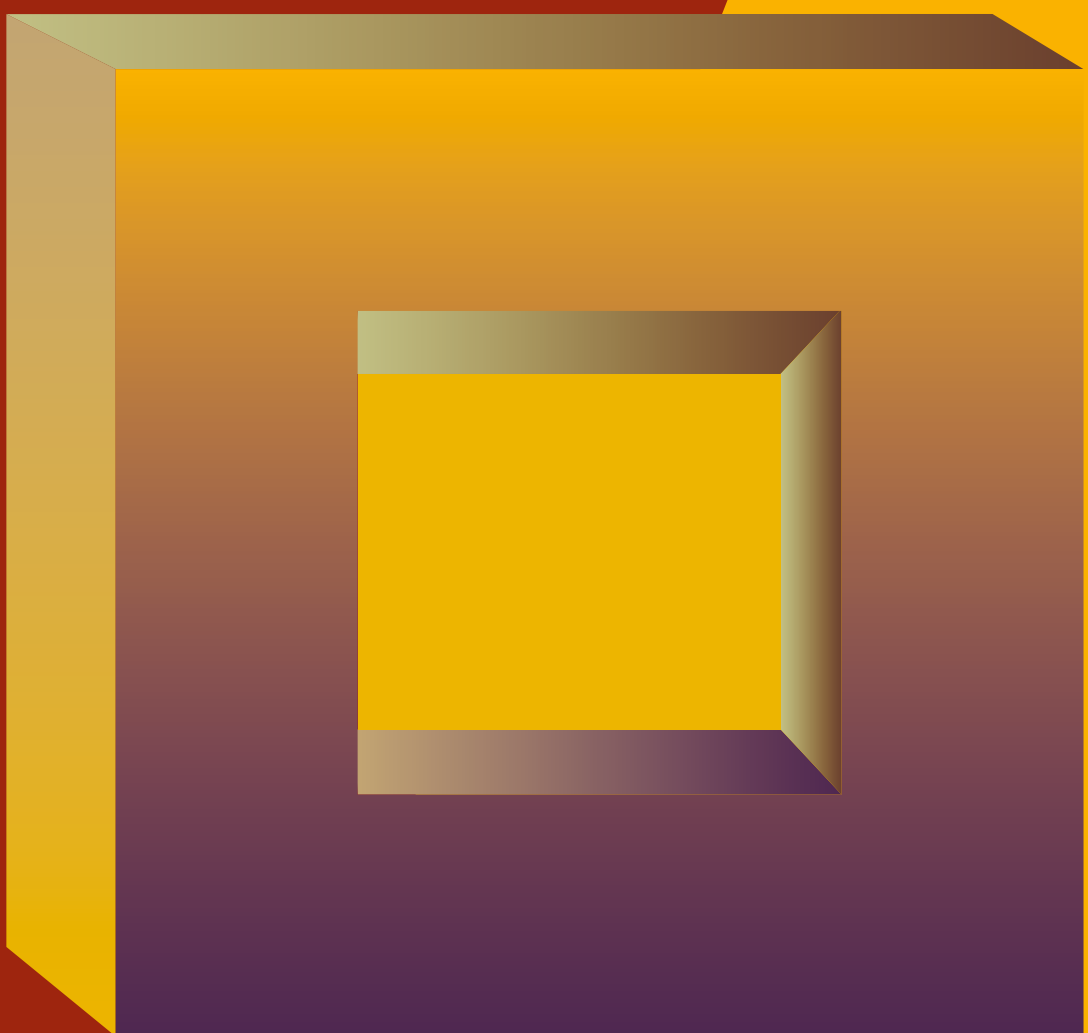

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FINANCIAL **STABILITY REPORT**

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FINANCIAL **STABILITY REPORT**

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

1. Assesses and manages financial risks in such a way that it facilitates the performance of the economy and the efficient allocation of resources;

2. Is capable of autonomously absorbing, dissipating, and mitigating the materialization of the risks that may arise as a result of adverse events.

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

This FSR is complemented by the Payment Systems Report, published annually by *Banco de la República*, which reports on the performance of the financial infrastructures of the Colombian economy.

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Glossary

API: Application Program Interface
AT1C: Additional Tier 1 Capital
BCBS: Basel Committee on Banking Supervision
BDBR: Board of Directors of *Banco de la República*
BF: Brokerage Firms
BIS: Bank of International Settlements
BP: Basic Points
CDT: Term Deposit
CET1: Common Equity Tier 1 Capital
CI: Credit Institutions
CIF: Collective Investment Funds
CIR: Inter-sectoral Resolution Commission
CMA: Competition and Market Authority
COP: Colombian Pesos
CPI: Consumer Price Index
CSD: Central Security Depository
DD: Distance to Default
DSR: Debt-Service Ratio
EUR: Euros
FDI: Foreign Direct Investment
FED: Federal Reserve of the United States
FNA: National Savings Fund
FSB: Financial Stability Board
FTD: Fixed-Term Deposit Effective Rate
GDP: Gross Domestic Product
IBR: Interbank Reference Rate
IC: Credit Intermediation
ICE: Indicator of Consolidated Exposure
IEFIC: Debt Service and Financial Education Survey
IFRS: International Financial Reporting Standard
IIE: Indicator of Individual Exposure
IMC: Foreign Exchange Market Intermediaries
IMC: Investment Management Companies
IMF: International Monetary Fund
IPS: Health Service Providers
LIH: Low Income Housing
LRI: Liquidity Risk Indicator
LSRR: Liabilities Subject to Reserve Requirements
MADR: Ministry of Agriculture and Rural Development
MER: Market Exchange Rate
MT: Maturity Transformation
NAFTA: North American Free-Trade Agreement
NBFI: Non-Banking Financial Institutions
NIM: Net Interest Margin
NLR: Net Liquidity Requirements
NPL: Non-Performing Loans
OB: Open Banking
PEF: Private Equity Funds
PFM: Pension and Severance Fund Managers
PILA: Integrated Template for Liquidation of Contributions
PUC: Single Accounting Plan
QRI: Quality Risk Indicator
ROA: Return on Assets
ROE: Return on Equity
IRPR: Indicator of Risk Perception by Rating
RUNEOL: Single National Registry of Payroll Deductible Loan Operators
RWA: Risk Weighted Assets
SB: Shadow Banking
SES: Superintendence of Solidary Economies
SFC: Office of the Financial Superintendent of Colombia
SMES: Small and Medium-Sized Enterprises
SS: Superintendence of Corporate Affairs
SYSMO: Systemic Stress Model
T2C: Tier 2 Capital
TC: Trust Companies
TES: Colombian Public Debt Bonds
USD: US dollar
UVR: Real Value Unit
VAR: Vector Auto-Regression Model
WATM: Weighted Average Term to Maturity

Executive Summary

During recent months, the Colombian economy has continued its trend toward sustained recovery. As a result, the main short-term vulnerabilities to the stability of the financial system identified in the September 2017 *Financial Stability Report* have faded gradually. This perception emerges from the analysis of the financial stability risk heatmap presented in Graph A, where the set of relevant macroeconomic variables has gradually abandoned the more intense red shades[1]. Naturally, economic recovery has the effect of reducing the likelihood of further materializations of credit risk in the near future.

In this context, with data to end-2017, credit institutions continued maintaining solid solvency and liquidity indicators despite the reduction in profitability and the slow growth in the volume of credit, which despite its slight recovery has remained in blue shades in the credit cycle region during the past two years (the longest period in such state in the horizon of Graph A).

This edition of the *Financial Stability Report* concludes that the main vulnerabilities for the financial stability of the Colombian economy at the moment are associated with: 1) the lagged effect of slow economic growth on the materialization of credit risk in a context of lower profitability of the banking business, and 2) the risk of a return to a path of economic slowdown in the near future. The latter scenario could become plausible in case of a weaker-than-projected economic growth of the country's main trading partners or of a sudden appearance of difficulties in external financing for the Colombian economy.

As in the previous edition of this *Report*, these vulnerabilities could affect the stability of the financial system mainly through the higher costs for credit institutions that would result from the deterioration in the quality of the credit portfolio. In this regard, at the closing of 2017, non-performing loans to the corporate sector and Colombian households still exhibited positive (though declining) growth rates Specifically, the recent deterioration of the quality of housing loans and of

1 The technical details regarding the interpretation, construction, and the variables used in the heatmap are discussed in Box 1 of the September 2017 *Financial Stability Report*.

Graph A
Risk Heatmap of the Colombian Financial System

Source: Office of the Financial Superintendent of Colombia, DANE, Fedesarrollo, Bloomberg, and *Banco de la República*; Calculations by *Banco de la República*.

business loans to firms belonging to the construction sector stands out, which are consistent with the performance of some indicators of the housing market on the heatmap of Graph A.

In order to adopt a prospective approach to these vulnerabilities, Chapter 3 of this *Report* presents a stress test exercise that seeks to assess the resilience of credit institutions in the face of a hypothetical extreme scenario that assumes a deep slowdown of the Colombian economy during the remainder of 2018 and throughout 2019, difficulties regarding external financing, and a greater materialization

of credit risk in vulnerable sectors. Regarding aggregate solvency indicators, the results of this stress test indicate that no significant negative effects would be observed, given that the banking system capital ratio would remain above the regulatory limit during the horizon of the scenario. However, significant negative effects would be observed on the aggregate loan portfolio and on the profitability of the banking business, which reflects the impact of the adverse scenario on the ability of the banking system to create credit and carry out its financial intermediation activities.

Regarding market risk, both the fixed-income and the equity markets have performed well in the recent past, which is reflected in shades of green in the majority of the relevant variables for this category in the risk heatmap. In this case, the vulnerabilities arising from difficulties in external financing could manifest themselves in eventual losses in fixed-income markets. As for funding of credit institutions, their liquidity risk indicator continues to indicate that banks have sufficient levels of liquid resources to meet their short-term obligations, in this occasion with a slight recovery of traditional funding sources. Due to the fact that non-bank financial institutions are mostly exposed to the fixed-income and equity markets, at the closing of 2017 their proprietary trading desks as well as their administered portfolios exhibited a relatively healthy growth accompanied by greater profitability.

The analysis of vulnerabilities presented in this *Report* calls upon participants in the financial markets to ensure that the risks to which they are exposed are being assessed and managed appropriately and prudently. In this context, *Banco de la República*, in compliance with its constitutional objectives, will continue to closely monitor the situation of financial institutions and will make those decisions that will ensure inflation and growth levels that are consistent with macroeconomic stability and long-term economic development.

Juan José Echavarría
Governor

01

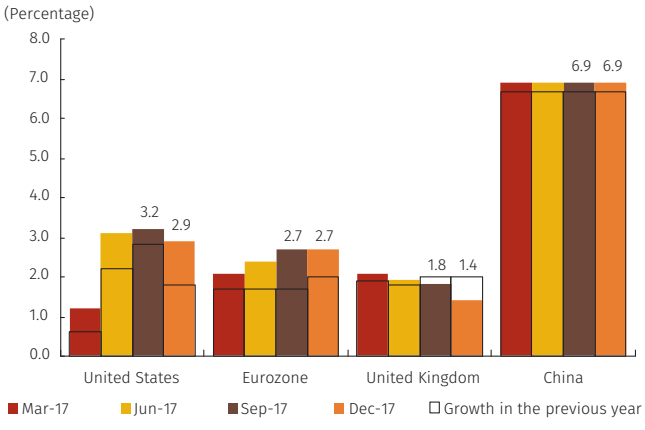
Macroeconomic Environment

The major global economies showed positive performances in the second half of 2017, except for the United Kingdom. In the United States, faster increases in the monetary policy rate than what had been expected initially are anticipated, while in Europe no short-term changes in the intervention rate are expected. China maintained a steady, uniform growth over the course of the year, which was accompanied by reforms in pursuit of greater macroeconomic and financial stability.

The United States registered a 2.9% growth figure in the fourth quarter of 2017, which was higher than what had been observed during the same period in 2016 (1.8%; Graph 1.1). Despite the fact that this performance has not translated into significant increases in salaries, inflation expectations for 2018 have shown an upswing, primarily due to this item (Graph 1.2). As a result of the above, the implicit expectations of the US monetary policy rate have risen considerably over the last half year (Graph 1.3). This factor generated concerns about medium-term growth and had a negative impact on the prices in the US stock market indices at the end of January 2018.

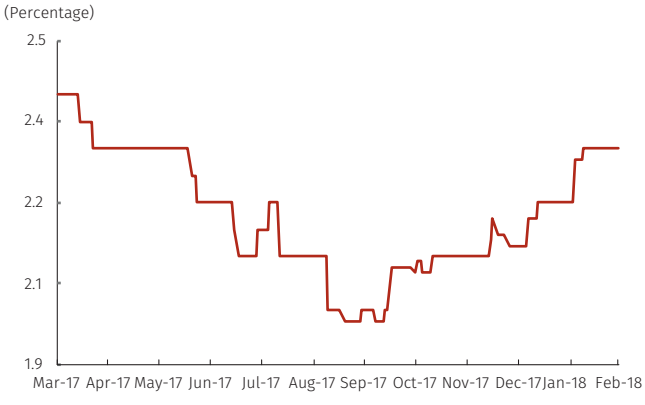
Furthermore, acceleration in the euro zone continued, and reached a real annual growth figure of 2.7% in the fourth quarter of that same year (Graph 1.1). Regarding inflation, the core indicators have been stable in recent months and, as a result, increases in the monetary policy rate are not envisaged yet. At the same time, the European Central Bank's reinvestment program has been lowered to EUR 30 billion (b) monthly since January 2018, amount that will be maintained until September of the same year. The United Kingdom, in turn, has remained on its downward trajectory compared to what had been seen in 2016 and had reached a growth of 1.4% in December 2017.

Graph 1.1
Real Annual Economic Growth of the Main World Economies



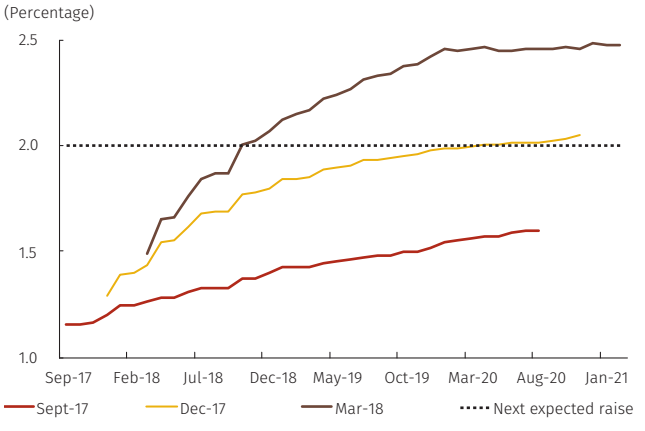
Note: Corresponds to the official annual growth figure for each country.
Source: Bloomberg.

Graph 1.2
Inflation Expectations in the United States for 2018



Source: Bloomberg Survey for analysists

Graph 1.3
Federal Fund Rate Expectations



Source: Bloomberg.
Note: Rate expectations are derived from futures contracts and federal fund options.

In the latest monetary policy communiques, the Bank of England reaffirmed its concerns about the adverse effects that the separation of the United Kingdom from the European Union could have in terms of growth and international trade. This could also have implications for the pace of the country's monetary normalization.

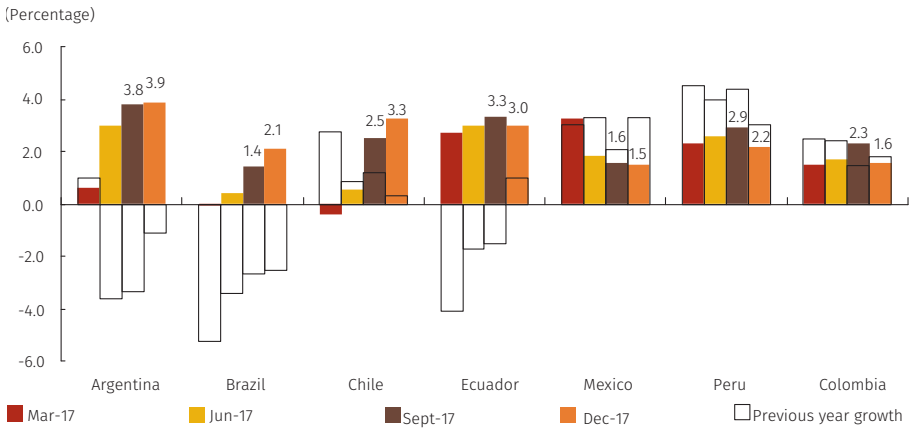
China registered an annual expansion of 6.9% in the fourth quarter of 2017 (Graph 1.1). The government's stimulus program, which has spurred an adjustment towards an economy that concentrates more on consumption, was accompanied by an increase in the regulations related to non-bank intermediation which holds a significant share of the total indebtedness and puts the country's financial stability at risk.[1]

The Latin American economies showed a mixed performance: Argentina, Brazil, Chile, and Ecuador registered upswings in 2017; in contrast, Mexico and Peru registered lower growth rates due to exogenous shocks. Despite the above, the outlook for 2018 is positive.

The performance of the Latin American economies showed mixed trends in the second half of 2017 (Graph 1.4). Argentina, Brazil, Chile, and Ecuador reported 3.9%, 2.1%, 3.3%, and 3.0% growth, respectively, in the fourth quarter. In contrast, the levels of growth showed by Peru and Mexico were lower than the ones registered in 2016. The former were adversely affected by *El Niño* climate conditions along the coast, while Mexico suffered from an earthquake that occurred in September 2017. As these exogenous shocks fade this year, the outlook for the region will improve. In spite of the above, the political uncertainty that Latin America is going through due to corruption scandals and elections this year poses downside risks as does the possibility of

1 This non-bank intermediation, which is known as shadow banking in the financial literature, has become important mainly in China, a country in which there has been a significant increase in the private corporate sector debt. For more information, see Chapter 2 of the *Global Financial Stability Report* for October 2014.

Graph 1.4
Real Annual Economic Growth for some Latin-American Countries



Note: Corresponds to the official annual growth figure for each country.
Source: Bloomberg.

faster-than-expected increases in the monetary policy rate in the United States.

Colombia had a growth figure of 1.6% as of December 2017. Six of the nine major branches of activity exhibited slowdowns compared to the same quarter in 2016, and the industry, construction and transportation sectors registered real contractions.

In the case of Colombia, a real annual growth of 1.6% was registered for the fourth quarter of 2017, which is lower than the figure for the previous year, 1.8% (Table 1.1). For the annual cumulative, growth in 2017 was 1.8%, which is lower than the 2.0% from 2016. Assessing sector performance, it is evident that the manufacturing industry was the most sluggish, with a 1.4% contraction. In addition, the construction and transportation, and warehousing and communications

Table 1.1
Real Annual Growth of the GDP by Economic Activity Sectors: Seasonally Adjusted Series

	2016-4Q	2017-4Q
Agricultural, forestry, hunting and fishing	3.6	1.0
Mining and quarrying	-8.7	0.5
Manufacturing industry	1.5	-1.4
Electricity, gas and water	-1.3	2.3
Construction	3.7	-0.6
Commerce, repairs, restaurants and hotels	3.0	0.3
Transportation, warehousing and communications	1.3	-1.0
Financial, real estate and business services	4.4	3.4
Social, community and personal services	1.0	3.7
GDP	1.8	1.6

Source: DANE.

sectors also registered negative growth (-0.6% and -1.0% respectively). The mining and quarrying sector stands out, as it started to see positive growth, as also did the electricity, gas, and water sectors. The branch that grew the most was the social, community, and personal services sector (3.7%).

Graph 1.5
Terms of Trade Index

Source: *Banco de la República.*

Despite of the downturn seen in 2017, the projections calculated by the technical staff at *Banco de la República* points to growth between 1.7% and 3.7% for 2018, with 2.7% being the most likely figure. This surge is based on the expectation of a more favorable outlook for the terms of trade (Graph 1.5), as well as to a greater demand from abroad that could be expected to result from a positive performance by the country's trading partners.[2] If these factors do not materialize, growth will probably be lower in 2018.

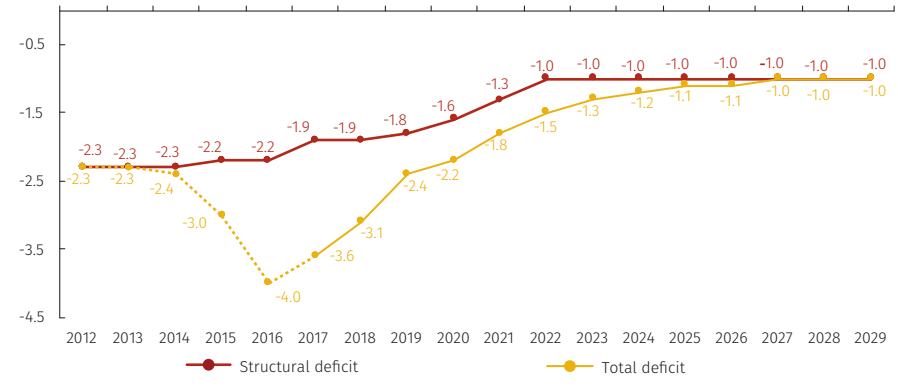
In December 2017, the credit rating agency Standard & Poor's lowered the long-term sovereign rating of Colombian securities denominated in local and foreign currency. The lower economic growth, the difficulty in reducing the government's fiscal deficit, and the volatility of the terms of trade were the determining factors for this reduction.

Last December 11, the credit rating agency Standard & Poor's lowered the sovereign rating of long-term Colombian securities one level taking them from BBB to BBB- on that entity's scale of ranking. The rating outlook was, likewise, changed from negative to stable and this reflects the expectation that there will be no changes in it in the short term. The agency's communiqué states that the foreign position of the local economy remains weak, and this makes it less resilient to shocks to the terms of trade like the one it suffered with the decline in the price of crude oil. Likewise, the report highlights the difficulties that the incoming administration will have to face in order to comply with the fiscal rule, which require that the national central government's total deficit be no more than 2.2% of the GDP for 2019 when the data show that it was 3.6% in 2017 (Graph 1.6). Last of all, the report indicates that the rating could be reduced another level if there are signs of deterioration in access to foreign financing, the fiscal deficit does not decrease sufficiently, government debt increases more than expected, or there is an unexpected setback in the implementation of the peace process.

2 See the minutes for the January 29, 2018 meeting of the Board of Directors of *Banco de la República*.

Graph 1.6
Total Structural Balance of the National Central Government 2012-2029

(Percentage)



Sources: Act 010 – Advisory Committee for Fiscal Regulations

As can be seen, Colombia's economic growth in the short- and medium-term faces three vulnerabilities: a potentially lower demand from abroad, a faster-than-expected increase in the international interest rates, and the possibility of further deterioration in the country's sovereign rating. Given the above, it becomes relevant to study the resilience of the Colombian financial system in an environment in which these risk factors materialize. That is why this *Report* is presenting a stress test that calculates the potential impact of a hypothetical scenario that includes low medium-term growth which results in some economic sectors having more limited creditworthiness. It likewise seeks to measure a set of risks for the banking system materializing as a result of that shock. The usefulness of the exercise lies in providing an estimate of the potential losses that would be seen in this scenario and reveal the possible transmission channels through which the vulnerabilities identified could end up affecting financial stability.

The results of the exercise indicate that the impact of the hypothetical scenario on the technical capital adequacy of the banking system as a whole would be moderate in magnitude. In spite of the above, reductions in the levels of profitability and in the strength of the portfolio will probably be registered. That underscores the need to continue carefully monitoring both the debtors' and entities' financial situations and the changing conditions in the macroeconomic environment. It must be noted that these results are obtained from a hypothetical scenario and through the use of a set of restrictive assumptions. It is to be expected, therefore, that under shocks that are smaller in magnitude or using weaker assumptions, the impact on financial stability will presumably be lower.

