



# FINANCIAL STABILITY REPORT

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March 2012

ISSN - 2145 - 650X



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March 2012

Banco de la República  
Bogotá, D. C., Colombia

ISSN - 2145 - 650X



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## EXECUTIVE SUMMARY

In 2011, the international economic environment was characterized by a high degree of uncertainty brought about by the problems of public or private debt in many of the industrialized countries. The financial conditions in the euro zone deteriorated significantly in the last quarter of the year and their outlook for growth got worse. Thus, in spite of the recent improvement in the economic strength of the United States, moderate worldwide growth is anticipated for the first six months of 2012. The economic activity indicators in Colombia, in turn, showed a favorable performance in the second half of 2011 and expectations continue to be optimistic.

Intermediation activities showed a strong performance which manifested itself in a growth rate for the credit institutions' gross loan portfolio that was close to a real annual 18% as of December 2011. The consumer and micro-loan portfolios, in particular, were the ones with the highest growth rates while the commercial one presented a slowdown. The expansion of credit generated an upswing in the interest income of the credit institutions which made the profitability and capital adequacy levels favorable.

The non-banking financial institutions (NBFI), in turn, registered less strength in the changes of the loan portfolio in comparison to what had been seen in the first half of 2011. This was reflected in lower levels of profitability. The devaluation in the national variable income securities generated a shift which favored the share of public debt securities and of investments in the financial sector.

When the indebtedness of the main borrowers is analyzed, one sees that the growth in the loans companies have was accompanied by improvements in their economic situation. At the same time, the household financial burden rose as a consequence of the performance of the consumer loan portfolio.

In the second half of 2011, the default and loan portfolio quality indicators improved. These are defined as the value of the non-performing and risky loan portfolios expressed as a share of the gross loan portfolio respectively.

This is mainly caused by the greater strength in all of the different types of loan portfolios. The risky and non-performing loan portfolios, in particular, that are part of the consumer loan portfolio showed positive growth although the rise in credit risk in this loan portfolio has been backed by an increase in the loan-loss provisioning.

The exposure to market risk, in turn, climbed as a result of the higher amount exposed and the upswing in the duration of the financial entities' portfolios. This has not translated into increases in the potential losses due to the low volatility of the TES price.

Furthermore, the entities in the financial system showed levels of liquidity during this period that made it possible for them to face an adverse funding scenario though these levels are lower than they were in the first half of 2011. Likewise, when market liquidity risk is analyzed, a situation that is favorable in terms of exposure to this risk is seen.

In conclusion, in 2011, the financial system continued to demonstrate an expansion process which was reflected in rises in the gross loan portfolio and stable levels of profitability for credit establishments. Although this trend was accompanied by improvements in the traditional indicators of credit risk, the growth of the risky and non-performing loan portfolios that was seen in the second half of the year for some areas of credit highlights the importance of continuing to monitor the quality of financial assets strictly.

**Jose Dario Uribe Escobar**  
**Governor**

# FINANCIAL STABILITY REPORT

Prepared By:  
The financial Stability Department of the  
Monetary and Reserve Division

One of the duties of Banco de la República, as stipulated in the Colombian Constitution and in Law 31/1992, is to ensure price stability. Doing so depends largely on maintaining financial stability, which is understood as a situation in which the financial system is able to broker financial flows effectively. Financial stability contributes to better resource allocation, which is important to preserving macroeconomic stability. For that reason, financial instability has a direct impact on macroeconomic stability and on Banco de la República's capacity to fulfill its constitutional mandate. In short, monitoring and maintaining financial stability are crucial to that activity.

Banco de la República provides for financial stability in a variety of ways. To begin with, it makes sure the payment system in the Colombian economy operates properly. Secondly, it extends liquidity to the financial system through its monetary transactions and by exercising its constitutional faculty as the lender of last resort. Thirdly, being the country's credit authority, it designs financial regulatory mechanisms to reduce episodes of instability. It does so in conjunction with the Superintendencia Financiera de Colombia. (Financial Superintendence) Moreover, Banco de la República carefully monitors economic trends that could threaten the country's financial stability.

The Financial Stability Report is part of this last task and accomplishes two objectives. First, it describes the recent performance of the financial system and its principal borrowers. This is done so future trends in that performance can be visualized. Secondly, it identifies the major risks to credit institutions. The reason for both these objectives is to inform the public of the trends and risks that can affect the financial system as a whole.

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# I. MACROECONOMIC ENVIRONMENT

*In spite of the fact that as of this issue the United States showed an improvement, the international environment remains uncertain due to the recent economic situation in the euro zone. Moreover, it has been predicted that worldwide growth will contract slightly in the first six months of 2012. However, in Colombia, the economic activity indicators showed a positive performance during the second half of 2011 and expectations for this year remain optimistic.*

## A. BACKGROUND OF THE INTERNATIONAL ENVIRONMENT

Since the first half of 2011, the international environment has been characterized by a high degree of uncertainty which was brought about by the public debt problems in the United States and Europe. In the last quarter of the year, the financial conditions deteriorated significantly and the outlook for growth worsened. Given this scenario, an overall slowdown in the global economy is expected to continue in 2012. In Europe, the sovereign debt crisis is deepening and becoming more systemic. Because of that, a slight recession is predicted for the first quarter of the year. In the United States, the contagion has been limited and its economy is expected to continue expanding although at a moderate rate given the persistence of the structural problems. Furthermore, a slight downward trend in economic strength is still being seen in the emerging economies.

In Table I the forecast for economic growth for 2012 and 2013 is presented.<sup>1</sup> In general, the global output is expected to expand 3.3% in 2012 and 3.9% in 2013. These figures are below the projections for last year and are the result of the worsening of tensions in the euro zone and the various weaknesses in

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<sup>1</sup> Predicted in January 2012 by the International Monetary Fund (IMF) in the *World Economic Outlook Update*.

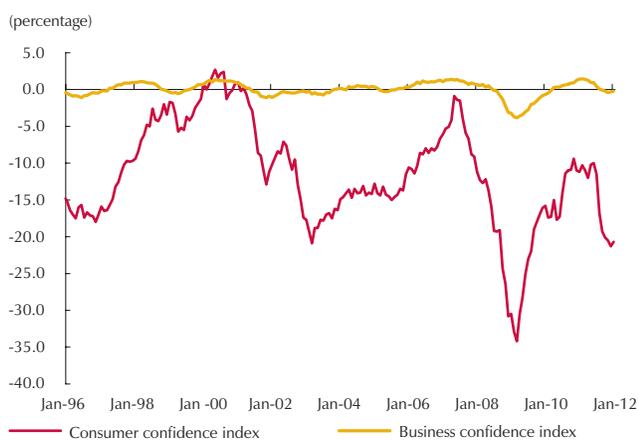
Table 1  
Economic Growth  
(annual percentage variation)

	Actual		Current forecast		Differences with respect to September 2011 forecast	
	2010	2011	2012	2013	2012	2013
<b>Global output</b>	<b>5.2</b>	<b>3.8</b>	<b>3.3</b>	<b>3.9</b>	<b>(0.7)</b>	<b>(0.6)</b>
<b>Advanced economies</b>	<b>3.2</b>	<b>1.6</b>	<b>1.2</b>	<b>1.9</b>	<b>(0.7)</b>	<b>(0.5)</b>
United States	3.0	1.8	1.8	2.2	0.0	(0.3)
Euro zone	1.9	1.6	(0.5)	0.8	(1.6)	(0.7)
Japan	4.4	(0.9)	1.7	1.6	(0.6)	(0.4)
United Kingdom	2.1	0.9	0.6	2.0		(0.4)
Canada	3.2	2.3	1.7	2.0	(0.2)	(0.5)
<b>Other emerging and developing market countries</b>	<b>7.3</b>	<b>6.2</b>	<b>5.4</b>	<b>5.9</b>	<b>(0.7)</b>	<b>(0.6)</b>
Latin America	6.1	4.6	3.6	3.9	(0.4)	(0.2)
Brazil	7.5	2.9	3.0	4.0	(0.6)	(0.2)
Mexico	5.4	4.1	3.5	3.5	(0.1)	(0.2)
Asia	9.5	7.9	7.3	7.8	(0.7)	(0.6)
China	10.4	9.2	8.2	8.8	(0.8)	(0.7)
India	9.9	7.4	7.0	7.3	(0.5)	(0.8)
<b>Colombia</b>	<b>4.3</b>	<b>5.8<sup>a/</sup></b>	<b>5.0</b>	<b>4.5</b>		

a/ Banco de la República forecast.  
Sources: International Monetary Fund (World Economic Outlook Update, January 2012).

other regions. Likewise, a slowdown in the growth of the advanced economies as well as in the growth of the emerging and developing ones is anticipated for the present year and should be at 1.2% and 5.4% respectively.<sup>2</sup>

Graph 1  
Euro Zone Confidence Index



Source: Bloomberg.

Note that even though Japan has succeeded in recovering beyond what was expected from the natural disaster in March 2011, its economy has begun to show symptoms of weakening. As a result, expectations for its growth in 2012 were lowered to 1.7% after having been at 2.9% in June 2011.

The deterioration in productive activity in the euro zone has been accompanied by a drop in consumer and business expectations. Just as can be seen in Graph 1, the consumer confidence index showed a downward trend in 2011 and was at a level of -20.7% as of January 2012 in comparison to a level of -11.2% a year earlier. The business confidence index also

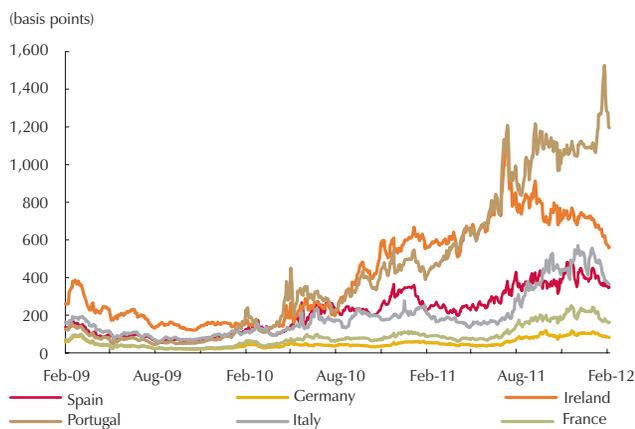
<sup>2</sup> As of June 2011, the forecasts of advanced and emerging economy growth in 2012 were higher than they were in January 2012 (2.6% and 6.4% respectively).

declined over the course of the year and went from 1.42% to -0.21% between January 2011 and the same month in 2012.

Since the third quarter of 2011, the European authorities have begun to take policy measures to face the problems that are exacerbating the crisis. Some of them have helped to improve confidence in the markets but the difficulties surrounding sovereign financing have not dissipated. The fiscal deficit for some of the advanced economies continues to climb and, as a result, their public debt continues to rise persistently. As was mentioned in the previous *Financial Stability Report*, this fact could have sharp repercussions on worldwide growth given that these economies will have to make fiscal adjustments in the short term that could affect their economic performance even more.

The European Central Bank (ECB), in turn, has played an important role in the crisis. In fact, since bank financing was practically paralyzed in the euro zone, the ECB had to take extraordinary measures to stabilize the system's condition. For example, it offered three year loans to commercial banks in order to alleviate their liquidity needs, broadened the kinds of collateral that were acceptable and reduced the benchmark interest rate to 1%. It likewise continued to intervene in the Spanish and Italian sovereign debt markets in order to reduce their financing costs. All of these measures have had favorable results, especially since they succeeded in reducing the uncertainty in these markets.

Graph 2  
Five-year Credit Default Swaps (CDS) for some European Countries



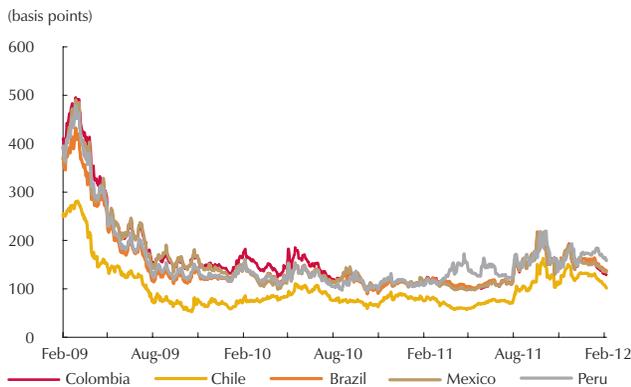
Source: Bloomberg.

As can be seen in Graph 2, the investors' risk perception of European markets measured as the premiums of the 5-year credit default swaps (CDS)<sup>3</sup> have begun to stabilize after having remained at historically high levels in countries like Portugal and Ireland since before the end of 2010.

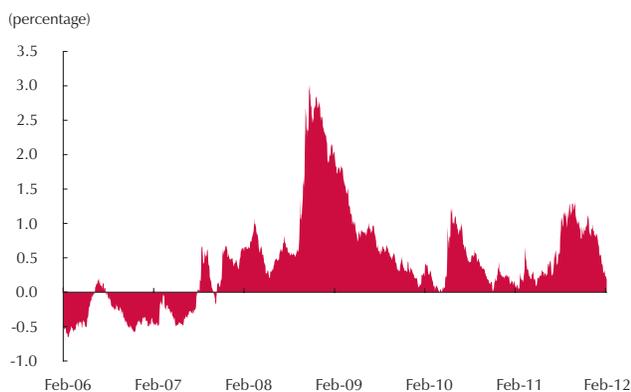
For Latin America, the CDS premiums continue to remain low and stable. However, in the last quarter of 2011, an upward trend appeared as a consequence of the uncertainty generated in the advanced economies. Note that this trend reversed itself at the beginning of 2012 (Graph 3) though it has not yet reached the levels registered at the beginning of 2011.

3 A CDS is a financial contract agreed upon between an entity and the bond holder. According to that contract, the bond holder pays entity a premium which is measured in basis points in exchange for which the entity takes responsibility for the nominal value of the bond if the issuer does not meet his obligations. The valuation of a CDS is directly related to the level of risk aversion the investors have.

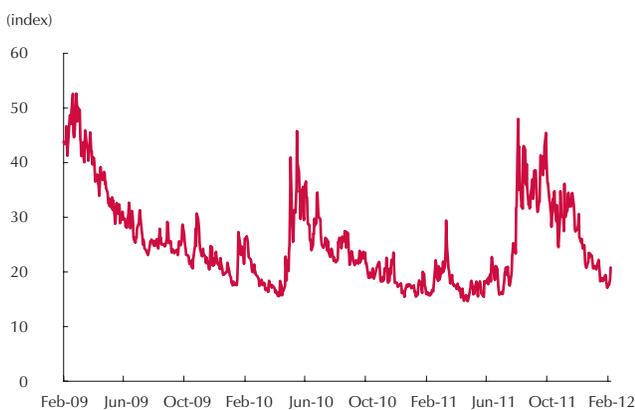
**Graph 3**  
Five-year Credit Default Swaps for some Latin American Countries



**Graph 4**  
Global Financial Stress Index



**Graph 5**  
Risk Aversion Index (VIX)



Although the uncertainty generated by the crisis in the euro zone is persisting, the indices of risk aversion and financial stress show signs of a better perception of risk on the part of foreign investors. Prior to this, their risk perception had shown high levels of deterioration. Taking the global financial stress indicator into account,<sup>4</sup> the financial conditions for the global economy have been gradually improving since November 2011 (Graph 4). The VIX,<sup>5</sup> likewise, showed a downward trend for the same period (Graph 5).

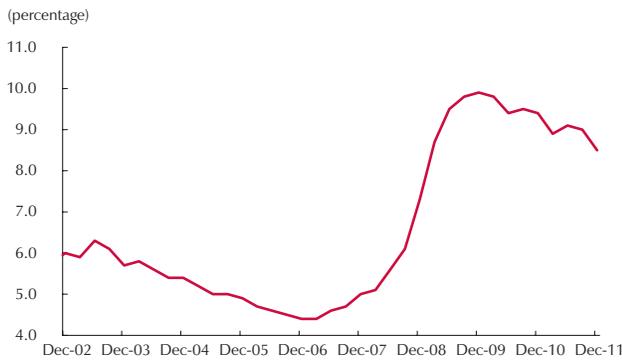
In the last two quarters of 2011, U. S. economic activity registered a surprising upswing due to the unexpected reduction in the savings rates and solid investment by companies. Consumer and business confidence recovered a little although it still remains at low levels. In addition, the unemployment rate showed an improvement as it went from 9.4% to 8.5% between the fourth quarter of 2010 and the same quarter in 2011 (Graph 6). This performance is especially due to the higher job creation and the reduction in the labor supply. However, there are doubts about the possibility that this trend will continue for the first half of 2012.

Furthermore, given the world economic performance, it is important to analyze the trend of commodity prices during the last half of 2011. In general, the prices for commodities have declined from the maximums they went to in the first quarter of the year. Nevertheless, they are still at high levels (Graph 7). With respect to the main products Colombia exports, one sees that the prices are remaining high, especially those for coal and petroleum.

4 That is calculated by adding a large quantity of stress measurements for different types of activities and different countries. The indicator measures three types of financial stress: volatility, capital adequacy and market risk as well as the demand for hedging and appetite for risk.

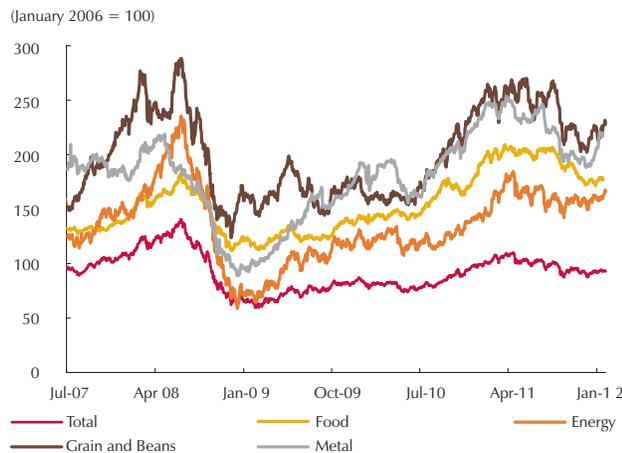
5 The VIX (composite volatility index) is an indicator of the implied volatility in the S&P 500 index options. An upswing in the VIX implies greater uncertainty in the stock market, which is reflected in higher prices for the options. Thus, this index can be interpreted as another measurement of risk aversion.

**Graph 6**  
Unemployment Rate in the United States



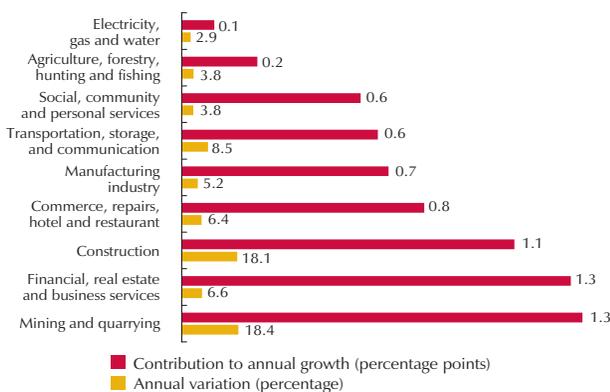
Fuente: Bureau of Labor Statistics.

**Graph 7**  
Price Index for Commodities



Source: Bloomberg.

**Graph 8**  
Contribution to the Annual Growth of the 2011 III Quarter GDP by Sector



Source: DANE, Banco de la República calculations.

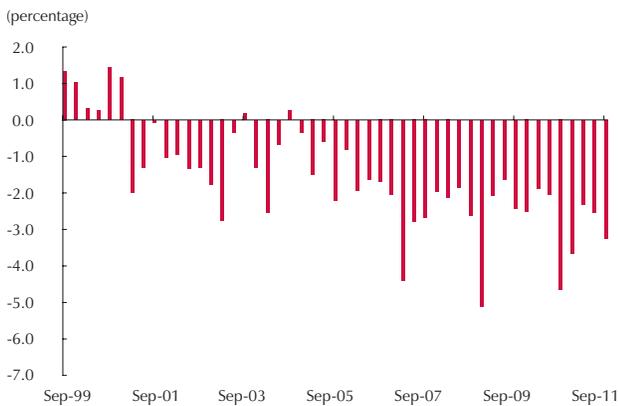
To summarize, the debt crisis that the European region is currently going through continues to generate high levels of uncertainty worldwide although this has been diminishing in the last few months. Even if measures have already been taken with respect to that, the fiscal and competitiveness problems that the region faces put pressure on the economic development and generate uncertainty and contagion in the international markets. In contrast, the economic strength of the United States has been recovering moderately. Moreover, commodity prices are expected to decline slightly in 2012 as a consequence of the slowdown in foreign demand. Nevertheless, the levels will remain high. In the case of the price for petroleum, there is uncertainty due to the supply restrictions and geopolitical tensions in the producer countries.

## B. STRENGTH OF THE PRODUCTIVE SECTOR

In 2011, the Colombian economy presented a positive performance that was above what had been expected. The largest real annual rate of growth (7.7%) since December 2006 was registered in the third quarter. This was driven by domestic demand and, especially, by the greater strength of private consumption (7.3%) and of investment (18.7%). Household consumption is the most important component in the growth of the gross domestic product (GDP) and has succeeded in remaining at high levels since the first quarter of 2010.

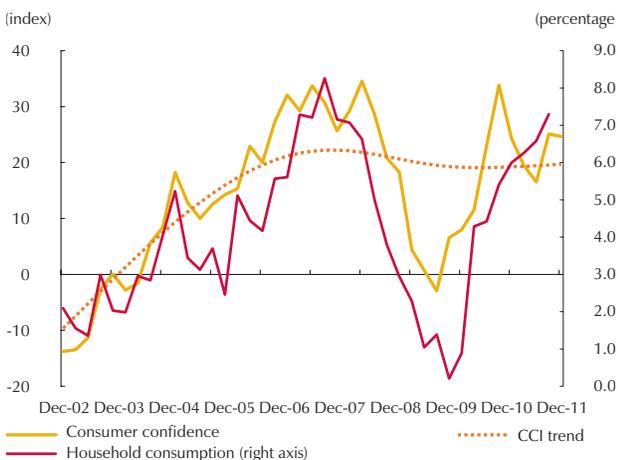
In Graph 8, the real annual growth of the GDP between July and September 2011 can be seen by sector. The leading sectors were mining and construction, which registered annual expansions of 18.4% and 18.1% respectively compared to the 10.0% and -7.1% seen during the same period the previous year. Meanwhile, the ones that contributed the least to the performance of the economy were the agricultural sector (3.8%) and that of electricity, gas and water (2.9%). It should be noted that between the third quarter of 2010 and the same quarter in 2011, all of the sectors, with the exception

Graph 9  
Current Account/GDP



Source: DANE, Banco de la República calculations.

Graph 10  
Fedesarrollo: Annual Growth of Household Consumption and Consumer Confidence



Source: Fedesarrollo.

of commerce, showed significant increases in their real annual rate of growth.

When the performance of the construction sector is broken down by components, public works is seen to be the subsector with the best performance. It grew 20.9% between June and September 2011 thus erasing part of the declines that had been registered since the third quarter of 2010. The building subsector also saw positive performance as it grew at a real annual 14%. This figure is above what was seen a year ago (-6.5%).

The current account deficit as a percentage of the GDP dropped to 3.3% in September 2011 in comparison to the 4.7% it was at a year earlier (Graph 9). This performance is due to the higher rate of exports since the first quarter of 2011. This has made it possible to reduce the deficit in the trade balance.

Over the course of the second half of 2011, foreign direct investment (FDI) continued to experience steady growth, especially during the third quarter, and amounted to US\$3.9 billion (b) compared to US\$3.5 b in the previous quarter. This is equivalent to a rise of 11.4%. This performance was mainly driven by the strength of the petroleum, commercial and mining sectors (US\$1.3 b, US\$1.1 b, and US\$616 m respectively). Between June and September, FDI registered the highest figure for the 2006-2011 period.

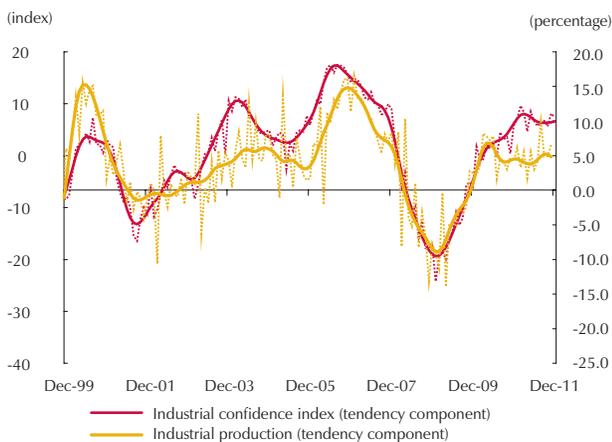
With respect to the labor market, there was an improvement in the national unemployment rate, which was at 10.1% as of December 2011 while it had been at 11.2% in June of that same year. This reduction in that rate has had a positive impact on the perception consumers have of how the country's economy is performing. As is shown in Graph 10, the consumer confidence index maintained a growth trend during the last six months of the year and was above the trend it has had since June 2010. This translates into a more dynamic household consumption.

Likewise, the forecast for this year suggests that economic activity will be similar to what was seen last year, i.e., it will remain at satisfactory and sustainable levels of growth. Furthermore, it is predicted that the direct effect of the international financial crisis on the Colombian economy will be

limited given that domestic demand is the main growth engine. Therefore, it is expected to remain strong for 2012.

Furthermore, when the manufacturing industry is analyzed, one sees that both the outlook and the performance of this sector are remaining at satisfactory levels. The Fedesarrollo industrial confidence index (BCI)<sup>6</sup> held to a relatively stable trend in the second half of 2011 while registering some upswings during that period. Likewise, the tendency component of industrial production remained practically constant between June and December 2011 (Graph 11).

Graph 11  
Industrial Confidence Index and Annual Growth of the Industrial Production Index (IPI)



Source: Fedesarrollo.

In general terms, the country's economic performance is satisfactory. In fact, in the third quarter of 2011, the growth rate of the real GDP was well above the prediction agreed upon by analysts. Domestic demand driven by consumption and investment in particular has explained a large part of this performance. Moreover, consumer confidence has remained at high levels, especially because of the positive results in the unemployment rate. Likewise, manufacturers demonstrated their optimism which was reflected in moderate increases in industrial production in the third quarter of the year. Thus, expectations for 2012 are quite positive.

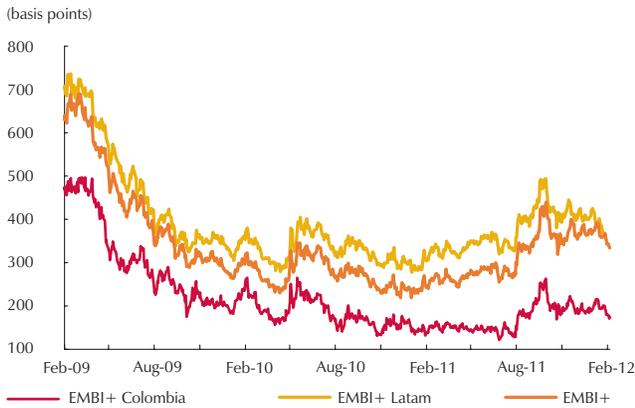
The performance of the economy is expected to hold its own although the possibility of moderate contractions cannot be ruled out when international tensions, especially those due to the crisis in the euro zone, are taken into account.

### C. OUTLOOK FOR THE FINANCIAL SYSTEM

As was mentioned in the previous *Financial Stability Report*, the performance of worldwide growth is a factor that could explain the changes in the Colombian financial system. Currently, the situation in the euro zone and the slow recovery of the US economy are turning out to be determinants the development of the financial systems of emerging countries. Specifically, the performance of said economies will have an influence on the volatility of the capital market, risk aversion of international investors, the price of commodities, and capital flow to emerging countries. Given these conditions, the strategies the financial institutions implement to manage the risks they are exposed to will take on more relevance.

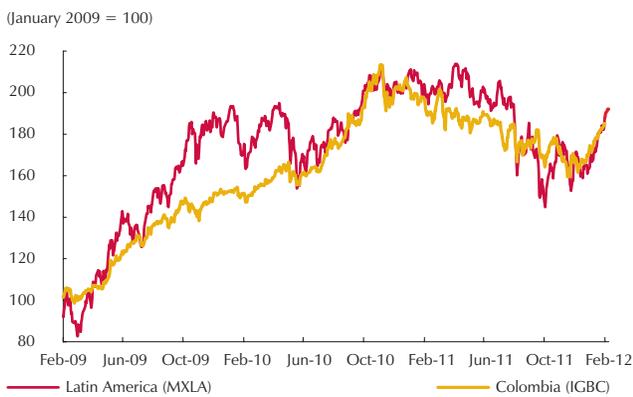
<sup>6</sup> This is an indicator built by Fedesarrollo to measure the level of confidence industry has. Three indices are required to calculate it: industrial orders indicator, industry inventory indicator, and indicator of 3-month production expectations.

Graph 12  
EMBI+ Spread for Colombia, Latin America (Latam) and Other Emerging Countries



Source: Bloomberg.

Graph 13  
Stock Market in Latin America and Colombia



Fuente: Bloomberg..

Graph 12 presents the country risk of the emerging economies measured by using the EMBI+ indicator.<sup>7</sup> As can be seen, it shows a downward trend between October 2011 and February 2012 as it went from 437 bp to 341 bp in response to the lower uncertainty in the international environment.

It is noteworthy that the EMBI+ for Colombia has remained below the Latin American and global indicators. This reflects Colombia's soundness with respect to the perception the global market has of the country meeting its sovereign debt payments in comparison to other countries in the region and other emerging economies.

Latin American stock markets, in turn, maintained the downward trend they have registered since March of last year. However, around mid-November, this trend turned around. This latter fact is due to the lower level of uncertainty in the markets. The general index of the Colombian Stock Market (IGBC in Spanish) also showed the same performance as the Latin American stock market index (Graph 13).

In general, the outlook for the financial system is still uncertain given the recent public debt situation in the euro zone as well as the limited growth of some advanced economies. Add to this the fact that this situation is expected to worsen<sup>8</sup> over the course of 2012 which will raise the level of uncertainty in the international markets. Nevertheless, the

country's economic performance has been affected very little by this situation. The terms of trade have remained high, risk perception remains low, and the net flow of FDI has not stopped growing.

In the second half of 2011, the rate of growth for the gross loan portfolio remained stable in comparison to what had been seen in the first six months of that year. The consumer and micro-credit loan portfolios, in particular, showed the greatest strength while the commercial loan portfolio had a slowdown. The

7 The emerging market bond index plus (EMBI+) is an indicator that measures country risk. It is calculated as the difference between the returns on government bonds issued by emerging countries and the return on Treasury bonds (which are assumed to be risk-free assets). High EMBI+ values imply high probabilities of defaulting on sovereign debt payments.

8 According to the updated projections in the document entitled "Outlook for the global economy" from the IMF, the worldwide economy will slow down in 2012. The majority of the advanced economies will avoid another recession while the emerging and developing ones will see a slowdown in their strong rate of activity.

importance of constantly monitoring the changes in lending should be noted, especially in periods of expansion such as the one that is going on currently when the indicators of debtors' financial burdens have risen and make them more vulnerable to adverse macroeconomic shocks.

The indicators for the loan portfolio quality and default continue to show a declining trend in contrast to the upswing that has been seen in the gross loan portfolio. However, the rise in the growth rate of the risky and non-performing loan portfolios within the one for consumer loans must be noted.

Regarding the credit institutions' liabilities, a sustained increase in deposits was seen in the second half of 2011. This fact is especially due to the greater growth of bonds and current accounts. Certificates of deposit, especially those with maturities of more than one year, have also shown an upswing in the period analyzed.

Profitability of the financial entities, in turn, has remained relatively constant due to the fact that earnings and assets grew at similar rates in the last six months of 2011.

Exposure to market risk has risen, in general, for all the different types of financial institutions whether this was due to the increase in the exposed balance or the longer duration of the loan portfolios. However, given the stable performance in the TES price volatility, the behavior of the VaR has been relatively constant. The increase in interest rates has not been reflected in losses as a result of the appreciation of the portfolio the financial system entities have.

Credit risk maintained the declining trend that has been seen since the first half of 2011. The indicators for the loan portfolio quality and default presented an improvement for all of the types of credit. Nevertheless, the new harvests in the consumer and micro-loan portfolios registered a higher risk in comparison to those that originated in previous quarters. The probability that loans would migrate towards worse ratings declined for housing loans, however. When the financing liquidity risk is analyzed, the entities in the financial system were found to have registered stable and positive levels on their indicators. This suggests that they could face adverse financing situations. The situation remains favorable in terms of market liquidity.

With this panorama, the effects on the Colombian financial system will depend to a large degree on the persistence of the strong positive growth and the recovery of international economies. Furthermore, the government's fiscal management, the changes in unemployment, and decisions concerning monetary policy could have impacts on the risks that the financial system faces.

## II. FINANCIAL SYSTEM

*In the second half of 2011, the growth rate of the gross loan portfolio of the credit institutions remained stable at levels similar to those that had been seen six months earlier. The consumer and micro-loan portfolios, in particular, show the most strength while the commercial portfolio showed a slowdown. The default and loan portfolio quality indicators continued a declining trend at the same time that interest income has risen in the last six months. This has made it possible for earnings and capital adequacy levels to remain favorable.*

*The non-banking financial institutions (NBFIs), in turn, showed less strength in the development of the loan portfolio compared with what had been registered in the first half of that same year. This was reflected in lower levels of profitability. The devaluation of the national variable income securities generated a shift that favored the share of public debt securities and investments in the financial sector.*

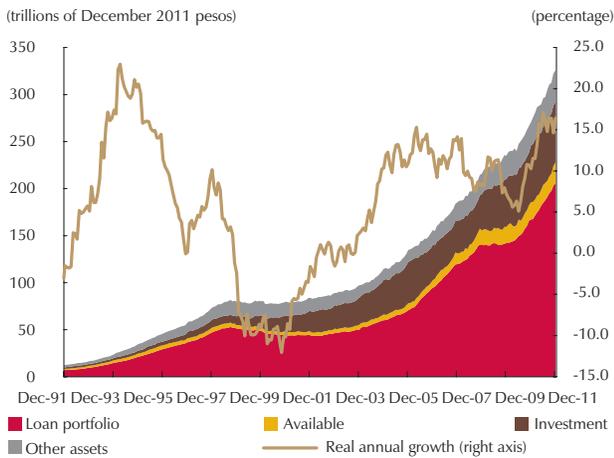
### A. CREDIT INSTITUTIONS

The growth rate of the gross loan portfolio remained stable in the second half of 2011 and registered levels that were similar to those seen in June of the same year. To be specific, the consumer and micro-loan portfolios show the most strength and the commercial loan portfolio presented a slowdown. The growth of investments, in turn, continued to decline and, therefore, their share in the assets of the credit entities has fallen during this period.

In spite of the increases in the non-performing and risky loan portfolios in the consumer portfolio, the default and loan portfolio quality indicators continued to show a declining trend because of the growth of the gross loan portfolio.

Said performance has generated an upswing in interest income for entities as well as a rise in the *ex ante* intermediation spread in, primarily, the first half of the year. This has been reflected in the favorable profitability and capital adequacy indicators.

Graph 14  
Credit Establishment Assets



Source: Financial Superintendency of Colombia, Banco de la República calculations.

## 1. General Balance Sheet Positions

### a. Asset Accounts

Since mid-2010, the real annual growth of credit establishment assets has seen an upward trend which is due to a surge in the loan portfolio and investments. In December 2011, this performance was 16.1% and reached a level of COP\$325.7 trillion (t). This rate stabilized at around this amount as of August 2011 (Graph 14).

In the second half of 2011, the real annual growth of the gross loan portfolio registered values of around 18%. The rate seen in December 2011 (17.9%) was 4.8 percentage points (pp) higher than what was reported for the same month in 2010 while at the

same time, it was 90 bp lower than the one from June. Thus, the total gross loan portfolio was at COP\$215.8 t in December 2011.

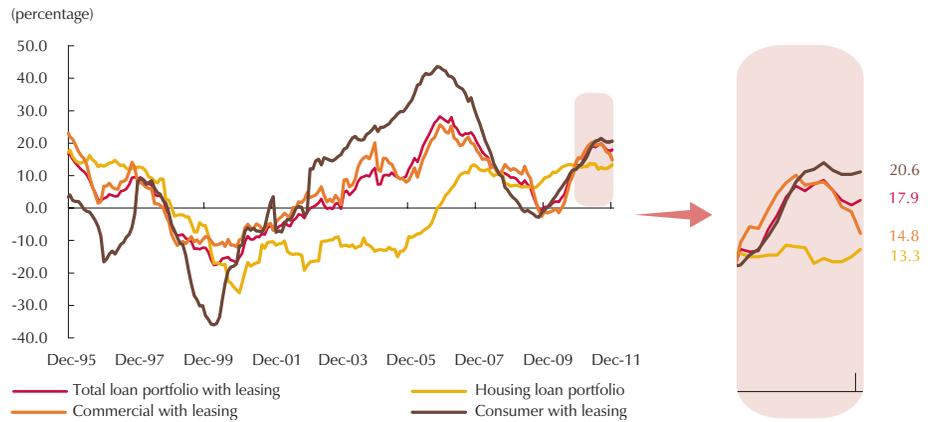
When the different types of credit are analyzed, the consumer loan portfolio was seen to show the highest growth rate in spite of the fact that its performance stabilized in the second half of 2011. The annual change for this type of credit was 20.6%, which is similar to what was seen in June of the same year (Graph 15). The commercial loan portfolio, in turn, showed a drop in its growth in December 2011 as it reported a rate of 14.8%, which was 4.5 pp lower than that of June (19.3%). Finally, the housing loan portfolio remained stable as it presented a real annual rate of 13.3% in December 2011.<sup>9</sup>

Going by groups of establishments, we see that the banks showed the most real growth in the portfolio with a rate of 21.1% in December 2011. This was lower than what had been registered in June of the same year (24%). The commercial financing companies' (CFC) portfolio, in turn, continued to drop thus showing a negative real annual change of 21.3% which was due to the migration of these types of companies to the banking sector. Last of all, the leasing entities' portfolio showed significant strength in the second half of 2011 as it exhibited a real annual expansion of 17.3%.

Furthermore, better growth for the portfolio for the credit institutions with national capital in comparison to the ones with foreign capital was seen. The former has a real annual 18.2% rate compared to 16% for the latter. In

<sup>9</sup> The housing loan portfolio without securitizations saw a growth of 32.9% in December 2011 which can be explained by the securitization process that was carried out in the same month of 2010. The rate of loan disbursements for this type of loan portfolio, in turn, is still following a declining trend. In December 2011, 10.9% was reported after having registered a rate of 21.2% six months earlier.

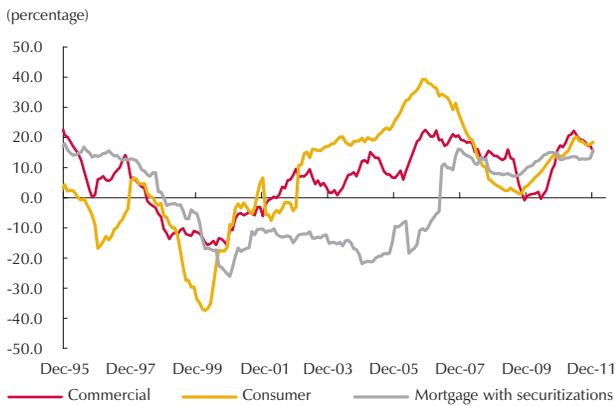
Graph 15  
Real Growth of the Gross Loan Portfolio by Type



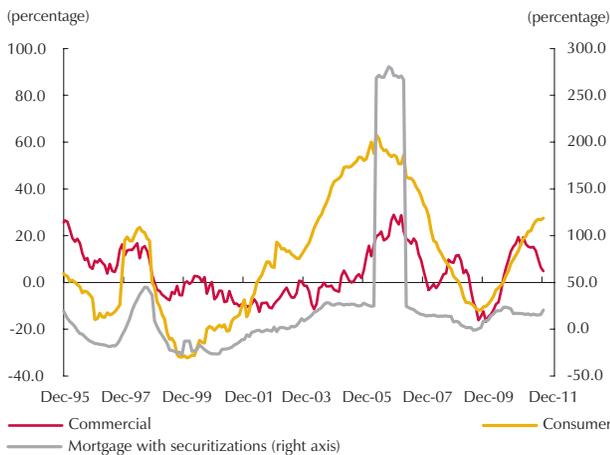
Source: Financial Superintendency of Colombia, Banco de la República calculations.

Graph 16  
Real Annual Growth of the Loan Portfolio by Type of Loan and of Capital

A. National Establishments



B. Foreign Establishments



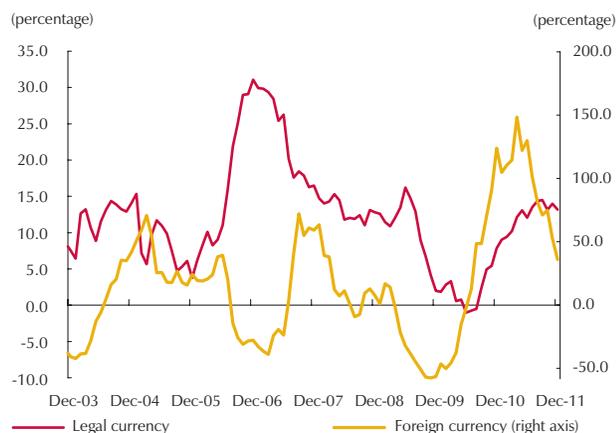
Note: the growth of the mortgage loan portfolio for these institutions rose between March 2006 and the same month in 2007 due to the purchase of Granahorrar on the part of BBVA, which is a foreign capital bank.  
Source: Financial Superintendency of Colombia, Banco de la República calculations.

December 2011, the national institutions showed a share of 82.1% of the total gross loan portfolio. This corresponds to a value of COP\$177.5 t.

When making this comparison while keeping the type of credit in mind, one sees that the foreign capital entities concentrated on granting consumer and micro-credit loans in 2011. The growth rates seen were 27% and 41.1% respectively. These figures are 9 pp and 21.2 pp higher than those registered by the national banks. Meanwhile, the latter expanded their commercial loans at a rate of 15.2% in December 2011 (Graph 16). Compared to what had been seen in December 2010, higher growth rates are noticeable in consumer, housing, and micro-credit loan portfolios and lower ones for commercial loans in both national and foreign entities.

In 2011, the performance of the gross loan portfolio in legal currency showed a growth trend that has tended to stabilize in the last few months of the year at levels that are close to a real annual 13%. Note that the amount of this loan portfolio for December of that year represented 88.2% of the total. The expansion of the foreign currency loan portfolio, in turn, saw a slowdown although this was with rates that were higher than those for the legal currency loan portfolio. In December 2011, the foreign currency loan portfolio registered a real annual change of 40.1% (Graph 17).

**Graph 17**  
Growth of the Gross Loan Portfolio by Currency



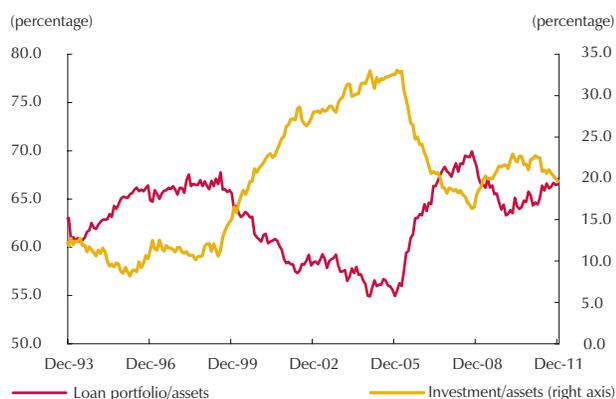
Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 18**  
Credit Establishment Investments



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 19**  
Investment and Gross Loan Portfolio as a Percentage Share of the Total Assets of Credit Institutions



Source: Financial Superintendency of Colombia, Banco de la República calculations.

In the second half of 2011, in turn, credit institutions' investments came to COP\$64 t thus showing a real annual growth rate of 2.3%, which six months earlier had been 10.9%. This drop in the growth trend could be due to the upticks in the benchmark interest rate together with the greater uncertainty in the international markets (Graph 18).

The higher growth of the gross loan portfolio (17.9%) in comparison to investments (2.3%) translates into an increase in the share the former has of the total credit institution assets. While in December 2010, investments represented 22.3% of the assets, a year later these dropped to a share equal to 19.6%. Thus, the share the loan portfolio has within the credit institutions' assets rose during this period as it went from 65.9% in June 2011 to 66.5% in December of the same year (Graph 19).

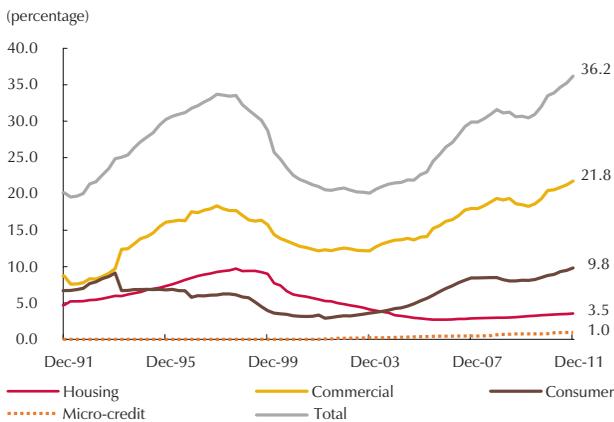
In 2011, the growth of the loan portfolio occurred in a scenario of economic expansion. Nevertheless, the strength of credit was better than that shown by the GDP. This translated into upswings in the indicator of financial deepening<sup>10</sup> which went from a level of 34.6% in June 2011 to 36.2% in December of the same year (Graph 20). Going by types of credit, the largest increases in the indicator correspond to the commercial and consumer loan portfolio. These presented an annual variation of 88 bp and 51 bp respectively.

**b. Liability Accounts**

The credit entities' liabilities reached a level of COP\$279.9 t in December 2011. This corresponded to a real annual growth of 20.3%, which was higher than the annual change seen in June of the same year (19.4%).

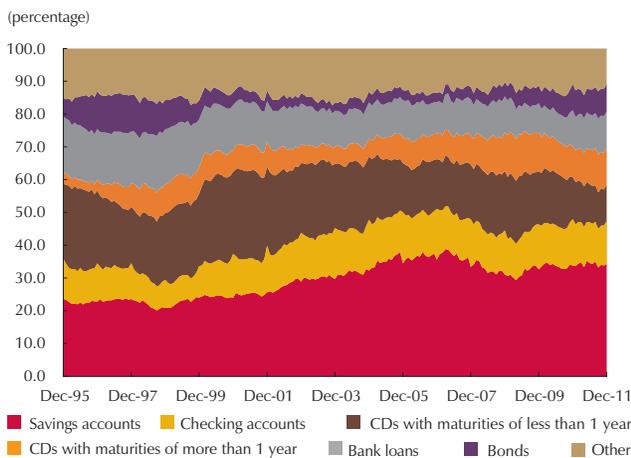
<sup>10</sup> Financial deepening is a measurement of the credit institutions' share in economic activity and is calculated as the ratio between gross loan portfolio and GDP.

**Graph 20**  
Financial Depth (Gross Loan Portfolio/GDP)



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 21**  
Credit Institutions: Liability Components



Source: Financial Superintendency of Colombia, Banco de la República calculations.

Liabilities of the credit institutions are mainly made up of deposits,<sup>11</sup> which in December 2011 represented 80.7% of the total, followed by bank loans<sup>12</sup> (11.1%) and other liabilities (8.2%).<sup>13</sup> Among these components, bank loans showed a surge of 13.8% and amounted to COP\$31 t in December while the credit entities' deposits<sup>14</sup> came to COP\$226.5 b for the same month. Thus, they registered a growth of 10.8% in the last half of the year.

When one looks at the makeup of the deposits, there is significant growth in the CDs with maturities of more than one year (15.2%). This suggests a greater preference for this type of liability in comparison to those with shorter maturities, which grew at a rate of 4.4%. Over the course of the last half of the year, deposits in savings accounts and CDs with maturities of less than one year lost 26 bp and 48 bp of their share of the liabilities. This represented 34.3% and 11.2% respectively of the liabilities as of December 2011. Meanwhile, the CDs with maturities of more than one year saw a 63 bp upswing in their share and came to 11.2%. Bonds, in turn, were 8.5% of the total liabilities in December 2011. This raised their share 84 bp in comparison to what was seen in June of the same year. The real growth in the last half of the year for this item was 20.7% (Graph 21).

Furthermore, the real rate of growth for savings accounts between June and December 2011 was 8.0% while the total for this item amounted to COP\$96 t. Deposits in checking accounts, in turn, came to a value of COP\$36.1 t in December and

showed a growth rate of 13.8% during the same period. This was higher than what had been registered six months before (-6.8%). Last of all, the CDs

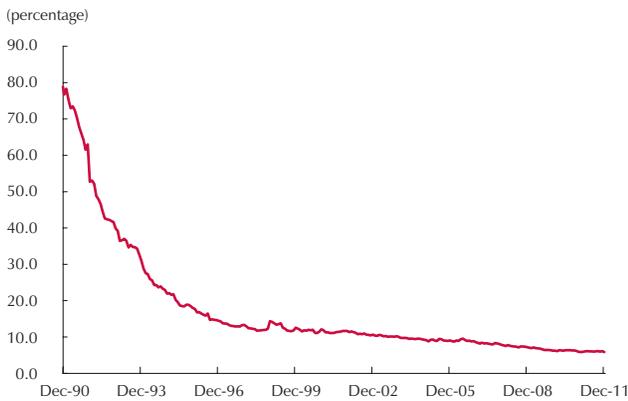
11 Deposits are the sum of deposits and current liabilities and bonds.

12 This loan refers to one granted by foreign entities and second-tier banking to the credit institutions. The credit granted from foreign sources represented 37.9% in December 2011 and came to a value of COP\$11.8 t.

13 The following accounts are found in this category: interbank funds, banker's acceptances, accounts payable, estimated liabilities and loan-loss provisioning, and other liabilities.

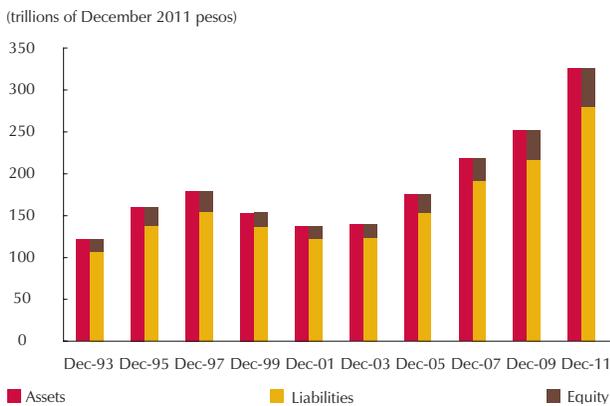
14 If the deposits are divided by their term, the shorter ones are made up of savings accounts, checking accounts and less than 1-year CDs and the longer term ones are the CDs for more than one year. As of December 2011, the share of the former group was found to be 81% and that of the latter 15.5%.

**Graph 22**  
Productive Assets/Technical Equity



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 23**  
Credit Institutions' Balance



Source: Financial Superintendency of Colombia, Banco de la República calculations.

showed a change of 9.5% and came to a value of COP\$62.8 t.

When the performance of deposits is analyzed by groups of intermediaries, one sees that their growth is due to the increase in deposits at the banks and leasing entities. As of December 2011, the deposits at these entities grew at a rate of 10.5% and 15.5% in comparison to what had been seen six months earlier and came to a total of COP\$211.9 t and COP\$7.5 t respectively. The change in deposits for the CFC, in turn, was 10.3%.

Last of all, as a measurement of financial system leverage, the ratio between productive assets and technical equity of the entities was used. Based on what was seen in December 2011, the productive assets of the credit institutions were 5.9 times the value of the technical equity for the same period. As can be seen in Graph 22, this share was significantly reduced between 1990 and 2008. Since then, it has remained relatively stable.

The rise in equity that was evident in the last few years can also be seen when the change in the structure of the balance that the financial system entities have over the course of time is analyzed (Graph 23). Starting in 2003, an uptick in the share of equity is seen. This went from 11.4% of the total assets in December 2003 to having a value that was

equivalent to 14.1% of the assets in the same month in 2011. The above means that the growth of the assets since 2003 has been accompanied by a greater increase in equity.

## 2. Exposure of the Credit Institutions to Their Main Debtors

In December 2011, the exposure of credit institutions to the different debtor agents was COP\$241.5 t with a real annual growth of 14% compared to what was seen in December 2010. The exposed total represented 74.1% of the financial sector assets, a figure that is slightly lower than the one that has been seen in the last two years (Table 2).

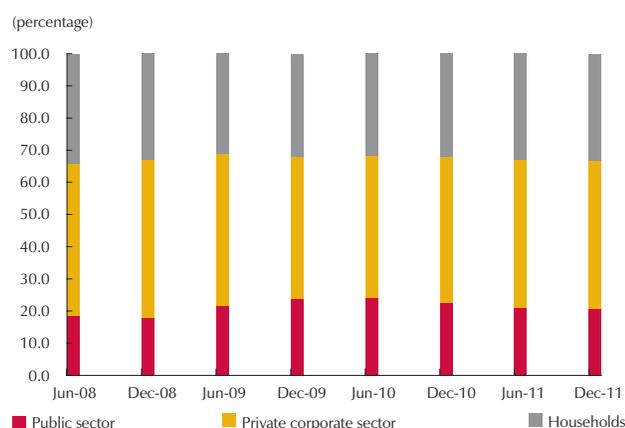
When the components of the exposed amount are evaluated, an upswing in the share of the private corporate sector is seen. This is due to the performance of its loan portfolio, which registered a real annual growth rate of 15.7% between December 2010 and the same month a year later. The exposure of the financial

Table 2  
Exposure of Credit Institutions to their Major Debtors

Type	December-10		December-11		Percentage real annual growth
	Trillions of December-11 pesos	Percentage share	Trillions of December-11 pesos	Percentage share	
<b>Public sector</b>					
Loan portfolio	11.5	5.4	11.5	4.8	0.8
Securities	36.3	17.1	38.3	15.9	5.7
Total	47.7	22.5	49.9	20.7	4.5
<b>Private corporate sector</b>					
Loan portfolio	95.3	45.0	110.8	45.9	16.2
Securities	0.9	0.4	0.6	0.2	(36.1)
Total	96.2	45.4	111.3	46.1	15.7
<b>Household sector</b>					
Loan portfolio	61.1	28.9	75.3	31.2	23.1
Consumer	49.5	23.3	59.8	24.7	20.8
Mortgage	11.7	5.5	15.5	6.4	32.9
Securitized	6.8	3.2	5.0	2.1	(27.0)
Total	67.9	32.1	80.2	33.2	18.1
Total amount exposed	211.9	100.0	241.5	100.0	14.0
Amount exposed as a share of assets (percentage)		75.5		74.1	

Sources: Financial Superintendency of Colombia and Banco de la República. Banco de la República calculations.

Graph 24  
Financial System Exposure by Debtors



Source: Financial Superintendency of Colombia, Banco de la República calculations.

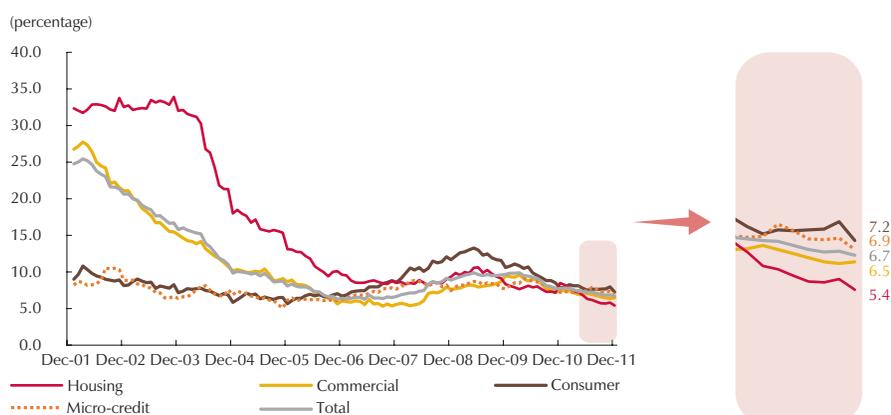
system, in turn, to the household sector increased. The household sector share of the exposed amount came to 33.2% in December 2011 compared to 32.1% registered in December 2010. Finally, said share has declined in the case of the public sector which has seen a reduction of 1.8 pp in comparison to what was seen in December 2010 (Graph 24).

In the case of the household sector, a 32.9% rise in the housing loan portfolio and a 27% reduction in the loan portfolio with securitization can be seen for December 2011 with respect to the same month a year earlier. This is associated with the securitization process that was carried out in December 2010.<sup>15</sup>

### 3. Loan Portfolio Quality and Loan-loss Provisioning

The indicator of loan portfolio quality (QI) –measured as the ratio between the risky<sup>16</sup> and gross loan portfolio– showed a decline in the last half of the year as it went from 7.3% in June to 6.7% in December 2011 (Graph 25). The housing loan portfolio saw the largest reduction in the QI as it went to a level of 5.4% for the end of the year compared to the 6.3% seen in June. Meanwhile, in the commercial, consumer, and micro-credit loan portfolios, reductions of 61 bp, 25 bp, and 51 bp can be seen in the QI. Thus they were at levels of 6.5%, 7.2%, and 6.9% respectively in December 2011. Note that the drop in the QI for the different loan portfolios in 2011 is lower than what was registered in 2010. This is due in part to the higher growth of the risky loan portfolio in 2011. One exception is the case of the loan portfolio quality indicator for housing loans, which rose in 2010 as a result of the securitization process.

Graph 25  
Loan Portfolio Quality Indicator by Type of Credit



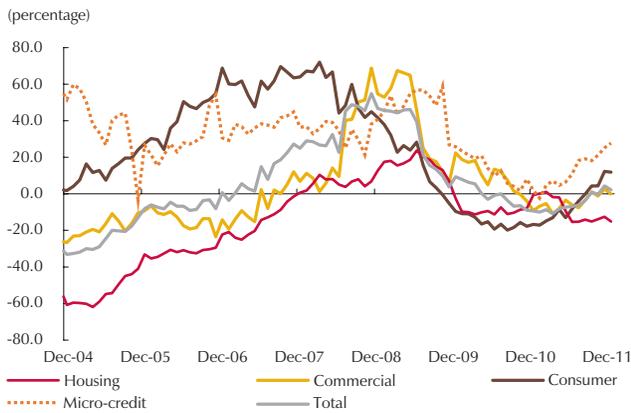
Source: Financial Superintendency of Colombia, Banco de la República calculations.

The risky loan portfolio presented a 2.2% real annual rate of change. It thus went to a level of COP\$14.5 t in December 2011 compared to COP\$14.3 t in June of the same year. The data show a surge in the real annual growth of the risky loan portfolios that are within the consumer and micro-credit portfolios. Their growth was 11.8% and 27.8% respectively and came to COP\$4.3 t and COP\$410 billion (b) in December 2011. This change was negative for the commercial and housing loan portfolios and the change for the latter was greater in magnitude. The results for each type of loan indicate that its QI has not deteriorated because of the growth that these loan portfolios have shown (Graph 26).

When the performance of the quality indicator for the loan portfolio for the most recent months is considered by type of intermediary, we see that the CFC continue to show a higher QI level in comparison to the rest of the groups

16 The risky loan portfolio is defined as the set of loans with ratings other than A.

**Graph 26**  
Real Annual Growth of the Risky Loan Portfolio



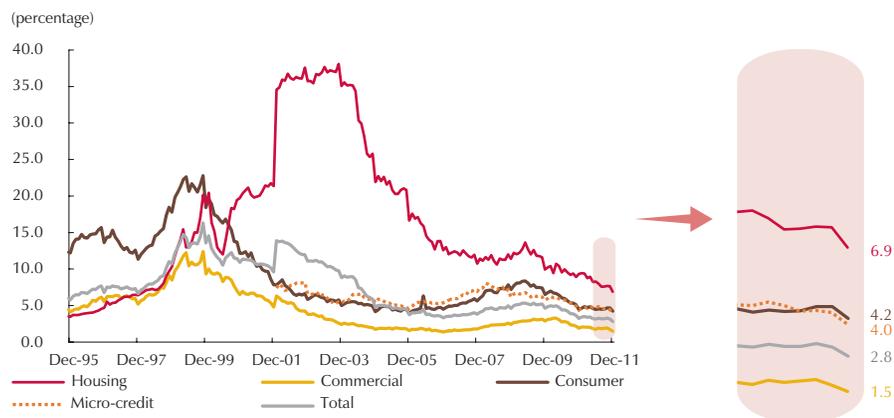
Source: Financial Superintendency of Colombia, Banco de la República calculations.

of entities and came to a level of 11.7% in December 2011. All of the intermediaries showed a QI that was lower compared to the one in June of the same year. Banks, financing companies, leasing companies, and cooperatives showed a decline of 52 bp, 2.6 pp, 17.0 bp, and 1.8 pp. In December 2011, they were at levels of 6.5%, 11.7%, 7.2%, and 6.5% respectively.

