



# FINANCIAL STABILITY

REPORT

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# CONTENTS

GRAPHS AND TABLES	4
EXECUTIVE SUMMARY	7
I. THE MACROECONOMIC ENVIRONMENT	11
II. THE FINANCIAL SYSTEM	16
A. CREDIT INSTITUTIONS	16
Box 1: THE RECENT TREND IN THE MORTGAGE MARKET	20
B. NON-BANK FINANCIAL INSTITUTIONS	29
III. RECIPIENTS OF LOANS FROM THE FINANCIAL SYSTEM: THE CURRENT SITUATION AND PROSPECTS	36
A. HOUSEHOLDS	36
Box 2: THE ASSET PRICE BUBBLE	40
B. PRIVATE CORPORATE SECTOR	43
Box 3: CORPORATE INDEBTEDNESS AT JUNE 2006: A SAMPLE OF COMPANIES LISTED ON THE STOCK EXCHANGE	52
Box 4: PRIVATE COMMERCIAL LOAN PORTFOLIO CONCENTRATION	54
C. NON-FINANCIAL PUBLIC SECTOR (NFPS)	56
IV. POTENTIAL RISKS	60
A. MARKET RISK	60
Box 5: DEVELOPMENTS ON THE TES B SECONDARY MARKET BETWEEN FEBRUARY AND JUNE 2006	66
Box 6: BEHAVIOR OF THE ZERO COUPON TES CURVE	70
B. CREDIT RISK	73
C. LIQUIDITY RISK	78
Box 7: CREDIT RISK POSED BY COMPANIES	81
Box 8: STRUCTURE OF THE MARKET FOR DOMESTIC GOVERNMENT BONDS TRADED THROUGH THE ELECTRONIC NEGOTIATION SYSTEM (SEN)	82
FINANCIAL STABILITY ISSUES	
ANALYSIS OF CONDITIONAL PROBABILITY OF DEFAULT BY THE MAJOR PRIVATE DEBTORS IN THE COLOMBIAN FINANCIAL SYSTEM JOSÉ EDUARDO GÓMEZ INÉS PAOLA OROZCO NANCY EUGENIA ZAMUDIO	93
A LIQUIDITY-RISK MEASUREMENT, MONITORING AND REGULATION PROPOSAL FOR COLOMBIA JUANITA GONZÁLEZ DANIEL ESTEBAN OSORIO	103
CREDIT SUPPLY DETERMINANTS IN THE COLOMBIAN FINANCIAL SECTOR ANDRÉS MURCIA JOSÉ HERNÁN PIÑEROS	112
SPATIAL COMPETITION IN THE COLOMBIAN DEPOSIT MARKET SANDRA ROZO DARIO ESTRADA	125

# GRAPHS AND TABLES

## I. THE MACROECONOMIC ENVIRONMENT

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Graph 1	Intervention Rates of the Principal Central Banks	12
Graph 2	Risk Aversion Index (VIX)	12
Graph 3	A. Interest Rates on the Secondary Public Domestic Debt Market	13
	B. Stock Exchange Movement in Several Emerging Economies	13
	C. Trend in the Nominal Exchange Rate for Several Emerging Economies	13
	D. Changes in Risk Premiums for Several Emerging Economies	13
Graph 4	Relation between Domestic and External Assets: TES Spot Curve at Ten Years, RMR and EMBI: Colombia	13
Graph 5	Net Direct Foreign Investment and the Current Account	14
Graph 6	Price of WTI Oil Futures Contracts at December 2007	14

## II. THE FINANCIAL SYSTEM

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Graph 7	Total Assets of Credit Institutions	16
Graph 8	Share (%) of Credit Institutions' Total Assets Represented by Investments and the Gross Portfolio	17
Graph 9	Investments by Credit Institutions	17
Graph 10	Real Annual Gross Portfolio Growth for Credit Institutions	17
Graph 11	Mortgage Loan Disbursements	18
Graph 12	A. Financial Depth (Portfolio/GDP)	19
	Extent of Financial Depth	19
Graph 13	Real Growth in Deposits with Credit Institutions by Type of Deposit	19
Graph 14	Past Due Loan Ratio by Type of Credit	24
Graph 15	Loan Portfolio Quality: Risky/Gross Portfolio Ratio	24
Graph 16	Coverage: Provisioning/ Risky Loans	25
Graph 17	Annual Growth in Earnings	25
Graph 18	Make-up of Earnings	26
Graph 19	Asset Yield (AY)	26
Graph 20	Capital adequacy ratio of Credit Institutions	27
Graph 21	Ex Ante Margin Spread, Using the CD Lending Rate	27
Graph 22	Ex Post Margin spread	28
Graph 23	Efficiency: Ratio of Administrative and Labor Expenses to Average Assets	28
Graph 24	Profitability of Mandatory Pension Funds	30
Graph 25	PFM Portfolio Composition, by Issuer	31
Graph 26	PFM Portfolio Composition, by Currency	31
Graph 27	A. Percentage of the Value of the Portfolio Denominated in Foreign Currency, without Coverage	32
	B. MPF: Net Covered Securities in Foreign Exchange Currency	32
Graph 28	Margins in the Insurance Sector	32
Graph 29	OMF Daily Average Weighted Profitability	33
Graph 30	Rentabilidad diaria ponderada promedio de los FCO	33
Graph 31	OMR and SMF Investment Portfolio by Issuer at June 2006	34
Graph 32	BF-managed Portfolio Exposure, by Issuer Portfolio Value at June 2006	35
Table 1	Exposure of Credit Institutions to Their Principal Debtors	23
Table 2	Investment Portfolio: Financial Institutions	29

### III. RECIPIENTS OF LOANS FROM THE FINANCIAL SYSTEM: THE CURRENT SITUATION AND PROSPECTS

Graph 33	Household Consumption	36
Graph 34	Household Consumption as a Percentage of GDP	37
Graph 35	Unemployment Rate	37
Graph 36	Occupation Rate	37
Graph 37	Annual Growth in the Real Wage Index	37
Graph 38	Consumer Expectation Index	38
Graph 39	Home and Durable Goods Buying Perception Index	38
Graph 40	Household Consumption and Consumer Expectation Index	39
Graph 41	Tasa de los desembolsos real. hipotecaria y de consumo	39
Graph 42	Asset Yield	44
Graph 43	Asset Yield (2005)	46
Graph 44	Total Indebtedness	46
Graph 45	Financial Indebtedness	48
Graph 46	Indebtedness Classified by Currency and Maturity	48
Graph 47	GDP Growth Expected in 2006 and 2007	50
Graph 48	Expectations for the Company's Economic Situation (CES)	50
Graph 49	Actual and Expected RMR	51
Graph 50	Actual and Expected DTF Rate	51
Graph 51	A. Current Perception of Credit Availability	52
	B. Trend in Liquidity during the Next Six Months	52
	C. Current Perception of Credit Availability	52
	D. Trend in Credit Availability during the Next Six Months	52
Graph 52	Nominal Average Rate on TES B - 2006	58
Graph 53	CG Creditworthiness	58
Table 3	Income Statement	45
Table 4	General Balance Sheet	47
Table 5	Financial Obligations (15,127 companies)	49
Table 6	NFPS Gross Debt	57

### IV. POTENTIAL RISKS

Graph 54	Valuation Losses as a Percentage of Annualized Profits, Given a 200 bp Shock	64
Graph 55	PMF Valuation Losses as a Percentage of the Portfolio Value, Given a 200 bp Shock	65
Graph 56	Commercial Bank, Valuation Losses	65
Graph 57	PMF Valuation Losses	65
Graph 58	Estimated Probability of Default Compared to the Number of Companies in Default	75
Graph 59	Credit Institutions' RUL	80
Graph 60	Sensitivity Analysis: RUL of Financial Intermediaries	80
Table 7	Outstanding TES B Valued at Market Prices: Credit Institutions	61
Table 8	Outstanding TES B Valued at Market Prices: Non-bank Financial Sector	62
Table 9	Variations in TES B Holdings	63
Table 10	Valuation Losses Shock Equal to the Change in Prices between June 28 and 23, 2006	64
Table 11	Number of Banks Where the Capital adequacy ratio Would Drop Below the Minimum (12 Months)	74
Table 12	Debt at Risk as a Percentage of Private Loans	75
Table 13	Stress Tests - Common Companies: December 2005 to March 2006	77

# EXECUTIVE SUMMARY

The Colombian financial system experienced a drop in the value of its tradable securities during the first half of the year, owing to the volatility of domestic financial markets at the time. Associated in part with the uncertainty perceived on international financial markets (and even more so in Colombia), this volatility occurred despite the positive trend in Colombia's productive sector.

That episode had a number of repercussions for credit institutions. To begin with, the drop in the value of tradable securities prompted somewhat of a shift in the assets held by these institutions. The loan portfolio accounted for 55% in June, while investments had declined to 28%. The respective figures in December 2005 were 50% and 32%.

In June, the annualized profits for credit institutions as a whole were down by 4.4% compared to the same month in 2005, primarily because of losses on investments in the tradable portfolio. This drop in profits reduced the system's asset profitability to 2.3% (0.5 percentage points (pp) less than in December). These difficulties also affected a good many non-bank financial institutions, since their portfolios are heavily exposed to changes in the valuation of investments in domestic government bonds.

This set of events constitutes materialization of the market risk facing credit institutions, a situation that was stressed repeatedly in previous editions of the *Financial Stability Report*. Consequently, for reasons concerning the stability of the financial system, it is important to underscore what the Office of the National Superintendent of Financial Institutions has done to measure and regulate market risk for institutions with a portfolio of tradable securities. Continuing this initiative in the years ahead will make the system more capable of dealing with such losses, especially with respect to its capital positions.

Traditional financial brokerage activities, on the other hand, continued to expand. Above and beyond the portfolio as a whole (19.3% real annual growth at June), an important highlight was the strong increase in consumer loans (41.2%), and the recovery in commercial and mortgage loans (15% and 1.6%, respectively). Growth in the loan portfolio was supported by a favorable increase in sources of funding used by establishments (real annual growth in deposit taking was 13.4% at June), their capital soundness, the good quality of their loan portfolios and high coverage for the riskiest loans, coupled with the recent stability in interest rates on loans of all types. As to this last aspect, it is important to note that the volatility witnessed on markets for tradable securities had no appreciable effect on the stability of these rates.

The positive situation and optimistic outlook for households suggests brokerage activities will continue to expand. However, it is important to keep an eye on the high growth rate of consumer

loans, especially after the slight recent deterioration in the quality of that portfolio. The good trend for households is complemented by growth in the private corporate sector (towards which most of the financial system's exposure is directed). Based on information available at December 2005, recent trends in the private corporate sector's indebtedness to the financial system continue to suggest that companies are more and more willing to finance working capital with their own resources.

In short, financial brokerage activities continued to increase, even if the recent volatility in tradable securities markets has affected the portfolio and financial performance of institutions. This expansion suggests that efforts to monitor and measure the credit risk posed by growth in the loan portfolio need to be stepped up. If the conditions that allowed for this growth continue, so would this expansion. Nonetheless, it is important not to forget that a change in those conditions could accelerate deterioration in the quality of the loan portfolio.

In addition to materialization of the market risk mentioned earlier and the good quality of the loan portfolio, the recent increase in liquidity risk is an important aspect to watch, even though it remains low. Limited concentration in the government bond market is a contributing factor in this respect, and Banco *de la República* has been cooperating with the Office of the National Superintendent of Financial Institutions on the design of new and better ways to measure, monitor and regulate liquidity risk.

Board of Governors  
Banco de la República



# FINANCIAL STABILITY REPORT

*By virtue of its constitutional mandate and Law 31/1992, one of Banco de la República's responsibilities is to ensure price stability. Doing so depends largely on maintaining financial stability. Financial stability is understood as a situation where the financial system is able to broker financial flows efficiently. This contributes to a better allocation of resources and, consequently, helps to preserve macroeconomic stability. Therefore, financial instability has a direct impact on macroeconomic stability and on Banco de la República's capacity to fulfill its constitutional mandate, all of which underscores the necessity of taking steps to monitor and maintain financial stability.*

*Banco de la República does a number of things to provide for financial stability. First of all, it is responsible for ensuring the payment system in the Colombian economy works 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. Being the authority on credit, it designs financial regulatory mechanisms to reduce episodes of instability. This is done in conjunction with the Office of the National Superintendent of Financial Institutions. Banco de la República also carefully monitors economic trends that might threaten the country's financial stability.*

*The Financial Stability Report falls within the realm of this last task and fulfils two objectives. It describes the recent performance of the financial system and its principal debtors, so as to visualize future tendencies in this performance. Secondly, it identifies the most significant risks to credit institutions. The motive behind both these objectives is to inform the public of the tendencies and risks that affect the financial system as a whole.*

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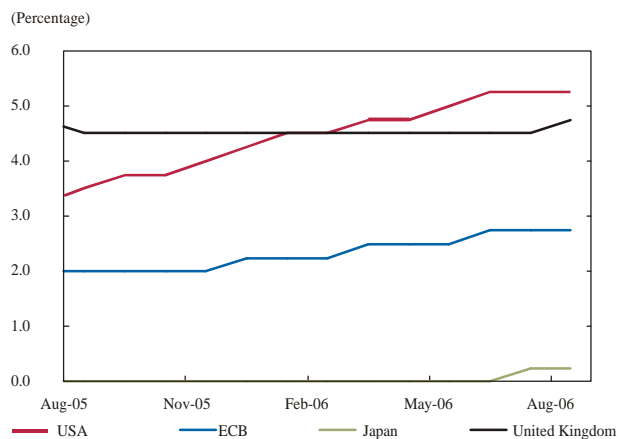


# I. THE MACROECONOMIC ENVIRONMENT

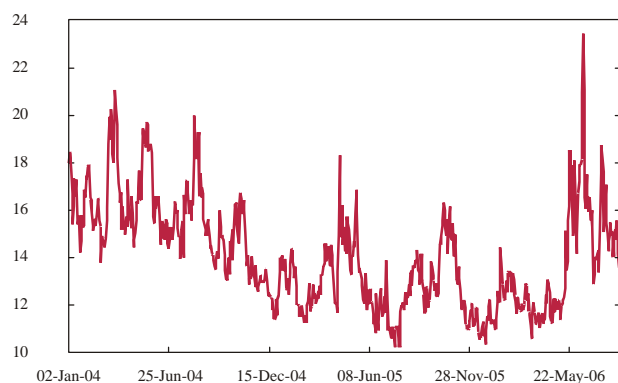
The tranquility of the domestic financial market was interrupted at the start of the second quarter of 2006. The sharp fluctuation in the price domestic assets had a drastic impact on their valuation and on the earnings of financial institutions. This volatility was not confined to the Colombian market, and was evident in other emerging financial markets and developed ones as well.

Uncertainty about inflation and world economic growth had a bearing on the how the financial markets behaved. In particular, the second quarter saw growing uncertainty about future developments in the United States economy, since core inflation in that country rose beyond expectations. However, the growth signals were mixed. After a very positive figure for the first quarter (5.6%), various indicators suggested the economy was weakening. The preliminary figure for second-quarter growth was 2.5%, which is less than the market expected. The deterioration in the United States economy, given the frailty of the housing market and earlier interest rate hikes, may be exerting less inflationary pressure, as suggested by inflation in July (0.4%). At any rate, the outlook for inflation and growth is uncertain.

As illustrated in Graph 1, other developed economies have adopted tighter monetary policies. This is reflected in policy interest-rate hikes and stronger announcements by the central banks. Last year, the European Central Bank raised its interest rates by 75 basis points (bp) and the Central Bank of Japan increased its rates for the first time in six years.

**GRAPH 1****INTERVENTION RATES  
OF THE PRINCIPAL CENTRAL BANKS**

Source: Bloomberg.

**GRAPH 2****RISK AVERSION INDEX (VIX)**

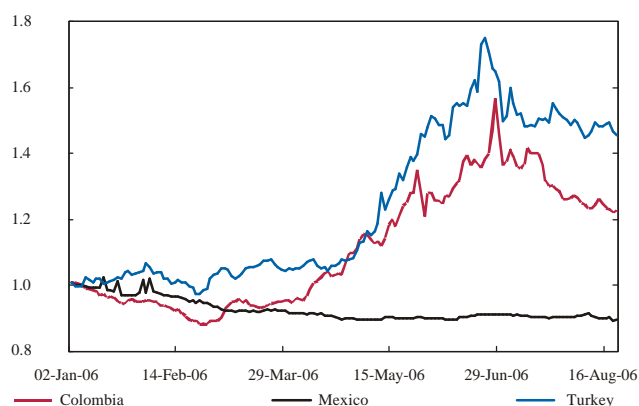
Source: Bloomberg.

These conditions sparked uncertainty about the future of international interest rates. Consequently, aversion to risk has increased (Graph 2), while investors have reassessed risk, causing the price of risky assets to drop. This impact was particularly noticeable in the emerging economies, as illustrated in Graph 3, which shows the changes experienced by some of these economies with respect to the exchange rate, the stock market, domestic government bonds and country-risk premiums. Contrary to the situation on other occasions, the impact on the exchange rate, stocks and the domestic debt in general was more important than the effect on risk premiums. In the case of Colombian financial assets, the range of movement was far broader than in other emerging economies (Graph 3). This might be explained by the close relationship between domestic assets, and between these and external assets (Graph 4), the increases in *Banco de la República*'s reference rate, and the particular micro-structural features of Colombia's financial market.

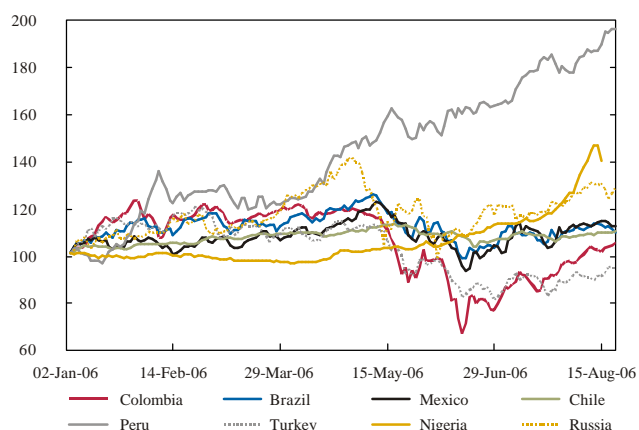
The financial system's performance in recent months has been influenced by these conditions. The valuation losses were significant and spelled less profit for credit institutions and tighter portfolios for non-bank financial institutions. The events of these months show how sensitive the financial system is to the risk posed by interest rates, both domestic and foreign. They also highlight the importance of having diversified portfolios and good risk-management practices.

The volatility seen on financial markets contrasts with developments in the foundations of the Colombian economy. Momentum was evident in first quarter of 2006, with 5.23% growth compared to the year before. In the June 2006 edition of the *Inflation Report* published by *Banco de la República*, the growth forecast for the year as a whole was 4.8%, primarily because of the increase in household consumption (5.3%), gross fixed capital formation (GFCF) without civil works (11.2%) and GFCF with civil works (12.7%). The fact that prospects for Colombia's economic growth in 2007 are also good (approximately 4.5%) adds to the expectation that the domestic context will have a positive influence on the financial system.

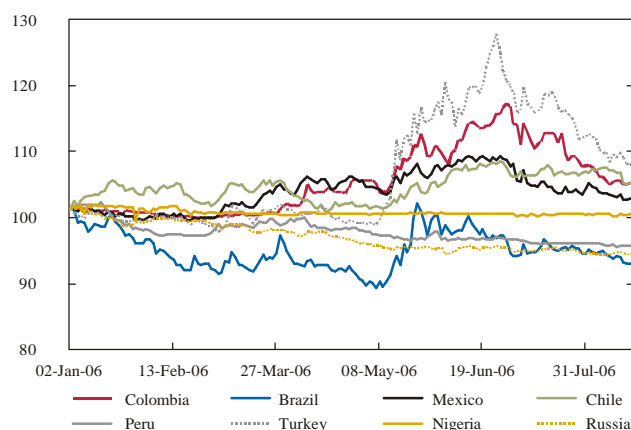
**A. INTEREST RATES ON THE SECONDARY PUBLIC DOMESTIC DEBT MARKET**



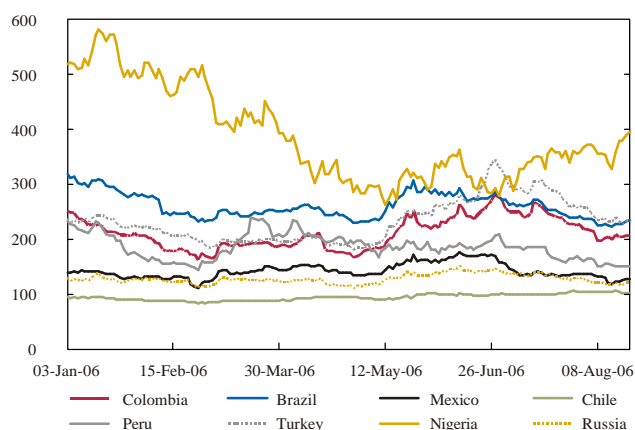
**B. STOCK EXCHANGE MOVEMENT IN SEVERAL EMERGING ECONOMIES**



**C. TREND IN THE NOMINAL EXCHANGE RATE FOR SEVERAL EMERGING ECONOMIES**



**D. CHANGES IN RISK PREMIUMS FOR SEVERAL EMERGING ECONOMIES**

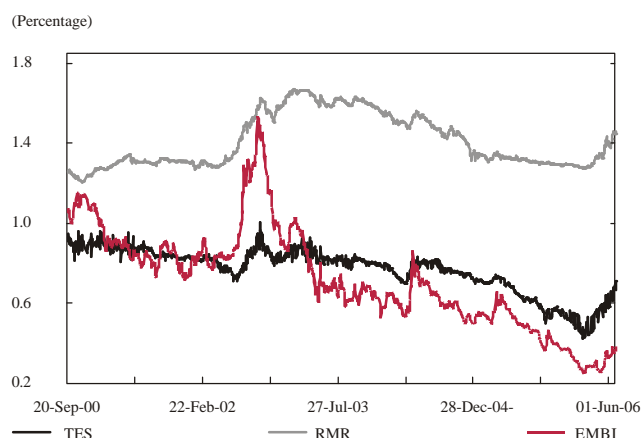


Source: Bloomberg.