Box 1

GDP-at-Risk: an Approach to the Risk of Extremely Low Economic Growth

Santiago Gamba
*Daniel Osorio**

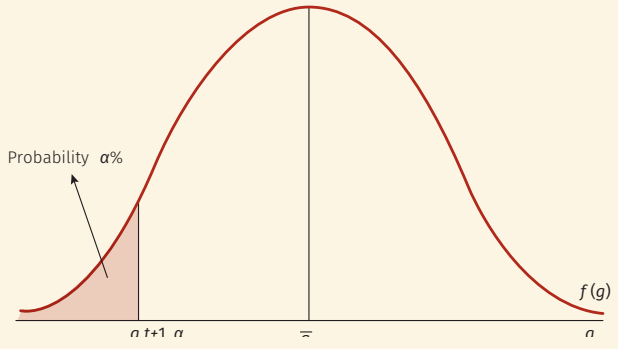
A measure that is commonly used to calculate the risk of extreme losses in an investment portfolio is Value-at-Risk (VaR). Although VaR was originally created to be applied in the area of finance, the general idea of estimating the risk of extreme results is relevant in multiple contexts. Based on this, Adrian et al. (2017) developed a methodology for estimating the risk of an extremely low future economic growth. Within a determined level of statistical confidence, this methodology estimates the minimum growth that an economy could experience (GDP-at-Risk: GaR) over a future horizon (for example, one year).

This box presents an application of this methodology to the Colombian case for the period between the first quarter of 1995 and the fourth quarter of 2017 with two objectives in mind: first, to offer a first assessment of GDP-at-risk in Colombia as well as of its evolution over time; second, to introduce the use of GaR in designing extreme scenarios for the stress test in chapter 3 of this Report.

1. GaR: the Colombian case

Graph B1.1 shows the conceptual basis of the methodology. Assuming that the annual growth of a given economy in period , , is a random variable with density function and mean , the GDP-at-risk (denoted hereafter as) is the minimum growth at one year that would be observed with a confidence level of %.[1] To estimate accurately, it is necessary to have an assumption with regard to the main factors that could cause extremely low growth. According to Adrian et al. (2017), the main determinant of this extreme risk is considered to be a measure of credit conditions under the understanding that the accumulation of financial imbalances tends to generate financial crises with their consequent impact on economic growth.

Graph B1.1
GDP-at-Risk: Graphical Description



Source: authors' elaboration.

The estimation of for different levels of is done by using quantile regression methods (Koenker and Hallock, 2001), which relate different percentiles of the distribution of economic growth at one year with observed growth and a measure of excessive credit growth.[2,3] With this regression as a basis, an asymmetric -Student distribution function is fitted for economic growth. Graph B1.2 summarizes the results as it shows the measure of excessive credit growth, actual GDP growth, and the evolution of estimated at 95% and 99% confidence levels between the first quarter of 1995 and the fourth quarter of 2017. The exacerbation of extreme risk is evident after the end of 1996 and again after the end of 2005, both of which were instances where there were credit imbalances in the financial sector. Currently (cut off as of December 2017) this risk is close to its historical average.

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

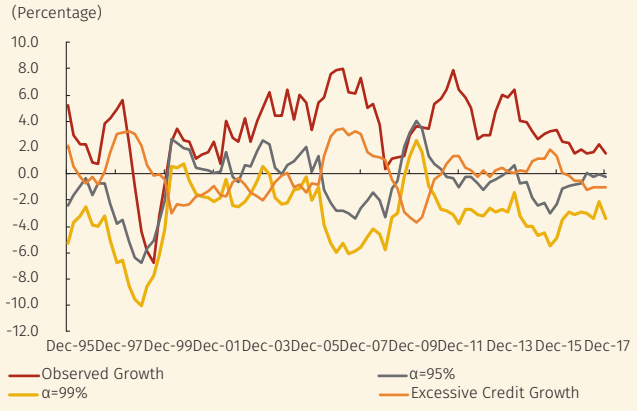
1 Therefore, the probability of registering a level of growth *below* $g_{t,\alpha}$ is 1- %.

2 This measure corresponds to the sum of the cyclical component of the real per capita loan portfolio and the cyclical component of the growth of the real per capita loan portfolio. The cyclical components are calculated using the Hodrick-Prescott filter.

3 Specifically, the conditional α percentiles of the GDP growth forecast at one year are estimated as a function of both their current level and the measure of excessive credit growth (e_t) based on the following equation:

$$g_{t+1,\alpha} = \mu^{\alpha} + \beta_e^{\alpha} e_t + \beta_g^{\alpha} g_t + \varepsilon_{t,\alpha}$$

Graph B1.2
GDP-at-Risk: Colombia, 1995-2017
(annual change)



Source: DANE, calculations by *Banco de la República*

2. Application of the Methodology to Generate Extreme Scenarios

A necessary component of the stress test presented in chapter 3 is the design of a hypothetically extreme macroeconomic scenario. In this regard, a balance between comparability over time (so that the exercises can be used to consistently estimate the degree of resilience the financial system has over time) and the need to assess relevant financial vulnerabilities, which change over time and with the circumstances, should be sought.

GaR potentially offers a solution to reach this balance (Graph B1.2). Specifically, it is possible to generate stress tests for different points in time that include trajectories of economic growth whose average during the stress test horizon is equivalent to and estimated at the same level of confidence for each point in time. Although different, these scenarios would be comparable to the extent that they evaluate the effects of the materialization of the same level of extreme risk. In the case of the stress exercise presented in Chapter 3, is equal to 97%, a value that is consistent with the growth trajectory of the stress test of the September 2017 Financial Stability Report. Thus, while both exercises analyze scenarios that emerge from vulnerabilities that are different at each point in time, they are comparable in terms of extreme risks.

3. Final remarks

The Global Financial Stability Report of the International Monetary Fund (IMF, 2017) included an exercise that used the GaR methodology for the case of global economic growth. Subsequently, the IMF has been using this methodology to evaluate the financial risks that the global economy faces. This illustrates the potential use of the GaR in the analysis of financial stability. In the case of Colombia, the methodology could be improved by including variables that are relevant to extreme risk (for instance, asset prices, international financing conditions, risk premia, or international prices of commodities) or the use of more accurate measurements of credit conditions, such as the IMF Financial Conditions Index. The Financial Stability Department of *Banco de la República* will work to further the development of this methodology for the Colombian case.

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Box 2

Reflections on the International Expansion of Financial Conglomerates[1]

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Angélica Lizarazo
Juan Carlos Mendoza
Daniel Osorio*

1. Opportunities and challenges in the expansion of the international financial conglomerates (IFC)

Over the last few years, IFCs have started to become a natural part of the financial landscape in advanced and emerging economies (Herring and Carmassi, 2010). The growth of trade between home countries (those in which the IFCs are headquartered) and host countries (those that receive IFCs), the advances in telecommunications technology, and investment opportunities in emerging economies in a context of low growth in advanced economies are among the main factors that explain the expansion of IFCs. This expansion is a natural and healthy trend in a scenario of globalization of commercial and financial flows that should be welcomed by the authorities in both home and host countries given its potential to foster economic growth and financial stability across borders. In the case of Colombia, several of the country's financial institutions have expanded abroad (mainly into Central America) since 2007 and have become regionally important IFCs.[2]

The recent growth of IFCs makes it possible for financial institutions to get access to a greater diversification of their investment portfolios thus making them less vulnerable to the conditions of a particular market and encouraging financial stability. At the same time, the presence of local banks abroad allows economic agents to capitalize on investment opportunities in different markets. However, this trend brings with it various policy challenges that must be taken into account. The fundamental challenge arises from differences in regulatory and oversight across different jurisdictions. These disparities can give financial institutions an incentive to take advantage of arbitrage opportunities that do not necessarily coincide with the best interest of savers and borrowers in different countries. Therefore, there is a latent necessity to internationally harmonize and coordinate some elements of regulation that could affect the normal operations of IFCs and their clients.[3]

From the standpoint of monetary policy, the challenge is threefold: to monitor IFCs which have operations in dollarized jurisdictions that do not necessarily have easy access to emergency liquidity facilities; to manage the effects that liquidity shocks in host jurisdictions have on the foreign exchange rate market in the economy of origin; and to face the greater complexity that implementing macroeconomic policy acquires in a context where external shocks can be transmitted more easily to the local economy as a result of the operations of the IFCs.

2. Policy Responses to the Expansion of IFCs

In response to the expansion of IFCs, regulatory and supervisory authorities have adopted mechanisms intended to deal with the specific characteristics of IFCs and their various structures. Since 2009, Colombia has passed laws to establish requirements for those financial institutions interested in expanding abroad. The law stipulates their obligation to obtain permits from the Office of the Financial Superintendent (FSC), which implies information, corporate governance, and risk management specific requirements.

The main response to the recent expansion of Colombian IFCs abroad was the adoption of Law 1870/2017, which defined new legal entities subject to oversight (*holdings*) and established new intervention mechanisms for a comprehensive and consolidated oversight of IFCs.[4] This law

1 This box presents a brief summary of the main conclusions of the seminar on the expansion of international financial conglomerates (IFCs) that took place on November 29 - 30, 2017 at the headquarters of *Banco de la República* in Bogota. This seminar, co-organized by the International Monetary Fund and the Inter-American Development Bank, was attended by representatives of central banks and supervisors from the Americas, Sweden, and Spain as well as by representatives from the financial sector (IFCs and rating agencies) and of the Central American Monetary Council.

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

2 While Colombian banks had 26 foreign subsidiaries in 2006 (with USD 3.8 b in assets), this figure rose to 236 (USD 80.4 b) in 2016.

3 A critical aspect in this regard is the lack of resolution protocols for IFCs that operate in different jurisdictions.

4 See chapter IV of the September 2017 *Financial Stability Report*.

follows international standards in the matter and acknowledges the new structure of the Colombian financial system, thus making it possible for the authorities' actions to be framed within the operational reality of IFCs. Simultaneously, the FSC has established channels of communication and coordination with supervisors in those jurisdictions that have hosted Colombian banks (school of supervisors), and *Banco de la República* has implemented a new set of regulations intended to mitigate the intermediaries' exchange and liquidity risks in different currencies while keeping constant communication with the Regional Financial Stability Group, made up by the financial authorities of Central America and the Caribbean.

From the standpoint of host jurisdictions in Central America and the Caribbean, the establishment of the Central American Monetary Council and the Central American Council of Superintendents of Banks, Insurers, and Other Financial Institutions has allowed for coordination among regional authorities in terms of regulatory agenda, information sharing, and inspections, among others.

3. Implications for Financial Stability

The implications of the expansion of the IFCs for financial stability have at least two dimensions. First, the specific way in which financial institutions obtain international status may affect their degree of resilience to shocks. In this regard, the expansion of the IFCs has followed two alternative models: international banking (with banks that carry out centralized transnational businesses and are financed from their country of origin; for example, German and Japanese IFCs) or multinational banking (with decentralized operations financed in each host country; for instance, Spanish and Colombian IFCs). While the international banking model facilitates the oversight and control of IFCs, some studies have shown that the resilience of financial systems to shocks is greater under the multinational banking model due to a lower incidence of contagion episodes and the greater diversification that the decentralized funding of transnational operations may offer.

Second, an important consequence of the expansion of local financial institutions into international markets is that the shocks and economic policies may be transmitted more easily across borders through the connections between IFCs. In this respect, the International Banking Research Network (IBRN) has carried out an empirical assessment of the characteristics of these transmission effects using information from 28 countries, among which Colombia is included (Buch and Goldberg, 2015 and 2017). The main results of this evaluation indicate that: 1) these effects are greater if they come from an advanced economy or from multiple emerging economies; 2) as discussed, the effects are crucially dependent on the IFCs' specific model of expansion (international or multinational);[5] 3) the effects of the transmission of macro-prudential policies are relatively limited; and 4) the effects of the transmission of monetary policy are much more significant (specifically, the monetary policy of the United States has strong transmission effects on other jurisdictions).

These implications for financial stability highlight the need for a coordinated international approach to the oversight and control of operations of IFCs. This approach must recognize that the sources of risk are increasingly located outside the borders of individual countries and, therefore, local authorities have relatively little influence on them. As a starting point, countries should move forward on establishing memoranda of understanding to share detailed information concerning the risk exposure of different IFCs in various jurisdictions that may serve as a basis for coordinated policy actions.[6] At the same time, the increasing complexity of IFCs calls for an upgrading of risk assessment exercises on the part of authorities. In this respect, there is a need for stress tests (such as the one presented in chapter 3 of this *Report*) at the IFC level that are based on the detailed information already mentioned.[7]

5 Argimon et al. (2017) found that Spanish banking (multinational in general) increases its transnational assets when the local monetary policy adopts a contractionary stance. This suggests that this expansion model has the capacity to transmit internal monetary shocks to other jurisdictions.

6 Some interesting examples with respect to this are the memorandum signed by the Nordic and Baltic States in February 2018 as well as the multilateral memorandum on information exchange and mutual cooperation for consolidated and cross-border oversight among the members of the Central American Council of Superintendents of Banks, Insurers, and Other Financial Institutions.

7 The DFAST stress test of the US Federal Reserve has an international component and includes subsidiaries of foreign banks that operate in the local market.

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02

Vulnerabilities of the Financial System[3]

Given the potential risks that have been identified in Chapter 1, the exposure of financial intermediaries to these possible sources of vulnerability are evaluated. In a context of economic downturn, the financial system has adjusted to the recent macroeconomic shocks and this has led to a gradual deterioration in the risk indicators. In this section, an overview of the financial system is presented and each one of the risks (credit, market, and liquidity) that the financial entities are exposed to are analyzed.

2.1 Current Situation of the Financial System

Based on the slower growth rate of the Colombian economy, the credit institutions' balance sheet continue exhibiting low levels of real growth which is primarily explained by the performance of the loan portfolio.

As of January 2018, the credit institutions' (CI) assets rose to COP 607.1 trillion (t) which represented a real annual expansion of 0.8%.[4] With respect to what was seen a year ago, the growth was higher by 1.8 pp. However, this is still below the average for the last five years (7.0%; Graph IIA1). In line with the slower pace of expansion for the asset, the CI liabilities grew at a rate of 1.0%, which is higher

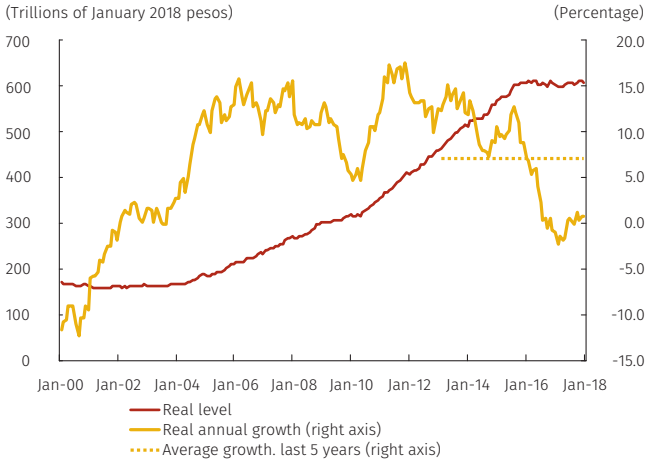
3 The cut-off date for the data presented in this section is January 2018.

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

than the -0.9% from a year ago but lower than the 7.3% average from the past five years.

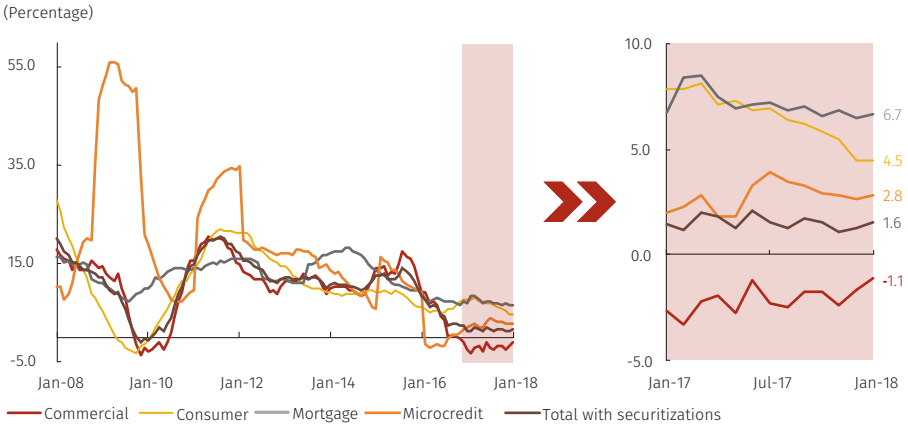
The asset's dynamics has mainly been explained by the performance of the loan portfolio[5]. In general, since the middle of 2016, the growth rates of the different types of credit have remained stable at relatively low levels. This contrasts with the fast rebound they registered after the international financial crisis in 2009 (Graph IIA2). This performance coincided with a lower demand for loans within the economy as well as with an increase in the requirements to be met before they will be granted (Graph IIA3).

Graph 2.1
CI Assets



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

Graph 2.2
Credit Institutions' Gross Loan Portfolio Annual Real Growth



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

The indicators of credit risk, in turn, showed deterioration in all of the types of loans.

The quality risk indicator (QRI)[6] has continued to exhibit rises for all of the modalities during the last six months and reached a level of 10.3% in January 2018. This figure is higher than the 8.7% seen a year ago and close to its maximum seen in November 2004 (11.0%). This trend is the product of the widespread deterioration of this indicator for all of the types of loan portfolios. Specifically, the QRI for the commercial loan portfolio has exhibited a rise of 2.2 pp in the last twelve months and reached 12.0% (the maximum seen since July 2004). A level of 9.0% was

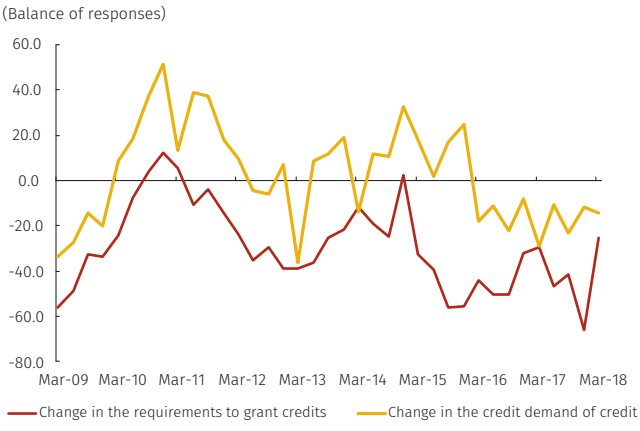
5 In January 2018 the portfolio share of the asset was 71.6% while that of investments was 18.6%.

6 The QRI is defined as the ratio between the risky and the total loan portfolio (the risky loan portfolio corresponds to the balance of the loans with ratings other than A on a scale from A to E where A is the best rating).

seen for the consumer loan portfolio which is 1.1 pp higher than it was the previous year. With respect to the housing loan portfolio, this indicator stood at 5.6%, 1.3 pp higher than it was a year ago. Last of all, the QRI for the microcredit portfolio rose 0.5 pp over the last year and came to 12.3% (Graph IIA4, panel A).

The non-performing loan indicator (NPI),[7] in turn, has shown an upswing since the beginning of 2017 and stood at 5.1% in January 2018, the highest level that has been seen since November 2009 when it reached 5.2% (Graph IIA4, panel B). Specifically, increases of 1.1 pp, 0.9 pp, 0.8 pp, and 0.5 pp were registered for the mortgage,

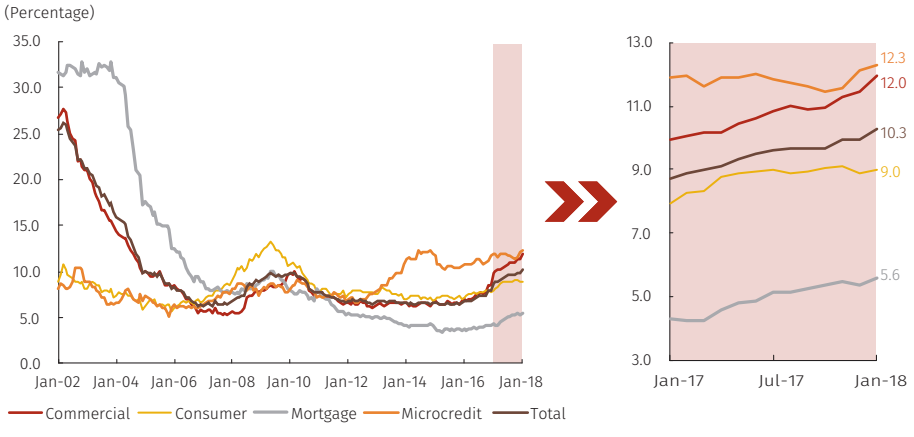
Graph 2.3
Change in Perception of Credit Supply and Demand



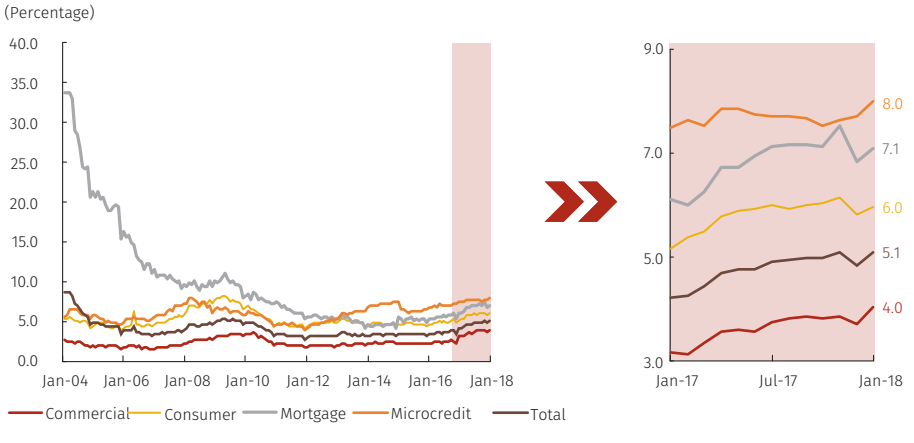
Source: Report on the loan situation in Colombia, calculations by *Banco de la República*

Graph 2.4

A. Quality Risk Indicator



B. Non-Performing Loan Indicator (NPI)

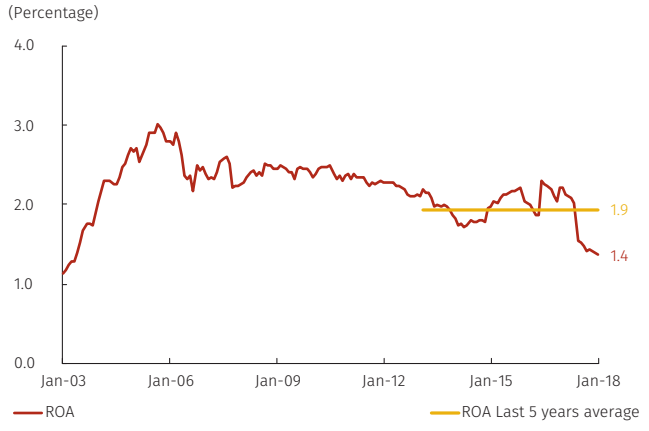


Source: Office of the Financial Superintendent of Colombia, calculations by *Banco de la República*

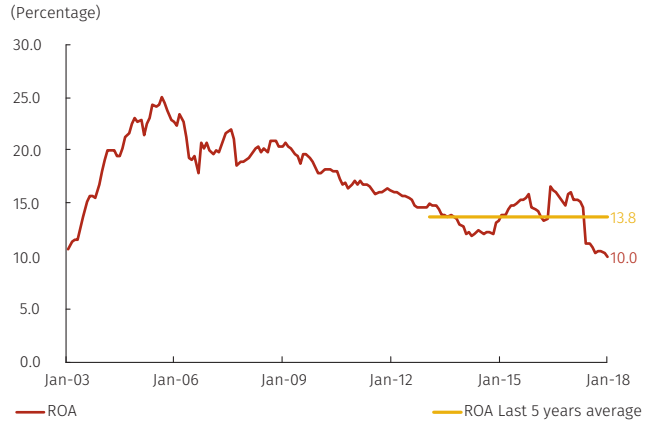
7 The non-performing loan indicator (NPI) is calculated as the ratio between the non-performing and total loan portfolios (the non-performing portfolio includes the balance of the loans that have been in arrears for more than 30 days).