The default indicator (DI), in turn, measured as the ratio between the non-performing portfolio<sup>17</sup> and the total gross loan portfolio shows a slight reduction in comparison to what was seen in June 2011. It was at a level of 2.8%, a figure that is the lowest value registered for this indicator, in December of the same year.

An analysis of the recent change in the indicator by type of credit shows a downward movement for all of the different types (Graph 27). Housing loans, specifically, showed the largest reduction in the default indicator in the second half of 2011 as they went from 8.3% in June to 6.9% in December. The non-performing portfolio in the consumer loan portfolio showed a surge of 11.4 bp during this period and came to a value of COP\$2.5 t. This deterioration, nevertheless, did not translate into an upswing of the DI because the gross loan portfolio grew even more.

**Graph 27**  
Default Indicator: Non-performing Loan Portfolio/Gross Loan Portfolio

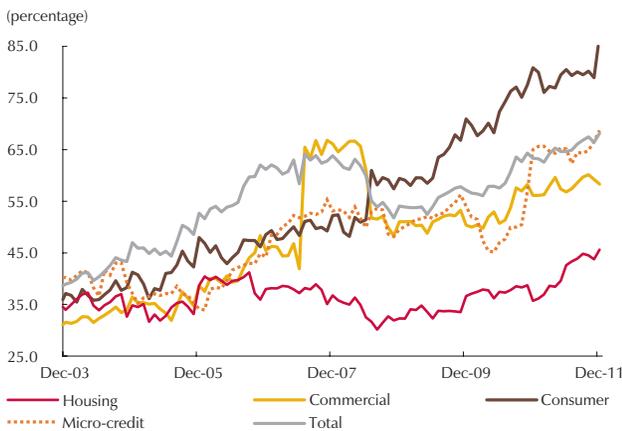


Source: Financial Superintendency of Colombia, Banco de la República calculations.

When the recent performance of the DI is analyzed based on the type of capital the financial entities have, a convergence is seen between the values registered for foreign and national entities, especially during the last year. The DI for both groups of entities continues to show a declining trend and was at close to 2.5% in December 2011.

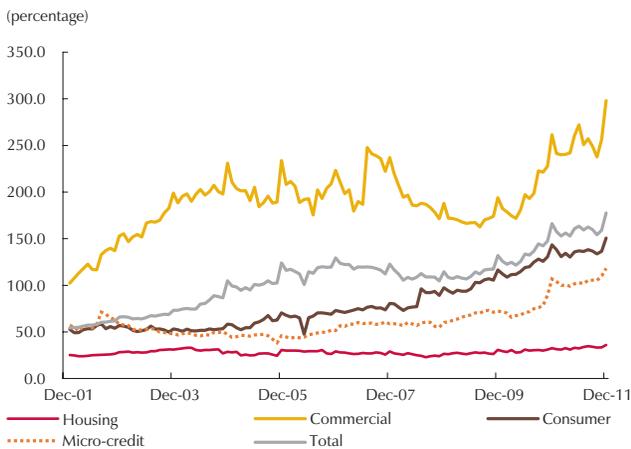
17 The non-performing portfolio is that which has a default that is equal to or higher than 30 days.

**Graph 28**  
Hedge Indicator: Loan-loss Provisioning/Risky Loan Portfolio



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 29**  
Loan-loss Provisioning/Non-performing Loan Portfolio



Source: Financial Superintendency of Colombia, Banco de la República calculations.

The indicator of loan portfolio coverage, measured with the loan-loss provisioning expressed as a share of the risky loan portfolio, showed an upswing for the total loan portfolio as it went from 64.6% in June of 2011 to 68.2% in December of the same year. This performance was the result of a growth in the loan-loss provisions that was higher than what was seen in the risky loan portfolio within the consumer, commercial and micro-credit portfolios. In the case of the housing loan portfolio, the rise in the loan portfolio coverage indicator is particularly due to a reduction in the risky loan portfolio, which saw a drop of 12.7% in the first half of 2011 (Graph 28). The indicator of loan portfolio hedging for the consumer loan portfolio came to a level of 87.1% in December 2011 while this share came to values of 58.3%, 68.7%, and 45.6% for the commercial, micro-credit, and housing loan portfolios respectively.

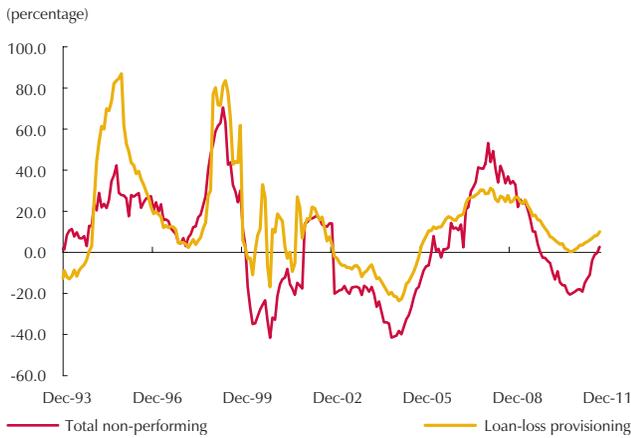
The loan-loss provisions expressed as a share of the non-performing loan portfolio have shown a growth trend for all of the types of credit since May 2010 and represented 1.7 times the total non-performing loan portfolio in December 2011 (Graph 29). This value rose in comparison to what had been seen in June 2011 when it was at 163.4%. The type of credit that showed the largest upswing in its indicator is the consumer one which registered a change of 13.7 pp compared with June 2011 and was at 150.6% in December 2011.<sup>18</sup>

When the annual growth of the total non-performing loan portfolio is analyzed in comparison to that of loan-loss provisioning, changes in the former are seen to be accompanied by changes in the latter. In 2011, the reactivation of loan-loss provisioning was seen due to the upswing in the non-performing loan portfolio. In December 2011, the real annual growth rates for the non-performing loan portfolio and loan-loss provisioning was 2.7% and 10% respectively (Graph 30). If this ratio is analyzed by type of portfolio we see that in the case of the consumer loan portfolio, the loan-loss provisions show a more accentuated reaction to the rise in the non-performing loan portfolio than they do the rise in the others. Loan-loss provisions for the commercial loan portfolio remain stable with respect to an increase in the non-performing loans in this portfolio.

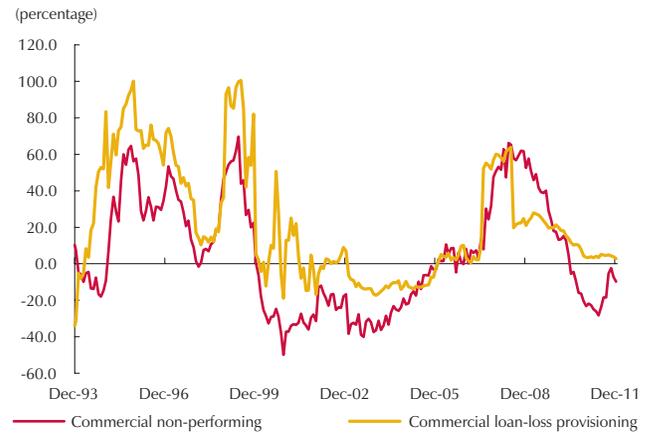
18 The expansion of loan-loss provisioning is partly due to the growth of the non-performing loan portfolio as well as to External Circular 043/October 2011, which modified the loss resulting from default (LRD) in the consumer portfolio.

Graph 30  
Growth of the Non-performing Loan Portfolio and Loan-loss Provisioning

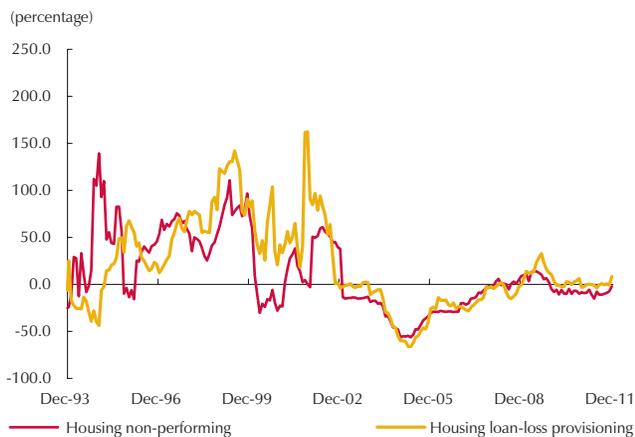
A. Total



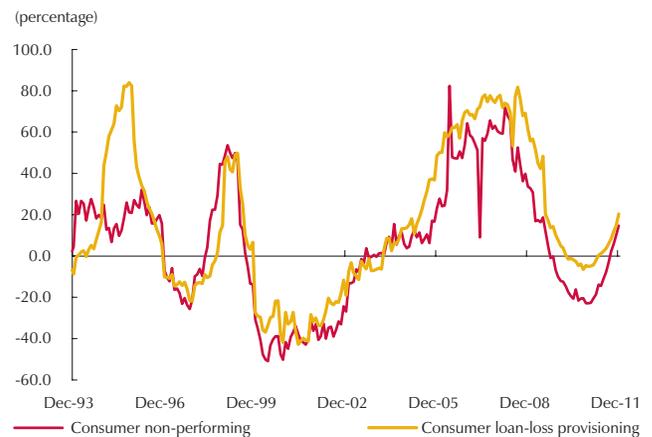
B. Commercial



C. Housing



D. Consumer



E. Micro-credit



#### 4. Earnings, Profitability, and Capital Soundness

The profits the financial entities registered in the second half of 2011 showed a real growth of 6.4% and were at COP\$6.9 t in December. This change is due to an upswing in interest income associated with the growth of the gross loan portfolio, which rose 4% in real terms between June and December 2011.

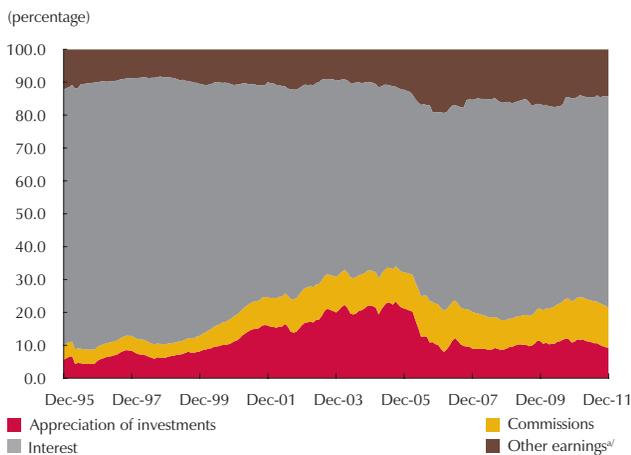
The performance observed in profits has not been uniform across groups of financial intermediaries. This item increased for banks and came to COP\$5.8 t in December 2011 after having registered a value of

Source: Financial Superintendency of Colombia, Banco de la República calculations.

COP\$5.3 t six months earlier. Meanwhile, the CFC, cooperatives, and leasing companies showed reductions of COP\$25.2 b, COP\$12.4 b, and COP\$10.4 b respectively during this period. The former went from registering profits of COP\$142.5 b to COP\$117.3 t while the cooperatives and leasing companies reported values of COP\$47.5 b and COP\$251.8 b respectively in December 2011.

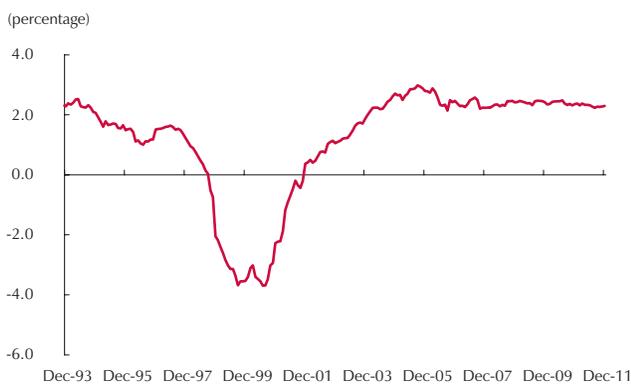
The financial earnings of the entities came to a value of COP\$31.9 t in December 2011 thus showing a real growth of 9.5% compared to what had been seen six months before. The performance of the financial earnings in the second half of 2011 is explained, in particular, by a surge in income from interest and commissions. The two of these showed real annual expansion rates of 19.7% and 10.6% respectively. Finally, earnings from investment appreciation declined 7.6% in comparison to what had been seen in June 2011 and were at COP\$2.9 t in December 2011 of that year.

Graph 31  
Components of Financial Income



a/ operating income from leasing (38%), dividends (35.4%), net changes (8.6%), and return on investment (7.5%).  
Source: Financial Superintendency of Colombia, Banco de la República calculations.

Graph 32  
Return on Assets (ROA)



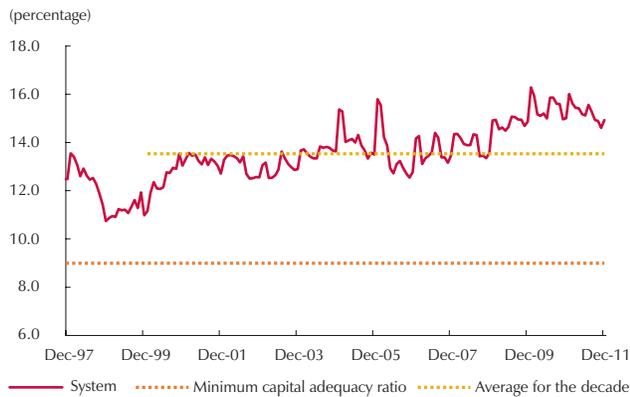
Source: Financial Superintendency of Colombia, Banco de la República calculations.

The item that has contributed the most to the increase in the entities' financial earnings is interest income, which represented 64.3% of these earnings in December 2011. This share has shown an uptick of 2.5 pp compared to what was seen in June 2011. The contribution of commission income, in turn, to total financial earnings diminished in comparison to what had been reported in June as it went from 12.7% that month to 12.2% in December 2011. Finally, earnings from appreciation on investment were 9.3% of the financial income registered in December 2011. This represents a decline of 1.7 pp in comparison to six months previously (10.9%) (Graph 31).

The financial institutions' profitability measured with the ROA indicator, which corresponds to the profits for the period as a share of the average assets for each entity, have remained stable for the last few six month periods. In December 2011, the ROA that was calculated for the institutions in the financial system was at 2.3% (Graph 32). This indicates that the growth in earnings has been accompanied by a similar dynamic in the entities' assets.

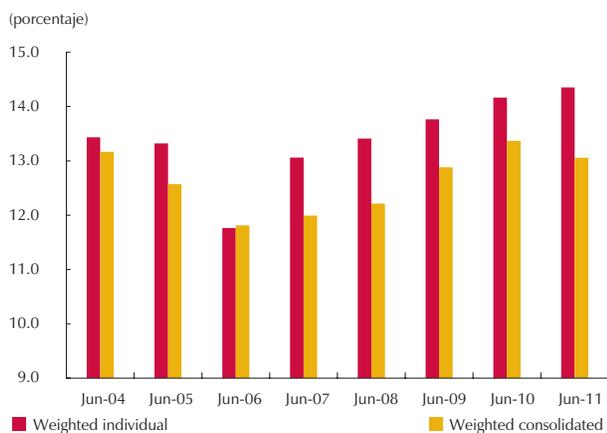
The capital adequacy ratio of the financial institutions, in turn, continues to remain above the average for the decade (13.5%) and the regulatory minimum (9%). In December 2011, this indicator came to a level of 14.9%, which is 20 bp lower than what had been seen in June of the same year (Graph 33).

**Graph 33**  
Credit Institutions: Capital Adequacy Ratio



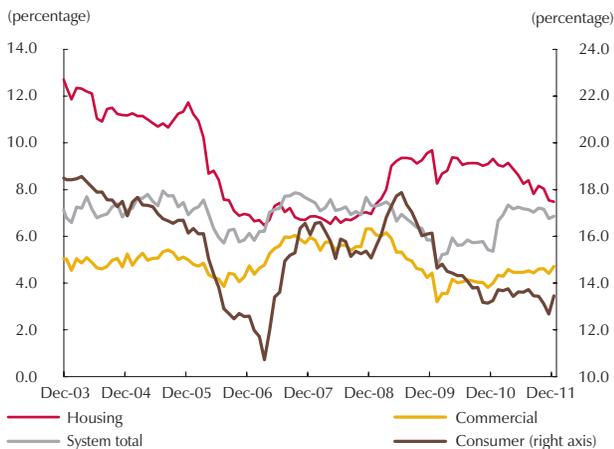
Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 34**  
Individual and Consolidated Capital Adequacy Ratios of Credit Institutions



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 35**  
Ex Ante Intermediation Spread Calculated with the CD Interest Rate



Source: Financial Superintendency of Colombia, Banco de la República calculations.

For the entities with subsidiaries, it is necessary to build a consolidated capital adequacy indicator in order to include the differences between the levels of leverage for both the parent company and the subsidiaries in the analysis.<sup>19</sup> When said indicator is built, the total technical equity of the financial institutions that belong to the conglomerate and their corresponding assets weighted by risk are borne in mind. Based on the information reported in June 2011, the consolidated capital adequacy ratio for the system, which is built as a weighted average through the equity share of each institution, was at 13.1%. This was 1.1 pp lower than the indicator built on the basis of the individual capital adequacy for each entity. The difference between these indicators rose in the first half of 2011, which indicates that the conglomerates showed a deterioration in their capital adequacy ratio in comparison to what had been seen for the individual indicators (Graph 34).

## 5. Intermediation Spreads

In 2011, the Board of Directors of the Banco de la República (JDBR in Spanish) began a less expansionary, monetary policy. This has been carried out with gradual increments in the benchmark interest rate which put it at 4.75% for December 2011. This corresponds to a change of 175 bp compared to December 2010.

The effects of this change in the monetary policy have been transmitted to the financial system's bond issue and deposit taking rates which saw a significant rise in 2011. It is noteworthy that during that year the former had registered a larger increase than the latter. This has generated a 1.5 pp change in the financial entities' ex ante spread, which came to 6.9% in December (Graph 35).

<sup>19</sup> According to Financial Superintendency of Colombia regulations, the credit institutions that have subsidiaries and own more than 50% of these subsidiaries are obligated to present the consolidated capital adequacy for the group. However, if the credit entity has a share that is less than 50%, it should subtract the subsidiary's technical equity from its own.

An analysis that differentiates by type of credit reveals that the rise in the *ex ante* spread for the total loan portfolio is due to an upswing in the lending rates of the commercial, consumer, and micro-credit loan portfolios. This upswing was higher than what was registered for the deposit rates in 2011. The spread for these types of credit registered an annual variation of 70 bp, 20 bp, and 3pp respectively based on the information available as of December 2011 and the *ex ante* spread for these loan portfolios was at 4.7%, 13.4%, and 30% respectively. Meanwhile, the spread for the housing loan portfolio showed a negative change of 1.8 pp and a value of 7.5% for December 2011.

Graph 36  
Ex post Intermediation Spread



Source: Financial Superintendency of Colombia, Banco de la República calculations.

The *ex post* intermediation spread dropped 20 bp in 2011 and came to a value of 6.9% as of December (Graph 36). This occurred because the implicit lending rate fell (-24 bp) and was at 10.6% while the implicit deposit rate remained stable and registered a level of 3.7% for that month. This was because of the fact that the interest income has seen a growth that is lower than that for the total loan portfolio.

To summarize, in the second half of 2011, the growth of the gross loan portfolio has remained stable in comparison to what was observed in the first six months of the year. The credit areas that showed the most strength are the consumer and micro-loan

portfolios while the commercial loan portfolio saw a slowdown in growth.

Although growth was seen in the non-performing and risky loan portfolios within the consumer loan portfolio, the indicators of loan portfolio quality and default continue to show a downward trend in spite of the rise demonstrated by the gross loan portfolio. Said performance has caused investments to decline as a share of the financial entities' assets. The earnings from investment appreciation have also dropped as a share of the total financial income.

When the change in the liability accounts of the credit institutions in the second half of 2011 is considered, we find that the expansion of deposits has been driven primarily by bonds and current accounts at the same time that CD deposits have shown an upswing during this period, especially those with maturities of more than one year.

With respect to the aspects of financial entity profitability and soundness, one sees that the rise in earnings, which was evident during the second half of the year, has been accompanied by similar growth in the assets. This indicates that the profitability of the institutions has remained relatively constant. Last of all, the difference in the indicators for individual and consolidated capital adequacy in the case of financial conglomerates has increased during the six-month period in comparison to what was seen in the previous six month period even though the levels registered are still appropriate.

## B. NON-BANKING FINANCIAL INSTITUTIONS

The analysis of the non-banking financial institutions (NBFI) is vitally important for the purpose of this Report since they are entities that can have an influence on financial stability. On the one hand, they are economic agents who, through portfolio management become savings and investment vehicles for households and the public in general. On the other, they are entities that are tightly linked to the rest of the financial agents whether as counterparts in their market operations or due to the fact that they belong to some financial group. Consequently, they are entities that can act as systemic agents in certain contingencies. The NBFIs that are analyzed in this section correspond to the managers of pension and severance funds (PFM),<sup>20</sup> the life (LIC) and (GIC) general insurance companies, trust companies (TC), stock brokerage firms (SBF), and investment management companies (IMC).

In order to study the share of the NBFI portfolio within the financial system, the value of the investments for each type of entity in the system is presented in Table 3. In 2011, the financial institutions' portfolio surged 12.7% and was at COP\$542.4 t, a figure that is equal to 88.4% of the GDP, in December of that year.

The value of the NBFI portfolio, in turn, showed a growth of 7.6% in the period under analysis. This figure is lower than what was seen in 2010 (19.3%). It should be mentioned that this slowdown was registered for all of the entities that the NBFI consists of. The drop in value of the SBF portfolio, which fell 24.9% in the period under analysis is noteworthy (Table 3).

### 1. Pension and Severance Fund Managers (PFM)

The real annual growth rate of the value of the funds managed by the PFM continued dropping during the second half of 2011 as it went from 13.7% in June 2011 to 0.64% in December of the same year and came to COP\$121.0 t (Graph 37).

When the funds managed by the PFM are broken down by type, the mandatory pension funds (MPF) were found to have registered a real annual growth of 2.4% in their portfolio and to have reached a level of COP\$103.8 t as of December 2011. In contrast, the voluntary pension funds (VPF) and severance funds (SF) registered real annual growth rates of -0.22% and -3.3% respectively as they went to levels of COP\$11.6 t and COP\$5.7 t in December 2011. In Graph 38, the seasonal performance that

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<sup>20</sup> In March 2011, the multifund plan for the mandatory pension system, Decree 2373 July/2010, went into effect. For more detail about the changes introduced by this measure see the box entitled "Reform of the Fully Funded Pension System Based on Individual Accounts," published in the September 2010 Financial Stability Report.

Table 3  
Financial Institutions' Investment Portfolio

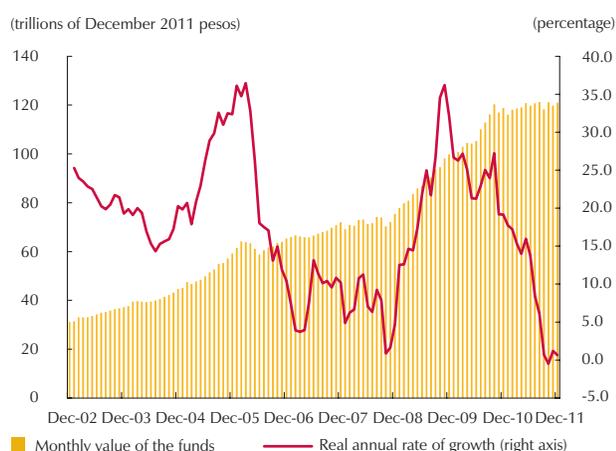
	2008		2009		2010		2011	
	Trillions of pesos	Percentage of the GDP	Trillions of pesos	Percentage of the GDP	Trillions of pesos	Percentage of the GDP	Trillions of pesos	Percentage of the GDP (proj)
<b>Credit Institutions</b>								
Investments	38.8	8.1	50.8	10.1	60.3	11.0	63.9	10.4
Loan Portfolio	147.8	31.0	151.3	30.0	176.8	32.2	215.8	35.2
Total credit institutions	186.5	39.1	202.1	40.0	237.1	43.3	279.7	45.6
<b>Non-banking Financial Institutions</b>								
Mandatory Pensions	58.4	12.2	79.9	15.8	98.9	18.0	103.8	16.9
Voluntary Pensions	7.5	1.6	9.5	1.9	11.3	2.1	11.5	1.9
Severance Pay	4.0	0.8	4.9	1.0	5.7	1.0	5.7	0.9
General Insurance	4.0	0.8	4.6	0.9	5.3	1.0	5.6	0.9
Life Insurance	11.9	2.5	14.3	2.8	16.6	3.0	18.7	3.1
Trust companies	74.7	15.7	88.1	17.5	101.4	18.5	113.5	18.5
Brokerage Firms and Investment Management Companies	2.6	0.5	3.4	0.7	5.1	0.9	3.8	0.6
<b>Total Non-banking Financial Institutions</b>	<b>163.1</b>	<b>34.2</b>	<b>204.8</b>	<b>40.6</b>	<b>244.2</b>	<b>44.5</b>	<b>262.7</b>	<b>42.8</b>
<b>Total</b>	<b>349.6</b>	<b>73.3</b>	<b>406.9</b>	<b>80.6</b>	<b>481.4</b>	<b>87.8</b>	<b>542.4</b>	<b>88.4</b>

(proj) projected to December 2011.

Source: Financial Superintendency of Colombia, Banco de la República calculations.

the value of the SF shows can be seen. In this fund, deposits are registered in the first two months of the year and disbursements in the following months.

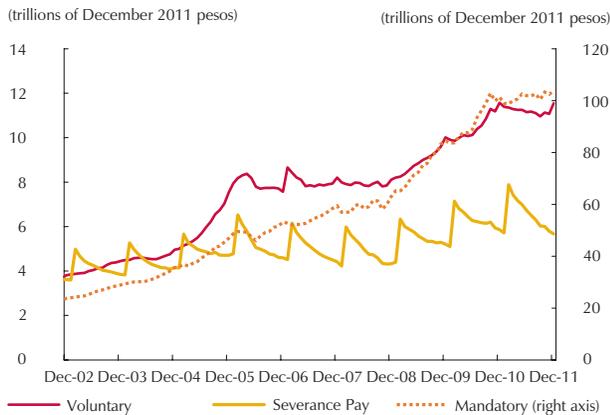
Graph 37  
Pension Funds: Value and Real Growth



Source: Financial Superintendency of Colombia, Banco de la República calculations.

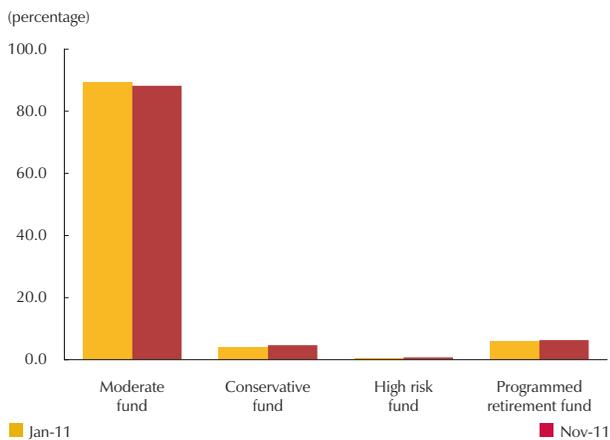
As was mentioned in the previous *Financial Stability Report*, the multifund plan for the MPF went into effect as of March 2011. In this, there are three funds in the accumulation phase (conservative, moderate, and high risk) and one for the pension stage (programmed retirement fund). In the first two months of 2011, the shareholders had the option of choosing among the three funds available. Those that did not choose were assigned to the moderate fund. In Graph 39, a high concentration of account holders can be seen in the moderate fund as of November 2011 (88.2%) just like the concentration in June of the same year (89.2%). This makeup suggests that the account holders have not modified their choice of fund on the basis of their risk profile,

**Graph 38**  
Value of Pension Fund Portfolio



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 39**  
Distribution of MPF Portfolio by Type of Fund



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 40**  
Average Profitability of the MPF for the Last Five Years



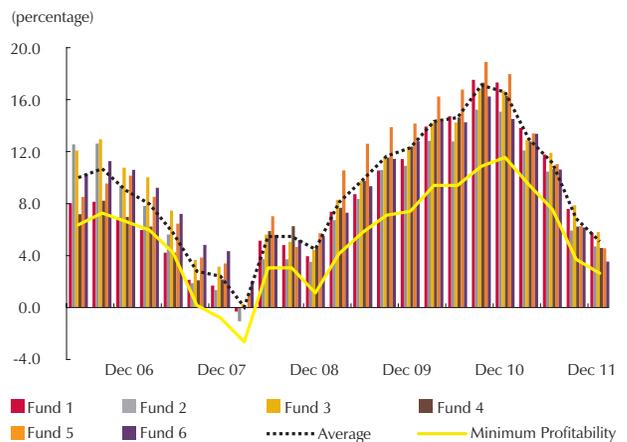
Source: Financial Superintendency of Colombia, Banco de la República calculations.

which was one of the purposes of the multifund plan.

When the profitability of the MPF for the last five years<sup>21</sup> is analyzed, we see that, in the last six months of 2011, a marked drop in the profitability was registered as it went from 14.23% in June to 12.0% in November (Graph 40). The two year profitability of the SF, in turn, also showed a reduction in the second half of 2011 and was at 5.1% in November of that year compared to the 11.1% that had been registered in June (Graph 41).

Regarding the makeup of the portfolio managed by the PFM, this is still concentrated in public debt instruments. In the second half of 2011, there was a shift from investments in the productive sector to this type of securities as well as to securities issued by financial institutions. As of November of that year, investments in government bonds and the productive sector<sup>22</sup> represented 42.0% and 21.9% respectively of the portfolio compared to the 40.9%

**Graph 41**  
Two-year Profitability and Minimum Profitability for Severance Funds

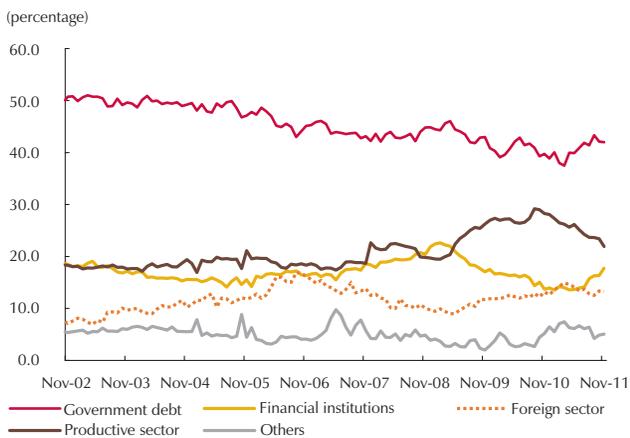


Source: Financial Superintendency of Colombia, Banco de la República calculations.

21 The calculation presented in Graph 40 represents the internal rate of return for the 5-year moving window prior to the date of the study. The width of the window is used given the interest in seeing the profitability over a broad period of time due to the nature of the investments managed by the pension fund managers.

22 Mainly bonds and highly liquid stocks.

Graph 42  
Components of Pension Fund Portfolio by Issuer



Source: Financial Superintendency of Colombia, Banco de la República calculations.

and 25.1% registered in June of the same year. The change in trend of the share of the securities issued by financial institutions<sup>23</sup> is noteworthy as it accounted for 17.8% of the portfolio in November 2011 in comparison to 13.9% six months earlier. The share of the foreign sector investments in the portfolio,<sup>24</sup> in turn, remained relatively stable and were at close to 13% in November 2011 (Graph 42).

The shift from productive sector securities towards investments in government bonds is related to the fact that the moderate fund still has the highest share of the total resources and the high risk fund has a very small share. This limited the PFM investment in domestic variable income securities due to the fact that since last year, it was already close to the regulatory limit (35% for the moderate

fund). This has caused the PFM to invest in government bonds. Added to this is the devaluation that the IGBC<sup>25</sup> suffered in the second half of 2011.

When the makeup of the investments for each type of portfolio within the multifund plan is analyzed, we see that the conservative fund and the programmed retirement one are concentrated in public debt securities (58.7% and 65.9% as of November 2011 respectively) although the share held in these securities has declined slightly compared to what was seen in June 2011. However, the high risk fund is showing a slight rise in the share that the domestic variable income securities have (accounting for 32.4% in November 2011) and, at the same time, has reported an upswing in the share invested in government bonds (30.2% as of November 2011). The moderate fund, likewise, is continuing to concentrate its investments in public debt securities and registered a 41.9% share in November 2011. Regarding the variable income securities, their share as of November 2011 was 33.2%, which is close to the maximum regulatory limit of 35% in spite of the fact that it declined slightly in comparison to what had been registered in June of the same year (34.6%). In addition, it can be seen that the percentage of the portfolio in unhedged foreign currency has risen slightly compared to what was registered in June 2011. However, the levels reported remain low and well below the maximum limits in effect for all of the funds. As of November 2011, this share was 5.0% for the conservative, 6.6% for the high risk, 5.3% for the moderate fund, and 4.8% for the programmed retirement fund (Graph 43).

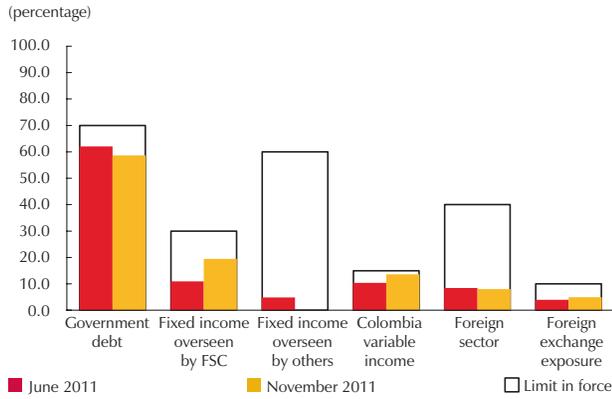
23 Bonds, CDs, and highly liquid stocks.

24 Most of these are shares in stock index funds, shares of mutual funds or international investment funds for which the main objective is to invest in stocks, etc.

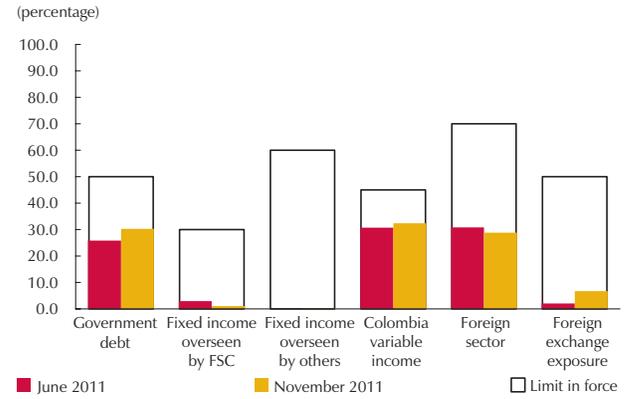
25 This index registered a drop of 9.9% between June and December 2011.

Graph 43  
MPF Portfolio Components as of November 30, 2011 Compared to Legal Limits in Force

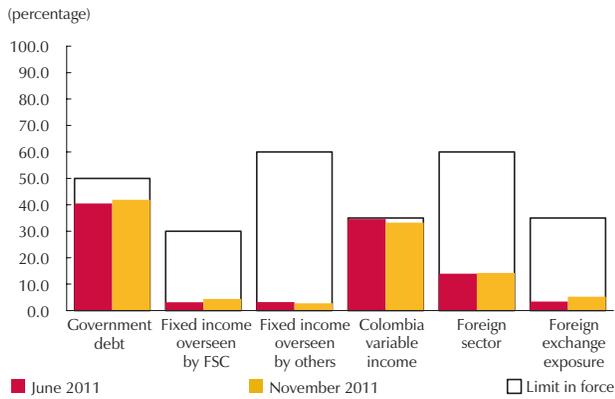
A. Conservative Fund



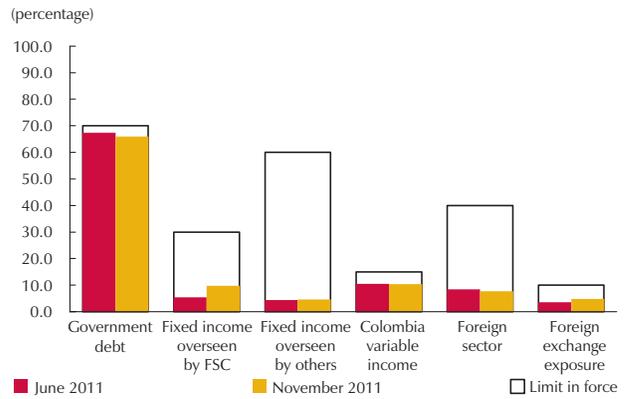
B. High Risk Fund



C. Moderate Fund



D. Programmed Retirement Fund



Source: Financial Superintendency of Colombia, Banco de la República calculations.

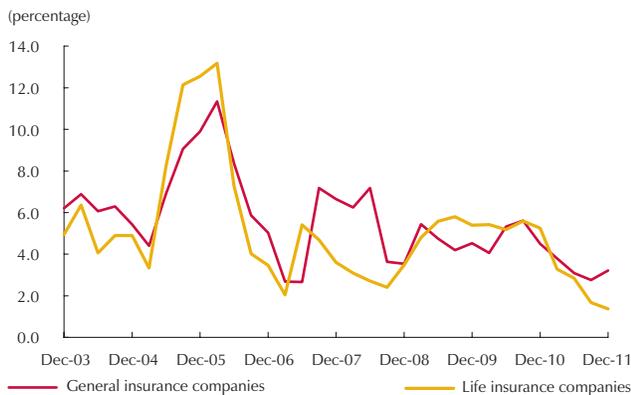
To summarize, in the second half of 2011, there was a drop in the strength of the value of the funds managed by the PFM as they registered growth levels below those seen in the first six months of the same year. This slowdown was due in particular to the performance of the variable income portfolio during that period. Likewise, there was a shift in the PFM portfolio towards public debt securities and securities issued by financial institutions.

## 2. Life and General Insurance

### a. Portfolio Value and Return

As of December 2011, the ROA of the LIC was at 1.4%, which represents a drop of 1.4 pp with respect to the value seen six months earlier (2.8%). However, the return for the GIC increased slightly during the same period as

**Graph 44**  
ROA for General and Life Insurance Companies



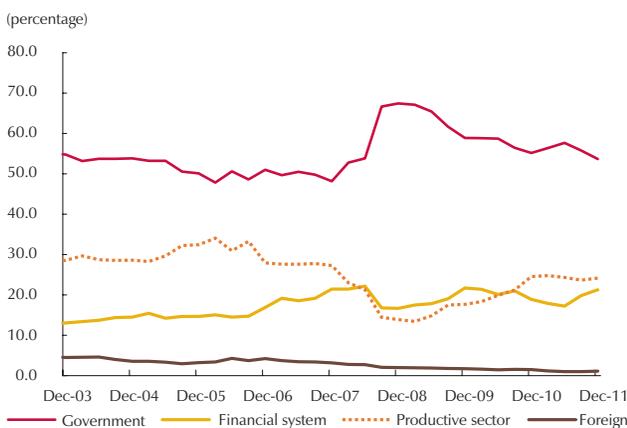
Source: Financial Superintendency of Colombia, Banco de la República calculations.

it went from 3.1% in June 2011 to 3.2% in December of the same year (Graph 44). The decline in LIC profitability was largely due to the downward trend in the prices of domestic stocks during the period under analysis. The rise in the GIC profitability, in turn, was related to a significant upswing in the premiums issued which had a positive effect on the earnings of these companies.

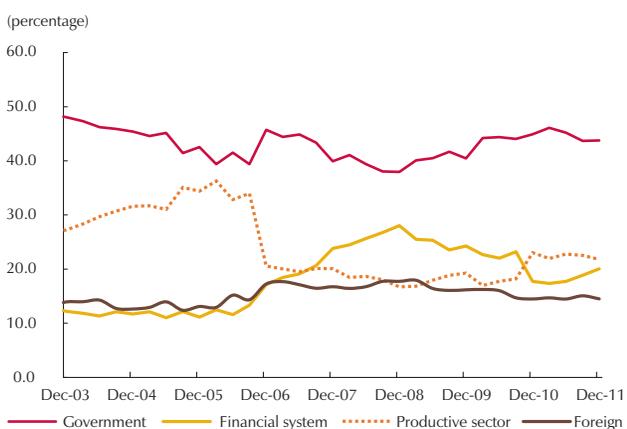
Furthermore, the upward movement, which has been seen since 2002, in the value of the GIC and LIC investment portfolios continued. As of December 2011, the value of said resources accounted for COP\$18.7 t and COP\$5.6 t for the LIC and GIC respectively. This constitutes a six-month variation of 4.4% for the former and 6.0% for the latter.

**Graph 45**  
Investment Portfolio by Issuer

**A. Life Insurance Companies**



**B. General Insurance Companies**



Source: Financial Superintendency of Colombia, Banco de la República calculations.

With respect to the investment portfolio of these entities,<sup>26</sup> it should be noted that it is still concentrated primarily in public debt instruments in spite of the fact that these securities declined as a share of the portfolio in the last half of the year while the financial sector securities gained in importance.

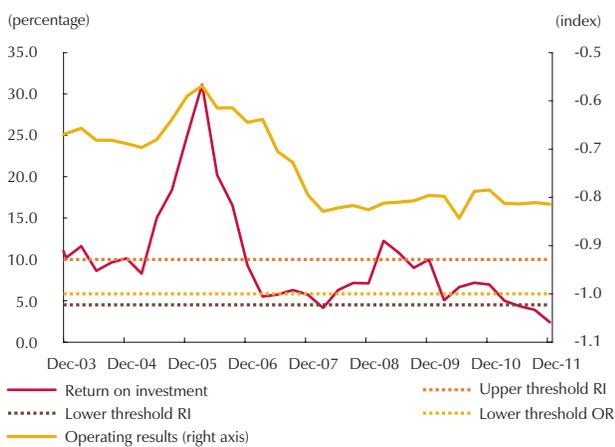
In the case of the LIC, the share held in financial sector securities rose 4 pp and was at 21.3% while the share in government bonds fell 4 pp and was at 53.7% at the end of 2011 (Graph 45, panel A). With respect to the GIC, the share in public debt securities declined 1.4 pp while the share in financial sector securities rose 2.4 pp and the two went to 43.8% and 20.1% respectively. Last of all, the share held in productive sector securities did not vary significantly for insurance companies in the period under analysis and was at 21.8% and 24.2% in December 2011 for the GIC and LIC respectively (Graph 45, panel B).

26 The legal investment limits for LIC are: government bonds (no limit), fixed income overseen by the FSC (50%), productive sector fixed income (70%), national and foreign variable income (40%), foreign sector (40%), and exchange rate exposure (35%). For the GIC they are: public debt (no limit), fixed income overseen by the FSC (20%), productive sector fixed income (70%), national and foreign variable income (30%), foreign sector (40%), and exchange rate exposure (35%).

In conclusion, the investment portfolio for both the GIC and LIC remains concentrated in government bonds in spite of the fact that, in the second half of 2011, this type of security declined as a share of the investment portfolio of these entities. During this period, financial sector securities gained importance. With regards to the profitability of these entities, the GIC showed a rise in the ROA while the LIC saw a decline in the second half of 2011.

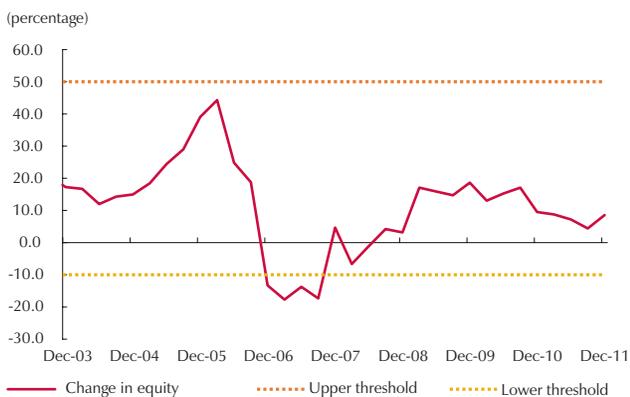
### b. Performance Indicators

**Graph 46**  
Return on Investments (RI) and Operating Results (OR) for General Insurance Companies



Source: Financial Superintendency of Colombia, Banco de la República calculations  
With respect to the change in equity, this rose as of December 2011 in comparison to the figure for June of the same year (7.2%) and went to 8.6%. This upswing was due to lower trend in the liabilities of the entities compared to that of their assets (Graph 47).

**Graph 47**  
General Insurance Companies: Change in Equity



Source: Financial Superintendency of Colombia, Banco de la República calculations.

A set of indicators is presented below in order to analyze the performance of the GIC. These are used to watch the performance of these entities from different aspects such as earnings, liquidity and other general standpoints.<sup>27</sup>

The indicator of return on investments shows a drop during the second half of 2011. As of December of that year, this indicator was at 2.4% while it had been at 4.3% in June of the same year. It is noteworthy that the level of this indicator is the minimum seen in the period under analysis and is below the lower international threshold (4.5%). The operating result, in turn, which combines indicators of technical and financial aspects and that has a high correlation with the return on investment remains at levels close to those registered in June 2011 and in December of that year was at -0.8. The above shows that the handling of technical aspects such as the accident rate and other costs associated with the business has counteracted the drop in the return on investments (Graph 46).

With respect to the change in equity, this rose as of December 2011 in comparison to the figure for June of the same year (7.2%) and went to 8.6%. This upswing was due to lower trend in the liabilities of the entities compared to that of their assets (Graph 47).

Regarding the companies' liquidity, the indicator of liabilities as a percentage of the liquid assets has remained stable during the period under analysis.

27 For more detail with respect to the calculation of each indicator, go to the box entitled: "Indicators of Financial Soundness for General Insurance Companies" in the Financial Stability Report for March 2011.

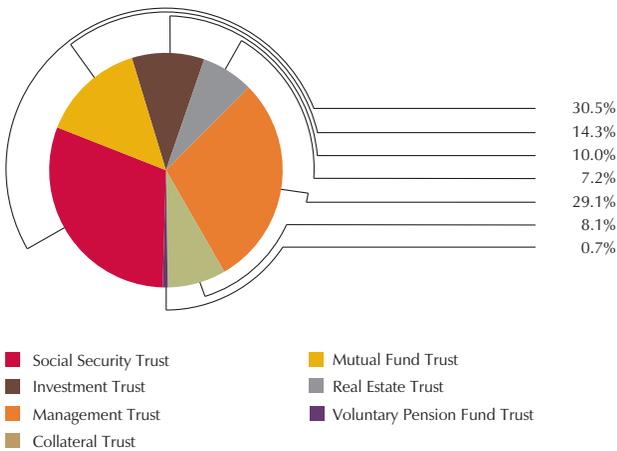
As of December 2011, the liabilities for the GIC came to 96.6% of their liquid assets. Based on international standards, a warning is issued when the liquid liabilities are more than 105% of the liquid assets (Graph 48).

**Graph 48**  
Liquidity Indicator for General Insurance Companies:  
Liquid Liabilities/Liquid Assets



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 49**  
Distribution of Trust Company Managed Assets by Type of  
Business as of December 2011



Source: Financial Superintendency of Colombia, Banco de la República calculations.

In conclusion, the indicator of return on investment shows a deterioration for the GIC and is below the international thresholds. In spite of this, the operating result did not fluctuate very much in the second half of 2011. Liquidity has remained at levels similar to those registered six months ago and a slight rise in changes to equity was seen.

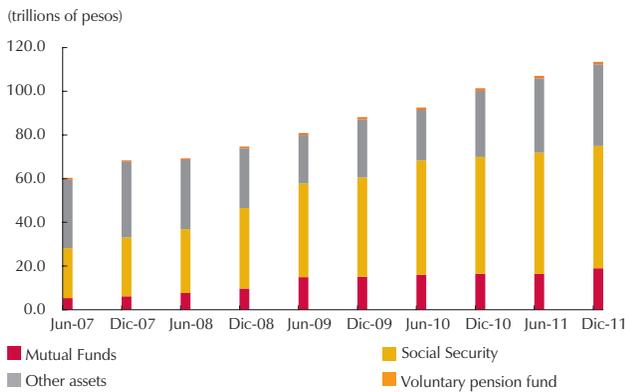
### 3. Trust companies

As of December 2011, the TC were managing funds<sup>28</sup> that had a value of COP\$197.9 t and which represented an annual growth of 17.6%. Of these assets, 30.5% corresponded to funds managed for social security, 29.1% to management trusts, and 14.3% to mutual funds. Among other trust assets, we find investment trusts (10%), collateral trusts (8.1%), real estate trusts (7.2%), and voluntary pension funds (0.7%) (Graph 49).

Of all the assets managed by the TC, investments represented 57.4% as of December 2011. They were at COP\$113.5 t, an amount that is COP\$6.5 t higher than the amount registered six months earlier. As can be seen on Graph 50, investments have grown continuously over the course of time. Just as is the case with assets, the most important items are in the social security portfolios and mutual funds. Between June and December 2011, the share of the resources invested for voluntary pensions declined while a rise in that for the mutual funds, social security, and other assets was seen.

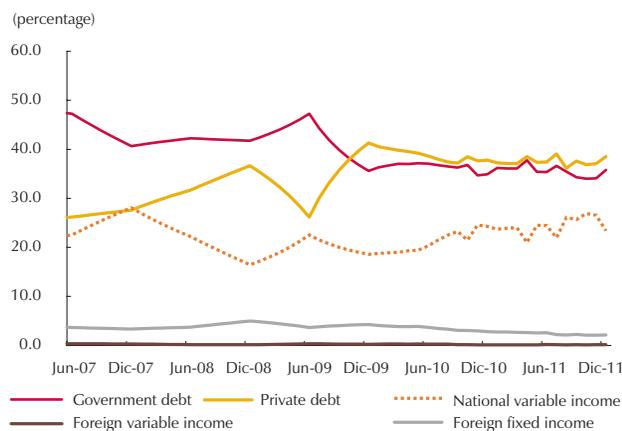
<sup>28</sup> The funds managed by the TC come from different types of businesses: In the investment trust, the client places a sum of money with the trust company to be invested in securities and managed for the benefit of the investor. This is known as a targeted investment. The management trust is one where the clients put goods into the hands of a fiduciary for it to manage based on what is agreed upon in the contract without giving up their property rights over them. The purpose of a real estate trust is to manage resources and goods belonging to a real estate project. In a collateral trust, the fiduciary manages resources or goods that are placed with it by the clients as a guarantee for a debt that they have with a third party. The mutual funds trust invests in mutual funds where each agent is clearly differentiated. A social security trust is a business which manages the funds allocated for social security and the voluntary pension fund trust manages the funds that the clients have allocated for that purpose.

**Graph 50**  
Changes and Components of Trust Company Portfolio



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 51**  
Ranking of the Investment Portfolio Managed by Trust Companies



Source: Fogafin, Banco de la República calculations.

Graph 51 presents the rating for the portfolio managed by the TC by type of asset. It can be seen that both private debt<sup>29</sup> and public debt securities continue to make up the largest share of the TC investment portfolio as they came to levels of 38.5% and 35.8% respectively. In the second half of 2011, a slight uptick in the share of the national variable income assets was registered. This reversed in December 2011, the month in which the asset was 23.4% of the portfolio. Moreover, there is a high preference for national investments since investments in foreign assets only represent 2.3% of the total.

#### 4. Stock Brokerage Firms and Investment Management Companies

The value of the investment portfolio managed by stock brokerage firms and investment management companies was at COP\$3.8 t as of December 2011. This represents an increase of 0.4% in comparison to what had been seen six months before. Nevertheless, during said year, their portfolio dropped 24.9% because of the performance of the variable income securities and the structure of their business which made the composition of the investment portfolio more volatile. The ROA of these institutions, in turn, registered a substantial drop as it went from 3.2% in June 2011 to 2.1% in December of the same year. This decline was mainly due to a fall in profits (Graph 52).

The general trend registered by the ROA does not necessarily follow the individual performance of the majority of the entities in this sector where there was evidence of varied behavior in the profitability of the assets in the second half of 2011. In Graph 53, panel A, 33 institutions can be seen whose profitability increased in proportion to the distance from the center towards the circumference. As can be seen, only nine entities had an ROA that was higher than the one in June 2011.

Just as was seen in the previous *Financial Stability Report*, the entities with a significantly negative ROA do not have excessive levels of leverage. In fact, these have an investment to net worth ratio that is lower than the

<sup>29</sup> CDs, bonds issued by companies in the productive and financial sectors, etc. are among the private debt securities. As of June 2011, CDs represented 55.3% of the total amount in private debt securities managed by the TC.

**Graph 52**  
ROA of Brokerage firms and Investment Management Companies



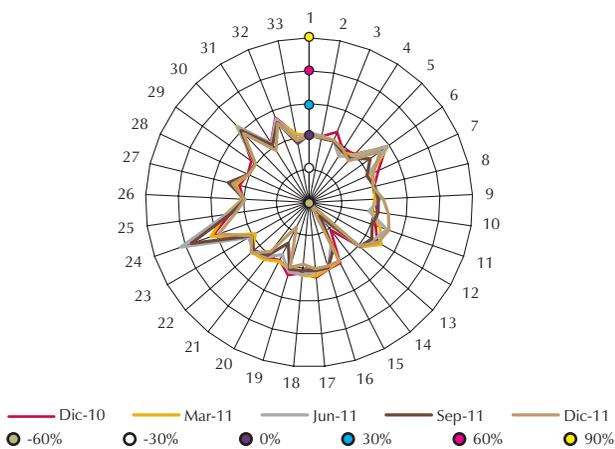
Source: Financial Superintendency of Colombia, Banco de la República calculations.

average registered for the sector. This ratio was four times as of December 2011. It should be noted that repurchase agreements that stock brokerage firms and investment managers carry out on a daily basis are not included within the leverage indicator (Graph 53, panel B).

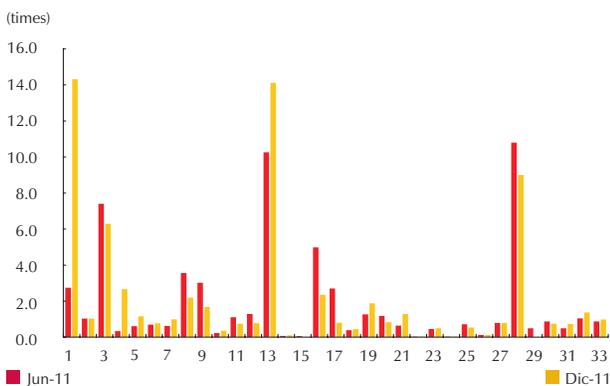
When the performance of the NBFIs is analyzed, it can be concluded that in the second half of 2011, there was, in general, a lower dynamic in portfolio changes in comparison to what had been registered in the first half of the same year. The devaluation of the national variable income securities led to lower levels of profitability for the majority of the NBFIs than what had been seen in the first half of 2011. Finally, with respect to the makeup of the investments, the performance was mixed. The PFM showed a shift towards government bonds while the insurance companies reduced the share of public debt within their investments in favor of financial sector investments. The portfolio managed by TC, in turn, remained concentrated in public and private debt with a high preference for national investments.

**Graph 53**

**A. ROA of Stock Brokerage Firms and Investment Funds**



**B. Investment/Net Worth of Stock Brokerage Firms and Investment Funds**



Source: Financial Superintendency of Colombia, Banco de la República calculations.

## Box 1 INTERNATIONAL INDICATORS

this box gives an analysis of the main indicators in some countries in Latin America in order to evaluate the conditions of the financial system in the region.<sup>1</sup> It takes into account the changes in loan portfolio, risk and efficiency between the fourth quarter in 2010 and the fourth quarter in 2011.<sup>2</sup>

In general terms, the financial situation of the Latin American economies registered a positive performance for the period under study. This is shown by increases in gross loan portfolio, greater hedging for credit risk, reduction in the default indicator and stability of the efficiency indicator for most of the countries analyzed.

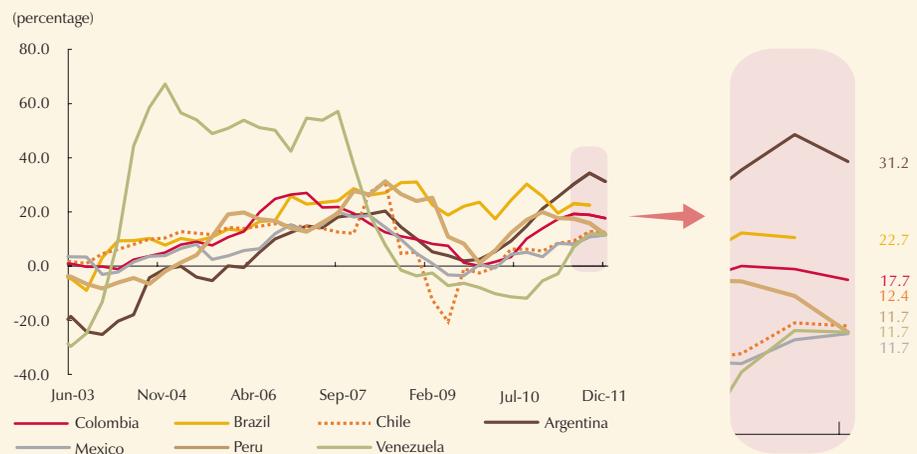
Generally, the performance of credit was positive in both the fourth quarter of 2010 and the same quarter in 2011 (Graph B1.1). The most representative case was that of Venezuela, which went from -5.5% to 11.7% real annual growth in the gross loan portfolio. Other countries such as Argentina, Chile and Mexico showed significant increases as they went from 21.2%, 5.6% and 3.4% to 31.2%, 12.4% and 11.5% respectively. Colombia,<sup>3</sup> in turn, rose 3.8 pp in the period analyzed and reached a real growth of 17.7%. In contrast, Peru and Brazil were the only countries that showed a decline in that indicator. The former

went from a growth of 20% to one of 11.7% while the latter had a growth reduction of 7.7 pp between the third quarter of 2010 and the third quarter of 2011 when it was at 22.6%.

The policy interest rate does not seem to have any current effect on the credit performance for the sample of countries. In the economies where the monetary authorities raised the policy interest rate, the gross loan portfolio had significant real growth with the exception of Peru where the dynamics of credit did respond to the policy measures.<sup>4</sup>

In addition, the default indicator had a relatively stable trend over the same period under analysis and was, on average, at

**Graph B1.1**  
Real Annual Growth of the Gross Loan Portfolio



Sources: central banks and bank superintendencies from each country, Banco de la República calculations.

- 1 It should be noted that the *Report of the Board of Directors to Congress* for March 2012 includes the box "Credit boom in Some Latin American Countries." This analyzes the performance of the loan portfolio relative to the size of the economy for a sample of countries in the region. Furthermore, a comparison of the level of indebtedness for the different economic sectors in the countries of the sample is included.
- 2 In the case of Brazil, the analysis covers the period from September 2010 to the same month in 2011 because the information is available only up to that date with the exception of data for the default indicator. The data for the rest of the countries is available up to December.
- 3 In the case of Colombia, the gross loan portfolio does not include leasing or securitizations in order to facilitate the comparison with other countries. That is why the indicators differ slightly from those presented in the other sections of this issue of the Financial Stability Report.