Current economic growth is supported by a better job market, high liquidity consistent with the targets for inflation, and a trade surplus that amounted to US\$219 million (m) in the first quarter of 2006 (Graph 5). This has raised demand, which was up by 8.79% in the first quarter of the year thanks to the positive trend in household spending (5%) and GFCF (26.76%).

The increase in household spending is supported mostly by durable goods consumption, which

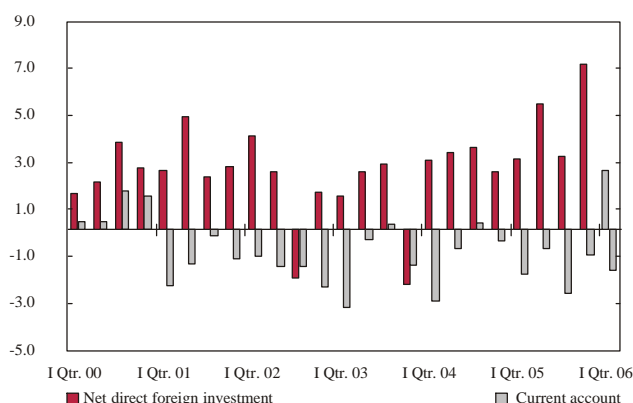
**RELATION BETWEEN DOMESTIC AND EXTERNAL ASSETS: TES SPOT CURVE AT TEN YEARS, RMR AND EMBI: COLOMBIA**



Source: Banco de la República, Bloomberg.

**GRAPH 5****NET DIRECT FOREIGN INVESTMENT  
AND THE CURRENT ACCOUNT**

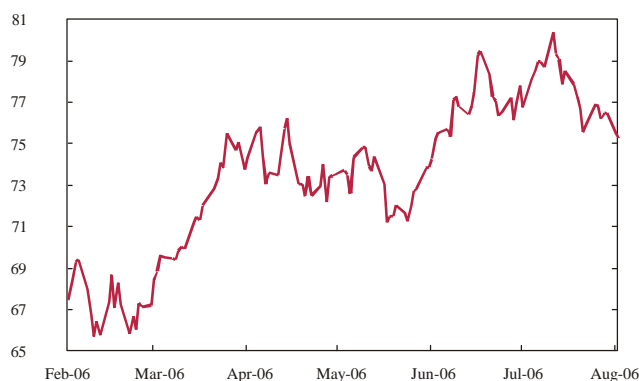
(Percentage of Quarterly GDP)



Source: Banco de la República.

**GRAPH 6****PRICE OF WTI OIL FUTURES CONTRACTS  
AT DECEMBER 2007**

(Dollars/barrel)



Source: Bloomberg.

accounts for 8.19% of total consumption and exceeds the levels witnessed before the crisis in the nineties. In the case of investment, GFCF is based primarily on more investment in machinery and equipment, construction and buildings. As to the different branches of the economy, most sectors have experienced real growth in excess of 5%. Mining, agriculture, social services and electricity are the only exceptions. This is consistent with the corporate sector, where there has been an increase in real sales of tradable goods and non-tradables.

As to the external sector, imports in the first quarter of 2006 saw a real annual increase of 24.2%, while exports were up by 16.1% compared to the same period the year before. Export highlights include petroleum, with 31.5% growth, and coal, with 21.5%. Intermediate goods and equipment topped the list of imports, having increased by 23.59%. Despite the current account deficit in the first quarter of 2006 (-1.72% of GDP), its financing is supported by US\$839 m in net direct foreign investment (2.54% of GDP). The primary recipients of this investment are mining, petroleum activity and manufacturing, with US\$451 m, US\$331 m and US\$129 m, respectively. The upward tendency in oil-price forecasts for 2006 and 2007 is important to bear in mind (Graph 6). Higher oil prices could exert “added pressure on domestic fuel costs, transportation fares and inflation in general”.<sup>1</sup>

The June 2006 edition of the *Inflation Report* forecasts “no substantial change in inflation during the second quarter of 2006 compared to the levels reported in June (3.9%)”.<sup>2</sup> However, the outcome for inflation in August (3.85% for the year to date and 4.72% in the last 12 months) suggests a slight rise due to expected price hikes, particularly in the food, transport and communication sectors. By the end of the year and as noted in the aforementioned report, inflation should be within the target range.

<sup>1</sup> Banco de la República, *Inflation Report* (June 2006), Bogota, Colombia.

<sup>2</sup> Ibid.

In short, despite the volatility generated by external shocks to the global economy, prospects for the foundations of the Colombian economy are good in terms of growth and inflation stability. Consequently, the evolution of the financial system will depend not only on the uncertainty in international financial markets, but also on the behavior of domestic inflation.

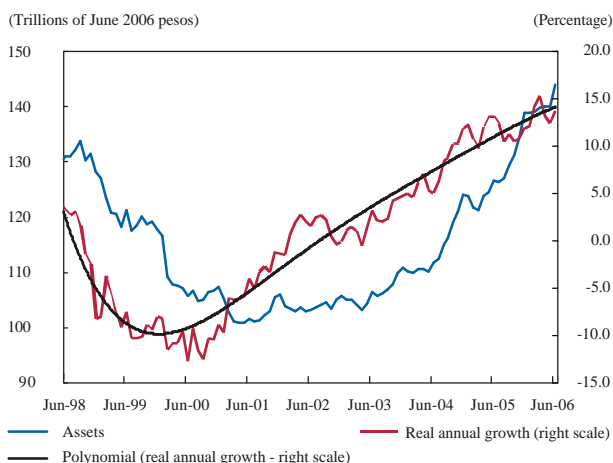
## II. THE FINANCIAL SYSTEM

### A. CREDIT INSTITUTIONS

The volatility witnessed on the domestic government bond market during the first half of the year had a negative impact on the way credit institutions performed. Most of the effects of that episode are reflected in the set of variables analyzed in this section. From the standpoint of traditional financial brokerage activities, the past few months have seen changes in the tendency of several components that constitute the loan portfolio quality. The likelihood that all these events might occur was mentioned in earlier editions of the *Financial Stability Report*. Credit institutions ended the first six months of 2006 with a low capital adequacy ratio compared to the average for recent years. While the general outlook for these institutions remains positive, it is important that these tendencies continue to be monitored closely.

GRAPH 7

#### TOTAL ASSETS OF CREDIT INSTITUTIONS



Source: Office of the National Superintendent of Financial Institutions.

### 1. General Balance-sheet Positions

#### a. Asset Accounts

The country's credit institutions reported Col\$144.1 trillion (t) in total assets at the end of the first half of 2006. This amounts to a real increase of 13.8% compared to the same period the year before (Graph 7). The trend is assets remains solid, although growth is less than in the early years of the post-crisis period.

The real average increase in assets during 2006 to date is 13.5%.

The momentum in the components that make up total assets reflects the situation on the domestic government bond market during the first six months of the year. Graph 8 suggests a temporary reversal of the phenomenon observed in past years; that is, portfolio substitution for investments in total assets. As the graph illustrates, investments have lost nearly 5 pp as a share of total assets since March 2006. This was a direct consequence of the loss in value experienced by investments during the first half of the year, coupled with liquidation – during the same period - of some of the portfolio in domestic government bonds held by credit institutions. This materialization of market risk has prompted a shift in total assets towards traditional intermediation, which is something that has not been seen for a number of years.

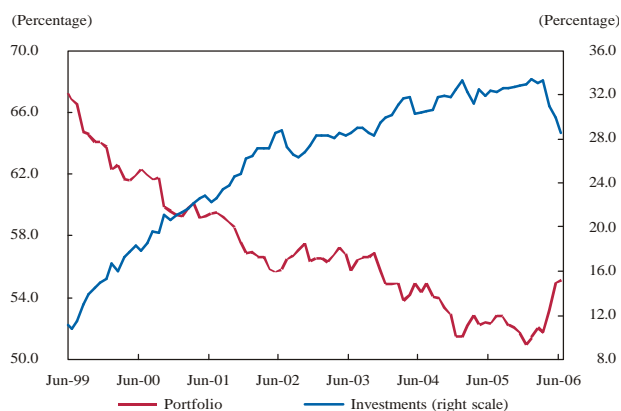
The drop in investment portfolio value on the balance sheet of credit institutions is shown in Graph 9. Following a high of Col\$46.1 t in March, the investment portfolio closed out the first half of the year at Col\$40.7 t. This is equivalent to a real decline of 11.75% during the period. However, compared to June 2005, investments remained constant in real terms. A standstill of this sort has not been observed since the episode of market volatility in 2002.

Therefore, the condition of total assets responds solely to the change in the loan portfolio. As illustrated in Graph 10, real annual growth in all loans made by the financial system was 19.32% at June, when they were valued at Col\$88.1 t (the last increase of this type was in June 1995). Compared to the analysis in previous editions of this report, all loan components are responsible for this expansion (Graph 10).

The continued vigorous growth in consumer loans came to 41.2% in real annual terms by the end of the first half of 2006. This is almost 10 pp above

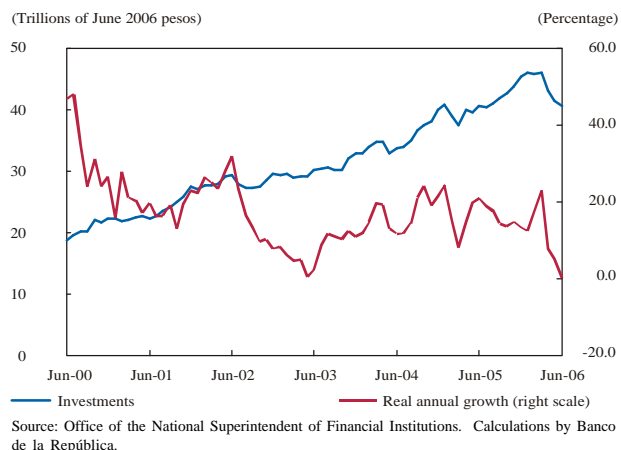
GRAPH 8

**SHARE (%) OF CREDIT INSTITUTIONS' TOTAL ASSETS REPRESENTED BY INVESTMENTS AND THE GROSS PORTFOLIO**



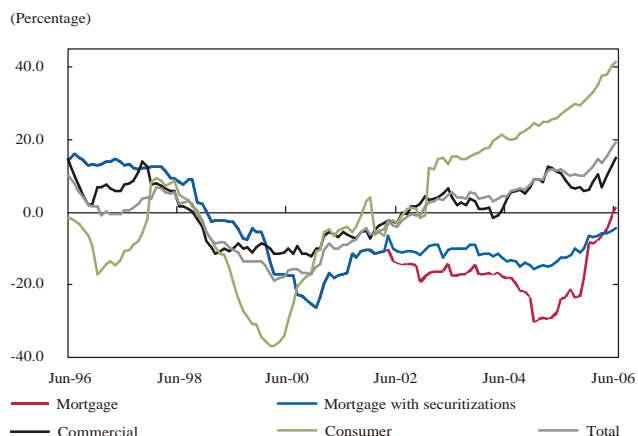
GRAPH 9

**INVESTMENTS BY CREDIT INSTITUTIONS**

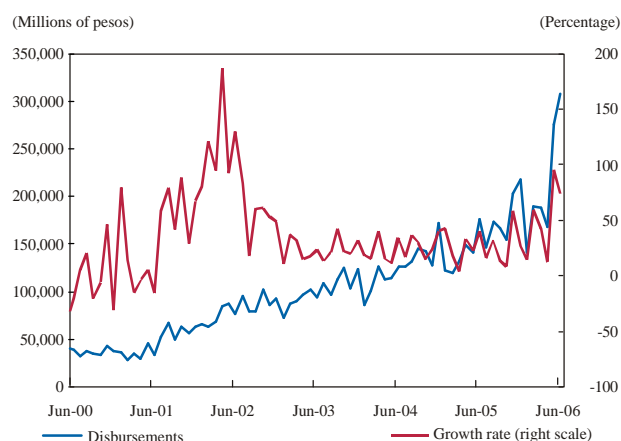


GRAPH 10

**REAL ANNUAL GROSS PORTFOLIO GROWTH FOR CREDIT INSTITUTIONS**



# MORTGAGE LOAN DISBURSEMENTS



Source: ICAV.

the historic high observed six months earlier.<sup>3</sup> Nonetheless, although it adds to financial depth (as is analyzed later in this report), it also is a signal for caution and careful monitoring, as growth of this magnitude can eventually include debtors who might not be creditworthy. As will be illustrated, recent developments in loan quality have begun to have an impact on the consumer loan portfolio.

During the first half of the year, the commercial loan portfolio recovered the momentum it lost during 2005. The standstill in 2005, as analyzed in earlier editions of this report, was due primarily to the fact that a good portion of the productive sector was using its own resources to finance working capital, rather than outside

funding. Given the fact that real annual growth in commercial loans went from 6.3% in December to 15% in June, it appears companies are again financing their operations through traditional sources, such as credit institutions.

Mortgage loans (without securitizations) saw affirmative real annual growth (1.6%) for the first time since the end of 1998. This reflects the consolidation of a positive trend observed since December 2004, when the growth in mortgage loans was -30%. The recovery is rooted in the trend in mortgage loan disbursements as of 2001 (Graph 11), which have risen steadily thanks to economic recovery and the recent decline in interest rates (Box 1 contains a detailed analysis of the forces behind the recent momentum in mortgage loans).

The sharp drop in outstanding securitized mortgage loans (20.3% during the period from June 2005 to June 2006) is an important factor to bear in mind. It is related to both the absence of new securitizations in the mortgage loan portfolio, as of September 2005, and the increased rate of repayment on securitized loans.

As illustrated in the upper panel of Graph 12, the positive performance of all the loan-portfolio components has allowed for greater financial depth.<sup>4</sup>

<sup>3</sup> Consumer loans now account for a fourth of the entire loan portfolio. Nearly a fifth of all consumer loans are credit card loans, which essentially constitute short-term funding with limited collateral.

<sup>4</sup> The micro-loan portfolio, which is not included in Graph 4, continues to register sharp growth (30.9% in real annual terms at June), although increasingly less so (the rate was 63.7% a year



Overall, the loan portfolio now accounts for 27.5% of GDP. However, as shown in the lower panel of Graph 12, financial depth is less than at the start of the eighties. Graph 12 (lower panel) underscores the historic importance of financial sector growth during the first half of the nineties (in terms of depth), and the rapid annual increase in the loan portfolio signals a recovery of the depth observed in past years.

#### a. *Liability Accounts*

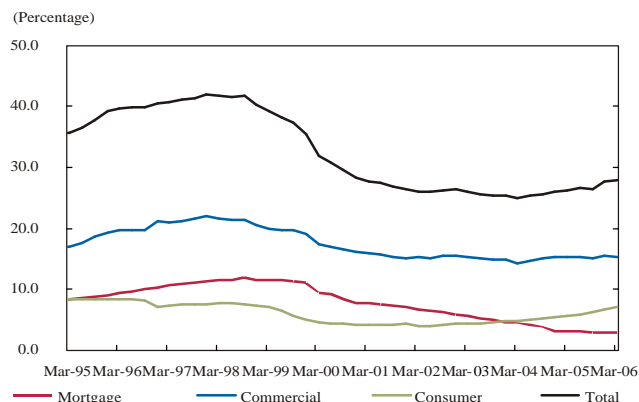
The period between June 2005 and June 2006 saw a real annual increase of 13.4% in total deposits with credit institutions. During the last 18 months, the momentum in deposits stabilized at around 14% and they totaled Col\$99.9 t by the end of the semester. As a share of total liabilities, they declined slightly to 78%.

Recent developments in the more important components of deposits with credit institutions (checking accounts, savings deposits and certificates of deposit) are illustrated in Graph 13, which shows a continued tendency among these institutions to replace their sources of financing with less costly instruments. For example, savings accounts, which are a low-cost source of funding, are the fastest growing component of deposits (20.8% at June). In contrast, the annual increase in certificates of deposit (CD) was 5.4%. Consistent with this trend, savings deposits accounted for 47% of total deposits in June (3 pp more than during the same month in 2005).

earlier). However, despite this vigorous momentum, it accounts for only 1.6% of all loans.

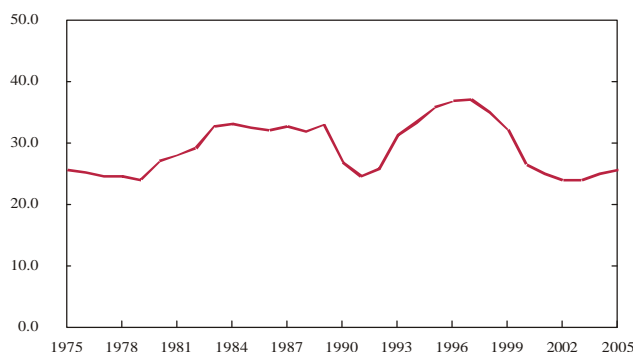
GRAPH 12

#### A. FINANCIAL DEPTH (PORTFOLIO/GDP)



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

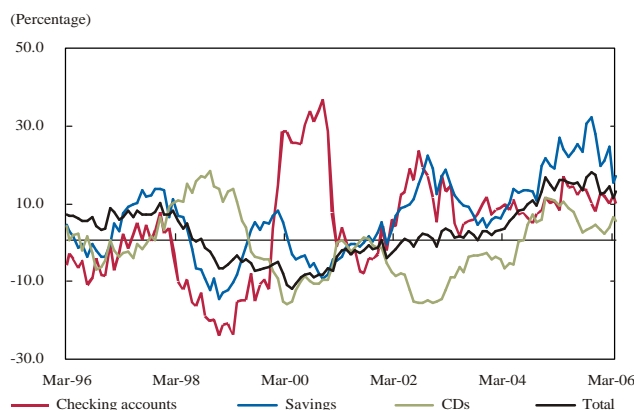
#### B. EXTENT OF FINANCIAL DEPTH (OUTSTANDING LOANS TO THE PRIVATE SECTOR AS A PERCENTAGE OF GDP, ADJUSTED BY THE 1994 PPP)



Source: Office of the National Superintendent of Financial Institutions. Federal Reserve Bank. Calculations by Banco de la República.

GRAPH 13

#### REAL GROWTH IN DEPOSITS WITH CREDIT INSTITUTIONS BY TYPE OF DEPOSIT



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

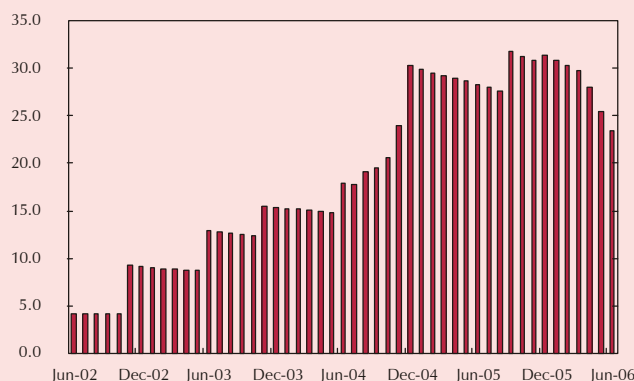
### THE RECENT TREND IN THE MORTGAGE MARKET

The serious credit crunch in the late nineties was significant for mortgage loans (Graph 12). Having accounted for 10.9% of GDP in 1998, they dropped to 3.3% of GDP in 2005. Although still at low levels, the mortgage loan portfolio (without securitizations) recently began to show positive growth rates, including a real annual increase of 1.6% at June 2006. Disbursements to individuals and builders amounted to Col\$1.27 t at June, which is an increase of 67% compared to the same month in 2005.

Strong competition among mortgage banks has expanded the mortgage loan portfolio. Several factors have made this situation possible. First and foremost, the construction sector has recovered from the crisis it experienced in the nineties and has grown steadily ever since. Secondly, the financial situation of households improved considerably after the economic crisis, as reflected in less unemployment, better real wages, less indebtedness and the recovery in housing prices. Thirdly, financing through the capital market has made it possible to develop a more solid funding scheme that avoids an excessive transformation of installments. Because of these factors, the securitized loan portfolio came to Col\$2.2 t at June of this year, following Col\$3 t in September 2005 (Graph B1.1). Lastly, as illustrated by the capital adequacy, profitability and loan-repayment indicators, the mortgage banks have recovered from the crisis.