Graph 2.5
Profitability of Credit Institutions

A. ROA



B. ROE



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

commercial, consumer, and microcredit loan portfolios respectively between January 2017 and the same month in 2018.[8] Likewise, the total non-performing loan portfolio has continued rising since the beginning of 2017 and reached a real, annual growth of 23.3% as of January 2018. This performance is mainly a result of the growth rate of the commercial, non-performing loan portfolio which stood at 26.6%.

In January 2018, the profitability indicators presented values that were lower than the average for the last five years, while the capital adequacy ratios rose.

The indicator for the return on assets (ROA) stood at 1.4% as of January 2018 thus presenting a decline of 85 bp over the last year (Graph IIA5).[9] The return on equity (ROE), in turn, closed at 10.0% having declined 6.0 pp during the same period. These indicator levels have not been seen since the beginning of 2003. This is due to an increase in the expenditures on loan-loss provisions, the growth rate for which went from 12.7% in January 2017 to 20.4% a year later thus moving away from the average for the last five years (10.3%). Nevertheless, the total and core capital adequacy ratios rose 50 bp and 37 bp between January 2017 and January 2018 respectively and stood at 16.2% and 10.9% respectively[10].

Assets held by non-banking financial institutions in proprietary and managed accounts continued to show a higher rate of growth with respect to the one registered by the financial system as a whole

In January 2018, Non-banking Financial Institutions' assets (NBFI) amounted to COP 81.7 t in proprietary accounts, which represents 5.2% of total financial system assets (Table IIA1). It reached an annual growth rate of 9.4% in real terms, 3.3 pp higher than the one observed

8 When the write-offs were included in the calculation of the NPI for these loan portfolios, they stood at 7.0%, 14.4%, 7.5%, and 14.8% for the commercial, consumer, mortgage, and microcredit loan portfolios respectively. Note that the NPI including write-offs for the consumer loan portfolio has risen at a faster rate than the NPI excluding write-offs since the beginning of 2015.

9 The positive jump that was seen in June 2016 was due to the decision made by the Banco de Bogotá against consolidating Corficolombiana.

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

Table 2.1
Non-Banking Financial Institutions' Proprietary and Third-Party Assets

Non-Bank Financial Institution Assets	Jul-17		Annual Real Growth	Jan-18		Annual Real Growth
	Trillions of Colombian pesos	Financial System Asset Percentage		Trillions of Colombian pesos	Financial System Asset Percentage	
Proprietary Position	77.6	5.1	6.1	81.7	5.2	9.4
Pension Fund Managers (PFM)	5.5	0.4	7.3	5.7	0.4	9.0
Trust Funds (TF)	3.2	0.2	4.7	3.1	0.2	4.4
Stock Brokerage Firms (SBF)	3.3	0.2	-6.9	4.7	0.3	32.9
Insurance Companies	65.6	4.3	6.8	68.2	4.3	8.4
Third-party Position	744.4	49.0	13.5	769.3	48.5	9.4
PFM: Mandatory Pensions	217.6	14.3	11.4	229.4	14.5	13.2
PFM: Voluntary Pensions	14.1	0.9	-7.9	17.3	1.1	11.1
PFM: Severances	10.3	0.7	-5.3	10.6	0.7	8.7
TF	476.9	31.4	14.4	489.4	30.9	7.2
SBF	24.9	1.6	45.0	22.6	1.4	19.1
Total Non-bank Financial Institutions	822.0	54.1	12.7	852.0	53.8	9.4
Total Financial System	1544.0	101.7	7.6	1584.8	100.0	6.9

Note: data expressed in January 2018 Colombian pesos.
Source: *Office of the Financial Superintendent of Colombia* and *Banco de la República.*

in July 2017. During the analysis period, proprietary assets of stock brokerage firms (SBF) grew at a rate of 32.9%,[11] which contrasts with the 6.9% reduction registered six months ago.

On the other hand, the NBFI's total assets under management stood at COP 769.3 t as of January 2018, which is equivalent to 48.5% of the total assets of the financial sector. The real growth rate of these portfolios showed a slight downturn in January 2018 (9.4%) relative to July 2017, when they grew at a rate of 13.5%. This was a response to the fact that trust companies (TC) assets under management - which represent about 63% of the total assets under management - registered a growth of 7.2%, compared to the 14.4% increment observed six months ago.

Between July 2017 and January 2018, Return on Assets of NBFI remained relatively stable, except for trust companies, which showed a slight decline. However, this indicator has continued to perform above the five-year average.

Regarding the NBFI's profitability indicators, Return on Assets (ROA) of both SBF and Pension and Severance Funds Managers (PSFM) stood at 2.4% and 16.5% respectively, about the same levels reported

11 This increase was partly explained by the stock markets and public debt securities observed in the second half of 2017.

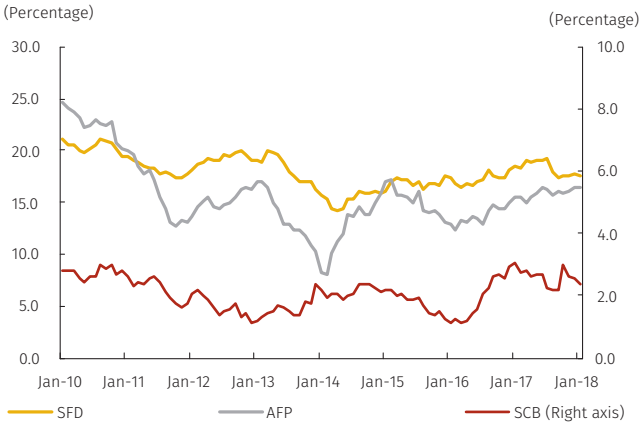
in July 2017 (Graph IIA6, Panel A). Trust companies had a ROA of 17.6% in January 2018, which is 1.7 pp lower than the one observed six months ago. ROA of Life and General Insurance Companies remained around 3.4% and 1.4% respectively during the period under review (Graph IIA6, Panel B). In general, it is worth mentioning that levels of profitability for the NBFIs remained above the five-year average.

Financial Institutions performance has been influenced by overall economic conditions. However, the transmission channel has been different based on the type of entity.

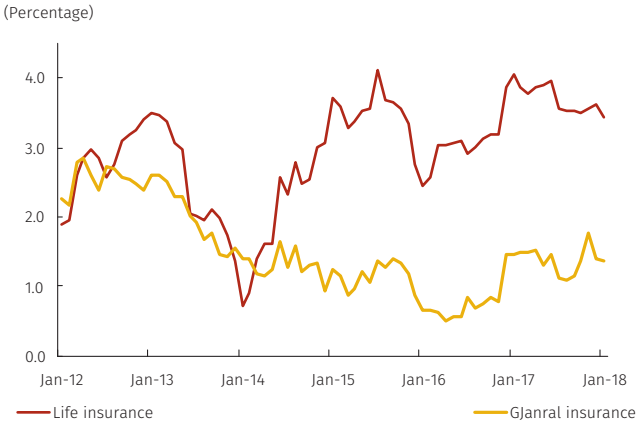
In conclusion, CI's profitability indicators continued to be weak as of January 2018. This has been largely explained by the deterioration in the credit risk indicators. NBFI's indicators are fluctuating around their historical averages given the fact that vulnerabilities of the macroeconomic environment have not been reflected in a materialization of market risk.

Graph 2.6
Returns on Assets of Non-Banking Financial Institutions

A. SFB, Trust Funds, and Brokerage Firms



B. Insurance Companies



Source: *Office of the Financial Superintendent of Colombia* and *Banco de la República.*

2.2 Credit Risk

The analysis of credit risk that is presented below is divided between the corporate sector and households. In the first sub-section, the development of corporate sector indebtedness and the perception and materializing of credit risk for private companies is analyzed by economic sector and by the size of the firm. Furthermore, the indebtedness and financial burden on households are identified in the second subsection and some risk indicators are presented that are related to the performance of these agents' portfolios.

2.2.1 Corporate Sector[12]

2.2.1.1 Development of corporate sector indebtedness

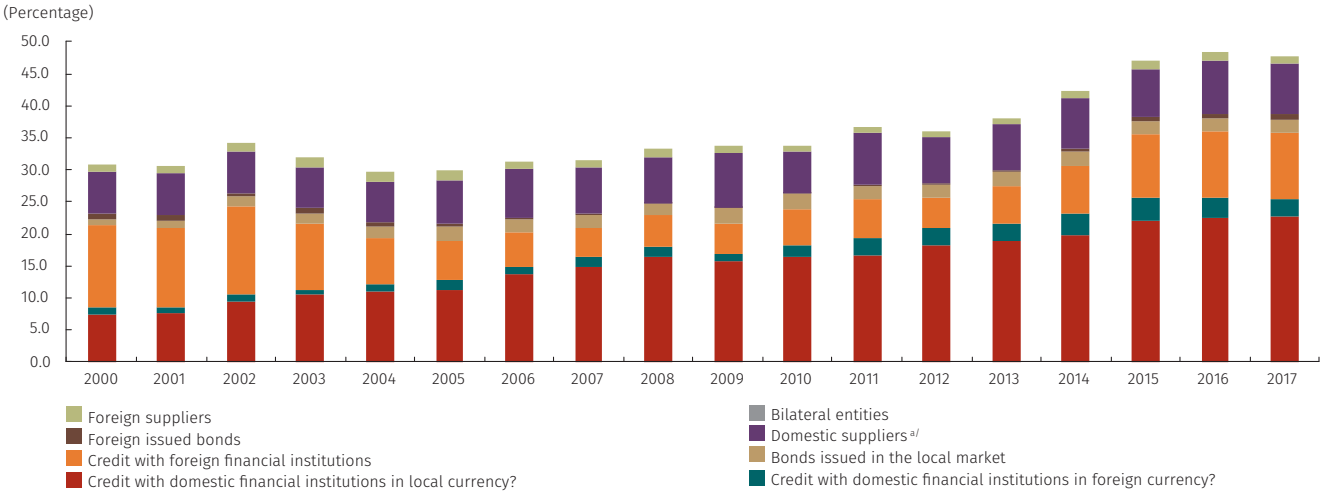
The public corporate sector presented a decline in their dollar-denominated indebtedness as a percentage of the GDP between December 2016 and the same month of 2017 while the indebtedness of the private sector remained relatively stable.

12 Due to availability of information from the FSC Format 341 "Individual Information by Debtor: Active Credit Transactions," the figures in this section were submitted as of December 2017.

As of December 2017, the total indebtedness of the corporate sector as a share of the GDP on an annualized basis stood at 56.7% and represented a 1.8 pp reduction with respect to what was registered during the same month in 2016. Of the total, the private corporate sector[13] contributed 47.7 pp and the non-financial public corporate sector contributed the remaining 9.0 pp. When the two sectors are analyzed separately, it can be found that the latter presented a decrease in indebtedness as a percentage of the GDP equal to 1.1 pp

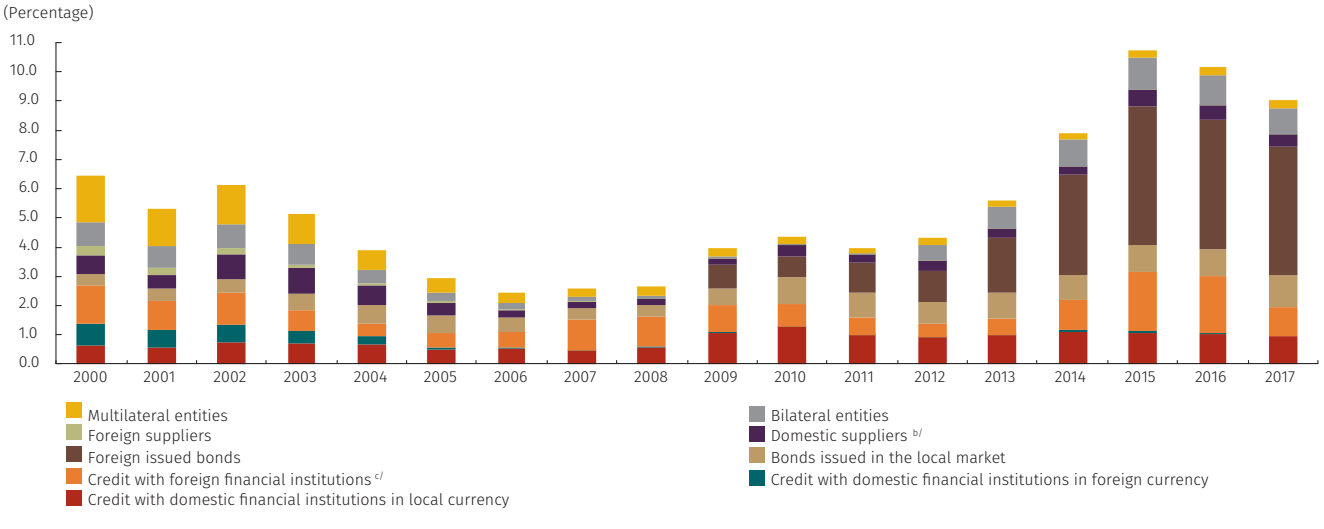
Graph 2.7
Corporate Sector Financial Debt as a Percentage of GDP by Instrument

A. Private Corporate Sector



a/ Includes only the information of the companies that reported Financial Statements to the Superintendent of Companies. In 2016, all companies registered their financial statements using IFRS, which did not allow for the identification of the balance of debt to domestic suppliers. Therefore, in order to estimate the data for these companies, the average percentage for this period was calculated for firms that were registered using the PUC between 2007 and 2015 which assumed a percentage equal to the entities that submitted financial statements in 2016 in which short and long-term providers entered their current and non-current liabilities respectively. With data available as of June 2017, a balance of suppliers equal to the estimate for December 2016 is assumed.
Sources: *Office of the Financial Superintendent of Colombia*, *Superintendent of Companies* and *Banco de la República*, *calculations by Banco de la República.*

B. Public Corporate Sector



a/ Does not include financial leasing operations.
b/ Includes information from the account payable balance of the public sector non-financial companies.
Sources: *Office of the Financial Superintendent of Colombia*, *General National Accounting Office*, *Ministry of Finance and Public Credit*, *calculations by Banco de la República.*

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

while the private sector remained relatively stable (Graph 1, panel A). The decline in the public sector indebtedness was essentially due to a lower loan portfolio balance with foreign financial institutions[14] as well as, to a lesser extent, to a reduction in their indebtedness to multilateral entities (Graph 1, panel B).

In addition to the above, note that the main sources of funding for the private sector at the time the analysis was done continued to be loans in legal currency from local financial institutions and, in foreign currency, from foreign lenders while, for the public sector, the sources are bonds issued in the foreign markets. It is also evident that the sources of financing that are used the least by the private and public corporate sectors are, respectively, bonds issued abroad and foreign providers.

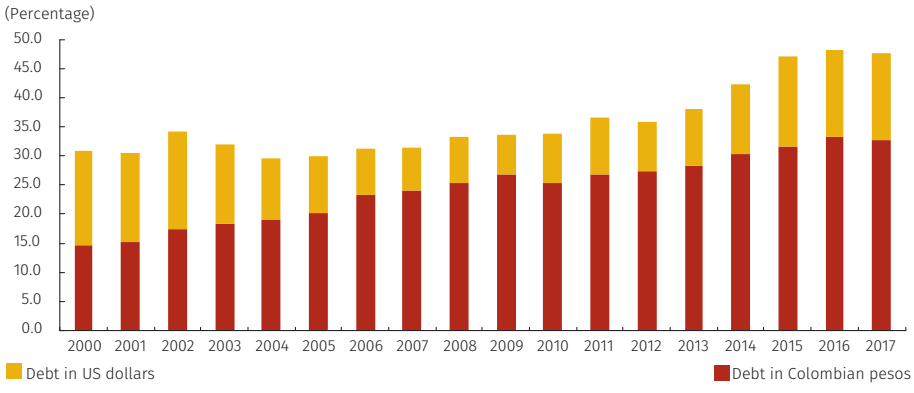
When indebtedness is analyzed by type of currency, it is evident that private companies still acquire the majority of their debt in pesos (68.8% of the total debt which is equivalent to 32.8% of the GDP for 2017) and there is, likewise, a relative stability in both pesos and foreign currency in the case of the aggregate debt. Publicly held companies, in turn, have preferred to borrow in foreign currency (66.6% of the total debt) although since 2015, this debt has been exhibiting a reduction as a percentage of the GDP as it went from 7.9% in December 2015 to 6.0% in the same month of 2017 (Graph 2).

Debt denominated in foreign currency may be a source of vulnerability for the corporate sector to the extent that it exposes the entity to movements in the exchange rate. Nevertheless, the exposure to exchange rate risk is mitigated if the company is an exporter, if it has coverage (through the use of derivatives), or if it has the backing of a foreign entity (i.e., through Foreign Direct Investment, FDI). Based on information up until 2016, Graph 3 shows the private corporate sector's financial debt by currency hedging and by the debtor's foreign trade as a share of the GDP. The analysis of this graph shows that in recent years, the share of debt denominated in foreign currency held by both exporters and non-exporting firms with FDI that do not have coverage has increased. The debt held by entities which are the most exposed to exchange rate risk (remainder) shows stability and in 2016 was the debt representing the lowest share of the GDP.

14 The balance of the non-financial public corporate sector indebtedness to foreign financial institutions dropped 98 bp as a percentage of the GDP between December 2016 and the same month in 2017. This reduction occurred mainly due to a prepayment of USD 1.925 b on a loan that Ecopetrol made in June 2017 to the international banks.

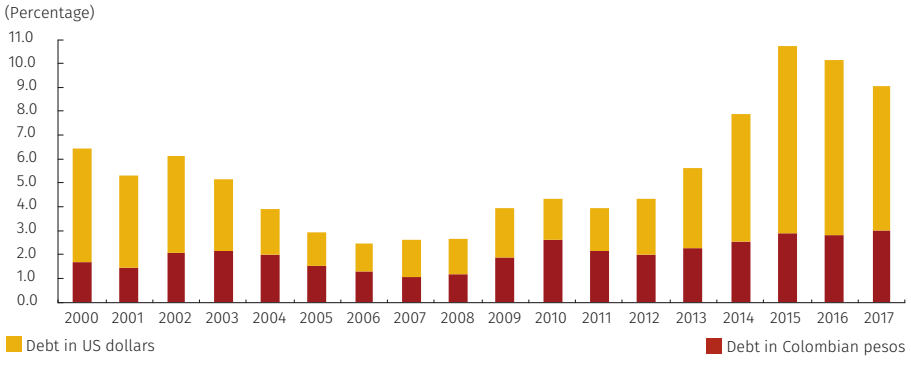
Graph 2.8
Corporate Sector Financial Debt as a Percentage of GDP by Currency

A. Private Corporate Sector



Note: made with the same data as Graph 15, panel A.
Sources: *Office of the Financial Superintendent of Colombia*, *Superintendent of Companies* and *Banco de la República*; *Calculations by Banco de la República.*

B. Public Corporate Sector



Note: made with the same data as Graph 15, panel B.
Sources: *Office of the Financial Superintendent of Colombia*, *General National Accounting Office*, *Ministry of Finance and Public Credit*; *calculations by Banco de la República.*

2.2.1.2 Sector Analysis[15]

Between December 2016 and the same month in 2017, of the loan portfolio granted to companies in the private corporate sector, the share held by the economic sectors of transportation and electricity rose. The share held by the rest of the branches was reduced or remained relatively stable.

The economic sectors with the largest share of the loan portfolio granted to private companies were commerce, manufacturing, and construction which, as a whole, accounted for 55.2% of this portfolio as of December 2017. The sectors of mining, restaurants and hotels, and agriculture, in turn, are the ones with the lowest share (8.0% of

15 In this subsection, abbreviations will be used for the following sectors: 1) real estate, rentals and business: real estate; 2) agriculture, animal husbandry, hunting, forestry, and fishing: agribusiness; 3) mining and quarrying: mining; 4) electricity, gas and water: electricity; 5) transportation, warehousing, and communications: transportation; and 6) financial intermediation: finance.

the loan portfolio placed with companies in the private corporate sector).

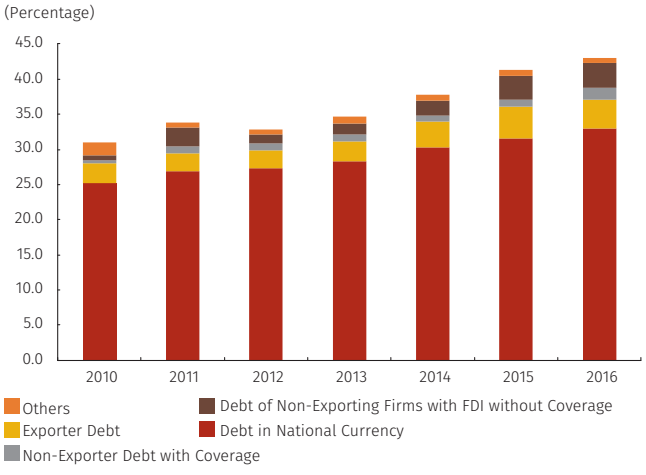
During the period under analysis, the transportation and electricity sectors were the ones that saw their share rise the most (Graph 4). The share of the loan portfolio held by real estate, finance, and commerce, in turn, declined while the last one has notably been representing a progressively lower percentage of the loans in that portfolio granted to the private corporate sector since 2014.

The analysis of various indicators makes it possible to infer that the economic sectors in which the credit risk has risen are, to a great extent, construction and transportation. The first sector has been significantly affected by the situation of the Concesionaria Ruta del Sol S.A.S. and the second, by the performance of the passenger transportation sub-sector. When these effects are ruled out, construction is the only one of these that may continue to show substantial deterioration.

Between December 2016 and the same month in 2017, the credit risk indicators for the commercial loan portfolio exhibited a deterioration. The Quality Risk Indicator (QRI) exhibited an increase of 2.8 pp when it registered a value of 11.4% in December 2017, whereas the increase in the non-performing loan ratio (NPL) was smaller as it went from 2.3% to 3.7%. From the above, it can be inferred that both the perception of credit risk in this type of portfolio and its materializing has risen.

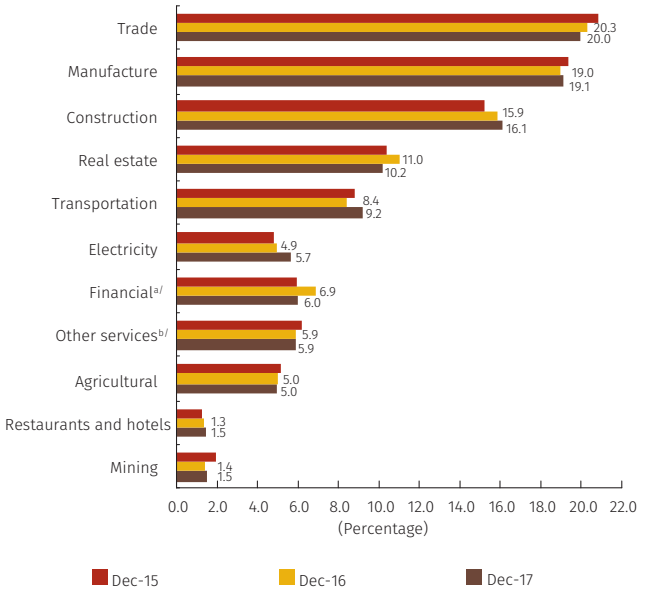
When the QRI is calculated by economic sector, the agribusiness, construction, and transportation sectors turn out to be the ones that have experienced major deterioration during the period under analysis (Graph 5, panel A). In addition to showing significant increases in the indicator, these last two branches are the ones that have contributed the most to the deterioration of the aggregate QRI of the private corporate sector (Graph 5, panel B).