2.6%. Note that Venezuela was the country that succeeded in reducing this indicator the most as it went from 3.4% to 1.4%. Meanwhile, the economies of Brazil and Mexico were the only ones to show deterioration in the overdue loan portfolio/gross loan portfolio ratio although this was very small. Argentina and Peru, in turn, continued to have the lowest default indicators and these were at 0.7% and 1.5% respectively as of December 2011. In contrast, Brazil had the worst loan portfolio quality rating (5.3%). Finally,

- 4 In Mexico, the interest rate remained constant for the entire year of 2011 (4.5%). In contrast, the monetary authorities in Brazil reduced the policy interest rate from 11.25% to 10.5% between February 2011 and the same month a year later. In Colombia, Chile and Peru said interest rate experienced an increase as it went from 3% to 5%, 3.5% to 5.5% and 3.5% to 4.25% respectively.

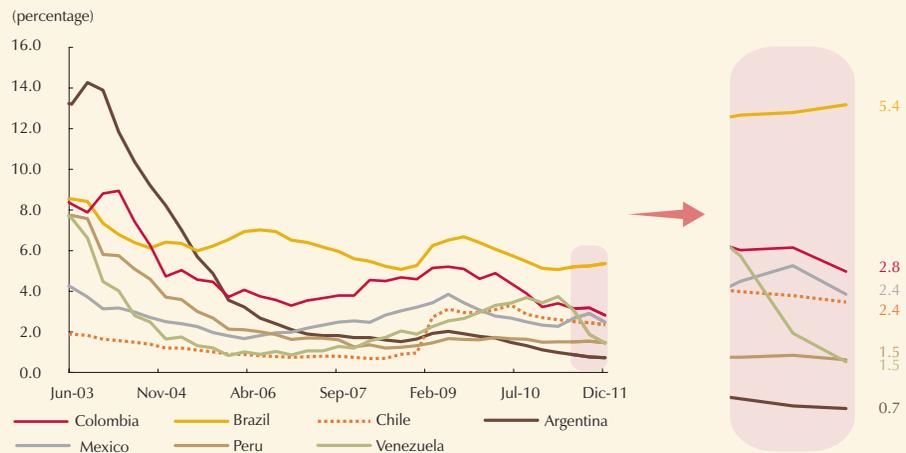
Colombia was the number two country with the highest overdue loan portfolio/gross loan portfolio ratio (Graph B1.2).

Also, the efficiency indicator, measured as the ratio of administrative and labor related expenditures (ALE) to assets, experienced a relatively constant performance in December 2010 and the same month in 2011. It should be noted that, by the end of the analyzed period, this indicator had improved only in the case of three countries: Chile, Colombia and Venezuela. However, Colombia and Venezuela are placed within the least efficient positions in the sample even though their share of administrative expenditures (4.1% and 4.4% respectively) remains close to the average for the analyzed countries. Argentina is still the country with the worst efficiency indicator (5.8%). In Mexico and Peru, it has remained at an average level of 3.5%. Regarding the efficiency of the financial entities in Brazil, a decline was registered as this went from 2% to 2.3% between the third quarter of 2010 and the same quarter in 2011 (Graph B1.3).

In the period under analysis, the hedging indicator, measured as the ratio of loan-loss provisioning to non-performing loan portfolio of the financial entities, registered a substantial upswing for every country in the sample with the exception of Mexico (Graph B1.4). The increases experienced in the hedging indicators for Venezuela and Argentina are notable as they went from 149.1% and 224.8% in December 2010 to 271.6% and 273.9% a year later. These results are mainly due to a reduction in the overdue loan portfolio of 39.5% and 5.9% in conjunction with an increase in loan-loss provisioning of 10.3% and 14.6% respectively. Chile, in turn, shows the lowest hedging indicator in the sample (99.1%). Brazil (107.6%), Colombia (177.6%) and Peru (251.1%), in turn, registered stable indicators.

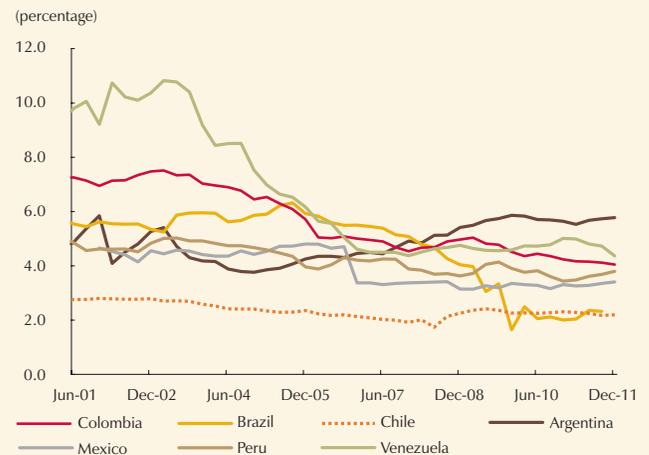
Graph B1.5 shows that the ratio of loan-loss provisioning/gross loan portfolio has remained relatively stable over the period of the study for every country in the sample with the exception of Venezuela, which showed a drop in the indicator beginning in June 2011. The fact that the ratio has held to a stable performance is noteworthy because it means the high growth rates for the loan portfolio registered in most of the countries in the region have occurred along with a significant upswing in the loan-loss provisioning. Argentina and Chile have the lowest indicator levels in the

**Graph B1.2**  
Default indicator: overdue loan portfolio/gross loan portfolio



Sources: central banks and bank superintendencies from each country, Banco de la República calculations.

**Graph B1.3**  
Efficiency: ALE/assets

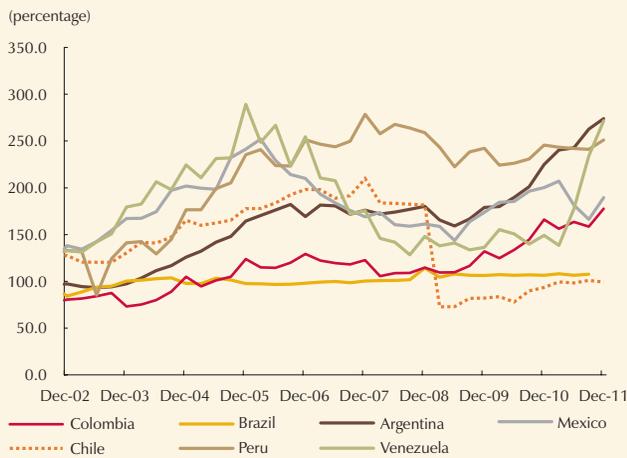


Sources: central banks and bank superintendencies from each country, Banco de la República calculations.

sample while Brazil, Colombia and Mexico are the countries that had a higher ratio between loan-loss provisioning and gross loan portfolio. However, the indicators for the last two remained within the average.

Finally, Graph B1.6 shows that Argentina, Mexico and Venezuela maintain high *ex post* intermediation spreads (12.3%, 12.7% and 11.6% respectively) while Chile has the lowest indicator (3.11%). In addition, Colombia and Peru have kept their intermediation spreads very stable for the entire period under analysis and were at around 6% and 8% respectively. The indicator for Brazil had the highest fluctuation in the sample as it went from 9.6% in September 2010 to 6.3% a year later.

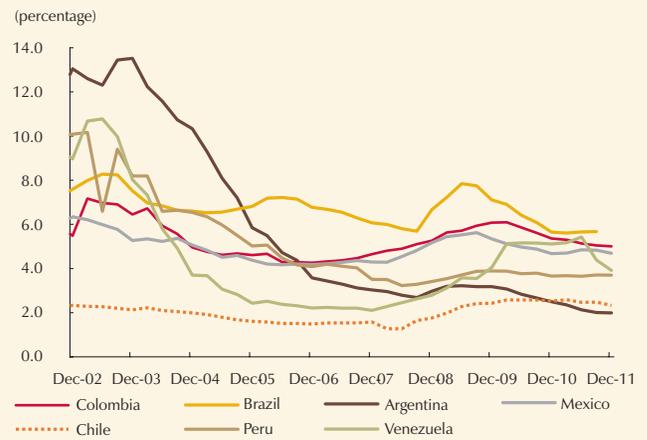
**Graph B1.4**  
Hedging: loan-loss provisioning/non-performing loan portfolio



Sources: central banks and bank superintendencies from each country, Banco de la República calculations.

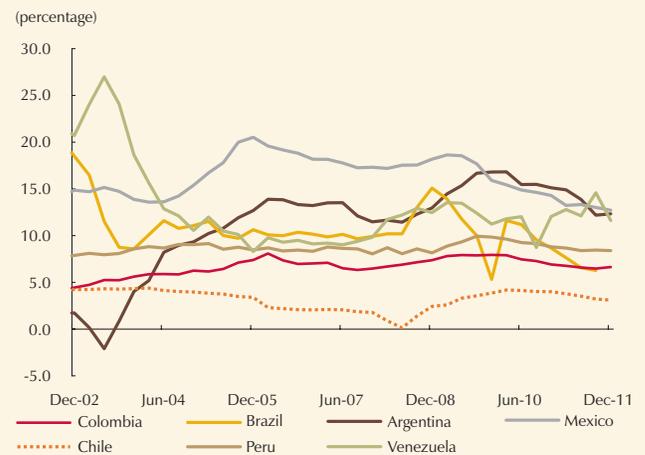
In summary, the situation of the financial system in some Latin American countries is positive in spite of the diversity in the sample. Venezuela experienced a substantial recovery in the real growth rate of the loan portfolio and the rest of the countries (with the exception of Peru and Brazil) registered moderate increases in the indicator. Default remained relatively stable and only rose for Brazil and Mexico. In addition, the efficiency indicator showed a constant trend over the period under study while hedging increased substantially for six of the seven countries analyzed.

**Graph B1.5**  
Loan-loss Provisioning/gross loan portfolio



Sources: central banks and bank superintendencies from each country, Banco de la República calculations.

**Graph B1.6**  
Ex post Intermediation Spread



Sources: central banks and bank superintendencies from each country, Banco de la República calculations.

## Box 2

### LOAN PORTFOLIO AND PERFORMANCE OF HOUSING PRICES IN COLOMBIA

In this box, the combined dynamics for credit and housing prices is analyzed in order to reveal potential economic and financial instabilities. It is important to identify situations in which there are permanent increases in the prices of assets fueled by an excessive level of credit associated with greater financing needs on the part of the debtors. Thus, it is essential to follow up on the variables that affect the behavior and expectations of the debtors in order to make it possible to analyze the consequences that those variables have on their creditworthiness. This box describes the performance of credit and its trends and, at the same time, analyzes the market cycles for housing in Colombia. At the end, an international comparison of an indicator for housing prices for a sample of thirty countries is presented.

#### 1. Credit market

This section examines the performance of credit and disbursements for housing. To do this, an indicator was constructed in which the real annual growth rates of some credit variables were combined with their respective cyclical components (measured by the deviation with respect to the Hodrick-Precott filter). This indicator identifies periods in which credit showed substantial deviations from its trend along with high growth rates. The indicator has been standardized and, therefore, its units are expressed in terms of standard deviations. The real series for housing credit scaled by population was used to build the indicator and subsequently the annual increases of the series and its cycles were calculated. Finally, the indicator was defined as the sum of those two standardized variables.

The final goal of the indicator is to identify situations in which credit goes through spikes that may suggest the presence of a credit boom. According to this indicator, a boom scenario commonly takes place when the growth rates are at high levels and when the credit shows a cycle with a strong positive deviation from its long term trend.

Graph B2.1 shows the indicator for the real housing loan portfolio per capita with securitizations. By taking one standard deviation as the risk threshold, risk signals were identified during the lead up to the crisis of 1999, the credit boom period in 2007 and over the most recent months. These signals indicate that the loan portfolio is currently going through a boom phase which could be the prelude to a period of recession (Mendoza and Terrones, 2008).

Graph B2.2 shows the indicator for disbursements as well as the indicator for the housing loan portfolio. In the first case, risk warnings during the time prior to the financial

Graph B2.1  
Combined Indicator for Credit Cycle and Growth: Housing with Securitizations



Source: Financial Superintendency of Colombia, Banco de la República calculations.

crisis of 1999 and during the credit boom period in 2007 were evident. This indicator also showed more than two standard deviations in 2002 in spite of the fact that the indicator for the housing loan portfolio registered levels that were close to zero. In the most recent months, the indicator for disbursements has been showing a quite moderate performance. Note that it predicts the trend of the credit indicator.

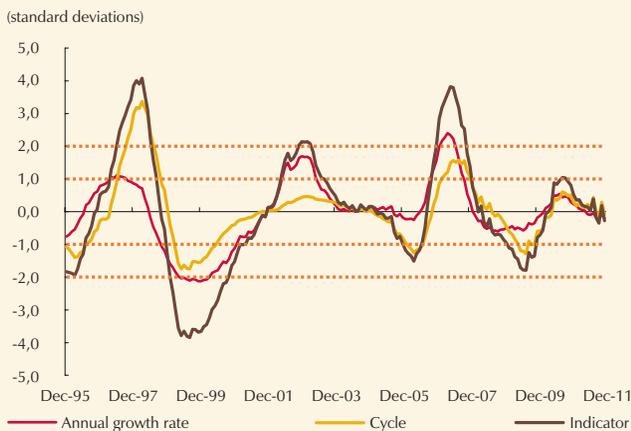
#### 2. Housing market

As was mentioned, it is important to analyze the changes in housing prices in conjunction with the results for the disbursements of mortgage loans so that it is possible to recognize points in time when there is excessive growth in these two variables simultaneously.

Two indicators are analyzed in Graph B2.3: the ratio of the new housing price index (NHPI) to the rent index (RI)<sup>1</sup> and the ratio of the used housing price index (UHPI) to RI. The goal of these indicators is to compare the strength of the housing prices in relation to the trend of its profits. The data show that the indicators are seeing similar behavior during the period under analysis and are currently presenting a growth trend. The NHPI/RI is at historically high levels and above

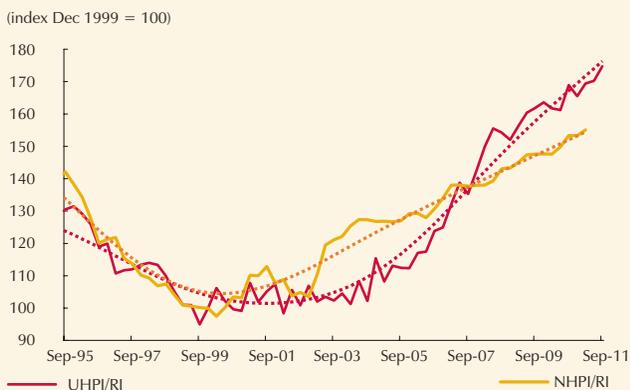
1 Monthly rent has been regulated so that increases cannot be above the annual change for the CPI calculated for the previous month. Currently, rent payments are regulated by Act 820/2003, which replaced Act 56/1985. The latter also had established limits on increases in rent payments.

**Graph B2.2**  
**Combined Indicator for Credit Cycle and Growth:**  
**Disbursements**



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph B2.3**  
**Ratio NHPI/RI and UHPI/RI and their Trends**



Sources: DANE, Financial Superintendency of Colombia, Banco de la República calculations.

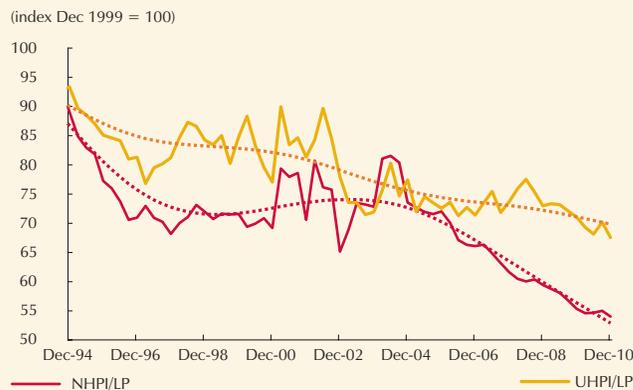
those registered in the period preceding the mortgage crisis of the late 1990's. In addition, the UHPI is still going through higher growth compared to that registered for the NHPI. This could be explained by the fact that the construction of the UHPI is based on the methodology of repeated sales.<sup>2</sup> The comparison of the sale of real estate property at two defined points in time may be influenced by the purpose behind the purchase of this property. If the intention is to build a new housing unit, the price could be higher compared to the price of a piece of property purchased to be lived in without any plans to make significant modifications to it.

2 See Escobar, J.; Huertas, C.; Mora, D., and Romero J. (2006 [2005]). "Índice de precios de la vivienda usada en Colombia (IPVU): método de ventas repetidas," Borradores de Economía, # 368, Banco de la República.

As has been mentioned in previous issues of the *Financial Stability Report*, the trend seen for housing prices could be related to the scarcity of land offered in urban areas of high demand. Graph B2.4 shows a declining trend for the ratios of both new and used housing prices to the price of land. This suggests that the restrictions on the supply of land have been one of the main components contributing to the upswing in prices in the mortgage market.

It is noteworthy that this price scenario is not an idiosyncrasy of Colombia because it corresponds to the interaction between supply and demand of housing in large urban centers. Given that the construction of the UHPI includes only the analysis of information from three big cities in the country (Bogota, Medellin and Cali) and that for the NHPI

**Graph B2.4**  
**Ratio NHPI/LP and UHPI/LP and their Trends**



Sources: DANE, Financial Superintendency of Colombia, Real Estate Property Association of Bogota, Banco de la República calculations.

is limited to only Bogota, these restrictions may explain the sharp changes in the two indicators in recent years.

### 3. International comparison

This section presents a cross-sectional analysis between the indicators for housing prices and for rent in similar areas in thirty countries. The indicators were taken from the *Global Property Guide* and were put together for some of the most expensive areas in each country<sup>3</sup> and for apartments that are 120 square meters (m<sup>2</sup>) on average. The figures are denominated in dollars and, in the case of Colombia, they were taken from the update done in October 2011.

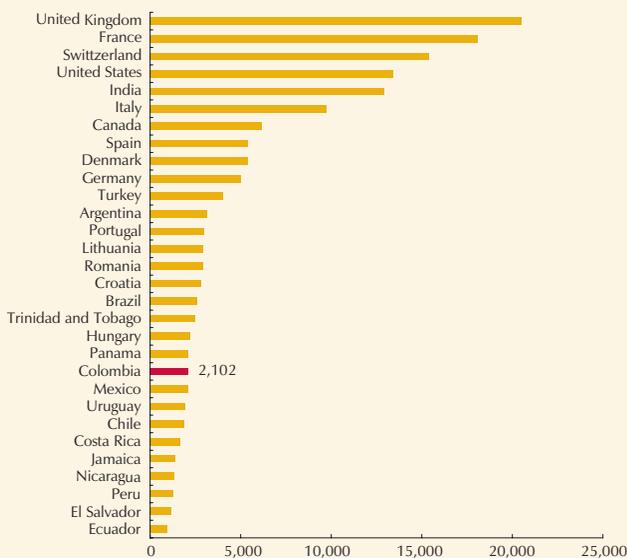
3 The updating of information varies from country to country. However, the areas under analysis can be compared. For Colombia, the prices correspond to the Chico, Santa Barbara and Chapinero Alto neighborhoods in Bogota.

The results show that the areas with the highest prices per m2 are those located in the biggest cities of developed economies. In the sample, the United Kingdom, France, Switzerland and the United States hold the top positions while Jamaica, Nicaragua and Peru are in the bottom ones (Colombia occupies position 21). If the price per m2 for Colombia (US\$2,102) is compared with that for other countries in the region, we see that the housing price in Colombia is below that for countries such as Argentina (US\$3,144), Brazil (US\$2,616), and Panama (US\$2,128) but above that for Mexico (US\$2,085), Chile (US\$1,875), and Peru (US\$1,306) (Graph B2.5).

With respect to the monthly rent in the same areas analyzed, the price in Colombia comes to US\$1,568 which is below that registered for Argentina (US\$2,051), Brazil (US\$1,896), and Mexico (US\$1,828) but above the price for Chile (US\$1,331), Peru (US\$1,067), and Ecuador (US\$756). In addition, when the annual profitability of housing as an investment is calculated by taking the annual rent divided by the price, the results show that the countries in the region have the highest return in the sample (Graph B2.6). Colombia registers a profitability of 7.46% which is similar to that for the rest of the countries in the region: Mexico (8.77%), Peru (8.17%), Ecuador (7.89%), Brazil (7.25%), Chile (7.10%), and Argentina (6.52%).

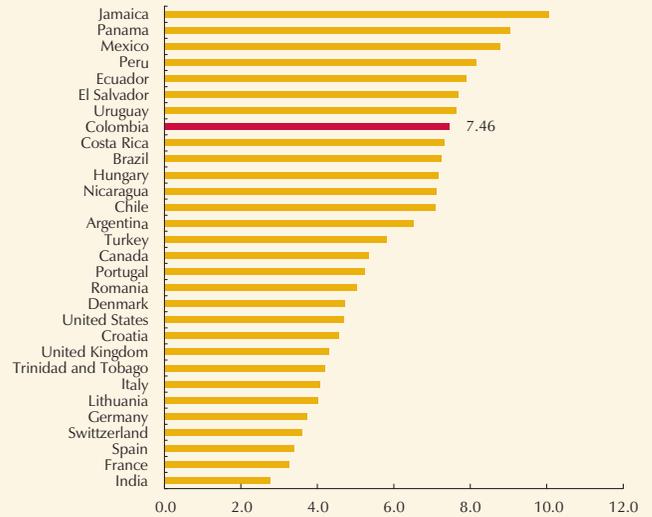
The relationship between the level of housing prices and the GDP per capita for the countries in the sample shows a positive trend. The countries that have a higher GDP per capita generally have higher housing prices as well. Thus, Switzerland, the United Kingdom, France and the United

**Graph B2.5**  
Price per m<sup>2</sup> in Dollars for Housing Purchase (dollars)



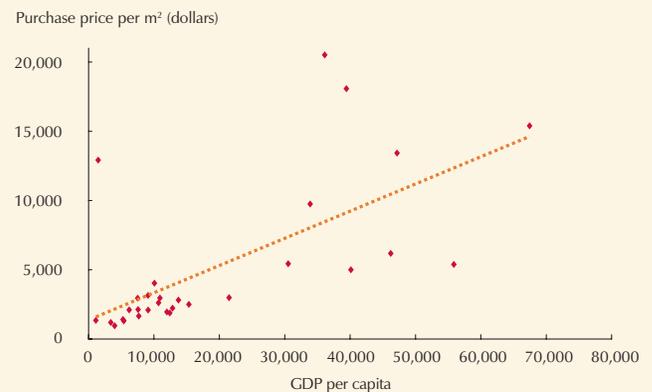
Source: Global Property Guide.

**Graph B2.6**  
Annual Profitability of Housing as an Investment (Annual Rent/Price) (percentage)



Source: Global Property Guide.

**Graph B2.7**  
Housing Price vs. GDP per capita (sample 30 countries)

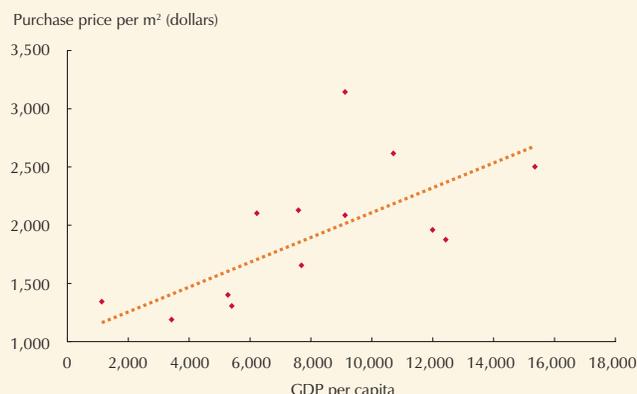


Sources: Global Property Guide, Banco de la República calculations.

States are ranked at very high levels of GDP per capita and housing prices when compared to the countries in this region (Graph B2.7).

When the relationship between GDP per capita and housing prices in the countries in this region is examined, Colombia shows a level that is quite similar to the average. However, its level of housing prices is higher than that for some countries in the region which have higher GDP per capita such as Mexico, Uruguay, and Chile (Graph B2.8).

Graph B2.8  
Housing Price vs. GDP per capita (region)



Sources: Global Property Guide; Banco de la República calculations

#### 4. Final comments

The indicators for housing prices and housing loans continue to show a growth trend. Warning signs are present in the loan portfolio indicator since it is above one standard deviation. Nonetheless, these levels are below those registered during the housing crisis at the end of the 1990's and during the credit boom in 2007. Regarding the indicator for disbursements, there is stability in both its cycle and growth rate, which are at levels close to those of its trend. The indicators for prices, in turn, are still growing. The indicator for used housing, in particular, has recorded the highest growth, a situation which could be associated with the market conditions for that type of housing. This performance has been associated with the trend of rising land prices. However, if the current prices of housing are compared with those registered in other countries in the region, Colombia's prices and profitability are quite similar to the average. There are countries in the region with higher levels of income but housing prices comparable to those in Colombia. Finally, it is important to continue monitoring the changes in these indicators given the fact that the current levels are still historically high. Also, an overvaluation of these assets may generate difficulties in the financial system with respect to either changes in the macroeconomic scenario or variations in household expectations.

Table B2.1  
Housing Price vs. GDP per capita (sample 30 countries)

Country	Purchase price per m <sup>2</sup> (dollars)	GDP per capita
United Kingdom	20,505	36,143.94
France	18,066	39,459.55
Switzerland	15,388	67,463.71
United States	13,428	47,198.50
India	12,913	1,474.98
Italy	9,739	33,916.88
Canada	6,179	46,235.64
Spain	5,431	30,541.61
Denmark	5,378	55,890.68
Germany	5,001	40,152.22
Turkey	4,028	10,094.03
Argentina	3,144	9,124.34
Portugal	2,988	21,504.81
Lithuania	2,956	10,933.50
Romania	2,943	7,537.71
Croatia	2,810	13,754.44
Brazil	2,616	10,710.07
Trinidad and Tobago	2,501	15,359.27
Hungary	2,221	12,851.98
Panama	2,128	7,588.89
Colombia	2,102	6,225.08
Mexico	2,085	9,123.41
Uruguay	1,959	11,995.82
Chile	1,875	12,431.03
Costa Rica	1,654	7,690.99
Jamaica	1,401	5,274.04
Nicaragua	1,342	1,131.82
Peru	1,306	5,401.37
El Salvador	1,189	3,425.60
Ecuador	958	4,008.24

Sources: Global Property Guide, Banco de la República calculations.

### III. CURRENT SITUATION AND OUTLOOK FOR FINANCIAL SYSTEM DEBTORS

*In 2011, the growth in the amount of credit the companies had was accompanied by improvements in their economic situation. However, in 2012, the growth of this loan portfolio could slow down. The indebtedness and financial burden of households, in turn, continued to rise as a consequence of the performance of the consumer loan portfolio. Last of all, the results for the non-financial public sector were favorable thanks to the higher tax collection which generated a lower need for financing.*

Evaluating the degree of indebtedness the economic agents have is important to the degree that excessive leverage can lower the ability to respond in the face of adverse shocks. An analysis is done below for Colombia in which a distinction is made between the indebtedness of the following agents: government, financial sector, companies, and households. Using the methodology suggested by the McKinsey Global Institute, the gross debt was calculated as all of the direct credit in the market (bonds, loans, and deposits). In Graph 54, we see that the ratio of total indebtedness – measured as debt to GDP – is within a range of 71%-459% for the set of countries analyzed. Colombia has the second lowest indicator in the sample (125% on average) if it is compared to developed countries (Graph 54, panel A). If it is compared to Latin American ones, it is in the middle (Graph 54, panel B).

When the change in the indicator for Colombia is studied, we find that this has remained at around 125% from 2000 to 2011. When the debt is broken down by economic agent,<sup>30</sup> one sees that the two main debtors have been

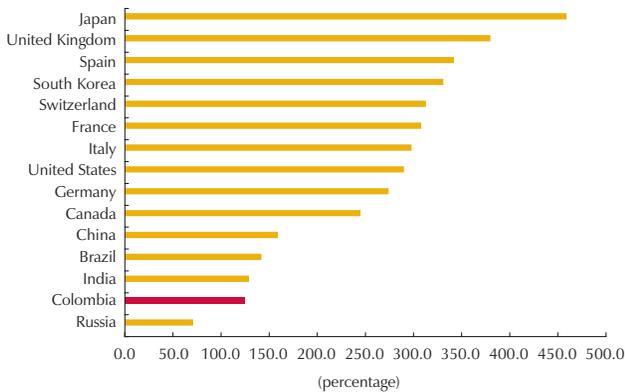
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30 The debt of economic agents is calculated as follows:

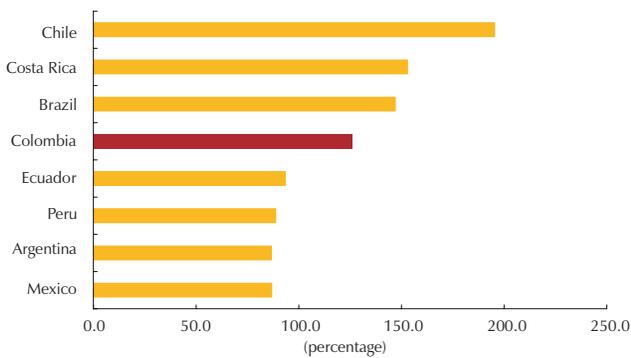
- Financial system: gross debt of the credit institutions (deposits, loans, bonds) and financial service entities (pension and severance fund managers, insurance companies, trust companies, etc.). Banker's acceptance accounts were excluded from the calculation given the fact that derivatives were included in them.
- Government: gross debt of the central national government (NG) and non-financial public sector.
- Household: consumer loan portfolio and housing loan portfolio.
- Companies: commercial loan portfolio, foreign debt and bonds.

**Graph 54**  
Ratio of Total Indebtedness by Country

**A. International Comparison, 2008**



**B. Comparison in Latin America, 2010**



Note: The data in panel A correspond to those seen in 2008. For Colombia, the average ratio for the period between 2000 and 2011 was taken.  
Sources: McKinsey Global Institute, Financial Superintendency of Colombia and Banco de la República.

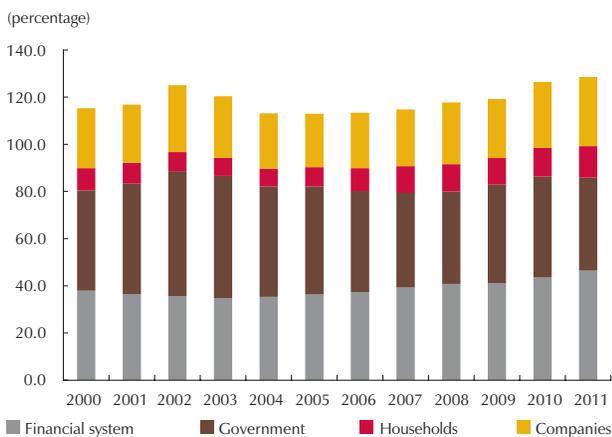
the government (average indicator of 44%) and the financial system (39%). With respect to household indebtedness, their share has seen an increase since 2005 as it went from 8% to 13% in 2011. However, companies have also raised their share and went to 29% in 2011 (Graph 55, panel B).

When the debt is broken down by type of currency, one sees that the majority of this is in local currency (Graph 56, panel A). In 2011, the financial system was the main holder of this debt with a share of 42.9% of the GDP. This figure is 8 pp higher than what was seen in the year 2000. The change, in turn, of the share of debt that was in foreign currency (Graph 56, panel B) makes it evident that there has been a substantial drop since 2003. This is particularly due to the performance of government debt which went from 24% in 2003 to 12.3% in 2011. Likewise, this debt has declined 4 pp for companies since 2003 and was at 10.1% in 2011.

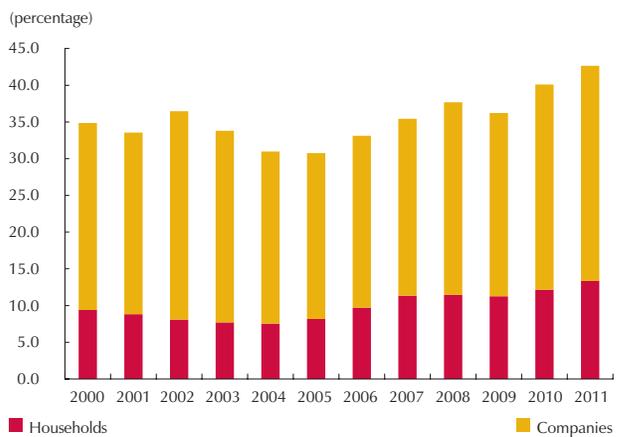
In conclusion, as can be seen, the level of indebtedness contracted by agents in Colombia has climbed in the most recent decade. Nevertheless, in comparison to developed economies, this is still low and in comparison to Latin American countries, it is at a medium level. The main borrowers in Colombia are the government and the financial system followed by companies and households.

**Graph 55**  
Ratio of Total Indebtedness for Colombia

**A.**



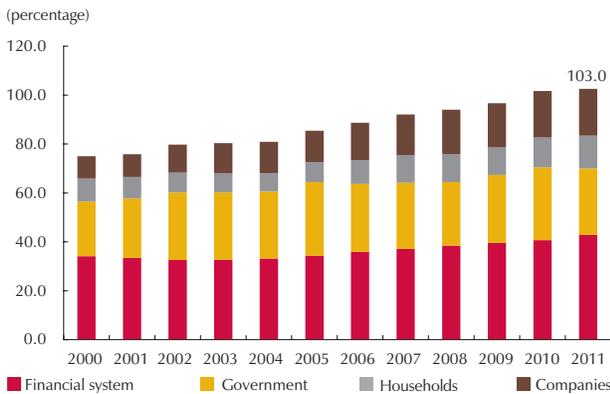
**B.**



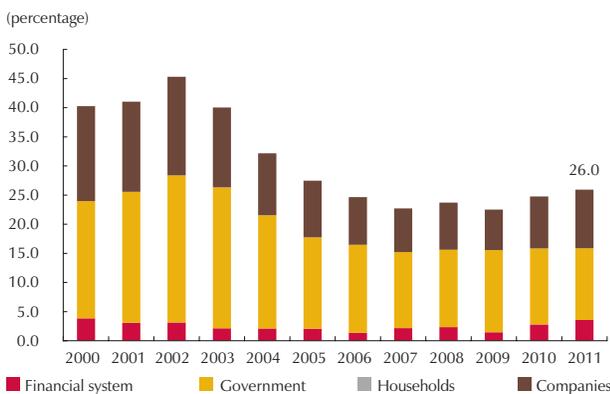
Source: Fogafin, Banco de la República calculations

**Graph 56**  
Ratio of Indebtedness by Currency

**A. National Currency**

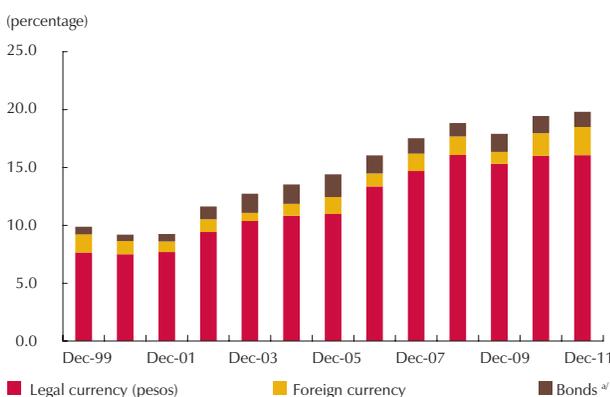


**B. Foreign Currency**



Sources: Financial Superintendency of Colombia and Banco de la República.

**Graph 57**  
Loans to Private Corporate Sector as a Percentage of the GDP



a/ Based on the information supplied by the Financial Superintendency, it is not possible to differentiate between the bonds in foreign currency and those in legal currency. Source: Financial Superintendency of Colombia, Banco de la República calculations.

Last of all, the declining trend of total indebtedness in foreign currency is noteworthy.

**A. PRIVATE CORPORATE SECTOR**

Analyzing the performance of companies is vitally important for maintaining financial stability due to the fact that a large part of the financial system assets is accounted for by these companies. In December 2011, the loans and securities of the private corporate sector represented 51% of the total assets held by credit institutions. This figure is 5 pp higher than what was seen a year ago.

In this section, the change in the indices for production, economic expectations, and availability of loans and liquidity are evaluated. Finally, given the accelerated growth of debt in foreign currency, the results of the survey on exchange rate risk are presented.

**1. Company Indebtedness**

The level of indebtedness private companies have (measured as the ratio between commercial loans and bonds to GDP) climbed 40 bp with respect to 2010 as it went from 19.4% to 19.8% in 2011. This upswing was mainly associated with loans in foreign currency, which went from 2% to 2.4% of the GDP during the same period (Graph 57).

When the growth of credit is evaluated by type of currency, we find that there was an increase in loans made in legal currency in 2011 (a real annual rate of 12.7%) and, even more so, in those made in foreign currency which grew at a real annual rate of 152%<sup>31</sup> (Graph 58). The latter represent only 10% of the total debt for the private corporate sector.

The growth seen in the outstanding balance of loans to companies makes it relevant to monitor the

31 This figure was reached in May 2011. It includes only intermediated loans.

**Graph 58**  
Real Annual Growth of the Commercial Loan Portfolio by Type of Currency

**A. Legal currency**



**B. Foreign Currency**



Sources: Financial Superintendency and Superintendency of Corporate Affairs, Banco de la República calculations.

**Graph 59**  
Annual Growth of Real Sales



Note: corresponds to the third-order moving average.  
Source: DANE, Banco de la República calculations.

changes in their income since an excessive upswing in indebtedness could jeopardize the liquidity or solvency of the firms. An analysis of the indices of earnings and economic expectations is presented below.

**2. Economic Activity**

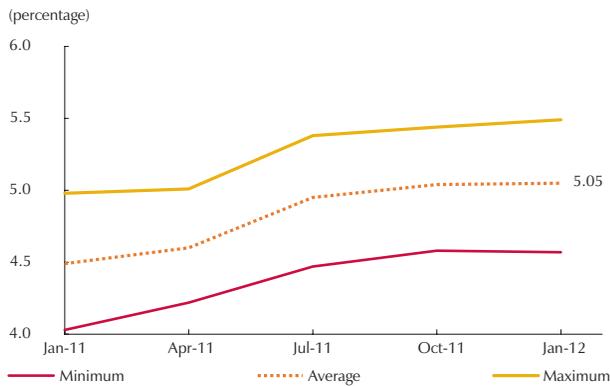
Graph 59 shows the growth of real sales for the retail sector and the manufacturing industry.<sup>32</sup> As can be seen, 2011 was a year of high growth for the commercial sector, which saw its sales rise 12.4% on average. Regarding the manufacturing industry, we see that in spite of the fact that its performance was lower than that for the commercial sector, its rate was more stable and remained at around 4.9%. Thus, it can be seen that the two sectors expanded at similar rates in the last quarter of 2011.

With respect to economic expectations, the survey done by the Banco de la República in January 2012 showed that businessmen expected that the growth of the economy would be between 4.6% and 5.5% for this year. This result does not differ much from what was expressed in the survey done in October 2011 (4.6% and 5.4%), which showed the highest result of those projected over the course of that year (Graph 60). The above suggests that a strong economic performance can be anticipated.

The Fedesarrollo business opinion survey (EOE in Spanish) done in December 2011 comes down on the optimistic side with respect to the economic situation for the next six months. When this result is contrasted with the same month in 2010, we see a rise in the number of agents who expect that their situation will be favorable (an upswing of 43.3% to 53.2%). Likewise, the balance between November

<sup>32</sup> These two sectors were chosen due to the availability of information. In addition, they account for close to 62.4% of the loan portfolio for the private corporate sector as of September 2011.

**Graph 60**  
Expected Growth of the GDP



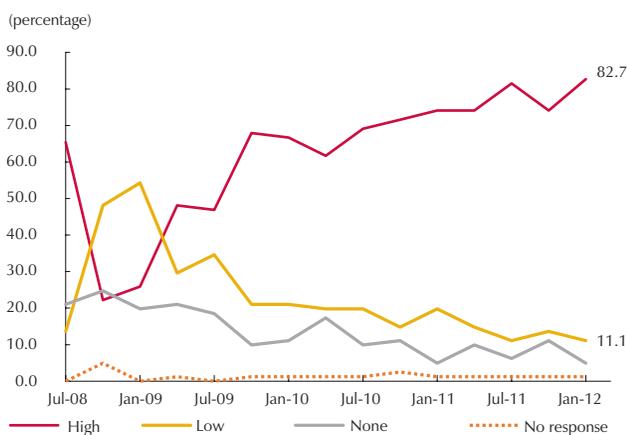
Source: Banco de la República (quarterly survey of economic expectations).

**Graph 61**  
Expectations Regarding Economic Situation of Companies



Source: Fedesarrollo (survey of business opinion).

**Graph 62**  
Current Perception of the Liquidity in the Economy



Source: Banco de la República (quarterly survey of economic expectations).

and December 2011 showed a significant expansion as it went from 39.6% to 50.2%<sup>33</sup> (Graph 61).

Thus, it can be seen that the earnings of the industrial and commercial sectors grew at rates that were low in comparison to commercial credit. Nevertheless, agents expect a favorable situation for their companies and the economy.

### 3. Monetary and Credit Conditions

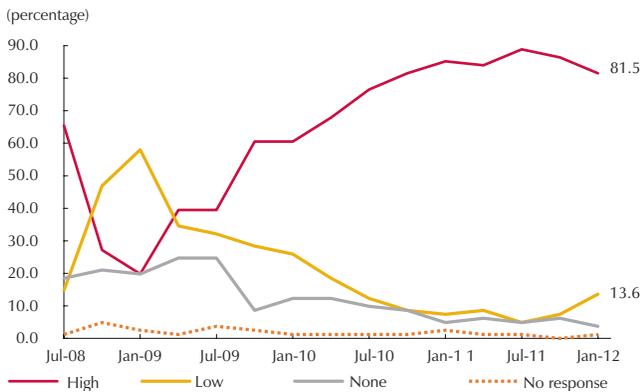
Respecting liquidity, one sees that the majority of the agents perceive a high level of this in the economy (82.7%). At the same time, the percentage of those surveyed who estimated that liquidity was low declined and was at 11.1% (Graph 62). This figure is 8.7 pp lower than the one registered a year before.

In regards to the liquidity expectations over the next six months, 70.4% of the businessmen who were surveyed in January 2012 believed that there would be no changes. This percentage is higher than the average registered in the 2011 surveys (66.7%). At the same time, 12.3% predict lower liquidity in said lapse of time. This figure is 9.9 pp lower than what was reported in October 2011.

When the perception of the availability of credit is analyzed, one sees that, as of January 2012, there were fewer agents who considered access easy. This is a drop of 7.4 pp in comparison to the information registered six months before. As shown in Graph 63, 81.5% of the agents think access is easy while 13.6% consider the availability of credit to be low. Finally, with respect to the availability of credit for the next six months, 66.7% think there will be no change, 21% estimate that it will be lower than the current availability, and 9.9% predict that it will be higher.

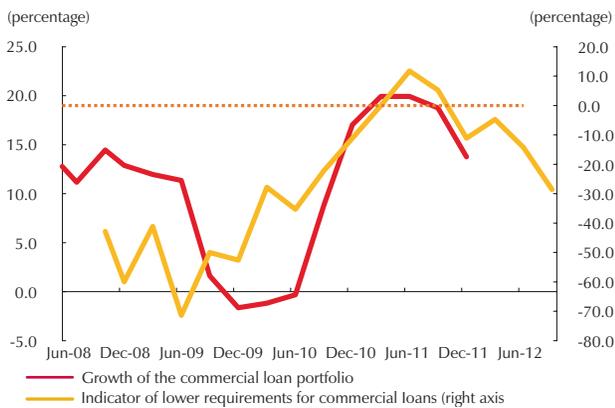
<sup>33</sup> Difference between the percentage of people surveyed who said that the situation would be favorable and those who believed that it would get worse.

**Graph 63**  
Current Perception of the Availability of Credit in the Economy



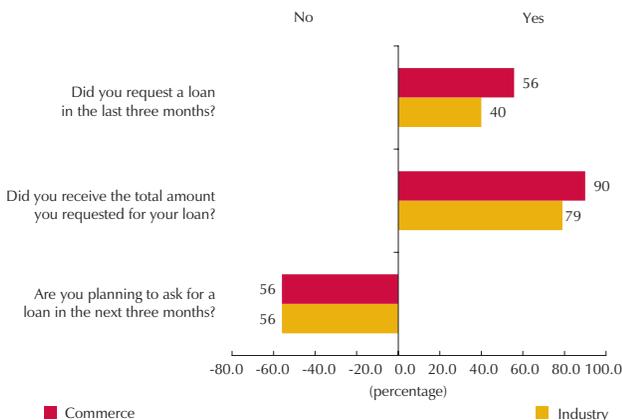
Source: Banco de la República (quarterly survey of economic expectations).

**Graph 64**  
Real Growth of the Loan Portfolio and Indicator of Lowering Loan Requirements.



Source: Banco de la República (survey of the credit situation).

**Graph 65**  
Perception of the Loan Market by Sector



Sources: Banco de la República and Fedesarrollo (quarterly survey of the financing structure).

The comparison between the indicator of lower requirements for the commercial loan portfolio<sup>34</sup> and the growth of the portfolio shows that, in recent years, the former has reasonably predicted the performance of the loan portfolio six months later. In Graph 64, the real annual growth of the commercial loan portfolio is contrasted with the indicator of lower requirements carried six months ahead. As can be seen, starting in June 2010, the upward trend of the indicator was accompanied by a surge in the loan portfolio. A decline in the indicator, which could suggest a possible slowdown in the loan portfolio, has been seen for the last few months. This result could be related to businessmen's expectations regarding a lower availability of credit for the next six months.

Last of all, in order to evaluate the perception of those who ask for commercial loans, a survey was done of businessmen in the industrial and commercial sectors. The results suggest that these have had easy access to loans since more than 70% of the companies that requested a loan received the total amount requested. To be specific, based on those surveyed, 56% of the companies that requested loans in the last three months of 2011, were commercial ones and 40% were industrial ones (Graph 65).

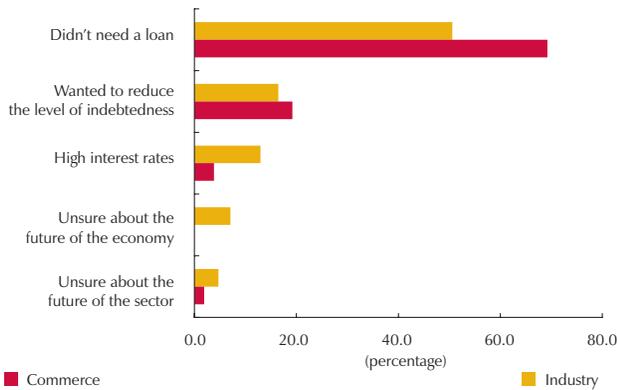
However, when the companies that did not ask for a loan were questioned, among the reasons for their negative answer was the fact that the majority did not need one. Sixty-nine percent of the commercial companies and 51% of the industrial ones gave this response. The second reason was that the companies wanted to reduce their indebtedness and the next one was the high interest rates (Graph 66, panel A).

When asked if they have any desire to ask for a loan in the next three months, a large number of those surveyed in both industry and commerce said that they have no interest in asking for one (56%). However, when the reasons that would lead them

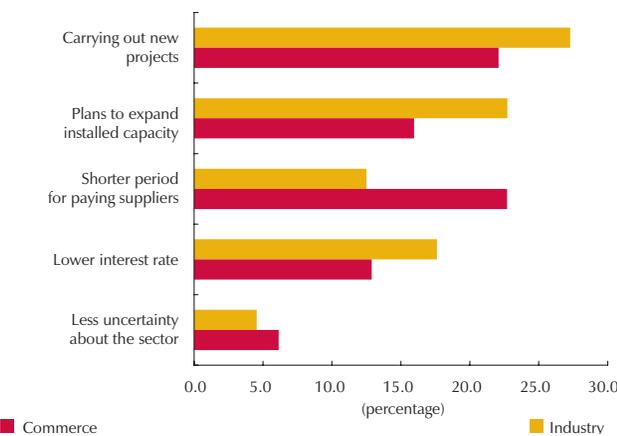
34 This is calculated as the difference between the credit institutions that lower their requirements for granting loans and the percentage of those that raise them. Thus, an indicator with a positive value implies that a net number of these institutions are relaxing their requirements for granting loans.

**Graph 66**  
Reasons for Not Requesting a Loan

**A. Why didn't you ask for a loan?**

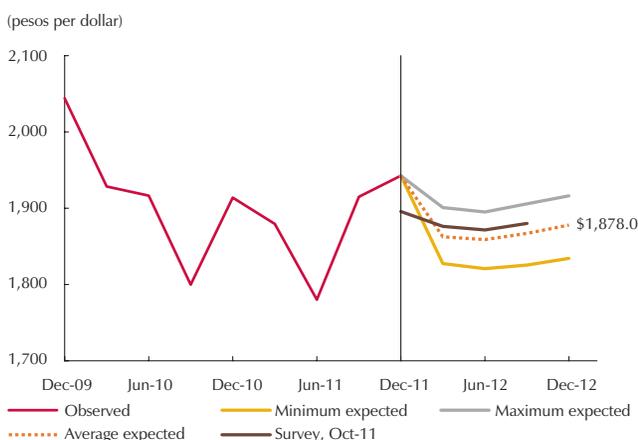


**B. Reasons That Would Lead Them to Substantially Increase Their Demand for Credit**



Sources: Banco de la República and Fedesarrollo (quarterly survey on structure of financing).

**Graph 67**  
Observed and Expected Nominal Exchange Rate and Expected Ranges



Source: Banco de la República (quarterly survey of economic expectations).

to substantially increase their request for credit are evaluated, the most important one for commercial companies would be the shorter period that they would have to settle debts with their suppliers. This was followed by the possibility of launching new projects and being able to expand their installed capacity. For the industrial companies, one sees that the main reason is to begin new projects and this is followed by expanding installed capacity and taking advantage of a lower interest rate (Graph 66, panel B).

Furthermore, when they are asked about the expectations they have for the interest rate on their loans, 50% of those consulted in industry predict that it will go up while 46% believe that it will remain the same. In the commercial area, 44% expect it to rise and 55% expect it to stay the same.

In short, the expectations on the side of both supply and demand suggest that in the next few months, the market for commercial loans could begin to slow down.

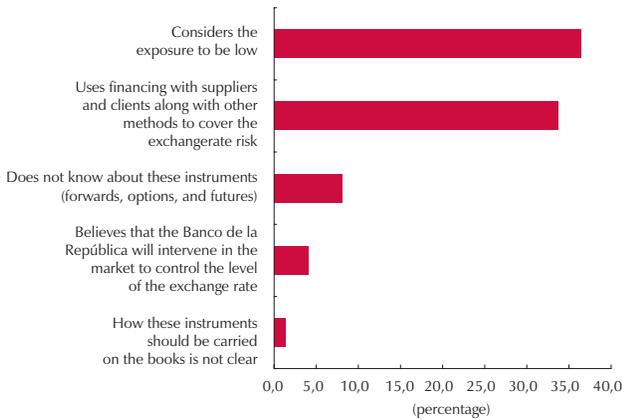
**4. Exchange Rate and Exchange Rate Risk**

Given the high growth seen in the foreign currency loan portfolio (Graph 58, panel B), it is important to analyze the expectations businessmen have with respect to the market exchange rate (TRM in Spanish). The survey done in January 2012, showed that an appreciation of 1% on average was expected for the current year. The businessmen specifically predicted that as of the close of the year, the rate would be COP\$1,878 (Graph 67). It is noteworthy that even though an annual devaluation of 1.5% was seen in December 2011, this was not reflected in the expectations for 2012. These may be associated with the appreciation (2.7%) that is seen when the average TRM for 2011 is compared to that for 2010.

With respect to the results of the survey on the exchange rate risk,<sup>35</sup> just as has been seen in

<sup>35</sup> This survey is done of companies that have some of their items in dollars (assets, liabilities, earnings or expenditures).

**Graph 68**  
Main Reason for Not Using Exchange Rate Derivatives

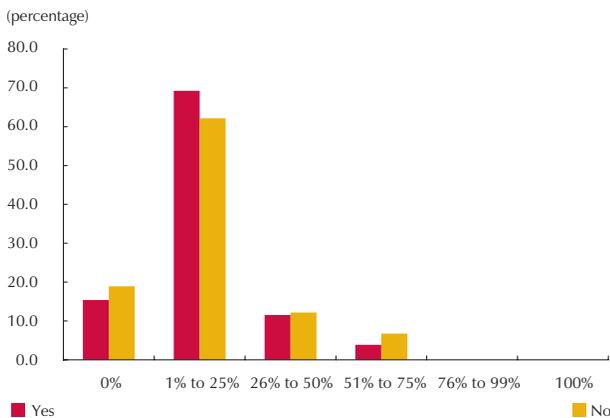


Sources: Banco de la República and Fedesarrollo (quarterly survey of exchange rate risk).

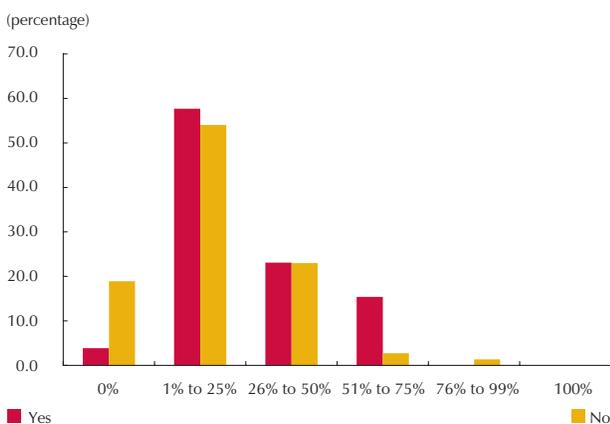
previous polls, the one done in January showed that a low percentage of the companies in the industrial sector hedged their exchange rate risk through derivatives (26%). The above suggests that exchange rate derivatives have not been incorporated into the corporate policies of this sector. This could be because of a low exposure to the risk or to lack of knowledge about these instruments along with other reasons. In order to corroborate this hypothesis, the businessmen were asked for the main reason they had for not using these types of instruments. As can be seen in Graph 68, the most important reason and the one given by 36% of those surveyed is that they considered their exchange rate exposure to be low. The next ones in order of importance are the use of financing with suppliers and clients (34%) and lack of knowledge about these instruments (8%).

**Graph 69**  
Distribution by Income and Expenditure Range in Dollars

**A. Income in Dollars**



**B. Expenditures in Dollars**



Sources: Banco de la República and Fedesarrollo (quarterly survey of exchange rate risk).

To determine whether or not the firms that said they did not use derivatives do have a limited exposure to exchange rate risk, they were asked for the percentage of their earnings and expenditures denominated in dollars. Graph 69, panel A shows that, with respect to income in dollars, both types of companies are concentrated in the lowest percentiles. In other words, the great majority of the companies surveyed received less than 25% of their total income denominated in that foreign currency. When doing a break down between companies that do not use derivatives and the ones that do use them, one sees that 80% of the former and 85% of the latter state that they have less than 25% of their total income denominated in that foreign currency.

When the distribution of expenditures in dollars is analyzed (Graph 69, panel B), a major difference between the firms that do not use derivatives and the ones that do can be seen. For one thing, we see that the former are still concentrated in the lowest percentiles where 73% of them have outlays that are below 25%. When this datum is compared with that of the companies that do use derivatives, we find that their expenditures are at higher percentiles. Twenty-three percent of them are in the 26%- 50% range and 15% are in ranges for expenditures that are above 50%.

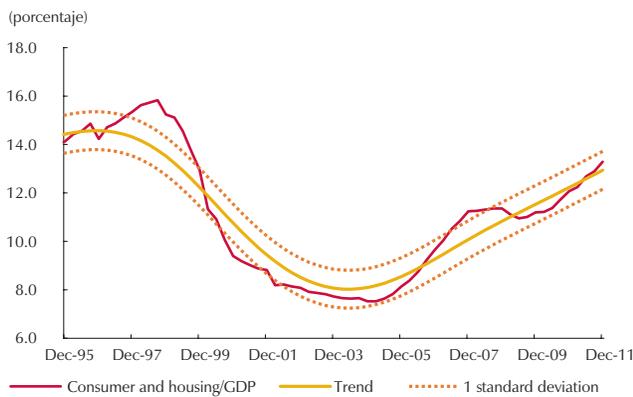
Therefore, the results suggest that although the companies that do not use derivatives are exposed to fluctuations in the exchange rate, their exposure seems to be relatively low.

In conclusion, the high growth of the commercial loan portfolio in 2011 could turn around given the higher requirements for granting loans and the decline in the demand for them. The changes in the indicators of economic activity suggest that the expansion of the loan portfolio was supported by an upswing in the earnings of the sectors that are the main debtors. Last of all, the expectations for the nominal exchange rate in 2012 suggest that companies expect an appreciation which will reduce the pressure on those companies that have debt in foreign currency.

## B. HOUSEHOLDS

The combined performance of consumer and housing loans as well as how these relate to the changes in prices for housing and the household financial burden are analyzed in this section. Furthermore, different indices of the expectations, confidence, and economic conditions of these agents are examined in order to understand their current financial situation and their future outlook.

Graph 70  
Consumer and Housing Loan Portfolio/GDP



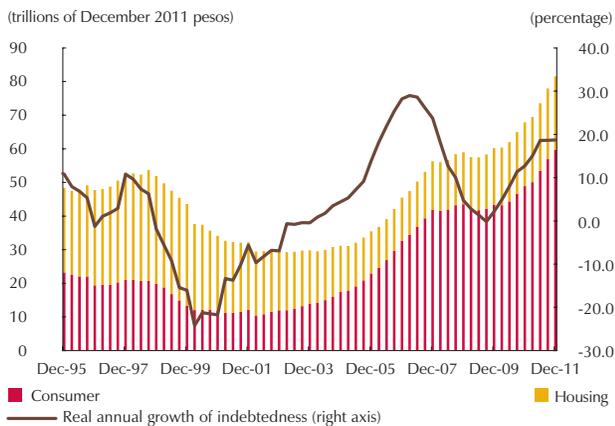
Note: The GDP for December 2011 corresponds to the one projected by the Banco de la República which assumes a real annual growth of 5.8%.  
Sources: DANE and Financial Superintendency of Colombia, Banco de la República calculations.

### 1. Household Indebtedness

The level of indebtedness for households (defined as the total housing and consumer loans/GDP) continued rising during the second half of 2011 and was at close to 13.29% for December of that year (Graph 70). The growth of the combined loan portfolio (housing and consumer) was at a real annual 18.7% as of December 2011, a figure that is very similar to the one from six months ago. The trend of indebtedness is particularly due to the performance of consumer loans. These rose a real annual 20.8% for the same period. The housing loan portfolio (including securitizations), in turn, maintained an expansion rate of approximately a real annual 13% in the second half of the same year.

As of December 2011, the level of household indebtedness amounted to COP\$81.5 t of which 73.3% corresponded to consumer loans. Even if this trend has been a growing one since June 2009, the level in December 2011 is still lower than the one at the end of the nineties (13.3% of the GDP in December 2011 compared to 15.8% of the GDP in September 1998). If the combined loan portfolio continues to grow in 2012 at a rate similar to that of 2011, it is possible that it could reach the level of indebtedness seen at the end of the nineties. However, it should be noted that the makeup of the debt is different since consumer loans are currently more highly represented than housing

**Graph 71**  
Components and Real Annual Growth of Household Indebtedness



Sources: Financial Superintendency of Colombia, Banco de la República calculations.

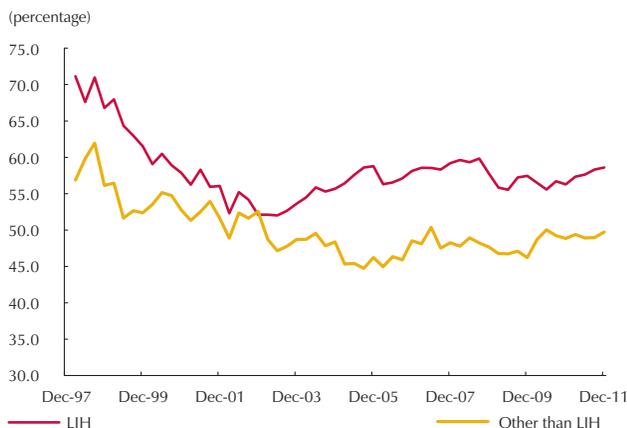
loans while the opposite was true in the nineties (the share held in the consumer loan portfolio was 73.3% in December 2011 and 40.6% on average for the 1995-1999 period) (Graph 71).