These conditions allowed mortgage banks to reorganize. As a result, there is more competition within the sector, and recent average interest rates on disbursements for

**GRAPH B1.1**  
**SECURITIZED PORTFOLIO AS A PERCENTAGE OF THE MORTGAGE PORTFOLIO TOTAL**

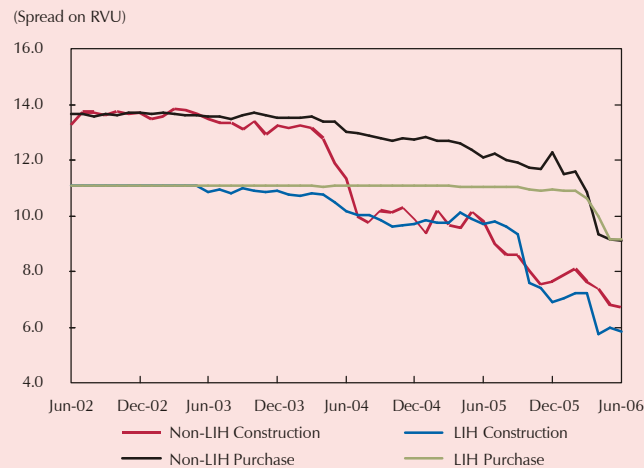


Source: Titularizadora Colombiana and the Office of the National Superintendent of Financial Institutions.

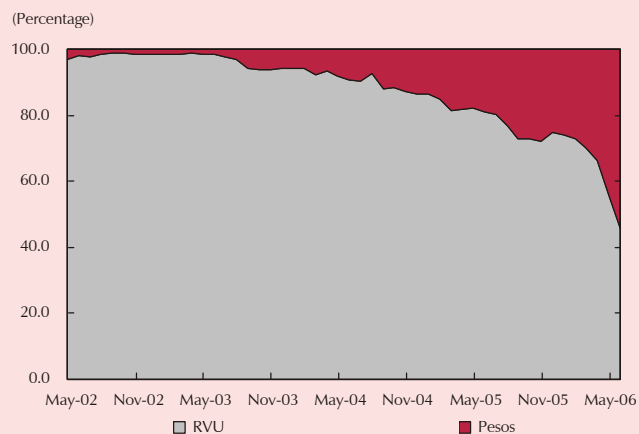
home purchases and construction have declined (Graph B1.2). This reduction has been the sharpest for the segment other than low-income housing (LIH), and the interest-rate reduction process has been accompanied by an increase in loans arranged in pesos. At June 2006, the share of loans disbursed in pesos (54%) exceeded the share in RVU (real value units) (46%) for the first time (Graph B1.3). This surge in peso loans could end up being costly for credit institutions, if interest rates jump significantly.

Sharp competition among mortgage banks has prompted a significant increase in mortgage loan prepayment. For example, in the case of the securitized portfolio at

**GRAPH B1.2**  
**AVERAGE INTEREST ON DISBURSEMENTS**

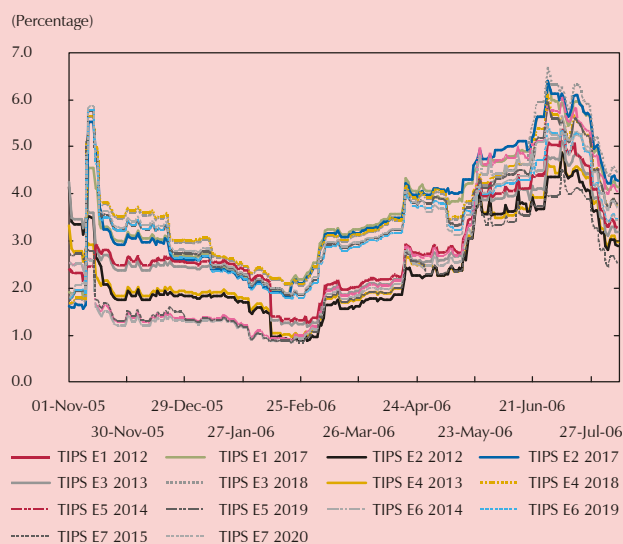


**GRAPH B1.3**  
**DISBURSEMENTS FOR HOME PURCHASE AND CONSTRUCTION, BY CURRENCY**



June of this year, outstanding TIPS were down by Col\$720 billion (b). The high prepayment rates (3.6% for LIH and 13.4% for non-LIH), which are well above historic averages, plus the sharp volatility experienced in the second quarter of this year, must have meant important valuation losses for the holders of these securities (Graph B1.4).

**GRAPH B1.4**  
**TREND IN TIPS RATES**



Source: Titularizadora Colombiana.

## 2. Exposure of Credit Institutions to Major Debtors

The real changes in exposure to major debtors during the period from June 2005 to June 2006 are summarized in Table 1. Total exposure was up to Col\$109.5 t mid-way through the year. This is an increase of 13.1% compared to the same period the year before. Considering the rate at the end of 2005 (12.2%), exposure to major debtors continued to grow. The private corporate sector is still the most important debtor (42.3% of exposure), with growth concentrated in the loan portfolio, which was up by 18.3% during the year.<sup>5</sup> In contrast, exposure to the public sector declined slightly (-1.5%). This reduction is particularly evident in the loan portfolio, due to central government policies aimed at substituting sources of financing.

<sup>5</sup> This entry is consistent with the recent recovery in commercial loans.

## EXPOSURE OF CREDIT INSTITUTIONS TO THEIR PRINCIPAL DEBTORS

Type	Jun-05		Jun-06		Real Annual Growth
	Trillions of Jun-06 pesos	Share (%)	Trillions of Jun-06 pesos	Share (%)	
<b>Public Sector</b>					
Portfolio	4.68	4.8	4.28	3.9	(8.6)
Securities	27.50	28.4	27.41	25.0	(0.3)
<b>Total</b>	<b>32.18</b>	<b>33.2</b>	<b>31.69</b>	<b>28.9</b>	<b>(1.5)</b>
<b>Corporate Private Sector</b>					
Portfolio	38.54	39.8	45.60	41.6	18.3
Securities	0.71	0.7	0.71	0.7	0.1
<b>Total</b>	<b>39.26</b>	<b>40.6</b>	<b>46.31</b>	<b>42.3</b>	<b>18.0</b>
<b>Household Sector</b>					
Portfolio	22.81	23.6	29.26	26.7	28.3
Consumer	15.32	15.8	21.65	19.8	41.3
Mortgage	7.49	7.7	7.61	6.9	1.6
Securitizations	2.56	2.6	2.27	2.1	(11.3)
<b>Total</b>	<b>25.37</b>	<b>26.2</b>	<b>31.53</b>	<b>28.8</b>	<b>24.3</b>
<b>Total Amount of Exposure</b>	<b>96.81</b>	<b>100.0</b>	<b>109.53</b>	<b>100.0</b>	<b>13.1</b>
<b>Ratio of amount exposed to assets</b>	<b>76.4</b>		<b>76.0</b>		

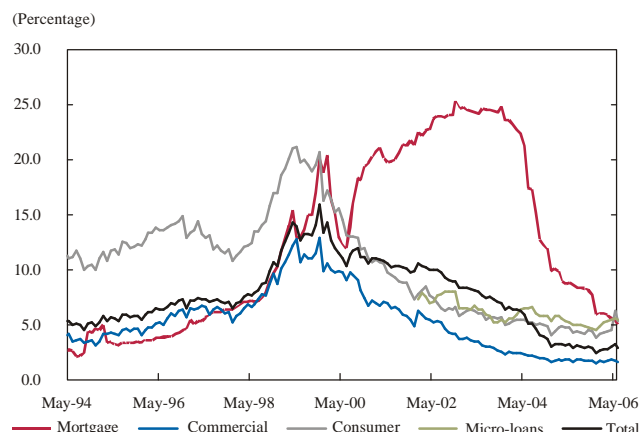
Source: Office of the National Superintendent of Financial Institutions and Banco de la República.

The increase in exposure to households is the only extraordinary change in the make-up of exposure to major debtors. At the end of the semester, household exposure was practically the same as exposure to the public sector. As mentioned earlier, consumer loans are the most dynamic component of household exposure. Advance payments on mortgage-backed securities have reduced exposure to investments of this type.

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

Recent trends in loan portfolio quality confirm what was suggested in the last edition of this report. Specifically, the types of loans exhibiting the strongest growth began to show signs of a decline in quality. The past due loan ratio (PDLR)<sup>6</sup> for each type of loan is shown in Graph 14. The PDLR for the entire loan portfolio stabilized recently and, in fact, has declined a bit (from 2.6% in December to 2.86% in June). This increase is due entirely to the deterioration

<sup>6</sup> The PDLR is calculated as the non-performing/gross loan ratio.

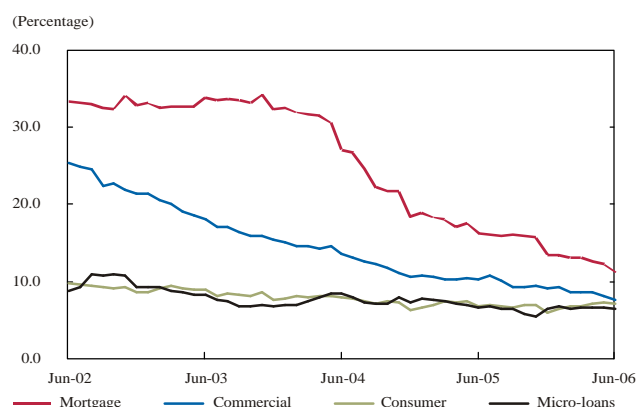
**GRAPH 14****PAST DUE LOAN RATIO  
BY TYPE OF CREDIT**

in consumer and micro-loans, which ended the semester at 4.6% and 5.4%, respectively. In the case of consumer loans, the PDLR is still at historically low levels.

Both the mortgage and commercial loan portfolios continue to improve in quality, having registered respective values of 4.8% and 1.6% at the end of the semester. These are below the values observed prior to the financial crisis.<sup>7</sup>

The increase in the consumer-loan PDLR as of December 2005 shows the non-performing loan portfolio has begun to grow faster than the total loan portfolio. This is the delayed result of the relaxation in risk policies underlying the recent momentum in consumer loans, which eventually allows for loans to less creditworthy debtors<sup>8</sup> and can create problems with financial system stability, since the consumer loan portfolio generally lacks sufficient collateral. Because consumer loans account for nearly 25% of all loans, a negative shock to households (the major debtors) could have an important impact on the system's performance. Consequently, the consumer loan portfolio must continue to be monitored carefully, and it is important to reiterate calls for the design of tools to adequately assess the risk to financial stability posed by consumer loans. This applies to credit institutions as well as regulators.<sup>9</sup>

The recent decline in the quality of the consumer loan portfolio also is evident if, as opposed to the non-performing portfolio, one considers the risky loans in the PDLR numerator (Graph 15), which increased from 5.6% of the gross loan portfolio in December to 6.7% in June.

**GRAPH 15****LOAN PORTFOLIO QUALITY:  
RISKY/GROSS PORTFOLIO RATIO**

<sup>7</sup> The drop in the PDLR does not necessarily imply an improvement in the risk-assessment policies applied to these loans. It is due merely to the fact that, although the PDLR denominator remains almost constant (the mortgage and commercial loan portfolios do not increase much), the numerator drops because of the recovery on non-performing loans.

<sup>8</sup> Given its short-term nature, the deterioration in consumer loans is mirrored more quickly on the balance sheet of credit institutions than other types of portfolios. This is important to bear in mind.

<sup>9</sup> The Office of the National Superintendent of Financial Institutions is designing a tool to assess and cover consumer-portfolio risk within the system, as a means of credit-risk management (SARC in Spanish).

Coverage for the riskiest loans (calculated as the ratio of loan-loss provision to risky loans) continued to increase during the first half of the year (Graph 16), having gone from 35.1% in June 2005 to 41.8% in June 2006. This recent expansion applies to all types of loans. Coverage for commercial and mortgage loans is historically high, as is coverage for the entire loan portfolio. As shown in the graph, consumer-loan-portfolio coverage tended to decline somewhat during the first months of the year, due to the rapid growth of the risky portfolio in this item. It is important to note that the increase in provisioning helps to maintain financial stability provided it stems from an adequate assessment of the credit risk institutions face. In this sense, the commercial credit-risk management system (SARC in Spanish), which was designed by the Office of the National Superintendent of Financial Institutions and is scheduled to take effect in January 2007, should be evaluated in light of its capacity to calculate the prevalence of credit risk at different stages in the economic cycle.

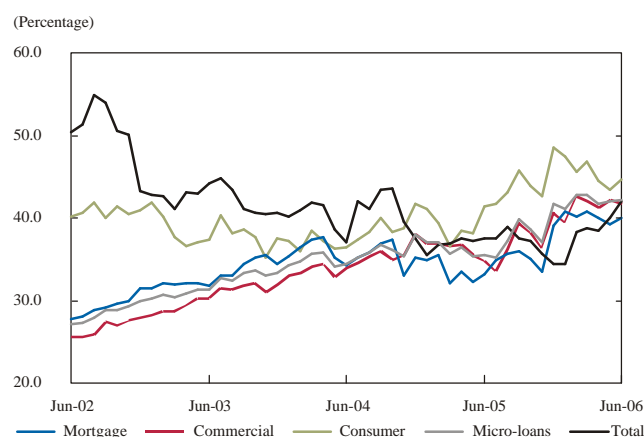
#### 4. Income, Profitability and Capital Soundness

At the end of the first six months of 2006, the earnings of credit institutions were in positive terrain. However, they had declined by 8.8% in real terms, compared to the same period in 2005, and totaled Col\$3.1 t on an annualized base.<sup>10</sup> This fact is particularly relevant when considering it represents the first negative growth in earnings on record since November 2002. Nonetheless, as shown in Graph 17, the drop was far from sudden, as the momentum in profits had been slowing gradually since mid-2003. In any case, although a reduction in profit growth is a normal event (taking into account the serious impact the crisis had on profits), the negative outcome in June can be explained by the volatility on the government bond market throughout the first half of the year.

This claim is supported in Graph 18 by a breakdown of the total earnings reported by credit institutions, listed by source. From August 1998 to

GRAPH 16

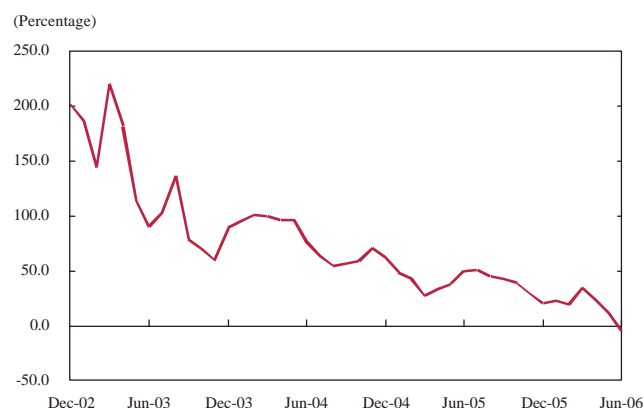
#### COVERAGE: PROVISIONING/ RISKY LOANS



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

GRAPH 17

#### ANNUAL GROWTH IN EARNINGS

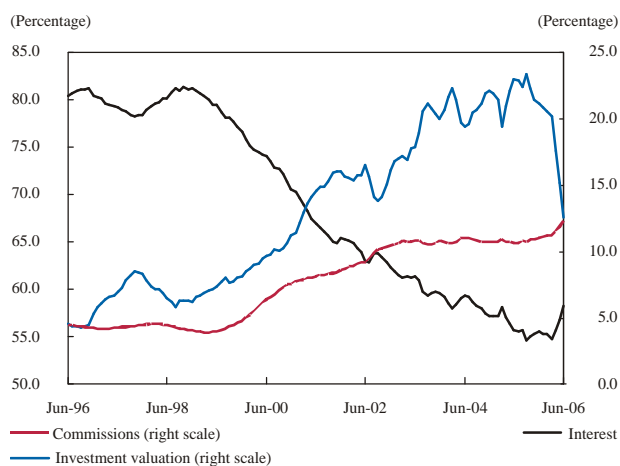


Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

<sup>10</sup> The real drop in earnings comes to 8.4% when compared to December 2005.

GRAPH 18

### MAKE-UP OF EARNINGS

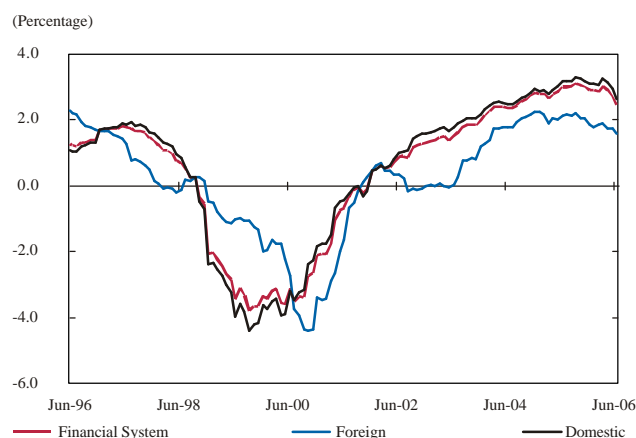


Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

November 2005, the share of income from securities valuation rose steadily, accounting for nearly 20% in November. The loan portfolio was responsible for most - but an increasingly smaller portion - of the income reported by credit institutions (54.6% in September 2005). Unfavorable developments in the market for domestic government bonds (the primary investment component) caused as sharp reversal of these tendencies during the early months of 2006, when the share of income from securities valuation declined by half (12.5%) and the share of loan income increased slightly to 58.2%. Income from commissions was still on the rise by the end of the first half of the year, when it accounted for nearly 12% of earnings.

GRAPH 19

### ASSET YIELD (AY)



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

In absolute terms, income from investment valuation registered an 80% drop between June 2005 and June 2006; loan portfolio income was up by 9.4%, which is not particularly high in light of last year's average (6.3%).<sup>11</sup> Consequently, the reduction in overall financial receipts (-0.6%) and, therefore, in earnings, was due entirely to investment valuation losses incurred by credit institutions, given the volatility of the domestic government bond market.

The trend in earnings is mirrored in less profitability for every peso in assets held by credit institutions. The ratio of earnings to assets (REA) for these establishments as a whole declined from 2.8% in December 2005 to 2.3% in June 2006 (Graph 19).

In short, less profitability for the system due to investment valuation losses, particularly on domestic government bonds, was examined in detail in earlier editions of this report, when it was argued that the system's exposure to domestic government bonds has caused a certain

<sup>11</sup> As will be illustrated, there has been a recent decline in the margin spread on the loan portfolio. Therefore, the rise in portfolio earnings indicates the sharp increase in the loan portfolio has more than offset the reduction in that margin.



amount of vulnerability to market risk. The trends summarized in this section are simply a materialization of that risk and vulnerability, which were then evident in the stress tests. For the future, the conclusion remains the same: with a repeat of these trends in volatility and interest rates, the system could continue to see its income and profitability decline. This would suggest that credit institutions need to maintain enough capital to deal with valuation losses.

The recent trend in the capital adequacy ratio of these establishments is illustrated in Graph 20 to analyze the soundness of their assets. Compared to December 2005, the ratio for credit institutions as a whole declined slightly throughout the first half of the year. The reduction was drastic, given the drop from 16% in January to 12.7% in June 2006. This last figure is less than the average for the decade to date (13.3%). Nonetheless, the capital adequacy ratio for the sector as a whole is still more than 3 pp above the minimum required by the Office of the National Superintendent of Financial Institutions. This means growth in intermediation activities is not restricted by capital positions.

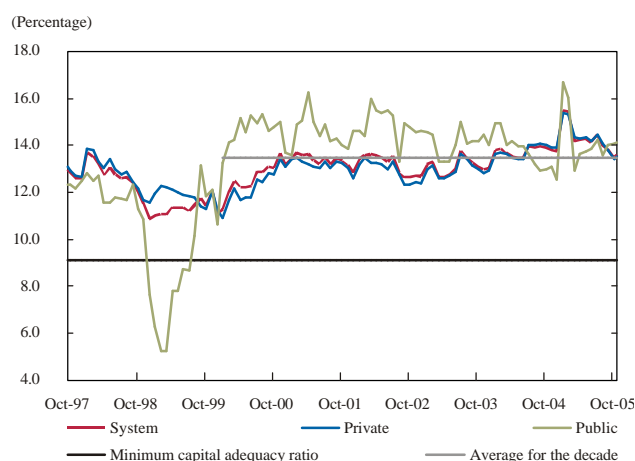
## 5. Margin Spreads

As noted in the last edition of this report, the sharp growth in consumer loans has been accompanied by a decline in interest rates on new loans. This could be a manifestation of increased competition among the financial intermediaries in this market. The *ex ante* margin on loans reflects that particular development, having gone from 16.2% in June 2005 to 13.2% in June 2006 (Graph 21). That same period also saw a nearly 3 pp reduction in the marginal rates on consumer loans. However,

<sup>12</sup> The *ex ante* margin is the difference between the marginal lending rates financial intermediaries charge on each type of credit and the deposit rate on CDs.