Graph 2.9
Corporate Sector Financial Debt as a Share of GDP by Exchange Rate Coverage and Debtor's Foreign Trade



Note: the debt in foreign currency includes only loans (not including leasing) and bonds. Suppliers are not included since the information is not available by TIN.
Sources: *Office of the Financial Superintendent of Colombia*, DANE, and *Banco de la República*

Graph 2.10
Breakdown of Private Corporate Sector Loan Portfolio Balance by Economic Sector

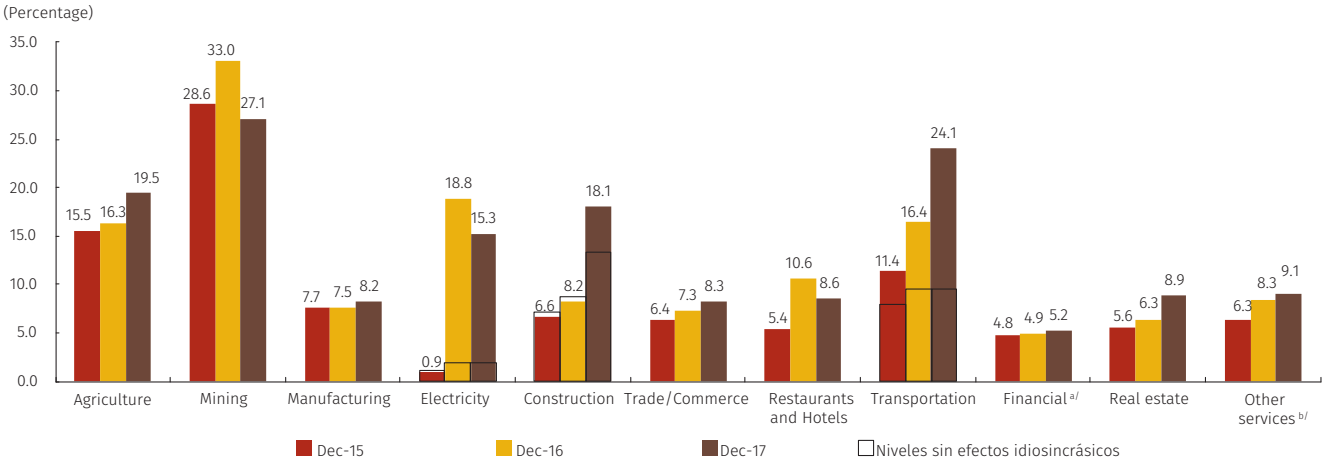


a/ The financial and insurance sector excludes the loan portfolio granted to entities supervised by *Office of the Financial Superintendent of Colombia.*
b/ 'Other services' groups firms belonging to the following economic sectors: public administration and defense, education, social and health services, 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*, *Superintendent of Companies*, and *Banco de la República*; Calculations by *Banco de la República*.

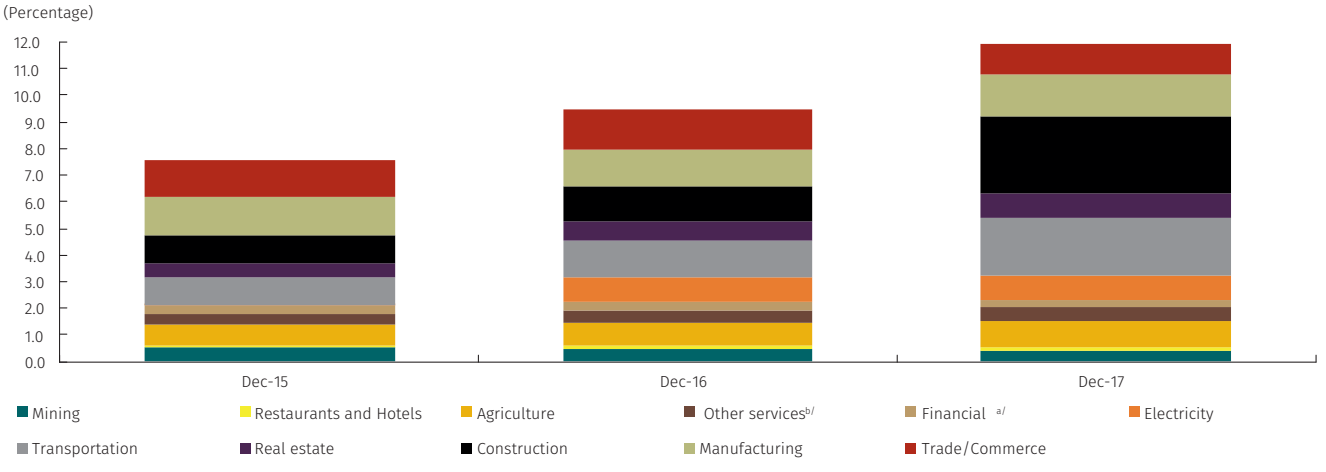
The deterioration that construction and transportation showed during the past year was largely due to idiosyncratic components. The first sector has been affected by the situation of the Concesionaria Ruta del Sol S.A.S. and the second, by the performance of the companies that provide passenger transportation. When these

Graph 2.11
QRI of the Private Corporate Sector

A. QRI by Economic Sector



B. QRI Contribution by Economic Sector



a/ The financial and insurance sector excludes the loan portfolio granted to entities supervised by *Office of the Financial Superintendent of Colombia.*
b/ 'Other services' groups firms belonging to the following economic sectors: public administration and defense, education, social and health services, 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*, *Superintendent of Companies,* and *Banco de la República*; calculations by *Banco de la República.*

effects are discounted, it turns out that construction is the only one of these two that will probably continue having a significant effect on the deterioration of the private corporate sector QRI.[16,17]

Regarding the NPL, all of the branches presented deterioration during the period under analysis, with the exception of mining and financial businesses. The change in the agribusiness (it went from 5.2% to 7.7%), the electricity (it went from 4.5% 14.7%), and the transportation (this

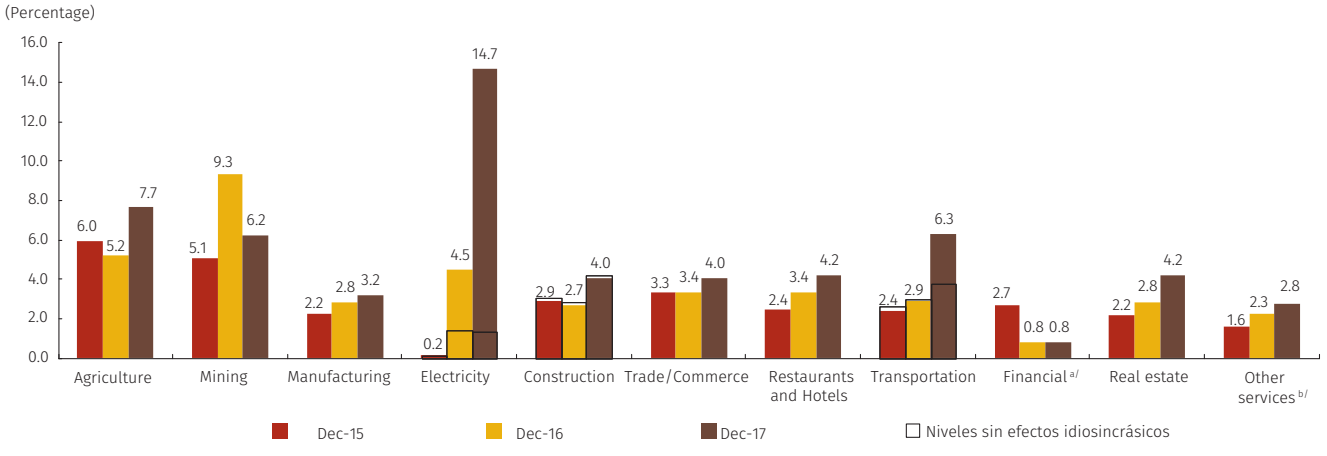
16 When the effect of the idiosyncratic components is ruled out, it can be seen that the QRI for construction between December 2016 and December 2017 may have risen 4.5 pp, and the QRI for transportation, 5 bp. In terms of contributing to this same indicator, the one for construction probably went from 1.4 pp to 2.1 pp, in the same period, and the one for transportation from 59 bp to 69 bp.

17 Between December 2016 and the same month in 2017, all of the sub-sectors of construction showed a deterioration in both the QRI and the NPL. Construction of residential buildings is the sub-sector that has contributed the most to the rise in these indicators.

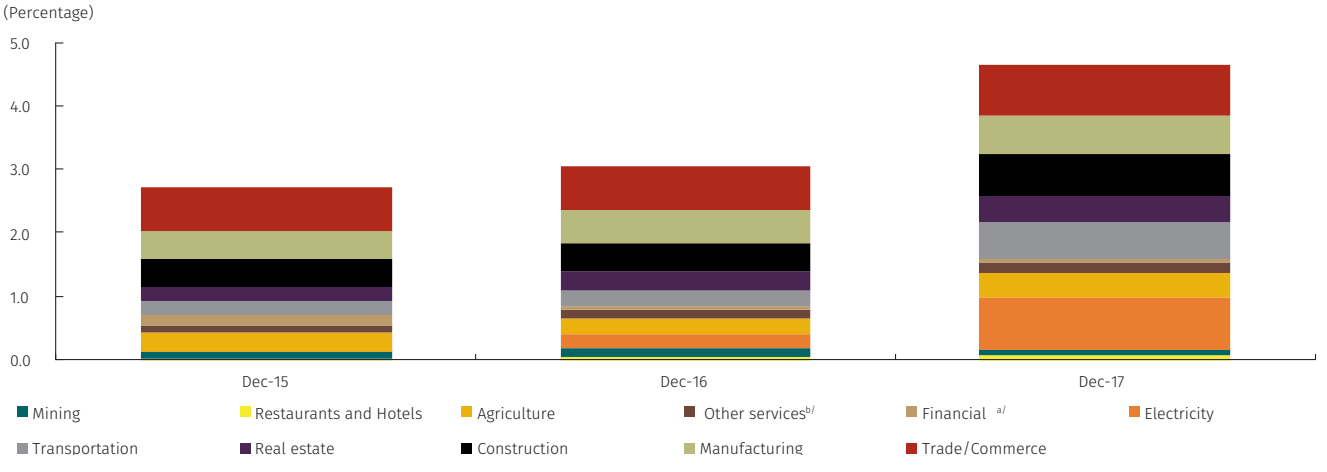
went from 2.9% to 6.3%) sectors stands out (Graph 6, panel A). When the contribution of each branch to the aggregate NPL of the private corporate sector is analyzed, it can be seen that the ones that have contributed the most to the increase in the indicator are electricity, transportation, and construction. It should be clarified that the performance of transportation was largely influenced by the previously mentioned idiosyncratic component and that of electricity was affected by the situation regarding *Electrificadora del Caribe S. A.*[18][19] (Graph 6, panel B).

Graph 2.12
Private Corporate Sector NPL

A. NPL by Economic Sector



B. NPL contribution by Economic Sector



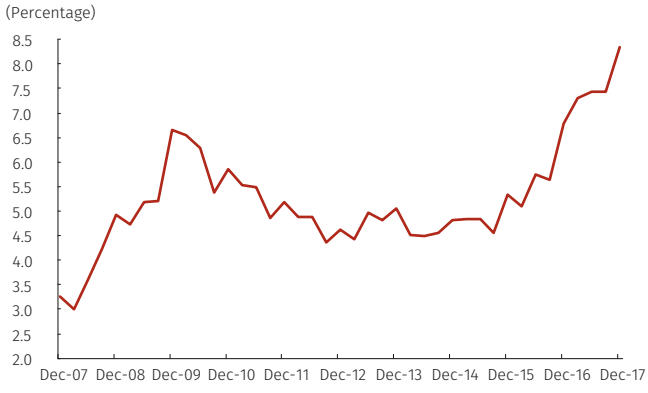
a/ The financial and insurance sector excludes the loan portfolio granted to entities supervised by *Office of the Financial Superintendent of Colombia.*
b/ 'Other services' groups firms belonging to the following economic sectors: public administration and defense, education, social and health services, 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*, *Superintendent of Companies,* and *Banco de la República*; Calculations by *Banco de la República.*

18 When the effect of the idiosyncratic components is ruled out, the NPL for electricity between December 2016 and December 2017 may have decreased 9 bp, and the NPL for transportation probably rose 80 bp. In terms of contributing to this same indicator, the one for electricity probably went from 6 bp to 7 bp in the same period and the one for transportation from 19 bp to 28 bp.

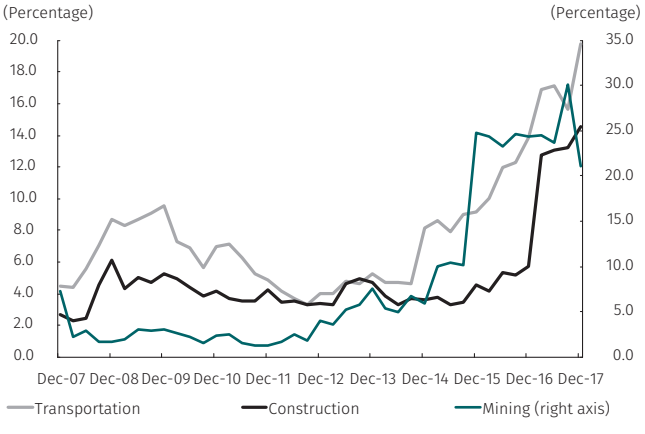
19 As of December 2017, the CEs had 67.2% loan-loss provisioning for the loan portfolio of *Electrificadora del Caribe S.A.*

Graph 2.13
Risk Perception Indicator by Rating

A. Corporate Sector Total Loan Portfolio



B. By Economic Sector



Source: *Office of the Financial Superintendent of Colombia* and *Banco de la República.*

In order to do a more thorough analysis of the performance of loans disbursed to firms, two additional, prospective indicators of credit risk were calculated which make it possible to identify episodes of increased vulnerability for the CEs: the risk perception indicator by rating (IRPR) and the weighted indicator of migrating to a worse rating.

The IRPR is defined as the percentage of loans, in terms of their balance, that have a worse rating than they would if only the days past due were taken into account.[20] The indicator continued a growth trend that it had been exhibiting since the end of 2015 for the total portfolio granted to the private corporate sector when it registered a value of 8.3% as of December 2017 (Graph 7, panel A). By economic sector, the CEs are seeing a higher risk for the loans granted to firms in the transportation and construction sectors. Mining companies, likewise, continue to have a high IRPR. However, they have not shown significant increases in the last six quarters (Graph 7, panel B).

In turn, the weighted indicator, of migrating to a worse rating is calculated by both balance and number of transactions.[21] Graph 8, panel A shows that the aggregate indicator by both balance and number of transactions has been showing a growth trend since the first quarter of 2012. During the last six months, the increase in the indicator by balance has been significantly greater than the one calculated by the

20 According to Appendix 1 to Chapter II of the Basic Accounting and Financial Circular issued by the FSC, if only the days past due were taken into account, the commercial loans would be rated as follows: 1) category A: loans that are past due by a month or less; 2) category B: loans that are past due by one to three months; 3) category C: loans that are past due by more than three and up to six months; 4) category D: loans that are past due by more than six and up to 12 months; and 5) category E: loans past due for more than 12 months.

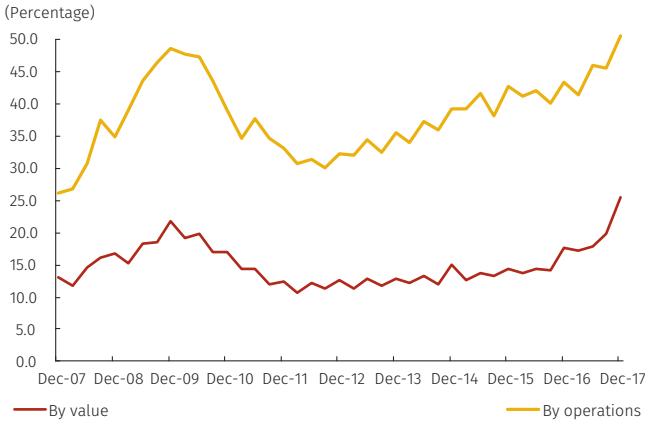
21 This indicator is calculated by using quarterly information from the FSC format 341 (active credit transactions). The term is assigned to the probability that a credit transaction has been rated with the letter during the quarter prior to the quarter being evaluated and is assigned to the probability that a credit transaction could migrate to the rating during the quarter being evaluated given that it was rated with the letter during the previous quarter. The ratings for the active credit transactions may correspond to any letter within the set {A, B, C, D, E} where A is the best rating (least risk) and E is the worst (highest risk). Given this, the weighted indicator of migrating towards a worse rating during the quarter is calculated as: $P(B_t|A_{t-1})\times 1\times P(A_{t-1})+P(C_t|A_{t-1})\times 2\times P(A_{t-1})+P(D_t|A_{t-1})\times 3\times P(A_{t-1})+P(E_t|A_{t-1})\times 4\times P(A_{t-1})+P(C_t|B_{t-1})\times 2\times P(B_{t-1})+P(D_t|B_{t-1})\times 3\times P(B_{t-1})+P(E_t|B_{t-1})\times 4\times P(B_{t-1})+P(D_t|C_{t-1})\times 3\times P(C_{t-1})+P(E_t|C_{t-1})\times 4\times P(C_{t-1})+P(D_t|D_{t-1})\times 3\times P(D_{t-1})+P(E_t|D_{t-1})\times 4\times P(D_{t-1})+P(E_t|E_{t-1})\times 4\times P(E_{t-1})$. Note that this is a weighted indicator since the worse the rating that a loan migrates to is, the higher the weighting (which is between 1 and 4) is.

number of transactions which indicates that, during the second half of 2017, the loans for larger amounts migrated to worse ratings.

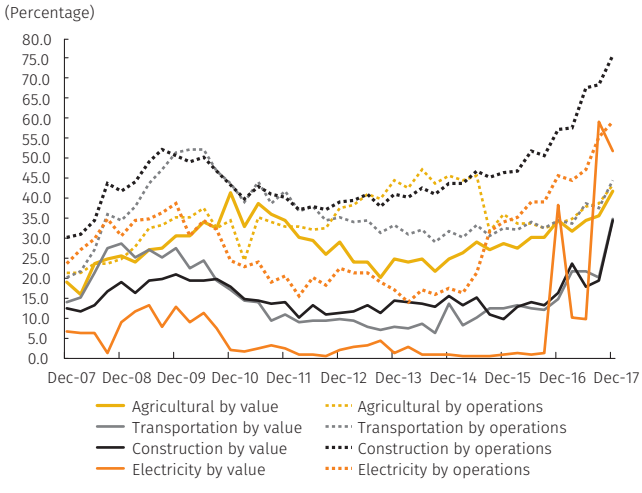
When this same analysis is done by economic sector, it is clear that the electricity, construction, transportation, and agribusiness sectors have been showing rises in the indicator over the last six months by both number of transactions and balance.[22] The increase has been greater by balance for these four sectors which indicates that loans in increasingly higher amounts are migrating to lower ratings (Graph 8, panel B).

Graph 2.14
Weighted Indicator of Migrating to a Lower Rating

A. Corporate Sector Total Loan Portfolio



B. By Economic Sector



Source: *Office of the Financial Superintendent of Colombia* and *Banco de la República.*

2.2.1.3 Analysis by company size[23]

The analysis by company size makes it possible to see that, compared to the increases in the large businesses, the rise in credit risk indicators for the small and medium-sized firms (mipymes in Spanish) has been higher. With this, the levels of the indicators in the case of the mipymes continue to remain higher.[24]

22 In the case of the electricity sector, the increase seen in the indicator by balance is due to the deterioration of *Electrificadora del Caribe S. A.* When this effect is discounted, the indicator would have probably registered a value of 4.2% in December 2017.

23 According to Chapter II, Appendix 3 of the Basic Accounting and Financial Circular issued by the FSC, businesses are classified by size based on their level of assets as follows: 1) small business if the level of its assets is lower than 5,000 minimum legal monthly salaries in effect (SMMLV in Spanish). 2) medium-size business if the level of its assets is between 5,000 and 15,000 SMMLV, and 3) large company if its level of assets is above 15,000 SMMLV.

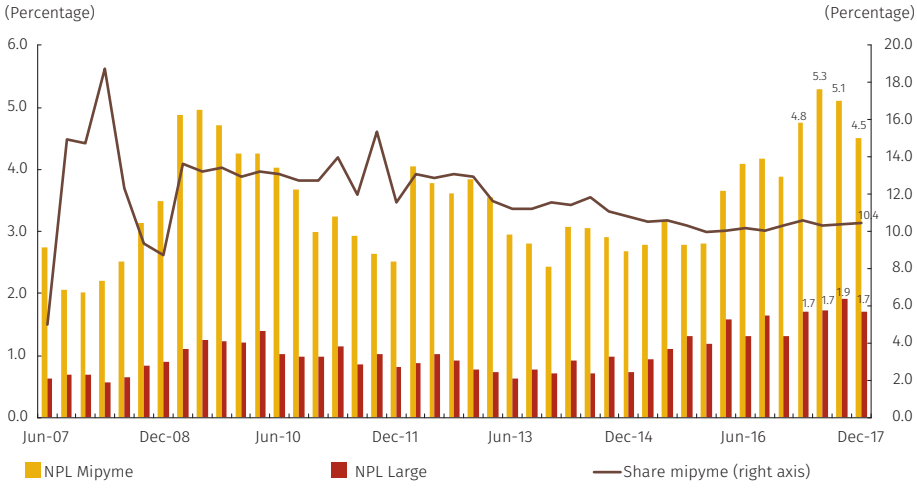
24 Due to the fact that there was deterioration in the commercial loan portfolio because of idiosyncratic factors, primarily in the large companies, the indicators presented in this section were produced while excluding these effects.

Between 2015 and December 2017, the traditional indicators of credit risk (i.e., NPL and QRI) presented a broad based rise for each and every size of company and reached their highest levels since 2007. The increase was greater in the cases of the micro, small, and medium-sized companies (mipymes) whose QRI and NPL went from 8.3% and 2.8% in December 2015 to 12.0% and 4.5% two years later. Furthermore, these same indicators grew during the same period and went from 1.2% to 1.7% and from 4.7% to 6.8% in the case of the large companies (Graph 9). Due to the above, a growth trend in the difference between the indicators for the mipymes and for large companies has continued over the last two years, and this indicated that the establishments raised the perception of risk for the former, which accounted for 10.4% of the total commercial loan portfolio as of December 2017.