This situation exposes the financial system to a greater risk in terms of loss given the default due to the lower guarantees required for consumer loans in comparison to housing loans. However, on the one hand, the former are for lower amounts and the outstanding balance of the loan portfolio is divided up among a larger number of debtors and this reduces the risk posed by credit concentration. On the other hand, the financial system has recently started supporting this situation with new regulations which demand a higher level of loan-loss provisioning for the consumer loan portfolio.<sup>36</sup>

In the case of the housing loan portfolio, the disbursements denominated in pesos continue to have a higher share (92.3%) in comparison to those denominated in UVR. Nevertheless, in the last six months, their share declined 3 pp. The higher share of housing loans issued in pesos has been growing since mid-2006 and implies that the credit institutions are more exposed to interest rate risk.

The loan-to-value (LTV) –ratio between the value of the disbursements and the value of the guarantees– has grown for the two types of housing in the second half of 2011. For low income housing (LIH), the value of the disbursements has increased with respect to the guarantee as it went from 57.6% in June 2011 to 58.6% in December of the same year. However, the LTV for housing other than LIH went from 48.9% to 49.7% during the same period. Even if both indicators rose in the second half of 2011, the LTV for LIH has been growing since the second half of 2010 while for housing other than LIH, it has remained relatively stable (Graph 72).

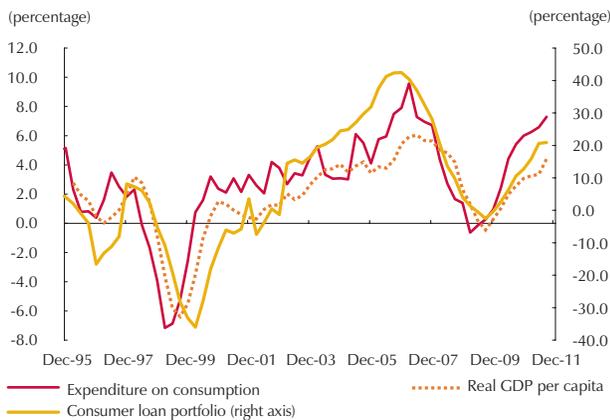
**Graph 72**  
Loan to Value



Source: Asobancaria, Banco de la República calculations.

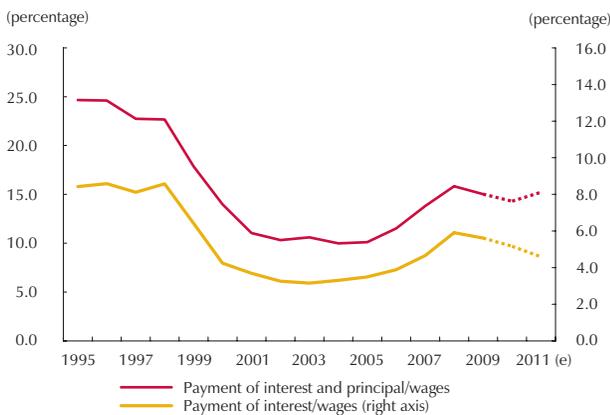
Household expenditures on consumption, in turn, continued their positive trend and reached a real annual growth of 7.3% in September 2011. This is still consistent with the higher indebtedness households have in this type of credit. Furthermore, this higher expenditure and indebtedness have been accompanied by rises in the real GDP per capita (Graph 73). Note that this trend has been seen since the beginning of 2010.

**Graph 73**  
Real Annual Growth of Household Consumption Expenditures, GDP per Capita, and of the Consumer Loan Portfolio



Sources: DANE and Financial Superintendency, Banco de la República calculations.

**Graph 74**  
Household Financial Burden



(e) estimated.  
Sources: Financial Superintendency of Colombia and DANE, Banco de la República calculations.

Like the household indebtedness, loan defaults have climbed for the consumer loan portfolio since the second quarter of 2011 but less rapidly than this loan portfolio has grown. Housing loan defaults, in turn, continued declining although to a lesser degree than they did six months ago. The main indicators of household financial burden are analyzed below.

## 2. Household Financial Burden

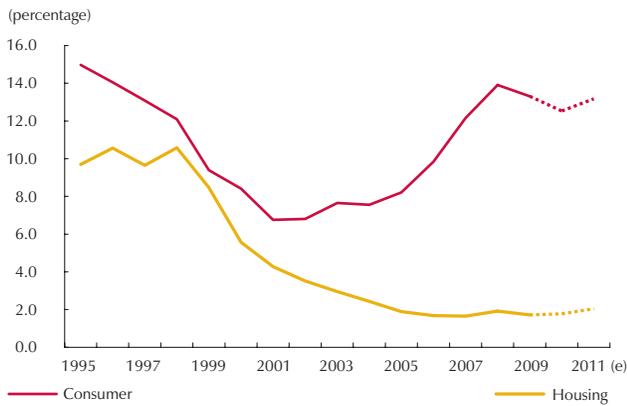
In 2011, the indicator of household financial burden (HFB)<sup>37</sup> registered an upswing in comparison to what was seen in 2010. At the end of December, this indicator was at 15.2% which indicated a 90 bp rise compared to a year prior (14.3%) (Graph 74). This performance is due to the greater payments the households are making as a result of the increase of their outstanding debt in 2011. The financial burden indicator, which includes only the interest component showed a drop as it went from 5.2% in 2010 to 4.6% in 2011.<sup>38</sup>

When the components of the financial burden are analyzed by type of loan, one sees that the change in this is primarily due to the upswing in the debt service for the consumer loan portfolio. This went from 12.5% of household income in 2010 to 13.2% a year later (Graph 75). The indicator for housing loans, in turn, made a slight contribution to the

37 This indicator is defined as the payments for interest and capital securitizations associated with the consumer and housing loan portfolios and divided by the remuneration received by wage-earners. The remuneration for 2010 and 2011 was projected using the growth of the nominal wage in the manufacturing industry index (5.0% and 4.1% respectively).

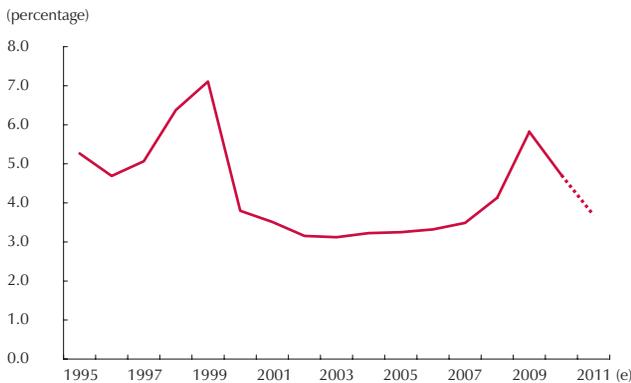
38 In spite of the fact that a rise in lending rates was registered in 2011, the total amount in payments for interest continued to decline due to the drop in the average interest rate for the performing loan portfolio. This performance could be the result of two factors. The first is related to the effects that the reduction in maximum interest rates has on the fixed rate loans issued in the consumer loan portfolio (approximately 90% of the portfolio) and, the second, that the loans made between the second half of 2009 and December 2011 were issued at lower rates. This indicates that there was a shift to loans with lower interest in 2011. Between 2007 and mid-2009 the intermediaries granted consumer loans at an average rate of 24.1% which were affected by the repeated reductions in the maximum interest rate between July 2008 and December 2010 (the maximum interest rate reached a minimum of 21.3% in October 2010). All of the consumer loans in effect that were issued at a rate higher than the maximum interest one had to be readjusted to a lower rate. At the same time this lowered the earnings from interest seen by the intermediaries. Furthermore, when the profiles of the lending rates between the second half of 2009 and 2011 are analyzed, we see that these were done at an average rate of 18.6% (the average lending rate in the second half of 2009 was 21.6%, the one in 2010 was 18.0%, and the one in 2011 was 18.2%). This figure is considerably lower than the 24.1% mentioned above.

**Graph 75**  
Household Financial Burden by Type of Loan (including securitizations)



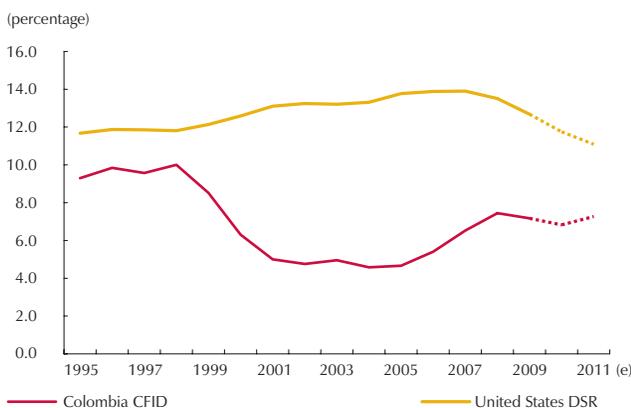
(e) estimated.  
Sources: Financial Superintendency of Colombia and DANE, Banco de la República calculations.

**Graph 76**  
Household Financial Burden: Real Component of Interest/Wages



(e) estimated.  
Sources: Financial Superintendency of Colombia and DANE, Banco de la República calculations.

**Graph 77**  
Financial Burden for Colombia and the United States



Sources: Financial Superintendency of Colombia, DANE, and the US Federal Reserve; Banco de la República calculations.

performance of the total indicator as it went from 1.8% in December 2010 to 2.0% in the same month in 2011.

Another type of financial burden indicator for households is built as follows:

$$\text{Financial burden} = \frac{\text{Real component of interest paid}}{\text{wages}}$$

The numerator reflects the outlay for interest but only in what concerns its real component. It does not include the inflationary component since this is not an expenditure but rather a payment against capital because it compensates for the loss of the nominal balance sheet value of the debt over time. That payment maintains the value of the debt in real terms and leaves household wealth unaltered. Payments against principal are not included for the same reason. Therefore, this indicator measures that portion of the household financial expenditure that reduces their wealth.

In 2011, this indicator continued to show the declining trend that has been seen since 2009. At the end of December, the indicator was at 3.7%. This reflects a reduction of 1.0 pp compared to what had been registered a year earlier (4.7%) (Graph 76). This performance is particularly due to a drop in payments on interest and higher inflation in comparison to what had been seen in December 2010.

The change in the HFB agrees with the perception the credit institutions have of the financial situation of households. According to the December 2011 *Report on the Credit Situation in Colombia* (RSCC in Spanish) the debtors' creditworthiness was the main reason why intermediaries were not granting a higher number of loans to households.

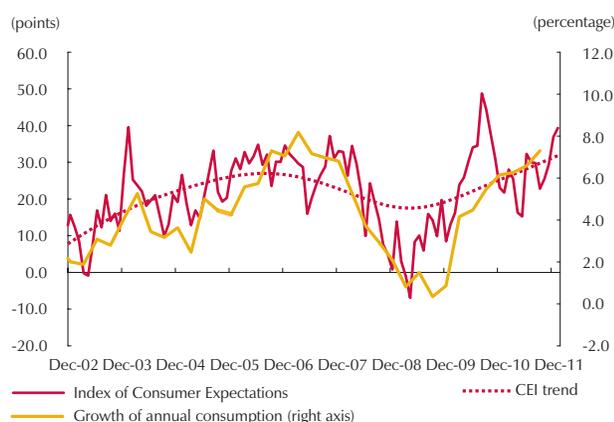
Graph 77 presents the financial burden indicators for Colombia (CFID in Spanish) and the United States (DSR) calculated as the ratio of payments against capital plus the interest payments in the consumer and housing loan portfolios to available income. In

2011, a growth trend for the CFID, which had come to 7.3% in December 2011 was seen. This indicates an increase of 44 bp in comparison to what was seen at the close of 2010 (6.8%). Nevertheless, it is noteworthy that the indicator was at levels below those registered during the crisis towards the end of the nineties.<sup>39</sup> The DSR, in turn, continued to show the declining trend seen

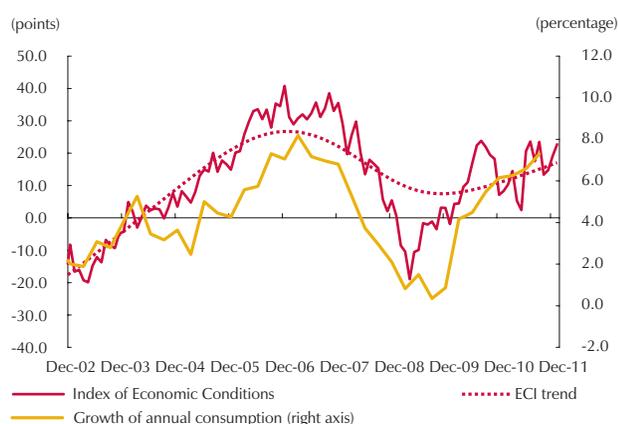
after the international crisis of 2008. Thus, the debt service of US households represented 11.1% of their income in September 2011. This indicates a drop of 66 bp in comparison to the figure seen nine months earlier (11.8%).

Graph 78  
Indices of Household Expectations

A. Growth of Household Consumption and Consumer Expectation Index (CEI)



B. Growth of Household Consumption and Consumer Economic Condition Index (ECI)



Sources: Fedesarrollo and DANE, Banco de la República calculations.

### 3. Outlook

In the second half of 2011, the favorable performance of the indicators of household expectations which had been seen in the first half of that year was still being registered. The index of consumer expectations (CEI)<sup>40</sup> kept up the trend that it had been showing since mid-2009 and was at 39.9 points (p) in January 2012 (Graph 78, panel A). The economic condition indicator (ECI),<sup>41</sup> in turn, registered a performance that was similar to CEI and was at 22.7 p in the first month of 2012 (panel B). If the trend of these indicators remains the same, household consumption can be expected to continue growing in the first half of 2012.

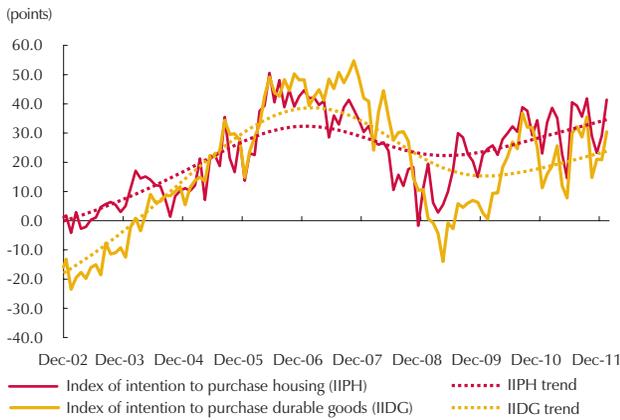
Likewise, the change in the indicators of intention to purchase housing and durable goods as well as their trends shows the better expectations that households have with respect to their economic situation (Graph 79). The index of intention to purchase housing continued to show a growth trend and was at 41.5 p, one of the highest figures registered in the last three years, in January 2012. The index of intention to purchase durable goods also reached a level of 30.1

39 The difference in the level between the HFB and CFID is due to the fact that the available income is 2.1 times greater than the wages.

40 This is constructed on the basis of the following questions: Do you believe that your household economic situation will be better, worse, or remain the same over the next year? Do you believe that economically the situation will be good or bad over the next 12 months? Do you believe that economic conditions in Colombia will be better or worse in a year compared to the situation at present?

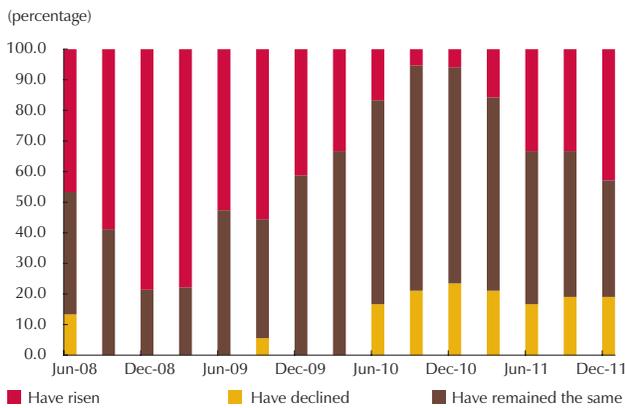
41 This is built on the basis of the following questions: Is your household better or worse off economically than it was a year ago? Do you believe that this is a good time to purchase major items such as furniture or electrical appliances?

**Graph 79**  
Purchase Intention Index for Housing and Durable Goods



Source: Fedesarrollo and DANE, Banco de la República calculations.

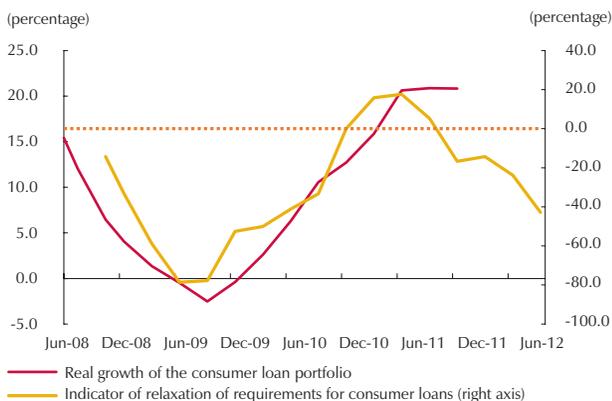
**Graph 80**  
Changes in Requirements for Allocating New Loans in the Consumer Loan Portfolio



Sources: Fedesarrollo and DANE, Banco de la República calculations.

**Graph 81**  
Real Growth of the Loan Portfolio and Indicators of Relaxation of Lending Requirements

**A. Consumer Loan Portfolio**



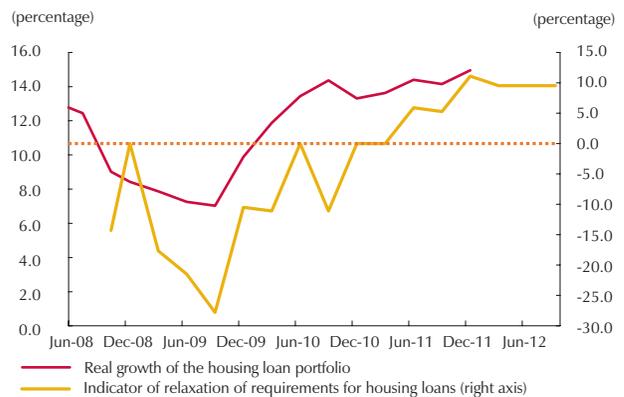
Source: Financial Superintendency of Colombia and Banco de la República.

p in the first month of 2012, a result that is similar to what had been seen seven months earlier (30.0 p).

Finally, the December 2011 RSCC showed that the majority of the banks raised their requirements for granting new loans while a similar number have kept them at high levels (Graph 80). This suggests that the intermediaries have done a more rigorous selection of their clients during the expansionary cycle of lending in order to mitigate the risk they expose themselves to during subsequent periods. When the real growth of the consumer loan portfolio is compared to the indicator of lending requirement relaxation for this loan portfolio, one sees that there is a larger number of banks that toughened their lending policies. Therefore, in the first half of 2012, we can expect the supply of loans to be primarily allocated to the system's best borrowers which could end in a lower rate of expansion for this type of loan (Graph 81, panel A). In the case of the housing loan portfolio, there is a higher percentage of entities that have relaxed their policies for granting new loans. Thus, this loan portfolio can be expected to maintain the performance that it registered in the second half of 2011 (Graph 81, panel B).

In conclusion, in the second half of 2011, an increase in household indebtedness was still seen, especially in consumer loans. However, this behavior was accompanied by growth in the non-performing and risky loan portfolio in contrast to what was described in the previous *Financial Stability Report*.

**B. Housing Loan Portfolio**



In addition, the financial burden of households continued rising during the abovementioned period. This is mainly explained by the greater strength of the consumer loan portfolio. It is noteworthy that the upswing in risk in the consumer loan portfolio has been accompanied by an increase in the loan-loss provisioning for this portfolio and by higher requirements for granting new loans. The indicators of household expectations, in turn, show a positive balance. Therefore, the strength of this sector can be expected to be sustained for the next few months.

## C. NON-FINANCIAL PUBLIC SECTOR

### 1. Fiscal Balance

According to the revision of the December 2011 financial plan,<sup>42</sup> the 2011 balance sheet for the non-financial public sector (NFPS) was better than the one for 2010 and better than what had been predicted over the course of the year in spite of the resources allocated to the emergencies caused by the winter weather. These were on the order of 0.7% of the GDP. The NFPS deficit, which is equal to 2.8% of the GDP, is primarily due to the improvement in the central national government's (NG) balance sheet. However, mention should be made of the decline in the decentralized sector surplus, which went from 0.7% to 0.4% of the GDP over the last year. This trend was similar to what had been projected (Table 4).

The result of the NG balance is due to a greater increase in income compared to expenses: Income rose 25% in the last year while expenditures rose 18%. Income tax, which grew 43%, was the most notable of the former and, investment of the latter, which includes resources allocated to winter weather problems.

Table 4  
Fiscal Balance: Non-financial Public Sector

Balance by period	Trillions of pesos		Percentage of the GDP <sup>a/</sup>	
	2010	2011	2010	2011
1. Non-financial public sector	(16.93)	(16.91)	(3.1)	(2.8)
1.1 Central National Government	(21.02)	(19.17)	(3.8)	(3.2)
1.2 Decentralized sector	4.09	2.26	0.7	0.4

a/ These data correspond to the updated financial plan for December 2011.  
Source: Ministry of the Treasury and Public Debt (Confis).

42 Preliminary fiscal close of 2011 and Financial Plan Update for 2012. Ministry of the Treasury and Public Credit, December 2011.

## 2. Dynamics of the Debt and Creditworthiness

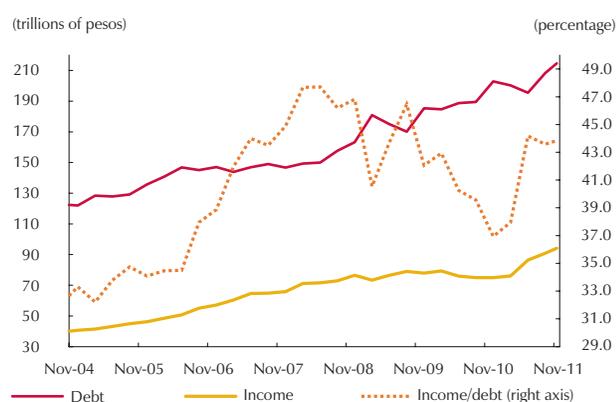
Over the course of 2011, the NG debt grew at a moderate rate (5.8% between December 2010 and December 2011) although slightly above what was stated in the last *Financial Stability Report* (3.6% as of June 2011). Within the gross debt, which came to COP\$214 t in December of last year, the better performance of foreign debt, which grew 7.9%, should be noted while domestic debt grew 5%. This combination of growth rates caused the makeup of the debt to move slightly in favor of foreign debt (Table 5).

Table 5  
Gross Debt of the NG

	Domestic	Foreign	Total	Domestic	Foreign	Domestic	Foreign	Total
	(trillions of pesos)			(share)		(nominal annual growth)		
Dec-05	88.1	47.6	135.7	64.9	35.1	28.3	(10.7)	11.2
Dec-06	94.4	52.6	147.0	64.2	35.8	7.2	10.5	8.3
Dec-07	99.1	47.7	146.7	67.5	32.5	4.9	(9.4)	(0.2)
Dec-08	108.7	54.6	163.3	66.6	33.4	9.7	14.6	11.3
Mar-09	116.0	64.9	180.9	64.1	35.9	10.2	47.2	21.1
Jun-09	118.4	56.6	175.0	67.7	32.3	11.5	29.1	16.6
Sep-09	118.3	51.9	170.1	69.5	30.5	11.0	1.4	7.9
Dec-09	125.6	59.7	185.3	67.8	32.2	15.6	9.3	13.5
Mar-10	129.2	55.5	184.7	69.9	30.1	11.4	(14.4)	2.2
Jun-10	131.3	57.4	188.7	69.6	30.4	10.9	1.4	7.8
Sep-10	134.3	55.2	189.5	70.9	29.1	13.5	6.5	11.4
Dec-10	143.5	59.3	202.8	70.8	29.2	14.2	(0.6)	9.4
Mar-11	141.9	58.4	200.3	70.9	29.1	9.8	5.1	8.4
Jun-11	140.7	54.8	195.5	72.0	28.0	7.1	(4.5)	3.6
Sep-11	145.9	62.4	208.4	70.0	30.0	8.7	13.0	9.9
Dec-11	150.7	64.0	214.7	70.2	29.8	5.0	7.9	5.8

Source: Ministry of the Treasury and Public Credit.

Graph 82  
NG Creditworthiness

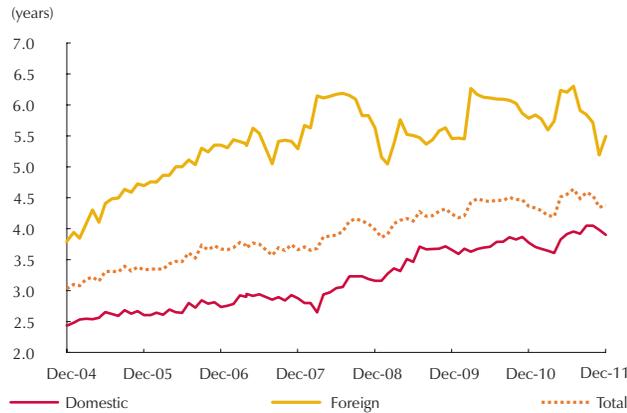


Sources: Ministry of the Treasury and Public Credit and Banco de la República.

In recent months, NG revenue has grown at a much higher rate than the gross debt and, thus, the government's creditworthiness continues to show significant improvements. Graph 82 shows that this creditworthiness has risen almost continuously since December 2010 and in November 2011 it came to 43.8%. This level is similar to what was presented in the last issue of the *Financial Stability Report*.

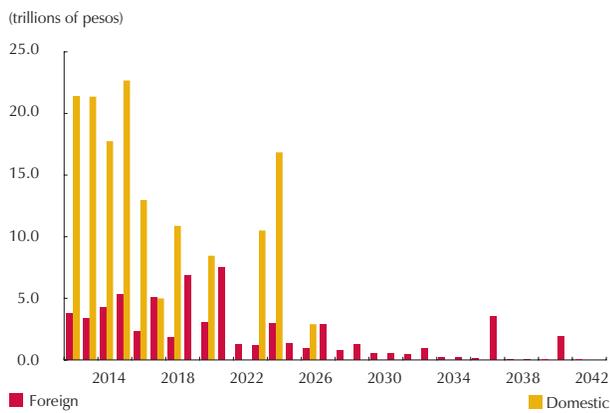
Graph 83 shows that, in the last six months, the duration of the foreign debt has dropped significantly (from 6.3 years to 5.5 years). This is in contrast to what has happened with the duration of domestic debt, which has remained almost

**Graph 83**  
Duration of NG Debt



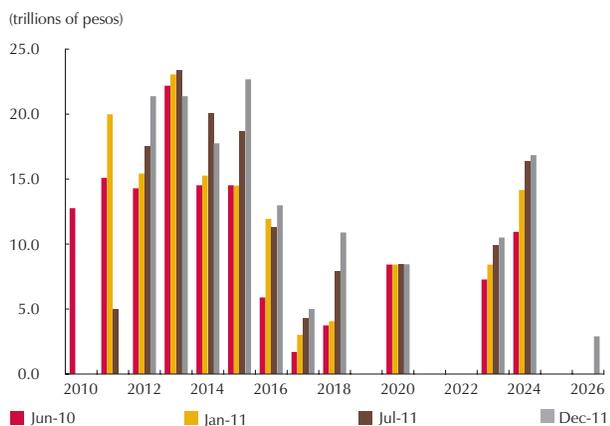
Source: Ministry of the Treasury and Public Credit.

**Graph 84**  
Maturity Profile in Pesos



Source: Ministry of the Treasury and Public Credit.

**Graph 85**  
Maturity Profile of the Domestic Debt (by year of maturity)



Source: Ministry of the Treasury and Public Credit.

constantly at around four years. This combination has generated a moderate reduction in the duration of the total debt over the last few months although it is still on a rising trend. Note that expansions in the duration of debt increase the sensitivity of this debt to changes in the interest rates.

When the profile of the debt maturities is analyzed, we see that almost 60% of these will mature within the next five years. Domestic debt is highly represented in this percentage given that almost 70% of that debt will come due during this period. Meanwhile, only 38% of the outstanding foreign debt will come due since this is for a longer term (Graph 84).

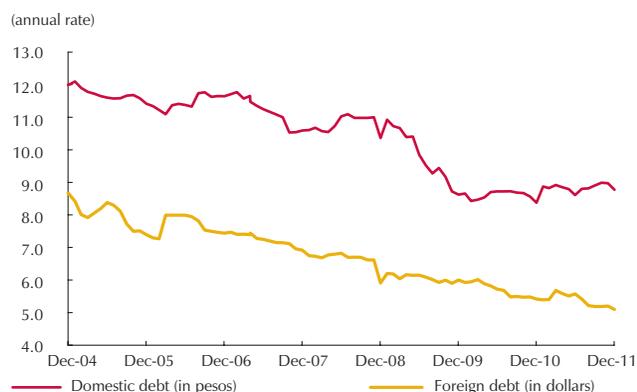
A comparison of the different maturities for domestic debt shows that said profile does not change significantly over time and that this debt remains highly concentrated in the first five years. The increase in short term maturities is noteworthy although some from the median term are also identified (2015, 2016, and 2018). In addition, small upticks in issues of long term debt instruments, which are for more than 12 years, should also be mentioned (Graph 85).

With respect to the average NG debt coupon,<sup>43</sup> the domestic debt rate remains on the path of growth it has shown since the beginning of 2010 thus confirming the change in the trend. This coupon rate, which came to 8.8% in December 2011, is similar to the one presented in July but 40 bp higher than that of December 2010. Note that this rise over the last year coincides with the increase in the policy rate on the part of the Banco de la República. The coupon for the foreign debt, in turn, showed declines during the most recent period as it went to 5.1%. This is 31 bp lower than the last one presented in the *Financial Stability Report* (Graph 86).

The total financing for the NG at the close of the year was very close to what had been projected

43 This corresponds to an average weighted by the amount of the debt.

Graph 86  
Average Coupon for NG Debt



Source: Ministry of the Treasury and Public Credit.

although the components of how it was used turned out differently. The deficit to be financed was much lower (COP\$19.5 t at the close, COP\$24.3 t projected). Meanwhile, the treasury transactions and final availability were higher. With respect to sources, debt disbursements were slightly lower than what had been predicted (COP\$34.9 t compared to COP\$35.1 t) and extra sources through privatizations were not required due to the better fiscal performance.

### 3. Outlook

In spite of the more limited growth of the GDP that was projected for 2012, the outlook presented by the government is quite encouraging in terms of the substantial improvement that is expected for the NFPS deficit. A 1 pp reduction in the deficit (from 2.8% of the GDP in 2011 to 1.8% in 2012), in particular, is expected to be reached through a 20 bp decline in the NG deficit (which would go from 3.2% to 3%) given the better performance of revenue compared to expenditures (more tax collection, more resources from Ecopetrol) and a 70 bp upswing in the balance sheet of the decentralized sector (in this case on the part of the regional and local entities) (Table 6).

Table 6  
Fiscal Balance: Non-financial Public Sector for 2012

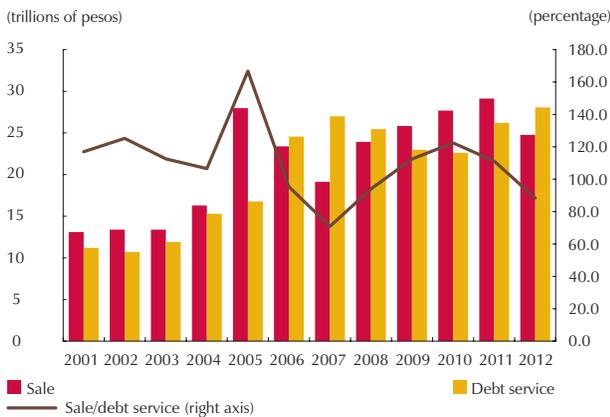
Balance for the period	Trillions of pesos	Percentage of the GDP
1. Non-financial public sector	(11.9)	(1.8)
1.1 Central National Government	(19.1)	(3.0)
1.2 Decentralized sector	7.2	1.1

Note: These data correspond to the updating of the financial plan. December 2011.  
Source: Ministry of the Treasury and Public Debt (Confis).

The financing needs for 2012 will amount to COP\$44 t and mainly consist of a lower deficit to be financed (COP\$19.2 t) and the debt repayments on the domestic and foreign debt (COP\$18 t). The levels of these two uses of resources are below what is registered in the *Mid-term Fiscal Framework* (MFMP in Spanish) for June 2011 and below what was mentioned in the last issue of the *Financial Stability Report*. In that report, the deficit to be financed and the debt retirement for 2012 were forecast to be COP\$23 t and COP\$19 t respectively.

Based on the lower financing needs the NG has for 2012, the issues of domestic debt will be on the order of COP\$24.8 t (74% through auctions and 26% through agreed upon and forced operations). These are almost COP\$3 t lower

Graph 87  
Domestic Debt Rollover (TES)



Source: Ministry of the Treasury and Public Credit.

than what had been predicted and presented in the last MFMP.

The calculation for debt service, in turn, remains almost unaltered at COP\$28 t. The roll-over of the debt will be at 88% for 2012. This implies that the debt service will be financed by appropriations other than TES sales. For example, it will be financed through the final availability of resources from 2011 or resources from privatizations (Graph 87).

A review of the list of domestic public debt security holders as of January 2012 indicates that financial entities and, specifically, pension funds and commercial banks are still the major investors in these securities. It is noteworthy that these institutions possess 27% and 22% respectively of the total outstanding TES and that the commercial banks have significantly raised their holdings in the last half year. They have gone from COP\$26.3 t to COP\$31.9 t thus increasing their exposure to market risk.

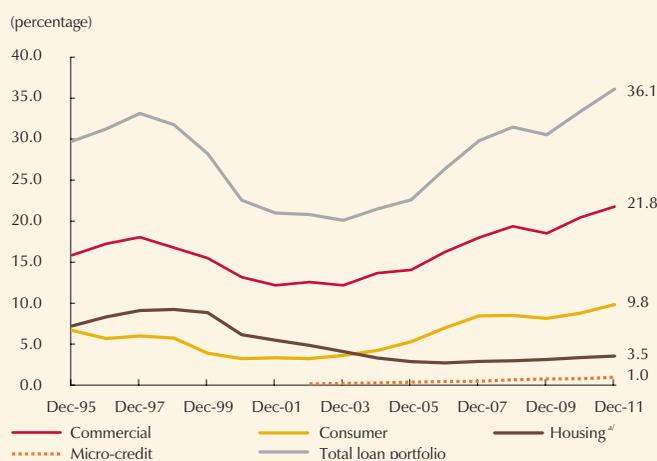
To summarize, the results for the NFPS in 2011 were much better than what had been predicted thanks to the higher tax collection and, therefore, as a result of that, the financing needs were also lower. Debt disbursements declined with respect to what had been projected. Also, although financial institutions did increase their TES holdings, the proportion of the rise was lower than it would have been if the supply of securities had been higher. For this year, an additional reduction is expected in the NFPS deficit through an improvement in the balance sheets of both the NG and the decentralized entities. What this implies is that there will likewise be lower pressure on the government's sources of financing in 2012.

### Box 3 ANALYSIS OF THE CHANGES IN CREDIT IN COLOMBIA

over the last few years, a strong dynamism in the Colombian loan portfolio has taken place. In the two most recent years, credit has grown at nominal annual rates of around 20% on average while the current GDP has increased at an average of 10%. This fact leads to the question of whether or not those growth trends can be sustained by the main macroeconomic variables over time. Answering that question is the main goal of this box. The indicator used to do this analysis was the ratio of loan portfolio to GDP given that it partially reflects the financial deepening but also indicates the value of the output that is financed.

When the changes in the loan portfolio/GDP indicator for Colombia are analyzed, an annual increase of 2 pp on average has been found since 2005. This came to 36.1% as of December 2011<sup>1</sup> (Graph B3.1). This trend is also reflected by the nominal annual growth rate of the loan portfolio which registered a surge as it went from 2.6% in December 2009 to 20.9% in the same month of 2011<sup>2</sup> (Graph B3.2). That is why it is interesting to identify periods in which there have been considerable increases in the loan portfolio/GDP ratio for Colombia and analyze if they were due to credit booms. Also, it is relevant to study whether or not the economy is currently in a credit boom period.

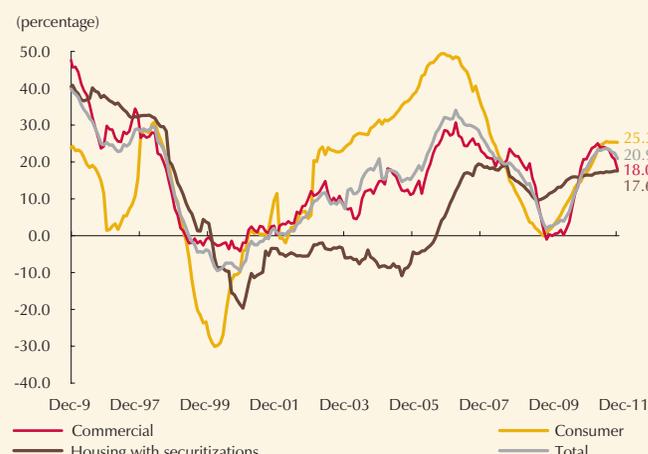
**Graph B3.1**  
Loan Portfolio/GDP



a/ The housing loan portfolio includes securitizations.  
Sources: Financial Superintendency of Colombia, Banco de la República calculations.

1 This figure includes housing loan portfolio securitizations.  
2 This growth rate includes housing loan portfolio securitizations.

**Graph B3.2**  
Growth Rate by Type of Loan Portfolio



Source: Financial Superintendency of Colombia, Banco de la República calculations.

The exercise proposed by Gourinchas *et al.* (1999) was carried out in order to identify episodes of credit boom in Colombia from 1990 to 2011. The main objective is to use this methodology to determine the periods in which the Colombian economy experienced credit boom episodes.

Note that in these kinds of episodes, the agents' leverage increases. This raises their vulnerability to economic shocks, which, in turn, may affect their financial stability. If the leverage is not controlled on time, it could bring about an economic crisis.

In this exercise, an episode of credit boom is defined when the loan portfolio/GDP ratio under study deviates at a defined limit for its trend. Graph B3.3 illustrates the course of an episode of this type.

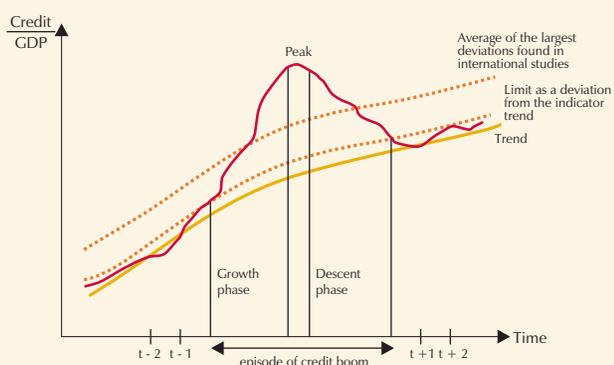
A boom episode is described in terms of the deviation between the indicator (*loan portfolio/GDP*) and its trend<sup>3</sup> with two types of deviations which are defined as follows:

$$absolute\ deviation = \left( \frac{loan\ portfolio}{GDP} \right)^{registered} - \left( \frac{loan\ portfolio}{GDP} \right)^{trend} \quad (1)$$

3 The trend was calculated based on the Hodrick-Prescott filter for quarterly data from June 1990 to December 2011.

$$\text{relative deviation} = \frac{\left( \frac{\text{loan portfolio}}{\text{GDP}} \right)^{\text{registered}} - \left( \frac{\text{loan portfolio}}{\text{GDP}} \right)^{\text{trend}}}{\left( \frac{\text{loan portfolio}}{\text{GDP}} \right)^{\text{trend}}} \quad (2)$$

Graph B3.3  
Credit Boom Episode<sup>a/</sup>



a/ This graph is the one presented by Gourinchas et al. (1999), in "Lending Booms: Some Stylized Facts"  
Source: Banco de la República based on Gourinchas et al. (1999), "Lending Booms: Some Stylized Facts"

According to Gourinchas et al. (1999)<sup>4</sup> the absolute deviation analyzes the indicator in terms of the size of the economy while the relative deviation measures it in terms of the size of the credit institutions. The beginning of a credit boom is considered to take place when the absolute deviation (equation I) is above two percentage points (pp) or in the case of the relative deviation (equation II) when it is above 5 pp. In addition, the authors found that for a sample of 91 countries (each country may have more than one episode of credit boom) the largest deviation (peak of the cycle) found was an average of 4.79 pp in absolute terms and 24.92 in relative terms for 100 cases of credit boom analyzed. In other words, those are the maximum values at which the one hundred abovementioned cases experienced deviations during the entire phase of credit booms.

By doing this exercise for Colombia from June 1990 to December 2011 in terms of both absolute and relative deviations (Graphs B3.4 and B3.5 respectively), the following episodes of credit boom can be identified (Table B3.1).

Based on Table B3.1, the average for the maximum deviation during the credit boom episodes in absolute terms was calculated to be 2.8 pp. In the case of the relative deviation, the average was 9.7 pp.

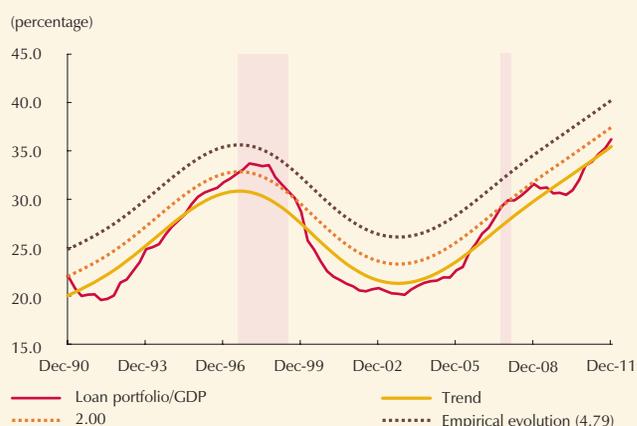
4 Gourinchas, P.; Valdés, R.; Landerretche, O. (1999). "Lending Booms: Some Stylized Facts," document prepared for the Second Annual Conference of the Central Bank of Chile, "Banking, Financial Integration, and Macroeconomic Stability."

Table B3.1  
Credit Boom Episodes in Colombia

Absolute deviation			
	Beginning	End	Maximum deviation (pp)
I	Sep-97	Sep-99	3.5
II	Sep-07	Dec-07	2.1
Relative deviation			
I	Jun-97	Sep-99	11.8
II	Jun-07	Dec-08	7.6

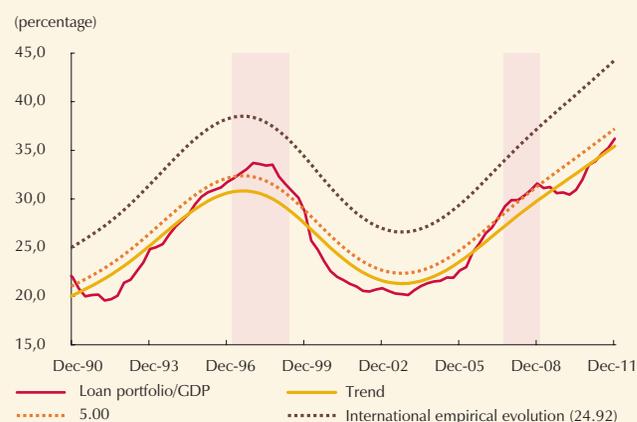
Source: Banco de la República calculations.

Graph B3.4  
Credit Boom Episodes in Colombia (1990-2011)  
(absolute deviation)  
(loan portfolio/GDP)



Sources: Financial Superintendency of Colombia, Banco de la República calculations.

Graph B3.5  
Credit Boom Episodes in Colombia (1990-2011)  
(relative deviation)  
(loan portfolio/GDP)



Source: Financial Superintendency of Colombia, Banco de la República calculations.

Furthermore, the exercise makes it possible to identify measurements such as the average duration of the episodes of credit boom. The duration may be affected by many factors, for instance, inflows or outflows of capital, economic phenomena of the region in which the country is located, and considerable changes in macroeconomic variables as well as worldwide financial crises.

In the case of Colombia, the results show that during the first credit boom episode in the period analyzed, the average duration was nine quarters for both types of deviations. However, the duration was two quarters for the absolute deviation and seven quarters for the relative deviation in the second episode. These facts suggest that in the credit boom at the end of the 1990's, the growth of the loan portfolio was higher for both the size of the economy and the size of the financial intermediaries. In contrast, in the credit boom of 2007, the expansion of the loan portfolio was sustained by a positive economic performance (taking into account its short span in absolute terms). However, that does not seem to have been the case for the financial intermediaries because the duration in relative terms was almost two years.

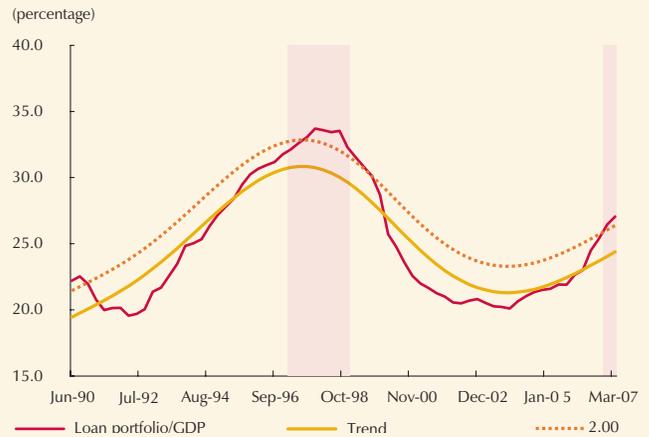
Moreover, this exercise was done by assuming a time span from June 1990 to March 2007 in order to check whether the indicator would give any warning with respect to a possible credit boom scenario. The results show a deviation of more than 2 pp in absolute terms beginning in December 2006, i.e., five months before the macro-prudential measure for reserve requirements went into effect<sup>5</sup> (Graph B3.6). The results corroborate the soundness of the model proposed.

Finally, it is important to analyze the performance of each type of loan portfolio in order to determine which of them generated the credit booms that were identified. Graphs B3.7, B3.8, and B3.9 present the values for each type of loan portfolio (commercial, consumer, and housing with securitizations) as a percentage of the GDP, their trends and the curves that indicate the limits equal to one standard deviation from the trend of the indicator. Unlike the exercise proposed by Gourinchas *et al.* (1999) for the entire loan portfolio, deviations in percentage points for the trends are not considered in the particular case of each type of loan portfolio. Rather, a standard deviation for the trend cycle is taken into account.

It was found that for the first credit boom episode (at the end of the 1990's) every type of credit surpassed the

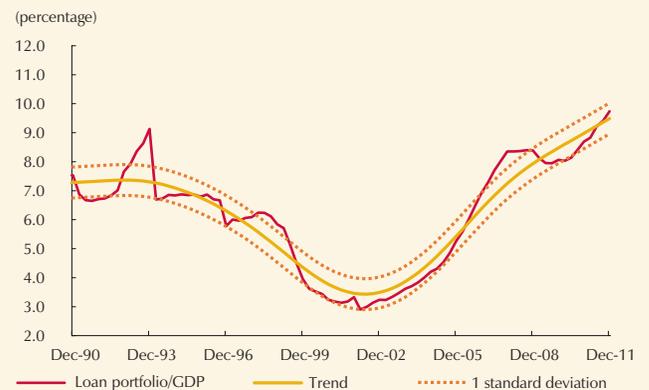
5 External resolutions 3 and 7/2007 issued by the Board of Directors by means of which the percentage for the ordinary reserve requirement and the remuneration for the reserve requirement were increased in addition to the implementation of the marginal reserve requirement of 27% for both checking and savings accounts and 5% for CD's with maturities of less than 18 months.

**Graph B3.6**  
Credit Boom Episodes in Colombia (June 1990 to March 2007)  
(absolute deviation)  
(loan portfolio/GDP)



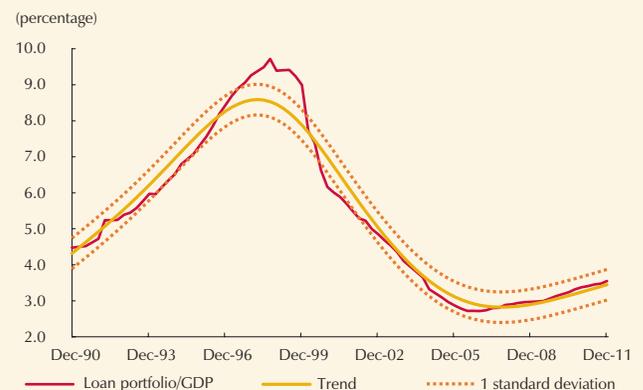
Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph B3.7**  
Consumer Loan Portfolio/GDP and its Trend



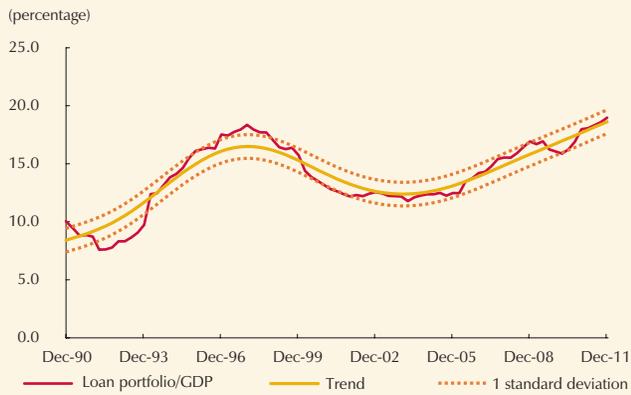
Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph B3.8**  
Housing Loan Portfolio with Securitizations/GDP and its Trend



Source: Financial Superintendency of Colombia, Banco de la República calculations.

Graph B3.9  
Commercial Loan Portfolio/GDP and its Trend



Source: Financial Superintendency of Colombia, Banco de la República calculations.

curve limits corresponding to one standard deviation. Nonetheless, the housing loan portfolio registered the largest deviation.

In the case of the second credit boom episode, the consumer loan portfolio was the only one to surpass the one standard deviation limit in its cycle. It is noteworthy that even though this portfolio deviated significantly from its trend in 1993, there was no boom in the total loan portfolio. This was due to the slowdown in the commercial loan portfolio, which had a 40% share on average in the total loan portfolio that year.

Based on the exercise proposed by Gourinchas *et al.* (1999), two credit boom episodes, which took place at the end of the 1990's and in 2007, were identified in Colombia. In addition, the exercise suggests that the loan portfolio/GDP indicator had not been substantially separated from its trend as of December 2011. However, if in 2012 there is an 8.1% annual nominal growth in the economy and the loan portfolio grows at a nominal 17.4% as a minimum, it could be thought that a credit boom is starting. Finally, it is recommended that the exercise be complemented by an analysis of the performance of other macroeconomic variables. Thus, it is suggested that the results shown in this box be interpreted cautiously.

## Box 4 COLOMBIAN COMPANIES WITH HIGH LEVELS OF INDEBTEDNESS

The indebtedness of the private corporate sector has grown significantly in the last few years and, therefore, it becomes relevant to identify the companies that have high levels of indebtedness. The objective of this box is to analyze the financial situation of said companies in order to establish whether they have the capital adequacy to comply with their obligations in a timely fashion. Likewise, the exposure of the financial system to those firms is included in the analysis.

The analysis is divided into three sections. The first describes the methodology and results of the exercises done to identify the companies that have a high degree of indebtedness. In the second, those companies with high level of indebtedness in relation to their size as well as to the share they have in the total assets of the private corporate sector are considered. Finally, the changes in the financial indicators of the companies are examined in order to determine if they represent a high risk for the stability of the financial system.

### 1. Database and methodology

#### a. Database

The companies analyzed are those that were under the oversight of the Superintendency of Corporate Affairs for the 1999-2011 period and that had debts contracted with credit institutions. For each company, the ratio of financial leverage was calculated as follows:<sup>1</sup>

$$RL_{it} = \frac{\text{total debt with credit institutions}_{it}}{\text{total assets}_{it}}$$

Where  $i$  denotes the company and  $t$  denotes the period (year).

Thus, an unbalanced panel of companies is built, i.e., the number of companies identified fluctuates over the years.

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1 The numerator in the indicator is calculated based on the information provided by Form 341 published by the Financial Superintendency of Colombia for the fourth quarter of year  $t$  under analysis. Likewise, the denominator corresponds to the information from the balance sheets of the companies, which is reported to the Superintendency of Corporate Affairs. Given the availability of data, the calculation of the indicator for 2011 was done based on both Form 341 for the third quarter of 2011 and the information from the private corporate sector balance sheet as of December 2010, which was projected with the figure for the nominal annual growth of the GDP registered for the period between September 2010 and September 2011.

This indicator measures the percentage of assets that were financed through debt with credit institutions. A significantly high value in this indicator could translate into capital adequacy/liquidity problems for the company given that a high percentage of its assets is committed to paying off the debt. This could leave the company with insufficient funds to carry out investment projects.

#### b. Methodology

In order to answer the question regarding which companies show high levels of indebtedness, a statistical indicator is used that identifies atypical companies with respect to the leverage ratio previously defined. This indicator is known as *modified Z score* and is based on robust statistics of first and second order defined as:

$$ZM_{it} = \frac{d_{it}}{\text{med}(d_{1t}, d_{2t}, \dots, d_{n(t)})}$$

where:

- $d_{it} = |RL_{it} - \tilde{RL}_t|$  denotes the distance for the leverage ratio of the company  $i$  in year  $t$  [ $\tilde{RL}_t$ ] with respect to the median of the ratio in year  $t$  [ $RL_{it}$ ].
- $\text{med}(d_{1t}, d_{2t}, \dots, d_{n(t)})$  denotes the median of the deviations for all companies identified in year  $t$  and represents a measure of statistical dispersion of the data that, unlike the unbiased estimator for the standard deviation,<sup>2</sup>  $s$ , is not affected by extreme values.

### 2. Description of atypical companies

The abovementioned procedure “may be seen as a robust standardization of data.”<sup>3</sup> For any year analyzed, if  $ZM_i > c$  the conclusion is that observation  $di$  is atypical with respect to the remaining  $n(t) - 1$ . In general, when the annual series for the indicator of financial leverage is analyzed, it turns

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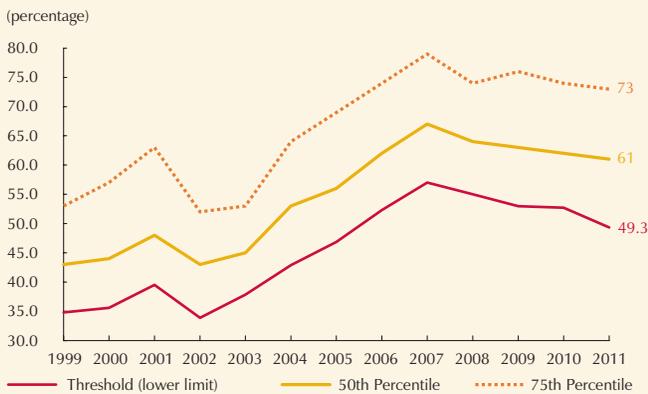
2 Where  $s_t = \sqrt{\frac{1}{n(t)-1} \sum_{i=1}^{n(t)} (RA - \bar{RA})^2}$

3 Peña, D. (2002). Análisis de datos multivariantes, Madrid: McGraw-Hill/Interamericana de España, pp. 124.

out that the series adjusts to an asymmetric and leptokurtic distribution. Thus, it will be assumed that  $c = 54$ .<sup>4</sup>

Graph B4.1 shows the lower limit (threshold) for the financial leverage ratio based on which a company can be classified as atypical. As can be seen, the thresholds vary between 34% and 57%. Likewise, the 50<sup>th</sup> (median) and 75<sup>th</sup> percentiles of the leverage indicator for atypical companies are presented. Generally, those three series have shown a similar trend over time. Starting in September 2011, a firm has been considered atypical if its financial leverage ratio is above 49.3%. For the same month, the median for the ratio of financial leverage in the case of atypical firms was 61% and the 75<sup>th</sup> percentile was 73%. Last of all, the indicator showed a growth trend in the 2002-2007 period, came to its maximum value in 2007, and began to decline afterwards. This was due to a general increase in the leverage ratio of the companies, especially in the 2006-2007 period.

**Graph B4.1**  
Threshold for Classifying a Company as Atypical, 50<sup>th</sup> and 75<sup>th</sup> Percentiles of the Financial Leverage Ratio for Atypical Firms



Sources: Financial and Corporate Affairs Superintendencies, Banco de la República calculations.

4 Iglewicz, B.; Hoaglin, D. C. (1993). How to Detect and Handle Outliers (1st ed.), Milwaukee, (Wisconsin): ASQ Quality Press, suggests that the limit for determining if an observation is atypical should be equal to 3.5, i.e.,  $c = 3.5$ . The calculation of this lower limit is based on different simulations done for a set of data adjusted to a normal distribution and as long as  $E[\text{median}\{x_i - \bar{x}\}] = 0,6745\sigma$ , when  $n \rightarrow \infty$  and  $X \sim N(\mu, \sigma^2)$ . However, Peña (2002) suggests that 5 should be accepted as the lower limit and does not specify that the variable of analysis shall be adjusted to any distribution or comply with any given size

When the aggregate indicator of financial leverage<sup>5</sup> for all atypical companies is analyzed, two important peaks registered in 2001 and 2007 stand out. In the first, the indicator was at 51.6% and showed a 5.8 pp increase with respect to the figure recorded in 2000 (45.9%). However, the largest change took place between 2006 and 2007 with a 12.8 pp<sup>6</sup> upswing (Graph B4.2). This increase is consistent with the boom experienced by the loan portfolio in those two years.

**Graph B4.2**  
Financial Indebtedness of Atypical Companies



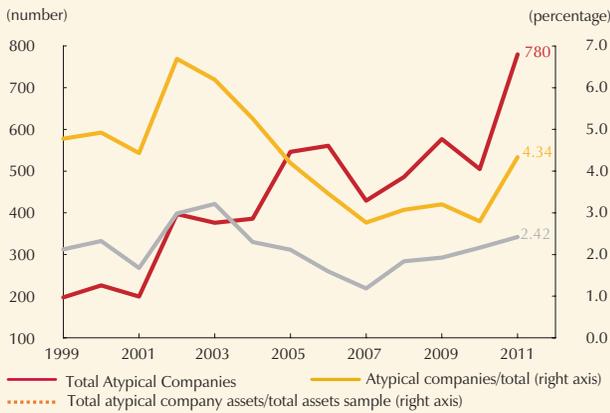
Sources: Financial and Corporate Affairs Superintendencies, Banco de la República calculations.

Graph B4.3 shows the number of atypical companies, the percentage they represent of the total number of companies in the sample and the assets they have. As can be seen, the number of atypical companies has grown in the period under analysis. However, this is due to the increase in the number of firms that report their financial statements to the Superintendency of Corporate Affairs and that have debts with credit institutions. It should be noted that the atypical companies have not registered any substantial increases as a percentage of the total assets held by the private corporate system in recent years. Likewise, the share atypical companies have in the total sample has shown a declining trend since it hit a maximum in 2002 with the exception of last year when that share went up to 4.3%.

5 For each year in the period of the analysis, the aggregate indicator is built as the ratio of the amount of debt with the credit entities that the companies classified as atypical have accumulated to the total assets held by these companies. This indicator can be seen as a weighted average of the individual indicators in which the weight for each company is the share their assets have.

6 Between 2001 and 2002, the real annual growth rate for the indebtedness that atypical firms have with credit establishments was 0.2% while the real annual growth for the total assets was negative and registered at -12.6%. Moreover, between 2006 and 2007, the real annual growth of the debt contracted with credit institutions was 25.1% while that for the total assets was 17.3%.