GRAPH 20

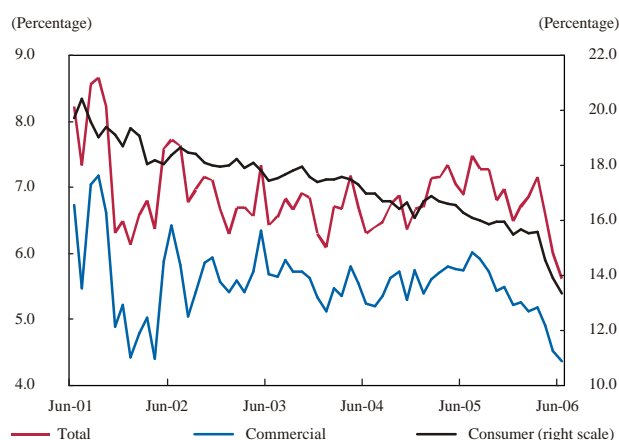
### CAPITAL ADEQUACY RATIO OF CREDIT INSTITUTIONS



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

GRAPH 21

### EX ANTE MARGIN SPREAD, USING THE CD LENDING RATE



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

the deposit rate on CDs remained relatively stable. Since December 2005, there has been a sustained increase in that rate and a downturn in interest on consumer loans. This is consistent with a 2.1 pp reduction in the margin spread on consumer loans compared to the figures published in the last edition of this report.

For other types of credit, the *ex ante* margin also decline compared to June 2005. As an example, the margin on commercial loans was down by 1.4 pp; this reduction has been steady since 2005. The total margin for the system declined by 1.3 pp in one year and was 5.6% at June 2006 (Graph 21).

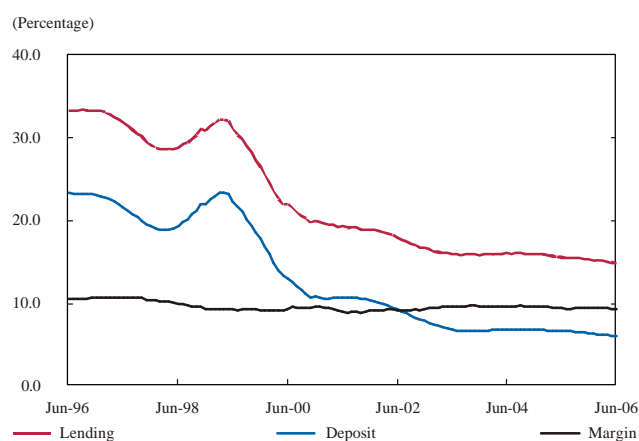
The *ex post* margin<sup>13</sup> shrunk a bit, to about 8.8% (Graph 22). Although the implicit lending rate was down by 0.4 pp compared to the figures published in the last edition of this report, that reduction was offset, in part, by a 0.3 pp decline in the implicit deposit rate. At June 2006, the implicit lending and deposit rates were 14.4% and 5.6%, respectively.

In addition to heightening competition among financial intermediaries, the recent decline in the margin spread is associated with the fact that credit institutions have become more efficient. An approximation to that efficiency is shown in Graph 23, where the ratio of administrative and labor expenses (ALE) to average assets is calculated for these establishments as a whole. As indicated by the Graph, efficiency has improved. For example, in April 2003, every Col\$100 in assets implied Col\$6.7 in ALE, as opposed to Col\$5.4 in June 2006. This is a historic low for the period in question.<sup>14</sup>

In short, despite the volatility on the government bond market, interest rates and margin spreads

**GRAPH 22**

**EX POST MARGIN SPREAD**



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

**GRAPH 23**

**EFFICIENCY: RATIO OF ADMINISTRATIVE AND LABOR EXPENSES TO AVERAGE ASSETS**



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

<sup>13</sup> The *ex post* margin is calculated as the difference between the implicit lending rate and the implicit deposit rate, the first being income from interest and adjustment for currency devaluation as a percentage of the producing portfolio, and the second, outlays for interest as a percentage of the liabilities with cost.

<sup>14</sup> However, in recent years, the financial sector has shifted the make-up of its total assets towards tradable securities. This also might have had something to do with the improvement in the efficiency indicator, without intermediation necessarily having become less costly.

were quite stable. This contributed to the increase in financial intermediation activities in an environment where credit institutions experienced problems with their investment portfolios.

## B. NON-BANK FINANCIAL INSTITUTIONS

The present section offers an analysis of the major non-bank financial institutions in Colombia.<sup>15</sup> As shown in Table 2, the size of the investment portfolio of these institutions and their importance within the financial system has grown considerably in recent years. Nonetheless, 2006 saw a slowdown in the growth of the investment portfolio held by some of these institutions, due to the unfavorable situation on the markets where most of their investments are concentrated. The market for domestic government bonds and the stock market are two examples.

<sup>15</sup> Included in this analysis are pension-fund managers (PFM), life and general insurance companies, ordinary mutual funds (OMF), special mutual funds (SMF), both of which are managed by trust companies, and brokerage firms (SF). This is the first time brokerage firms have been included in the analysis in this report.

TABLE 2

### INVESTMENT PORTFOLIO: FINANCIAL INSTITUTIONS

	2003		2004		2005		2006 (june)	
	Trillions of pesos	% of GDP	Trillions of pesos	% of GDP	Trillions of pesos	% of GDP	Trillions of pesos	% of GDP (proj)
<b>Credit Institutions</b>								
Investments	28.81	12.46	36.93	14.30	43.93	15.48	40.65	14.43
Portfolio	57.45	24.85	66.06	25.57	77.09	27.16	88.18	31.31
<b>Total: Credit Institutions</b>	<b>86.26</b>	<b>37.31</b>	<b>102.99</b>	<b>39.87</b>	<b>121.02</b>	<b>42.64</b>	<b>128.83</b>	<b>45.75</b>
<b>Non-bank Financial Institutions</b>								
Mandatory Pensions <sup>a/</sup>	20.34	8.84	26.45	10.33	36.58	12.86	38.03	13.50
Voluntary Pensions <sup>a/</sup>	3.77	1.64	4.49	1.76	7.33	2.58	8.03	2.85
Severance Pay <sup>a/</sup>	2.74	1.19	3.13	1.22	3.71	1.30	4.39	1.56
General Insurance	2.47	1.07	2.84	1.11	3.62	1.27	3.57	1.27
Life Insurance	3.55	1.54	4.38	1.71	5.82	2.04	5.76	2.05
OMF	3.98	1.73	4.52	1.77	5.33	1.87	4.19	1.49
SMF	1.83	0.80	1.93	0.75	3.12	1.10	1.95	0.69
Stockbrokers <sup>b/</sup>	1.77	0.77	2.78	1.09	4.18	1.47	3.52	1.25
<b>Total: Non-bank Financial Institutions</b>	<b>40.45</b>	<b>17.58</b>	<b>50.52</b>	<b>19.74</b>	<b>69.70</b>	<b>24.49</b>	<b>69.44</b>	<b>24.66</b>
<b>Total</b>	<b>126.71</b>	<b>54.89</b>	<b>153.51</b>	<b>59.60</b>	<b>190.72</b>	<b>67.13</b>	<b>198.27</b>	<b>70.40</b>

<sup>a/</sup> The investment portfolio in May.

<sup>b/</sup> Own position.

(proj) Projected.

Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

## 1. Pension Fund Managers (PFM)

### a. Portfolio Growth

The PFM-managed portfolio at May 2006 was valued at Col\$50.5 t. This is equivalent to a real annual increase of 27.1%. Unlike other non-bank financial institutions (NBFI), the PFMs continued to grow. As a result, their importance in the markets where their investments are concentrated has increased. For example, in June 2006, PFMs held 17.42% of all outstanding TES in circulation, as opposed to only 7.6% in December 2000.

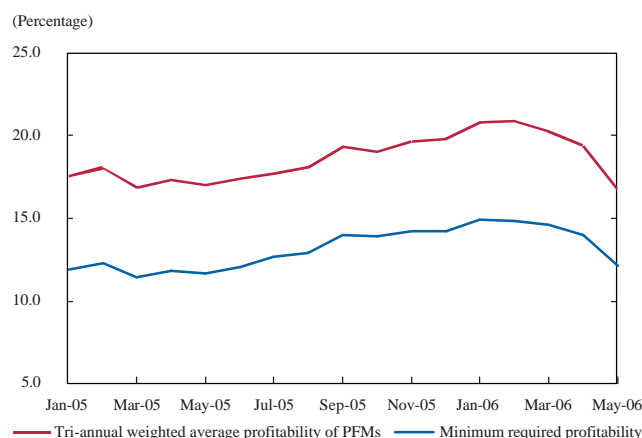
In terms of earnings, recent PFM yields have been affected substantially. At June 2006, credited yields<sup>16</sup> on pension and severance funds were negative (-Col\$1.8 t). Compared to the yields reported in June 2005, the foregoing figure implies an absolute variation of Col\$4.5 t. This is equivalent to 9.3% of the total value of these funds as a whole and depicts a significant negative impact on earnings.

Most PFM holdings consist of mandatory pension funds (MPF) (76.8%). By May and despite lower yields, these funds had seen a real annual increase of 25.5%. This is explained by the number of active subscribers, which continues to grow at a significant pace,<sup>17</sup> mainly due to the improvement in economic activity.

The accumulated profitability of MPF during the three previous years (the period used to calculate minimum profitability) was 16.6% at May. This follows a change in tendency during the second quarter of the year (Graph 24), due primarily to variations in the price of domestic government bonds. In the case of MPF, this is where 46.7% of the value of the fund is concentrated. On average, the system is 5.5 pp above minimum required profitability,<sup>18</sup> which has been adjusted in light of the unfavorable situation.

GRAPH 24

#### PROFITABILITY OF MANDATORY PENSION FUNDS



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

<sup>16</sup> This is defined as the difference between the sum of operational and non-operational income and the sum of operational and non-operational expenses.

<sup>17</sup> By March, the annual increase in active MPF subscribers was 13.6%.

<sup>18</sup> At the individual level, the MPF closest to the required minimum profitability registers 3.61 pp.

## b. Portfolio Composition

### i. Breakdown by Issuer

The government remains the principal counterpart in the PFM investment portfolio, even though there has been somewhat of a decline in exposure to this counterpart (Graph 25). In December 2004, public debt paper accounted for 49.5% of the value of PFM-managed funds. By May, this portion had declined to 45.2%. The external sector is the issuer that has increased its share of the PFM portfolio the most: from 10.7% to 15.99%.

Although TES account for a smaller share of the total value of the PFM portfolio and exposure to the domestic private sector continues, these funds have increased their investment stock in domestic government bonds and stocks. Between December 2005 and May 2006, their TES and stock holdings were up by Col\$1.1 t and Col\$847 b, respectively.

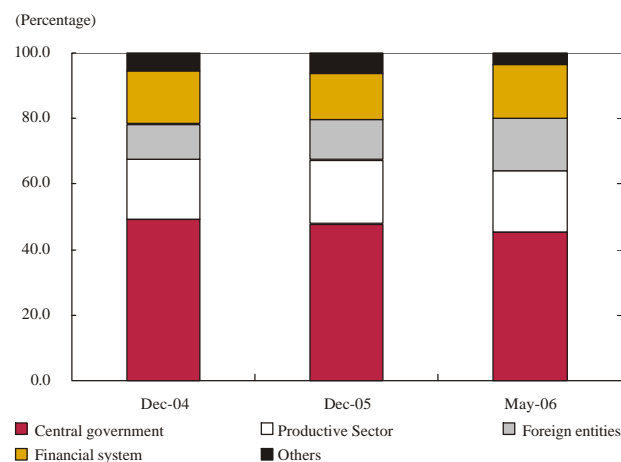
### ii. Breakdown by Type of Currency

Efforts to restructure the investment portfolio denominated in pesos seem to have slowed in recent years. This may be associated with the loss in value of instruments denominated in pesos and PFMs' increased demand for dollars in the last few months. The latter reflects of the increased share of the portfolio denominated in dollars, which rose from 11.45% of the total value of the portfolio to 13.13% for the same period. Additionally, the RVU-denominated portfolio continued to decline, accounting for 30.5% of the total value of the funds at May 2006 (Graph 26).

The PFM portfolio has seen more exchange exposure in recent months (Graph 27). This is a major change with respect to the way the system had behaved. The biggest difference was in voluntary pension funds, where the uncovered portfolio denominated in foreign currency went from 7.6% in February 2006 to 19.6% in May of this year. In the case of mandatory pension funds, this proportion reached 10.4%, on average, which is a long ways from the

GRAPH 25

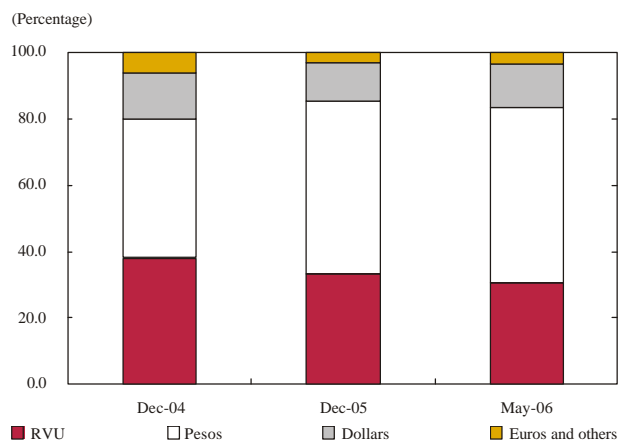
PFM PORTFOLIO COMPOSITION, BY ISSUER



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

GRAPH 26

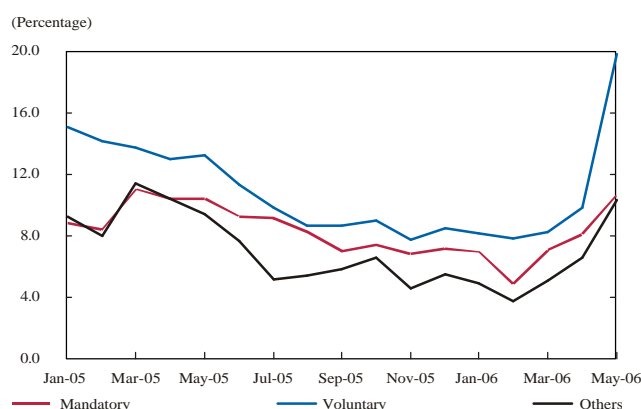
PFM PORTFOLIO COMPOSITION, BY CURRENCY



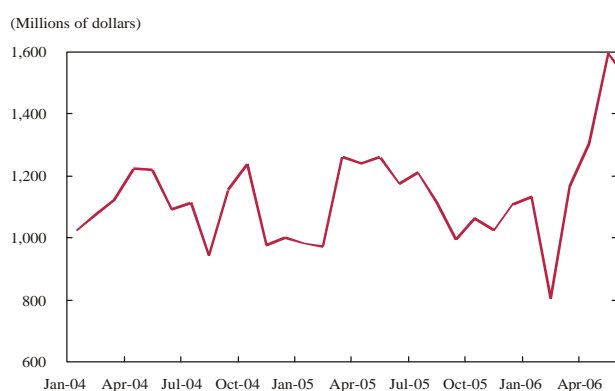
Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

GRAPH 27

**A. PERCENTAGE OF THE VALUE OF THE PORTFOLIO DENOMINATED IN FOREIGN CURRENCY, WITHOUT COVERAGE**



**B. MPF: NET COVERED SECURITIES IN FOREIGN EXCHANGE CURRENCY**



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

limits set by the Office of the National Superintendent of Financial Institutions (20%).

The build-up in exchange exposure also is evident in the position of investments denominated in foreign currency. In the case of MPF (Graph 27, upper panel), these were up by US\$408 m during the first half of the year. This is a dramatic change compared to recent years, when outstanding investments in foreign currency remained relatively constant.

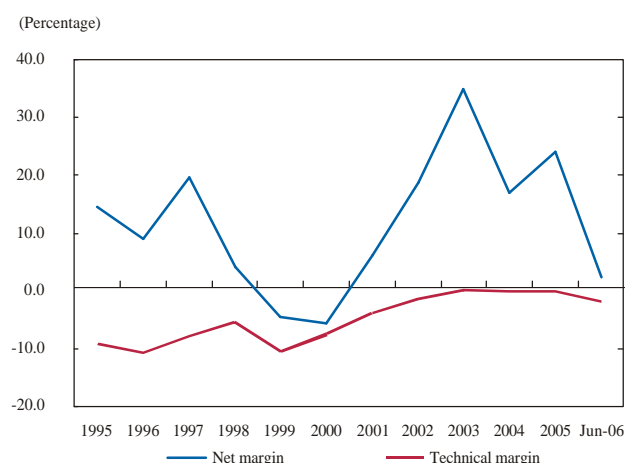
## 2. Life and General Insurance

Life insurance companies (LIC) reported Col\$5.8 t<sup>19</sup> in investments at June 2006. General insurance companies (GIC) reported Col\$3.7 t.<sup>20</sup> In real terms, the LIC expanded their investment portfolio by 10.1% and the GIC, by 17.4%. These are smaller increases than those observed previously. The ratio of investments to technical reserves is virtually the same with respect to June of last year.

As mentioned in previous editions of this report, earnings in the insurance business have not been altogether favorable, and the sector's profitability depends heavily on the way its investments perform. The trend in the technical margin<sup>21</sup> (Graph 28), which shows the return on insurance activity per se, remains in negative and near-zero terrain, which is not unusual for the insurance business.<sup>22</sup> In and of itself, this outcome is quite positive for the insurance industry compared to the past, when the technical margin was extremely unfavorable. The improvement is the result of a better measurement of claims by the insurance

GRAPH 28

**MARGINS IN THE INSURANCE SECTOR**



Source: Fasescolda.

<sup>19</sup> Equivalent to 1.21 times the technical reserve.

<sup>20</sup> Equivalent to 1.19 times the technical reserve.

<sup>21</sup> Defined as the ratio of business returns to premiums issued.

<sup>22</sup> Broadly speaking, insurance companies obtain their profits from investments made with the resources they receive from the insured.

sector. Nonetheless, the net margin,<sup>23</sup> which evaluates the overall performance of insurance companies, including the return on their investments, changed course and also is at levels not seen since 2000 (the net margin was 1.8% at June 2006).

The decline in the net margin for the insurance sector is due essentially to fewer yields on investments. In the case of GIC, their investments showed a return of Col\$184 b, which is equivalent to a real annual variation of -32.3%. The return on investments by LIC came to Col\$142.3 b. This amounts to a real annual reduction of -71.6%.

The unfavorable trend in GIC and LIC investments is explained by adverse performance on the markets where these companies have most of their investments. The government is the insurance sector's main counterpart (Graph 29). In fact, 52.5% of the LIC portfolio is exposed to that issuer, compared to 41.5% for GIC. Instruments issued by the productive sector (mainly stocks) account for 28% of the LIC portfolio and 32.8% of the GIC portfolio.

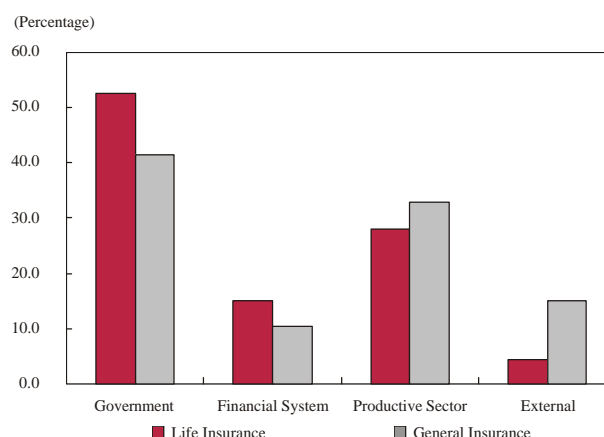
### 3. Special and Ordinary Mutual Funds (SMF and OFM)

At June 2006, OMF and SMF-managed portfolios were valued at Col\$4.2 t and Col\$1.9 t respectively, which amounts to real respective annual reductions of 18.6% and 20.3%. These sizeable declines are associated with a drastic change in the terms and conditions governing the profitability of such funds. Graph 30 shows a drop in average OMF profitability since April, while the volatility of these funds has increased.

Considering the general outcome for funds managed by trust companies, earnings at June 2006 were down by Col\$73.5 b in the case of OMF, compared to June 2005. This variation is equivalent to 1.8% of the total value of these funds and is explained

GRAPH 29

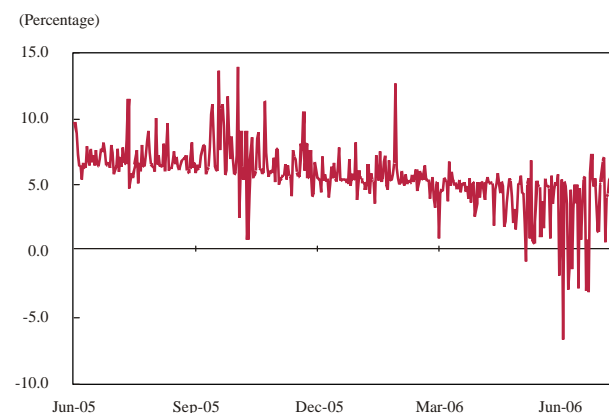
#### INVESTMENT PORTFOLIO OF GENERAL AND LIFE INSURANCE COMPANIES



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

GRAPH 30

#### OMF DAILY AVERAGE WEIGHTED PROFITABILITY

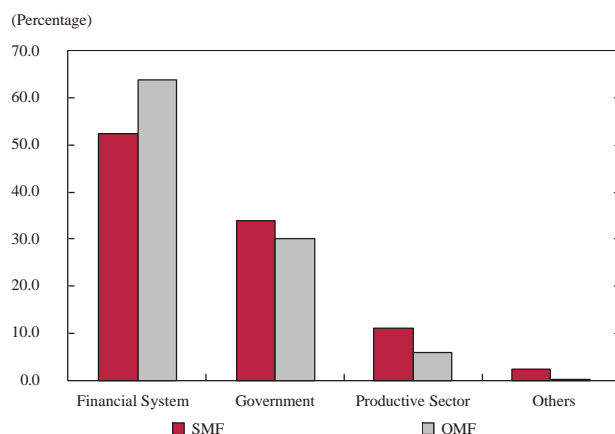


Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

<sup>23</sup> Defined as the ratio of net profits to premiums issued.