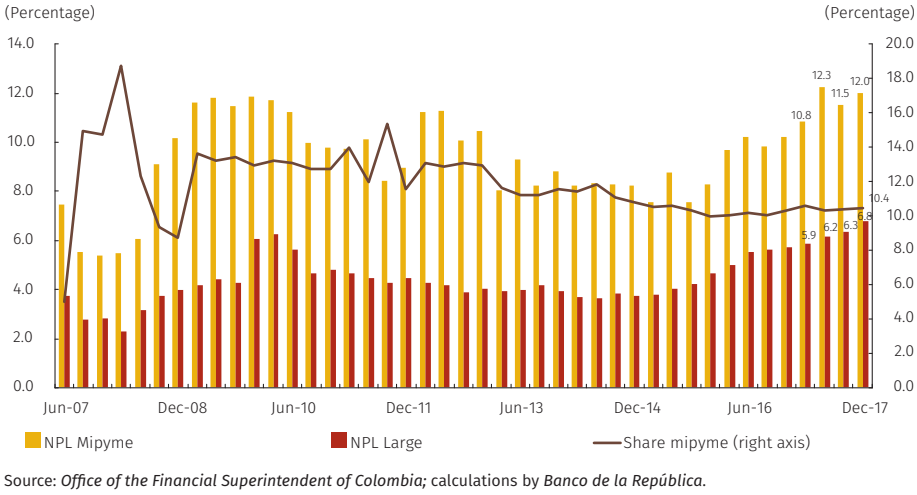
Meanwhile, when the performance of the weighted indicator of migrating to a worse rating (by balance and number of transactions) is

Graph 2.15
Traditional Credit Risk Indicators for Large Companies and Mipymes

A. Non-performing loan indicator

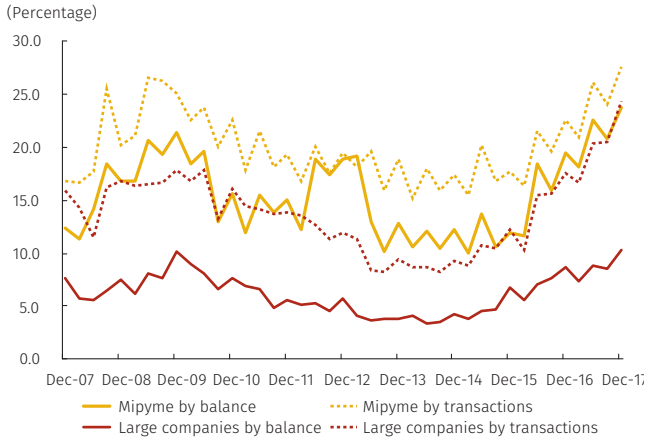


B. Quality Risk Indicator



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

Graph 2.16
Weighted Indicator of Migrating to a Worse Rating for Big Companies and Mipymes



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

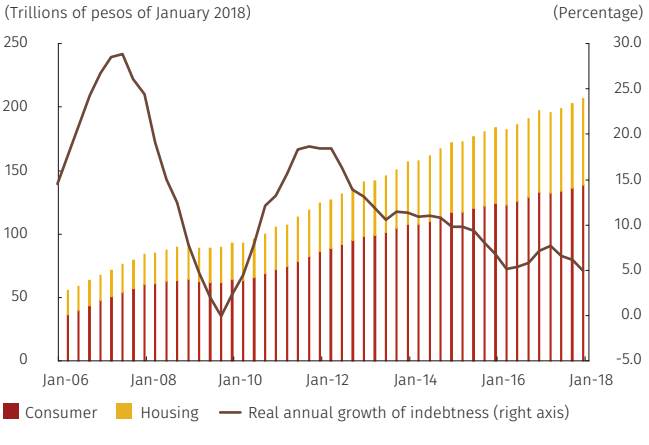
analyzed, it can be seen that between December 2015 and the same month in 2017, there was a growth trend in both the case of the mipymes and that of the large businesses (Graph 10). Nevertheless, the gap between the indicator by number of transactions and the indicator by balance declined for the mipymes while it grew for the large companies. The above implies that, for the mipymes, the loans with more capital deteriorated while, even though the share of the loans that deteriorated grew for the large companies, these are the smallest in size within this class.

In accordance with what is stated in this subsection, one may conclude that the indebtedness of the private corporate sector has remained stable while that of the public corporate sector has declined due to lower financing from foreign financial institutions. As expected, the economic downturn in the country has, been reflected in the deterioration of the firms' credit risk indicators, especially those for the *mipyme* and for the companies working in construction which, after discounting idiosyncratic effects, are the ones that have contributed the most to the rise in these indicators. This vulnerability will be evaluated in more detail in the stress test.

2. Households

The level of Colombian household indebtedness rose between July 2017 and January 2018 being the housing portfolio the one that showed the major growth.

Graph 2.17
Breakdown and Real Annual Growth of Household Indebtedness



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

As of January 2018, the households' loan portfolio [25]registered COP 185.0 t which accounted for 42.0% of the CI's total loan portfolio –higher percentage than the one in July 2017 (40.9%). A more precise measurement of the levels of debt these agents have also includes the portfolio of loans granted by the National Savings Fund (FNA in Spanish) and the solidarity sector – savings and loan cooperatives (CAC in Spanish) and employee funds[26]. In this sense, total household indebtedness as of January 2018 amounted to

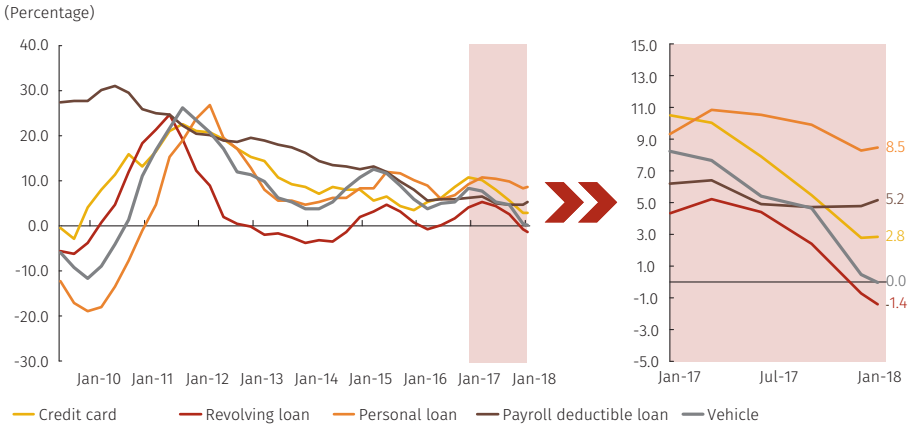
25 Households' loan portfolio refers to the sum of both consumer and mortgage portfolio.

26 This calculation does not include information from the family subsidy funds due to lack of availability.

COP 205.8 t of which 67.2% corresponded to consumer loans and the remaining 32.8% to housing (Graph 1). The real annual growth of this debt stood at 5.1% showing stability after the downward trend presented during 2017. According to this, indebtedness as a share of disposable income[27] remained at 33.5% over the same period.

By type of credit, the CI's consumer loan portfolio[28] was the one that showed the greatest downturn between July 2017 and January 2018, as it went from 6.9% to 4.5%. The payroll deductible and personal loans, which make up to 60.2% of this loan portfolio, registered the highest rates of growth. In contrast with the other types of credit, these two loan portfolios showed a relatively stable performance. In the cases of credit cards and vehicle loans, the growth rates are the lowest registered since 2010 (Graph 2).

Graph 2.18
Consumer Loan Portfolio Annual Real Growth by Credit Type



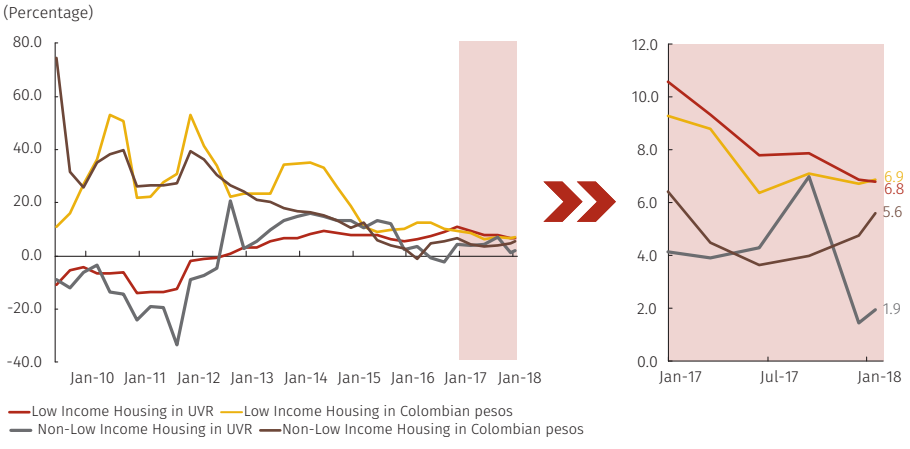
Source: *Office of the Financial Superintendent of Colombia*; calculations by *Banco de la República*.

The housing loan portfolio, in turn, registered a real growth of 6.2% as of January 2018. By segment, the peso-denominated non-low income housing (non-LIH) loans, which represent the largest share of this portfolio, registered a stabilizing trend in their growth rate and, as of January 2018, this was at 6.9%. Low-income housing (LIH) loans that are denominated in pesos, on the other hand, have shown a growth trend since July 2017 and stand at 5.6% (Graph 3).

27 The available income is taken from the integrated economic accounts of the National Bureau of Statistics (DANE in Spanish) that are available up to 2016. The forecasts of available income for 2017 and 2018 were calculated on the assumption that this would expand at the same rate as the nominal GDP minus the average historical difference between the growth of the two variables.

28 Due to information availability, the indicators that are presented by type are calculated only on the basis of information from credit institutions and the FNA. However, this is considered a good approximation of the total household indebtedness since these entities represent 92.7% of the total.

Graph 2.19
Mortgage Loan Portfolio Annual Real Growth by Credit Type



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

Between January 2017 and a year later, the NPI for consumer and mortgage increased. Specifically, the NPI of the peso-denominated non-LIH segment, which accounts for the largest share of the mortgage loan portfolio, reached levels that have not been seen since 2009.

As of January 2018, the consumer portfolio's NPI for all types of loans reached values that have not been seen since the 2009-2010 period. Particularly, the NPI for vehicles loans exceeded the NPI for personal loans which, historically, had the highest indicator (Graph 4, panel A). Regarding housing loans, the NPI for all segments, with the exception of UVR-denominated LIH, registered increases over the past year. The indicator for the pesos-denominated non-LIH segment, which represents the largest share of the housing portfolio, was the one that rose the most and, in November 2017, it reached 7.0%, maximum since 2009 (Graph 4, panel B).

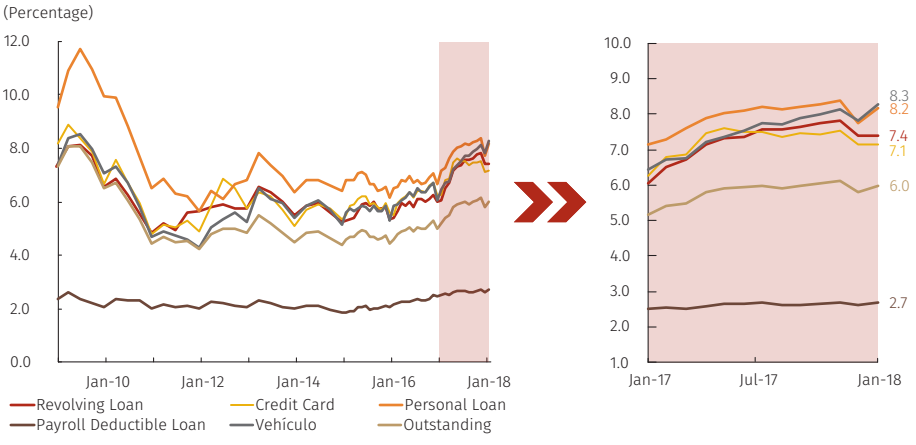
With respect to the static pool analysis, the NPI for vehicle and personal loans granted in recent quarters has been higher than those registered during previous periods. The QRI for the non-LIH mortgage loans, in turn, continued to deteriorate and reached historical peaks in the last quarter of 2017.

The static pool analysis[29] for the consumer loan portfolio shows an improvement for all types of loans with the exception of personal and vehicles loans during the last quarter of 2017. The NPI of the personal loans granted in the last quarter of 2017 is the highest one registered since June 2009 and stands above the historical average (1.6%). This effect has been accompanied by a greater deterioration

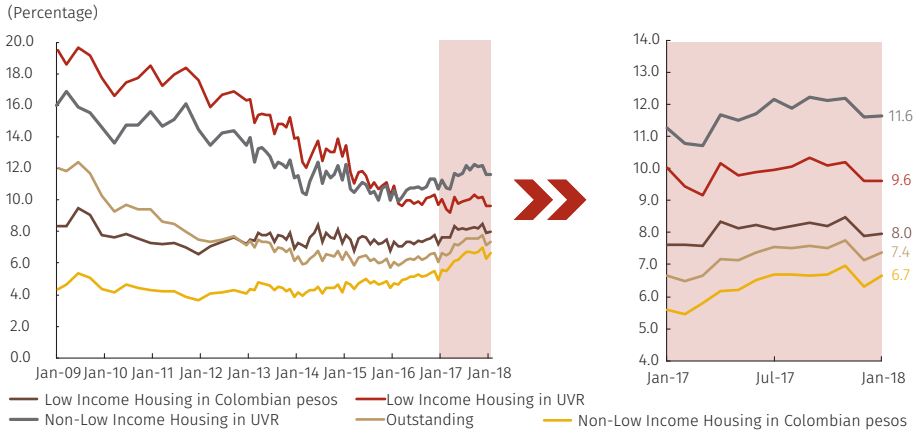
29 The graphic interpretation of a static pool is as follows: on the horizontal axis, the bars represent the quality risk indicator of the loans generated in the corresponding quarter (contemporary) and on the vertical axis, they represent the quality risk indicator evaluated at different horizons (six months, a year, and two years ahead).

Graph 2.20
NPI by Credit Type

A. onsumer Loan Portfolio



B. Mortgage Loan Portfolio



Sources: *Office of the Financial Superintendent of Colombia* and *Banco de la República.*

of the static pools generated at the end of 2015 and 2016 evaluated one and two years ahead. With respect to vehicle loans, the NPI of the loans granted in the last quarter of 2017 was the maximum registered in the available history. Furthermore, during the last six months the NPI for all the different horizons registered increases (Graph 5, panels A, B, and C).

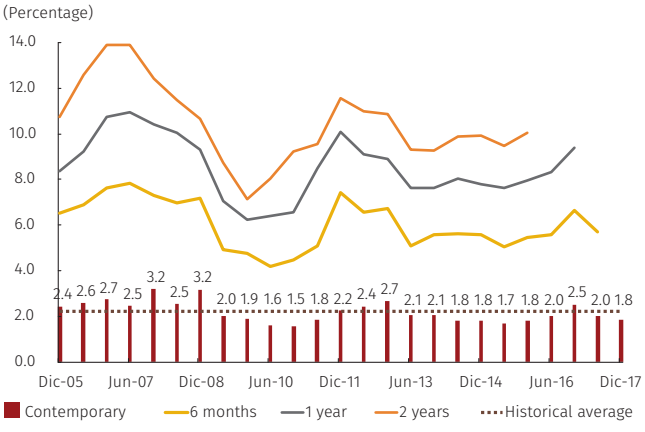
The higher levels of default registered for personal and vehicle loans in the last quarter do not necessarily imply that there is a problem in the origination of loans. Rather, the widespread deterioration in the loan static pools may be reflecting the difficulties the debtors have to comply with their obligations in an adverse macroeconomic context.

As for the mortgage portfolio's static pool analysis, the QRI of the loans granted during the fourth quarter of 2017 reached its historical maximum. This has been accompanied by a widespread deterioration in all of the periods analyzed. This has been explained by the performance of the loans allocated to non-LIH housing. Loans allocated for

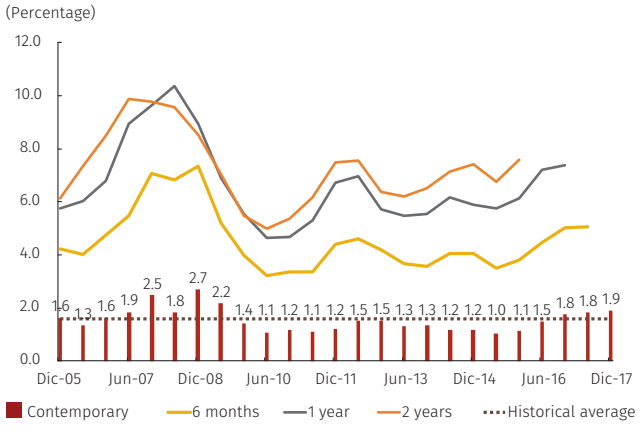
LIH, in turn, reversed the growing trend of their QRI which, in the last quarter of 2017, registered an improvement of 71 bp (Graph 6, panels A, B, and C). This analysis along with the information of the NPI for

Graph 2.21
NPI by Static Pool Analysis

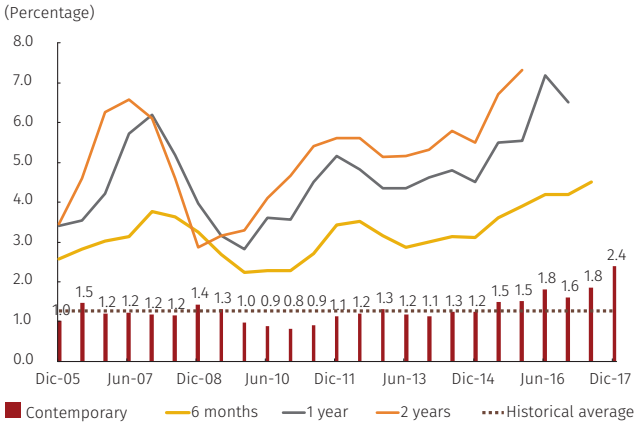
A. Consumer Outstanding



B. Personal loans



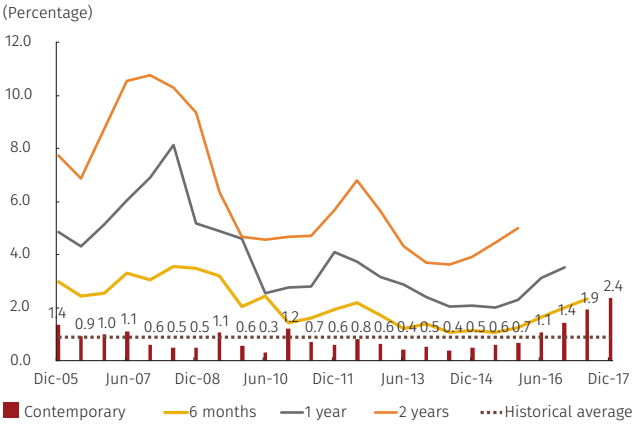
C. Vehicles



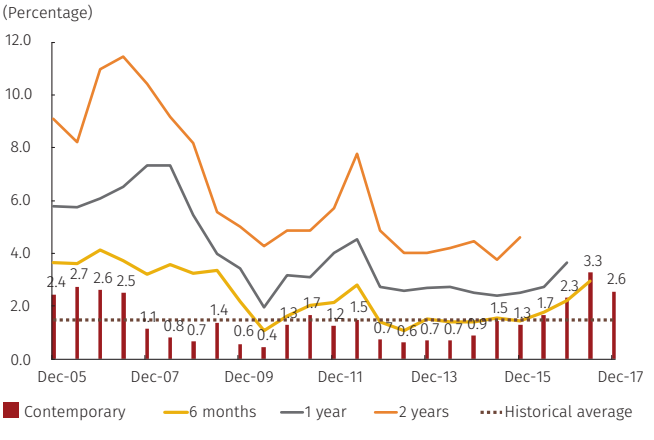
Sources: *Office of the Financial Superintendent of Colombia* and *Banco de la República.*

Graph 2.22
QRI by Static Pool Analysis

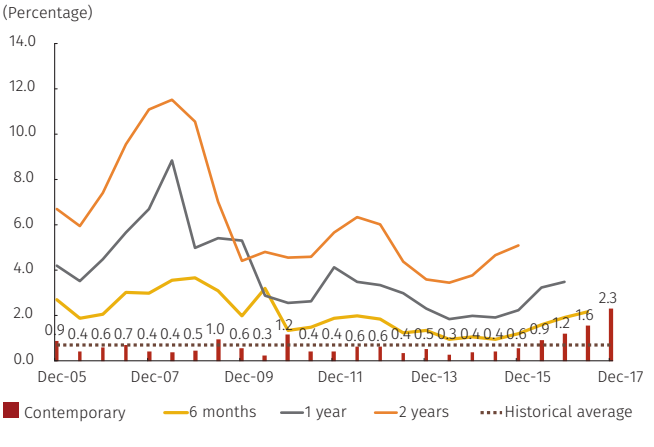
A. Mortgage Outstanding



B. LIH



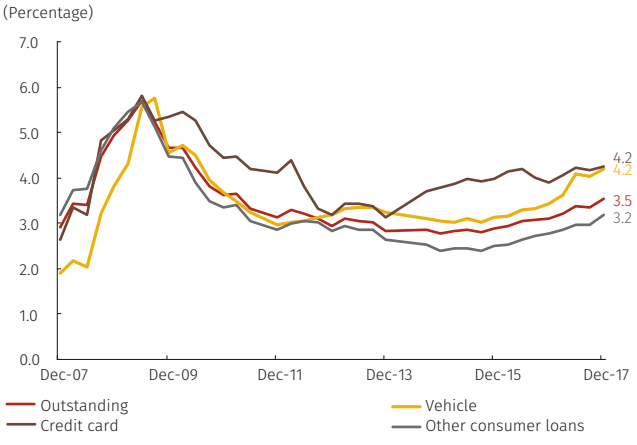
C. Non-LIH



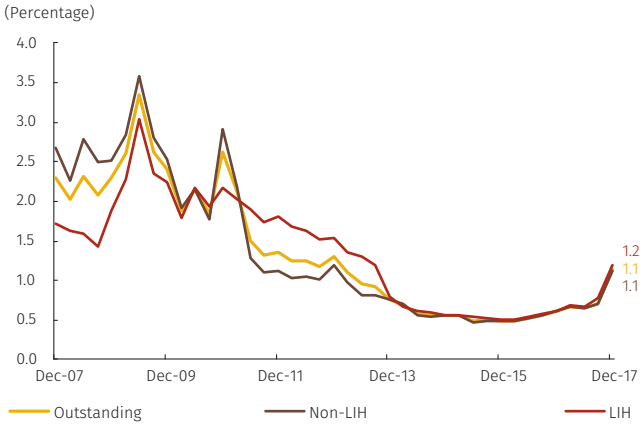
Sources: *Office of the Financial Superintendent of Colombia* and *Banco de la República.*

Graph 2.23
Risk Perception Indicator by Rating

A. Consumer Portfolio

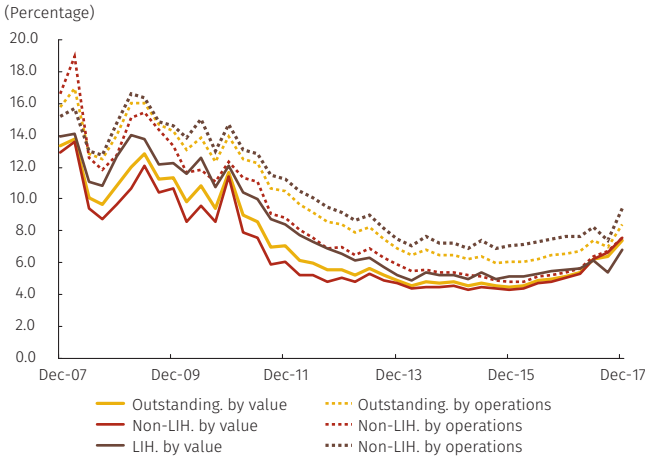


B. Mortgage Portfolio



Sources: *Office of the Financial Superintendent of Colombia* and *Banco de la República.*

Graph 2.24
Weighted Indicator of Migrating to a Lower Rating, Mortgage Portfolio



Sources: *Office of the Financial Superintendent of Colombia* and *Banco de la República.*

this portfolio allows to deduce that, along with the higher materialization of credit for the non-LIH segment, there is a greater perception of risk for this type of loan.

As for the RPIR, which was defined in the previous subsection, both the consumption outstanding and the different modalities, with the exception of credit cards, are still showing a growth trend. The largest change was registered by the vehicle portfolio, which went from 3.4% to 4.2% during the past year (Graph 7,). The RPIRfor housing loans showed a more pronounced rise over the last six months as it went from 0.6% to 1.1%. Notwithstanding the indicator for this loan portfolio remains below its historical peaks (Graph 7, panel B).

The weighted indicator of migrating to a worse rating for the mortgage portfolio has exhibited a growth trend over the last year (Graph 8). This performance has also been presented by segments where the indicator based on value has risen more for the non-LIH loans, while the indicator based on operations has risen more for LIH loans. This indicates that the loans for larger amounts are the ones that are deteriorating the most in the first segment while those for smaller amounts are the ones that deteriorated the most in the second.

The adverse macroeconomic environment has also affected the creditworthiness of households and this has been reflected in an increase in their financial burden indicator.