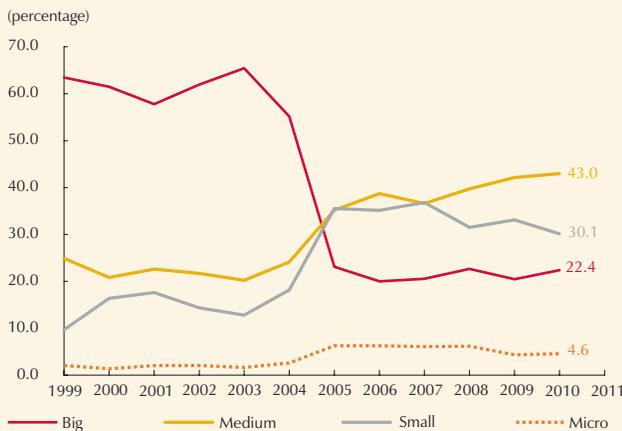
**Graph B4.3**  
**Number of Atypical Companies, Total Ratio of Atypical Companies to Sample Size and Total Ratio Assets of Atypical Companies to Total Assets of the Sample**



Sources: Financial and Corporate Affairs Superintendencies, Banco de la República calculations.

When the size of atypical companies is analyzed,<sup>7</sup> one finds that between 1999 and 2004, the majority of these companies were large (Graph B4.4). However, at the beginning of 2005, that trend shifted when medium and small companies started to become more representative. This fact is consistent with the drop in the percentage of assets accumulated by atypical firms.

**Graph B4.4**  
**Components of Atypical Companies by Size**



Sources: Financial and Corporate Affairs Superintendencies, Banco de la República calculations.

7 Between 2001 and 2002, the annual, real growth rate for indebtedness of the atypical firms with credit institutions was 0.2% while the annual, real growth for the total assets was negative and registered at -12.6%. Likewise, between 2006 and 2007, the real annual growth of the debt contracted with credit establishments was 25.1% while that for the total assets was 17.3%.

Graph B4.5 presents the outstanding debt for atypical companies versus the percentage it represents in the total for the commercial loan portfolio. As of September 2011, those companies had accumulated a total of COP\$8.8 t which represents 6.9% of the total in the commercial loan portfolio.

Finally, given the fact that atypical companies represent a substantial share of the commercial loan portfolio identified as of September 2011, it is necessary to establish the relevance of each sector. When the sector components of the atypical loan portfolio are studied, it can be seen that the commerce and manufacturing sectors hold the largest shares: 40% and 19% respectively (Graph B4.6).

**Graph B4.5**  
**Annualized Commercial Loan Portfolio Accumulated by Atypical Companies**



Sources: Financial and Corporate Affairs Superintendencies, Banco de la República calculations.

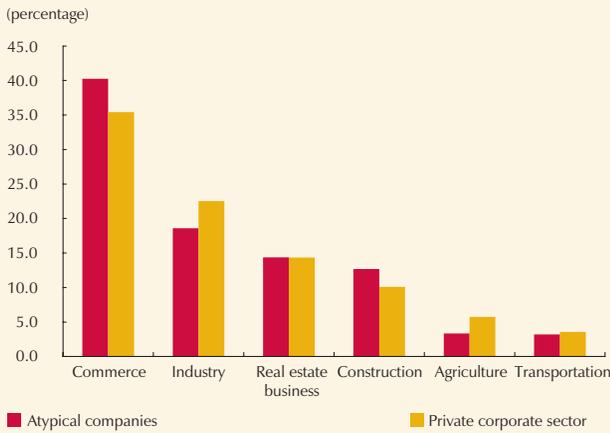
### 3. Financial Situation of Atypical Companies

To evaluate the impact that high levels of indebtedness have on the financial soundness of the firms, a financial analysis of the atypical companies based on a study and interpretation of the traditional indicators for performance and indebtedness is presented below.<sup>8</sup>

Graph B4.7 shows the changes in these indicators during the 1999-2011 period for the atypical companies and for the total sample.

8 The following are the financial indicators under analysis: return on assets (operating profit/total assets), current ratio (current assets/current liabilities), net working capital (total current assets – total current liabilities), total indebtedness (total liabilities/total assets), ST financial indebtedness (ST financial obligations/total assets) and LT financial indebtedness (LT financial obligations/total assets)

**Graph B4.6**  
Sector Components for Atypical Firms and the Private Corporate Sector as of September 2011



Sources: Superintendency of Corporate Affairs, Banco de la República calculations.

In general, the atypical companies had values for the liquidity indicators (current ratio and net working capital) that were significantly below those found for the total sample. In spite of that and without considering the 1999-2001 period, the atypical companies have shown a current ratio above 1 (which is equivalent to a strictly positive indicator of net working capital).

Furthermore, the profitability of the atypical companies has been lower. However, the gap in relation to what was found for the total sample is not substantially large. In particular, the value of this indicator was higher for the atypical companies in 2003. Also, two aspects are noteworthy: i) between 1999 and 2001, the indicator for atypical firms showed negative values, and ii) as of September 2011, the two samples tended to converge in their profitability (atypical firm ROA = 5.6% and total sample ROA = 6.2%).

As was expected, the levels of indebtedness for atypical companies have been far above those for the total sample.

The indicator of total indebtedness for the atypical companies has fluctuated within the 70%-85% range with a declining trend in recent years that came to 71.5% in 2011. For the total sample, this indicator has shown a stable trend with the highest values recorded in the 1999-2001 period.

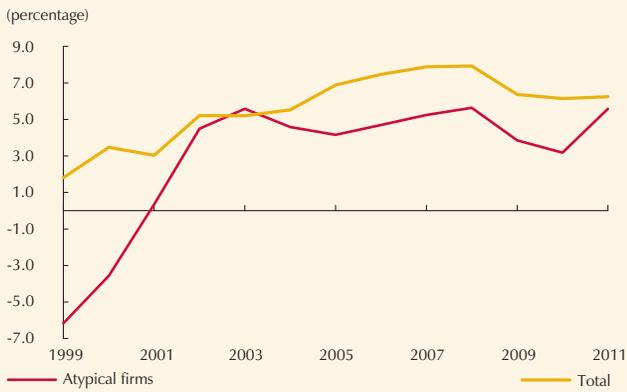
In addition, the indicators of indebtedness concentration by term indicate that, during the period analyzed, these indicators have been higher with respect to those registered for the total sample. The indicator of long term financial indebtedness (LT) shows high levels of leverage for atypical companies. However, the values seen for this indicator have been lower with respect to those registered for the indicator of short term financial indebtedness (ST). As a consequence, the atypical companies have been more exposed in the short term compared to the rest of the companies in 2011 since the indicator for the former is at 26.6% while the indicator for the total sample is 8.1%.

In summary, the atypical companies have presented a weaker financial situation in comparison to that for the private corporate sector. In general, the financial analysis gives details with regard to problems with the financial soundness of the companies analyzed for the 1999-2001 period. Although the atypical companies have not recorded critical values for the indicators of profitability and liquidity, it must be noted that they face a greater exposure in the short term.

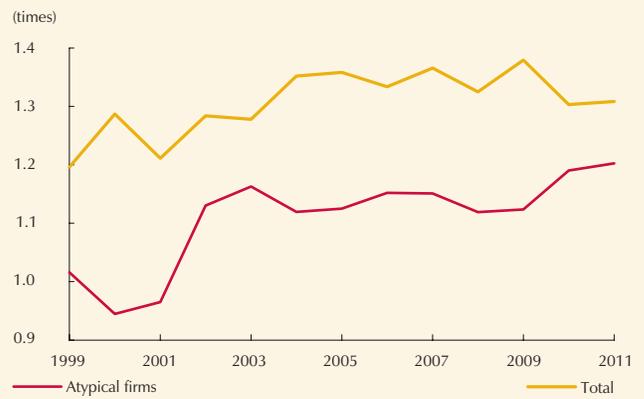
In conclusion, in recent years the majority of the companies with high levels of indebtedness (atypical) have been medium or small companies. As of September 2011, they accounted for 6.9% of the entire commercial loan portfolio, which is equivalent to COP\$8.8 t. Also, they have shown a fragile financial situation in comparison to the companies with lower levels of indebtedness. Therefore, a relatively high level of leverage seems to produce a negative effect on the financial soundness of the companies. Even if the atypical companies do not represent an imminent threat to the stability of the financial system, it is appropriate to monitor the exposure of the financial entities to them.

Graph B4.7  
Financial Indicators for the Atypical Companies

A. Return on asset (operating profit/total assets)



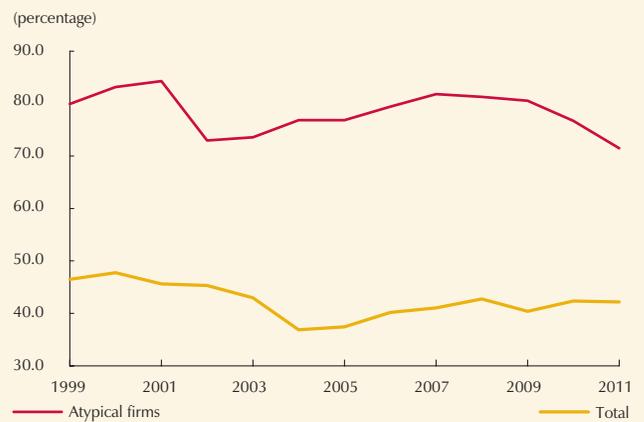
B. Current ratio (current assets/current liabilities)



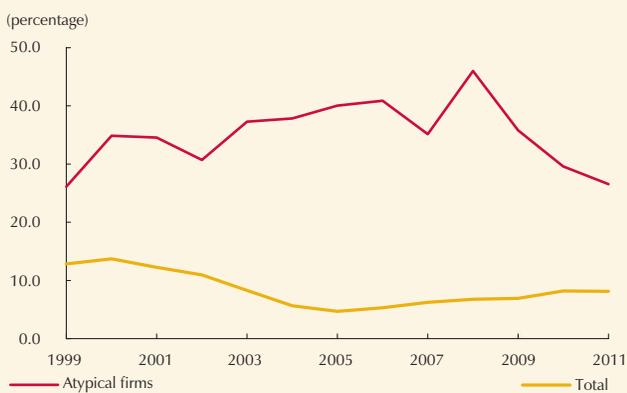
C. Net working capital (total current assets - total current liabilities)



D. Total indebtedness (total liabilities/total assets)



E. Short term financial indebtedness (short term financial obligations/total assets)



F. Long term financial indebtedness (long term financial obligations/total assets)



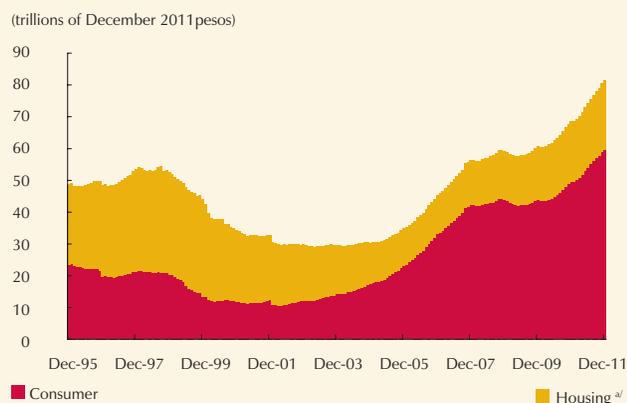
Sources: Superintendency of Corporate Affairs, Banco de la República calculations.

## Box 5

### SURVEY OF FINANCIAL BURDEN AND EDUCATION OF HOUSEHOLDS

In 2011, the exposure of the financial system to the households continued a trend of rapid growth along with an upswing in the risk derived from loans granted to this sector of the economy (Graph B5.1). In addition, the indebtedness of households is still concentrated in the consumer loan portfolio, which means there is a higher credit risk for the intermediaries due to the low presence of proper collateral to back that type of loan.<sup>1</sup> Therefore, it becomes crucially important to do permanent monitoring of the financial situation of households in order to identify possible deteriorations that could affect their ability to pay off their debts.

**Graph B5.1**  
Real Indebtedness of Households by Type of Credit



a/ Housing includes securitizations.  
Sources: Financial Superintendency of Colombia, Banco de la República calculations.

To provide a solution for this need, some entities in the public and private sectors have joined forces to gather information that would make it possible to do said follow up. On one hand, Banco de la República and the National Bureau of Statistics (DANE in Spanish) implemented the survey of financial burden and financial education of households (Iefic in Spanish), which has been done in Bogotá since the beginning of March 2010.<sup>2</sup> The purpose of this survey is to gather information related to the financial and socio-demographic features of the households as well as information that would be helpful for understanding how

households make their decisions on indebtedness, savings and investment.

On the other hand, the Asobancaria-Cifin has a database of debtors to the financial system in which the information about all of the obligations people have contracted with entities in the system is recorded. Furthermore, the office for Risk Management in that entity developed a model of neuronal networks by means of which is possible to determine the level of an individual's income and, as a result, estimate his level of indebtedness (Asobancaria-Cifin, 2011).

By using the information from Iefic and Asobancaria-Cifin, this box presents the results of the indicators constructed to monitor the state of household indebtedness.

#### 1. Indicators of Financial Burden and Indebtedness

The goal that financial indicators for households ought to have is to evaluate the capacity households have to meet the obligations they have contracted with the financial system. Two factors have to be considered: i) the availability of funds destined to debt service over a specific period, and ii) the amount of debt (Cifuentes and Cox, 2006). To achieve this objective, three indicators were constructed based on Gutiérrez *et al.* (2011). The first is a traditional index of financial burden (FBI) that seeks to quantify the percentage of income that is set apart for debt service. The other two attempt to measure the level of indebtedness with respect to annual income (DBI) and to wealth (DBW). Therefore, the indicators are defined as follows:

$$FBI = \frac{\text{debt service}}{\text{total income}}$$

$$DBI = \frac{\text{total debt}}{\text{total annual income}}$$

$$DBW = \frac{\text{total debt}}{\text{total wealth}}$$

where debt service corresponds to the sum of both payment of principal and interest<sup>3</sup> on the loans, income is calculated as the aggregate of salaries from the different jobs held by an

- 1 The consumer loan portfolio is riskier than the housing loan portfolio because it does not have appropriate collateral to back the loans.
- 2 The decision to carry out the first phase in Bogotá was made under the consideration that the loans granted in Bogotá represent close to 44% of the total loan portfolio.

- 3 The partial payment against the principal and the payment of interest include mortgage loans, credit cards, unspecified use loans, loans contracted with pawn shops, loans granted by cooperatives, loans from friends and short term loans from neighborhood stores (items put on account).

individual<sup>4</sup> and wealth is defined as the sum of income, real estate properties and other assets, and investments in the financial markets.<sup>5</sup>

Furthermore, the availability of micro-data allows for the breakdown of these indicators to analyze them in more detail. Indicators that differentiate by gender and level of income were built by using the information from lefic. These indicators were also broken down by type of credit based on data from Asobancaria: i) consumer loans excluding credit cards, ii) credit cards, and iii) housing purchase.

## 2. Results

The results of the calculations for the indicators of financial burden and indebtedness are presented in this section. Note that the indicators built by using the information from lefic reflect the financial condition of the households in Bogota while the indicators from Asobancaria-Cifin show the situation of households at the national level.<sup>6</sup>

Based on the data provided by lefic, an increase in the financial burden of households took place in 2011 while the level of indebtedness with respect to income remained relatively constant. Thus, the debt service went from representing 16.9% of household income in 2010 to 20.0% a year later (Graph B5.2). Moreover, the DBI registered a slight decline when it went to 33.2%, which represents a 70 bp drop in comparison to the results for 2010 (33.9%). In terms of wealth, the indebtedness indicator showed a considerable reduction as it went to 12.0%, a figure that is 7.3 pp below the one registered a year before.

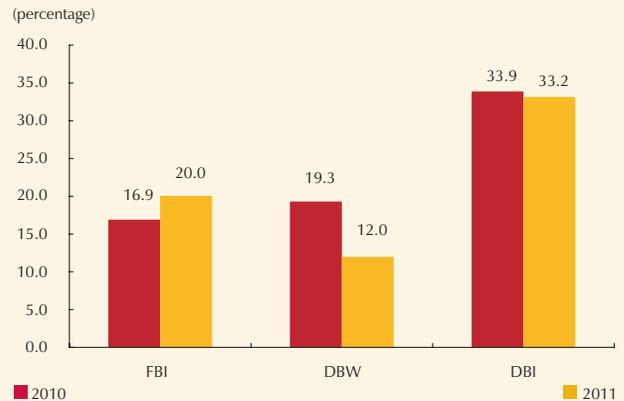
This trend may be explained by the fact that the households continue perceiving a higher value for their wealth. Also,

4 The calculation of household income refers to income derived from job activities (income from the main and second jobs, work paid in kind and income from work done by unemployed and inactive people) and income derived from other sources (interest, dividends, pensions, retirement benefits, money transfers, severance pay, rent and other types of income).

5 The definition of wealth in the case of households considers the total household income, the real estate property (apartments, industrial facilities, farms, storefronts, lots, offices, warehouses, parking lots, hotels and hostels), vehicles (motorcycles, private vehicles, public service vehicles, ships and airplanes), machinery, equipment and animals.

6 Despite the fact that lefic is done in Bogota, the indicators built based on this information are representative because close to 44% of the total loan portfolio has been granted in that city. Likewise, it is important to mention that these indicators are not comparable with those presented in the section on households of this Financial Stability Report because they are calculated with data that has been broken down and consider only the indebted households.

Graph B5.2  
Indicators of Financial Burden and Indebtedness



Sources: lefic, DANE and Banco de la República.

when the distribution of the indicator of financial burden for 2010 and 2011 is compared, no important changes are found (Graph B5.3).

When the financial balance for households at the national level is analyzed, the debt service in proportion to income registered an increase in the first and third quarters of 2011 and a reduction in the fourth quarter as a result of substantial growth in income in comparison to that for the debt service that year. Indebtedness, in turn, continued growing and came to 20.4% as of December 2011 (Graph B5.4).

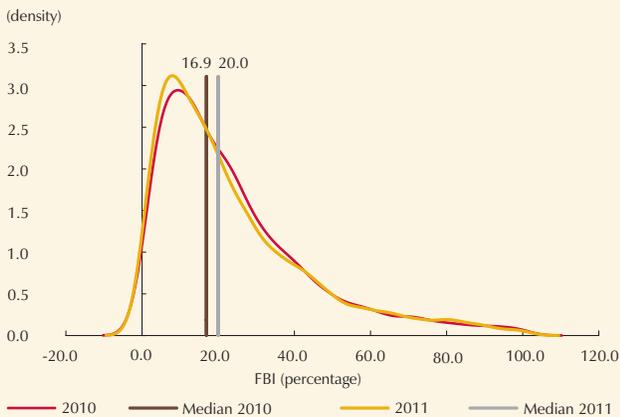
In spite of the high growth in the consumer loan portfolio, no major changes have been found in the distribution of debt by quintile of income.<sup>7</sup> As of December 2011, the households with high income (quintiles 4 and 5) accounted for close to 70% of the loan portfolio granted to this sector while those in the quintile 1 represented just 5.2%<sup>8</sup> (Graph B5.5).

When the indicators are evaluated by level of income, the FBI for households in the fifth quintile had the highest increase as it went from 13.3% in 2010 to 18.0% a year later. Likewise, the households in quintiles one and two are the ones with the highest financial burden in the sample (Graph B5.6, panel A). As the level of indebtedness is analyzed, one sees that the DBW dropped for all quintiles with the exception of the first (panel B) while the DBI for the latter had the highest

7 The quintiles considered from the information provided by Asobancaria are defined, on average, for the following ranges: i) 0 < quintile 1 ≤ 1.4 m; ii) 1.4 m < quintile 2 ≤ 1.8 m; iii) 1.8 m < quintile 3 ≤ 2.4 m; iv) 2.4 m < quintile 4 ≤ 3.5 m, and v) 3.5 m < quintile 5.

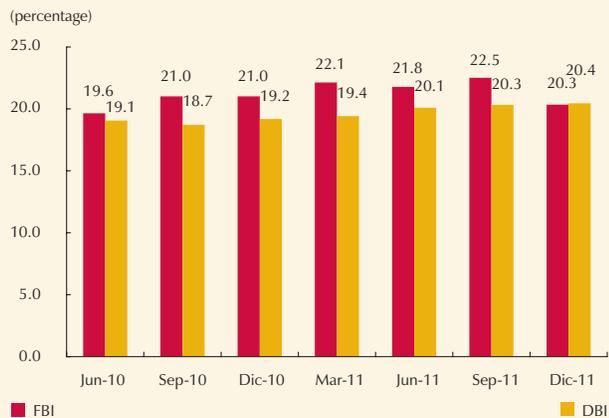
8 The quintiles presented from the information provided by lefic are defined, on average, for the following ranges: i) 0 < quintile 1 ≤ 0.9 m; ii) 0.9 m < quintile 2 ≤ 1.5 m; iii) 1.5 m < quintile 3 ≤ 2.3 m; iv) 2.3 m < quintile 4 ≤ 3.9 m, and v) 3.9 m < quintile 5.

**Graph B5.3**  
Probability Density Function of FBI



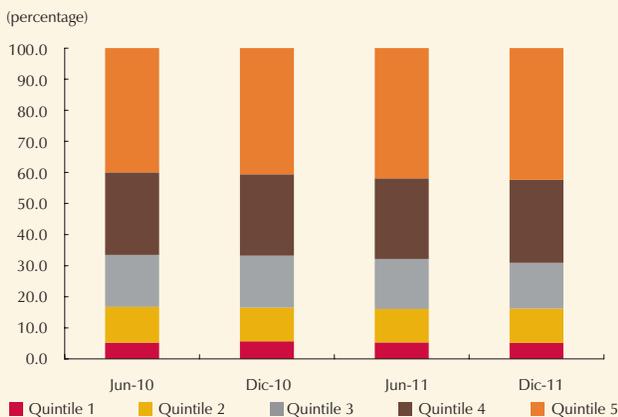
Sources: Iefic, DANE and Banco de la República.

**Graph B5.4**  
Financial Burden and Total Indebtedness



Source: Asobancaria.

**Graph B5.5**  
Distribution of Debt by Quintiles of Income



Source: Asobancaria.

growth compared to quintiles 2, 3 and 4, which registered drops (panel C). These results suggest that the loan period for the households in quintile 1 was deferred over a longer period of time.

In summary, the financial burden and the indebtedness of households showed an upward trend in 2011. By level of income, quintile 5 had the highest growth in these indicators while quintiles 1 and 2 registered the highest figures for the indicators in the sample. However, the exposure of the system to quintiles 1 and 2 is around 5.0% of the loan portfolio granted to the sector of households. It is vitally important to continue monitoring these indicators over the next few months in order to identify possible deterioration in the financial situation of households.

## References

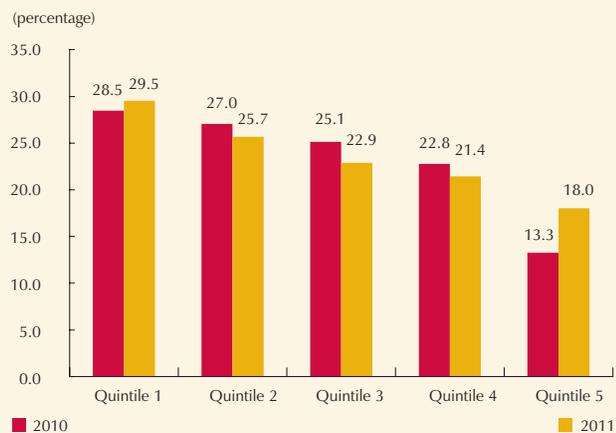
Cifuentes, R.; Cox, P. (2006). "Indicadores de deuda y carga financiera de los hogares en Chile: metodología y comparación internacional", Banco de Chile.

Risk Management, Asobancaria-Cifin. (2011). "Estimación de la carga financiera en Colombia", Financial Stability Issues, *Financial Stability Report*, Banco de la República, March.

Gutierrez Rueda, J.; Capera Romero, L.; Estrada, D. (2011). "Un análisis del endeudamiento de los hogares", Financial Stability Issues, *Financial Stability Report*, Banco de la República, September.

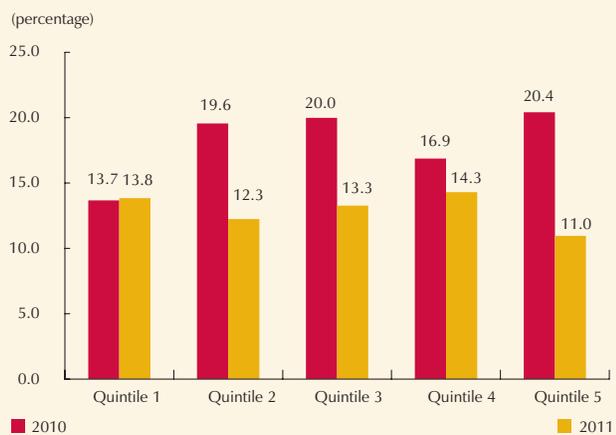
Graph B5.6  
Indicators for Financial Burden and Indebtedness by  
Gender

A. FBI

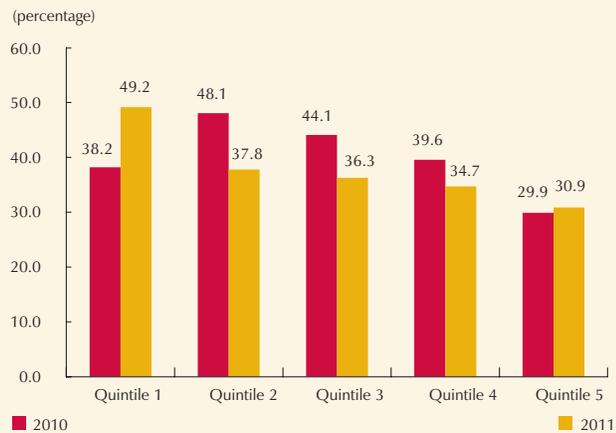


Quintile 5

B. DBW



C. DBI



Sources: Iefic, DANE and Banco de la República.

## IV. FINANCIAL SYSTEM RISKS

*In the second half of 2011, there was an improvement in the indicators of loan portfolio quality and default for all of the different types of loans. However, the new harvests in the consumer and micro-loan portfolios registered a higher risk in comparison to the ones that originated in previous quarters. With respect to the housing loan portfolio, there was a decline in the probability of the loans migrating towards worse ratings.*

*The exposure to market risk rose because of the higher amount exposed and the increase in the duration of the financial entities' portfolios. This has not translated into upswings in the potential losses due to the stable trend in the volatility of TES prices.*

*Finally, the entities in the financial system registered levels of liquidity during the period that would allow them to face extraordinary shocks in deposit withdrawals at the same time as the situation in terms of market liquidity remained favorable.*

### A. MARKET RISK

#### 1. Financial System Exposure to Public Debt Securities

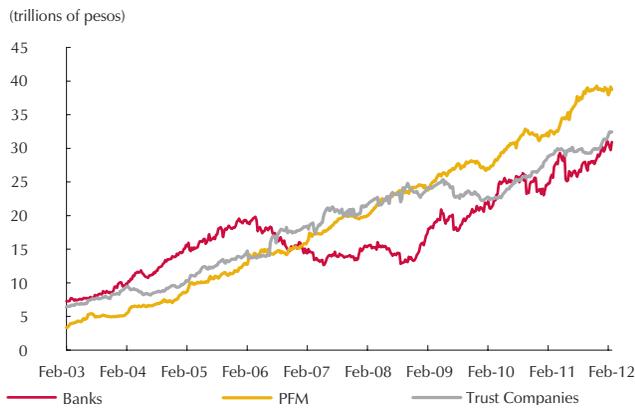
The PFM, trust companies (TC)<sup>44</sup> and commercial banks are the entities that manage and account for most of the government debt securities within the financial system. The outstanding TES managed by the PFM, TC, and commercial banks showed an upsurge of COP\$1.4 t, COP\$2.5 t, and COP\$3.5 t respectively between August 2011 and February 2012. As of February 24 this year, the TES portfolio held by these entities was at COP\$38.7 t, COP\$32.5 t, and COP\$30.9 t for the same groups of entities (Graph 88).

The commercial bank balance sheets as of February 24, 2012 represented 95.2% of the outstanding TES in credit institutions. Meanwhile, PFM and TC

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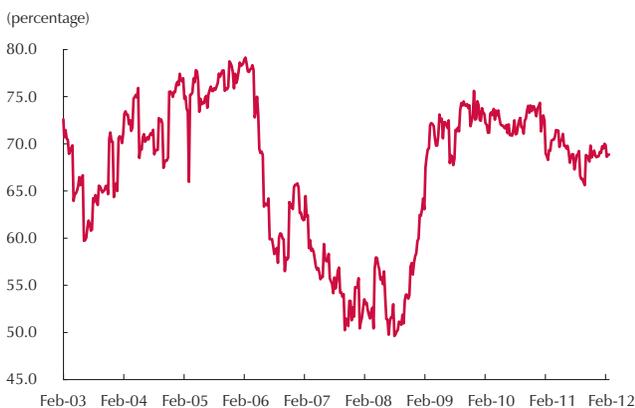
<sup>44</sup> In this issue of the Financial Stability Report, the portfolio managed by the trust companies for third parties will be analyzed and not only the one that belongs exclusively to them as was done in previous versions.

**Graph 88**  
**Outstanding Peso and UVR-denominated TES Held by Commercial Banks, PFM and Trust Companies**



Source: Banco de la República.

**Graph 89**  
**Share of TES Investment Portfolio Including Negotiable and Available-for-sale TES Held by Commercial Banks**



Source: Banco de la República.

had a share of 89.6% (48.7% and 40.8% respectively) of the total NBF public debt securities.

In the case of banks, not all of the investments are exposed to changes in market prices.<sup>45</sup> That is why it is important to analyze the changes in the amount exposed<sup>46</sup> to market risk in the case of these entities. In the latest six months, the amount exposed in commercial banks rose 12% and amounted to COP\$21.3 t in February 2012. This increase is due to the larger holdings of government bonds. Thus, the levels of exposure commercial banks have to market risk continue to climb and are at their maximum levels for the period analyzed. Nevertheless, the proportion of negotiable securities available for sale (68.9%) declined in comparison to what had been registered six months before (69.2%) (Graph 89).

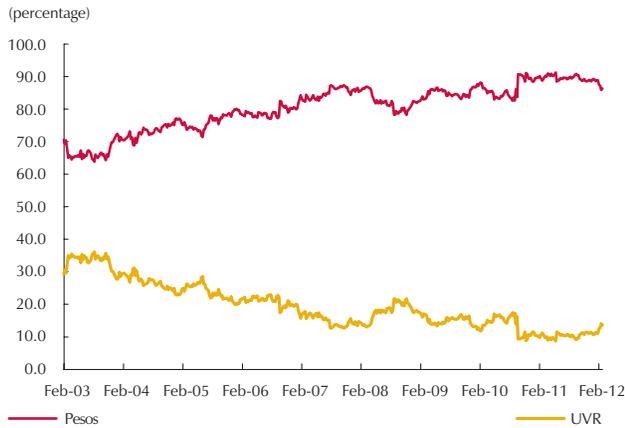
With respect to the components of the portfolio by currency, it can be seen that both the commercial banks and the PFM and TC are holding to their preference for securities in pesos. As of February 2012, their share within the portfolio was 86.4%, 56.7%, and 86.4% respectively. However, the commercial banks registered a shift towards UVR-denominated securities. The share of this type of security in the TES portfolio rose 3.3 pp (this corresponds to an increase of COP\$1.3 t) and was at 13.6% in February of this year. The PFM and TC increased the amount they were holding in peso-denominated securities between August

45 The investments can be classified as negotiable, available for sale or at maturity. The first are securities that are acquired to make a short term profit based on fluctuations in their prices. They are entered on the books initially at the purchase price and are revalued daily based on their current market price. The resulting adjustment is entered in the profit and loss account. The second are securities that the holder intends and is legally entitled to hold for a period of no less than one year or Central Bank bonds with low or minimal marketability. In spite of this restriction, there is no change in their condition as saleable. They remain investments that can be sold at any time. They are initially entered on the books at the purchase price and are adjusted daily just as investments at maturity are. However, the variations in their market prices are also incorporated in the adjustment, which is entered in the capital or proprietor accounts. Investments at maturity, in turn, are securities the holder intends and is legally entitled to hold until maturity or redemption. They are initially entered on the books at their purchase price and daily revalued exponentially based on the internal rate of return calculated at the time of purchase. The adjustment is registered in the profit and loss accounts.

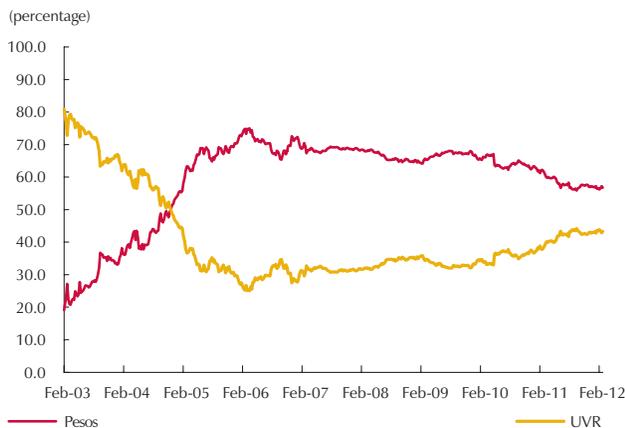
46 The amount that is exposed is defined as the balance of the public debt securities that is subject to changes in the market price. Therefore, this corresponds to the total negotiable securities plus those that are available for sale.

Graph 90  
Composition of Investment in TES by Monetary Unit

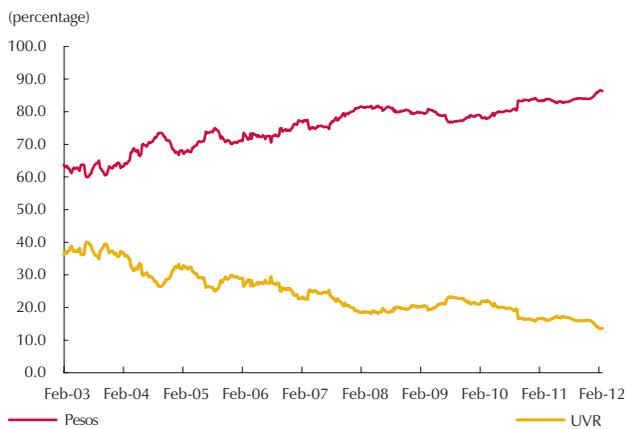
A. Commercial banks



B. PFM



C. Trust Companies

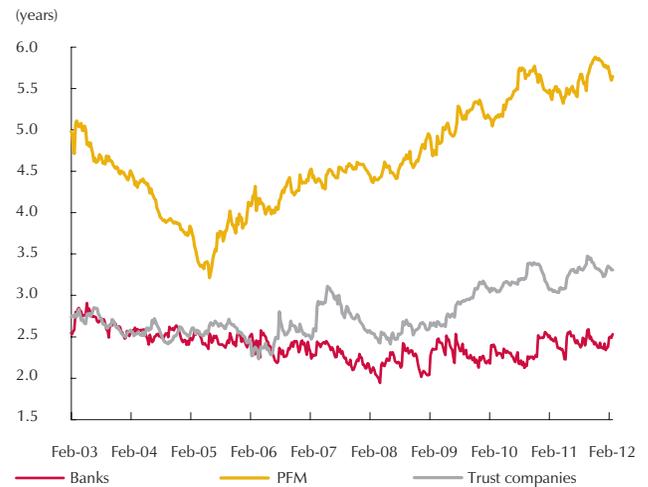


Source: Banco de la República.

2011 and February 2012 as they went from 56.3% to 56.7% and from 83.7% to 86.4% respectively (Graph 90).

Going by maturities,<sup>47</sup> the banks, PFM and TC have different components in their portfolios as a consequence of their business structure. The banks and TC have a concentration of medium and short term securities in their portfolios while the securities held by PFM are long and medium term securities. As of February this year, the duration<sup>48</sup> of the debt portfolios of the commercial banks, TC, and PFM remained at the same levels seen six months earlier and were at 2.5, 3.3, and 5.6 years respectively (Graph 91).

Graph 91  
Duration of Commercial Bank, PFM, and Trust Company TES Portfolios



Source: Banco de la República.

47 The maturities structure has a classification based on time to maturity: short maturity TES are considered to be those with maturity periods of less than two years, medium for those that mature between two and eight years and long term for those with periods that are more than eight years.

48 The duration measures the sensitivity of the price of a fixed income portfolio to changes in the market interest rate. Thus, the longer the duration, the greater the interest rate risk.

## 2. Sensitivity to Increases in the TES Rate

In this section, two stress tests are done in order to analyze the exposure to market risk that the different institutions in the financial system have. The first consists of calculating the losses in portfolio value with a 200 bp increase in all of the maturities along the zero-coupon yield curve for peso and UVR-denominated TES.<sup>49</sup> This is the shock suggested by the Basel Committee on Banking Supervision for countries other than the G-10. In the second stress test, three scenarios are considered with increases in the bond interest rates. It is based on the assumption that, in the event of a possible rise in those rates, financial institutions will adjust the makeup of their portfolios in order to limit their losses. In other words, they will reduce the duration of the portfolio and the share of negotiable securities it holds, which will reduce their exposure to market risk.

### *a. Exercise 1: A Parallel Increase of 200 bp in the TES Zero-Coupon Curve*

The losses that the financial entities would suffer due to appreciation after a parallel shock of 200 bp in the TES curve would rise for the majority of the entities which were analyzed in comparison to six months earlier. The exception to that would be the commercial financing companies (CFC) and insurance companies. In this scenario, as of February 24, 2012 the losses in the event of a parallel shift of the curve would come to COP\$1.3 t for all of the credit institutions. This amount is COP\$168.8 b higher than what would have been seen if the shock had occurred in August 2011. This upswing is due to the greater exposure that commercial banks and the FC have. The two would see their losses rise 13% and 51% respectively in comparison to what they would have been if the shock had occurred six months before. These results come from the growth of the outstanding TES in the former and the significant rise in the duration of the portfolio in the latter case (from 2.5 to 4.2 years).

The NBFIs, in turn, would have an aggregate loss of COP\$7.4 t for the sector, an amount that is COP\$305.7 b higher than what would have been registered if the shock had occurred six months earlier. Said loss is associated particularly with the devaluation of the PFM portfolio, which would come to COP\$4.7 t as well as that of the trust companies, which would come to COP\$2.3 t. In both cases, the losses are higher than those that would have been registered in August 2011 having increased COP\$160.4 b and COP\$172.1 b respectively. This upswing in exposure to market risk is a reaction to the growth mentioned in the TES portfolio balance these entities have.

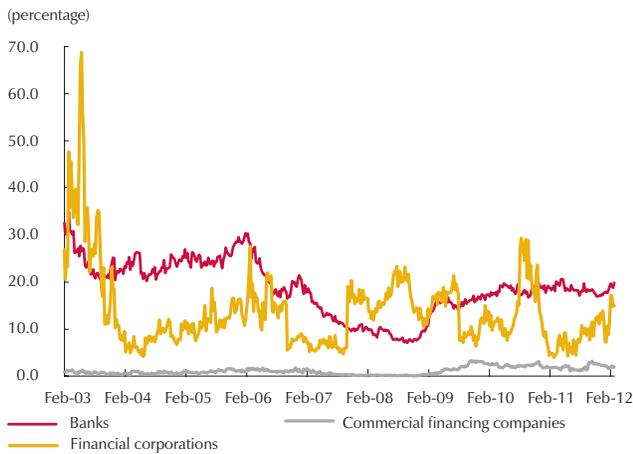
In order to weight the magnitude of said loss, Graph 92 shows the potential losses as a percentage of the annualized profits for the credit institutions (panel A) and as

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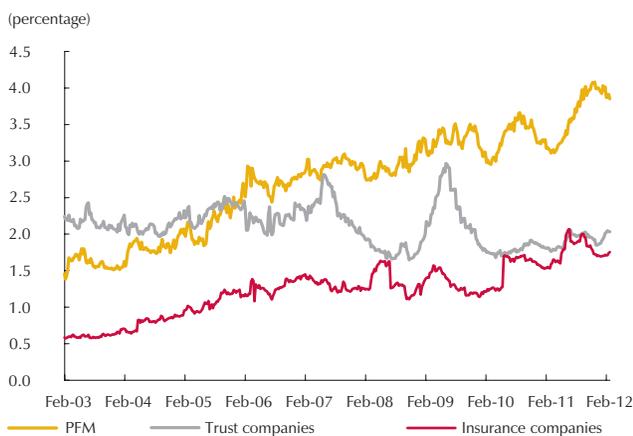
49 For the UVR-denominated TES, an increase in the real spread for the UVR benchmark rate is assumed. If this has to do with a rise in inflation expectations, the losses will occur only in the fixed rate TES since the real return on the UVR-denominated security would not change.

Graph 92

A. Losses Due to Appreciation After a 200 bp Increase as a Percentage of the Annualized Earnings



B. Losses Due to Appreciation After a 200 bp Increase as a Percentage of the Portfolio Value for the<sup>a/</sup>



a/ Annualized earnings and portfolio values as of December 2012 were used for the 2012 calculations.  
Source: Banco de la República.

a share of the value of the portfolio for the NBF (panel B). By type of entity, commercial banks are still the ones that would be affected the most with respect to their earnings (19.7%, a figure that is 10 bp higher than what would have been registered in August 2011). The FC, in turn, would face a devaluation of 14.9% of their earnings, an amount that is 5.7 pp higher than the one from six months earlier. Therefore, with respect to earnings, there was a rise in exposure to market risk, especially for the FC and banks. The CFC, in turn, would have registered losses of 2% in their earnings. This amount is similar to the one that would have been presented six months before.

When the NBF losses are analyzed as a percentage of the total value of their portfolio, one sees that the PFM are still the entities that are the most exposed to the parallel shock in interest rates. They are followed by trust companies and insurance companies. However, it should be noted that the potential losses with respect to that scenario have remained relatively stable in the last six months. In the case of the PFM, the losses would represent 3.9% of the portfolio value which is only 10 bp above what would have been seen in August 2011. The trust companies and insurance companies, in turn, would have losses of 2.0% and 1.8% of their portfolio value during the same period. This would represent a change of 5 bp and -14 bp respectively during the same period. The reduction in the latter is mainly due to a decline in the TES balance in the portfolio.

b. *Exercise 2: A Parallel Shift in the Zero-coupon Yield Curve for TES Considering Changes in Duration and in the Exposed Outstanding Balance*<sup>50</sup>

In this exercise, different scenarios of changes in the interest rates of public debt securities are considered. These correspond to the 99, 80, and 60 quantiles of the annual increases that have been seen in the peso-denominated zero-coupon yield

50 It is worth noting that the two exercises that were done were defined differently and, therefore, their results are not directly comparable. A parallel change in all of the maturities of the TES zero-coupon curve is considered in the first one. However, the second one summarizes a parallel shock with a change in the rate for a zero-coupon bond with a maturity that is equivalent to the average maturity of the securities in the portfolio the entities hold. Nevertheless, this latter one takes into consideration the fact that the behavior of the agents is dynamic and they restructure their portfolios in the expectation of increases in the interest rates.

curve since 2003. In each one of the scenarios, the fact that the financial system institutions will make changes in their portfolio when they expect increases in the interest rates in order to minimize the impact on their earnings and the value of their equity is considered. Therefore, in the event of an increase in interest rates for securities, the entities will lower the duration of the portfolio and the share of negotiable securities.<sup>51</sup> The scenarios of rate increases considered are: moderate (150 bp), medium (200bp), and extreme (300 bp). For this exercise, the public debt portfolios as of February 24, 2012 were taken.

The results of the exercise can be seen in Table 7. In the case of the credit institutions, in the event of a 200 bp increase in the TES rate, the commercial banks and FC would have lost close to 18.9% and 15.3% of their annualized earnings. These losses represent a slight uptick compared to what would have been seen six months earlier in the case of the banks (18.3%) but a significant upswing in the case of the FC, which had potential losses of only 8.7% of their earnings in August 2011. This was the result of a significant increase in duration. Meanwhile, given their low balance of TES, the CFC and cooperatives would have faced lower losses of close to 1.7%.

Last of all, the NBFIs that show the largest potential losses as a percentage of the total value of the portfolio in the medium scenario are the PFM (4.1%) and the TC (2.2%). The high amounts registered in these entities' losses result from the higher levels of TES holdings. Furthermore, the high concentration in the medium and long parts of the yield curve makes them more vulnerable to interest rate shocks.

### 3. Value at Risk and Conditional Value at Risk

In this section, two risk indicators for the different sectors of the financial system are estimated. The first is the unconditional value at risk (VaR), which is traditionally used to approximate the maximum loss that the system could experience in its investment portfolio during a specific period. The second is the conditional value at risk (CoVaR) developed by Adrian and Brunnermeier,<sup>52</sup> which, just like the VaR, measures the maximum loss that an entity could experience in its investment portfolio under the conditions provided by the performance of the portfolio belonging to another institution. This measurement seeks to detect which institutions could be the most systemic<sup>53</sup> and most vulnerable<sup>54</sup> to movements of the market.

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51 For more detail on the parameters of changes in duration and share of negotiable securities used in each one of the scenarios for each entity, see the March 2010 Financial Stability Report.

52 Adrian, T and Brunnermeier, M. (2011), "CoVaR," working paper series, num. 17454, National Bureau of Economic Research.

53 Defined as the institutions that contribute to the risk in the system to a greater degree.

54 Defined as the institutions that contribute to the risk in the system to a greater degree.

Table 7  
Results of Stress Test

A. Credit Institutions										
Type	Duration (years)	Exposed balance	Market price	Annualized profit	Scenario 1		Scenario 2		Scenario 3	
					(trillions of pesos)			(\$b)	(%) <sup>a/</sup>	(\$b)
Commercial banks	2.53	21.31	32.82	5.72	(1.157)	(20.2)	(1.082)	(18.9)	(834)	(14.6)
FC	4.14	1.12	1.24	0.64	(144)	(22.7)	(98)	(15.3)	(74)	(11.6)
CFC	1.31	0.26	0.29	0.37	(8)	(2.3)	(6)	(1.7)	(5)	(1.3)
Financial cooperatives	1.34	0.03	0.03	0.05	(1)	(2.6)	(1)	(1.7)	(1)	(1.3)

B. IFNB										
Tipo	Duration (years)	Exposed balance	Market price	Portfolio value	Scenario 1		Scenario 2		Scenario 3	
					(trillions of pesos)			(\$b)	(%) <sup>a/</sup>	(\$b)
PFM	5.64	38.72	45.30	121.00	(7.416.9)	(6.1)	(4.998.9)	(4.1)	(3.762.8)	(3.1)
Trust companies	3.31	32.45	37.21	113.48	(3.695.7)	(3.3)	(2.463.8)	(2.2)	(1.847.9)	(1.6)
Insurance companies	4.27	4.67	5.38	24.36	(690.0)	(2.8)	(460.0)	(1.9)	(345.0)	(1.4)
Brokerage firms	2.17	0.84	0.93	3.83	(60.7)	(1.6)	(40.5)	(1.1)	(30.4)	(0.8)

a/ Percentage of annualized profits as of December 2011.

b/ Percentage of portfolio value as of December 2011.

Source: Financial Superintendency of Colombia, Banco de la República calculations.

### a. Value at Risk

The value at risk (VaR) is a measurement that estimates the maximum loss that an institution could experience in its investment portfolio over a specific time frame and at a confidence level. It is included to get a more rigorous approximation of the market risk that both the credit institutions and the NBFIs are exposed to. Specifically, the VaR for each one of these sectors is defined as the sum of the individual VaRs for each one of the entities that the sector is made up of.<sup>55</sup>

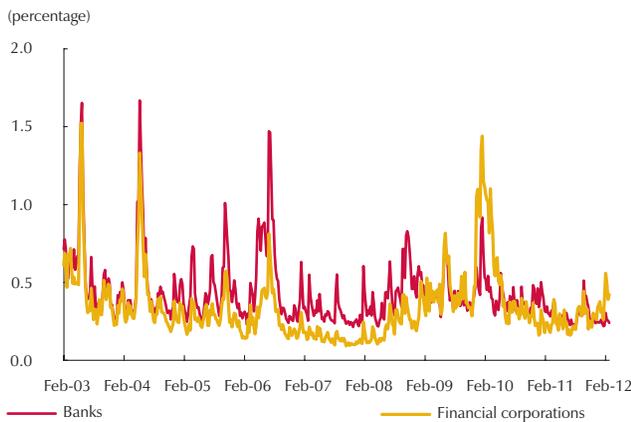
First of all, the procedure implemented for calculating the VaR requires that a daily estimate of the correlations and variances be made of the returns for each one of the risk factors (The risk factors refer to the TES and UVR for different maturities). Following the method suggested by RiskMetrics,<sup>56</sup> these factors were established for specific maturities for both the zero-coupon curve yield for the peso-denominated TES and for the UVR-denominated one between

55 The details of the methodology used can be found in O. Martínez and J.M. Uribe Gil, (2008), “Una aproximación dinámica a la medición del riesgo de mercado para los bancos comerciales en Colombia,” Financial Stability Issues, Financial Stability Department, Banco de la República, # 31.

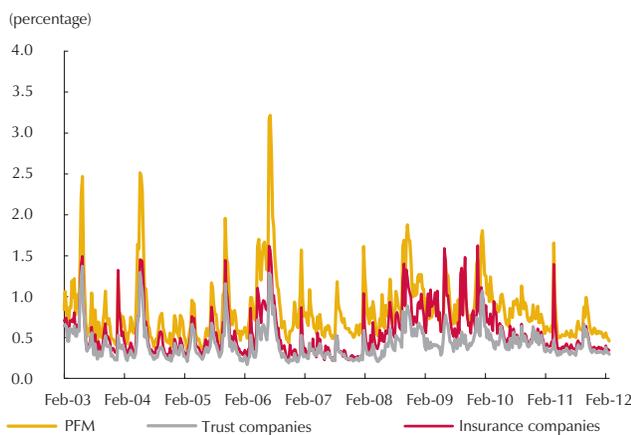
56 RiskMetrics (1996). “Technical Document” fourth edition, J. P. Morgan/Reuters, December 1996.

Graph 93  
VaR as a Percentage of the Value of the Exposed Balance

A. Credit Entities



B. Non-banking Financial Institutions



Source: Colombian Stock Market, Banco de la República calculations.

January 3, 2003 and February 24, 2012. The results of the annualized volatility of the returns were obtained by using constant correlations (model CCC).

Based on the estimates of return volatility, the VaR was calculated for the sectors which have TES portfolios that represent a significant share of their total investments. To do this, the portfolio information available on the Friday of each week from January 2003 to February 2012 for each one of the institutions that belong to these sectors was used. With this information, the risk measurement was estimated daily with a 99% confidence level assuming normality (Graph 93).

With respect to the credit institutions, the VaR was calculated for the banks and for the financial corporations (panel A). For the commercial banks, this indicator, as a percentage of the portfolio, registered a slight dip due to the low volatility in their portfolio as it went from 0.32% in August of the previous year to 0.24% in February of this year. For the FC, in turn, this indicator showed a slight uptick as it went from 0.35% to 0.42% during the same period.

In the case of the NBFIs, the overnight VaR was estimated for the PFM, insurance companies, and TC. As can be seen in panel B, the period between August 2011 and February 2012 was characterized by a low level of risk. In February of the current year, the overnight VaR for PFM was at 0.46% of the portfolio value. It was at 0.34% for the insurance companies,

and 0.3% for the TC. These values are lower than those registered six months before (0.62%, 0.43%, and 0.39% respectively).

**b. Conditional Value at Risk**

The conditional value at risk (CoVaR) is a measurement of systemic risk, which seeks to explain the co-movements<sup>57</sup> between the portfolio returns of the institutions in a situation of stress.<sup>58</sup> Just like the VaR, this measurement is a

57 The prefix, *co*, should be interpreted as contribution, co-movements, and conditional simultaneously.

58 For a more detailed description of the methodology for calculating the CoVaR, See the box titled “CoVaR” in the September 2011 issue of the Financial Stability Report.

quantile that is defined for both a forecast horizon and a confidence level, but it is established on the distribution of profits and losses of an institution that is conditioned to the level of stress another entity could experience. Based on the estimate of the CoVaR, the contribution of one entity to the risk of another can be calculated through the  $\Delta\text{CoVaR}$  indicator in order to detect which generates more vulnerability in the system and vice versa. To estimate these indicators, the same information and the same level of confidence will be used that is used for calculating the VaR.

Note that given the fact that only the information on the TES portfolio held by entities in the financial system is being used, the indicators calculated refer to systemic market risk or, in other words, how each one of the sectors and entities affect the level of market risk for the entire system.

Table 8 shows the  $\Delta\text{CoVaR}$  between each one of the sectors or types of entities that the financial system consists of. This should be read as follows: each value corresponds to the increase in the value at risk of the entity that is in the row in the Table when the entity that in the column is in a stressed

Table 8  
 $\Delta\text{CoVaR}$  Between Sectors or Types of Entities in the Financial System  
 (percentage)

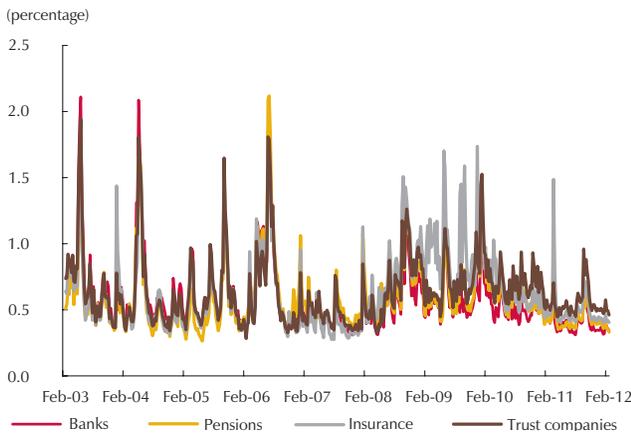
		Average for the total sample							
	CB	FC	CFC	PFM	Coop	SBF	IC	TC	System
CB		0.39	0.39	0.45	0.29	0.35	0.41	0.49	<b>0.49</b>
FC	0.32		0.24	0.28	0.20	0.19	0.28	0.26	<b>0.27</b>
CFC	0.29	0.30		0.30	0.26	0.28	0.35	0.36	<b>0.32</b>
PFM	0.73	0.62	0.64		0.60	0.72	0.81	0.97	<b>0.96</b>
Coop	0.55	0.40	0.49	0.59		0.48	0.60	0.65	<b>0.65</b>
SBF	0.48	0.42	0.42	0.44	0.40		0.51	0.49	<b>0.51</b>
IC	0.52	0.40	0.35	0.50	0.25	0.51		0.49	<b>0.54</b>
TC	0.43	0.30	0.37	0.41	0.30	0.33	0.42		<b>0.44</b>
System	<b>0.58</b>	<b>0.43</b>	<b>0.51</b>	<b>0.59</b>	<b>0.38</b>	<b>0.47</b>	<b>0.64</b>	<b>0.63</b>	

		B. Average for the last two years							
	CB	FC	CFC	PFM	Coop	SBF	IC	TC	System
CB		0.46	0.37	0.42	0.25	0.26	0.41	0.50	<b>0.48</b>
FC	0.27		0.22	0.27	0.17	0.14	0.28	0.27	<b>0.26</b>
CFC	0.24	0.35		0.28	0.22	0.21	0.35	0.37	<b>0.31</b>
PFM	0.62	0.74	0.60		0.52	0.54	0.82	1.01	<b>0.95</b>
Coop	0.46	0.48	0.46	0.55		0.35	0.60	0.67	<b>0.64</b>
SBF	0.41	0.50	0.40	0.42	0.35		0.51	0.51	<b>0.50</b>
IC	0.43	0.48	0.33	0.47	0.22	0.38		0.51	<b>0.53</b>
TC	0.36	0.36	0.35	0.38	0.26	0.24	0.42		<b>0.43</b>
System	<b>0.48</b>	<b>0.51</b>	<b>0.49</b>	<b>0.55</b>	<b>0.32</b>	<b>0.35</b>	<b>0.64</b>	<b>0.66</b>	

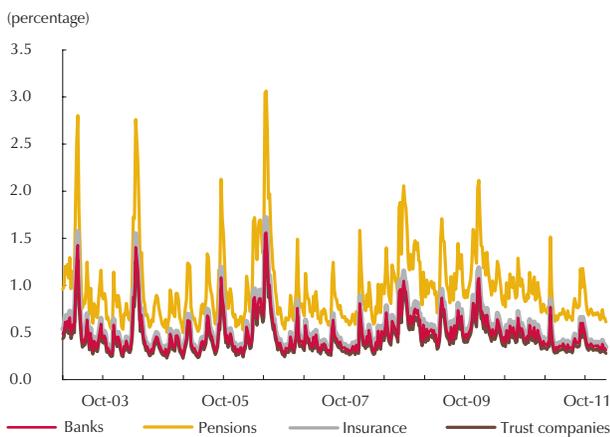
Source: Banco de la República.

Graph 94

A.  $\Delta$  CoVaR of the Sectors / System



B.  $\Delta$  CoVaR of the System / Sectors



Source: Colombian Stock Market, Banco de la República calculations.

situation.<sup>59</sup> As a result, the last row represents the increase in risk to the system when each one of the sectors is under stress. When we look at the results for the average of the data sample in the last two years (panels A and B respectively), we see that the entities that increase the risk to the system the most are the insurance companies, trust companies, pension funds, and commercial banks. However, note that the difference is not very significant between sectors. The largest contribution to risk from the first two sectors is explained by a greater correlation between their returns and those of the system. Likewise, if the last column, which shows the increase in risk for each sector when the system is in a stressed situation, is analyzed, one sees that the most vulnerable sector or the one that is subjected to a larger upswing in market risk is the pension fund sector. This is consistent with the larger size of their portfolio in the system.

Moreover, if the performance of the  $\Delta$  CoVaR among the sectors with the highest holdings of TES and the entire system are analyzed, one sees that this shows a volatile behavior over the course of time (Graph 94). Panel A shows how the level of risk to the system is affected by each type of entity. In general, a similar performance is found in the results for all of the sectors. Likewise, in the last six months, a low level has been registered in this indicator which means there is a lower level of systemic market risk.

This is consistent with the low levels of market risk that the entities have shown in the same period of time.

Panel B, in turn, shows the effect that a stress situation in the system has on the level of risk for the sectors analyzed. In spite of the volatility of this indicator, one sees that the largest increase in risk always occurs in the pension funds. That makes this sector the most vulnerable to adverse shocks in the public debt market.

With the analysis that has been done, it can be concluded that the exposure to market risk has risen in general for all types of financial entities whether this is due to the increase in the balance exposed or the increase in the

<sup>59</sup> An entity is defined as being in a situation of stress when its losses are equal to the VaR of its portfolio estimated at a confidence level of 99%.

duration of the portfolios. Nevertheless, given the stable performance in TES price volatility, the VaR has not shown major changes in the most recent months. Also, the entities that raise the risk to the system the most are the insurance companies, trust companies, pension funds, and commercial banks. However, the difference between the sectors is not very significant. In addition, the PFM are the most sensitive to adverse situations in the government bond market. The gradual rise in interest rates during 2011, in turn, has not been reflected in upswings in price volatility nor in significant losses due to appreciation of the public debt portfolio the entities in the financial system have.

## B. CREDIT RISK

### 1. Credit institutions

In 2011, the loan portfolio continued to present strong growth which was accompanied by positive changes in the risky and non-performing loan portfolios. Thus, the risks the system faces remain latent. This is why it is important to evaluate the effect that an adverse scenario in the fundamental macroeconomic variables could have on the performance of the credit institutions. To do this, a stress test based on the economic crisis at the end of the nineties was developed.