OMR AND SMF INVESTMENT PORTFOLIO  
BY ISSUER AT JUNE 2006 (Col\$6.1 T)



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

primarily by Col\$104.1 b less profit due to valuation losses on the public domestic debt. This is an annual variation of 48.4%.

In terms of portfolio exposure by issuer (Graph 31), there were no changes with respect to what was noted in the last edition of this report. The financial sector is the main counterpart. This is the primary difference between these funds and the other NBFI. The financial sector accounts for 63.9% of all OMF investments and 52.5% in the case of SMF. The vast majority of this exposure to the financial sector is in the form of CDs.<sup>24</sup> High exposure to deposits of this type can create liquidity problems for these funds. However, their exposure to market risk is much less than with other types of assets.

#### 4. Brokerage Firms (BF)

At June 2006, brokerage firms reported Col\$3.5 t in investments with respect to their own position.<sup>25</sup> During the same period, they had Col\$3.9 t in assets, which is equivalent to 4.8% real annual growth. Their earnings were down by Col\$56.6 b compared to June 2005. In real terms, this is a reduction of 77.7% and was due mainly to the situation on the markets in the second quarter of 2006. The rate of return on equity (ROE) for brokerage firms as a whole went from 15.12% to 2.51% during the same period. At the individual level, some incurred losses equivalent to more than 50% of their equity capital.

Brokerage firms manage Col\$1.5 t in third-party funds and, like most other NBFI, they are highly exposed to public debt securities. In fact, 45% of this portfolio is invested in these types of securities (Graph 32). Nonetheless, a large portion (31.9%) consists of derivative instruments, which means less real exposure to the various issuers. Underlying 47.6% of these contracts are public debt securities, the counterparts of which

<sup>24</sup> In the case of OMFs, these account for 51.7% of the funds' value. The equivalent in the case of SMFs is 33.1%.

<sup>25</sup> These pertain to the investments and derivative instruments in the assets of these firms.

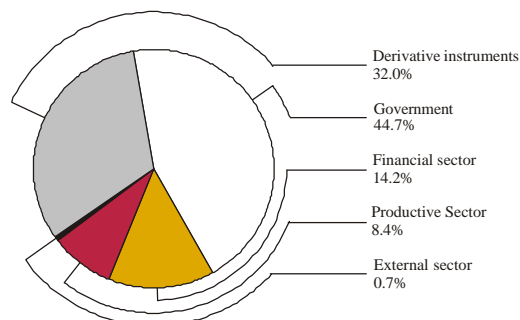


pertain to the financial and productive sectors (14% and 8% of the total portfolio, respectively).

In conclusion, non-bank financial institutions were generally hard hit by the extreme volatility on domestic markets, which reduced the growth in their investment portfolios due to their emphasis on domestic market instruments. The risk implied by concentrating their assets in public debt securities and stocks, to which many of these companies were highly exposed, has materialized.

GRAPH 32

**BF-MANAGED PORTFOLIO EXPOSURE,  
BY ISSUER PORTFOLIO VALUE AT JUNE 2006  
(COL\$1.5 T)**



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

### III. RECIPIENTS OF LOANS FROM THE FINANCIAL SYSTEM: THE CURRENT SITUATION AND PROSPECTS

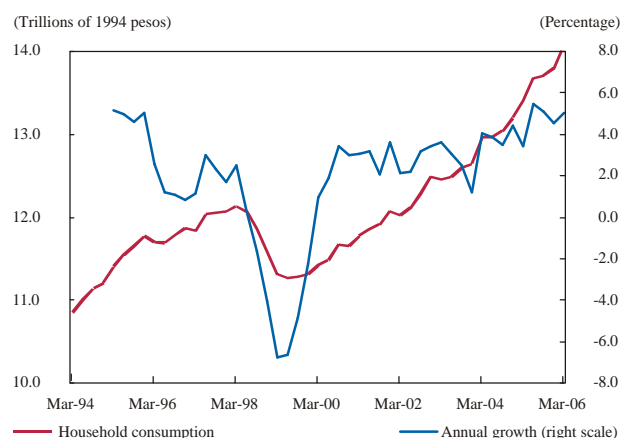
#### A. HOUSEHOLDS

##### 1. Household Finances

The momentum in household consumption remains positive, with 5% real annual growth in the first quarter of 2006, which is less than the variation observed in the second quarter of 2005 (5.5%, Graph 33). Much of this development in household spending is due to increased consumption of durables (18%) and semi-durables (4.6%); and, on a lesser scale, to the consumption of services (4.2%) and non-durable goods (3.5%).

GRAPH 33

#### HOUSEHOLD CONSUMPTION (SEASONALLY ADJUSTED SERIES)



Source: DANE. Calculations by Banco de la República.

Despite having declined as a share of GDP during the second and third quarters of 2005, consumption began to recover in the last quarter of 2005 and the first quarter of 2006, stabilizing at around 62% (Graph 34). It is important to note that the increase in consumer loans reflects the positive trend in the real growth of household consumption, particularly consumption of durable and semi-durable goods.

The job market also has been fundamental to the increase in household consumption. Thanks to positive momentum since 2005, unemployment is down and the occupation rate is up. Compared to June 2005, the unemployment rate has gone from 14% to 12.4% (Graph 35). Underemployment experienced an increase in March of this year, with

rates above those of the two previous years. It reached a high of 33% in May 2006 before dropping to 31.3% in June (1 pp more than in June 2005).

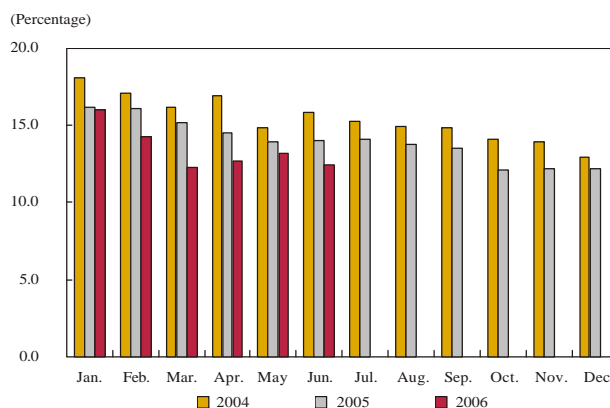
Compared to previous years, the trend in the occupation rate has been favorable as of February 2006. In June, it was 55.3%, which is 2 pp higher with respect to the same month in 2005 (Graph 36). The rise in this indicator is associated with the fact that positive growth in the working-age population between these months was substantially less (2.6%) than the increase in the employed population (6.5%).

Real wages continued to rise, as they have since the second quarter of 2005 in the case of manufacturing jobs, and since the start of 2006 for retail trade. Consequently, at June 2006, the annual growth in real wages was 3.49% for manufacturing and 2.8% for retail trade (Graph 37). This real wage trend, coupled with the increase in employment, confirms the improvement in conditions on the job market during the second quarter of 2006.

In conclusion, household financial health can be said to have benefited from the positive trend in both

GRAPH 35

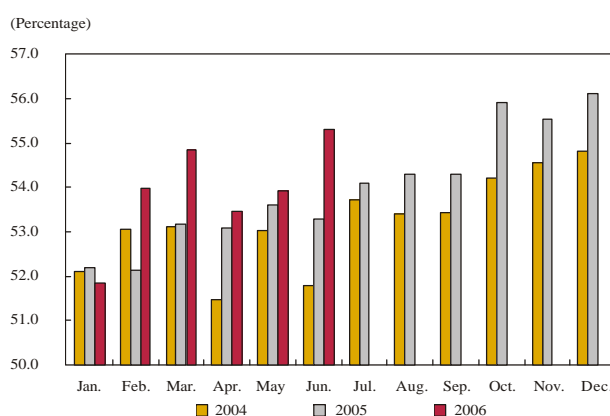
### UNEMPLOYMENT RATE



Source: DANE. Calculations by Banco de la República.

GRAPH 36

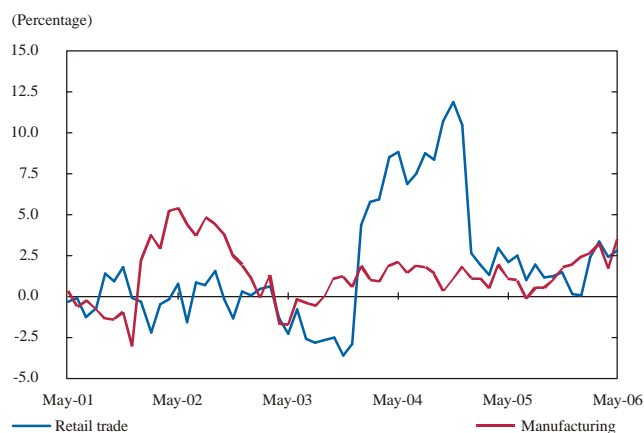
### OCCUPATION RATE



Source: DANE. Calculations by Banco de la República.

GRAPH 37

### ANNUAL GROWTH IN THE REAL WAGE INDEX



Source: DANE. Calculations by Banco de la República.

GRAPH 34

### HOUSEHOLD CONSUMPTION AS A PERCENTAGE OF GDP



Source: DANE. Calculations by Banco de la República.

employment and wages. From the standpoint of financial system stability, these conditions spell less of a financial burden for households and, as a result, help to improve prospects for loan repayment. In any case, given the recent trend in the quality of the consumer loan portfolio, it is important to continue to regularly monitor the tendency in household loan repayment, as well as the variables that might affect household solvency, including the set of indicators examined in this section.

## 2. Prospects

The trend in household expectations for the Colombian economy is positive,<sup>26</sup> having reached 29.3 points in July 2006, despite being less than in June 2006 (34.8). Agents are now far more optimistic than they were during the two previous years. The expectations in January 2004 were the only exception (Graph 38).

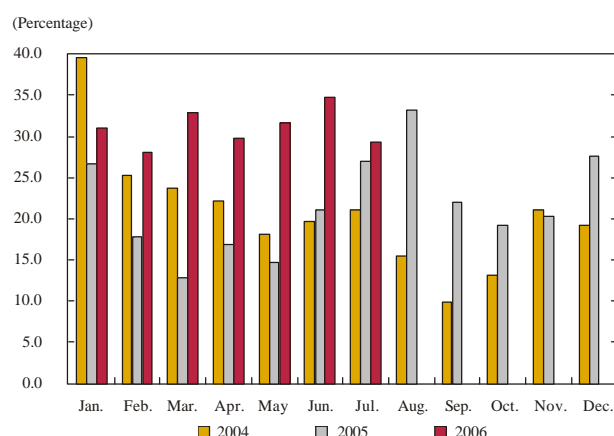
The durable goods buying perception indicator has been on the rise since December 2005. It hit an all-time high of 29.2 points in May 2006 and oscillated around 25 points in July 2006. This increase of 2.7% with respect to the year before is primarily due to growth in the automotive vehicle and durable goods buying index during 2006, returning to a tendency not seen since mid-2005 (Graph 39).

At 48.1 points, the home buying perception index in July 2006 was 29.4 points higher than in July 2005. This is, however, less than the historic high in May 2006, when the indicator reached 50.6 points. Consolidation of the growing trend in this indicator throughout 2006, compared to the downturn witnessed in the second half of 2005, (Graph 39) is an important fact to consider.

Also significant is the ratio of the trend in consumer expectations to the trend in household consumption of these items. There has been a close correlation between household expectations and consumption (Graph 40) since the third quarter of 2005. As noted

GRAPH 38

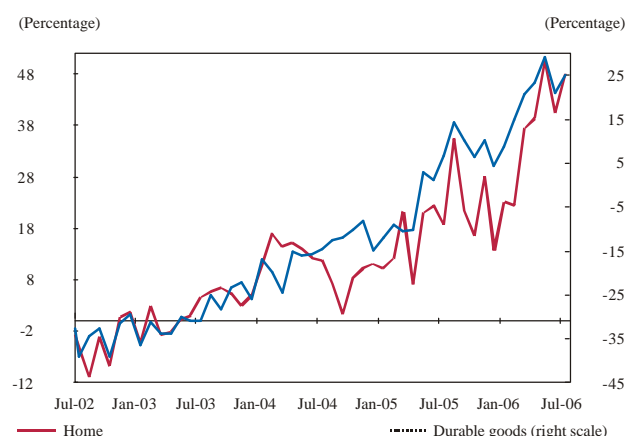
### CONSUMER EXPECTATION INDEX



Source: Fedesarrollo.

GRAPH 39

### HOME AND DURABLE GOODS BUYING PERCEPTION INDEX (\*)



(\*) Percentage of households that believe it is a good time to buy, minus the percentage that do not.  
Source: Fedesarrollo.

<sup>26</sup> The Consumer Expectation Index calculated by Fedesarrollo is an attempt to measure these expectations.

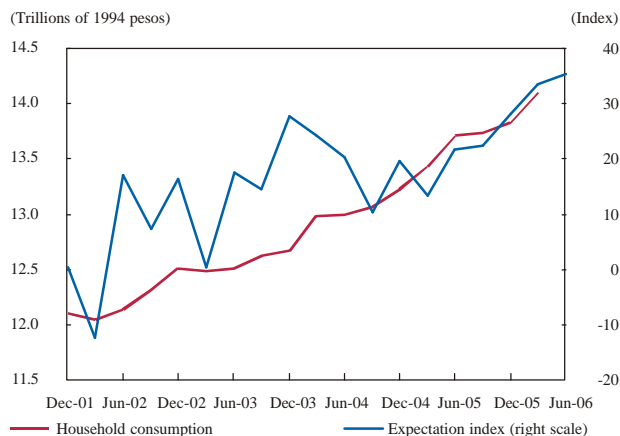
in the last edition of the *Financial Stability Report*, this would imply a continuation of the upward trend in household consumption.

The upward trend in the durable-goods and home-buying index has materialized in the form of added household consumption, as reflected in the increase in real sales of automobiles (20.85%), in durable goods consumption (18%) and in housing (1.3%). Accompanying the growth in these items is an increase in the consumer loan portfolio and in disbursements for home buying, as was mentioned in the section on credit institutions. If currently-favorable market conditions continue and the forecasts for 2006 prove to be correct, these items would continue to grow, supported by increased borrowing. These tendencies are also backed by the downward trend in real marginal rates on loan disbursements (Graph 41) and by housing price stability.

In short, the current momentum in private consumption will likely continue in the months ahead, provided favorable household expectations and current financial conditions persist. Insofar as part of this momentum is financed by consumer loans (a likely prospect given the force of tradable goods consumption), the consumer loan portfolio probably will continue to increase with the vigor seen to date. As emphasized repeatedly throughout this report, it is important that this vigor prompt increased efforts to adequately measure the credit risk posed by the consumer loan portfolio

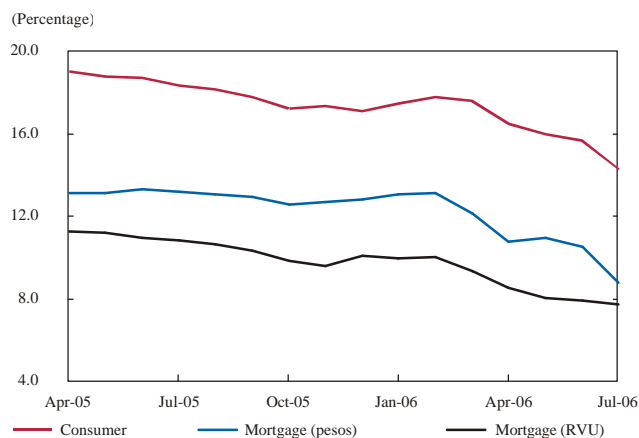
GRAPH 40

#### HOUSEHOLD CONSUMPTION AND CONSUMER EXPECTATION INDEX



GRAPH 41

#### TASA DE LOS DESEMBOLSOS REAL, HIPOTECARIA Y DE CONSUMO (\*)



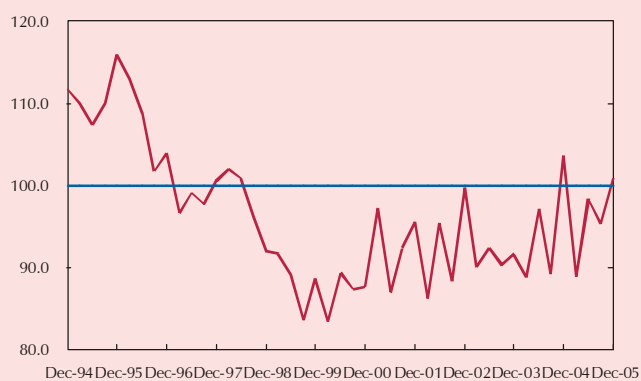
## THE ASSET PRICE BUBBLE

The purpose of this section is to review the evidence of speculative bubbles in asset prices in Colombia, specifically by analyzing the home-mortgage and stock markets. As in previous editions of this report, a price-to-earning ratio is calculated to analyze the markets in question.<sup>1</sup>

Two indicators are constructed to determine the presence of a bubble in the home-mortgage market. One is the ratio of the used-housing price index (IPVU in Spanish) to the rent index calculated by *Banco de la República*. The other is the ratio of the new-housing price index (IPVN in Spanish), calculated by the National Department of Planning, to the rent index. Deviations from the long-term average are plotted on a graph.

As shown in graphs B2.1 and B2.2, the price-to-earning ratios on the new and used housing markets are very near their long-term level,<sup>2</sup> which rules out the existence of bubbles in the market. However, one must be cautious about these findings, as aggregate data were used to construct both the numerator and denominator of the indicators.

**GRAPH B2.1**  
**USED HOME PRICE -TO-RENT RATIO**  
**AVERAGE (1988-2005) = 100**



Source: Calculations by Banco de la República.

<sup>1</sup> The method involves dividing the asset price index by the index of the return it offers. The resulting ratio then is compared to the long-term value of the asset to measure how much the market in question is overvalued.

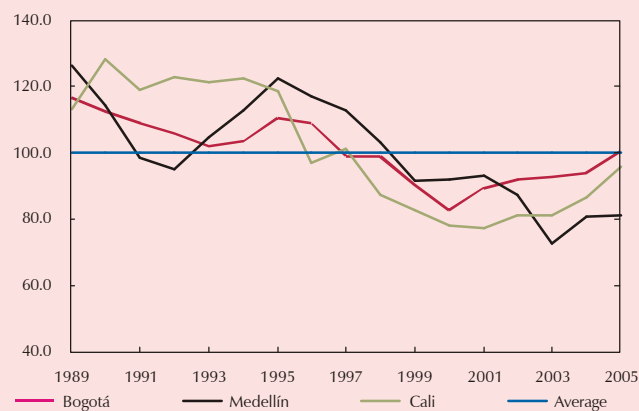
<sup>2</sup> The IPVU is a series developed by Banco de la República. Its construction is explained in Escobar, Huertas, Mora and Romero (2005). "Índice de precios de la vivienda usada en Colombia-PVI-Método de Ventas Repetidas," in Borradores de Economía, Banco de la República, No. 368, December.

**GRAPH B2.2**  
**NEW HOME PRICE-TO-RENT RATIO**  
**AVERAGE (1988-2006) = 100**



To overcome this difficulty, the IPVU figures were broken down in accordance with the three major cities and the type of housing. Graph B2.3 shows the IPVU ratio and the rent index for Bogotá, Medellín and Cali. In December 2005, none of the three showed evidence of a mortgage bubble. In the last year of study, the city with the highest prices was Bogotá, followed by Cali and Medellín. Graph B2.4 shows the IPVU ratio and the rent index for low-income housing (LIH) and housing outside this category (non-LIH).<sup>3</sup> The graph enables us to conclude there was no bubble in any of these markets during

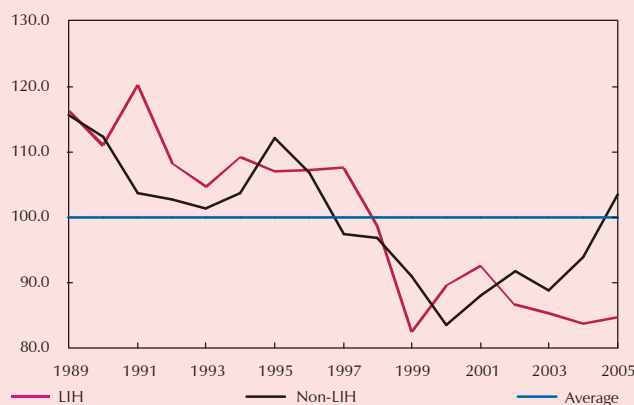
**GRAPH B2.3**  
**USED HOME PRICE-TO-RENT RATIO FOR THE THREE MAJOR CITIES**  
**AVERAGE (1988-2005) = 100**



Source: Calculations by Banco de la República.