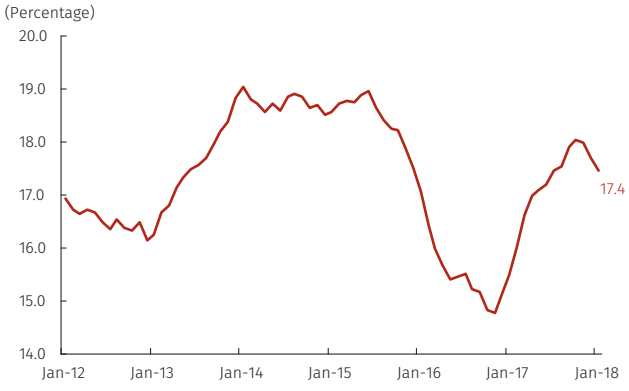
Between January 2017 and 2018, the debt-service-ratio (DSR),[30] defined as the ratio of debt service payments (principal and interests) and income, rose as it went from 15.5% to 17.4% (Graph 9, panel A). Of this percentage, the DSR associated with consumption is 14.1% while the remaining 3.4% corresponds to housing.

30 This indicator is built based on the information from the Survey of Financial Burden and Financial Education (lefic in Spanish) elaborated by *Banco de la República* and DANE. The indicator is constructed using a moving average of 12 months, given its volatility.

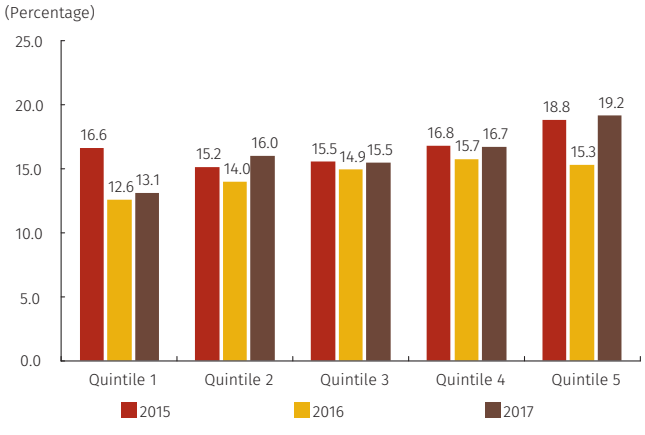
The rise in the indicator has mainly resulted from the income adjustment that households have been experiencing in the current macroeconomic environment, as well as for an increase in debt payments. By income quintile, the highest increases in the DSR were registered for quintiles two and five which accounted for approximately 67.6% of the debt[31] (Graph 9, panel B). Nevertheless, the DSR for Colombia is well below the levels of risk (30%) and vulnerability (40%) considered by the International Monetary Fund.

Graph 2.25

A. DSR, 12-Month Moving Average



B. DSR by Income Quintiles



Sources: *Banco de la República and DANE.*

2.3 Market Risk

The fixed income market presented valuations between September 2017 and March 2018. This has been driven mainly by decreases in inflation and the consequent change in the local monetary policy rate.

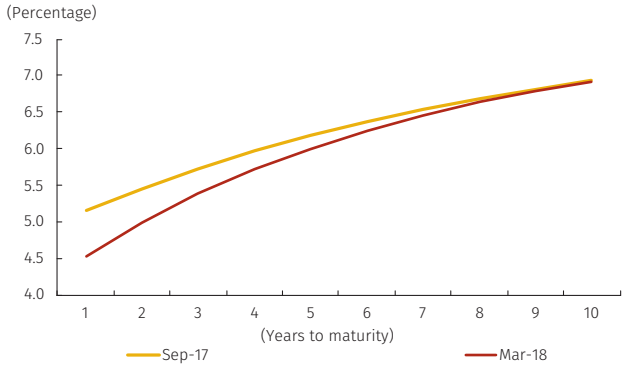
The yield curves of the public debt market experienced valuations between September 2, 2017 and March 26, 2018, when there was a steep decline in the rates of the short and medium tranches. In particular, at the analysis date the points of the TES curve in pesos at one and five years decreased by 62 and 18 bp, respectively. In the case of securities denominated in UVR, the decrease was observed only in the short tranche, where the one-year rate fell 94 bp in the same period (Graph 2.26). The main driver of this increase in valuation was the fall of the inflation rate during the period of analysis and the consequent decrease in *Banco de la República's* intervention rate. Since inflation expectations are anchored and annual inflation continues its process of convergence to the target, the market expects stability in the intervention *Banco de la República*'s rate during the coming months, so no additional valuations are expected in this market derived from the behavior of this rate (Graph 2.27).

The private debt market registered a performance similar to that of public debt denominated in pesos, to the extent that the determinants of the behavior of public debt affected the performance of corporate securities.

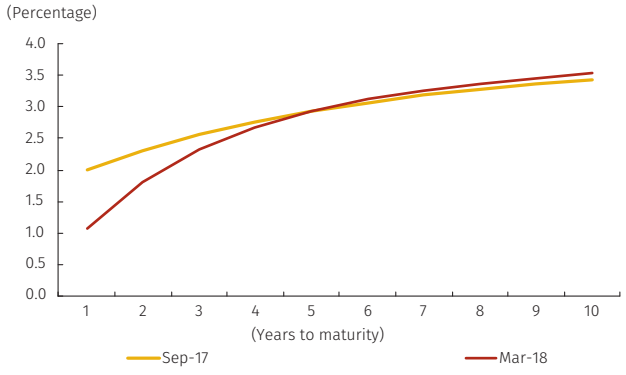
31 By quintiles, the distribution of debt is as follows: quintile one: 1.9%; quintile two: 6.3%; quintile three: 9.6%; quintile four: 20.8%; quintile five: 61.3%

Graph 2.26
Zero-coupon TES Curve

A. Colombian pesos

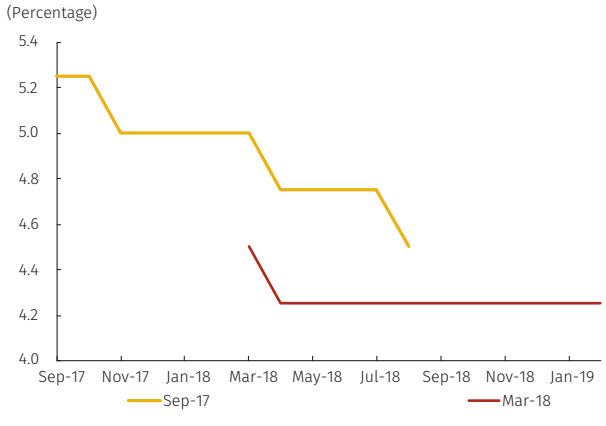


B. UVR



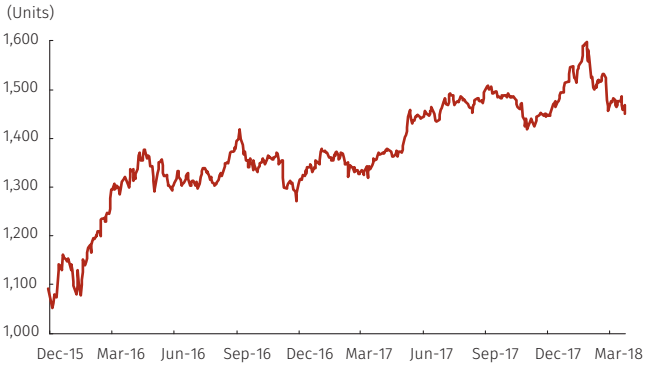
Source: Infovalver, calculations by *Banco de la República*

Graph 2.27
Implicit Monetary Policy Rate Expectations



Source: Bloomberg; calculations: *Banco de la República*

Graph 2.28
Behavior of Colcap



Source: *Colombia Stock Market* and Bloomberg

Meanwhile, the variable income showed a significant growth between November 2017 and January 2018, in contrast there was a fall from January to March. The latter caused the return of the Colcap to the levels that it had at the beginning of the period.

Between September and March, the price of the equity market, measured with the Colcap index, showed a devaluation of 2.5% in the analysis period (Graph 2.28). This decrease was accompanied by high volatility due to the valuations presented between November 2017 and January 2018 in shares of the energy sector, and the fall in the share price of the telecommunications, raw material and financial sectors between January and March (Table 2.2).

This fall was due to two factors. On the one hand, as noted in the Financial Stability Report of September 2017, the financial sector was showing weaknesses in the credit risk and profitability indicators. On the other hand, the higher expectations of increases in the interest rate of the Fed, led the international stock markets to a general decline in the prices of their securities.

Due to the previously explained context, volatility in the equity market increased, reaching its maximum value since the first half of 2016 (Graph 2.29)[32].

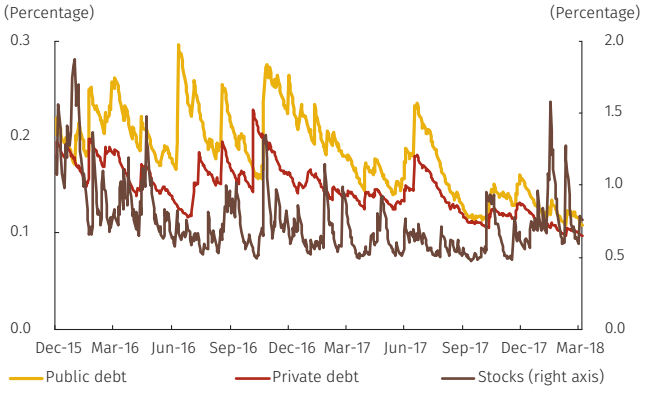
32 Volatility is calculated using a GARCH (1,1) model. Daily returns of the Colcap index were used in the case of variable income, while for fixed income, the daily differences of the first principal component of each curve were used.

Table 2.2
Breakdown and Appreciation

Sector	Share (percentage)	Appreciation[a/] (percentage)
Financial	44,7	-10,9
Utilities	16,1	-15,5
Consumption	14,4	-1,5
Industrial	13,8	85,1
Energy	9,5	-1,4
Raw Materials	1,3	1,4
Communications	0,1	-22,3

a/ Between March 3rd and September 4th
Source: *Colombia Stock Market* and Bloomberg; calculations: *Banco de la República.*

Graph 2.29
Conditional Volatility of Fixed and Variable Income Markets



Source: *Colombian Stock Market* and Infovalmer, calculations by *Banco de la República.*

This increase implies a higher market risk due to the increase in the uncertainty in the price of this type of securities. Meanwhile, the volatility of the price of private debt securities and public debt remains stable at levels that were not observed since the end of 2015.

The main exposure to market risk by financial institutions is concentrated in the fixed income market.

Exposure to fixed income and equity markets, measured as investment in securities exposed to market risk, is concentrated in fixed income securities, where the public debt market represents the largest share[33]. However, insurance companies have a greater investment in private debt securities, which is why the aggregate of the NBFIs shows greater exposure to this market. For credit institutions, the highest share is found in the public debt market, with banks being the type of entity with the highest investment in this type of securities (Table 2.3).

In the future there are risks that, if materialized, can affect the health of the financial system. On the one hand, as mentioned in chapter 1, there are expectations of increases in the Fed rate for the remainder of the year. If this is materialized in a sudden and unexpected way, it could lead to a liquidation of foreign positions that would generate devaluations in the securities of the fixed income markets. On

33 This figure was calculated at market prices and according to the guidelines of the Basic Accounting and Financial Circular. For the equity instruments of national issuers, the balance in shares was analyzed, while for debt securities the negotiable and those available for sale were analyzed.

Table 2.3
TES (in Colombian pesos and Real Value Units, UVR), Private Debt Securities and Stocks Exposed to Market Risk

Type of entity	TES[b/]	Private debt	Total	Total	TES	Private debt	Total	Total
	(trillions of Colombian peso balance)				(variación porcentual últimos seis meses)			
Credit institutions	41.82	4.73	6.10	52.66	9.94	11.48	6.42	9.65
Commercial banks	38.77	4.41	0.00	43.17	10.11	9.56	0.00	10.06
Financial corporations	3.05	0.25	6.10	9.40	7.73	88.38	6.43	8.08
Financing companies	0.01	0.05	0.00	0.06	41.24	-14.45	-1.69	-10.75
Financial cooperatives	0.00	0.03	0.00	0.03	0.00	-11.42	0.00	-11.42
Non-banking Financial Institutions	8.17	11.27	6.05	25.50	21.15	3.60	4.76	1.38
Pension fund managers: proprietary position	0.22	0.65	0.09	0.95	51.82	3.36	-8.81	9.90
Stock brokerage firms: proprietary position	2.07	0.24	0.27	2.58	13.80	-8.58	54.34	14.29
Trust funds: proprietary position	0.21	0.27	0.80	1.28	80.26	10.77	10.54	18.02
Insurance Companies	5.67	10.11	4.89	20.68	21.62	3.76	2.37	7.75
System: proprietary position	49.99	16.01	12.16	78.16	11.63	5.81	5.59	9.42
Third-party Position								
Stock brokerage firms: third-party position	1.00	9.68	5.90	16.58	-7.10	1.53	5.25	2.25
Trust companies: third-party position a/	91.50	38.94	20.03	150.47	14.27	10.42	-11.38	9.08
System	142.49	64.63	38.09	245.20	13.15	7.84	-4.11	8.70

a/ Does not include pension liabilities managed by trust companies.
b/ The value for the proprietary position is obtained from form 351 "Investment portfolio," while the managed position is obtained from DCV data.
Sources: *Depósito Central de Valores* (DCV) (Central Securities Depository), *office of the Financial Superintendent of Colombia*; calculations by *Banco de la República*.

the other hand, a weak macroeconomic performance of the country could translate into lower valuation of the securities. Therefore, the risk of devaluation resulting from the above factors in the sensitivity exercise will be considered.

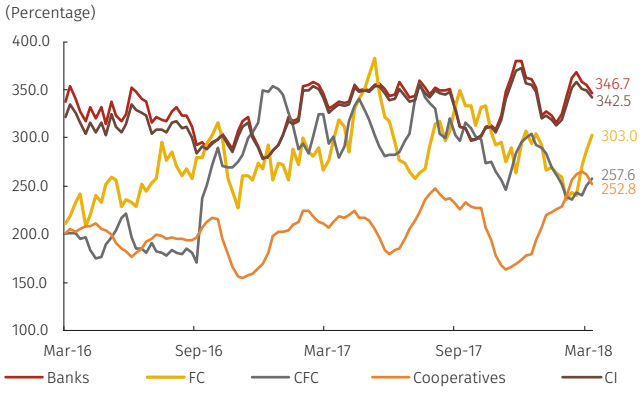
2.4 Liquidity Risk

The short-term liquidity of credit institutions (CI) increased during the last six months. Although a mixed performance was seen by type of institution throughout the period, in all cases the Liquidity Coverage Ratio exceeded the regulatory minimum requirement.

As of March 2018, the Liquidity Coverage Ratio (LCR) for the CI was 380.9%,[34] higher compared to both the one registered six months ago (312.0%) and the average of the previous year (338.1%). This performance was mainly explained by an increase in the value of the liquid assets held by banks, due to the bullish move in bond markets. In contrast, the LCR for financing companies and financial corporations exhibited a downward trend since the second half of 2017 (Graph 2.30).

When assessing liquidity by entity, all of them are found to maintain adequate LCR levels, although 8.0% of the CI reported a LCR close to the regulatory minimum relative to its volatility.[35]

Graph 2.30
Liquidity Coverage Ratio (LCR) of the CIs[/a]

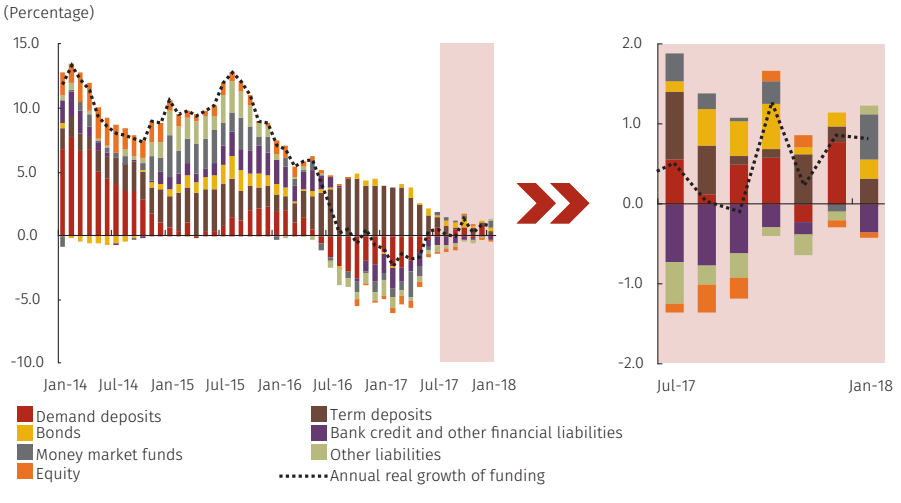


a/ average that assigns greater weight to the most recent data
Source: Office of the Financial Superintendent of Colombia; calculations by *Banco de la República.*

In terms of structural liquidity, CI's funding has continued to expand at moderate pace, as of January 2018.

Graph 2.31 presents the real annual growth rate of funding for CI differentiated by source (liabilities and equity). In January 2018, the growth rate was 0.8%, which was slightly higher than the rate of 0.5% observed six months ago.

Graph 2.31
Annual Real Growth of Credit Institution Funding (Liabilities and Equity) and its Contribution by Component



Note: other liabilities correspond to: bank acceptances and derivatives outstanding, capital contributions, banks and correspondent banks liabilities, convertible bonds (BOCAS for its Spanish acronym), mandatory convertible bonds (BOCEAS for its Spanish acronym), term deposit certificates with issuance maturity less than one month (CDAT for its Spanish acronym), payable accounts, electronic deposits, other deposits and liabilities, labor-related liabilities, loan-loss provisions and debt collection services.
Source: Office of the Financial Superintendent of Colombia; calculations by *Banco de la República.*

34 This value is the highest one registered since mid-2013 when the LCR reached 388.4%.

35 An entity is considered to have an LCR level close to the regulatory minimum relative to its volatility, if its actual indicator is less than one median deviation from 100%.

Notwithstanding financing expansion growth has moderated since mid-2017, it showed signs of recovery in January 2018 respect to the same month of the previous year. This was in response to the increase in both demand deposits and liabilities of the money market funds. In contrast, the contribution made by term deposits have diminished compared to the levels observed during 2016 and mid-2017, in spite of the positive growth rates registered during the analysis period. This is in line with the fact that the outstanding of these types of deposits remained stable throughout the period (Graph 2.31).

Although term deposits have been exhibiting a smaller contribution to CI's funding since the end of 2016, the issuance of these securities rebounded in the last quarter of 2017.

The issuance of term deposit certificates (CDT) by the CIs with maturities longer than six months picked up in the last quarter of 2017, reversing the downward trend that had been observed since mid-2016. Regarding to the CDTs issued for shorter maturities, the issuances remained relatively stable over the period (Graph 2.32, panel A).

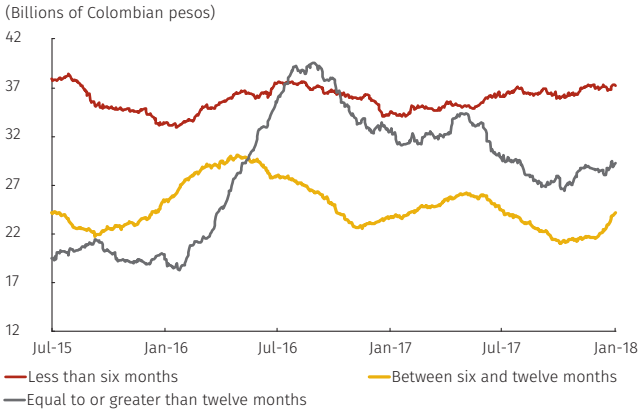
On the other hand, the outstanding of CDT issued with maturities longer than 12 months remained relatively stable, while the outstanding of CDT issued for shorter maturities continued to decline (Graph 2.32, panel B).

However, the growth of demand deposit accounts in CI has recovered compared to the first half of 2017 for the most representative counterparts.

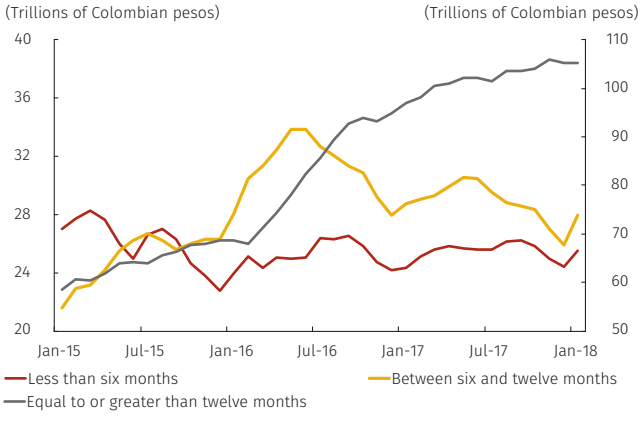
As of December 2017, annual growth rates of demand deposits of the public sector, institutional clients (proprietary and managed), and real sector were 11.4%, 7.7%, and 5.9% respectively, in real terms. This contrasts with what was seen six months ago when the deposits of these agents grew at rates of -6.7%, 0.6%, and 2.8% respectively. Given that approximately 72.3% of the total demand deposits belong to these types of clients (Graph 2.33), their performance had an influence on the growth observed in this category of funding during the analysis period. In

Graph 2.32
Evolution of Term Deposit Certificates (CDT) of Credit Institutions

A. Issuance of CDT by Maturity (six-month cumulative)

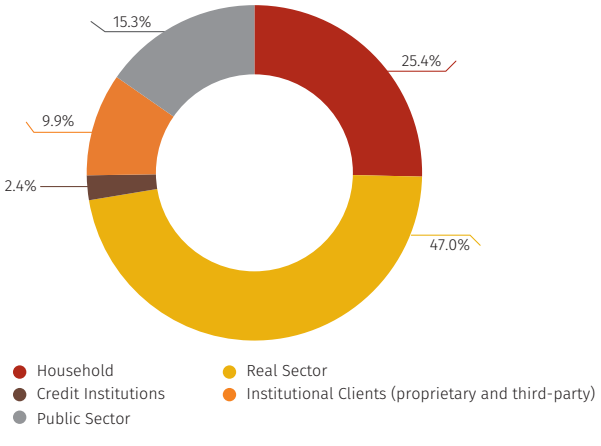


B. CDT Outstanding by Maturity



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

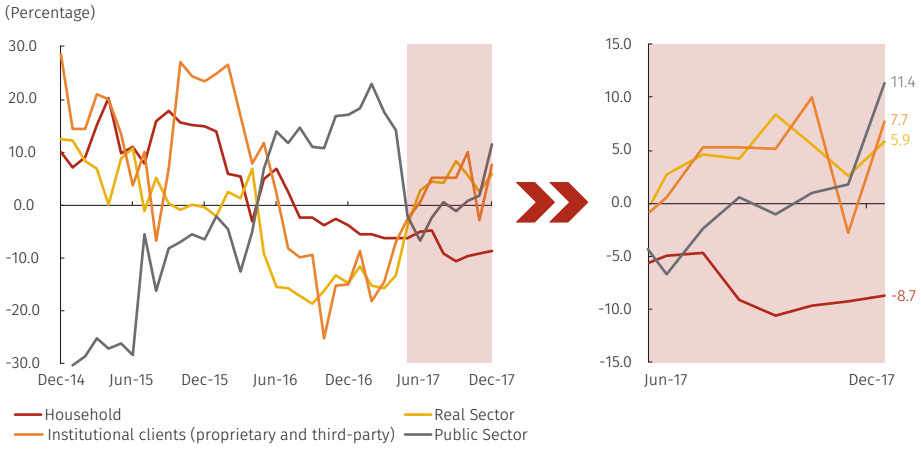
Graph 2.33
Demand Deposit Counterparty Structure, December 2017



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

contrast, deposits of individuals continued the downward trend seen since August 2016, and as of December 2017, they showed a reduction of 8.7% in real terms, 3.2 pp less than the growth reported in the same month of the previous year (Graph 2.34).