For this issue of the Financial Stability Report, a new stress test was developed. The purpose of this is to evaluate the performance of some financial indicators for commercial banks in the event of an adverse scenario in the real growth of the GDP, the real interest rate (DTF in Spanish), the real index of prices for new housing (NHPI real) and the unemployment rate in a 2-year horizon. The scenario proposed for this test was built on the basis of the worst paths seen for each one of the series during the crisis towards the end of the nineties. Note that the exercise in this section corresponds to a hypothetical case with a low probability of occurring since each of these individual paths has not occurred simultaneously. Graph 95 shows the paths for each one of the variables in the stress scenario considered for this analysis.<sup>60</sup>

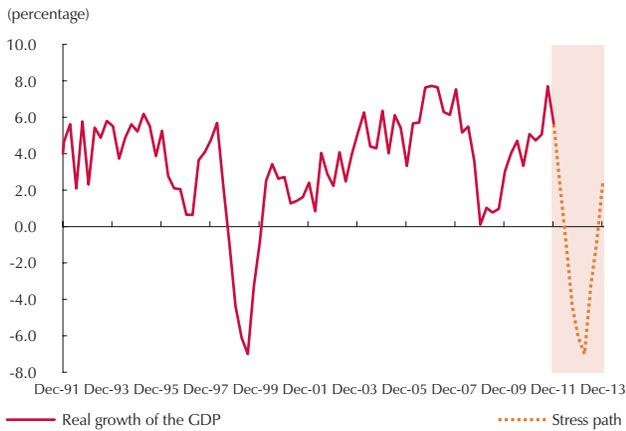
The results that are presented show the effect that an adverse scenario has on defaulting in the loan portfolio, profitability, and capital adequacy of the commercial banks. The shocks in the macroeconomic variables increase the non-performing loan portfolio in the different types of credit. This translates

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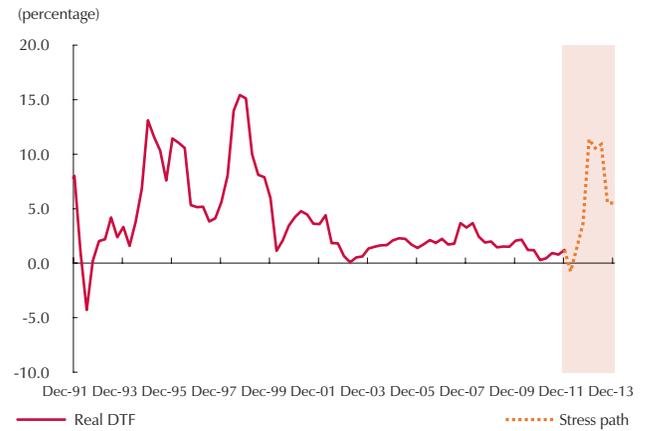
<sup>60</sup> For this issue of the *Financial Stability Report*, the models presented in “A Co-integration Analysis for Credit Risk” (Financial Stability Issues, September 2008) were modified. For this analysis, a VEC (vector error correction) model was estimated for each portfolio by using the real non-performing loan portfolio and the real total loan portfolio as endogenous variables in contrast to the previous model that used only the default index. Likewise, the exogenous variables used for the consumer and commercial loans were the GDP, the DTF, and the unemployment rate (all in real terms). Meanwhile, the real GDP, the real NHPI, and the unemployment rate were used for housing loans.

Graph 95  
Paths of Macroeconomic Variables

A. Real Growth of the GDP



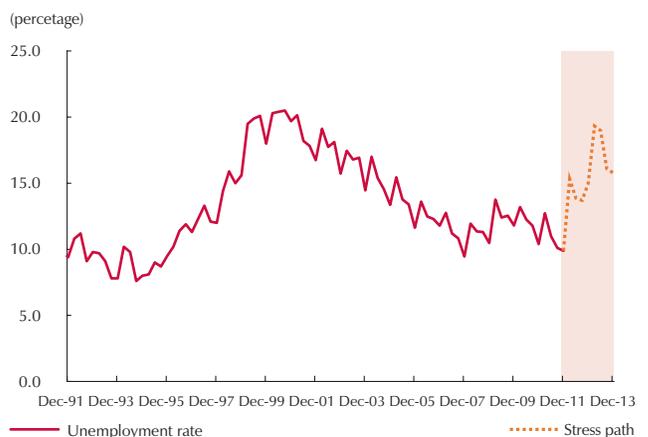
B. Real DTF



C. Real NHPI



D. Unemployment Rate



Sources: DANE, DNP, and Banco de la República.

into a decline in the earnings as a result of an upswing in the cost due to loan-loss provisioning and a reduction in income because of interest. Also, it is to be assumed that when an intermediary has negative profitability, the losses should be covered with capital. This translates into a reduction in their capital adequacy ratio.

Graph 96 presents the effect of the shock on the default indicator. Based on the results, that index would go from 2.9% in December 2011 to 6.2% two years later and register the worst numbers six quarters after the initial shock (8.0%).

This rise in the default indicator would cause a drop of COP\$6.8 t in the profit during the two years affected by the shock as it went from COP\$7.6 t in December 2011 to COP\$800 b upon completing the test. At that time, eight entities would have a negative profitability. Six quarters after the

Graph 96  
Default Indicator during the Stressed Scenario



Source: Financial Superintendency of Colombia, Banco de la República calculations.

shock, the banking system would register the lowest level of profit (-COP\$1.9 t) at which time ten banks would show losses. It should be clarified that in this exercise no projections were done on earnings. (Table 9).

In terms of return on assets, the ROA would show a decline of 2.3 pp as it goes from 2.6% in December 2011 to 0.3% two years later. Furthermore, in the first three quarters of the second year after the shock, the ROA would show negative values for the entire banking system as it would go to a minimum value of -0.6% (Graph 97). It should be noted that in spite of the size of the shock, the banks in the aggregate have a positive profit at the end of the exercise.

In the case of the capital adequacy ratio, a reduction in this indicator was observed as it went from 14.2% in December 2011 to 12.9% two years later. However, this value is higher than the regulatory minimum established by the Financial Superintendency of Colombia (9%). Nonetheless, when this indicator is analyzed by entity, we find that four banking institutions failed to meet the regulatory minimum. This would imply a capitalization requirement of COP\$306.8 b, a figure that is 17.2% of the technical net worth of these entities as of December 2011 (Graph 98).

Table 9  
Reduction in Profit for Each Period Due to the Extreme Shock

	Commercial <sup>a/</sup>	Consumer <sup>a/</sup>	Housing <sup>a/</sup>	Total <sup>a/</sup>	Stressed profit <sup>a/</sup>	Banks with negative profit <sup>b/</sup>
Profit as of December 2011	7,6	7,6	7,6	7,6	7,6	0
t + 1	(0,3)	(0,8)	(0,4)	(1,5)	6,1	1
t + 2	(0,5)	(1,1)	(0,6)	(2,1)	5,4	1
t + 3	(1,0)	(1,4)	(1,1)	(3,5)	4,1	4
t + 4	(1,3)	(1,8)	(1,4)	(4,5)	3,1	5
t + 5	(2,7)	(3,5)	(2,5)	(8,8)	(1,3)	10
t + 6	(3,5)	(3,3)	(2,6)	(9,5)	(1,9)	10
t + 7	(3,6)	(2,7)	(2,7)	(9,0)	(1,4)	10
t + 8	(2,6)	(1,8)	(2,3)	(6,8)	0,8	8
RReduction in profit in t + 6 (percentage)	46,7	44,3	34,4	100+	(8,8)	
Reduction in profit in t + 8 (percentage)	34,7	23,9	30,8	89,4	(6,8)	

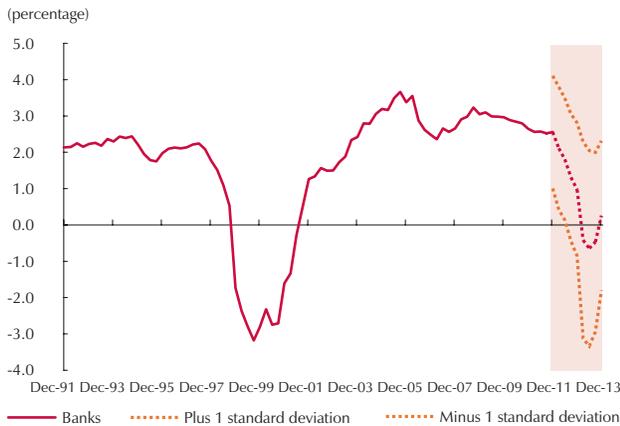
a/ Data in trillions of pesos.

b/ The number of banks that would go from a positive profit to a negative one as a result of the shock.

c/ The profit presented in this exercise corresponds to earnings before taxes.

Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 97**  
Change in the ROA in a Stressed Scenario



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 98**  
Change in the Banks' Capital Adequacy in a Stressed Scenario



Source: Financial Superintendency of Colombia, Banco de la República calculations.

## 2. Analysis of Loan Portfolio Concentration and Credit Risk<sup>61</sup>

### a. Commercial Loan Portfolio

As of December 2011, the commercial loan portfolio represented 61.9% of the total loan portfolio held by the credit institutions. As a result of this, it is currently the type of loan with the largest share. Over the course of 2011, this portfolio showed a strong performance, especially in the first half of the year when it grew at a real annual 18%. However, in the last few months of 2011, this rise slowed down and the rate ended up at a real annual 13.7%. Table 10 shows the information concerning amount, number of debtors, and average amount per debtor and discriminates between the commercial loan portfolio in national currency and the one in foreign currency. As can be seen, the rise in this portfolio was due to the increase in both loans granted in national currency (a real annual 11.5% in December 2011) and the ones granted in foreign currency (a real annual 32.8%). In regards to the average amount per debtor, we find that there is still a huge difference between the average amount in foreign currency (COP\$1.181 m) and the one in national currency (COP\$311 m). An upswing in the average amount per debtor can likewise be seen in the loans in both currencies. In other words, the number of borrowers grew proportionally less compared to the outstanding balance they accumulated.

#### 1) Commercial Loan Portfolio Concentration

When the concentration of the commercial loan portfolio is analyzed by entity, one finds that the five largest financial institutions increased their share moderately in 2011 as they went from 64.2% in December 2010 to 66.2% a year later. This trend is also seen when the ten largest entities are analyzed. In this case, the share went from 85.4% to 87.1% during the same period.

The loan portfolio concentration can also be evaluated by debtor and the amount of the debtor's loans. When the debtors are organized from largest to smallest,

<sup>61</sup> The information in this section is taken from Form 341 issued by the Financial Superintendency of Colombia. This includes the loans granted by the special and official institutions (IOES in Spanish) apart from rediscount loans, leasing transactions and the loans granted to trust companies, which were not considered in the first section of this report.

**Table 10**  
Commercial Loan Portfolio

Date	Loans in national currency			Loans in foreign currency		
	Balance <sup>a/</sup>	Number of debtors	Average amount per debtor <sup>b/</sup>	Balance <sup>a/</sup>	Number of debtors	Average amount per debtor <sup>b/</sup>
Jun-08	86.1	427,850	201	8.3	9,073	918
Dec-08	94.9	408,366	232	8.8	10,021	882
Jun-09	98.4	394,277	250	5.8	10,003	576
Dec-09	96.2	383,636	251	5.9	10,545	563
Jun-10	97.1	374,208	260	7.6	11,804	641
Dec-10	105.8	359,474	294	12.6	11,888	1,062
Jun-11	109.7	365,642	300	13.9	13,000	1,066
Dec-11	117.9	378,807	311	16.8	14,196	1,181

a/ Balances in trillions of December 2011 pesos.

b/ Balances in millions of December 2011 pesos.

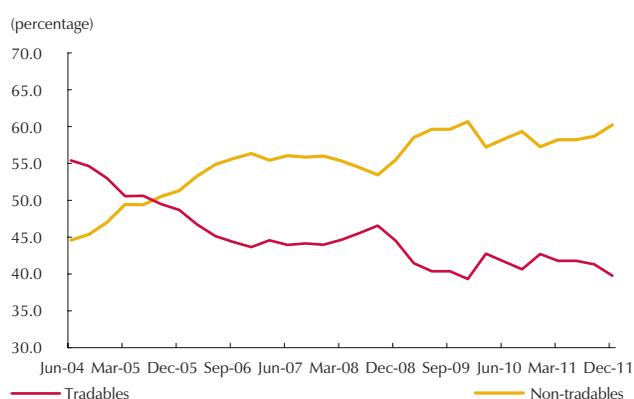
Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 99**  
Percentage of Borrowers Accounting for 90% of the Commercial Loan Portfolio



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 100**  
Share by Type of Sector



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

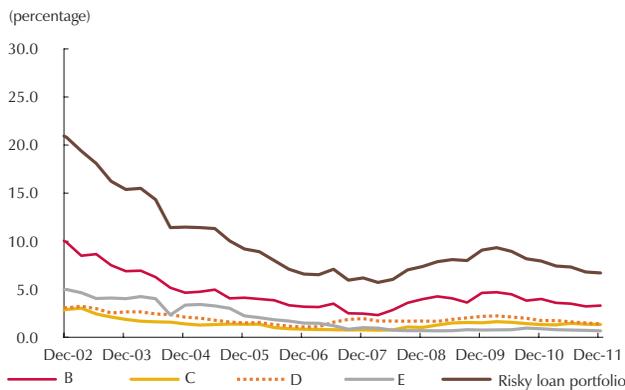
one finds that the share of debtors who account for 90% of the loan portfolio dropped from 7% to 6.7% between December 2010 and the same month in 2011. This figure is the minimum that has been seen since June 2005 when 6.2% of the debtors accounted for 90% of the loan portfolio. It shows that the loan portfolio has tended to be more concentrated in fewer debtors in recent years (Graph 99).

Finally, when an aggregate analysis is done between companies that produce tradable goods and those that produce non-tradable ones,<sup>62</sup> it can be seen that the gap between these sectors has spread since December 2010 (Graph 100). For December 2011, the share of the non-tradables had risen and was at 60.2%. Note that the higher concentration was the consequence of the increase in indebtedness in the wholesale and retail sectors of commerce as well as in the financial intermediation sector.<sup>63</sup>

<sup>62</sup> The companies that produce tradable goods are those that belong to the sectors of agriculture, fishing, mining and quarrying, and manufacturing. The companies that produce non-tradable goods are included in the rest of the sectors.

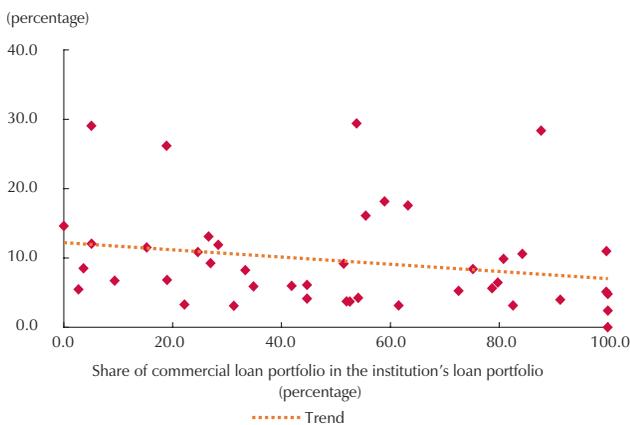
<sup>63</sup> This analysis was done through an exchange of the information based on economic sector from the Superintendency of Corporate Affairs and the information on loans from the Financial Superintendency of Colombia. Thus, 48% of the total balance for the commercial loan portfolio was identified.

Graph 101  
Share of Risky Loan Portfolio by Rating



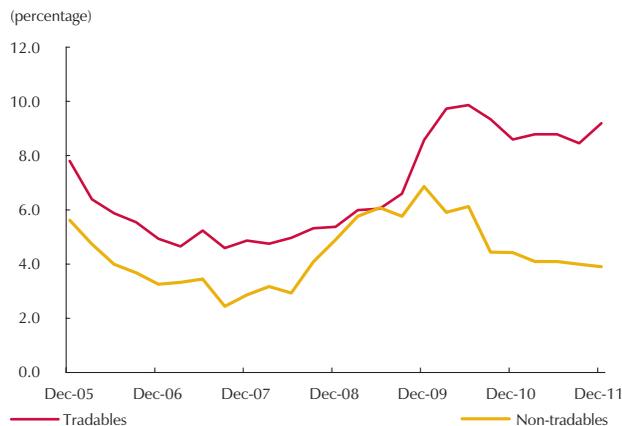
Source: Financial Superintendency of Colombia, Banco de la República calculations.

Graph 102  
QI of the Commercial Loan Portfolio vs. Share of Commercial Loans in Each Institution's Loan Portfolio



Source: Financial Superintendency of Colombia, Banco de la República calculations.

Graph 103  
Loan Portfolio Quality Indicator by Type of Sector



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

## 2) Credit Risk

With regard to the change in the commercial loan portfolio quality index, one finds that this declined 1.2 pp and 60 bp respectively in comparison to December 2010 and June 2011. In December 2011, it came to 6.7% as a result of a contraction in the amount in loans rated B and D while C and E remained stable (Graph 101). Furthermore, when QI is broken down by financial entity and analyzed, the outcome shows that the majority of the institutions in which the commercial loan portfolio represents the largest share of the total loan portfolio have a QI that is lower than the average (Graph 102). Note that close to 50% of the establishments have a QI that is below 6.7%.

Graph 103 shows the QI for the tradable and non-tradable sectors. When the performance of this indicator is analyzed by sector, one finds that the former rose in 2011 as it went from 8.6% in December 2010 to 9.2% a year later. This behavior was particularly due to an increase between September and December 2011 in the amounts in loan portfolios rated as B, C, and E for the manufacturing sector. The trend for the non-tradable sector was different since the indicator declined as it went from 4.4% to 3.9%.

Although the above loan portfolio quality indicator makes it possible to figure out an approximation of the credit risk that the financial entities face, it is necessary to broaden this analysis by using other indicators based on the number of loans. Two indicators are constructed for this: one of quality based on operations (OQI) measured as the ratio between the risky loans and the total loans and another that shows the ratio between the loans in default and the total (NLIO).

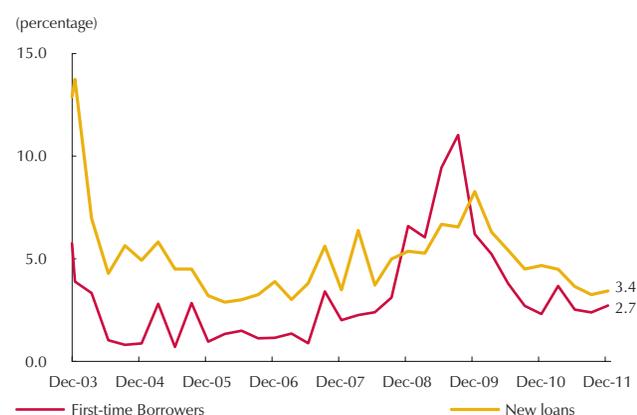
Table 11 shows these measurements and it can be seen that, although they have higher values than those for the indicators based on the loan amount, their performance is similar since they showed decreases in 2011 in comparison to their values for 2010. The difference between the indicators based on the loan amount and the ones based on number

**Table 11**  
Quality and Default Indicator by Number of Commercial Loans

Date	Totals	Risky (number of loans)	In default	OQI (percentage00000)	NLIO <sup>a/</sup>
Jun-05	674,039	75,133	43,668	11.1	6.5
Dec-05	726,924	74,878	43,901	10.3	6.0
Jun-06	786,530	89,159	50,028	11.3	6.4
Dec-06	871,114	95,586	55,862	11.0	6.4
Jun-07	1,004,341	140,457	88,007	14.0	8.8
Dec-07	1,023,897	119,855	75,549	11.7	7.4
Jun-08	1,049,565	125,116	80,406	11.9	7.7
Dec-08	1,035,790	182,861	98,208	17.7	9.5
Jun-09	1,019,258	194,497	114,924	19.1	11.3
Dec-09	1,009,584	199,239	127,681	19.7	12.6
Jun-10	1,010,782	191,427	118,886	18.9	11.8
Dec-10	1,004,306	168,978	94,749	16.8	9.4
Jun-11	970,796	153,657	84,044	15.8	8.7
Dec-11	1,005,370	135,026	76,794	13.4	7.6

a/ The number of loans in default is calculated as the sum of those rated C, D, and E, which corresponds to the maturity profile determined by the Financial Superintendency of Colombia.  
Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 104**  
Probability of First-time Borrowers and New Loans  
Defaulting



Source: Financial Superintendency of Colombia, Banco de la República calculations.

of loans is a result of the fact that in the commercial loan portfolio, the largest loans are usually the ones with the best credit risk rating. At the same time, the differences in amount between large and small loans are substantial.

The NLIO indicator, in turn, can also be associated with a probability of default. If this probability is estimated for the new loans and first-time borrowers, one sees that this has fallen in the last few years. Graph 104 makes it evident that between December 2009 and December 2012, the probability of default has declined for both the first-time borrowers and the new loans as they have gone from 6.2% to 2.7% and from 8.3% to 3.4% respectively.

The change in the risky loan portfolio can also be evaluated by means of the transition matrices, which show the probability of staying at the same rating or moving to another. The elements on the diagonal show the probability of remaining at the same rating (persistence) from one period of time to another. The probabilities below the diagonal (lower triangle) are associated with improvements in rating while the percentages located above the diagonal (upper triangle) correspond to the probabilities of getting a rating associated with higher levels of risk.

Table 12 shows the average transition matrix between March 2002 and December 2011 (panel A) and the one calculated for June 2011 (panel B) and for December of the same year (panel C).

When the December matrix is compared to the average, we find that the probability of persistence has risen and was at 91.5%.<sup>64</sup> This performance is reflected in a decline in both the probability of getting a worse rating and the probability of getting a better one. The former dropped 2.4 pp and was at 5.9%<sup>65</sup> and the latter dipped 80 bp and went to 2.6%. Likewise, when these results are compared to the ones in June 2011, a similar pattern is seen. In that case, the probability of getting worse declined 1.8 pp and that of getting better slipped 88 bp.

The risk indicator for harvests of debtors<sup>66</sup> makes it possible to examine the evolution of the loans throughout the period they are in effect and compare between harvests for different periods. The QI for each harvest as well as for the total commercial loan portfolio since December 2008 is shown in Graph 105. Here, the bars represent each one of the harvests evaluated for different quarterly periods.<sup>67</sup> When the change in this indicator is analyzed, it can be seen that the loans granted in the fourth quarter of 2011 showed a lower QI (2.7%) than the QI for the other harvests at the time they originated. These showed an average indicator of 3.4%.

In general terms, the commercial loan portfolio continued to show a positive trend although a slowdown has been seen in recent months. This performance was based on better quality and default indicators. With respect to new loans, a lower probability of default and a lower QI for the fourth quarter harvest of 2011 is seen.

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64 The probability of persistence is calculated as:  $P(A/A) \times P(A) + P(B/B) \times P(B) + P(C/C) \times P(C) + P(D/D) \times P(D) + P(E/E) \times P(E)$ .

65 The probability of migrating from a higher rating (X) to a worse one (Y) is calculated as:  $P(Y/X) \times P(X)$ .

66 One harvest represents the set of loans that are granted within a specific period of time.

67 Beginning with the Financial Stability Report for September 2011, the harvests correspond to the loans originated in the quarter mentioned rather than the six-month period (the former basis of calculation). The harvest graphs are interpreted as follows: the horizontal axis shows the six-month period for evaluating the harvest while the colors of the bars are associated with each harvest. The line is, in turn, the loan portfolio quality indicator for each type of loan in each period. In the analysis of loan portfolio quality for a harvest, we must clarify the fact that, a few six-month periods after its inception, the fact that the riskiest loans have a larger share in the current balance must be taken into account. However, this bias is common for all of the harvests and, therefore, they can be compared to each other. The analysis of harvests was changed from a six-month to a quarterly basis, but their evaluation is done every six months.

Table 12  
Transition Matrices for the Commercial Loan Portfolio  
(percentage)

A. Average of the Transition Matrices between March 2002 and December 2011					
	A	B	C	D	F
A	94.1	4.9	0.8	0.2	0.0
B	32.6	44.6	15.8	6.3	0.6
C	7.1	10.5	42.4	36.5	3.4
D	2.8	1.4	3.0	80.0	12.8
E	1.6	0.8	1.6	2.1	93.9
B. June 2011					
	A	B	C	D	E
A	93.9	5.2	0.7	0.2	0.0
B	35.8	45.2	12.8	5.5	0.8
C	4.3	11.1	52.4	28.7	3.5
D	3.2	1.5	3.7	80.5	11.3
E	2.8	1.0	2.6	0.7	93.0
C. December 2011					
	A	B	C	D	E
A	95.5	3.8	0.5	0.2	0.0
B	32.4	49.5	11.7	5.8	0.6
C	5.2	12.5	52.0	26.9	3.4
D	1.5	1.0	3.6	83.8	10.2
E	0.5	0.3	1.8	1.3	96.2

Source: Financial Superintendency of Colombia, Banco de la República calculations.

## b. Consumer Loan Portfolio

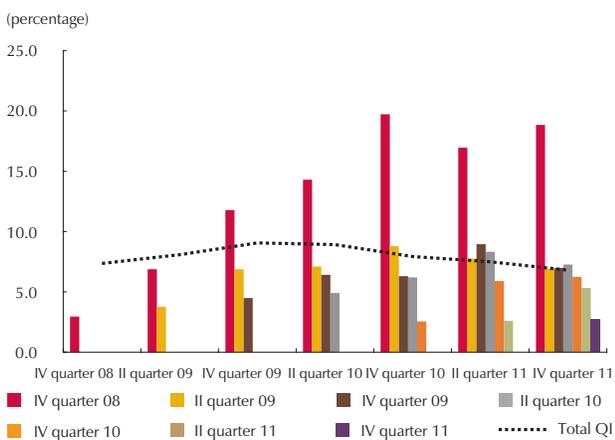
As of December 2011, the outstanding balance of the consumer loan portfolio was at COP\$60 t,<sup>68</sup> and accounted for a share of 27.7% of the total financial system loan portfolio. Consumer loans are classified into three types: credit cards, loans for the purchase of vehicles, and other consumer loans. Each one of these categories has different average amounts, average loan duration, type of collateral, and changes in its quality. The consumer loan portfolio and the risk profile for each one of its modalities are described in this section.

### 1) General Characteristics of Consumer Loans

The outstanding balance of the consumer loan portfolio was concentrated in other consumer loans (65.4%) followed by credit cards (22.4%) and the rest

68 The value does not necessarily coincide with the balance obtained from the financial statements of the credit institutions that were reported to the Financial Superintendency monthly since it is calculated on the basis of Form 341. The components and number of loans are procured from the same source.

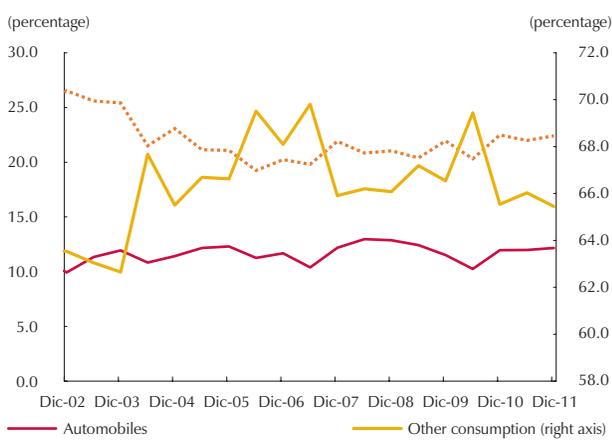
**Graph 105**  
Commercial Loan Portfolio: Analysis of Quality Index by Harvests



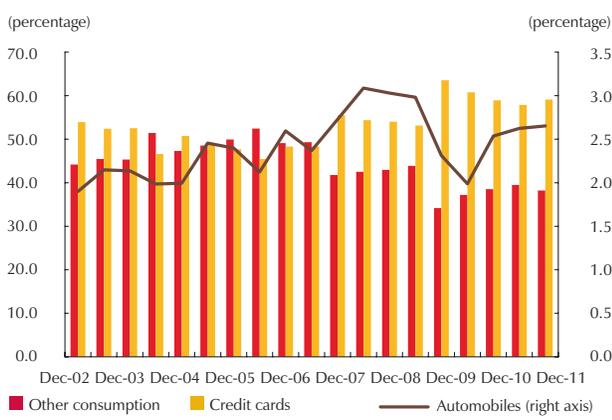
Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 106**

**A. Share of the Amount in Consumer Loan Portfolio by Type**



**B. Share of the Number of Consumer Loan Portfolio Transactions by Type**



Source: Financial Superintendency of Colombia, Banco de la República calculations.

(12.2%) corresponds to loans for automobiles and other private use vehicles (Graph 106, panel A). Based on operation, credit cards (59.1%) and other consumer loans (38.2%) have the highest share. Meanwhile, vehicles added 2.7% to this (Graph 106, panel B).

In the cases of both the share in outstanding balance and transactions, credit cards and car loans increased moderately as a share of all consumer loans in the second half of 2011 unlike the first six months of 2011 when other consumer loans were the only type to take a larger share.

Considering that the growth in the consumer loan portfolio (a real annual 20.8%) was higher than the rise in the number of transactions (5% annually), the average loan amount per transaction continued to increase for all types of credit between June and December 2011. Table 13 shows that the highest average amount of debt is the loans for purchase of vehicles with a COP\$19.3 m average per transaction compared to the average for other consumer loans (COP\$7.2 m) and credit cards (COP\$1.6 m). As of December 2011, the real annual growth of the average amounts was 16.9%, 15.3%, and 12.7% for other consumer loans, credit cards, and purchase of automobiles respectively. Note that these rises were lower than the ones seen in the first six months of 2011.

**2) Credit Risk and Loan Portfolio Quality**

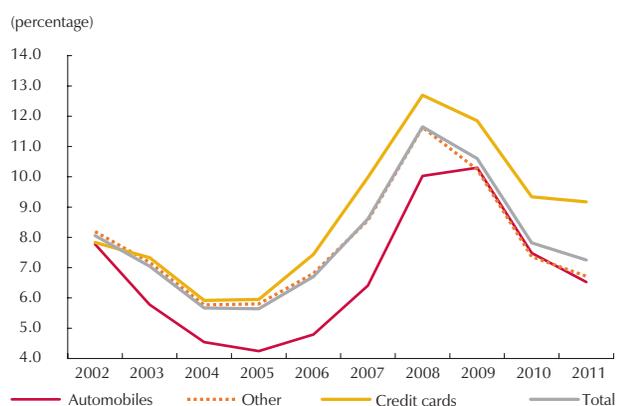
Given the greater strength in the total outstanding balance for the consumer loan portfolio, the loan portfolio quality indicator continued to show a declining trend for all of the types of loans (Graph 107). The QI for credit cards went from 9.4% to 9.2% between June and December 2011. The QI for vehicle loans changed from 7.2% to 6.5% and the one for other consumer loans went from 6.9% to 6.7% during the same period. Note that credit cards are still the riskiest and they are the only type of loan that has a higher QI compared to total consumer loan portfolio (9.2% compared to 7.2% as of December 2011). Note that the credit card loan niche is still the riskiest. It is

Table 13  
Average Amount of Debt by Type of Loan as of December Each Year <sup>a/</sup>

Date	Automobiles	Credit cards	Other consumption	Total consumption
2002	14.66	1.38	4.04	2.80
2003	15.75	1.36	3.89	2.82
2004	17.79	1.41	4.30	3.10
2005	16.64	1.43	4.33	3.24
2006	15.10	1.41	4.66	3.36
2007	16.01	1.41	5.66	3.58
2008	15.52	1.42	5.62	3.65
2009	14.78	1.03	5.79	2.97
2010	17.12	1.38	6.17	3.63
2011	19.29	1.60	7.21	4.21

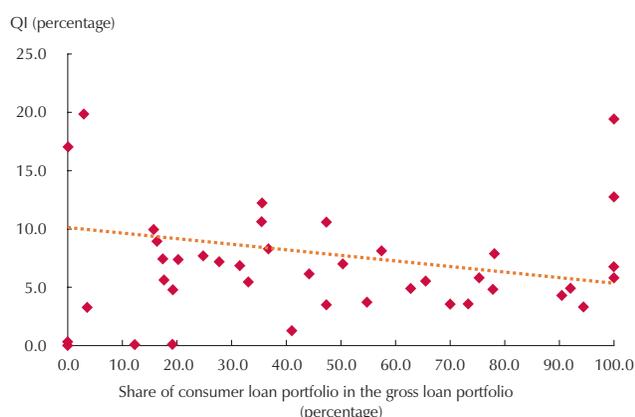
a/ The average amount is in millions of December 2011 pesos.  
Source: Financial Superintendency of Colombia, Banco de la República calculations.

Graph 107  
Loan Portfolio Quality Indicator by Type of Consumer Loan (risky loan portfolio/gross loan portfolio) as of December each Year



Source: Financial Superintendency of Colombia, Banco de la República calculations.

Graph 108  
QI Compared to Share of Consumer Loan Portfolio in Gross Loan Portfolio



Source: Financial Superintendency of Colombia, Banco de la República calculations.

also the only one that shows a high value in its QI in comparison to the one for the entire consumer loan portfolio (9.2% compared to 7.2% as of December 2011). This could be due to the fact that the policies for giving out new cards tend to be laxer than those for other types of consumption.

In order to evaluate the risk by credit institution, the relationship between the total QI for the consumer loan portfolio and the share of this portfolio within the portfolio of each entity is analyzed. Graph 108 shows a major dispersion in the data. However, it is important to monitor those entities that hold a high share of the consumer loan portfolio within their own portfolio and have a QI for this type of loan that is above the one for the system given the fact that their vulnerability is greater in the event of deteriorations in this loan portfolio.

As a complement to the previous analysis, Table 14<sup>69</sup> shows the change in the number of total loans, risky loans and loans in default for the consumer loan portfolio since 2006. In general terms, we see that the value of the OQI is higher than the QI, which suggests that loans for larger amounts in the consumer loan portfolio are less risky. As of December 2011, the OQI was at 10.9% which showed an improvement

<sup>69</sup> The decrease registered for the total operations between June and December 2010 was due to the fact that one entity changed the way they reported credit card transactions.

Table 14  
Default and Loan Portfolio Quality Indicators by Number of Loans for the Total Consumer Loan Portfolio

Date	Total	Risky (number of loans in millions)	In default	OQI (percentage)	NLIO <sup>a/</sup>
2006-I	8.37	0.73	0.42	8.78	5.07
2006-II	10.19	0.94	0.57	9.21	5.57
2007-I	11.13	1.18	0.70	10.61	6.28
2007-II	11.65	1.26	0.77	10.78	6.61
2008-I	11.58	1.39	0.83	12.03	7.18
2008-II	12.17	1.69	1.11	13.90	9.09
2009-I	12.06	1.86	1.19	15.40	9.86
2009-II	15.10	2.25	1.56	14.88	10.36
2010-I	15.69	2.28	1.60	14.53	10.22
2010-II	13.79	1.57	1.10	11.38	7.96
2011-I	13.65	1.56	1.05	11.44	7.70
2011-II	14.31	1.57	1.07	10.94	7.48

a/ The number of loans in default was calculated as the sum of those rated C, D, and E. This corresponds to the maturity profile determined by the Financial Superintendency of Colombia.  
Source: Financial Superintendency of Colombia, Banco de la República calculations.

with respect to the indicator for June of the same year (11.4%). In addition, the default in consumer loans has dropped thus showing a change from 7.7% to 7.5% in the NLIO between June and September 2011.

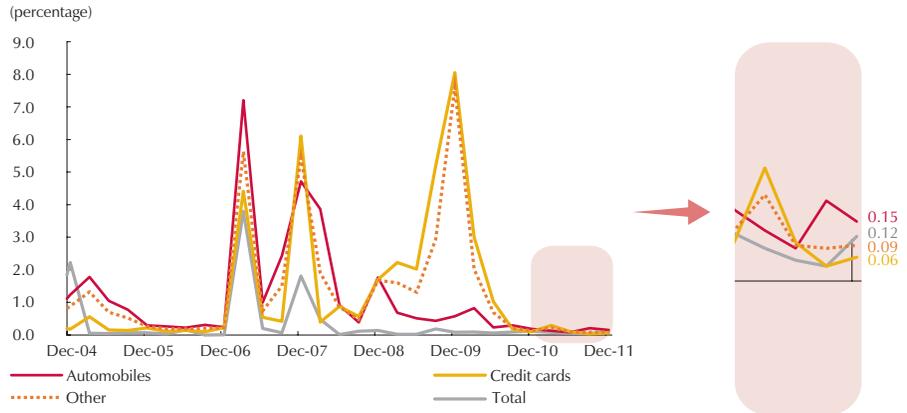
Graph 109 shows the probability of default (PD) for all the new loans and first-time borrowers. There one sees that this indicator for new loans has remained relatively stable between the fourth quarter of 2004 and 2011 with the exception of an upswing in 2010. The default probability first-time borrowers also remained stable and lower than the total number of new loans during the same period. Nevertheless, in 2007 and 2009, there were rises in their PD that came to levels similar to the PD for new loans taken out by return borrowers. This could suggest that, in general terms, financial intermediaries see the new borrowers as being less risky than the return borrowers that they granted new loans to. However, in periods of time when loan portfolios are growing at high rates, the intermediaries take on a higher level of risk and significant differences cannot be seen in the PD of first-time and return borrowers for these periods of expansion.

Over the last year, the probability of default indicator rose moderately to 0.12% for the first-time borrowers for consumption purposes. This was mainly due to the increase in risk for automobile loans (Graph 109, panel A). During the same period, the probability of default for all the new loans dropped to 5.1%, especially because of the lower risk the new credit cards have (Graph 109, panel B).

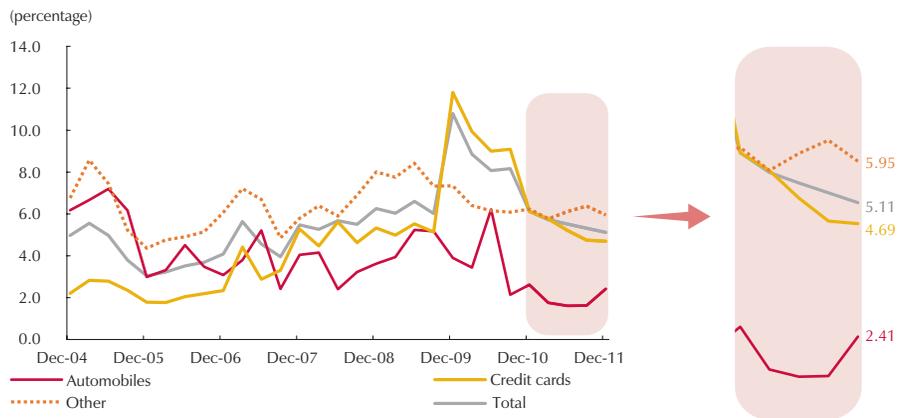
Regarding the value of the new loans granted (Table 15) a decline in their rate of growth can be seen. The average amount of the new loans came to a real

Graph 109  
Probability of Default (C, D, and E Loan portfolio transactions/total)

A. First-time Borrowers



B. New Loans



Source: Financial Superintendency of Colombia, Banco de la República calculations.

annual 46.2% in June 2011 while in December 2011 of that same year, this rate was a real annual 22.9%. This reduction was primarily due to the fact that the total amount issued in new credit cards had a lower growth rate. In December 2011, from the entire new loan portfolio, the new loans that were approved had an average value of COP\$3.8 m and, by type, the average value of the loan was at COP\$23.2 m for the purchase of a vehicle, COP\$6.9 m for other consumer loans, and COP\$1.7 m for credit cards.

The first-time borrowers, in turn, reduced the average amount of their loans by a real annual 5.5% which put them at COP\$2.5 m. This was due to the fact that the number of loans for vehicle purchase rose to a greater degree than did the growth of the total outstanding balance of these loans. The average outstanding balances for credit cards and other consumer loans borrowers had taken out continued to climb in the second half of 2011. Going by type, the loans given to first-time borrowers were at COP\$13.7 m for cars, COP\$6.3 m for other consumer loans, COP\$690,700 for credit cards (Table 16).

**Table 15**  
Average Real Balance of New Loans

Date	Total	Automobiles	Credit cards	Other
Dec-04	3,375,778	21,328,441	1,307,427	4,341,899
Jun-05	3,049,088	19,476,786	1,348,043	4,519,839
Dec-05	3,253,172	18,437,287	1,453,114	4,410,106
Jun-06	3,454,869	21,717,885	1,470,785	4,868,847
Dec-06	3,303,763	18,653,449	1,512,874	4,773,934
Jun-07	3,554,547	18,711,577	1,563,296	5,670,687
Dec-07	3,942,743	16,504,200	1,488,670	6,107,356
Jun-08	3,117,193	18,617,926	1,488,013	5,510,763
Dec-08	2,985,184	20,579,235	1,482,139	5,048,662
Jun-09	2,871,666	18,883,655	1,491,436	4,720,641
Dec-09	1,830,149	19,731,286	743,880	5,227,038
Jun-10	2,605,806	17,920,718	1,030,509	5,424,950
Dec-10	3,128,679	23,896,233	1,307,823	5,905,125
Jun-11	3,809,687	22,998,056	1,616,508	6,686,211
Dec-11	3,846,210	23,190,028	1,678,318	6,873,821

Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Table 16**  
Average Real Balance of First-time Borrower Loans

Date	Total	Automobiles	Credit cards	Other
Jun-04	3,068,266	20,099,284	698,846	3,600,920
Dec-04	2,769,809	23,698,044	717,514	3,401,949
Jun-05	2,881,243	14,676,520	628,631	3,714,216
Dec-05	2,403,650	13,326,215	665,079	3,004,089
Jun-06	2,147,117	14,275,226	605,442	2,768,114
Dec-06	2,218,513	9,330,144	615,526	3,181,826
Jun-07	2,932,031	12,454,021	729,597	4,746,314
Dec-07	2,678,523	10,573,517	784,938	4,898,947
Jun-08	2,942,187	10,045,364	626,371	5,316,973
Dec-08	2,420,931	11,260,728	613,958	4,621,175
Jun-09	2,879,622	10,781,476	636,007	5,042,886
Dec-09	569,566	11,566,149	241,023	5,071,594
Jun-10	2,670,285	11,677,652	641,480	4,988,912
Dec-10	2,664,649	16,964,979	653,415	5,991,824
Jun-11	3,415,208	16,046,983	696,615	8,142,997
Dec-11	2,516,987	13,760,992	690,763	6,278,473

Source: Financial Superintendency of Colombia, Banco de la República calculations.

In order to analyze the change in credit risk, a calculation of transition matrices for quarterly periods was done for the entire consumer loan portfolio. Table 17 shows the average for the transition matrices between March 2002 and December 2011 (panel A), the transition matrix for June 2011 (panel B), and the one for December of the same year (panel C). The higher percentages below the diagonal are associated with improvements in ratings while those that are above it are related to deteriorations in them or, in other words, increases in credit risk.

When the matrices for December 2011 are compared to the matrix for the historical average, there are lower probabilities of worsening (in particular from the A rating) at the same time as there are lower probabilities of improving. This situation suggests a greater persistence in the same ratings for the consumer loans in December 2011. This has been the case for the last year (Table 17).

Furthermore, for each type of consumer credit, an analysis of the changes in credit risk was done based on the harvests of borrowers. This analysis identifies, over the course of time, the quality of the loans held by borrowers from the financial system during a given quarterly period (harvest) and also makes it possible to distinguish between the risk profiles of new loans compared to prior harvests.

Table 17  
Transition Matrices for the Total Consumer Loan Portfolio  
(percentage)

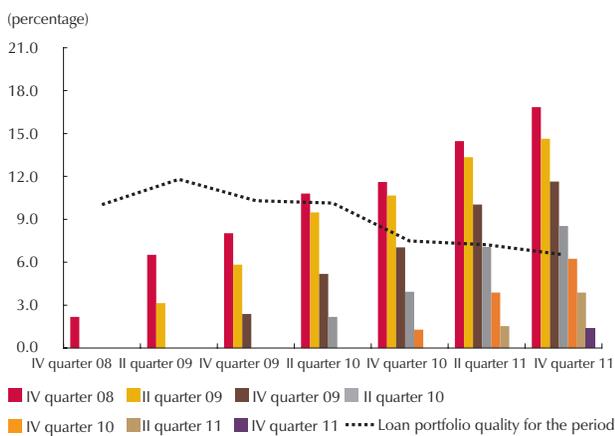
A. Average of the Transition Matrices Between March 2002 and December 2011					
	A	B	C	D	E
A	95.3	2.8	1.1	0.6	0.1
B	44.5	27.5	9.4	17.7	0.9
C	23.0	11.6	19.3	43.3	2.7
D	11.5	4.4	6.2	35.3	42.6
E	5.7	1.4	1.8	4.0	87.2
B. June 2011					
	A	B	C	D	E
A	95.8	2.5	1.0	0.7	0.0
B	35.3	34.6	12.8	16.5	0.8
C	13.9	13.8	28.1	39.2	5.0
D	5.0	2.7	7.5	59.8	25.1
E	10.5	2.0	3.0	4.4	80.1
C. December 2011					
	A	B	C	D	E
A	97.1	1.5	0.7	0.7	0.0
B	39.0	31.4	9.2	19.2	1.2
C	14.8	13.0	31.4	37.9	2.9
D	2.1	1.7	8.5	32.9	54.8
E	2.8	1.0	2.4	7.7	86.1

Source: Financial Superintendency of Colombia, Banco de la República calculations.

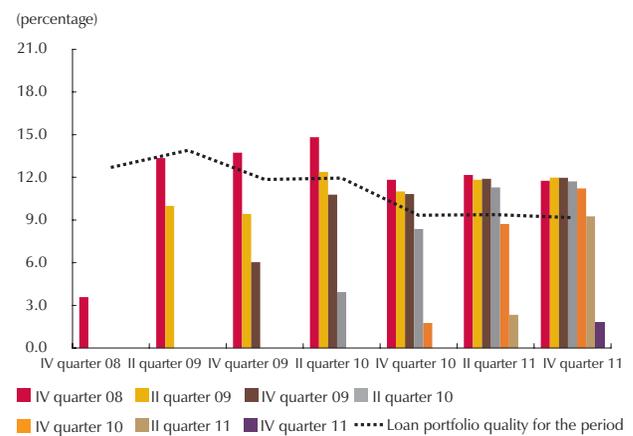
Graph 110 shows the loan portfolio quality by harvests and type of consumer loan.<sup>70</sup> The QI for all of the new consumer loans granted in the fourth quarter of 2011 was higher than the one for six months earlier as it went from 2.5% in June 2011 to 2.9% in December of the same year. This rise was due to the fact that risk in other consumer loans increased as can be seen when the loans are analyzed by type since this is the only one that showed a higher QI for the new harvest.

Graph 110  
Analysis of Consumer Loan Portfolio Quality by Harvests

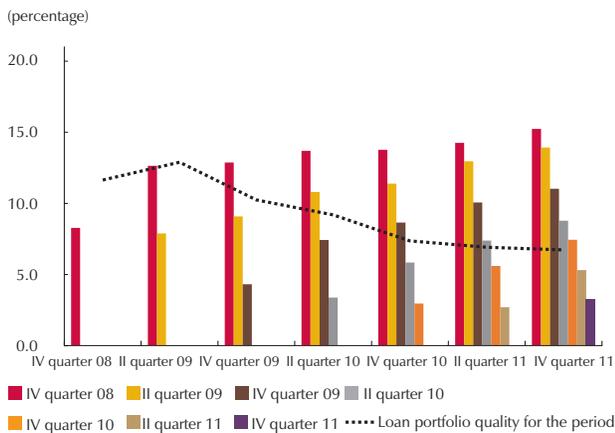
A. Automobiles



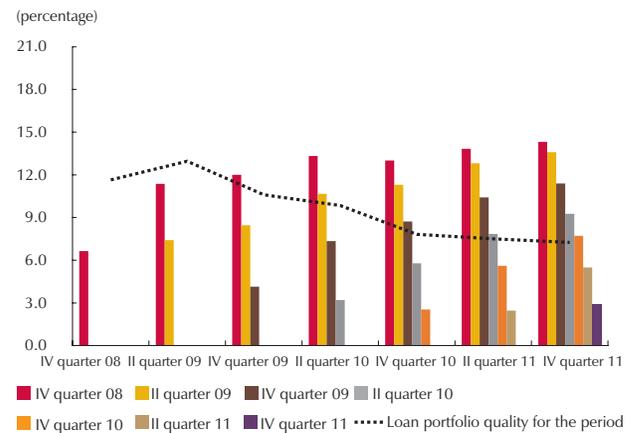
B. Credit cards



C. Other consumption



D. Total consumption



Source: Financial Superintendency of Colombia, Banco de la República calculations.

70 The harvest graphs are interpreted as follows: the horizontal axis shows the six-month period for evaluating the harvest while the colors of the bars are associated with each harvest. The line is, in turn, the loan portfolio quality indicator for all of each type of loan in each period. In the analysis of loan portfolio quality for a harvest, we must clarify the fact that, a few six-month periods after its inception, the riskiest loans must be taken into account since they have a larger share of the current balance. However, this bias is common for all of the harvests and, therefore, they can be compared to each other. The reader is reminded that the analysis of harvests was changed from a six-month to a quarterly basis, but their evaluation is done every six months.

The credit cards that were approved in the fourth quarter of 2011 showed a QI of 1.8% while six months prior to that, the indicator for the new credit cards had been at 2.3%. A similar situation was seen with respect to loans for automobiles. In this case, the QI for the new loans went from 1.5% to 1.3% between June and December 2011. The QI for other consumption, in turn, varied between 2.7% and 3.3% during the second half of said year. Also, given its higher share of the outstanding balance of the consumer loan portfolio, its impact is such that the new harvest for all the loans of this type is riskier than the one that originated in the second quarter of 2011.

In spite of this upswing, it is noteworthy that the new loans are still getting better credit risk ratings in comparison to the harvests originated before June 2010. Last of all, when the change in the QI for each one of the harvests is analyzed, one sees that there is a lower rate of deterioration when the most recent ones are compared to the ones from prior to June 2010.

To summarize, in the second half of 2011, rises in the outstanding balances of the consumer loan portfolio continued. These increases have been higher than the trend in the number of loans granted thus resulting in an average value for the loan in December 2011 that was higher than what had been seen in periods prior to 2002. These upswings have caused the aggregate indicators for risk and default to continue declining. Furthermore, the transition matrices show that the probabilities of worsening and of improving a rating dropped in 2011 and persistence in the current loan rating had risen. However, the new loans allocated to other consumer loans (which are a larger share of the total amount for this type of loan) presented a riskier harvest than they did six months before.

### 3) *Analysis of first-time borrowers*

The recent performance of the consumer loan portfolio shows that there has been greater strength in this loan portfolio over the last two years and that the risk indicators are still remaining low. However, this situation also generated more exposure for the credit institutions in the second half of 2011. That is why it is important to monitor which entities are taking on the highest risks and whether or not their loan portfolio is being expanded through more bancarization (first-time borrowers in the consumer loan portfolio of the financial system).

In 2011, 18 million loans were granted for the area of consumer loans. Of these, 843,000 were made to first-time borrowers. In other words, 4.7% of the new loans were allocated to first-time borrowers. In general, during the previous year, the total number of borrowers was 5.3 m as of December 2010 while approximately 782,000 people got consumer loans for the first time.

When the indicators of quality and default for the new loans are analyzed with a focus on those granted to first-time borrowers, we see that the credit institutions see a lower risk in the new loans to first-time borrowers than in those that are granted to previous clients (Table 18).

Table 18  
OQI and NLIO of New Loans and First-time Borrowers for the Fourth Quarter of 2011 (percentage)

	December 2010		December 2011	
	New loans	First-time borrowers	New loans	First-time borrowers
<b>OQI</b>				
<b>Total</b>	<b>9.1</b>	<b>3.1</b>	<b>8.4</b>	<b>1.3</b>
Credit cards	9.4	4.3	8.5	1.7
Cars	3.6	0.3	3.6	0.6
Other consumption	8.6	1.7	8.6	0.9
<b>NLIO</b>				
<b>Total</b>	<b>6.1</b>	<b>2.0</b>	<b>5.1</b>	<b>0.2</b>
Credit cards	6.1	3.0	4.7	0.3
Cars	2.6	0.1	2.4	0.1
Other consumption	6.2	0.8	6.0	0.1

Source: Financial Superintendency of Colombia, Banco de la República calculations.

When this is analyzed by entity, we find that those intermediaries that have a higher share of first-time borrowers in their new loans tend to be, on the one hand, those that have higher real rates of growth for their consumer loan portfolio and, on the other, those that have a lower share of the entire system's outstanding consumer loans.

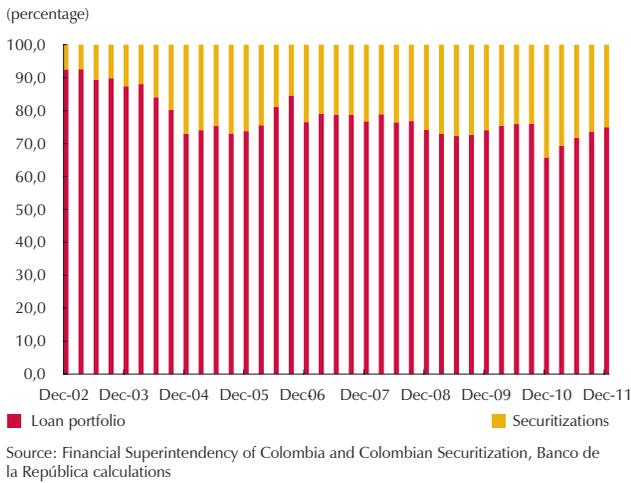
With respect to the number of first-time borrowers, the credit institutions which have a concentration of consumer loans in their portfolios are the ones that have contributed the most to the total number of first-time borrowers. In terms of risk, the financial intermediaries that have a higher level on the QI are the ones that are contributing to a higher number of first-time borrowers and their loan portfolio is highly concentrated in this type of loan.

### *c. Housing Loan Portfolio*

#### *1) Credit Risk*

In the second half of 2011, the share held by the loan portfolio without securitizations continued rising and came to 75% of the total in December 2011. This reflects the decline in securitizations that has been seen since December 2010 when the tax incentives that these securities had had were eliminated (Graph 111). Although this reduction indicates that the intermediaries are more exposed to credit risk, the elimination of the incentives has led to pension

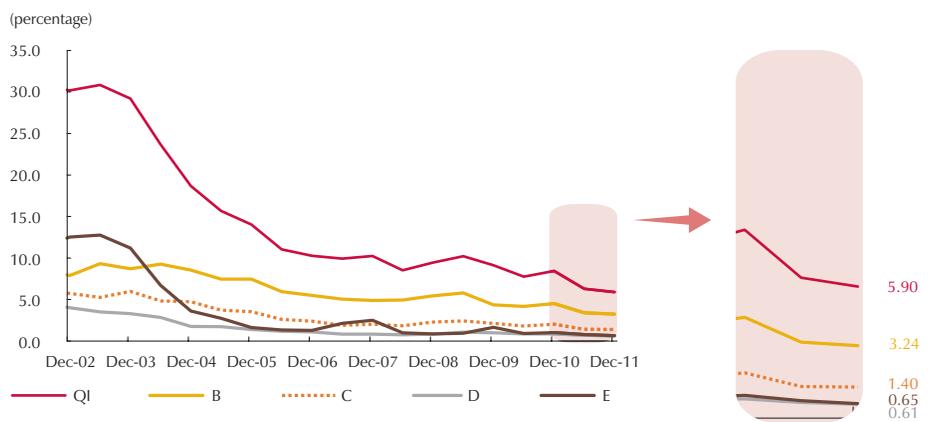
**Graph 111**  
**Components of the Housing Loan Portfolio by Loan Portfolio and Securitization in Pesos**



funds being the entities that are currently acquiring the highest share of these securities in comparison to what happened in the past when banks were the ones pursuing them the most aggressively.

When the components of the portfolio are analyzed by type of rating, one finds that the quality indicator of the loan portfolio continued to improve in the second half of 2011. It was at 5.9% in December of that year in comparison to the 6.3% registered six months earlier. This performance is particularly the result of a significant upsurge in the A rated loan portfolio that was greater than that of the risky loan portfolio. An analysis of the latter shows a decline in the share of all the ratings in the portfolio (Graph 112).

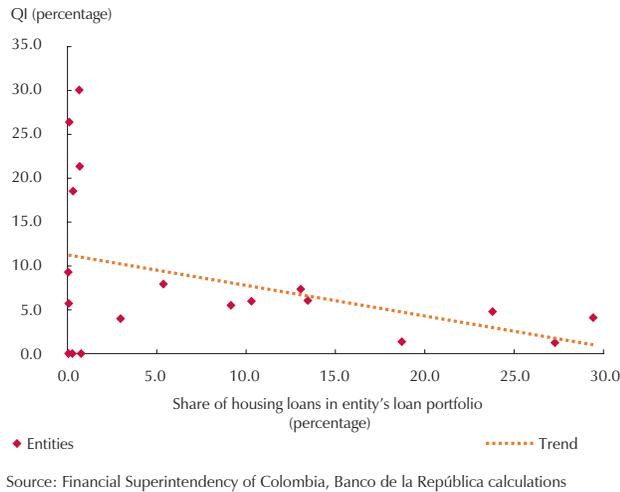
**Graph 112**  
**Share of the Risky Loan Portfolio by Rating**



When the relationship between the QI and the share the housing loan portfolio holds in the loan portfolio each entity has is analyzed, we find that there is a negative relationship between these variables. This shows that the quality indicator for the housing loan portfolio is better for those intermediaries who give this portfolio greater weight in their total loan portfolio (Graph 113).

In terms of the number of loans based on their level of risk, it can be seen that OQI is still showing a declining trend and was at 9.4% in December 2011. Meanwhile, the NLIO showed a slight deterioration compared to what had been registered six months before. This shows that the number of C, D, and E rated housing loans has risen more than the A rated loans (Table 19). In addition, it is noteworthy that these indicators are higher than those calculated based on the outstanding balances of the loan portfolio. This suggests that the largest loans have better ratings.

Graph 113  
QI of the Housing Loan Portfolio Vs. Share of Housing Loans in the Loan Portfolio



Source: Financial Superintendency of Colombia, Banco de la República calculations

In order to analyze the changes in credit risk, the transition matrices were calculated for this loan portfolio. Table 20 shows the average transition matrices between June 2007 and December 2011 (panel A) as well as the matrix for June 2011 (panel B) and for December 2011 (panel C). Positive values above the main diagonal (upper triangle) represent increases in the probability of moving towards worse ratings while the positive values below the main diagonal (lower triangle) indicate rises in the probability of going to better ratings. When the matrix for December is compared with the average matrix and that for June, a rise in persistence for all ratings is found. This was reflected in a substantial drop in the probability of migrating towards a worse rating in comparison to the probability of moving towards a better one.

Table 19  
Number of Loans Based on Risk Level

Date	Total loans (number of loans)	Risky	In default	OQI (percentage)	NLIO <sup>a/</sup>
Jun-04	561,745	126,185	75,533	22.46	13.45
Dec-04	473,899	82,974	43,243	17.51	9.12
Jun-05	461,091	76,201	38,951	16.53	8.45
Dec-05	434,851	65,673	29,539	15.10	6.79
Jun-06	454,453	63,147	30,364	13.90	6.68
Dec-06	441,703	56,488	27,129	12.79	6.14
Jun-07	470,327	64,406	32,799	13.69	6.97
Dec-07	435,103	52,224	25,482	12.00	5.86
Jun-08	434,986	48,444	20,857	11.14	4.79
Dec-08	423,394	49,770	21,686	11.76	5.12
Jun-09	411,403	53,962	24,595	13.12	5.98
Dec-09	426,611	47,714	26,120	11.18	6.12
Jun-10	433,654	43,913	20,882	10.13	4.82
Dec-10	387,896	39,881	19,188	10.28	4.95
Jun-11	521,461	49,534	23,221	9.50	4.45
Dec-11	577,750	54,069	25,975	9.36	4.50

a/ The number of loans in default was calculated as the sum of those rated C, D, and E, which corresponds to the maturity profile determined by the Financial Superintendency of Colombia.

Source: Financial Superintendency of Colombia, Banco de la República calculations.