<sup>3</sup> The classification of housing as LIH or non-LIH (low-income or otherwise) is done by the mortgage bank.

**GRAPH B2.4**  
**USED HOME PRICE-TO-RENT RATIO FOR LIH AND NON-LIH HOUSING**  
**AVERAGE (1988-2006) = 100**



Source: Calculations by Banco de la República.

2005. It also reveals, as would be expected, that the non-LIH housing market has been higher priced than the LIH market since mid-2005.

The ratio of the Colombian Stock Exchange Index (IGBC in Spanish) to a return on equity indicator for the firms listed on that market was constructed to evaluate the existence of a speculative bubble in the securities market.<sup>4</sup> As illustrated in Graph B2.5 and as mentioned in previous editions of this report, there has been a stock market bubble since March 2004. Two important factors must be considered when analyzing this growth. To begin with, the calculated long-term average includes the entire 1999 crisis period, which could bias it towards a lower level in comparison to the average that would be obtained if the data on the complete economic cycle were to be included. Secondly, this excessive growth might be explained by the stock market's major expansion in recent years.<sup>5</sup>

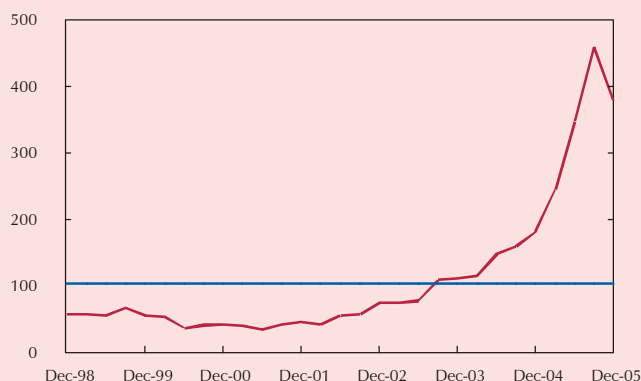
However, after peaking at 355% overvaluation in March 2006, this tendency reversed and resulted in a plunge that was even more pronounced than the one on July 3, 2001 when the Bogotá, Medellín and Occidente exchanges merged. The external markets

<sup>4</sup> The following is the method to calculate this indicator. 1) Figures from the Office of the National Securities Superintendent are used to construct the ratio of operational profit to the balance-sheet account for property, plant and equipment account. 2) An eight-quarter moving average of this ratio, weighed by the amount of fixed capital per firm, as a portion of the total stock of fixed capital in the sample, is used as each firm's return on equity indicator. 3) Finally, the figures for each quarter are added and the negative profitability indicators are eliminated, as firms with negative averages do not participate in construction of the IGBC, which takes into account those with the most stock-market activity.

<sup>5</sup> The last three years have seen a substantial increase in volume traded and the number of shares negotiated daily.



**GRAPH B2.5**  
**RATIO OF THE IGBC TO THE CAPITAL RETURN INDEX**  
**AVERAGE (1997-2005) = 100**



were particularly responsible for this drop. On the one hand, there was the uncertainty about inflation indicators in the United States, with expectations that the Federal Reserve Bank would raise interest rates. On the other, the world's major stock exchanges plummeted as a result of those expectations. The New York Stock Exchange was the only exception. Nevertheless, the stock-market drop in Colombia might have been due to the fact that some stocks were overvalued and in the process of being corrected.

In conclusion, with respect to the price of assets, there was no speculative bubble on the home-mortgage market at the aggregate level. There was, however, evidence of a speculative bubble on the stock market. Nonetheless, this tendency declined during the last quarter (March to June 2006) in response to the performance of external markets and to a possible correction in overvalued stock.

## **B. PRIVATE CORPORATE SECTOR**

The situation analysis for the private corporate sector was based on a sample of companies that reported regularly during 2000-2005 to the Office of the National Superintendent of Financial Institutions and Office of the National Superintendent of Corporate Affairs.<sup>27</sup> The indicators were identical to those

<sup>27</sup> The sample includes 5,799 companies. They are classified as producers of tradables or non-tradables, depending on the economic sector where they operate. They also are classified by size, based on the value of their yearly sales. The agriculture, livestock, hunting, forestry,

examined in previous editions of this report and are regarded as determinants of the frailty of Colombian companies.<sup>28</sup>

## 1. Profitability<sup>29</sup>

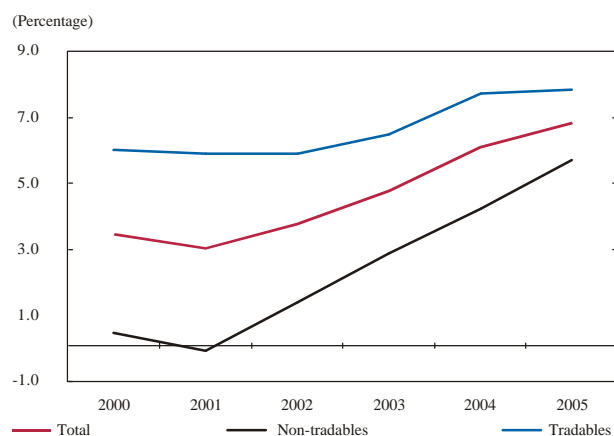
Asset yield continues to increase and was 6.8% by December 2005. The rapid and steady rise in this indicator, as mentioned in several previous editions of this report, continues to be explained by the growth in corporate sales and by the positive way companies manage their expenses, particularly those of a non-operational nature. The past year saw no change for companies producing tradable goods, which reported fewer yields during the period in question than companies producing non-tradables. Therefore, it was the non-tradable producers that sparked the good result in earnings (Graph 42).

This is confirmed by the income statement. The companies in the sample reported a real increase of 8% in sales and, although operational expenses were up by 9%, the drop in non-operational expenses came to 59%. The result was 33% more profits between 2000 and 2005 for the companies as a whole. The tradable and non-tradable sectors accounted for an almost equal proportion of total sales during 2005; however, sales in the non-tradable sector increase far more (52% as opposed to 22%) due to better performance with respect to income and spending<sup>30</sup> (Table 3).

In the case of companies producing tradable goods, those in the mining sector were the only ones to see their yields increase. Thanks to soaring profits, the indicator for that sector was nearly 40%. Industry and agriculture

GRAPH 42

### ASSET YIELD



Source: Office of the National Superintendent of Financial Institutions and Office of the Office of the National Superintendent of Corporations. Calculations by Banco de la República.

fishing, mining/quarry and industrial manufacturing sectors were classified as producers of tradables; the other sectors were classified as producers of non-tradables. Sales value was considered as follows to determine the size of the companies: the 10% with the highest sales were classified as large companies, and the 60% with the lowest sales were regarded as small companies.

<sup>28</sup> Martínez, Óscar (2003). "Determinantes de fragilidad de las empresas colombianas" in Borradores de Economía, Banco de la República, No. 259.

<sup>29</sup> The profitability indicator is equal to earnings on total assets, before taxes.

<sup>30</sup> The difference in profitability between tradable and non-tradable producers is more than a question of profit growth rates. The extent of growth in profits compared to the rate of growth in assets also is a factor. In the case of companies producing tradable goods, profits increased slightly less than assets.

## INCOME STATEMENT

Entire Sample (5,799 companies)								
Trillions of December 2005 Pesos								
	2000	2001	2002	2003	2004	2005	Share Last Year	Growth Last Year
Sales	130.17	141.23	148.91	159.03	169.56	183.54	100.00	8.25
Sales cost	91.79	101.30	104.78	114.69	120.97	129.97	70.81	7.44
Gross profits	38.37	39.94	44.12	44.35	48.59	53.57	29.19	10.25
Administrative expenses	14.01	14.98	15.52	15.04	14.98	16.24	8.85	8.45
Sales expenses	14.80	16.64	17.19	17.39	18.47	20.23	11.02	9.56
Operational profits	9.56	8.32	11.41	11.92	15.15	17.10	9.32	12.86
Non-operational income	9.45	8.05	16.49	8.85	26.42	11.59	6.31	(56.13)
Non-operational expenses	12.37	10.56	20.25	10.92	28.39	11.61	6.32	(59.11)
Profits before taxes	6.64	5.81	7.66	9.85	13.18	17.08	9.31	29.60
Adjustments for inflation	0.56	0.39	0.45	1.36	1.23	1.02	0.56	(16.56)
Taxes	3.13	2.87	3.40	4.20	4.91	5.44	2.96	10.79
Final profit	4.07	3.33	4.70	7.01	9.50	12.67	6.90	33.36
Transables (2,333 empresas)								
Trillions of December 2005 Pesos								
	2000	2001	2002	2003	2004	2005	Share Last Year	Growth Last Year
Sales	71.15	75.26	78.04	84.15	90.90	97.21	100.00	6.93
Sales cost	49.18	53.47	54.51	59.81	64.02	68.09	70.05	6.36
Gross profits	21.97	21.79	23.53	24.34	26.89	29.12	29.95	8.29
Administrative expenses	6.23	6.27	6.52	6.72	6.35	7.27	7.48	14.43
Sales expenses	8.31	8.62	9.24	9.21	9.68	11.05	11.37	14.16
Operational profits	7.43	6.91	7.77	8.41	10.85	10.80	11.11	(0.54)
Non-operational income	5.15	4.11	6.40	4.66	18.58	6.19	6.37	(66.68)
Non-operational expenses	6.50	5.24	8.03	6.07	20.62	6.48	6.67	(68.56)
Profits before taxes	6.07	5.77	6.13	7.00	8.81	10.50	10.80	19.21
Adjustments for inflation	0.10	0.04	0.12	0.67	0.60	0.51	0.52	(15.25)
Taxes	2.16	1.97	2.29	2.84	3.45	3.72	3.83	7.95
Final profit	4.02	3.84	3.97	4.83	5.96	7.29	7.50	22.26
Non-tradables (3,466 companies)								
Trillions of December 2005 Pesos								
	2000	2001	2002	2003	2004	2005	Share Last Year	Growth Last Year
Sales	59.02	65.98	70.86	74.88	78.65	86.33	100.00	9.76
Sales cost	42.61	47.83	50.27	54.88	56.95	61.88	71.67	8.65
Gross profits	16.41	18.15	20.59	20.00	21.71	24.46	28.33	12.67
Administrative expenses	7.79	8.71	9.00	8.32	8.63	8.97	10.39	4.04
Sales expenses	6.48	8.02	7.94	8.17	8.79	9.18	10.64	4.50
Operational profits	2.14	1.41	3.65	3.51	4.29	6.30	7.30	46.74
Non-operational income	4.31	3.94	10.09	4.18	7.84	5.40	6.25	(31.13)
Non-operational expenses	5.87	5.31	12.22	4.85	7.77	5.12	5.93	(34.02)
Profits before taxes	0.57	0.04	1.52	2.84	4.37	6.58	7.62	50.55
Adjustments for inflation	0.45	0.35	0.32	0.69	0.63	0.52	0.60	(17.80)
Taxes	0.97	0.90	1.12	1.36	1.46	1.71	1.99	17.51
Final profit	0.06	(0.51)	0.73	2.17	3.54	5.38	6.23	52.04

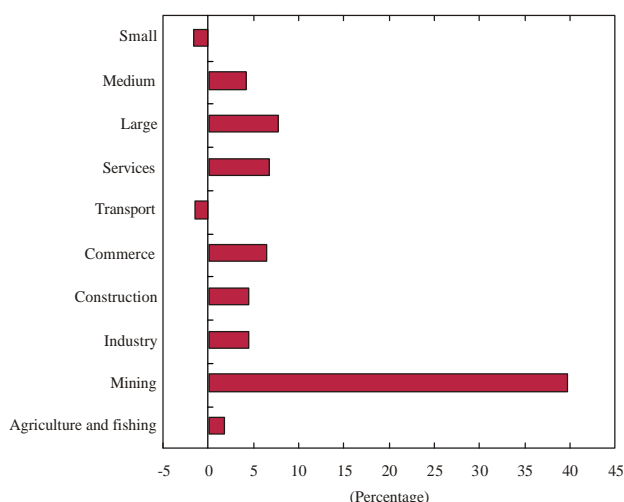
Source: National Financial Superintendent's Office and the Office of the Superintendent of Corporations. Calculations by Banco de la República.

experienced a drop in profits to levels similar to those in 2003. The most important changes for non-tradable producers were in the service sector, which nearly doubled, in commerce, which had one of the highest indicators in this group of companies, and in transport, which again saw negative profitability, following a slight recovery in 2004. The losses in the transport sector were due to poor performance by telecommunications companies (Graph 43).

In terms of size, the large companies continued to see their profitability increase (it was 7.6% in 2005). For the medium-sized companies, profitability has stayed at 4% during the last three years, while it turned negative for the small companies, because of the losses incurred in this group.

**GRAPH 43**

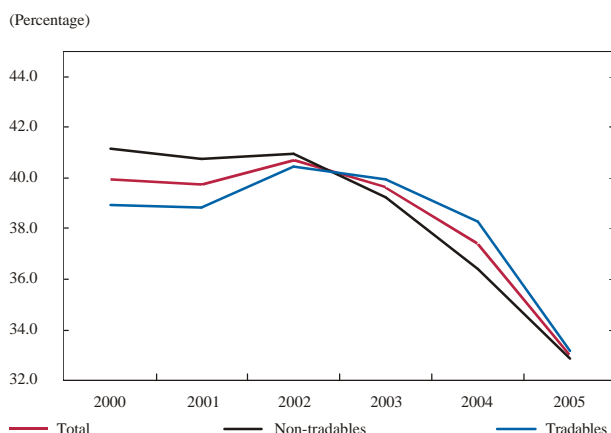
**ASSET YIELD  
(2005)**



Source: Office of the National Superintendent of Financial Institutions and the Office of the National Superintendent of Corporate Affairs. Calculations by Banco de la República.

**GRAPH 44**

**TOTAL INDEBTEDNESS**



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

## 2. Indebtedness<sup>31</sup>

Total indebtedness at December 2005 was down again, having gone from 37.4% to 33%. This applies to producers of both tradables and non-tradables, with debt indicators similar to the total (Graph 44). The make-up of the general balance sheet indicates this is the result of less growth in total liabilities compared to total assets.

Consistent with the foregoing, the asset side of the balance sheet continued to exhibit substantial growth (Table 4). Investments and valuations were the items that increased the most. The liquid assets represented in the disposable balance also performed well. Once again, the standstill in liabilities was due to fewer financial obligations, particularly long-term liabilities. In terms of share, financial liabilities continued to lose ground compared to almost all other liability items, but primarily with respect to bonds<sup>32</sup> and accounts payable.

<sup>31</sup> Two indicators are analyzed in this section. The first is total indebtedness, which is calculated as the ratio of total liabilities to total assets. It is on this basis that the structure of all company liabilities to third parties is analyzed. The second is financial indebtedness, which is measured by the quotient between financial liabilities and total assets. This indicator is used to analyze the composition of a company's financial debt by maturity, currency and type of institution.

<sup>32</sup> As warned in past editions of this report, bonds continued to increase as a share of financial obligations. However, they are not an important item with respect to total liabilities.

## GENERAL BALANCE SHEET

	Trillions of December 2005 Pesos						Share Last Year	Growth Last Year
	2000	2001	2002	2003	2004	2005		
Disposable balance	4.23	4.40	4.69	5.44	5.56	6.44	2.55	15.92
Investments	7.03	7.11	6.58	6.40	8.84	10.23	4.05	15.76
Debtors	33.93	32.62	36.48	35.34	37.01	39.38	15.58	6.42
Inventario	18.62	19.32	20.52	21.48	23.61	24.51	9.70	3.82
Deferred	1.29	1.15	1.29	1.15	1.13	1.24	0.49	10.28
<b>Current Assets</b>	<b>65.10</b>	<b>64.60</b>	<b>69.54</b>	<b>69.81</b>	<b>76.14</b>	<b>81.81</b>	<b>32.37</b>	<b>7.45</b>
Investments	27.90	28.00	31.53	35.86	38.91	48.97	19.37	25.87
Debtors	3.96	5.19	5.30	4.70	3.85	4.19	1.66	8.81
Property, plant and equipment	39.49	40.15	38.63	37.93	38.15	41.17	16.29	7.91
Intangibles	9.80	10.53	11.01	10.58	10.13	8.53	3.38	(15.78)
Deferred	10.55	9.96	9.48	8.13	7.04	6.50	2.57	(7.77)
Other assets	0.48	0.51	0.49	0.58	0.80	0.69	0.27	(13.71)
Appreciation	37.25	37.24	39.36	41.19	43.82	60.90	24.09	38.99
<b>Noncurrent Assets</b>	<b>129.43</b>	<b>131.57</b>	<b>135.80</b>	<b>138.96</b>	<b>142.70</b>	<b>170.95</b>	<b>67.63</b>	<b>19.80</b>
<b>Total Assets</b>	<b>194.52</b>	<b>196.17</b>	<b>205.35</b>	<b>208.77</b>	<b>218.84</b>	<b>252.76</b>	<b>100.00</b>	<b>15.50</b>
Financial obligations	14.39	15.19	15.43	15.58	16.48	15.80	18.94	(4.11)
Suppliers	14.24	13.96	15.16	15.63	15.78	16.70	20.01	5.85
Accounts payable	9.71	8.97	9.16	9.46	10.30	11.24	13.47	9.13
Taxes	3.23	2.76	3.46	3.61	4.08	4.47	5.36	9.51
Labor obligations	1.34	1.39	1.35	1.36	1.43	1.53	1.83	6.94
Estimated liabilities and provisions	1.94	1.98	2.06	2.55	2.72	3.13	3.75	15.33
Deferred	0.53	0.63	0.78	0.73	0.60	0.61	0.73	1.66
Other liabilities	1.89	1.87	2.16	2.44	2.94	2.97	3.56	0.80
Bonds and commercial paper	0.22	0.25	0.39	0.58	0.78	0.78	0.93	0.12
<b>Current Liabilities</b>	<b>47.49</b>	<b>47.01</b>	<b>49.96</b>	<b>51.94</b>	<b>55.11</b>	<b>57.23</b>	<b>68.58</b>	<b>3.85</b>
Financial obligations	19.26	19.07	20.27	16.37	12.52	9.67	11.58	(22.78)
Accounts payable	2.79	3.41	3.29	3.06	3.25	3.91	4.68	20.30
Labor obligations	0.17	0.17	0.17	0.16	0.15	0.11	0.14	(23.22)
Estimated liabilities and provisions	2.65	2.81	3.00	3.13	3.03	3.16	3.79	4.11
Deferred	2.14	2.13	2.07	2.08	2.05	2.10	2.52	2.65
Other liabilities	0.44	0.57	0.80	0.84	0.91	1.46	1.75	60.39
Bonds and commercial paper	2.76	2.78	4.00	5.14	4.81	5.81	6.96	20.80
<b>Noncurrent Liabilities</b>	<b>30.21</b>	<b>30.95</b>	<b>33.59</b>	<b>30.77</b>	<b>26.72</b>	<b>26.22</b>	<b>31.42</b>	<b>(1.86)</b>
<b>Total Liabilities</b>	<b>77.70</b>	<b>77.96</b>	<b>83.55</b>	<b>82.71</b>	<b>81.83</b>	<b>83.45</b>	<b>100.00</b>	<b>1.99</b>
Capital stock	12.25	11.16	9.96	6.65	4.42	3.17	1.87	(28.17)
Surplus capital	19.10	20.86	19.88	21.05	24.50	29.30	17.30	19.56
Reserves	11.75	11.91	12.19	13.53	14.20	16.13	9.53	13.56
Equity revaluation	36.25	37.43	39.37	40.89	42.81	46.42	27.42	8.43
Dividends	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(77.50)
Earnings for the period	4.04	3.27	4.70	6.85	9.28	12.43	7.34	34.01
Earnings in previous periods	(3.78)	(3.65)	(3.66)	(4.11)	(2.05)	0.97	0.57	(147.03)
Valuation surplus	37.21	37.24	39.36	41.20	43.86	60.89	35.97	38.85
<b>Equity</b>	<b>116.82</b>	<b>118.21</b>	<b>121.80</b>	<b>126.06</b>	<b>137.01</b>	<b>169.31</b>	<b>100.00</b>	<b>23.57</b>

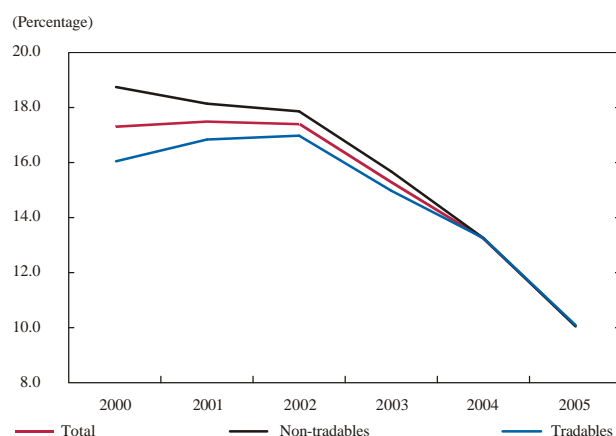
Source: Office of the National Superintendent of Financial Institutions and the Office of the Superintendent of Corporate Affairs. Calculations by Banco de la República.