Graph 2.34
Real Annual Growth Rate of Demand Deposits in CIs



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

2.4.2 Banking Book Interest Rate Risk

The structure of the interest rates of the credit institutions balance sheet is analyzed in this section as is their exposure to the interest rate risk.[36] The measurement of this risk seeks to estimate how changes in the interest rates for assets and liabilities affect the net interest income.

Between September 2017 and March 2018 the share of both variable rate assets and variable rate liabilities remained relatively constant...

Between September 2017 and March 2018 the CIs registered a ratio of assets contracted at variable rates that fluctuated around 48.4% and stood at 48.2% at the end of that period (Graph LB1, panel A). Among these, those anchored to the DTF continued the downward trend exhibited since 2015 and went from 25.3% to 23.9% during the period under analysis. The assets indexed to the Banking Benchmark Indicator (BBI), in turn, continue to gain a larger share, which went from 10.3% to 12.1% during those six months. Likewise, the share of

36 This risk has two dimensions: the first is the one that is analyzed in the section on market risk and refers to the risk of devaluations of the assets in the trading book in the event of interest rate movements; the second, which is analyzed in this section, corresponds to the impact of interest rate changes on the net interest income of institutions based on the information in the banking book.

liabilities agreed at variable rates[37] fluctuated around 52.0% (Graph LB1, panel B). In this case, the ratio of liabilities anchored to the BBI fell, going from 4.8% to 4.4%. This is similar to the situation for the ratio of liabilities indexed to the DTF which went from 4.7% to 4.0% during the period under analysis.

Among the variable rate assets, note that the ones indexed to the DTF rate are those with the largest position in the total assets (23.9%), followed by those linked to the BBI (12.1%), and to the UVR (5.4%). With respect to variable rate liabilities, the demand deposits belonging to corporations, official entities (31.2%), and those linked to the CPI (9.9%) stand out (Graph LB2).

...and exposure to the interest rate risk in the banking book registered a stable performance.

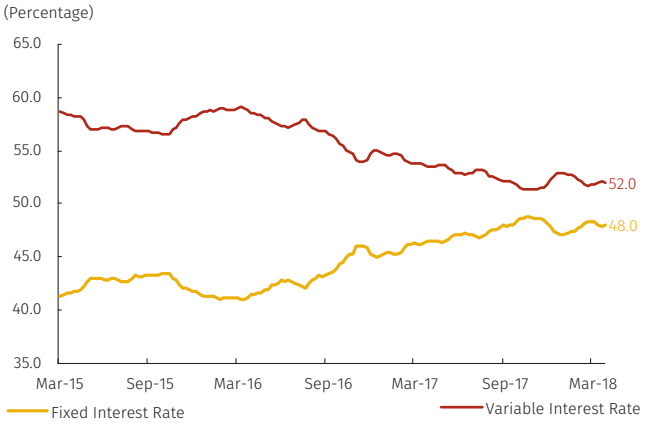
To measure the exposure to the banking book interest rate risk, the *WATM gap* indicator was calculated. This is defined as the difference between assets and liabilities that are sensitive to changes in interest rates. When this indicator takes on a negative value, it means that an increase of the same magnitude in lending rates and deposit rates would generate a reduction in the net interest income. This measurement of interest rate risk depends primarily on two factors: 1) the proportion of variable rate assets and liabilities, and 2) the maturity of fixed-rate assets and liabilities.[38]

The *WATM gap* was calculated for different time horizons between March 2015 and March 2018. The indicator generally presents a negative value for all of the periods analyzed. Between September 2017 and March 2018, the performance in the gap was stable for all the time horizons which indicates that the institutions had not registered a change in their exposure to this risk (*Graph LB3*).

Graph 2.35
Evolution of Assets and Liabilities by type of Interest Rate

A. Assets

B. Liabilities



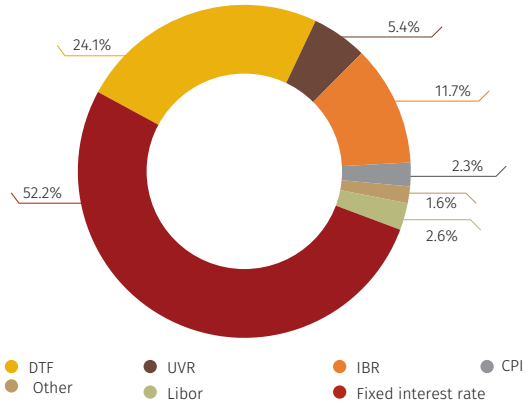
Source: *Office of the Financial Superintendent of Colombia (FSC)*; calculations by *Banco de la República*.

37 Among the liabilities contracted at variable rates, demand deposits belonging to individuals are not included since these have limited elasticity with respect to changes in the monetary policy stance. Therefore, these liabilities are incorporated into fixed-rate liabilities.

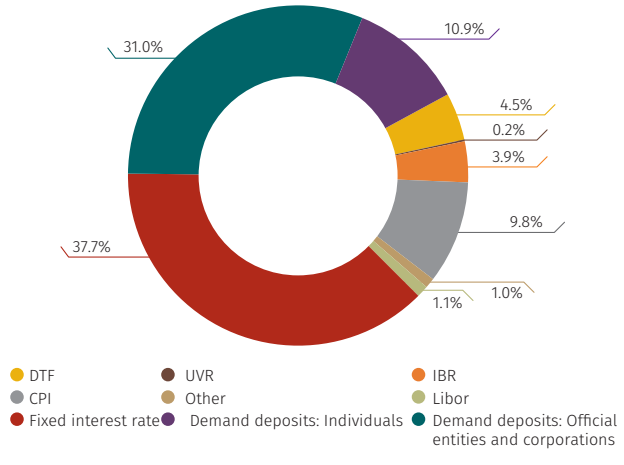
38 For more detail on the calculation of the WATM Gap, see the box "Interest Rate Risk of the Colombian Credit Institutions Banking Book" in the September 2015 *Financial Stability Report*.

Graph 2.36
Breakdown of Assets and Liabilities by type of Interest Rate
(August 2017)

A. Assets

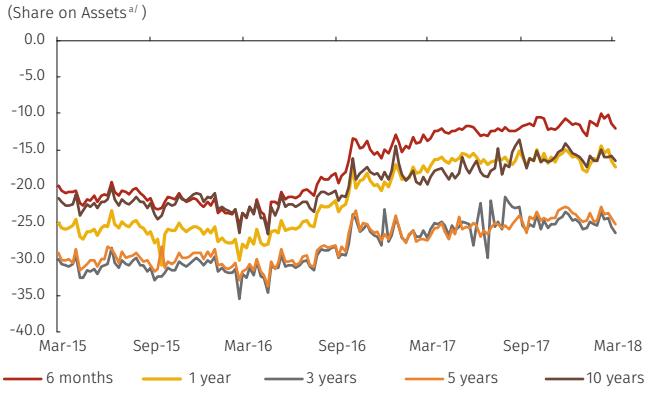


B. Liabilities



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

Graph 2.37
WATM Gap



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

Box 3

Relationship between the Macroeconomic Variables and the Yield Curve of the TES Denominated in Pesos and in UVR for a Stress Test

Oscar Fernando Jaulín
Eduardo Yanquen*

The yield curve of the public debt market shows the relationship between the interest rate paid by a government zero-coupon bond and the maturity of that bond. In the international literature, studies have modeled this relationship based on three factors: level, slope, and curvature. These elements are related to the trends of some external factors such as the macroeconomic environment, the agents' interest rate expectations, changes in the agents' preferences for liquidity, and the perception of risk in this market.

In order to introduce the effects that some macroeconomic variables have on the patterns of yield curves within the framework of the SYSMO (Gamba et al., 2017), this box proposes a model by means of which a yield curve is built. This construction is consistent with a hypothetical and adverse performance of the economy, such as the one described by the DSGE model of the SYSMO.

Empirical strategy

The paper by Diebold and Li (2006) uses the following theoretical expression to estimate the three factors of the yield curve:

$$y_t(\tau) = \beta_{1t} + \beta_{2t}\left(\frac{1-e^{-\lambda t\tau}}{\lambda_t\tau}\right) + \beta_{3t}\left(\frac{1-e^{-\lambda t\tau}}{\lambda_t\tau} - e^{-\lambda t\tau}\right)$$

Where $yt(\tau)$ is the rate that a zero-coupon bond pays at maturity τ, β_{1t}, represents the level, β_{2t} the slope, β_{3t} the curvature, and λ_t is an adjustment parameter[1]. This expression is the same one used by Infovalmer® to calculate the prices of bonds on the public debt market in Colombia. As a result, the level, slope, and curvature data used in this exercise correspond to the parameters provided by Infovalmer[2].

A VAR model is estimated to determine the relationship between these factors and the macroeconomic variables. The three factors, the annual inflation, and the interbank rate (TIB in Spanish) – used as an approximation of *Banco de la República* benchmark rate – are considered dependent variables in the model[3]. The VAR model is estimated using monthly data from August 2005 to December 2017 as set out in the following equation:

$$y_t(\tau) = \beta_{1t} + \beta_{2t}\left(\frac{1-e^{-\lambda t\tau}}{\lambda_t\tau}\right) + \beta_{3t}\left(\frac{1-e^{-\lambda t\tau}}{\lambda_t\tau} - e^{-\lambda t\tau}\right)$$

Where, $Vt = \{\beta_{1t}, \beta_{2t}, \beta_{3t}, \lambda_t, inflación_t, TIB_t\}$ are the coefficients to be estimated, ε_t is the error term, and P is the number of lags in the model chosen using the Hannan-Quinn information criterion.

Effects of the Macroeconomic Variables

Graph B1.1 shows the changes in the yield curves for both pesos and UVR as a product of a shock of two standard deviations in inflation and in the TIB. The results indicate that an inflation increase generates devaluations in the debt curve in both pesos and UVR. However, note that slight appreciations can be seen in the short term rates of the latter (Graph B1.1,

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

1 In this document, the coefficient associated with the slope of the curve is actually its opposite; therefore, the higher the value of the flatter the curve.

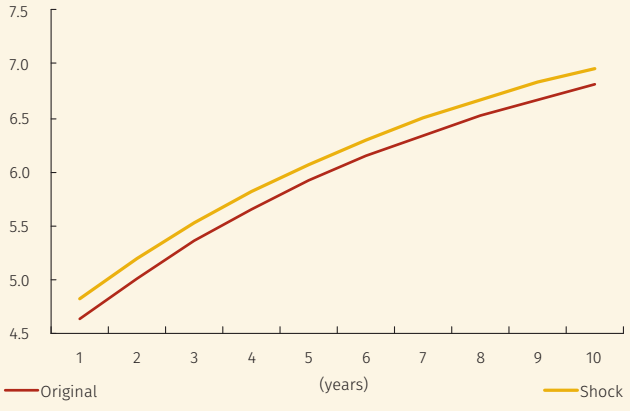
2 Melo and Castro (2010) use different methodologies to calculate the value of each factor. Thus, they find that the performance of each one is similar with respect to the different approaches.

3 The GDP is not included in the model. This is because there is a positive relationship between this variable and the level of the curve in pesos since the market expects rates to increase when the economic activity expands and vice versa when the growth of GDP decreases. However, it is recognized that, in a stress test, securities lose value in the case of an adverse scenario (which includes a macroeconomic deterioration).

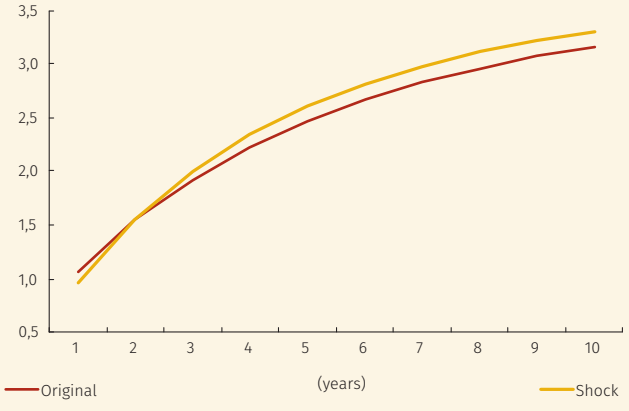
Graph B3.1
Response of Zero-coupon Curve to Shocks to Macroeconomic Variables

A. Inflation Shock

i. Pesos

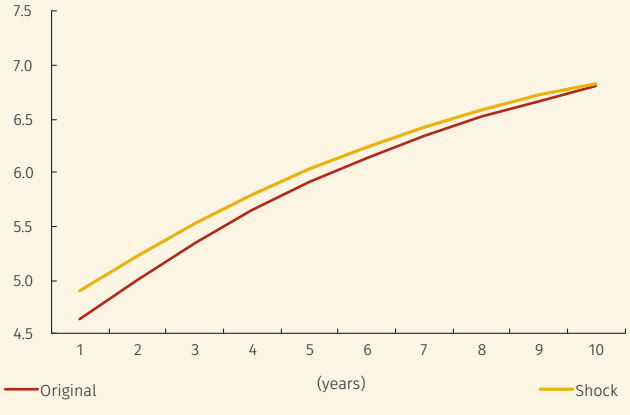


ii. UVR

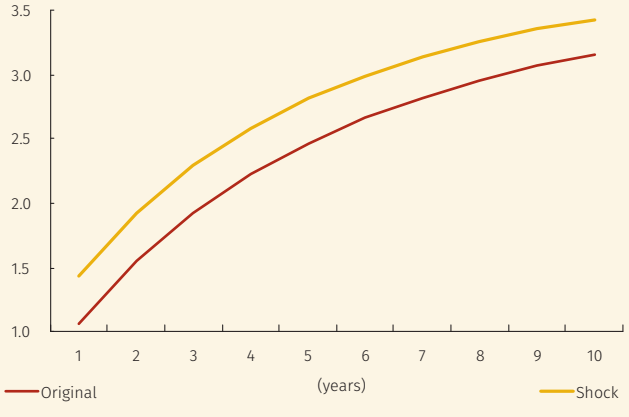


B. Shock to IBR

i. Pesos



ii. UVR



Source: Precia S.A., calculations by *Banco de la República*

panel A). Furthermore, in the presence of shocks to the IBR, the curve in pesos reveals a greater increase in the short term rates of the curve while the UVR curve shows an increase along its entirety (Graph B1.1, panel B).

These results make it possible to generate simulations of public debt markets that are consistent with a crisis scenario in which the banks would experience losses in the value of their investments because of a hypothetical macroeconomic deterioration. This model was included in the stress test presented in chapter 3 of this *Report*.

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Box 4

Long-Term Financing in Colombia

Juan Carlos Mendoza
Carlos Quicazán*

1. Introduction

Access to long-term financing is of the utmost importance for countries as it helps them to meet their infrastructure needs as well as their needs for innovation and investment in the private sector. In addition, it helps the different agents in the economy to ease their financial burden and allows them to improve their cash flow. In this box, changes in different long-term financing indicators for Colombia are analyzed, and they are compared to what has been registered in some Latin American countries.

2. Colombian case

Several indicators that illustrate the evolution of long-term financing in Colombia are presented in this section. They were chosen based on Beck (2016), which suggests several factors including the following: share of long-term loan portfolio (initial maturity greater than five years), percentage of adults who have housing loans, volume of bonds issued by the private corporate sector and the public sector as a share of GDP, and the balance of long-term public debt securities issued by the national government[1] (initial maturity greater of more than five years) that are held by foreign investors.

As shown in Graph B4.1, the long-term financing indicators analyzed revealed a rising trend during the 2010-2017 period. For example, the long-term loan portfolio went from 14.4% to 29.8% as a percentage of GDP[2]. This was accompanied by a higher proportion of adults with housing loans that went from 1.7% to 2.9% during the period under analysis. In addition, there has also been an increase in the balance of bonds issued by public and private companies as a share of GDP. Moreover, the balance of long-term government debt held by foreign investors as a percentage of GDP has increased significantly (while this ratio was 11.2% in 2010, it reached 20.7% in 2017).

The foregoing indicates that Colombia has made an improvement its long-term financing market during the period under study. This made it possible for home buyers as well as for long-term investment projects in the corporate sector to get more financing. Furthermore, there has also been an improvement in the financing for the public sector, which has facilitated the development of infrastructure and innovation projects. Last of all, these trends reflect a better supply of long-term financial instruments and, thus allows for the participation of foreign investors.

3. Long-term financing in Latin America

In order to compare the state of long-term financing in Colombia with respect to other Latin American economies, other indicators proposed by Beck (2016) were used.[3] Among the economies analyzed, Chile and Brazil are the ones that showed the best indicators, which is in line with the greater development of their financial systems. In regards to financing granted through bank loans, Colombia ranks third in the region. However, with respect to the indicators of financing through capital markets, Colombia ranks below Mexico, but above Peru and Argentina (Graph B4.2). In the case of the indicator of the balance of corporate debt securities as a share of GDP, in particular, Colombia is in the lowest position among the countries analyzed. This shows the limited depth of this market in Colombia.

4. Conclusions

According to Beck (2016), the development of long-term financing in an economy is sensitive to its macroeconomic stability as well as to having a reliable and effective institutional system. In addition, the regulations, the tax system, and the competitiveness are significantly important factors for the existence of a supply of long-term financing in any country. In the case of Colombia, given the extent

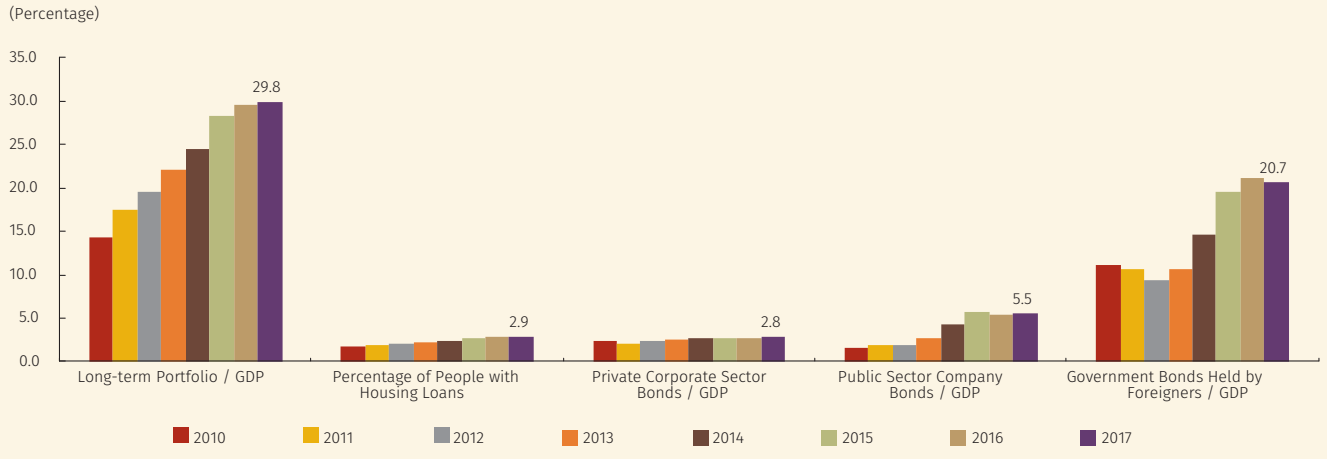
* The authors are part of the Financial Stability Department of *Banco de la República*. The views expressed are not binding on the Bank or its Board of Directors. Any persisting errors or omissions are the exclusive responsibility of the authors.

1 This calculation included both domestic and external debt.

2 With regards to the total loan portfolio, the long-term loan portfolio represented 62.9% as of December 2017. By type of credit, this percentage is 47.9% for the commercial loan portfolio, 74.9% for the consumer portfolio, 99.5% for mortgages, and 27.5% for microcredit.

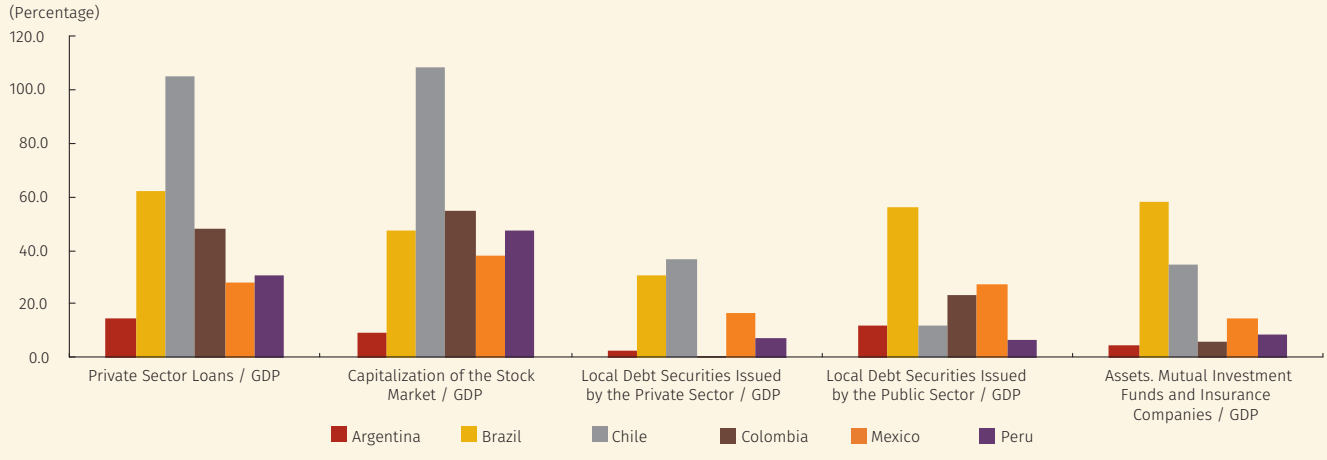
3 To make this comparison, the long-term financing indicators for Latin American countries during the 2010-2015 period that are available in the database of the World Bank (Global Financial Development Database) were used.

Graph B4.1
Change in Long-Term Financing in Colombia



Source: *Office of the Financial Superintendent of Colombia*, DANE, and *Banco de la República*

Graph B4.2
Long-Term Financing in Latin America



Note: The data on this graph are averages between 2010-2015
Source: Global Financial development database and World Bank

to which there have been improvements in the abovementioned aspects, there has been a positive evolution for this type of financing. However, there are opportunities to continue making progress in the development of long-term financing, especially in the capital market. Thus, it is advisable to keep working on improving the conditions to attract institutional investors that demand long-term assets and contribute to diversifying the supply of these types of resources.

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03

Stress Test

The structure and results of the biannual stress test that ***Banco de la República*** applies to CEs are described in this section. This test, known in the international literature as a stress test, seeks to measure the resilience of the ECs in the event of a hypothetical adverse scenario. The results suggest that aggregate capital ratios of the system would not be lower than regulatory limits in the scenario under consideration.

The stress test is a quantitative analysis that evaluates the resilience of CEs in the event of an unlikely, hypothetical adverse macroeconomic scenario. The results indicate that the impact of the scenario on the aggregate capital adequacy of the system would be of a relatively reduced magnitude.

Taking as a starting point the set of vulnerabilities for financial stability that have been identified throughout this *Report*, this chapter seeks to calculate the impact a hypothetical scenario would have on CEs. In this scenario, which starts in the first quarter of 2018 and continues until the end of 2019, the growth rate of the Colombian economy is assumed to be relatively low. The adverse scenario has been intentionally designed to reflect an extreme situation for the Colombian economy for the time horizon inasmuch as it incorporates a variety of shocks that are not very likely but would occur simultaneously. In this respect,

the results of the test do not constitute any kind of forecast of future changes in the Colombian economy. Rather, the results should be interpreted as a quantitative evaluation of the resilience of the entities in the event of an extreme scenario based on their current financial conditions and under restrictive assumptions. Likewise, the exercise assumes that the economic authorities respond to the macroeconomic stress but that there is no policy reaction to the deterioration of the entities' financial statements nor preventive measures based on the monitoring of their risk management which would presumably have made the impact of the averse scenario smaller.