In order to do a risk analysis of the new loans, the new harvests from each six-month period since December 2008 were evaluated. This analysis makes it possible to study the risk profile of the loans that originated in a specific period (harvest) and compare it to those that were granted during other periods. A

Table 20  
Transition Matrices for the Housing Loan Portfolio  
(percentage)

A. Average of Transition Matrices between June 2007 and December 2011					
	A	B	C	D	E
A	96.6	3.3	0.1	0.0	0.0
B	29.8	50.4	19.1	0.3	0.4
C	14.0	8.1	59.8	17.4	0.7
D	7.9	2.1	6.1	56.9	27.0
E	6.2	1.2	1.9	3.7	87.0

B. June 2011					
	A	B	C	D	E
A	96.4	3.6	0.0	0.0	0.0
B	31.2	38.2	29.9	0.5	0.2
C	14.3	6.9	52.3	25.9	0.6
D	10.5	2.4	6.8	46.8	33.5
E	13.2	2.2	3.4	5.3	75.8

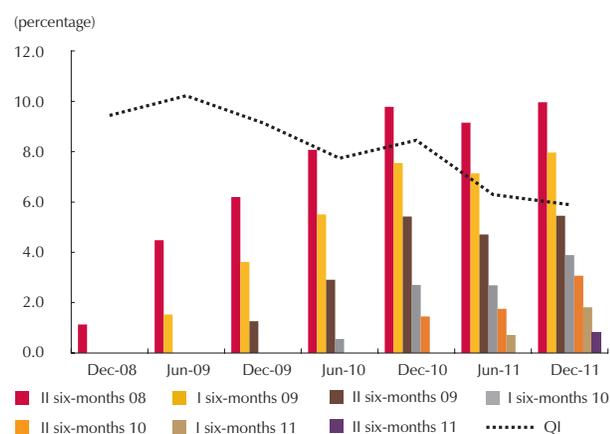
  

C. December 2011					
	A	B	C	D	E
A	97.2	2.7	0.0	0.0	0.0
B	26.7	54.1	18.7	0.3	0.2
C	11.3	7.4	64.8	16.3	0.3
D	5.9	1.4	6.0	63.9	22.9
E	5.4	1.1	1.9	3.6	88.0

Source: Financial Superintendency of Colombia, Banco de la República calculations.

slight worsening in the QI for the harvest in the second half of 2011 is found with respect to these that originated six months before. Moreover, the deterioration in the harvests that have originated since June 2009 slowed down in the second half of 2011 and this was accompanied by a drop in the QI (Graph 114).

Graph 114  
Analysis of Housing Loan Portfolio Quality by Harvests



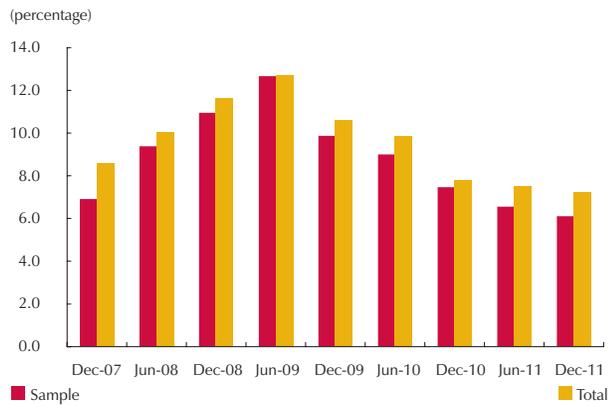
Source: Financial Superintendency of Colombia, Banco de la República calculations.

## 2) Combined Credit Risk: Housing and Consumer Loan Portfolio

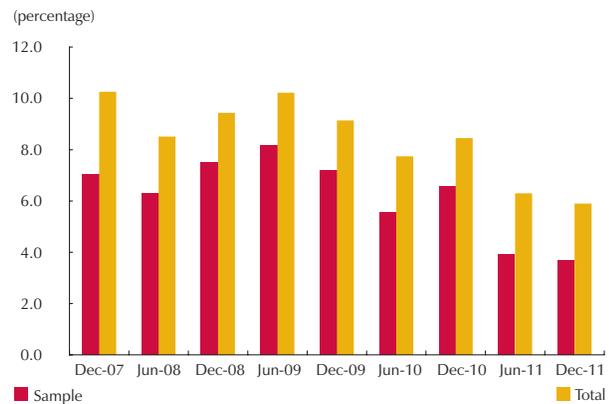
In this section, an analysis is presented of the exposure the financial institutions have to the credit risk of agents that have more than one type of loan. To do this, a database was built of the borrowers who have housing and consumer loans by using the information from the six-month periods since December 2007. As of December 2011, the agents with the two types of loans represented 70.6% of all of the housing loan borrowers and 6.7% of the consumer loan borrowers.

**Graph 115**  
Comparison of QI Between Sample and Total

**A. Consumer Loan Portfolio**

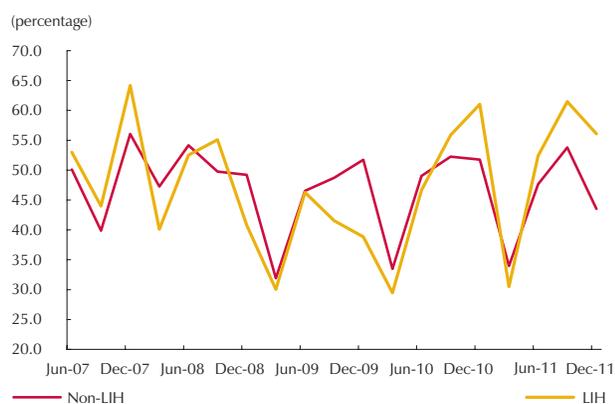


**B. Housing Loan Portfolio**



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 116**  
Share of First-time Borrowers Compared to the Total Number of People with New Loans



Source: Financial Superintendency of Colombia, Banco de la República calculations.

Graph 115 compares the loan portfolio quality indicator for consumer and housing loans of agents who have both types of loans to the one for the total loan portfolio. When the results for each one of these are analyzed, the QI of the debtors with both types of loans is seen to be lower than the one for the total sample. This implies that the borrowers that have the two types of loans are, on average, less risky than the debtors as a whole in the total loan portfolio. This could be due to greater creditworthiness.

**3) Analysis of First Time Borrowers**

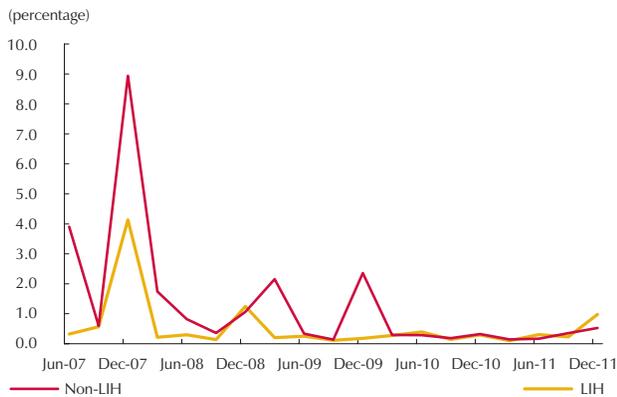
In order to evaluate whether or not the growth of housing loans is a result of an increase in the amount granted to first-time borrowers and whether or not credit institutions are taking additional risks as they enlarge their housing loan portfolio, different indicators of the new loans issued in the fourth quarter of 2011 are analyzed in this section.

Graph 116 presents the share of first-time borrowers with respect to the total number of people who acquired new housing loans. On average, 46.8% of the new loans were found to correspond to first-time borrowers who have not had a housing loan with the financial system since 2002. This proportion is similar to the average for the period analyzed. Note that the performance of the low income housing loans (LIH) and the housing loans that are not for low income is very similar.

Furthermore, the risk profile for this segment is analyzed in Graph 117. A slight recovery in the quality indicator for first-time borrowers for housing can be seen, especially in LIH loans. Nevertheless, these levels are still relatively low. Note that the QI for housing loans is usually low for the first-time borrowers given that the majority of the loans granted have an A rating.

Last of all, the number of people with new loans and the quality indicator for these borrowers was studied by entity. Table 21 shows that the entities that have the highest number of this type of borrower are the ones that have the lowest quality

Graph 117  
Quality Indicator for First-time Borrowers



Source: Financial Superintendency of Colombia.

indicators. Moreover, the entities that grant the most new loans have been the same ones for the last two years.

In conclusion, the growth of the housing loan portfolio as well as the decline in the share securitizations have in this entire portfolio show an upswing in exposure to credit risk. At the same time, a significant improvement in the QI for this type of credit was registered. This is explained, in particular, by an expansion of the A rated loans. Likewise, a decline in credit risk was evident. This was the result of the drop in the probability that loans would move towards worse ratings. With respect to borrowers with more than one type of

loan, borrowers with consumer and housing loans are still seen to be less risky than those that have only one of these two types of loans.

Table 21  
Quality Indicator of Borrowers with New Loans by Bank

Entity	Number of People with New Loans				QI Borrowers with New Loans			
	Jun-10	Dic-10	Jun-11	Dic-11	Jun-10	Dic-10	Jun-11	Dic-11
1	20.132	15.738	17.362	14.369	0.9	0.3	0.5	0.5
2	6.209	6.750	8.892	13.928	1.5	2.3	2.7	6.6
3	7.601	8.040	9.595	11.484	1.2	0.8	0.5	1.2
4	11.080	7.973	7.544	8.972	5.4	3.5	4.9	4.0
5	4.688	4.614	4.967	5.920	0.5	0.2	0.9	0.5
6	1.163	1.710	1.658	2.122	0.8	2.7	2.1	4.6
7	1.012	1.439	986	1.819	2.5	2.4	1.7	0.4
8	1.100	667	586	1.419	1.9	0.6	0.7	5.0
9	294	386	411	651	0.0	0.0	0.2	0.2
10	416	361	322	412	3.1	3.9	2.5	1.2
11	241	319	110	137	37.3	44.8	26.4	19.0
12	109	87	14	13	3.7	2.3	14.3	0.0
13	152	22	9	7	35.5	0.0	0.0	0.0
16	99	43	7	5	4.0	0.0	14.3	0.0
18	88	117	4	3	1.1	0.9	0.0	0.0
<b>Total</b>	<b>54.549</b>	<b>48.321</b>	<b>52.496</b>	<b>61.338</b>	<b>2.2</b>	<b>1.7</b>	<b>1.7</b>	<b>2.8</b>

Source: Financial Superintendency of Colombia. Banco de la República calculations.

Finally, close to half of the people who get new housing loans are first-time borrowers in this area of credit and their quality indicators are relatively low although they rose slightly in the last quarter of 2011. At the same time, the entities with the highest number of new loans showed a better quality indicator.

#### d. *Micro-credit Portfolio*

The real annual growth of the micro-credit portfolio continued to show rates above 30% in the second half of 2011. This trend was notable after it had seen a significant slowdown in 2010. Thus, micro-credit ended 2011 a real annual expansion rate of 33.4% (compared to 8.6% the previous year).<sup>771</sup>

This growth has been accompanied by a rise in the number of borrowers<sup>772</sup> which went from 1,022,333 to 1,639,469 between December 2010 and the same month in 2011. As was mentioned in the previous *Financial Stability Report*, this upswing was the result of both the greater strength this loan portfolio had in the different credit institutions and the addition of a bank specializing in this type of loan portfolio to the financial system. The addition of the new entity generated a substantial expansion in the outstanding balance of the micro-loan portfolio (given that it was already handling loan portfolio operations before becoming part of the financial system). However, the average balance per debtor has declined from COP\$4.4 m to COP\$3.6 m between December 2010 and one year later (Table 22).

Table 22  
Micro-credit Loan Portfolio: Capital and Borrowers

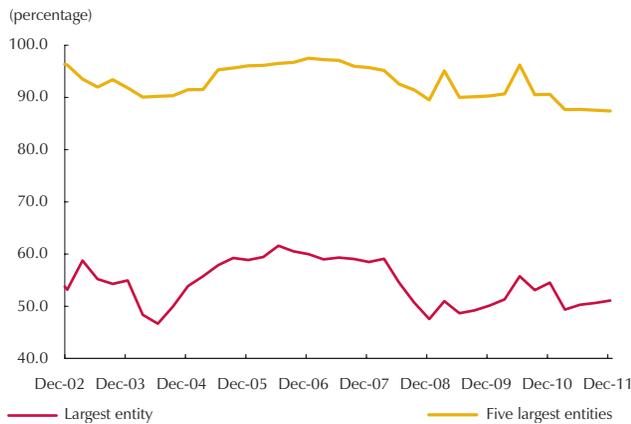
Date	Balance <sup>a/</sup>	Number of borrowers	Average amount per borrower <sup>a/</sup>
Dec-02	596,499	136,506	4.37
Dec-03	818,306	190,872	4.29
Dec-04	1,148,728	272,868	4.21
Dec-05	1,631,490	398,892	4.09
Dec-06	2,092,698	540,209	3.87
Dec-07	2,326,415	631,161	3.69
Dec-08	3,366,425	897,340	3.75
Dec-09	4,106,023	1,037,664	3.96
Dec-10	4,460,422	1,022,333	4.36
Dec-11	5,948,270	1,639,469	3.63

a/ Balances in millions of December 2011 pesos.  
Source: Financial Superintendency of Colombia, Banco de la República calculations.

71 It is important to keep in mind the fact that an entity that specializes in micro-credit was added to the financial system in February 2011. Therefore, it is necessary to analyze the strength of this loan portfolio without including that change. When the changes in the outstanding balance of this type of loan are analyzed without including the new entity, significant increases in the rate of growth are still seen. As of December 2011, this was a real annual 20.1%.

72 In general terms, the debtors in the micro-loan portfolio are individuals (90%). However, many of these loans are part of the financial support offered to small businesses, but due to their informal character, the debt is recorded under the name of the individual who contracted it. This could be due mainly to the high costs small businesses incur in terms of registration procedures and requirements for by-laws as was mentioned in the latest issues of the *Financial Stability Report*.

**Graph 118**  
Concentration of Micro-loans in the Largest Institutions



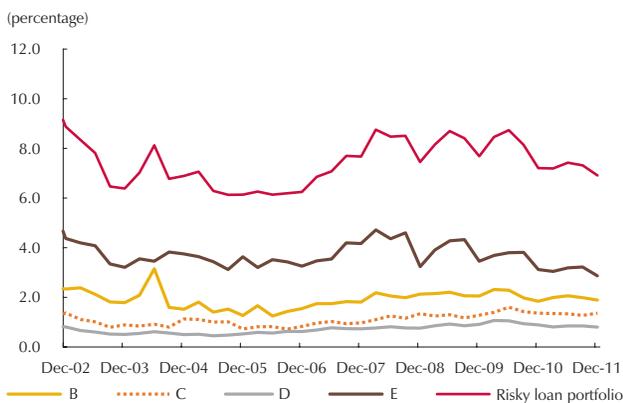
Source: Financial Superintendency of Colombia, Banco de la República calculations.

this type of loan but which have pushed their micro-loan portfolio in the latest six-month period.

## 2) Credit Risk

Graph 119 shows the changes in the QI for micro-credit and the share of each category of the risky loan portfolio within the total gross loan portfolio. As of December 2011, the QI for micro-credit improved and was at 6.9% while it had been at 7.4% six months previously. When the components of the risky loan portfolio are analyzed by rating, we see that the E rating, which is the one with the largest share and risk, has declined moderately, causing the decline in QI. Note that unlike the rest of the loan portfolios, where the B rated loans have the highest share within the risky loan portfolio, in the micro-loan portfolio, E rated loans account for the majority.

**Graph 119**  
Share of the Risky Loan Portfolio by Rating



Source: Financial Superintendency of Colombia, Banco de la República calculations.

## 1) Micro-credit Portfolio Concentration

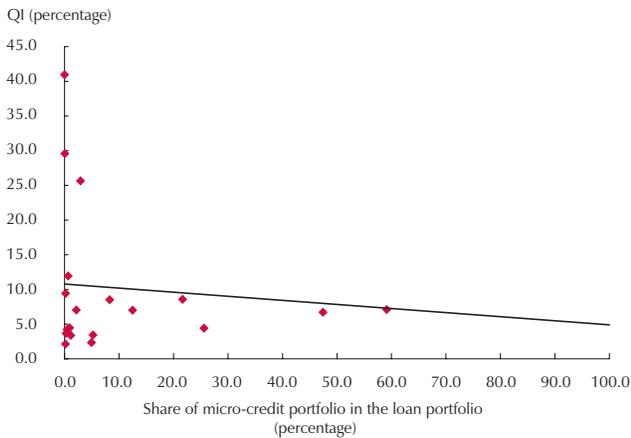
Graph 118 shows the variations that micro-credit concentration has gone through. In general terms, there is an entity that has accounted for more than half of this portfolio and even if its share has declined over the course of time, it grew moderately in the second half of 2011 as it went from 50.3% in June 2011 to 51.1% in December of the same year.

When the five entities that account for the highest balances for this loan portfolio are analyzed, the opposite effect is seen since the share for this set of entities dropped 30 bp in the second half of 2011 and was at 87.4% in December of that year. This could be interpreted as a better performance by other credit institutions that are not as representative of

When the QI of the loan portfolio of each institution –with micro-credit being a part of that portfolio– is considered, no major risks associated with this loan portfolio are found. The riskiest entities have less than a 1% share of micro-credit within their own portfolios while entities that account for most of micro-credit maintain a risk level (measured by the QI) that is lower than that shown by the total loan portfolio (Graph 120).

Table 23 shows the number of loans in the micro-loan portfolio divided into total loans, risky loans, and those in default. When the OQI is compared with the QI for the micro-credit portfolio, the risk

Graph 120  
Relationship Between QI and Share of Micro-loan Portfolio  
in the Loan Portfolio



Source: Financial Superintendency of Colombia, Banco de la República calculations.

per number of borrowers is found to be higher than the risk based on outstanding loan balances (8.5% vs. 6.9% as of December 2011). This could suggest that the loans granted for higher amounts are the ones with lowest levels of risk. Furthermore, between June and December 2011, the OQI and the NLIO declined as they went from 9.5% to 8.5% and from 6.9% to 6.1% respectively. It has been six months since OQI has shown upswings.

The transition matrices make it possible to see the trend that credit risk is moving towards. The matrices are shown in Table 24 for the average between March 2004 and December 2011 and for the second and fourth quarter of last year. When the probabilities of migrating towards other ratings are

Table 23  
Default and Loan Portfolio Quality Indicators by Number of Loans for the Total Micro-loan Portfolio

Date	Totals (number of loans in thousands)	Risky	In default	OQI (percentage)	NLIO (percentage)
2006-I	516.1	39.0	30.9	7.6	6.0
2006-II	595.3	45.3	34.5	7.6	5.8
2007-I	656.5	60.1	46.5	9.2	7.1
2007-II	687.0	62.9	49.0	9.2	7.1
2008-I	746.3	79.2	61.6	10.6	8.3
2008-II	989.0	96.8	72.1	9.8	7.3
2009-I	1,081.1	124.0	96.4	11.5	8.9
2009-II	1,145.8	107.8	81.3	9.4	7.1
2010-I	1,170.3	117.9	89.9	10.1	7.7
2010-II	1,231.1	110.7	84.4	9.0	6.9
2011-I	1,542.6	145.4	105.7	9.5	6.9
2011-II	1,639.5	139.2	100.3	8.5	6.1

Source: Financial Superintendency of Colombia, Banco de la República calculations.

compared to that for the average in December 2011, lower probabilities for both worsening and improving are seen. Thus, the probability of remaining at the same rating is higher. Furthermore, when this result is compared to the one seen six months ago, lower probabilities of migrating towards higher risk ratings were found for the end of 2011. In conclusion, the matrices suggest that the micro-credit trend for the long term has been to remain at the same rating (especially in the A and E ratings). Nevertheless, in the last six months, the potential risk has declined.

Table 24  
Transition Matrices for the Entire Micro-loan Portfolio  
(percentage)

A. Average of the Transition Matrices between March 2004 and December 2011					
	A	B	C	D	E
A	96.5	1.9	0.9	0.6	0.1
B	27.3	27.5	11.2	8.0	26.0
C	11.7	5.5	22.9	8.2	51.6
D	6.8	2.1	2.6	17.1	71.4
E	2.4	0.5	0.4	0.6	96.0
B. June 2011					
	A	B	C	D	E
A	96.6	1.9	0.9	0.6	0.0
B	12.0	48.7	11.2	9.1	19.0
C	3.8	4.1	46.2	6.4	39.5
D	2.0	1.6	2.8	31.6	61.9
E	0.9	0.4	0.4	0.9	97.4
C. December 2011					
	A	B	C	D	E
A	96.5	2.0	1.0	0.5	0.0
B	21.7	36.1	12.3	8.3	21.7
C	6.4	5.7	48.1	5.3	34.6
D	3.0	1.4	2.6	29.9	63.1
E	1.5	0.5	0.6	1.0	96.3

Source: Financial Superintendency of Colombia, Banco de la República calculations.

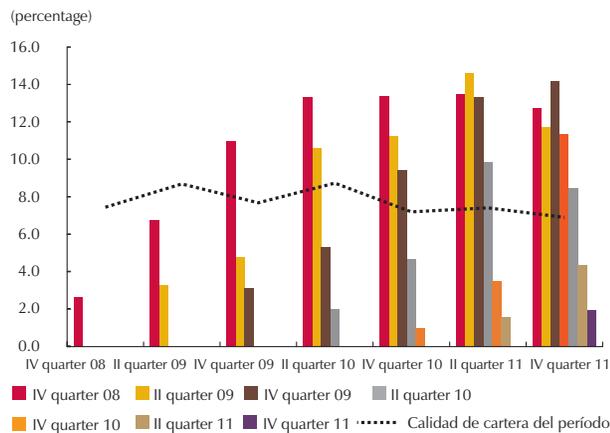
Finally, the analysis by harvests of loans makes it possible to monitor the QI of the loans granted in each period. Graph 121 shows the changes in this indicator for micro-loans in the second and fourth quarters since 2008.

Just as in the first half of 2011, the QI for the new loans rose in the second half of the same year. The indicator for the loans that originated in the fourth quarter of that year was 1.9%, which is 40 bp above the one for the new harvest in the second quarter of 2011. This suggests that the new loans in the second half of the year continued to be riskier than they were six months ago. However, these new loans still show a potential risk level that is lower than the risk level for the loans that originated in harvests prior to June 2010.

### 3) Combined Credit Risk: Micro-credit, Consumer, Housing, and Commercial Loan Portfolios

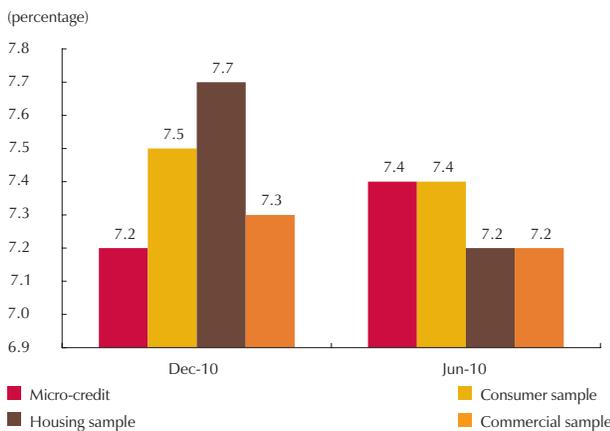
In this section, the credit risk that financial institutions are exposed to stemming from borrowers who have more than one type of loan is analyzed. To do this, an analysis of debtors who have a micro-loan and, at the same time, another type of loan (consumer, housing, and commercial) was carried out.

**Graph 121**  
**Analysis of the Loan Portfolio Quality by Harvests:**  
**Micro-credit**



Source: Financial Superintendency of Colombia, Banco de la República calculations.

**Graph 122**  
**QI Comparison Between Samples and Total**



Source: Financial Superintendency of Colombia, Banco de la República calculations.

The percentage of micro-loan borrowers who also have another type of loan is relatively low. The consumer loan is the type of loan that is the most likely to be held simultaneously since 22.3% of the micro-loan borrowers have these two types of loans. With respect to the rest of the loan portfolios, of the debtors who have micro-loans only 4.2% and 1.4% respectively also have commercial and housing loans.

Between June and December 2011, micro-credit debtor risk has dropped although it shows no relationship with whether they have only micro-credit or another type of debt at the same time (Graph 122). Moreover, those debtors with more than one type of loan maintain a lower than average level of risk in the micro-loan portfolio while in the rest of the loan portfolios these same borrowers are the riskiest. For example, in the consumer loan portfolio (the type with the highest percentage of debtors with both types of loans) these types of borrowers had a QI of 10.9%, which is higher than the total QI for consumer loans (7.2%). However, their QI in micro-credit (6.9%) was equal to the total QI for the micro-credit loan portfolio.

#### 4) Analysis of First-time Borrowers

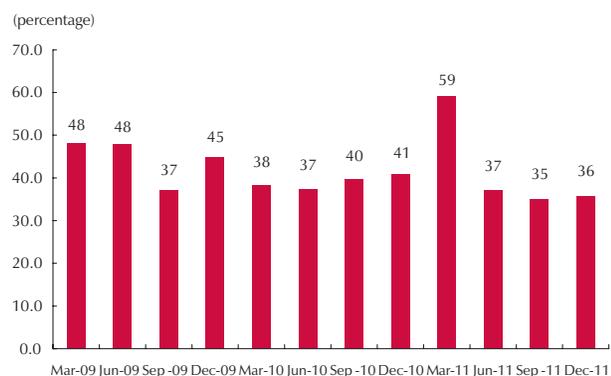
Since 2009, approximately 42% of the new micro-loans are allocated to first-time borrowers from the financial system. The highest share was seen in March 2011 when 59% were allocated to people

who were not included in the micro-loan portfolio. This can be explained by the addition of the new entity that specialized in this area to the system. As of December 2011, the percentage of bancarization in micro-credit had fallen to 36%. Nonetheless, when this is compared to other types of loans, it is still at high levels (Graph 123).

When the average balances for the new loans assigned to first-time borrowers are compared to the total, one sees that in the average for the last three years, there are no major differences between the value of the loans assigned to the first-time borrowers that for all the loans (Table 25).

Last of all, when the differences in risk that the financial intermediaries see between the new loans and first-time borrowers is analyzed, it can be seen that the first-time borrower risk has been significantly lower than that of all the new loans (Table 26). Between March 2009 and December 2011, we see that

**Graph 123**  
Share of First-time Borrowers in the Total Number of New Loans



Source: Financial Superintendency of Colombia, Banco de la República calculations.

the OQI of the first-time borrowers has remained at levels below 2%<sup>73</sup> while the new loans as a whole have gone to values that are higher than 6%. Note that the annual average for the OQI calculated for the new loans as a whole has shown a declining trend in the last three years.

To summarize, the performance of micro-credit in 2011 was impacted by the addition of a new entity that specialized in this loan portfolio which generated a larger number of borrowers and a lower average amount for these loans. Furthermore, the concentration of the balance of the micro-credits in the five largest entities declined and the loan portfolio as a whole rose. Because of that an increase can be seen in the competition on the part of some

financial intermediaries that are not very representative of this type of loan. In addition, the risk indicators show an improvement in the second half of 2011 considering that in the first half of the same year, they had deteriorated. However, it is important to monitor the performance of micro-credit in 2012 since the new harvests from 2011 originated with a QI above those for 2010.

**Table 25**  
Average Real Balance of New Loans Broken Down by New Borrowers

Date	New loans	First-time borrowers
Mar-09	4,110,402	4,560,200
Jun-09	4,028,263	4,470,108
Sep-09	3,943,025	4,552,260
Dec-09	3,892,250	4,204,343
Mar-10	3,770,518	3,956,338
Jun-10	3,851,660	4,085,792
Sep-10	3,929,969	4,053,179
Dec-10	4,225,767	4,491,770
Mar-11	3,146,040	2,799,457
Jun-11	4,053,893	3,860,738
Sep-11	4,101,716	4,083,512
Dec-11	4,072,271	4,163,543

Source: Financial Superintendency of Colombia, Banco de la República calculations.

<sup>73</sup> Just as with the rest of the indicators analyzed, the effect of the new entity which specialized in micro-loans could be seen on the OQI of the first-time borrowers. Considering that this institution carried out loan operations before it became a part of the financial system, the debtors it already had were counted as first-time borrowers in March 2011 in spite of the fact that they already had a credit history within the entity. This affected the OQI of the credit institutions.

Table 26  
Quality Indicator for New Transactions Differentiated by First-time Borrowers

Date	New loans	First-time borrowers
Mar-09	5.3	0.7
Jun-09	6.7	1.2
Sep-09	6.7	0.7
Dec-09	4.2	1.5
Mar-10	6.9	1.9
Jun-10	4.1	0.7
Sep-10	3.9	0.4
Dec-10	4.1	0.4
Mar-11	5.1	4.6
Jun-11	2.6	0.3
Sep-11	2.9	0.4
Dec-11	2.6	0.7

Source: Financial Superintendency of Colombia, Banco de la República calculations.

### C. LIQUIDITY RISK

There are two dimensions of liquidity risk that have been widely discussed in literature. The first is the financing liquidity risk which is understood as the inability to cover current liabilities on time due to the insufficient supply of liquid assets available. The second is associated with the market liquidity risk, which occurs when it is not possible to liquidate assets at suitable prices and in a timely fashion.

With this difference in mind, exercises for measuring the liquidity risk associated with each of the abovementioned dimensions are given in this section. Furthermore, stress exercises are included to measure how sensitive the system is to extreme, but unlikely scenarios of low liquidity. At the end of the section, an analysis of the structure of the interbank market network is also included.

#### 1. Financing Liquidity Risk

The scaled liquidity risk indicator (LRI) is used to measure funding liquidity risk. This indicator was introduced by the Financial Superintendency of Colombia when the liquidity risk management system (SARL in Spanish) went into effect in the first half of 2009. It is constructed as a short term liquidity gap which is calculated for a horizon of seven, fifteen, and thirty days.<sup>74</sup>

<sup>74</sup> In the September 2008 issue of the Financial Stability Report, the SARL and the method for calculating the LRI implemented by the Financial Superintendency of Colombia are described.

For a horizon of one week, the LRI formula corresponds to the sum of the liquid assets adjusted for market liquidity (AML) and the requirement of net liquidity (RNL) estimated for that range of time:

$$LRI = AML + RNL$$

where,

$$RNL = FNVC + FNVNC$$

FNVC1 is the net cash flow of contractual maturities from assets, liabilities and off-balance sheet positions within the next seven calendar days and FNVNC1 is the estimated net cash flow for the next seven days from deposits and liabilities payable on demand that do not correspond to contractual maturities. The FNVC can be positive or negative depending on whether cash income exceeds outlays, but the FNVNC has a negative sign based on its construction:

$$FNVNC1 = -frn \times [demand\ deposits\ and\ liabilities\ to\ date]$$

where  $frn_1$  is the net withdrawal factor for a seven-day horizon. It is calculated as the maximum percentage of net reduction in the sum of deposits and liabilities the respective institution may have faced from December 31, 1996 to the last day of the month immediately prior to the calculation, taking end-of-month withdrawals into account for this calculation. The FNVNC is, therefore, an indicator of a stressed withdrawal scenario. Liquid assets adjusted for market liquidity (AML), in turn, are calculated using the following equation, where securities are entered at a fair market price:<sup>75</sup>

$$AML = cash + (bonds\ issued\ by\ the\ national\ government,\ Banco\ de\ la\ República,\ Fogafin) \times (1 - TES\ haircut) + (all\ other\ securities) \times (1 - 1.2 \times TES\ haircut) - (total\ required\ daily\ average\ reserve)$$

When calculating the LRI, an additional 3.7% haircut is applied to the foreign currency component of the institution's liquid assets. In addition to incorporating an adjustment for market liquidity risk, the purpose is to do the same for foreign exchange risk. Moreover, this indicator is scaled by illiquid assets to allow for a comparison of the different financial institutions. That is,

$$\widehat{LRI}_{it} = \frac{LRI_{it}}{TA_{it} - AML_{it}}$$

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75 The haircuts applied to securities correspond to the ones published monthly by the Department of Operations and Market Development at the Banco de la República.

Where TA represent total assets while AML are liquid assets adjusted to market liquidity risk.

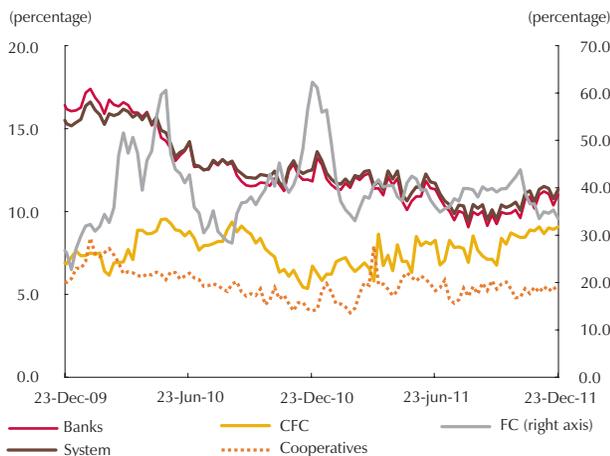
Given that LRI is a liquidity gap calculated on the basis of liquid assets – liquid obligations and liabilities, it is interpreted as follows:  $\widehat{LRI}_{it} < 0$  implies high risk while higher  $\widehat{LRI}_{it}$  levels are associated with a better liquidity position for the institution being analyzed.

Note that the Financial Superintendency of Colombia introduced changes into the LRI through External Circular 044 October 2011. The new method incorporates some items proposed by Basel III with respect to the calculation of liquid assets, liquidity requirements, and the measurement horizon. These changes went into effect as of January 2012. That is why the liquidity risk will not be analyzed in this Report with the most recent methodology. The data that will be studied is that which has been presented up to December 23, 2011.

When the change in the LRI ratio with a seven-day horizon for the financial system is analyzed, the fact that this has remained at stable levels and shown

little variability since mid-2011 can be seen. The indicator for the entire system was at 11.3% as of December 23, 2011, a figure that is 38 bp lower than what was seen in the last week of June 2011. This suggests that the level of liquidity has declined slightly. The trend for the banks is similar to that of the system (Graph 124).

Graph 124  
LRI Ratio at 7 Days by Type of Intermediary



Source: Financial Superintendency of Colombia, Banco de la República calculations.

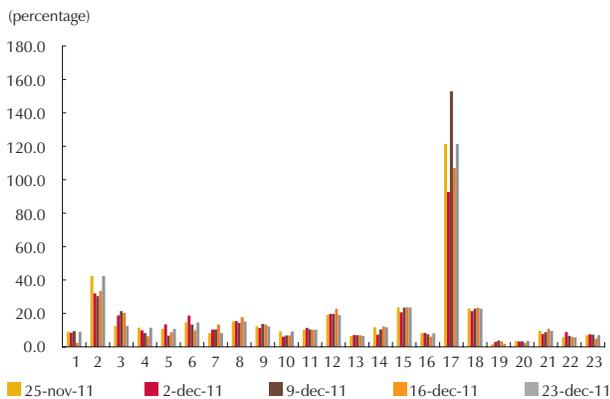
Graph 125 shows the change in the LRI ratio for commercial banks from November 25, 2011 to December 23 of the same year based on the last week of each month. Although the agents' liquidity levels are considerably disperse, in no case was the indicator found to be negative. This suggests low funding liquidity risk for the financial institutions during that period.

### Stress tests

Stress tests make it possible to evaluate the ability of institutions to respond to shocks to certain variables in extreme but unlikely scenarios. The following test was done by assuming a deposit-withdrawal scenario in addition to the one already incorporated into the LRI. The stressed indicator was calculated for the commercial banks and is defined as:

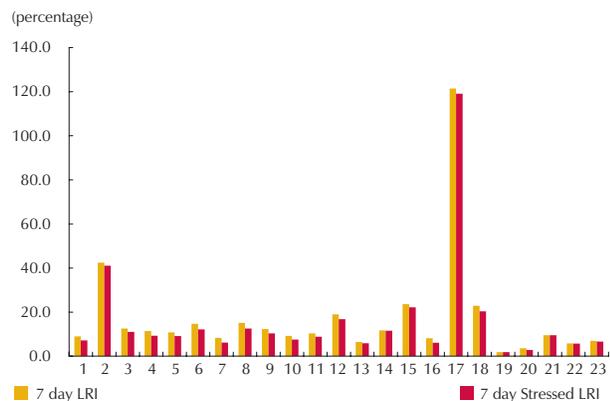
$$\widehat{LRI}_{stressed} = \frac{LRI_{i,t} - x(\text{checking and savings accounts})}{TA_{i,t} - AML_{i,t}}$$

Graph 125  
LRI7/(TA-LA)  
December 23, 2011



Source: Financial Superintendency of Colombia, Banco de la República calculations.

Graph 126  
Stress Test for LRI7/(TA-LA)  
December 23, 2011



Source: Financial Superintendency of Colombia, Banco de la República calculations.

Using the data for  $LRI_{i,t}$  (seven days) as of December 23, 2011, the stress test was calculated for the banks, assuming  $x = 4\%$ . As can be seen in Graph 126, none of the entities showed a negative LRI level after the stress test was applied. This verified that the banks were able to resist the withdrawal shock without a substantial deterioration in their liquidity condition.

In addition to the above, the same stress test was done but this time with a liquidity gap after fifteen days. The LRI indicator does not show negative values for any of these entities before this shock. This indicates that none of them would find themselves in a situation of high liquidity risk.

In addition to the abovementioned stress scenario where a simultaneous shock was carried out, a stress test was designed in which the shocks to deposits are weighted based on type of creditor.<sup>76</sup> Given the information available for the case of Colombia, a stress test was built in which the creditors were classified into three categories: companies, private people and other depositors.<sup>77</sup> The adjustment factors as defined give greater importance to the deposits from companies and less to those from private individuals. These differences are due to the fact that the concentration of deposits per agent is higher in the former case than it is in the case of individuals, whose deposits are generally isolated. Thus, in this exercise, the shock is equivalent to a 6% withdrawal of deposits for companies, 3% for households and 4%

for other depositors.

Graph 127 shows the adjusted LRI for a week and the results of the stress exercises described above for the different banks based on the share of the deposits coming from companies, households and others.

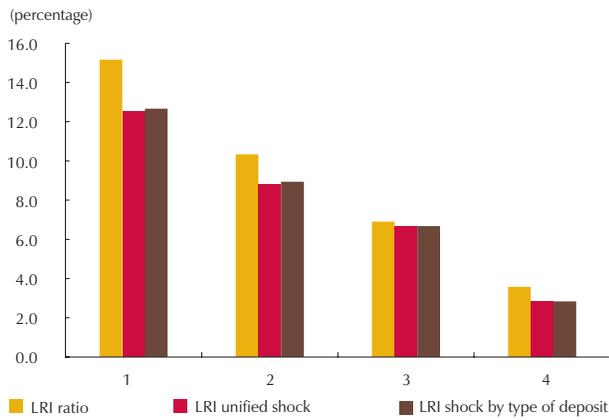
When the results are analyzed, we see that this exercise succeeds in capturing the liquidity risk associated with the business structure of each entity. In other words, the banks where a higher share of the deposits come from companies are more sensitive to a liquidity shock while banks with a higher concentration

76 This exercise is based on the method developed by the Bank of Sweden (Riksbank). For additional information, see Sveriges Riksbank (2010), Financial Stability Report, No 2, December 2<sup>nd</sup>.

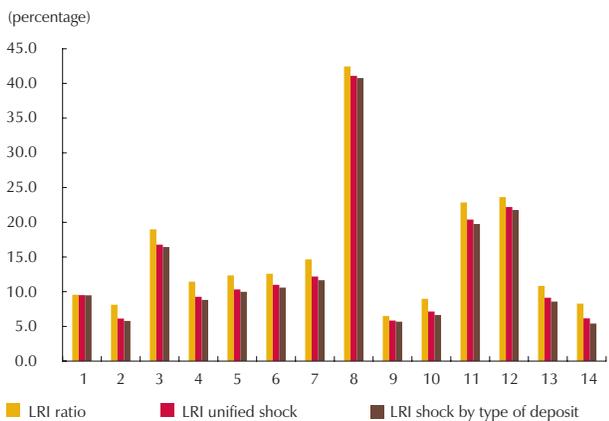
77 This classification includes the loans for the foreign, public and financial sectors.

Graph 127  
Stress Test for LRI7/(TA-LA)  
(based on the structure of the deposits)  
December 23, 2011

A. Banks with a Larger Share of Deposits Belonging to Households



B. Banks with a Larger Share of Deposits Belonging to Businesses



Source: Financial Superintendency of Colombia, Banco de la República calculations.

of deposits that belong to households are more resistant to the shock. Using the information that was available for the fourth week of December 2011, it is noteworthy that the institutions did not have liquidity problems even though the proposed shock was more severe for some.

2. Liquidity-adjusted Value at Risk (L-VaR): A Market Liquidity Risk Indicator<sup>78</sup>

L-VaR makes it possible to determine the percentage increase in the VaR estimates that would be required to include liquidity concerns. The larger this percentage is, the greater the market liquidity risk will be and, therefore, the greater the adjustment that will have to be applied to the VaR.<sup>79</sup> The results of the L-VaR estimated for commercial banks are presented in this section. The exercise was done only for their TES portfolio based on data as of February 24, 2011 (Table 27).

The results show that the VaR for credit institutions as a whole should increase by 4.7% to incorporate market liquidity risk. This figure shows a decrease in liquidity risk in comparison to what had been registered on August 26, 2011 (6.0%). The latter is the result of both a slight reduction in the average bid-ask spread (bas)<sup>80</sup> for the system and the lower volatility shown by the bands of debt securities with a higher share in the portfolio (short term) (Graph 128).

When the L-VaR is analyzed by entity, the banks are found to be less dispersed in comparison to what was seen in August 2011 when a lower variability in exposure to market liquidity risk on the part of these institutions was seen. It is noteworthy that the indicator improved for

78 The method for calculating the L-VaR is found in Gonzalez and Osorio (2007). "Liquidity Adjusted Value-at-Risk in Colombia," *Financial Stability Report*, Banco de la República, March 2007.

79 It should be noted that as a consequence of the information restrictions on the bid-ask spreads for public debt securities, the VaR calculated in this exercise differs from the one that is presented in the section on market risk since the securities in this exercise are grouped into eight bands depending on the number of years to maturity.

80 The bas is a measurement of the distance between the points registered for the bid - asked price of a security. A higher bas is associated with a higher liquidity risk since it indicates greater difficulty for a transaction to occur.

Table 27  
Market Liquidity Risk (L-VaR)  
Percentage of Correction

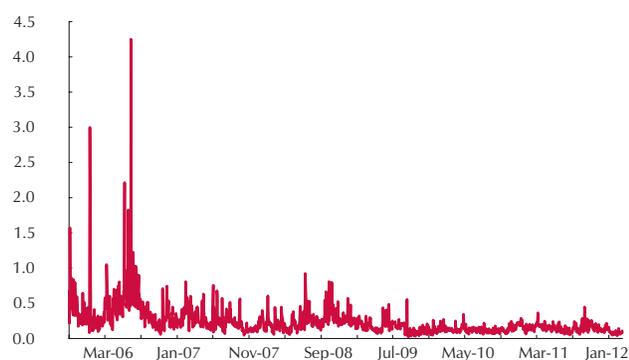
Institutions	August 26. 2011		February 24. 2012	
	L-VaR scenario excluding volatility	L-VaR scenario with volatility <sup>a/</sup>	No volatility	Volatility scenario <sup>a/</sup>
1	9.2	20.3	6.4	20.3
2	5.7	23.5	4.6	24.7
3	8.0	20.1	6.8	21.0
4	5.1	20.3	4.3	20.3
5	9.1	16.8	6.0	17.6
6	6.5	20.3	5.0	20.3
7	4.8	20.0	5.3	20.3
8	3.8	14.3	5.9	14.5
9	5.9	18.4	4.9	16.8
10	3.9	20.2	4.7	20.0
11	6.3	21.2	4.0	20.1
12	4.4	21.4	4.7	21.6
13	5.5	22.0	4.1	23.2
14	5.8	15.5	5.9	16.0
15	4.4	20.4	4.0	20.2
16	7.2	24.7	4.4	20.4
17	7.1	23.5	5.0	21.3
18	6.9	23.9	4.4	30.6
System	6.0	20.7	4.7	20.6

a/ Based on volatility in the second quarter of 2006.  
Source: Banco de la República calculations.

most institutions and only deteriorated in five cases. In general, a favorable situation in terms of exposure to this risk was found.

Graph 128  
Average Bid Ask Spread

(spread with respect to average price)



Source: Banco de la República.

Moreover, a stress test was done to evaluate the performance of liquidity adjustment in extremely illiquid market conditions. The scenario simulates a market performance similar to what was seen in the first quarter of 2006 when there were high levels in both the bas and the bas volatility for all of the bands (Graph 128). The results show a 20.6% rise in liquidity adjustment for the system as of February 24, 2012, a figure that is very similar to the one registered in August 2011. This shows that the current composition of the aggregate loan portfolio has not changed significantly with respect to adverse liquidity shocks (Table 27).

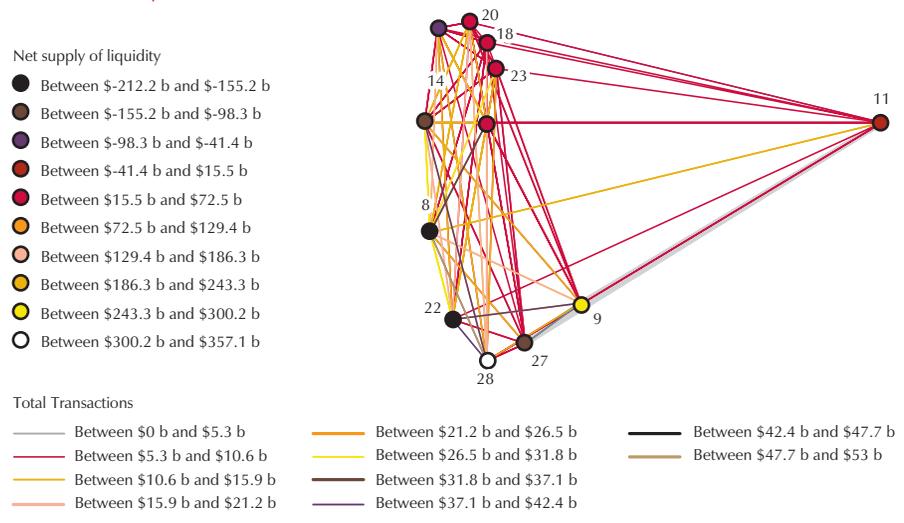
### 3. Interbank Market for Public Debt Securities: Network Structure

Currently, financial institutions manage a large part of their liquidity through government bond transactions, which can be negotiated through two trading systems. One is the Colombian Electronic Market (MEC in Spanish) run by the Colombian Stock Exchange (BVC in Spanish). The other is the Electronic Trading System (SEN in Spanish) which is managed by the Banco de la República.

In order to determine what the pattern of behavior of the financial institutions has been in the interbank markets for government debt securities (TES in Spanish), the networks consisting of institutions (nodes) and the transactions among them (links) are analyzed. In the SEN interbank market,<sup>81</sup> centrality indices,<sup>82</sup> which measure the importance of the agents in the market, are calculated and based on that, the networks are built for the dates analyzed.<sup>83</sup> Graph 129 shows the structure seen for SEN on the fourth Friday between January 13, and February 24, 2011 with only collateralized transactions between commercial banks being considered. The networks that are shown present an incomplete structure. Specifically, the network for February 24, 2011 shows many peripheral agents, which indicates that the agents who participated in the market that day closed their transactions with a limited number of agents. In contrast to what was seen

Graph 129  
SEN Structure

#### A. January 13, 2012



81 An analysis of the MEC is done in Box 9 of this issue of the *Financial Stability Report* titled, “Indicators for Network Structure of the Colombian Electronic Stock Market (MEC).”

82 For a broader definition of these indicators see Saade (2008). “Aproximación cuantitativa a la centralidad de los bancos en el mercado interbancario de juegos cooperativos,” *Financial Stability Issues*, # 037, Banco de la República.

83 Agents who are the most central are found in the center of the network that is built while those who are more peripheral are situated at the extreme ends. The peripheral participants are shown within a dark gray area, based on the centrality index. The color of each node is associated with the degree of the net supply of liquidity the agent delivered that day. The existence of a line between nodes indicates that there were operations between those agents. The color of the line indicates the sum of the transactions between agents as an absolute value.

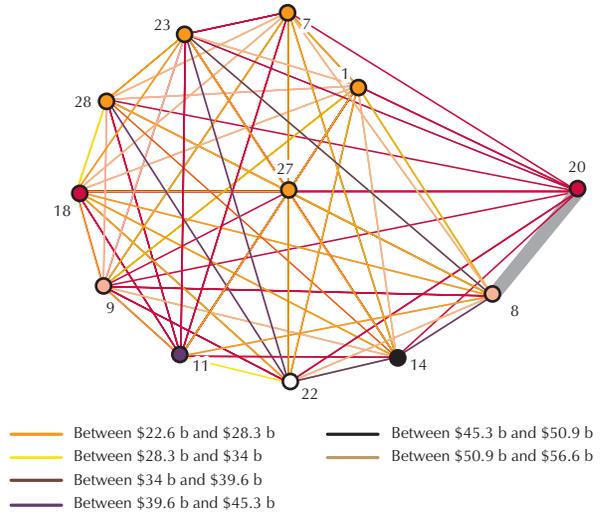
### B. January 27, 2012

Net supply of liquidity

- Between \$-420.6 b and \$-340 b
- Between \$-340 b and \$-259.5 b
- Between \$-259.5 b and \$-179 b
- Between \$-179 b and \$-98.4 b
- Between \$-98.4 b and \$-17.9 b
- Between \$-17.9 b and \$62.7 b
- Between \$62.7 b and \$143.2 b
- Between \$143.2 b and \$223.8 b
- Between \$223.8 b and \$304.3 b
- Between \$304.3 b and \$384.9 b

Total Transactions

- Between \$0 b and \$5.7 b
- Between \$5.7 b and \$11.3 b
- Between \$11.3 b and \$17 b
- Between \$17 b and \$22.6 b



- Between \$22.6 b and \$28.3 b
- Between \$28.3 b and \$34 b
- Between \$34 b and \$39.6 b
- Between \$39.6 b and \$45.3 b
- Between \$45.3 b and \$50.9 b
- Between \$50.9 b and \$56.6 b

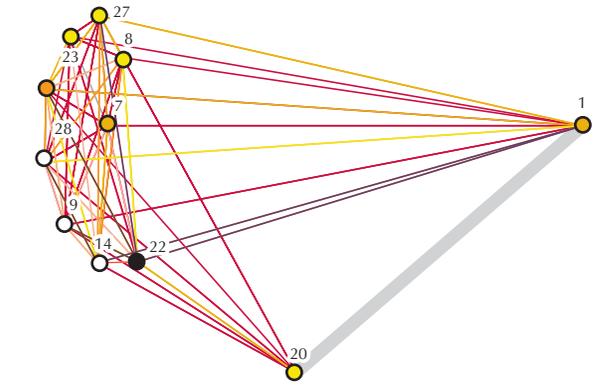
### C. February 10, 2012

Net supply of liquidity

- Between \$-450.8 b and \$-390.6 b
- Between \$-390.6 b and \$-330.3 b
- Between \$-330.3 b and \$-270.1 b
- Between \$-270.1 b and \$-209.8 b
- Between \$-209.8 b and \$-149.6 b
- Between \$-149.6 b and \$-89.3 b
- Between \$-89.3 b and \$-29 b
- Between \$-29 b and \$31.2 b
- Between \$31.2 b and \$91.5 b
- Between \$91.5 b and \$151.7 b

Total Transactions

- Between \$0 b and \$3.1 b
- Between \$3.1 b and \$6.1 b
- Between \$6.1 b and \$9.1 b
- Between \$9.1 b and \$12.2 b



- Between \$12.2 b and \$15.2 b
- Between \$15.2 b and \$18.3 b
- Between \$18.3 b and \$21.3 b
- Between \$21.3 b and \$24.4 b
- Between \$24.4 b and \$27.4 b
- Between \$27.4 b and \$30.5 b

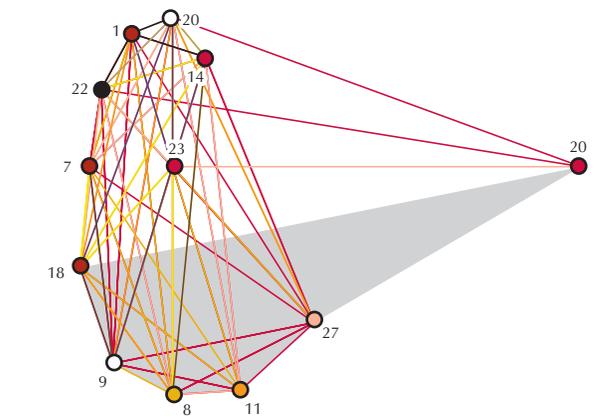
### D. February 24, 2012

Net supply of liquidity

- Between \$-450.8 b and \$-390.6 b
- Between \$-390.6 b and \$-330.3 b
- Between \$-330.3 b and \$-270.1 b
- Between \$-270.1 b and \$-209.8 b
- Between \$-209.8 b and \$-149.6 b
- Between \$-149.6 b and \$-89.3 b
- Between \$-89.3 b and \$-29 b
- Between \$-29 b and \$31.2 b
- Between \$31.2 b and \$91.5 b
- Between \$91.5 b and \$151.7 b

Total Transactions

- Between \$0 b and \$3.1 b
- Between \$3.1 b and \$6.1 b
- Between \$6.1 b and \$9.1 b
- Between \$9.1 b and \$12.2 b

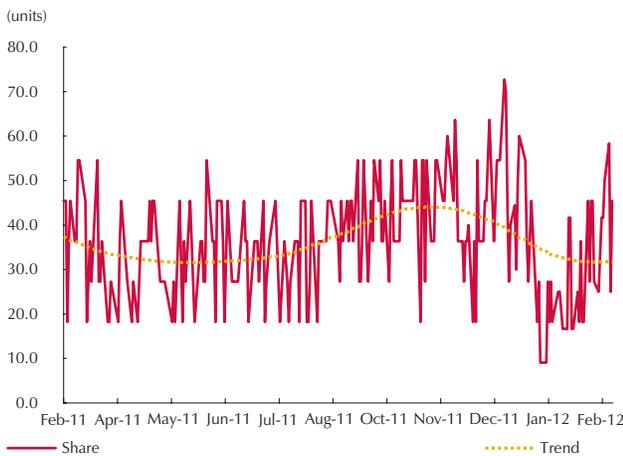


- Between \$12.2 b and \$15.2 b
- Between \$15.2 b and \$18.3 b
- Between \$18.3 b and \$21.3 b
- Between \$21.3 b and \$24.4 b
- Between \$24.4 b and \$27.4 b
- Between \$27.4 b and \$30.5 b

Source: Financial Superintendency of Colombia, Banco de la República calculations.

in the previous *Financial Stability Report*, not much persistence in the entities' net liquidity position nor in their centrality index was observed.

Graph 130  
Share of peripheral entities in the SEN



Source: Banco de la República.

Graph 130 shows the number of peripheral entities in SEN and their trends between February 21, 2011 and February 24, 2012 for the days on which the network was not complete. The trend shows a rise until the end of November 2011, which reflects a rise in the number of peripheral entities and suggests that there are fewer connections in the incomplete networks for that month. However, this trend was seen to reverse itself in the first few months of this year and came to levels similar to those seen in February 2011. This type of connectivity in the network indicates that the system has more resistance to liquidity shocks since the risk is spread out among all the agents.

#### D. COMBINED RISK ANALYSIS

In terms of financial stability, it is important to continuously monitor the different kinds of risks and the levels of profitability and soundness of the financial intermediaries as well as the macroeconomic conditions they face.

To do a combined analysis of the risks that the financial system is exposed to, the Financial Stability Map (FSM) is presented. The purpose of the map is to measure the stability of the system based on six aspects or dimensions. Three are related to current risk conditions. Two are related to the macroeconomic environment and one, to the soundness and profitability of the system. The method used ranks the risk situation on a scale of one to nine with one being a low level of risk. Note that the model is designed to provide an overall look at the current situation in the financial system and should not be interpreted as an early warning indicator.<sup>84</sup>

##### 1. Diagram Design

As was mentioned, the FSM considers six dimensions: the domestic macroeconomic environment, the foreign sector, profitability and capital adequacy, and credit, market and liquidity risks. For each one of these categories, representative variables were selected in order to evaluate the

84 The method used for the construction of the FSM is based on the Global Financial Stability Map of the IMF and on the Financial Stability Cobweb of the Central Bank of New Zealand.

levels of risk that each institution faces<sup>85</sup> pursuant to the method suggested by the IMF<sup>86</sup> and by Bedford and Bloor (2009).<sup>87</sup> The indicators considered for each of the dimensions are shown in Table 28.

Table 28  
FSM: Dimensions and Variables

Domestic Macroeconomic Environment	Exposure to Foreign Sector	Credit Risk	Liquidity Risk	Market Risk	Profitability and Capital Adequacy
Growth of the GDP	EMBI+ Colombia	Default indicator	Ratio of unhedged liabilities	Percentage of negotiable securities	Capital adequacy
Inflation	Exports/Imports	Growth of non-performing loan portfolio	Liquid liabilities/ liquid assets	VaR	ROE
Unemployment	Current account		Deposits/gross loan portfolio		Ex-post intermediation spread
Fiscal deficit	Foreign direct investment		Interbanking funds/ liquid assets		Leverage

Source: Banco de la República.

The model was built with a quarterly basis for the dimensions related to the macroeconomic environment and monthly for the dimensions related to the financial system.<sup>88</sup> For each one of the indicators, the longest available time series was used. Therefore, there are some variables which have a smaller dimension.

The comparative results of the FSM are presented in Graph 131. The brown line represents the median and is considered a normal level of risk. Note that the graph should be read cautiously since the description of the risks does not imply the analysis of a measurement of systemic risk nor does it take into account the relationships between the different risks.

In December 2011, the domestic macroeconomic environment showed a level of vulnerability similar to what had been seen a year earlier. Over the course of 2011, the Colombian economy showed a drop in the unemployment rate and higher growth in output. Nevertheless, during this period a higher inflation rate was also registered which contributed to keeping the vulnerability indicator stable. The foreign sector, in turn, demonstrated conditions that were better

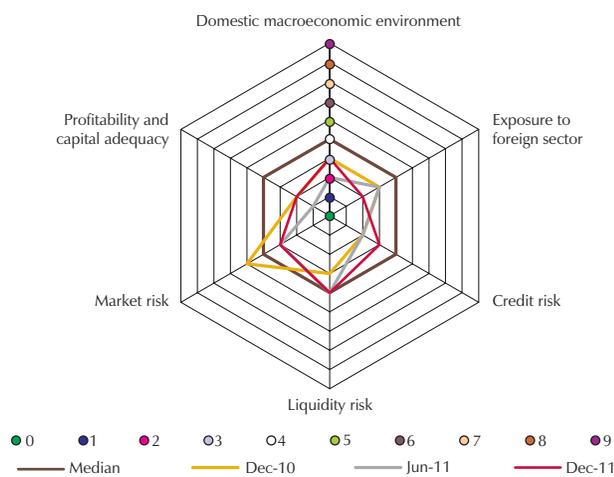
85 In the selection of variables, the indicators that showed an unchanging performance with respect to the risk that needed to be analyzed in each dimension were taken into account. However, in some cases it is difficult to find indicators that have that characteristic.

86 International Monetary Fund (IMF) (2008), Global Financial Stability Report, October.

87 Bedford and Bloor (2009). "A Cobweb Model of Financial Stability in New Zealand," Discussion Paper Series, # DP2009/11, Reserve Bank of New Zealand, November.

88 The difference in frequency for each dimension does not create difficulties since each one of them was constructed independently of each other.

Graph 131  
Financial Stability Map



Sources: Financial Superintendency of Colombia, DANE, and Bloomberg; Banco de la República calculations.

than what had been seen a year earlier as a result of a better flow of foreign direct investment. This translates into a reduction in the vulnerability of this sector.

With respect to the risks in the system, the deterioration shown in credit risk as a consequence of more growth in the non-performing loan portfolio should be noted. Thus, the indicator moved away from one its lowest values and towards a more normal level or risk. The liquidity risk, in turn, remained at a normal level since there have been no major changes with respect to the components of the liquid assets and liabilities. Regarding market risk, there were no major changes and vulnerability to this risk remains below the medium.

In the case of the profitability and capital adequacy of the financial system, an upswing in their vulnerability was seen in the second half of 2011. This was the result of a decline in the intermediation spread and in the profitability of the equity along with a slight deterioration in the capital adequacy indicator.

In conclusion, in the second half of 2011, the financial stability map showed normal levels in the risk and macroeconomic conditions. In general, we see that the indicators analyzed for each sector have not surpassed the normal risk level. Nevertheless, it is important to continue monitoring in order to identify vulnerabilities that could put the stability of the system at risk.