Equity continues to increase well in excess of assets and liabilities (at an annual rate of 24% compared to 16% and 2% growth in assets and liabilities). The valuation surplus and earnings were the items exhibiting the most growth. Once again, this underscores how important the use of a company's own resources for financing has become.

The limited momentum in corporate financial obligations prompted a new reduction in the financial indebtedness indicator, which declined from 13.3% in 2004 to 10.1% in 2005 (Graph 45). A breakdown of financial obligations points to several explanations for this situation, which has essentially been in play since the end of the crisis in the late nineties.

**GRAPH 45**

**FINANCIAL INDEBTEDNESS**



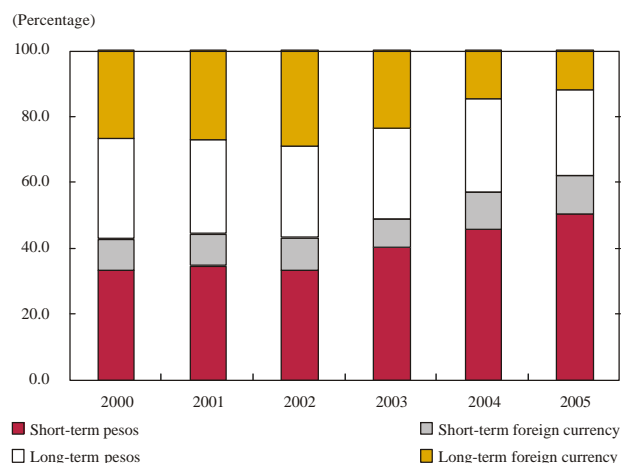
Source: Office of the National Superintendent of Financial Institutions and Office of the Superintendent of Corporate Affairs. Calculations by Banco de la República.

At December 2005, all the company groups showed less financial borrowing. This applies to producers of tradables and non-tradables, and to large and small businesses alike. The indebtedness indicator for medium-sized companies rose by more than 1 pp during 2005, possibly because losses at the end of the fiscal year left them with no other resources to finance their operations.

The debt began to shift towards short-term loans several years back, particularly as of 2003. A classification by currency shows the foreign currency debt continued to decline, accounting for 23.8% in 2005 as opposed to 36.1% in 2000. As illustrated in Graph 46, this debt is what has pulled down long-term obligations. An analysis by companies shows a reduction in debt to local and foreign lenders alike, although not so much in the case of the former and more so for the latter.

**GRAPH 46**

**INDEBTEDNESS CLASSIFIED BY CURRENCY AND MATURITY**



Source: Office of the National Superintendent of Financial Institutions and the Office of the Superintendent of Corporate Affairs. Calculations by Banco de la República.

Although consistent in tendency, the reduction in debt to local lenders differs in magnitude, as indicated in the last edition of this report, specifically in the section on credit institutions. In March 2006, it was noted that growth in commercial loans as a whole had slowed from 12.59% in March 2004 to 6.31% in December 2005. For the companies in the sample, these percentages were 0.3% in December 2004 and -7.7% in December 2005.

Although the outlook for the commercial loan portfolio had changed by June of this year, the

figures for companies at December seem to say the reduction in growth during 2005 was due to less borrowing from the financial system by a group of firms in the private corporate sector. If we analyze this phenomenon last year, based on a sample of the largest companies, it is possible to find explanations for this trend.

The second sample is comprised of 15,127 companies that filed information in 2005 and for which a comparative analysis can be developed with respect to 2004.<sup>33</sup> Short-term, long-term and total financial obligations are shown in Table 5, divided by credit institutions (which would be equivalent to the commercial loan portfolio), foreign entities and other obligations.

A variety of information can be drawn from Table 5. First, the decline in total financial obligations, which was noted earlier, seems to be the result - or at least can be explained largely - by fewer long-term obligations to foreign lenders. Secondly, the drop in the long-term debt applies to all types of

<sup>33</sup> Last year, the Office of the Superintendent of Corporate Affairs collected balance sheets from more than 19,000 firms. This was due to an enlargement of the sample based on the list of companies registered with chambers of commerce. At December 2005, the debt owed by the companies in the sample represented 55% of all private commercial loans.

TABLE 5

**FINANCIAL OBLIGATIONS (15,127 COMPANIES)  
TRILLIONS OF DECEMBER 2005 PESOS, SHARE AND GROWTH**

	2004	Percentage	2005	Percentage	Growth
Domestic banks	13.01	41.52	13.29	44.18	2.10
Finance corporations	0.95	3.02	0.83	2.76	(12.44)
Commercial finance companies	0.63	2.01	0.61	2.01	(3.81)
Banks specializing in mortgages	0.18	0.57	0.19	0.62	3.52
<b>Short-term - Credit Institutions</b>	<b>14.77</b>	<b>47.12</b>	<b>14.91</b>	<b>49.57</b>	<b>0.93</b>
Short-term obligations with foreign entities	2.11	6.75	2.13	7.10	0.96
Other short-term obligations	1.73	5.52	1.24	4.12	(28.43)
<b>Total Short-term Financial Obligations</b>	<b>18.61</b>	<b>59.39</b>	<b>18.28</b>	<b>60.79</b>	<b>(1.80)</b>
Domestic banks	5.27	16.81	5.21	17.31	(1.20)
Finance corporations	1.09	3.47	0.79	2.62	(27.60)
Commercial finance companies	0.46	1.47	0.56	1.85	20.43
Banks specializing in mortgages	0.14	0.44	0.12	0.39	(15.40)
<b>Long-term - Credit Institutions</b>	<b>6.95</b>	<b>22.19</b>	<b>6.66</b>	<b>22.16</b>	<b>(4.17)</b>
Long-term obligations with foreign entities	3.25	10.36	2.70	8.97	(16.92)
Other long-term obligations	2.53	8.06	2.43	8.08	(3.75)
<b>Total long-term Financial Obligations</b>	<b>12.73</b>	<b>40.61</b>	<b>11.79</b>	<b>39.21</b>	<b>(7.34)</b>
<b>Total Financial Obligations</b>	<b>31.34</b>	<b>100.00</b>	<b>30.07</b>	<b>100.00</b>	<b>(4.05)</b>

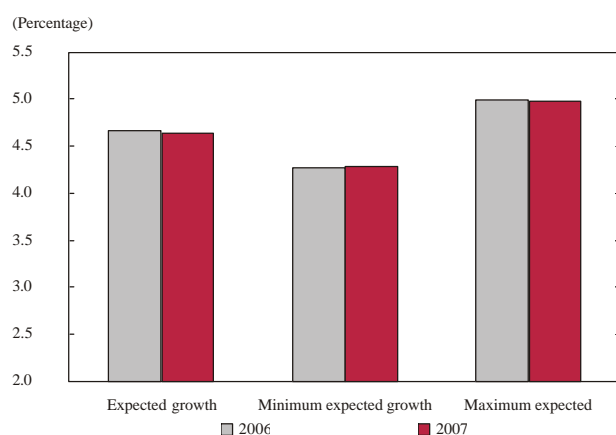
Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

credit. Therefore, less borrowing from credit institutions also was a consequence of this trend and was not offset by the slight rise in short-term loans. Finally, the short-term debt to credit institutions, which accounted for 50% of all financial obligations (compared to 22% of long-term loans) did increase and could be the reason for the growth observed in June 2006.

In short, earnings in 2005 were a reflection of controlled expense management and positive sales performance at the corporate level. This is consistent with the trend in aggregate demand and in the economy overall. The common tendency in balance-sheet accounts, ongoing for nearly three years and noted in several previous editions of this report, not only strengthens corporate equity, but also keeps liquidity high and signals the use of own resources to finance the private corporate sector. All of this indicates the corporate sector, which is an important debtor to the financial system, is financially sound.

**GRAPH 47**

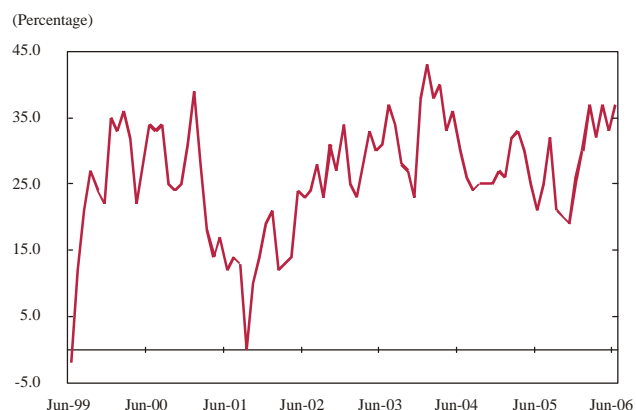
**GDP GROWTH EXPECTED IN 2006 AND 2007**



Source: July 2006 Expectation Survey, Banco de la República.

**GRAPH 48**

**EXPECTATIONS FOR THE COMPANY'S ECONOMIC SITUATION (CES)**



Source: July 2006 Business Expectation Survey, Fedesarrollo.

### 3. Expectations in the Business Community

Last year, the economy grew more than what businessmen expected three months prior to the end of the year. As indicated in the July 2006 edition of *Banco de la República's* expectation survey, companies are more optimistic than they were nine months ago about the increase in gross domestic product (GDP). This is clearly because of good economic performance last year and so far during 2006. The expectation for GDP growth in 2006 is 4.7%; it was 4.2% at the end of 2005. For 2007, it is similar to what is anticipated for this year (Graph 47).

In the June 2006 edition of the Fedesarrollo Business Opinion Survey (BOS), the tally of replies on the economic situation for the next six months is consistent with the expectation for economic growth. This perception was at a high point in June 2006 (Graph 48), similar to other peaks observed during the period in question.

Consistent with the Expectation Survey done by *Banco de la República*, the March 2006 edition of



the ANDI Joint Industrial Opinion Survey (JIOS) shows sales were up by more than 6.9% in the first quarter of 2006, compared to the same period in 2005, and use of installed capacity was at one of the highest levels ever recorded by the survey (82.4%). Furthermore, the yield on investments is good and will remain so in the immediate future, inasmuch as 61% of those interviewed have plans for investment projects this year.

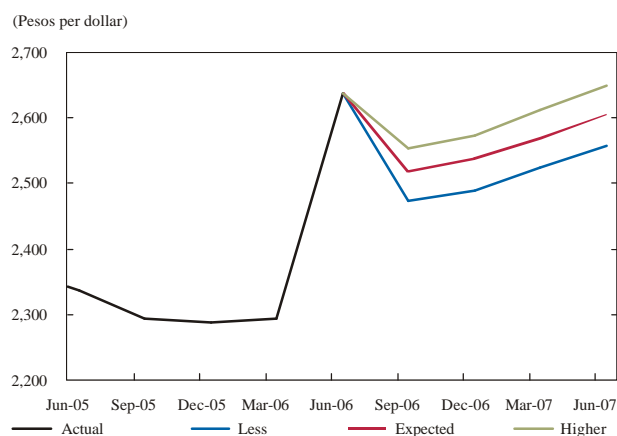
The hefty increase in the representative market rate of exchange (RMR) between March and June of this year may have altered businessmen's expectations for this variable. Those surveyed expect the RMR to be Col\$2,513 per dollar by September 2006 and Col\$2,532 by the end of the year (Graph 49). Although previous editions of this report warned about steady upward expectations for the exchange rate, this reduction in the difference between actual and expected rates appears to be due to the fact that businessmen have adjusted their expectations in keeping with the almost two-year tendency towards peso revaluation.

Companies have raised their expectations for time certificates of deposit (DTF in Spanish). As illustrated in Graph 50, the interest rate they expect to see in the coming quarters exceeds their expectations as reported in the April 2006 survey. For example, they expect the DTF rate to be 6.4% in September and 6.5% by the end of the year. The latter is almost 0.5 pp above the rate in June. This shows agents quickly adjust their expectations to current developments.

The anticipated increase in the DTF rate and the turbulent events that shook the markets during the second quarter of 2006 influenced businessmen's opinion about liquidity and the availability of credit in the economy. In the July 2006 Expectation Survey, 28.4% of those interviewed said the next six months will see less liquidity in the economy. This is a considerable proportion compared to 9.9% in the April survey, and is quite high in contrast to 1.2% a year ago. In short, the percentage of those interviewed who believe the DTF rate will increase or remain the same has declined since the last survey (Graph 51). As to credit, 21% believe there will be less availability in the next six months, as opposed to 7.4% and 3.7% in the April 2006 and July 2005 surveys.

GRAPH 49

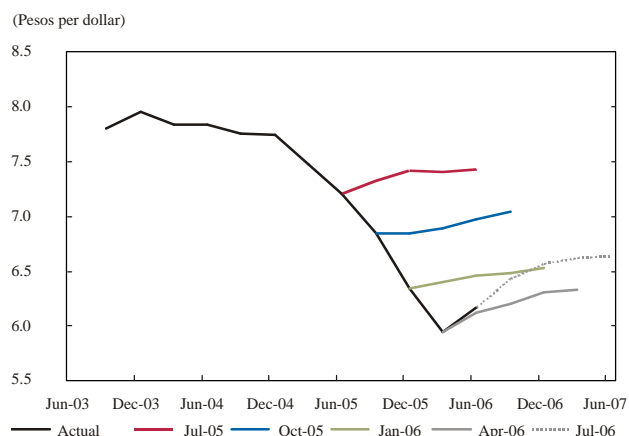
#### ACTUAL AND EXPECTED RMR



Source: July 2006 Expectation Survey, Banco de la República.

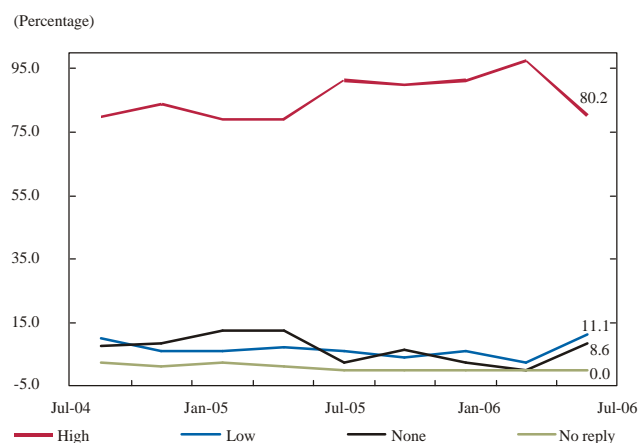
GRAPH 50

#### ACTUAL AND EXPECTED DTF RATE

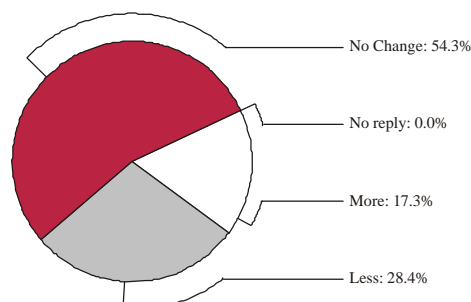


Source: July 2006 Expectation Survey, Banco de la República.

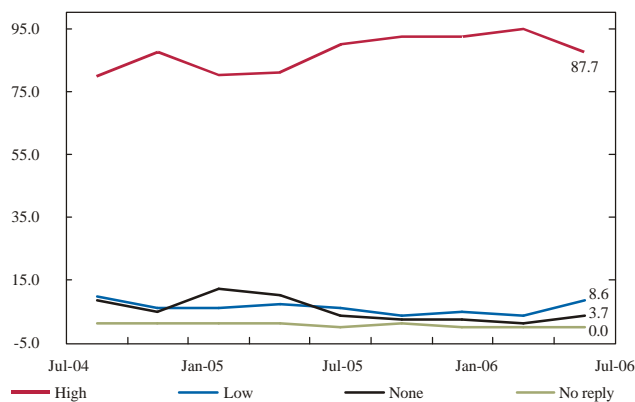
**A. CURRENT PERCEPTION OF CREDIT AVAILABILITY**



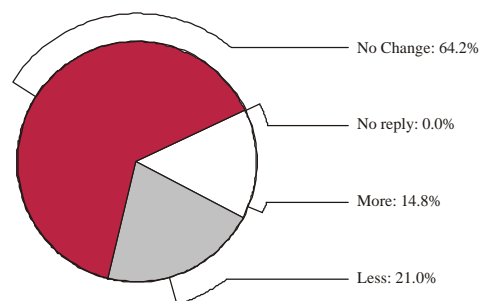
**B. TREND IN LIQUIDITY DURING THE NEXT SIX MONTHS**



**C. CURRENT PERCEPTION OF CREDIT AVAILABILITY**



**D. TREND IN CREDIT AVAILABILITY DURING THE NEXT SIX MONTHS**



Source: Encuesta de expectativas, julio de 2006. Banco de la República.

**Box 3**

**CORPORATE INDEBTEDNESS AT JUNE 2006:  
A SAMPLE OF COMPANIES LISTED  
ON THE STOCK EXCHANGE**

Indebtedness at June 2006 can be analyzed only with the sample of companies that are listed on the stock exchange and submit quarterly figures to the Office of the National Superintendent of Financial Institutions. Although not a representative sample, as it includes, on average, only a few large companies, it is useful for an up-to-date review of the tendency in the private corporate sector debt.<sup>1</sup>

As indicated in the first section of this report, which contains an analysis of credit institutions, private commercial loans increased sharply during June 2006 (18%), altering what had been the tendency for several quarters. Figures for the companies in the sample (Table B3.1) show 2% real growth in financial obligations to domestic credit institutions at June 2006, primarily because of more debt for companies producing non-tradables (10%).

Although not significant, this growth in financial obligations does alter the trend in debt to domestic credit institutions. It also reflects the increased momentum in commercial loans during the year to date and confirms the performance indicated in the first part of this report. The outlook concerning obligations to foreign lenders is different as well; they nearly doubled during the past year.<sup>2</sup> This development, in both the domestic and external portions, generated an increase of 31% in total financial obligations at June

**TABLE B3.1**  
**FINANCIAL OBLIGATIONS**

	Trillions of June 2006 Pesos				Annual Growth Rate			
	Domestic Credit Estab.	Foreign Estab.	Others	Total	Domestic Credit Estab.	Foreign Estab.	Others	Total
<b>Total</b>								
Jun-04	3.47	4.49	0.81	8.77				
Dec-04	3.51	3.36	0.79	7.67				
Jun-05	2.80	2.57	0.77	6.13	(19.33)	(42.81)	(5.56)	(30.08)
Dec-05	2.08	3.11	0.53	5.73	(40.58)	(7.66)	(32.80)	(25.33)
Jun-06	2.86	4.75	0.44	8.05	2.21	85.11	(42.31)	31.35
<b>Tradables</b>								
Jun-04	1.82	2.67	0.38	4.87				
Dec-04	1.82	2.15	0.38	4.35				
Jun-05	1.54	1.24	0.37	3.15	(15.23)	(53.42)	(2.86)	(35.19)
Dec-05	1.21	1.37	0.45	3.03	(33.66)	(36.16)	17.39	(30.42)
Jun-06	1.48	3.01	0.32	4.81	(4.16)	142.59	(13.10)	52.57
<b>Non-tradables</b>								
Jun-04	1.65	1.82	0.43	3.90				
Dec-04	1.69	1.22	0.41	3.32				
Jun-05	1.26	1.32	0.40	2.98	(23.85)	(27.29)	(7.95)	(23.70)
Dec-05	0.88	1.73	0.09	2.70	(48.05)	42.73	(79.23)	(18.65)
Jun-06	1.38	1.74	0.12	3.24	10.03	31.23	(69.52)	8.88

Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

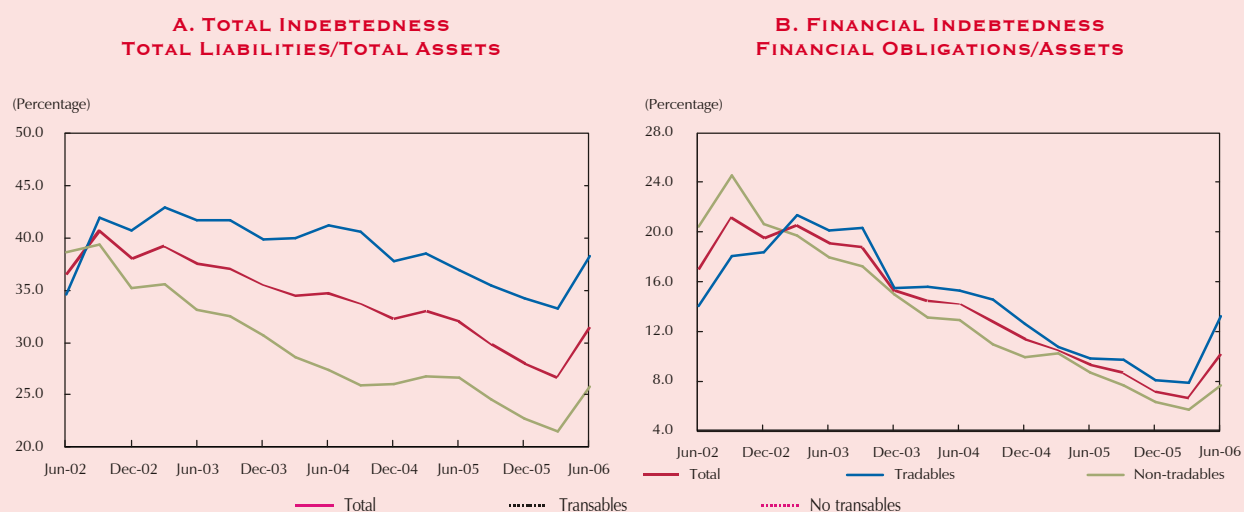
<sup>1</sup> The debt owed by this corporate sample accounted for 6% of all private commercial loans at June 2006.