The usefulness of the test lies in providing an estimate of the potential losses that would be seen if the extreme scenario were to materialize. Finally, the test helps shed light on the possible transmission channels by means of which the vulnerabilities identified could affect financial stability[39].

With respect to the aggregate indicators of total and core capital adequacy, the results indicate that no significant negative effects are likely to be observed given that they will probably remain at levels exceeding the regulatory limits during the horizon of the scenario. However, there are some negative effects on the portfolio and the aggregate profitability of the EC. This reflects the impact that the adverse scenario could have on the ability of the banking system to create credit and carry out its intermediation activity.

3.1 Macroeconomic Scenario and Materializing Risks

The trajectories of the main variables in the scenario take into account a rate of economic growth that is low and that extends throughout the horizon of analysis.

The stress test seeks to capture the effects of an adverse macroeconomic context that would imply an accentuated economic downturn during 2018 and 2019. The trajectories of the aggregate variables for the Colombian economy in such a scenario are constructed by using a general equilibrium macroeconomic model that assumes a reduction in aggregate demand that could be associated with either a hypothetically lower growth of trading partners or increased restrictions in international capital flows arising from potential disturbances in international financial markets. Under this assumption, the model predicts a lower-than-expected economic growth, a rise in unemployment, and

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

an increase in inflation[40]. At the same time, it is assumed that the lending rates will rise gradually to levels that correspond to the maximum historical *spreads* with respect to the policy interest rate.[41]

A hypothetical scenario of accentuated economic slowdown and high interest rates could entail, in a first stage, the materialization of some of the risks (credit and market) that CEs face. The endogenous response of CEs to the scenario could unleash the materialization of additional risks that, in a second stage, could have a direct impact on the financial statements of each entity (funding, liquidity, interest rate, and contagion risks).

Concerning credit risk, two elements are considered. First, the natural consequence of a macroeconomic deterioration would be for the default rates of economic agents to increase. The hypothetical trajectories of non-performing loans of all credit categories during the horizon are presented in Graph III.1.[42] Second, the exercise assumes that the adverse scenario would unleash a gradual two-level rating downgrade of the commercial loan portfolio of firms belonging to the construction sector (excluding public works), firms that have currency mismatches, and of the housing portfolio of households with arrears longer than 60 days.[43] In addition, given the idiosyncratic behavior of certain firms in the electrical and mass transportation sectors, displacement full downgrade of these debtors was included.[44]

Concerning market risk, two elements are considered. First, the macroeconomic trajectories of the hypothetical scenario generate shifts of the zero-coupon TES curve and the private fixed income curve. Second, the exercise assumes that the general deterioration of macroeconomic conditions would cause a gradual and permanent exit of foreign bond holders from the local public and private debt markets. As a result, additional shifts of the curve would be observed arising

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40 This macroeconomic scenario is constructed in such a way as to take into account the effects of feedback between the financial sector and the productive sector of the Colombian economy. The level of economic growth in the stressed scenario is determined by using a methodology that allows for the construction of a trajectory with a predetermined level of statistical confidence. For more detail on this methodology see Box 1.

41 The largest spreads of the commercial, consumer, housing, and microcredit loan portfolios were 760 bp (November 2016), 2060 bp (February 2003), 1350 bp (May 2004), and 3110 bp (August 2016) respectively.

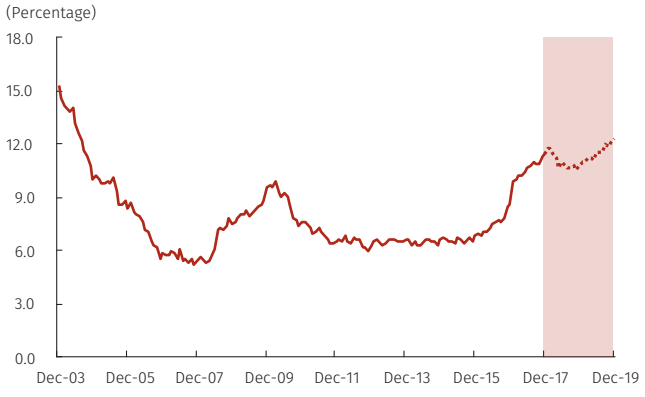
42 To establish these hypothetical trajectories, an autoregressive vector (VAR) model was used for the non-performing loans of each one of the portfolio categories.

43 With a cut off as of December 2017, the loan portfolio of companies belonging to the construction sector (excluding public works) represents 7.7% of the total commercial loan portfolio while the portfolio of firms with a currency mismatch amounts to 3.1%. The housing portfolio with loans in arrears for more than sixty days represents 4.6% of the total housing loan portfolio.

44 As of December 2017, the portfolio of these companies represents 1.6% of the total commercial loan portfolio. The exercise considers the fact that with the same date cut-off, CEs have loan-loss provisions for a little more than 48% of the total loan portfolio of these companies.

Graph 3.1
NPLs Trajectory by Credit Type

A. Commercial



B. Consumer

C. Mortgage

D. Microcredit

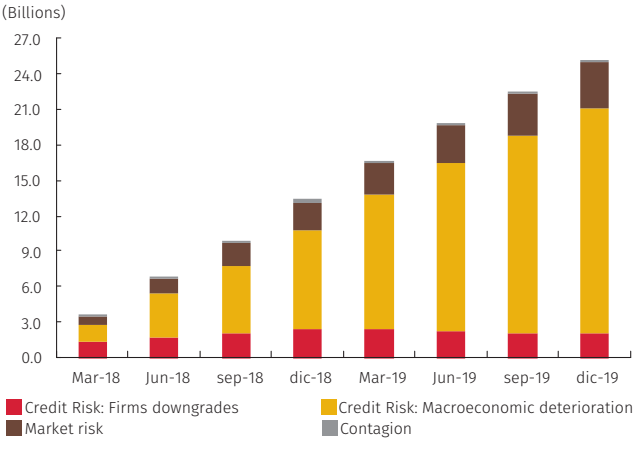
Source: Office of the Financial Superintendent of Colombia *(before December 2017); calculations by Banco de la República (from March 2018 to December 2019).*

from the liquidation of the entire portfolio on the part of foreign investors.

3.1.1 Results

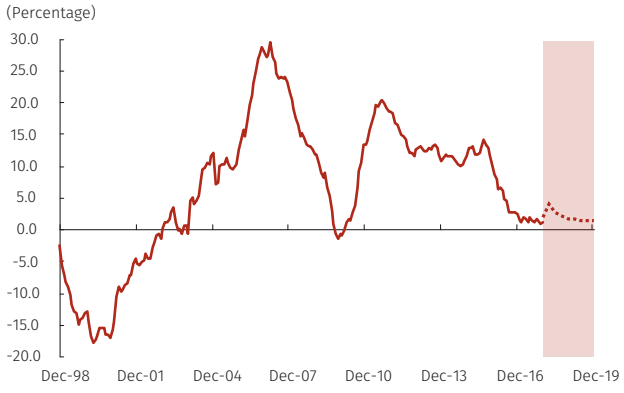
Graph III.2 presents the cumulative decline in profits that the CEs would experience in the adverse scenario as a consequence of the additional outlays on loan-loss provisions and the losses from the valuation of investments. Out of a total of COP 25.3 t at the close of 2019, COP 19.0 t would correspond to the overall (macroeconomic) deterioration in the quality of the CE loan portfolio, COP 2.1 t to the cost of loan-loss provisions caused by the downgrades of the portfolio granted to vulnerable debtors, COP 3.9 t to the losses due to materializing market risk, and COP 0.3 t to the losses generated by the materialization of the entity-to-entity contagion risk.

Graph 3.2
Reduction in Profits of Credit Institutions (cumulative)



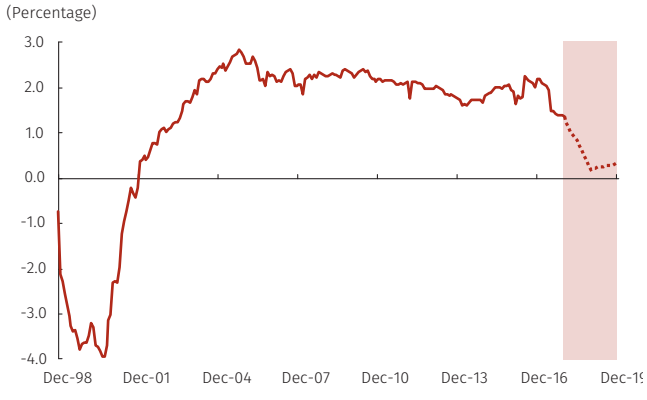
Source: Calculations by *Banco de la República*

Graph 3.3
Loan Portfolio Growth



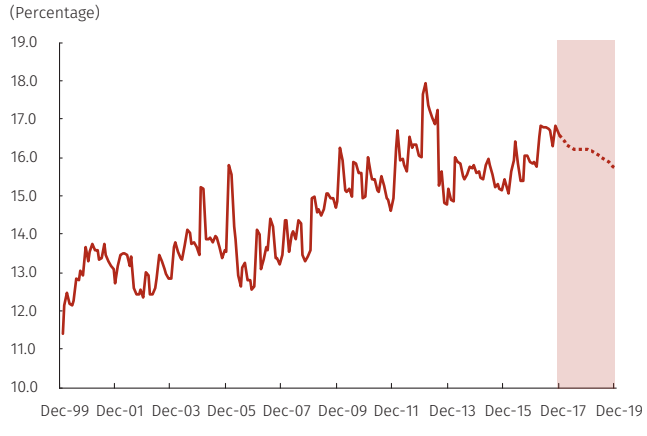
Source: Office of the Financial Superintendent of Colombia *(before December 2017); calculations by Banco de la República (from March 2018 to December 2019).*

Graph 3.4
Return on Assets (ROA)



Source: Office of the Financial Superintendent of Colombia *(before December 2017); calculations by Banco de la República (from March 2018 to December 2019).*

Graph 3.5
Capital Adequacy Ratio (Tier II)

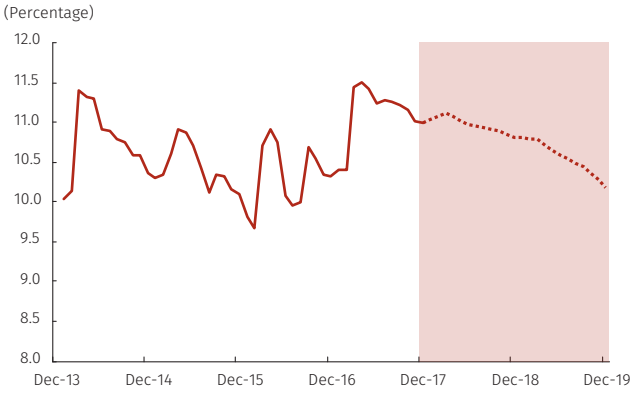


Source: Office of the Financial Superintendent of Colombia *(before December 2017); calculations by Banco de la República (from March 2018 to December 2019).*

Altogether, the trajectories of the aggregate variables of the CEs would change in the stressed scenario according to what is shown in Graphs III.3 to III.6. The shaded area corresponds to the horizon of the exercise. The real, annual growth of the loan portfolio would probably remain at low levels (see Graph III.3), this would be consistent with greater sluggishness of aggregate liabilities in the hypothetical macroeconomic scenario. Lower profits, in turn, caused by the materialization of risks would bring about a decrease in the ROA of CEs. ROA would fall from 1.4% to 0.2% between December 2017 and December 2019 (see Graph III.4). This fall illustrates the relative severity of the stressed scenario on intermediaries. As a consequence of lower profits, the ratio of the Core and Tier II capital adequacy would experience a slight reduction, although both would remain well above the corresponding regulatory minima (see Graph III.5 and III.6).[45] The main source of the fall in capital adequacy is the lower profits resulting from the higher expenditures that arise from the crystallization of the CE risks in a context of low asset growth.

Finally, even though the aggregate indicators of the CEs may not have presented high levels of deterioration in the scenario under study, the results per entity are mixed (see Graphs III.7 and III.8). With regards to ROA, CEs with a negative indicator would go

Graph 3.6
Core Equity Tier I Ratio

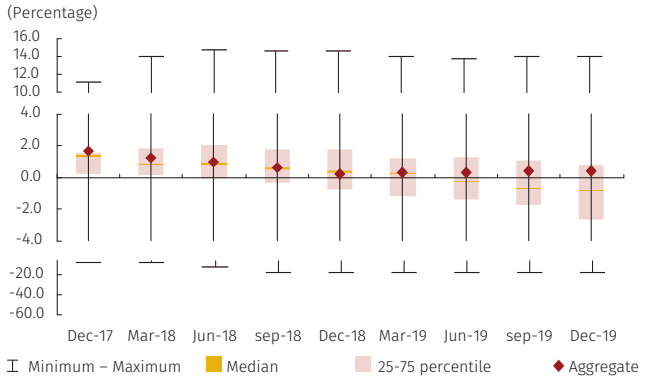


Source: Office of the Financial Superintendent of Colombia *(before December 2017); calculations by Banco de la República (from March 2018 to December 2019).*

45 The calculation of the capital adequacy ratio excludes the intangible assets from the equity in order to consider only those components of capital with the capacity to effectively absorb losses.

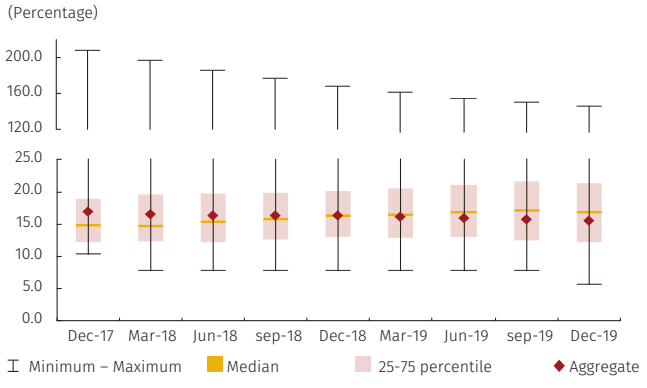
from representing 5.4% to 52.2% of the total assets in the system over the course of the analysis horizon. In the case of total capital adequacy, the stressed scenario would cause some entities to register levels below the regulatory minimum (these entities would represent less than 5.3% of the total CE assets).

Graph 3.7
Distribution of Return on Assets



Source: Office of the Financial Superintendent of Colombia *(before December 2017); calculations by Banco de la República (from March 2018 to December 2019).*

Graph 3.8
Capital Adequacy Ratio Distribution



Source: Office of the Financial Superintendent of Colombia *(before December 2017); calculations by Banco de la República (from March 2018 to December 2019).*

3.1.2 Final Comments

The results of the exercise suggest that in spite of the severity of the hypothetical macroeconomic scenario and the consequent reduction in profitability and in the ability to create credit, the majority of CEs would be able to keep their aggregate indicators of Tier II and Core capital adequacy above the regulatory minima. This reflects the current resilience of the entities in the event of a macroeconomic scenario like the one described above.

As has been discussed, the stress test presented in this section is built on the basis of a set of assumptions that, by incorporating various shocks that occur simultaneously, reflect an adverse situation and one that is very unlikely for the Colombian economy. For one thing, it assumes that economic authorities do not take action in response to the deterioration of the CEs' financial situation. Likewise, CEs' shareholders are presumed to be excessively passive in the sense that they only capitalize profits without taking any other kind of strategic initiative to face financial stress.[46] If shareholders do take any of these actions, the size of losses to the system would be expected to be cushioned so that the impact of the adverse scenario would presumably be smaller. Finally, the starting point for the analysis is capital adequacy at the individual (not consolidated) level. Presumably, the results at the consolidated level may differ from those presented here.

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

04

Financial Regulation

In this chapter, a summary is given of the new measures and local regulatory changes published between September 2017 and March 2018 that could have an impact on the financial system's performance or possible implications for financial stability.

FSC External Circular 031/2017: implementation of the Stress Test (ST) and the information report on the results

Two groups of entities were created through this circular in order to differentiate the scope of implementation of the stress tests. Group 1 includes commercial banks with assets that are greater than 2% of the banking sector while group 2 includes the remainder of the banks and other types of credit institutions. Within their stress testing, entities in group 1, in particular, will be required to include more detailed and comprehensive estimates than those in group 2. For example, while group 1 is required to include liquidity, credit, and market risks in their stress test, group 2 must include the first risk listed and choose one of the two latter risks based on their business approach (loan portfolio or investments).

Likewise, the external circular establishes some estimates that are more simplified within the calculations for each one of the above-mentioned risks for group 2. Furthermore, some of the guidelines for analyzing the liquidity risk were modified in order to do the quarterly estimate of that risk during the first year forecast. In addition, the sections that must be included in the qualitative report that entities are required to submit each

year are established. Last of all, the FSC granted an extended period for the entities in group 2 to carry out the stress tests. While group 1, which began to present their results in 2016, must continue to submit their tests annually, the entities in group 2 shall submit their report for the first time in September 2018 using information from December 2017.

Resolution 2215/2017: operating manual for the Registry of Electronic Invoices (Refel in Spanish)

This resolution gives instructions on the operating the Registry of Electronic Invoices (Refel) in order for this market to be implemented as one that is open and transparent. It shall comply with the objective that the organization of the registry be based on the criterion of the identity of the member parties to the circulation of the invoice. This resolution establishes that to get access to consultation services or registration of Refel one shall electronically create a user account. In it the individual shall provide the personal data of the interested party and some support documents so that the system can verify the identity of the user. On the inscription form, one should choose one of the following options for the electronic invoice: direct negotiation, electronic endorsement, electronic mandate, or bill. In addition, it shall be specified whether or not the registered invoice may be a Secured Transaction. The Refel shall verify that the registered electronic invoice corresponds to the unique code in the information services of the National Revenue and Customs Bureau (DIAN in Spanish). Once this process has been carried out, the Refel shall notify the parties involved of the registered invoice.

The resolution defines the following agents as users of the registry: the issuers of the electronic invoice, technology providers who act on behalf of issuers, purchasers, potential purchasers, electronic trading systems, legitimate holders, and buyers. Depending on the type of user, these agents will be able to get access to the Refel information consulting services.

Included among the Refel operations in relation to inscription is the assignment of the Unique Electronic Invoice Code to the registry, the implementation of suitable mechanisms for communication with the users of the registry, the conservation of the history of the file system for at least ten years, and the issuance of information certificates regarding the electronic endorsements and mandates at the request of the issuer of the invoice. In a case where the proper administrative and judicial authorities place a limitation on the circulation of an electronic invoice, the Refel shall be responsible for modifying the status of the invoice to block the trade. Last of all, the resolution states that Refel shall be supervised by the Superintendent of Industry and Commerce and shall be subject to two annual audits.

Decree 1756/2017: foreign investment funds

Due to the fact that mutual investment funds are important mechanisms used to expand access to securities markets for all types of investors and

that integrating the markets of these types of funds into different jurisdictions offers various benefits for the respective economies, this decree lays down rules with respect foreign investment funds allowed in Colombia.

To this end, a foreign investment fund is defined as a collective investment vehicle which operates in jurisdictions other than Colombia with the prior and express authorization of a supervisory authority that has signed agreements or treaties for the exchange of information and monitoring protocols with the FSC. This authority must also exercise oversight over the administrator of the foreign investment funds. In addition, the decree lists a few requirements that these funds must comply with such as: have standards for segregation of equity, thus allowing the managed assets to constitute an independent equity; have standards for providing investors with information on a regular basis; meet the obligation of having a professional custodian who is independent of the fund and not carry out leveraged transactions.

Furthermore, the decree determines that those who meet the qualifications of a professional investor and a customer investor shall be able to participate in these funds. Last of all, it was determined that advertising of these types of funds could only be done through the specialized distributor of mutual investment funds. This distributer, acting as a consultant, would have the duty to inform the investor that the monitoring of the fund and its manager is done by the supervisory authority in the jurisdiction where the fund originated.

Decree 2076/2017: operation of companies that specialize in electronic deposits and payments (Sedpe)

This decree establishes that electronic currency deposits and savings accounts with simplified procedures offered by the CEs and the Sedpes could be used to allow the owners to receive funds other than those from subsidy or benefit programs granted by the Colombian state. In addition, it opens up the possibility for financial consumers to be owners of more than one electronic deposit when these are accessed through the conventional opening process which would not have to be done in person.

Moreover, it also authorizes the Sedpe to use the network of entities, through their local offices, supervised by the FSC to offer their services bearing in mind the fact that these firms are based on a model of simplified operations. Last of all, the decree makes it possible for the Sedpe to comply with the requirement for handling cash using resources other than deposits for the operations carried out through correspondents.

Decree 246/2018: criteria for excluding entities that belong to financial conglomerates from supervision.

This decree determines that the FSC may exclude corporate entities or investment vehicles from the scope of consolidated oversight when they are not of significant supervision interest and when the size of the entity or the level of interconnection does not have an impact on the financial conglomerate. However, the FSC could, at any time, bring an entity that had previously been excluded under its oversight.

Decree 521/2018: purchase of assets and assumption of liabilities and bridge bank

Act 1870 published in September 2017 stipulated that Fogafin could order the purchase of assets and assumption of liabilities as an alternative to the payment of deposit insurance in the event that the FSC orders the forced liquidation of an entity. Decree 521 regulates that law and establishes that the transfer of assets and liabilities shall be done by one or more CE or bridge banks. To adopt this measure, Fogafin shall evaluate the two alternatives (deposit insurance and the purchase of assets and assumption of liabilities) and shall choose the one with the lowest cost.

Fogafin shall be in charge of evaluating the elements concerning this measure such as the value of the assets and liabilities to be transferred, the entity's critical functions, the requirements of the entities that will receive the transfer, the guarantees for the assets and liabilities to be transferred, and the procedures and means of transfer. In the event that the measure in question is adopted, Fogafin shall define which types of assets shall be subject to transfer and evaluate the liquid assets that should remain for the payment of debts. The liabilities subject to transfer shall correspond to all those that are covered by deposit insurance though others could be selected when Fogafin consider that their transfer is important for maintaining the stability of the financial system. In order to procure equivalence between the assets and liabilities subject to the mechanism, the fund may make contributions to the ECs in liquidation.

The CEs that apply to purchase assets and assume the liabilities of an entity going through liquidation must be authorized by the FSC. In the event that no CE applies, Fogafin shall evaluate the creation of a bridge bank or the payment of deposit insurance. The goal of the bridge bank shall be to receive the assets and liabilities of the entity going through liquidation to manage them and sell them in the shortest time possible. This entity shall not be subject to all the requirements of the other CEs and is not requited the FSC for its creation. In addition, it may carry out the transactions and investments authorized for any CE and may exist for up to two years with

an extension of up to five years. The status of the bridge bank shall end when it has been acquired by or merged with another CE, when Fogafin sells or transfers its share in the bridge bank, or when it so decides.

Decree 415/2018: appropriate equity for financial service companies

The goal of this decree is to standardize the measurement of the capital adequacy ratio of the companies that manage third-party funds[47] and to include the main risks that these entities are exposed to in the various transactions they carry out within a single measure. In general, the capital adequacy indicator was defined as follows:

$$RS = \frac{PT}{APNR + \left(\frac{100}{9} RM\right) + \left(\frac{100}{9} RO\right)}$$

Where *PT* refers to the total regulatory capital of the company; APNR to the credit risk weighted assets in a proprietary position; RM to the market risk of the proprietary loan portfolio, and RO to the operating risk due to the management of third-party funds.

One of the main novelties of this measure is the inclusion of the operational risk component. This is defined as a percentage of the average net income by commissions from the management of third-party resources which is in line with international standards. Thus, this regulation seeks to ensure that the firms that manage third-party funds have enough balance-sheet soundness to face adverse events in both their proprietary position and as the managers of third-party funds. Entities have nine months to comply with the provisions of this decree. This term may be extended by six months, with prior approval from the FSC.

47 Included among these are the trust companies, brokerage firms, pension fund managers, investment management companies, and insurers that administer social security funds through independent equities.

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