## Box 6

### RESULTS FOR THE SINGLE FINANCIAL INDICATOR (SFI) AS OF DECEMBER 2011

The single financial indicator (SFI) is an accounting and financial model that hierarchically evaluates and organizes the performance of credit establishments by using a single financial indicator.<sup>1</sup> Through the continuous monitoring of the financial intermediaries by means of the SFI, this mechanism becomes an early warning system.

The SFI classifies the credit institutions' management into four zones: I (with an SFI between 1.5 and 2.0) and II (an SFI between 1.0 and 1.49) include the best rated entities because their levels of profitability have remained *outstanding* and *acceptable* respectively. Their core indicators are consistent with a sound financial position in their respective zones. Zone III (an SFI between 0.5 and 0.99) is considered risky because it includes those entities with core indicators that reveal financial weakness even though they have a slightly positive real profitability. Finally, zone IV (an SFI between 0.0 and 0.49) is considered a deterioration zone because it encompasses those financial intermediaries with poor core indicators and whose to negative real profitability has just started to weaken their equity. In this last case, the institutions are unsustainable in the medium term unless they are financially supported by their shareholders or by an external entity (Table B6.1)

#### 1. Changes in the Financial Situation by Groups of Financial Intermediaries<sup>2</sup>

Graph B6.1 shows the changes in the financial situation for each group of credit institutions. In the second half of 2011, the indicator for banks, CFC and financial cooperatives showed a downward trend. This performance is due to the deterioration in some of the financial indicators used to build the SFI and which differ based on the entities themselves. However, the banks were able to improve their ratings significantly between November and December 2011 and went from 1.15 to 1.34.

1 For further information about the model see Pineda, F. and Piñeros, H. (2009), "El IFU como mecanismo de alerta temprana: una nueva versión," in Financial Stability Issues, Financial Stability Report, March.

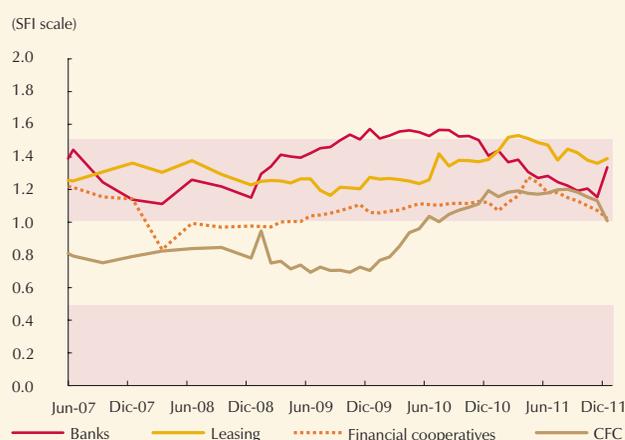
2 It includes banks (both commercial and those specialized in mortgage loans, BECH), the financing companies (CFC), those that specialize in leasing, and the financial cooperatives. The financial corporations were not considered because they do not do lending; rather, they specialize in investment banking.

Table B6.1  
Classification by Zones

Zone	SFI value	State
I	1.50 – 2.00	Outstanding
II	1.00 – 1.49	Acceptable
III	0.50 – 0.99	Risky
IV	0.00 – 0.49	Deterioration

Source: Banco de la República.

Graph B6.1  
Financial Entities (SFI changes, 2007-2011)



Source: Financial Superintendency of Colombia, Banco de la República calculations.

The leasing companies<sup>3</sup> registered the most volatile performance among the four groups of financial intermediaries over the course of that semester. It is noteworthy that, as of December 2011, the leasing companies experienced a reduction in their indicator as a result of a drop in both their levels of capital adequacy and return on equity. Nonetheless, this has been the group with the best ratings since February 2011.

An analysis of the changes in the case of the banks shows that their financial situation measured by the SFI indicator went from 1.28 to 1.34 between June and December 2011. However, up to November 2011, the performance of these entities had been falling due to deterioration in the indicators for return on equity (ROE) and exposure of assets. In the first case, the deterioration was the result of more growth in equity compared to that in profits. The second was mainly caused by growth of the risky loan portfolio.

3 Only those entities which were active at the time the analysis was done were included to calculate the SFI for the sector.

The CFC maintained a relatively stable trend between June and November 2011 and remained within zone II with an indicator of around 1.17. Nevertheless, the CFC's financial situation went through a substantial deterioration in December which placed them on the boundary between the acceptable and the risky zones. Likewise, the financial cooperatives have remained close to the warning zone and their indicator has gone from 1.18 to 1.02 during the period under analysis.

In addition, the leasing companies registered a drop in the SFI as they went from 1.47 in June 2011 to 1.39 six months later. However, between November and December of that year, their financial performance improved and approached

the outstanding zone. These results were mainly due to an increase in the ROE.

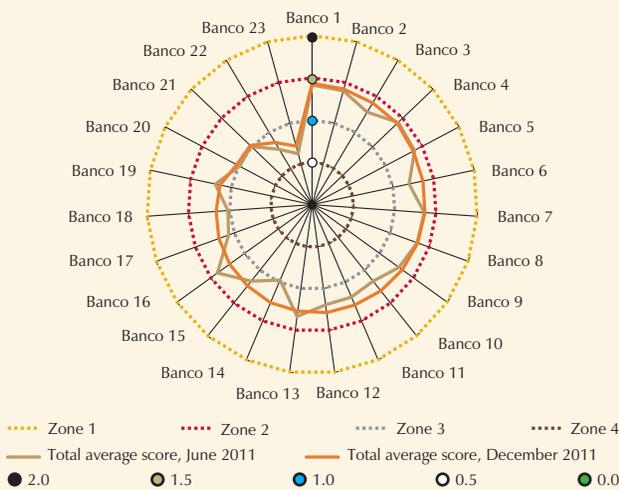
## 2. Financial Situation for Entities at the Individual Basis

Graph B6.2 (panels A, B, C and D) shows the hierarchical organization by group for each one of the financial entities based on the results of intermediation management evaluated by the SFI. As of December 2011, no financial entity was found to be in the deterioration zone (zone IV).

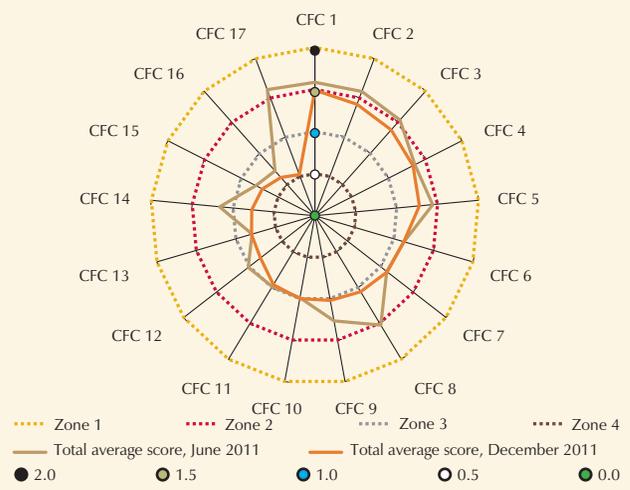
When analyzing the results by entity, the SFI experienced improvements which are equal to 78.3% of the total for the

Graph B6.2  
Classification as of December 2010 and June 2011

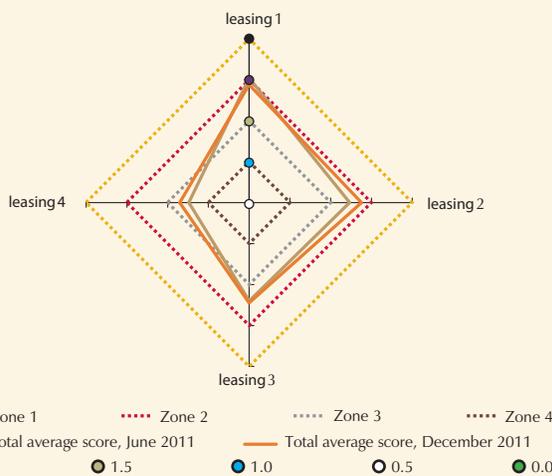
### A. Sistema bancario



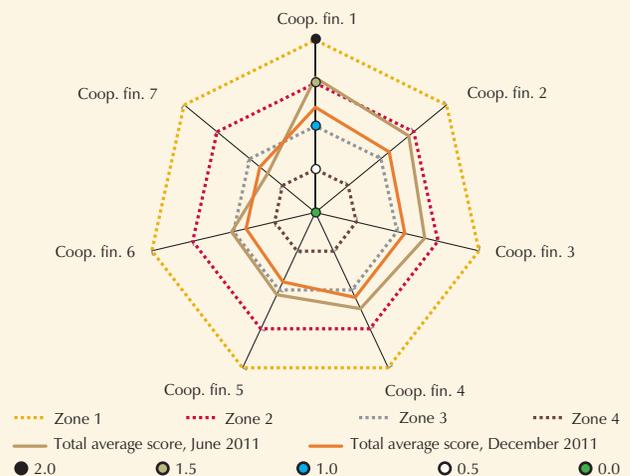
### B. CFC



### C. Leasing



### D. Cooperativas financieras



Source: Financial Superintendency of Colombia, Banco de la República calculations.

banking system. It is noteworthy that banks 4, 5, 13, 16 and 19 were the only ones that did not record any rise in their indicators. Nevertheless, their ratings dropped slightly. In addition, banks 22 and 23<sup>4</sup> are the only ones placed within the risky zone while the rest of banks are in the acceptable zone.

In the case of the CFC, we see that fourteen out of the seventeen entities that were analyzed saw their financial situation worsen over the second half of 2011.

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4 Banks 22 and 23 have been recording the lowest SFI scores since they entered the market (December 2006 and June 2008 respectively). Although those entities have been part of the financial system for over a year, their indicator of return on equity (ROE) is very low when compared with that for the other banks. Because of the way the SFI was built, the low ROE levels have caused the standardized version of the other components to also be very low.

Furthermore, 57.1% of the CFC's with ratings that had worsened are in the risky zone. This fact contributed to the deterioration of the aggregate performance for the CFC's which registered an indicator of 1.00 as of December 2011. It is noteworthy that the downward trend in the SFI that this group of entities experienced was mainly due to the fact that their return on equity indicator fell. This was a consequence of the continuous reduction in their interest income over the course of the period.

Finally, three leasing companies were in the acceptable zone and only one in the risky zone. Furthermore, the indicator for companies 2, 3 and 4 registered improvements (Graph B7.2, panel C). In contrast, the financial cooperatives showed a gradual deterioration over the course of the second half of 2011 when four of them went into the acceptable zone and three into the risky zone (Graph B7.2, panel D). This fact was due to a decline in the total loan portfolio those entities had which has also generated a decline in their indicators of risk and profitability.

## Box 7 FINANCIAL STABILITY INDEX FOR COLOMBIA

This box shows the update of the financial stability index for Colombia (FSI), a continuing and quantifiable measurement that can determine the stress level of the Colombian financial system over time.<sup>1</sup> This indicator, which is calculated monthly, includes the considerations that were developed in Aspachs *et al* (2006) with respect to profitability and the probability of default.<sup>2</sup>

For the construction of the indicator, a combination of ratios of capital, profitability, credit risk and liquidity risk for the different financial intermediaries was used. The variables chosen for the index are: return on assets (ROA), return on equity (ROE), ratio of overdue loan portfolio to total loan portfolio (OP), ratio of non-performing loan portfolio to total loan portfolio (NP), intermediation spread (IS), ratio of liquid liabilities to liquid assets (LL) ratio of inter-bank funds to liquid assets (IF) and the uncovered liabilities ratio (ULR).

These variables are weighted by means of different methods suggested by the international literature such as variance equality,<sup>3</sup> principal component analysis,<sup>4</sup> and models for counting methods: *zero inflated poisson regressions* and *zero-inflated binomial negative regression*.<sup>5</sup> As is seen in Table B7.1, the methodologies used result in a higher weight for the variables associated with profitability and credit risk. As will be shown, the indices that were built based on the different weights have a similar performance.

1 For further information, see D. Estrada and M. Morales (2009), "Índice de estabilidad financiera para Colombia," Financial Stability Issues of the Banco de la República, *Financial Stability Report*.

2 O. Aspachs, C.A.E. Goodhart, M. Segoviano, D.P. Tsomocos, L. Zicchino, (2006) "Searching for a Metric for Financial Stability," Special Paper Series, # 167, *LSE Financial Markets Group*.

3 Better known as variance equal approach (VEA). In this technique, the variables are standardized in order to express them in the same unit and then aggregate them by using identical weights.

4 The main idea behind the methodology of principal component analysis (PCA) is to build an index based on the weight of the selected variables such that the combination would fully explain the combined variance of the variables.

5 The approach of counting method models, specifically, the methodology of *zero-inflated binomial negative* (ZINB), uses econometric estimates to model the relationship between the variables that indicate stress and the dependent variable. In this case, it is defined as the number of stressed banks per period. The estimated coefficients are the basis for calculating the weights.

Table B7.1  
Weights of Variables in the Index of the System by Methodology

	VEA	PC	ZINB
ROA	12,5	15,76	7,65
ROE	12,5	15,89	11,75
OP	12,5	13,52	15,69
NP	12,5	15,38	6,17
IS	12,5	12,51	23,03
LL	12,5	9,47	11,95
IF	12,5	8,64	12,03
ULR	12,5	8,8	11,73

Source: Banco de la República calculations.

The information generated by the FSI allows for a simple interpretation given that each variable included in its construction has been standardized. Thus, the stress level of the current period can be compared to the historical one in terms of deviations from the mean. The index values that are above zero indicate situations of greater than average financial stress while the negative values indicate periods of greater stability. Likewise, growth of the index within a specific period of time can also provide useful information about changes in the stress level over time.

Given the availability of data, the index can be constructed for each type of entity including commercial banks (CB), financing companies (CFC) and financial cooperatives (COOP) as well as for the financial system in general.

Graph B7.1 shows the financial stability index between December 1991 and the same month in 2011. For the purposes of this report, a special emphasis is given to the levels of the index registered over the last six months when the degree of financial stress measured by the index has increased even though it remains below the historic average. This fact suggests that the levels of stress in the system are still low.

Graph B7.2 shows the indicator calculated for the different types of entities analyzed.<sup>6</sup> The performance is mixed when the entities are compared by type. In the case of CB, the level of financial stress has remained stable over the last six months. The indicator of financial stress for

6 The methodologies used are variance equal approach and principal component analysis. The models for counting methods are not used in this case.

the CFC's, in turn, has increased slightly in the last half year and has shown less favorable conditions compared to what took place in the middle of 2011. Among other reasons, this change has been associated with slight deterioration of the variables that measure the liquidity of these entities. Finally, this indicator has declined in the case of cooperatives and shows a lower level of financial stress in comparison to the figure for in June 2011. Note

that for all of the types of entities, the stress level has been lower than the historical average.

As has been seen, the index can determine the level of current stress in the system both globally and broken down into parts by entity. This makes it possible to generate a diagnosis of financial stability in Colombia. The results of the update indicate that the degree of stress in the system remains stable.

**Graph B7.1**  
Financial Stability Index



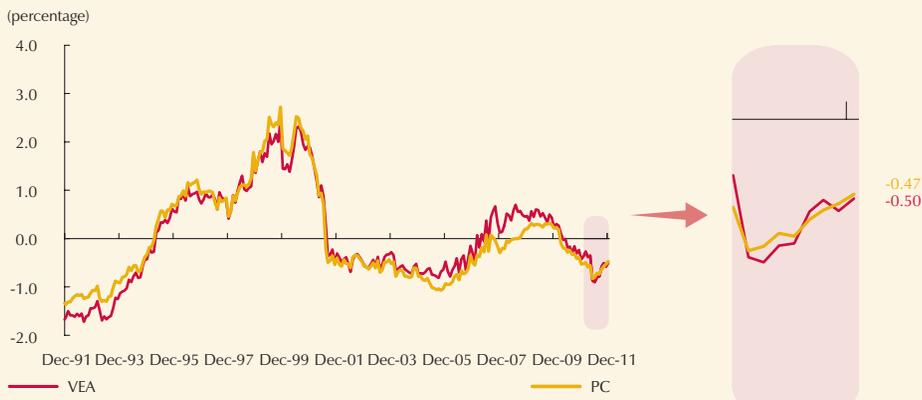
Sources: Financial Superintendency of Colombia, Banco de la República calculations.

Graph B7.2  
Index of Financial Stress by Type of Entity

A. Commercial banks



B. Commercial Financing Companies



C. Cooperatives



Sources: Financial Superintendency of Colombia, Banco de la República calculations.

## Box 8

### EFFECTS OF THE DEVALUATION OF THE NOMINAL EXCHANGE RATE ON THE PRODUCTIVE AND FINANCIAL SECTORS

the companies with a high level of indebtedness denominated in foreign currency<sup>1</sup> are more vulnerable to sudden devaluations in the pesos-per-dollar exchange rate. An unexpected increase in the nominal exchange rate causes a rise in the value of their liabilities denominated in foreign currency when these are expressed in legal tender. This situation brings about a currency mismatch when the debt is not hedged, for instance, with forward contracts in dollars or income in dollars. In this case, the expenditures could be higher than the income. Thus, in the event of a devaluation shock, the companies that are exposed to depreciation in the nominal exchange rate could become a risk for the financial system.

The productive sector that is exposed to devaluation in the market exchange rate (MER) consists of the following groups:

- i. *Net importers*: companies whose total value of imports is higher than their total value of exports ( $M > X$ ).
- ii. *Net exporters with debt denominated in foreign currency (F/C)*: companies whose total value of exports is higher than their total value of imports ( $M < X$ ) but who have debt denominated in foreign currency with credit establishments.
- iii. *Debtors in F/C without commercial activity*: companies that have debt denominated in foreign currency with credit institutions and that have no commercial activity abroad.

Thus, since the MER registered a 1.5% annualized depreciation in 2011 and no devaluation has taken place since 2008, the purpose of this box is to determine whether or not a devaluation shock has a negative effect on the financial situation of the productive sector exposed to it and also if that devaluation increases the exposure of the financial system to the productive sector. The analysis is divided into four sections. In the first the variations in the exchange rate for the 2000-2011 period are described in order to identify the years in which devaluation peaks occurred. In the second section, the financial situation of the companies exposed to devaluation in the years identified is analyzed based on information provided by the Superintendency of Corporate Affairs. In the third section, stress exercises were carried out to evaluate the effects that a high depreciation of the MER has on the financial indicators of the companies and the stability of the financial entities. Finally, the expected loss for the credit institutions as of December 2011 was estimated

1 The exercises and analysis considered in this box assume that the total debt in foreign currency that a company has is denominated in dollars.

based on the probability of default registered in those years with high devaluation.

#### 1. What is a sharp devaluation?

The analysis of the changes in the MER between 2000 and 2011<sup>2</sup> makes it possible to identify and analyze the years in which a significantly high devaluation of the MER took place. Table B8.1 presents the devaluation recorded for each one of the years in this period, which is calculated as the annualized arithmetic mean of the monthly variations in the exchange rate.<sup>3</sup> In addition, the annualized standard deviation<sup>4</sup> for those variations is presented as a measurement of volatility and the coefficient of variation as a measurement of dispersion.<sup>5</sup>

The highest levels of depreciation in the nominal exchange rate were 22.3%, 17.4% and 10.8% for the years 2002, 2000 and 2008 respectively. However, it should be noted that the

2 The selection of the period for the analysis was due to the fact that, on September 25, 1999, the system of an exchange rate band was eliminated and a free floating system for the nominal exchange rate has been in force ever since.

3 For each one of the years in the 2000-2011 period, the monthly variation in the nominal exchange rate registered for that month in comparison to that registered in the immediately preceding month,  $t-1$ ,  $[r_t]$ , is defined as the logarithmic return of MER $_t$  and MER $_{t-1}$ , i. e.,

$$r_t = \text{variación mensual} = \ln\left(\frac{TRM_t}{TRM_{t-1}}\right), t = 1, 2, \dots, 12$$

where MER $_0$  denotes the value recorded for the nominal exchange rate in December of the year prior to the one under analysis. The arithmetic mean of these variations is defined as,

$$\bar{r} = \frac{1}{12} \sum_{t=1}^{12} r_t$$

Finally, the annualized average devaluation,  $[\bar{r}_a]$ , corresponds to the arithmetic mean multiplied by 12, i. e.,  $\bar{r}_a = 12 \times \bar{r} = \sum_{t=1}^{12} r_t$ .

4 The annualized standard deviation of the monthly changes in the MER  $\sigma(r_1, r_2, \dots, r_{12})$  is defined as follows:

$$\sigma(r_1, r_2, \dots, r_{12}) = \sqrt{12} \times \sqrt{\frac{1}{11} \sum_{t=1}^{12} [r_t - \bar{r}]^2}$$

To learn more about the methodology for the calculation of returns and volatility expressed as annual rates, please consult Benninga (2000).

5 The coefficient of variation, CV, for each one of the years in the analysis corresponds to,  $CV = \frac{\sigma(r_1, r_2, \dots, r_{12})}{|\bar{r}|}$

This statistical indicator is a dimensionless measure that makes it possible to quantify dispersion or variability in a sample of data.

**Table B8.1**  
Annualized Devaluation and Dispersion Statistics for the Nominal Exchange Rate

Year	Annualized devaluation	Standard deviation (percentage)	Coefficient of variation
2000	17.4	7.6	43.9
2001	2.7	3.8	139.6
2002	<b>22.3</b>	10.7	48.0
2003	(3.1)	5.9	193.5
2004	(15.1)	7.1	47.1
2005	(4.5)	3.6	79.0
2006	(2.0)	13.2	657.2
2007	(10.5)	16.6	157.7
2008	<b>10.8</b>	22.5	<b>209.0</b>
2009	(9.3)	19.1	204.9
2010	(6.6)	8.5	129.8
2011	1.5	12.9	<b>864.1</b>

Sources: Banco de la República, Banco de la República calculations.

coefficient of variation registered the highest level in 2008, which means that there were significant fluctuations in the MER performance during that year. For companies in the productive sector exposed to MER devaluation, this substantial volatility in the exchange rate translates into higher uncertainty with respect to both net income and cash inflow.

Furthermore, in 2011 the variations in the nominal exchange rate had the highest coefficient of variation for the period analyzed (864%). However, a 1.5% annual devaluation was registered this same year. This is a relatively low figure compared with those for periods with devaluation peaks. Therefore, in order to study the impact of a high MER devaluation on the financial situation of the companies that are exposed as well as on the stability of credit institutions, those periods in which there was a high MER devaluation and high volatility in the exchange rate simultaneously were analyzed: 2002 and 2008.

## 2. Financial analysis of the exposed groups

To evaluate the impact of high depreciation in the MER on the financial situation of the productive sector exposed to it, a financial analysis of the companies was carried out based on the study of the indicators for performance and traditional indebtedness.<sup>6</sup> Table B8.2 compares the financial

<sup>6</sup> The indicators analyzed are: return on assets (earnings before taxes/total assets), current liquidity (current assets/current liabilities), net indebtedness (total liabilities/total assets).

situation of the exposed companies and of the total sample<sup>7</sup> during periods with high devaluation (2002 and 2008) in relation to that recorded the year prior to it (2001 and 2007 respectively).

In short, the financial analysis shows the following outcome in the cases of periods with serious devaluation:

- The liquidity indicator was the most sensitive and declined for all the groups exposed.
- The net indebtedness registered a slight upswing with the exception of the results for debtors in F/C as of December 2002. For this group, the indicator dropped 16 pp with respect to the figure recorded a year earlier. This reduction was due to a 0.84% annual nominal growth rate for the total liabilities between 2001 and 2002 while the annual nominal growth rate for the total assets was higher at 17.6%.
- The return on assets dropped for every group excluding that of debtors in F/C.<sup>8</sup>

In general, it can be said that a sharp devaluation has a negative effect on the companies by weakening their financial soundness. The groups exposed are less profitable, less liquid and more indebted than the total sample. In the case of the latter, a period of critical devaluation means a reduction in the liquidity and an increase in the indebtedness of the firms, which correlates with the results found for the groups exposed to devaluation. Nevertheless, the sample from the Superintendency of Corporate Affairs did not show a deterioration in the indicator of profitability during a period of sharp devaluation and, therefore, in this regard, it has a better performance in comparison with the outcome for the firms exposed.

<sup>7</sup> This corresponds to the homogeneous sample of companies that reported their financial statements to the Superintendency of Corporate Affairs. In other words, it is the cross-reference of information in the databases of the companies that reported their accounting information in i) 2001 and 2002 (panel A) and ii) 2007 and 2008 (panel B).

<sup>8</sup> Regarding this conclusion, it should be noted that:  
- Between 2001 and 2002, the rise in the ROA indicator took place as a result of a significant growth in earnings before taxes. In 2001, the return was negative (\$-33 b) while in 2002, it was positive (\$184 b). This change (\$217 b) was due to the 31% reduction in financial expenditures that the debtors in F/C made between 2001 and 2002.  
- In addition, when the results of the ROA indicator for 2007 and 2008 are analyzed, we can see that the annual nominal growth for earnings before taxes (42%) was above what was registered for total assets (-5.5%). The substantial increase in profits is explained, in part, by a high nominal annual growth of the non-operating income, which was 56%.

**Table B8.2**  
Financial Situation of the Exposed Groups and the Sample from the Superintendency of Corporate Affairs

Groups/indicators	A. Aggregate financial indicators for 2001 and 2002									Number of companies
	ROA		Current ratio (percentage)			Net indebtedness				
	2001	2002	2001	2002	2001	2002				
Net importers	2.0	2.0	122.9	122.6	49.3	50.2			2.795	
Exporters with debt in F/C	6.0	4.6	146.1	141.9	41.6	41.8			330	
Debtors in F/C <sup>a/</sup>	(1.0)	4.5	120.3	107.2	111.7	95.8			111	
Total groups exposed	2.7	2.5	126.4	125.3	49.3	49.7			3.236	
Superintendency of Corporate Affairs	1.4	2.3	128.5	127.2	40.8	41.2			9.420	

Grupos/indicadores	B. Aggregate financial indicators for 2007 and 2008									Number of companies
	ROA		Current ratio (percentage)			Net indebtedness				
	2007	2008	2007	2008	2007	2008				
Net importers	8.2	7.3	134.9	132.6	46.4	47.1			5.439	
Exporters with debt in F/C	4.8	4.8	134.6	128.4	42.0	45.7			687	
Debtors in F/C <sup>a/</sup>	3.0	4.5	136.6	128.5	23.1	26.8			884	
Total groups exposed	7.0	6.6	135.0	131.7	43.0	45.0			7.010	
Superintendency of Corporate Affairs	7.0	7.0	138.4	135.2	36.2	38.0			19.807	

<sup>a/</sup> Companies that do not have commercial links abroad.  
Sources: Superintendency of Corporate Affairs, Banco de la República calculations.

### 3. Stress exercises

#### a. Effect on the financial situation of the groups exposed

When the MER registered on January 31, 2009 was compared to the figure for May 31, 2008, the devaluation was 38.8%.<sup>9</sup> In order to analyze the impact of a sudden devaluation on the financial indicators of the groups that are exposed, this variation (increase in the pesos-per-dollar exchange rate) is linearly applied to the accounts for non-operating expenses as well as to the short and long term liabilities denominated in foreign currency.<sup>10</sup>

<sup>9</sup> Corresponds to the discrete variation.

<sup>10</sup> Due to the availability of data supplied by the Superintendency of Corporate Affairs, the stress exercise was done using the most recent accounting information, i.e., what was published on December 31, 2010.

Based on its construction, this devaluation shock is expected to generate a reduction in earnings before taxes and an increase in the companies' total liabilities.

Table B8.3 presents a contrast between the financial situation of the groups exposed as of December 2010 and that calculated once the devaluation shock is applied (2010C). As was expected, the indicators show that a strong devaluation shock weakens the financial situation of the companies. For all groups, the three indicators examined show a worse performance. In particular, the indicators of profitability and liquidity are the ones that are the most affected while indebtedness shows a slight increase. It is noteworthy that the group of debtors in F/C is the least affected by the shock because its financial indicators had a less negative variation in comparison to that registered for the rest of the groups. The most vulnerable group is that for the importers.

Table B8.3  
Results of the Devaluation Shock (Aggregate Financial Indicators)

Groups/indicators	ROA		Current ratio (percentage)		Total indebtedness		Number of companies
	2010	2010C	2010	2010C	2010	2010C	
Net importers	6,4	↓ 3,3	128,6	↓ 123,6	49,0	↑ 51,1	6.708
Exporters with debt in F/C	4,7	↓ 2,6	129,4	↓ 125,0	38,7	↑ 40,5	589
Debtors in F/C <sup>a/</sup>	4,0	↓ 3,1	135,7	↓ 130,9	26,1	↑ 27,2	1.182
Total groups exposed	5,9	↓ 3,1	129,1	↓ 124,2	44,6	↑ 46,6	8.479
Superintendency of Corporate Affairs	5,5		131,9		36,8		23.817

a/ Companies that do not have commercial links abroad.

Sources: Superintendency of Corporate Affairs, Banco de la República calculations..

Finally, the set of companies with a weak financial situation after the shock is identified and examined. A weak company is defined as one that simultaneously complies with the following conditions: i) they are not profitable ( $ROA = 0$ ), ii) they are not liquid ( $current\ liquidity < 1$ ) and iii) they have an indicator of indebtedness above 54.1%.<sup>11</sup> In total, the shock results in 513 companies with a weak financial situation, which account for 4.1% of the commercial loan portfolio registered in the fourth quarter of 2011. The average amount per debtor comes to \$10.6 m.

When the makeup of those weak companies is analyzed by sector and by economic group, the outcome shows that most of them belong to the sectors of commerce and industry (Graph B8.1, panel A). Likewise, more than 70% are importers (Graph B8.1, panel B) which was expected because this group represents 79% of the sample examined (8,479 firms). Finally, 46 companies that were financially sound as of December 2010 and then became weak after the shock were identified. Thus, the number of companies with sound financial indicators and that can be affected by a high devaluation in the nominal exchange rate is not representative.

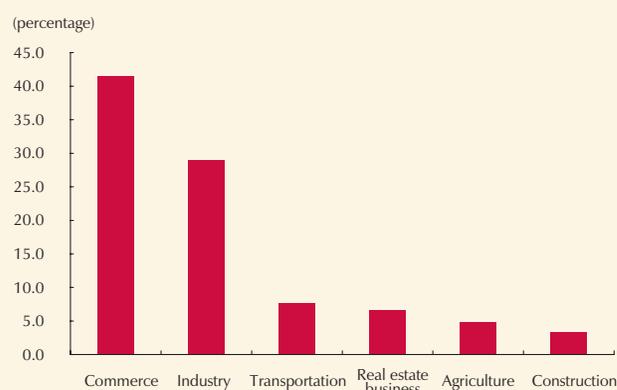
#### b. Effects on credit institutions

In this section, the losses expected for credit institutions are calculated when an exchange rate devaluation shock is applied. For the scenario evaluated, it is assumed that an

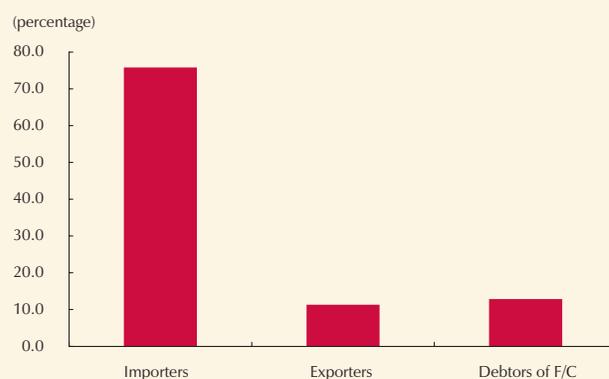
11 This figure corresponds to the median of the aggregate indicator of total indebtedness for every group exposed.

Graph B8.1  
Features of Weak Companies that Result from a Devaluation in the MER Shock

#### A. Composition by Sector



#### B. Composition by economic group



Sources: Superintendency of Corporate Affairs, Banco de la República calculations.

increase in the exchange rate affects the companies' ability to pay and, as a consequence, the expected loss for the credit institutions. Given that not every company is exposed to devaluation, the distinction in the previous section where a company is considered exposed if it is a net importer, a net exporter with debt in F/C, or if it is a debtor in F/C without commercial links abroad still applies.

Graph B8.2, panel A, shows the percentage of the commercial loan portfolio that has been held by the abovementioned companies. As can be seen, they held around 50% of the total of the commercial loan portfolio during the entire period under analysis. Notice that in the last two years, this share grew 9.8 pp as it went from 47.8% in December 2009 to 57.6% in the same month of 2011. Consequently, as of December 2011, the group that accumulated most of the debt was the one made up of net importers (40.1%) followed by exporters with debt in F/C (9.1%) and finally, debtors in F/C (8.4%).

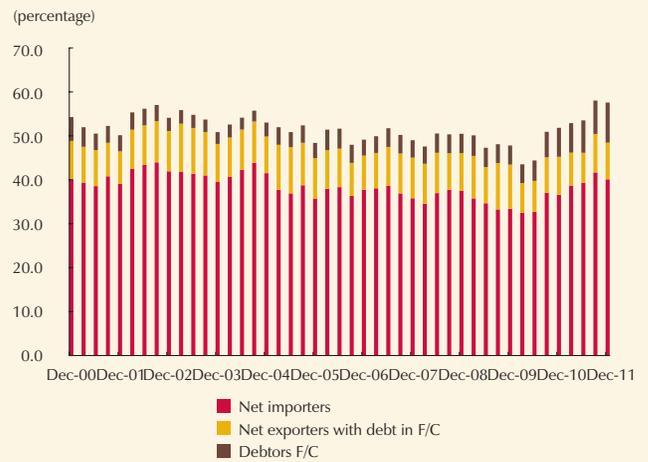
Graph B8.2, panel B, presents the changes in the quality indicator (QI) for these companies. As of December 2011, the indicator fell below the QI for the total loan portfolio: 4.6% vs. 6.7%. Note that even though the exposure of these companies has grown in the two most recent years, this has taken place in the presence of declines in the QI. In particular, the QI fell between December 2010 and the same month in 2011: 70 bp for net importers and 44 bp for exporters with debt in F/C, but it remained stable for debtors in F/C. As a result, the indicator was 4.7% for importers, 4.6% for exporters with debt in F/C, and 4.1% for debtors in F/C at the end of 2011.

Given the high exposure of credit institutions to those companies, it is important to calculate the possible losses they would experience if a devaluation shock raised the probability of default for those firms. The exercise that follows seeks to calculate the expected loss as percentage of the balance in the loan portfolio for different devaluation scenarios.

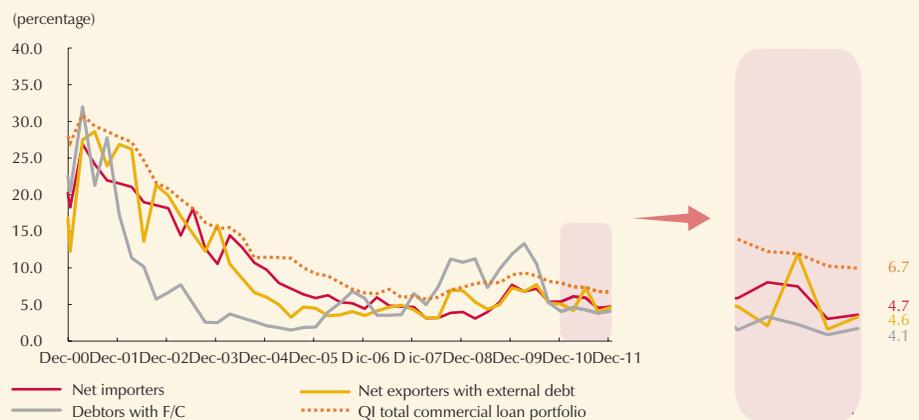
As was indicated by Table B8.1, the years with the highest devaluation and volatility in the exchange rate were 2002 and 2008. Therefore, the probability of default that will be

Graph B8.2

A. Components of the Commercial Loan Portfolio by Sector Exposed



B. Indicator of Quality by Sector Exposed



Sources: Financial Superintendency of Colombia, Banco de la República calculations.

used in the shocks will correspond to the shocks seen during those years.

Thus, the expected loss is defined as follows:

$$PE = \sum_{i=1}^4 \theta_i \times PDI_i,$$

Where  $\theta_i$  is the probability of default for the group  $i$ , and  $LDD_i$  is their loss due to the default.

Four groups were defined to calculate the loss expected for the entire loan portfolio. The first three correspond to the groups exposed to devaluation and the last one is made up of the companies that are not directly affected by one. The estimate of parameter [  $i$  ] is made by following the guidelines

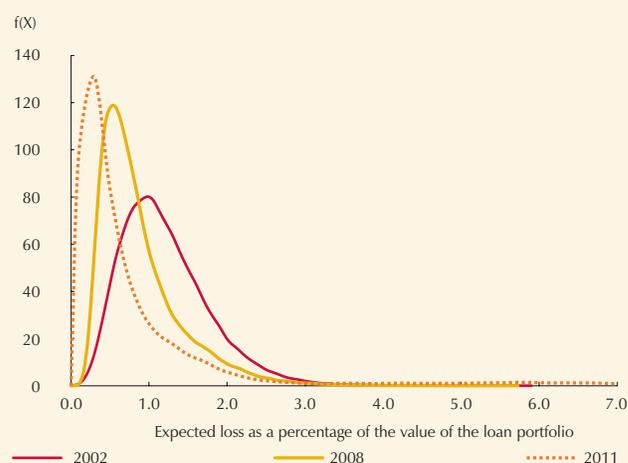
from Gonzalez et al. (2010), who adapted the methodology from Adasme et al. (2006) for Colombia.<sup>12</sup>

Before working out the estimate for the total loan portfolio, it is crucial to verify whether or not the loss expected for the groups exposed was indeed raised by the sharp devaluation of the MER. To do this, the impact on the non-exposed group is excluded from the analysis and the loss is calculated only for the loan portfolio of the exposed companies. As can be seen (Graph B8.3), 2002 really is the year with the highest expected loss among the three years in the study followed by 2008 and 2011. It should be noted that given the high dispersion in the loan amounts granted in 2011, both the maximum loss and the unexpected loss were higher that year (Table B8.4).

Finally, Table B8.5 presents the results of the stress tests in which the probability of default by sector was taken into account for 2002 and 2008. The goal of this exercise is to estimate the losses should the default turn out to be similar to those registered during those years of high devaluation. The results indicate that in a worst case scenario the loss expected would not surpass 1.6% of the total value of the commercial loan portfolio. This outcome corresponds to the shock of 2002. That figure is 50 bp above the expected loss measured under normal conditions for December 2011. In the case of the shock that uses the default probability for 2008, an expected loss of 1.2% is recorded which is slightly higher than that for December 2011.

In conclusion, the financial situation of the firms that are exposed tends to get worse during periods of high devaluation. The liquidity indicator, in particular is the one that is most affected. When the financial stress exercises were done, it was found that a low percentage of the companies analyzed go from a sound situation to a weak

**Graph B8.3**  
Distribution of the Expected Loss for the Loan Portfolio of Exposed Companies



Sources: Superintendency of Corporate Affairs, Banco de la República calculations.

**Table B8.4**  
Expected Loss, Maximum Loss and Unexpected Loss

Years	A Expected loss	B Maximum loss <sup>a/</sup> (percentage)	B-A Unexpected loss
2002	1,2	2,8	1,6
2008	0,9	2,7	1,8
2011	0,8	4,9	4,0

a/ Corresponds to percentile 99.  
Sources: Superintendency of Corporate Affairs, Banco de la República calculations.

one. Therefore, a sudden devaluation is not expected to substantially deteriorate the sustainability of the companies.

In the case of the credit institutions, the exposure of the system to the most vulnerable groups in the presence of devaluation has grown in the most recent years. This negative effect can be counterbalanced by means of improving the quality indicator for the loans granted to those vulnerable companies. Likewise, the stress exercises indicate that the loss expected would not be significantly high with respect to the value of the portfolio analyzed if a strong and unexpected devaluation of the exchange rate shock takes place.

Thus, a sharp devaluation of the MER has an initial negative, though moderate, impact on the performance indicators of both the companies in the productive sector and the credit institutions.

12 This methodology is a non-parametric approximation that uses the bootstrapping technique to calculate the probability of default for group *i*. Before carrying out this procedure, a distinction was made between the loans that defaulted and those that did not. That was done by using a binary variable that takes the value of 1 in the first case and 0 in the second one. Afterwards, 100,000 random samples of the group *i* were taken and the probability of default was calculated for each sample as:

$$\theta_i = \sum_{j=1}^n \frac{Deuda_j \times I_j}{Deuda_j}$$

Where  $I_j$  is the binary variable.  
In addition, the  $LDD_i$  is calculated as the balance exposed multiplied by the percentage of loans that become irrecoverable. This percentage is assigned on the basis of the loan collateral. Thus, a vector of losses expected for each portfolio is obtained  $\overline{PE}_i = [PE_{i,1}, PE_{i,2}, \dots, PE_{i,100,000}]$  and the expected loss is calculated as the average of these.

Table B8.5  
Situation as of December 2011

Group	Probability of default (percentage)	Loss due to default (trillions of pesos)	Expected loss	Expected loss Value of loan portfolio (percentage)
Net importers	1.9	26.2	0.5	0.4
Net exporters with debt in F/C	1.2	5.6	0.1	0.1
Debtors in F/C	0.8	5.6	0.0	0.0
Net exporters	1.8	1.4	0.0	0.0
Not exposed	4.1	21.1	0.9	0.6
Total				1.10
Shock I: balance exposed in 2011 using 2002 probability of default				
Group	Probability of default (percentage)	Loss due to default (trillions of pesos)	Expected loss	Expected loss Value of loan portfolio (percentage)
Net importers	3.2	26.2	0.8	0.6
Net exporters with debt in F/C	4.2	5.6	0.2	0.2
Debtors in F/C	1.2	5.6	0.1	0.1
Net exporters	6.3	1.4	0.1	0.1
Not exposed	4.1	21.1	0.9	0.6
Total				1.6
Shock II: exposed balance in 2011 using 2008 probability of default				
Group	Probability of default (percentage)	Loss due to default (trillions of pesos)	Expected loss	Expected loss Value of loan portfolio (percentage)
Net importers	1.4	26.2	0.4	0.3
Net exporters with debt in F/C	2.1	5.6	0.1	0.1
Debtors in F/C	4.1	5.6	0.2	0.2
Net exporters	3.6	1.4	0.1	0.0
Not exposed	4.1	21.1	0.9	0.6
Total				1.2

Sources: Financial Superintendency of Colombia, Banco de la República calculations.

## References

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- Benninga, S. (2000). *Financial Modeling* (second edition) Cambridge, Massachusetts, MIT.
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## Box 9

### INDICATORS FOR NETWORK STRUCTURE OF THE COLOMBIAN ELECTRONIC STOCK MARKET (MEC)

Currently, a sizable portion of liquidity management for the financial entities is carried out through operations with public debt securities transacted on the Colombian electronic stock market (MEC in Spanish), which is managed by the Colombian Stock Market (BVC in Spanish). The study of how the agents who are involved in that market interact becomes important because part of the risks in the system could be propagated through this route. In particular, it is fundamental to study the features of the network which make it possible to identify the interdependency of the agents over time.

In this box, the network indicators that consist of the agents that participate in the MEC will be analyzed in order to portray and compare the networks at different points in time. Based on the classic theory of networks, it is necessary to build a network for each day that the market is in operation and in which the nodes are the entities that took part in the market that day. It will be seen that there is a connection (edge) between two agents if there was a transaction between them. In addition, it is possible to build a network that will allow one to identify the direction of the transactions. In this case, a directed network<sup>1</sup> will result, the nodes will be the same, and there will be a relationship between agent  $i$  and agent  $j$  when a purchase operation by  $i$  from  $j$  is identified.

To analyze the structure of the network, the first indicator that will be considered is the average degree of the node which measures the average number of agents to which each node in the network is connected. The degree of the node does not consider the number of agents participating in the market. Thus, it is important in comparison to the network connectivity index. This index is calculated as the number of existing relationships in the network as a percentage of the number of possible relationships and measures, therefore, the level of connection the network had each day. In the case in which the connectivity index is 1, the network is said to be complete.

Furthermore, the percentage of reciprocal connections was analyzed (as a percentage of the total number of connections). It appears that the higher the number, the greater the interdependency will be between the agents in the sense that those relationships are bidirectional. Finally, the clustering coefficient, which measures to what degree an agent has substitutes in the network, was calculated. Formally, in a directed network there is a cluster around an agent  $i$  as long as there are nodes  $j$  and  $k$  such that  $j$  is related to  $i$ ,  $i$  is related to  $k$  and, in addition,  $j$  is related to  $k$ . The

clustering coefficient for agent  $i$  measures what percentage of the peers to which  $i$  is related also become clusters with  $i$ . The higher the coefficient is for agent  $i$ , the less necessary  $i$  becomes when the nodes are connected because there is a direct path between the agents connected by  $i$ .

Last of all, the clustering coefficient of the network is the average of the clustering coefficients of the agents that are connected with two or more nodes. The clustering coefficient for the network is built so that the agents with few connections have more weight. Thus, in the case of the network that is put together in the MEC and which is characterized by having many agents and few connections, a high clustering coefficient could indicate that some of the agents with few connections generate clusters with agents who are centrally well-positioned.<sup>2</sup>

By using the information about transactions carried out in June and December 2011, the indicators that were previously defined were calculated for each day in the months under study.

Graph B9.1 shows the results of the indicators described for those days. The average number of agents (nodes) per day that participated in the MEC for those two months was 443. However, almost every day in June the number of participants in the market was above the number involved in December (Graph B9.1, panel A). What was found was that for those months each agent connected with 3.5 nodes on average while, during June, each node was connected with more agents in comparison to December (Graph B9.1, panel B). Given the fact that in June there were more participants in the market, it is important to analyze the ratio of the connections registered as a percentage of the total number of connections (connectivity index). The outcome shows that the indicator is similar for the two months with the exception of the final days in each one when the network was more connected in the case of December (Graph B9.1, panel D).

Panel C in Graph B9.1 presents the reciprocal relationships as percentage of the total number of relationships. In general, the results indicate that the percentage is higher for December in comparison to June. The indicator rose in the last few days of December which could explain the rise in the connectivity index for those days. That would mean the performance of the connectivity index in December was not

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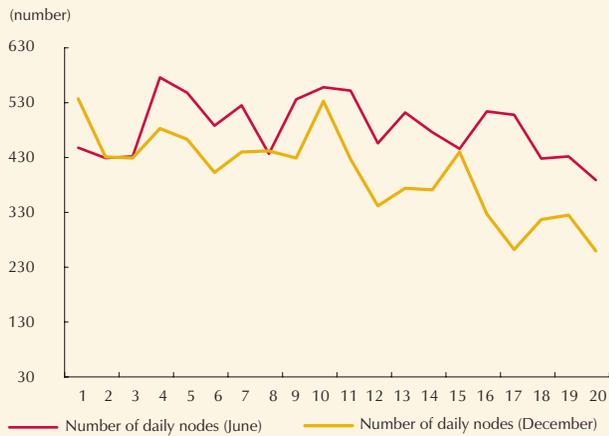
1 A directed network is the one in which the connections between the agents go in one direction. The connections will be called relationships between agents.

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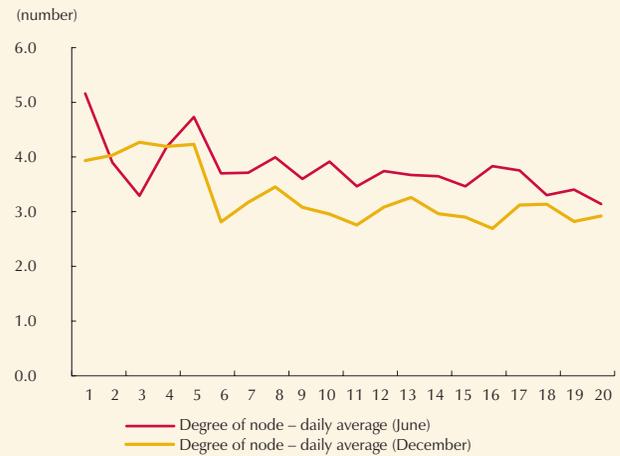
2 For further details regarding the definition of the indicators and the way they are calculated, see Saade, A. (2010). "Estructura de red del mercado electrónico colombiano (MEC) e identificación de agentes sistémicos según criterios de centralidad," *Financial Stability Issues, Financial Stability Report*, Banco de la República, September.

Graph B9.1  
Indicators for Networks Built in the MEC for Each Working Day in June and December 2011

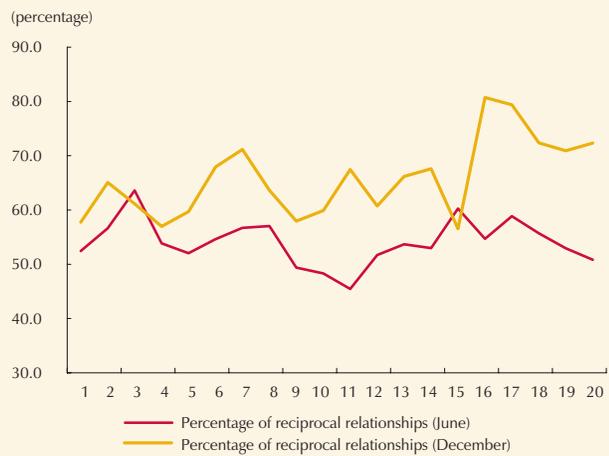
A. Number of Daily Nodes



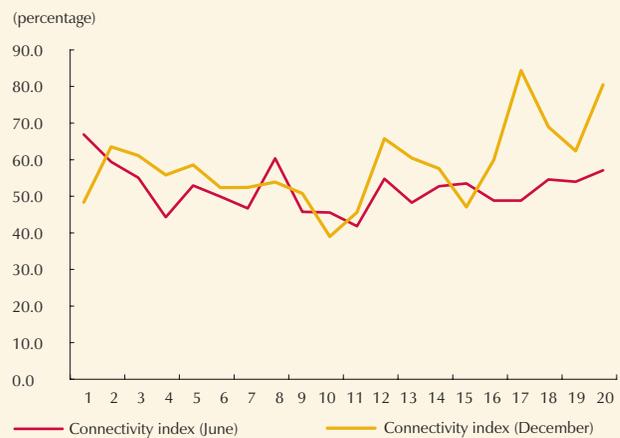
B. Average degree of node



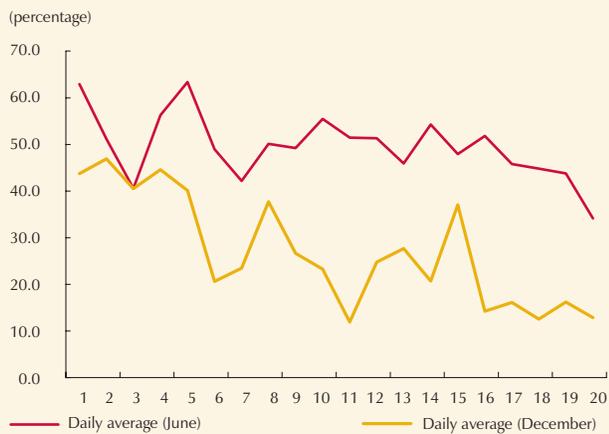
C. Percentage of Reciprocal Relationships



D. Connectivity index



E. Clustering coefficient



due to new connections but rather it was largely caused by a few connections that became reciprocal.

Finally, panel E in Graph B9.1 shows the average clustering coefficient for each day in the study. The average is higher for almost every day in June in comparison with December. As was mentioned, due to the structure of the MEC, the result means that in June there were more agents who were not needed to make the connections with other agents.

In conclusion, the networks built for the days in the months under analysis were found to have similar connectivity indices, excluding the last days in each month when the index was higher for December. In general, a more connected network is regarded as less risky because a higher number of connections imply that in the presence of a liquidity shock, there will be more possibilities for funding.

Sources: Financial Superintendency of Colombia, Banco de la República calculations.

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**Crashmetrics: An Application For Colombia**

*Crashmetrics: una aplicación para Colombia*

Esteban Gómez  
Juan Carlos Mendoza  
Nancy Zamudio

## DEMANDA Y OFERTA DE CRÉDITO: UNA ESTIMACIÓN A PARTIR DE MODELOS DE DESEQUILIBRIO

WILMAR CABRERA  
SANTIAGO CAICEDO  
MIGUEL ÁNGEL MORALES

En este documento se estima la demanda y oferta de crédito del sistema financiero colombiano, utilizando modelos de desequilibrio, así como la información de las encuestas de crédito. Se desarrollaron estimaciones usando variables macroeconómicas para las diferentes modalidades de crédito y estos resultados se compararon con la información microeconómica obtenida a partir del análisis de las encuestas. Las estimaciones permitieron identificar momentos en los cuales han existido restricciones crediticias, así como los principales determinantes de la demanda y oferta de crédito.

## USING DISEQUILIBRIUM MODELS TO ESTIMATE LOAN DEMAND AND SUPPLY FUNCTIONS

In this paper we estimate the Colombian financial system credit demand and supply functions for each type of credit using disequilibrium model and macroeconomic data. We compare these results with an estimation based on microeconomic information using credit surveys. We identify credit constraints episodes together with the main determinants of credit demand and supply.

## ¿CÓMO CARACTERIZAR ENTIDADES SISTÉMICAS?: MEDIDAS DE IMPACTO SISTÉMICO PARA EL SISTEMA FINANCIERO COLOMBIANO

MARIANA LAVERDE  
JAVIER GUTIÉRREZ

Este trabajo pretende hacer una contribución a la caracterización de las entidades sistémicas así como de los mecanismos mediante los que este riesgo se trasmite. Inicialmente, siguiendo la metodología propuesta por Zhou (2010), se estiman y analizan indicadores de riesgo sistémico para los establecimientos de crédito en Colombia. En términos de regulación es relevante contar con estos indicadores, pues estos sustentan acciones de rescate en escenarios de estrés, y además dan luces acerca de las entidades que deben ser monitoreadas con especial cuidado. Como un segundo punto, se estudia cuál es la relación de estas medidas con el nivel de interconexión de las entidades en el mercado interbancario y sus posiciones coincidentes en activos riesgosos.

## HOW TO CHARACTERIZE SYSTEMIC INSTITUTIONS? SYSTEMIC MEASURES FOR THE COLOMBIAN FINANCIAL SYSTEM

This paper attempts to contribute to the characterization of systemic entities as well as the transmission channels of this risk. At first, we estimate and analyze systemic risk measures for credit institutions in the Colombian financial system using the methodology proposed by Zhou (2010). These indicators are valuable because they can be used to support bail-out actions and they give information to supervisory authorities about entities that should be carefully monitored. Afterwards, we study the relation of these measures with the interconnection of the entities in the interbank market as well as their coincident positions in risky assets

## DETERMINANTES DE LA FRAGILIDAD DEL SECTOR CORPORATIVO PRIVADO EN COLOMBIA

JUAN SEBASTIÁN LEMUS  
ADRIANA MARÍA CORREDOR  
JAVIER GUTIÉRREZ

El objetivo de este documento es identificar aquellos indicadores que distinguen mejor las empresas frágiles de las no frágiles, en la medida que esto permite conocer qué factores financieros podrían aumentar la exposición de los establecimientos de crédito al sector corporativo. El análisis se basa en la aplicación del método estadístico multivariado denominado análisis discriminante. Los resultados sugieren que la rentabilidad y el endeudamiento son indicadores claves dentro de la determinación de la fragilidad de una empresa.

## FRAGILITY DETERMINANTS OF THE PRIVATE CORPORATE SECTOR IN COLOMBIA

The aim of this document is to identify the financial ratios that best separate the fragile companies from the non-fragile. This classification permits to distinguish the financial variables which could assess the exposition of credit establishments to the corporate sector. The analysis is developed by the estimation of a model using discriminant analysis. The results suggest that profitability and leverage are key reference to establish firms' fragility.

## DETERMINANTES DEL CRÉDITO Y SU IMPACTO EN EL CRECIMIENTO DE LAS EMPRESAS EN COLOMBIA

CARLOS QUICAZAN  
DIANA FERNÁNDEZ  
DAIRO ESTRADA

Con este trabajo se analiza el impacto que tiene el crédito sobre el crecimiento de las empresas en Colombia, para lo cual se calculó un nivel de crédito como porcentaje del PIB consistente con las principales variables macroeconómicas. Adicionalmente, el ejercicio se replicó para la cartera comercial, con el fin de evaluar el impacto del nivel del crédito estimado sobre el crecimiento de las empresas colombianas.

Se encontró que el gasto en consumo, la inversión y la tasa interbancaria son los principales determinantes de este indicador. Por otro lado, el efecto del crédito comercial sobre el crecimiento de las empresas es significativo.

## CREDIT DETERMINANTS AND ITS IMPACT ON FIRMS' GROWTH IN COLOMBIA

The purpose in this study is analyzing the impact of credit on firms' growth in Colombia, for which we calculate the consistent level of credit as a percentage of GDP with the main macroeconomic variables. Additionally, the exercise was replicated for commercial loans in order to assess the impact of estimated credit level on companies' growth.

We found that consumer spending, investment and the interbank rate are the main determinants of this indicator. On the other hand, the effect of commercial loans on firms' growth is significant.

## UN MAPA DE RIESGO DE CRÉDITO PARA EL SISTEMA FINANCIERO COLOMBIANO

MIGUEL MORALES  
WILMAR CABRERA  
LAURA CAPERA  
DAIRO ESTRADA

El mapa de riesgo es una herramienta usual en la literatura de riesgo operacional que ha sido empleada recientemente en el análisis del riesgo de crédito en el sector financiero. En línea con estos desarrollos, el presente documento propone un mapa en el que se cuantifica la probabilidad de incumplimiento y el daño potencial asociado a la ocurrencia de choques macroeconómicos adversos sobre los principales sectores económicos (hogares, empresas y sector externo). La metodología utiliza un modelo de corrección de errores que permite establecer las relaciones de corto y largo plazo entre las variables relevantes y el indicador de mora. Finalmente se obtiene una representación gráfica que permite hacer un seguimiento de la vulnerabilidad del sistema financiero ante distintos choques en cada sector.

## A CREDIT RISK MAP FOR THE COLOMBIAN FINANCIAL SYSTEM

A risk map is often employed as a tool in operational risk management and has been used recently to monitor and analyze credit risk in financial systems. In line with current literature on the subject, this document proposes a risk map that quantifies the default probability and the potential damage associated with adverse macroeconomic shocks on important economic sectors as households, enterprises and external sector. We use a vector error correction model –VECM– in order to estimate the short and long run relation in our data. The results are summarized in a graphic representation which allows us to identify the financial system vulnerabilities.

## CRASHMETRICS: UNA APLICACIÓN PARA COLOMBIA

ESTEBAN GÓMEZ  
JUAN CARLOS MENDOZA  
NANCY ZAMUDIO

En este documento se emplea una metodología denominada *CrashMetrics*, para estimar la exposición de un portafolio a movimientos pronunciados en el mercado. Utilizando información diaria, encontramos que *CrashMetrics* se constituye como un complemento idóneo a otras técnicas de pruebas de estrés (*stress-testing*) tradicionales, proveyendo no solo un escenario de pérdidas extremo, sino uno que está fundamentado en un choque de mercado observado y en las sensibilidades estimadas del cambio en el valor del portafolio durante períodos de estrés financiero. Adicionalmente, se encuentra que las instituciones financieras parecen estar relativamente más expuestas al riesgo de mercado en esta metodología frente a otras. Por tanto, los resultados sugieren que *CrashMetrics* provee información vital desde un punto de vista prudencial, alertando a los hacedores de política sobre exposiciones de riesgo significativas individuales o sectoriales.

## CRASHMETRICS: AN APPLICATION FOR COLOMBIA

This document employs *CrashMetrics* methodology for estimating the exposure of a portfolio to severe market movements. Using daily data, we find that *CrashMetrics* complements more traditional stress testing techniques, providing not only a stringent loss scenario, but one that is cemented on an observed market shock and on the estimated sensitivities of the change in portfolio value during periods of financial turmoil. Given that correlations between assets are stronger during a market crash, our findings indicate that financial institutions seem relatively more exposed to market risk under this methodology than using other market risk measures. Thus, results indicate that *CrashMetrics* provides vital information from a prudential perspective, alerting policymakers of significant individual or sector-specific exposures to market risk.