<sup>2</sup> Although producers of tradables apparently were responsible for the largest increase, it is important to remember that, by December 2005, producers of non-tradables had already altered the tendency of the growth rate in debt to foreign lenders (from negative to positive). At present, it is difficult to know if this applies to the sector as a whole, since large companies usually have more debt in dollars.

2006. Accordingly, the indicators of total and financial borrowing are up this year (Graph B3.1).

Profitability for the corporate sample was similar to what it was in September and December 2005 (4.8%). However, since then, companies producing non-tradables have shown better yield than tradable producers, at least with respect to the sample. Strong equity growth also is evident in these companies, although their liabilities increased at a high rate during the first half of 2006.<sup>3</sup>

**GRAPH B3.1**



Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de la República.

<sup>3</sup> Although less than the increase in assets and equity, annual growth in liabilities during the first half of 2006 came to 17%.

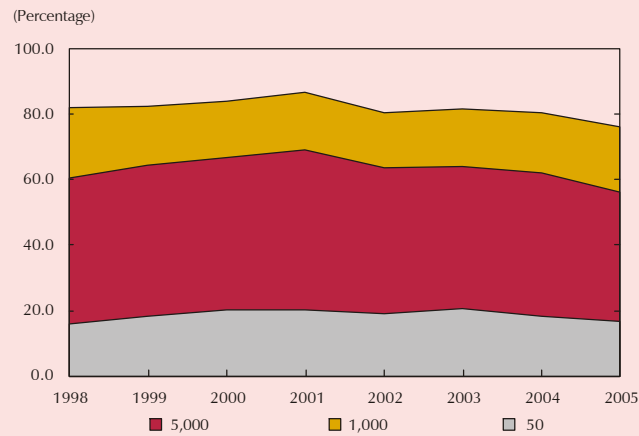
#### Box 4

### PRIVATE COMMERCIAL LOAN PORTFOLIO CONCENTRATION

The private commercial loan portfolio, which was highly concentrated for a number of years, became even more so in the late nineties. However, this tendency began to change as of 2002, particularly among the 1,000 and 5,000 debtors whose share of private commercial loans went from 69% and 87% in

2001 to 56% and 76% in 2005. This shows new debtors have gained access to the commercial loan portfolio and, as a result, the financial system has seen more diversification in its clients (Graph B4.1).

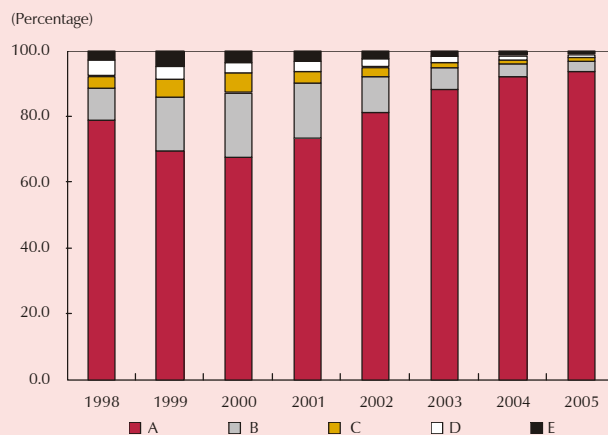
**GRAPH B4.1**  
**BF-MANAGED LOAN EXPOSURE, BY ISSUER**



Source: Office of the National Superintendent of Financial Institutions

Type-A loans, which declined as a share of total private commercial loans after the crisis, began to gain ground in 2001 and particularly as of 2002, having accounted for 94% in December 2005. The share pertaining to the other types of loans declined as a result. For example, type-E loans, which include maturities beyond 12 months, hit an all-time low last year (1%) (Graph B4.2).

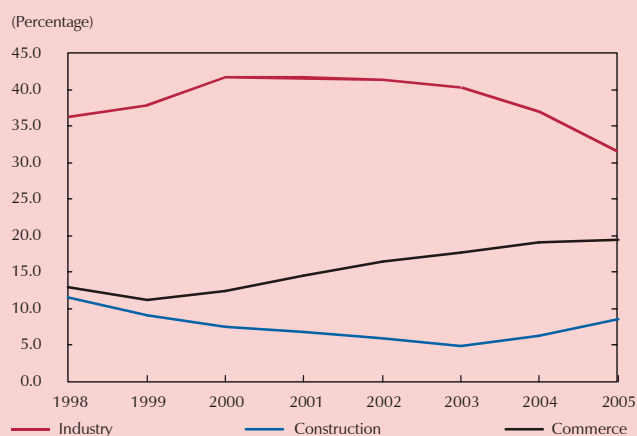
**GRAPH B4.2**  
**COMMERCIAL LOANS OF THE 5,000 MAJOR DEBTORS (BY CLASSIFICATION)**



Source: Office of the National Superintendent of Financial Institutions

Industrial manufacturing, construction and commerce are the sectors of the economy that saw their share of private commercial loans change the most. As illustrated in Graph B4.3, industry reduced its share as part of the 5,000 major private debtors from 41.3% in 2000 (the high point) to 31.2% in December 2005. The points lost to the tradable goods sector have gone to commerce, which expanded its share by more than 7 pp, and to construction, given the recent growth in that sector.

**GRAPH B4.3**  
**CONCENTRATION OF COMMERCIAL LOANS**



Source: Office of the National Superintendent of Financial Institutions

## C. NON-FINANCIAL PUBLIC SECTOR (NFPS)

### 1. Aggregate Debt in the NFPS

After declining since 2002, the gross debt as a percentage of GDP was 55% at June 2006 (Table 6). The central government (CG) continued to account for almost 90% of all domestic and external borrowing. A look at the outstanding CG debt in recent years shows a shift towards borrowing in pesos and less actual exchange exposure. In 2005-2006, the central government increased the amount of global TES issued on foreign markets,<sup>34</sup> in keeping with its policy to lower exchange risk, and added to the diversification

<sup>34</sup> Global TES are central government bonds issued outside the country. They are denominated in pesos, but payable in dollars.

of investors and/or holders. However, as noted in recent editions of this report, the past six months saw market risk materialize for domestic holders with a high concentration of TES in their portfolios. Despite the decline in TES prices between March and June 2006, and high devaluation at the end of June, there was no deterioration during the first half of 2006 with respect to the central government's ability to pay.

CG obligations denominated in pesos continue to exhibit the most growth, despite having declined as a share of GDP during the last semester. The reduction in peso borrowing is attributed to less need for financing on the part of the central government (mainly because of more tax revenue). This, in turn, lowered the TES placement goal by Col\$2.3 t between January and August

TABLE 6

**NFPS GROSS DEBT**

	(Billions of Pesos)			(Percentage of GDP) <sup>b/</sup>			(Share)		(Nominal Annual Growth) (%)		
	Internal <sup>a/</sup>	External	Total	Internal	External	Total	Internal	External	Internal	External	Total
Dec-96	12,679	12,927	25,606	12.60	12.80	25.40	49.50	50.50	27.71	7.56	16.68
Dec-98	23,946	24,448	48,395	17.00	17.40	34.40	49.50	50.50	27.55	38.84	33.02
Dec-00	46,653	41,965	88,618	26.70	24.00	50.70	52.60	47.40	41.68	27.63	34.66
Dec-02	67,838	61,975	129,813	33.20	30.30	63.50	52.30	47.70	23.56	22.01	22.81
Dec-03	75,078	65,883	140,961	33.00	28.90	61.90	53.30	46.70	10.67	6.31	8.59
Dec-04	84,322	59,779	144,101	32.80	23.70	56.60	58.50	41.50	12.31	(9.27)	2.23
Mar-05	88,815	59,149	147,964	33.80	22.90	56.70	60.00	40.00	15.92	(5.98)	6.05
Jun-05	91,790	53,225	145,015	34.20	19.80	54.10	63.30	36.70	18.46	(16.52)	2.67
Sep-05	95,958	52,093	148,051	35.10	19.10	54.20	64.80	35.20	21.14	(16.25)	4.70
Dec-05	102,408	53,343	155,751	36.40	19.00	55.30	65.80	34.20	21.45	(10.77)	8.08
Mar-06	104,686	51,551	156,237	36.20	17.80	54.10	67.00	33.00	17.87	(12.85)	5.59
Jun-06	105,286	58,009	163,296	35.40	19.50	54.90	64.50	35.50	14.70	8.99	12.61

(Composition by Exchange Exposure) <sup>c/</sup>											
	(Billions of Pesos)			(Percentage of GDP) <sup>b/</sup>			(Share)		(Nominal Annual Growth) (%)		
	Pesos	F/C	Total	Pesos	F/C	Total	Pesos	F/C	Pesos	F/C	Total
Dec-96	12,679	12,927	25,606	12.60	12.80	25.40	49.50	50.50	27.71	7.56	16.68
Dec-98	23,624	24,770	48,395	16.80	17.60	34.40	48.80	51.20	25.83	40.67	33.02
Dec-00	44,740	43,878	88,618	25.60	25.10	50.70	50.50	49.50	42.64	27.40	34.66
Dec-02	64,986	64,827	129,813	31.80	31.70	63.50	50.10	49.90	26.31	19.49	22.81
Dec-03	73,138	67,823	140,961	32.10	29.80	61.90	51.90	48.10	12.54	4.62	8.59
Dec-04	84,471	59,630	144,101	32.90	23.70	56.60	58.60	41.40	15.50	(12.08)	2.23
Mar-05	90,019	57,945	147,964	34.30	22.40	56.70	60.80	39.20	20.24	(10.39)	6.05
Jun-05	93,009	52,006	145,015	34.70	19.40	54.10	64.10	35.90	22.58	(20.44)	2.67
Sep-05	97,192	50,860	148,051	35.50	18.60	54.20	65.60	34.40	25.14	(20.22)	4.70
Dec-05	104,212	51,539	155,751	37.00	18.30	55.30	66.90	33.10	23.37	(13.57)	8.08
Mar-06	107,466	48,771	156,237	37.20	16.90	54.10	68.80	31.20	19.38	(15.83)	5.59
Jun-06	108,017	55,279	163,296	36.30	18.60	54.90	66.10	33.90	16.14	6.29	12.61

<sup>a/</sup> The CG domestic debt includes public-bank capitalization bonds.

<sup>b/</sup> GDP in the last 12 months.

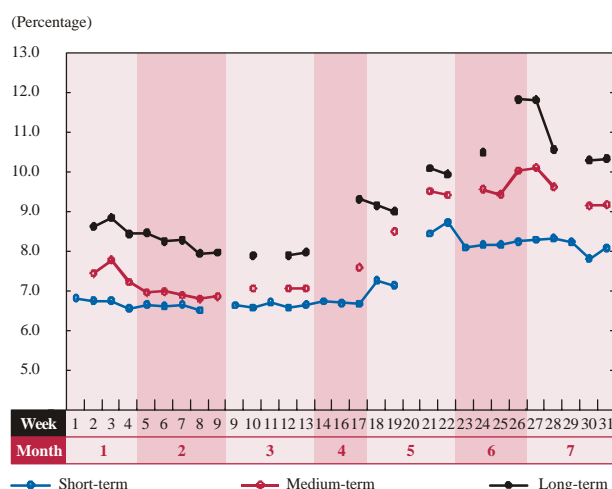
<sup>c/</sup> NFPS indebtedness in pesos is calculated as domestic indebtedness, plus all outstanding global TES, minus all outstanding TES RMR. Indebtedness in foreign currency (F/C) is calculated as domestic indebtedness, minus all outstanding global TES, plus all outstanding TES RMR.

Source: Banco de la República, Ministry of Public Finance and Credit

2006 (Col\$1.4 t of which are being auctioned). The substitution of global TES for domestic indebtedness (primarily TES-B) is an important highlight. It has eased pressure on the domestic market, by diversifying bond holders (from domestic to external), and is consistent with efforts to lower CG exposure to foreign exchange. By August 16, the central government had auctioned Col\$1.25 t in global TES and had lowered the domestic-bond placement goal. As to borrowing in foreign currency, the outstanding balance in pesos saw positive nominal growth for the first time since 2003. However, the outstanding balance in dollars continues to decline nominally.<sup>35</sup> The high value of the debt in pesos is due to the high exchange rate at the end of the June.<sup>36</sup>

GRAPH 52

#### NOMINAL AVERAGE RATE ON TES B - 2006



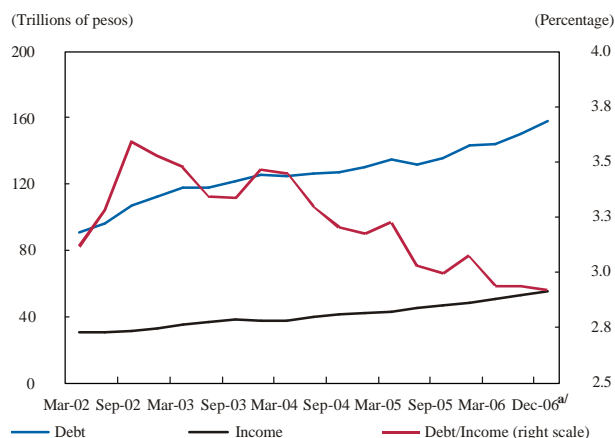
Note: The rate was calculated as the weighted average of the amount of the issues at auction time, which is considered a TES primary market rate. Duration was determined by the number of days to maturity. 1. Short term: up to one year. 2. Medium term: 366 days to five years. 3. Long term: five years and one day to 15 years.  
Source: Banco de la República

## 2. Creditworthiness

The central government's creditworthiness improved between 2002 and June 2006. Despite the accelerated increase in TES rates during the second quarter of 2006 (see Graph 52 and Box 6 in the section on market risk for a description of what happened to the spot curve for TES in pesos) and the high exchange rate at the end of June, the CG debt-to-income ratio remained stable at 2.93 during the second quarter of 2006 (Graph 53). The decline in the total debt/income ratio throughout 2005 and 2006 was due to increased tax receipts, particularly from income tax, tariffs and VAT, and is expected to continue up to December 2006.

GRAPH 53

#### CG CREDITWORTHINESS



a/ It is assumed the domestic debt will increase by 11% in 2006. This is consistent with the growth of the domestic debt in TES contemplated in the 2006 Revised Financial Plan, CONFIS (January 18, 2006). The domestic debt accounts for Col\$104 t of the total debt (Col\$ 156 t); the remainder is the external debt (US\$ 22 b).  
Source: Banco de la República and CONFIS

## 3. Prospects

The central government plans to sell Col\$23.7 t in TES during 2006. This is Col\$5.3 t less than in 2005 and Col\$2.3 t less than was planned in January. In doing so, it hopes to finance a projected deficit of Col\$16.6 t.<sup>37</sup> Approximately 75% of the TES goal

<sup>35</sup> The CG has no plans for an external bond issue denominated in dollars to finance the 2006 period. For that year, it expects to have Col\$ 5 in loans from multilateral and other lenders.

<sup>36</sup> The month-end exchange rate applied for June was Col\$2,633 per dollar.

<sup>37</sup> "Informe de gestión de deuda" (August 18, 2006), Finance Ministry.



(Col\$18 t) was met by August 18, 2006, leaving Col\$6 t in placements scheduled for the remainder of the year. This reduction in the bond supply is due to less need for financing, partly because of better expectations for tax revenue. The sale of global TES is expected to continue in 2007, as it did in 2006, thereby reducing the domestic sale of TES B and relieving pressure on the local market.

## IV. POTENTIAL RISKS

The initial sections in this report contain a detailed analysis of recent performance by credit institutions and the primary forces underlying the current solvency of the major debtors in the system. The conclusion is that, despite the difficulties on markets for financial assets in the first half of 2006, the soundness of these establishments as a whole continues to be based on the growth in traditional financial intermediation.

This means efforts must be stepped up to monitor market risk (which materialized in the form of valuation and liquidation losses during the first six months of the year) and credit risk (which tends to build as loans increase). According to the analysis in this section, which focuses on these risks and liquidity risk, although the market is still the major threat to the system, both these risks have increased significantly in past months.

### A. MARKET RISK

The growing importance of investments as a share of assets in the financial system has increased interest in adequate market-risk measurement and management. Past editions of this report underscored the necessity of closely monitoring exposure to market risk, precisely because of this tendency. Therefore, the focus of this section is on an appraisal of the financial system's portfolio and an assessment of its sensitivity to unexpected changes in bond interest rates.

## 1. Exposure of the Financial System to the TES B Market

The method described in the last edition of this report was used to value bonds. It consists of assessing each bond based on the average price at which the respective issue was traded on the market.<sup>38</sup> The agents' portfolio on August 29, 2006 showed credit institutions hold Col\$22.7 t in TES B valued at market prices.<sup>39</sup> This is 11.8% less than the amount registered in February 2006 (Col\$25.8 t) (Table 7). In contrast, the non-bank financial system (NBFS)<sup>40</sup> has continued to broaden its exposure to the market risk implied by government bond holdings, and increased its balance by 12.6% between February and August 2006, from Col\$26.2 t to Col\$29.5 t (Table 8).

Concentration, by type of intermediary, has not changed with respect to what was indicated in previous editions of the *Financial Stability Report*. More than 93% of all TES B held by credit institutions were in the hands of commercial banks, while nearly 70% of those held by the non-bank financial sector were held by pension and severance-pay management

<sup>38</sup> For more details on the method, see the December 2005 edition of the *Financial Stability Report* published by Banco de la República.

<sup>39</sup> The assessment exercise includes all TES B held by agents (tradable, available for sale and up to maturity).

<sup>40</sup> With respect to the NBFS considered in this section, trust companies include mutual investment funds.

TABLE 7

### OUTSTANDING TES B VALUED AT MARKET PRICES: CREDIT INSTITUTIONS (MILLIONS OF PESOS)

	In pesos	At Variable Rates	In RVU	Total
<b>Amount Outstanding at February 28, 2006</b>				
Commercial banks	18,184,198	925,063	4,851,008	23,960,269
Commercial finance companies	64,998	0	23,784	88,782
Superior-grade finance cooperatives	10,730	0	0	10,730
Finance corporations	1,548,694	18,256	136,031	1,702,982
<b>Total: Credit Institutions</b>	<b>19,808,621</b>	<b>943,319</b>	<b>5,010,823</b>	<b>25,762,763</b>
<b>Amount Outstanding at August 29, 2006</b>				
Commercial banks	16,581,182	3,980,665	21,297,035	
Commercial finance companies	100,755	0	22,359	123,115
Superior-grade finance cooperatives	6,469	0	2,944	9,413
Finance corporations	1,037,735	15,278	238,294	1,291,308
<b>Total: Credit Institutions</b>	<b>17,726,142</b>	<b>750,466</b>	<b>4,244,263</b>	<b>22,720,870</b>

Source: Banco de la República.

TABLE 8

**OUTSTANDING TES B VALUED AT MARKET PRICES:  
NON-BANK FINANCIAL SECTOR  
(MILLIONS OF PESOS)**

	In pesos	At Variable Rates	In RVU	Total
<b>Amount Outstanding at February 28, 2006</b>				
Brokerage firms	274,006	1,635	157,314	432,954
Insurance and investment companies	1,456,089	193,921	902,854	2,552,864
Pension and severance-pay management funds	13,876,068	856,814	4,587,987	19,320,868
Trust companies	2,694,225	583,770	631,880	3,909,875
<b>Total: Non-bank Financial Sector</b>	<b>18,300,387</b>	<b>1,636,140</b>	<b>6,280,035</b>	<b>26,216,561</b>
<b>Amount Outstanding at August 29, 2006</b>				
Brokerage firms	328,094	7,882	166,092	502,068
Insurance and investment companies	1,613,316	183,252	1,384,019	3,180,587
Pension and severance-pay management funds	14,642,049	808,883	5,639,376	21,090,308
Trust companies	4,002,402	241,044	493,760	4,737,206
<b>Total: Non-bank Financial Sector</b>	<b>20,585,861</b>	<b>1,241,061</b>	<b>7,683,247</b>	<b>29,510,169</b>

Source: Banco de la República.

funds. Once again, the focus is on fixed-rate securities (in pesos). Respectively, they accounted for 76% and 64% of the portfolio.<sup>41</sup>

The decline in the share of fixed-rate securities in the non-bank financial system is due to a major shift in the PMF portfolio towards securities denominated in RVU. During the period in question, the PMFs increased their RVU-denominated TES holdings by Col\$1.2 t (with Col\$402 b less in fixed-rate TES). This expanded the proportion of these securities in the total portfolio from 25% to 32%.

Table 9 shows the entire change in portfolio value: the variation not explained by an increase or reduction in TES holdings (quantity effect) is called the price effect. Being constituted as a residue, it includes the effect of the shift towards securities that might have experienced rising or falling prices during the period under analysis.

A breakdown of the change in these two components shows the price effect is responsible for no more than 7% of the total variation; that is, in the case of credit institutions. Its importance remains at around 40% for non-bank establishments. The result for credit institutions is explained by the performance of commercial banks. To shift their portfolio towards securities with less sensitive prices, they liquidated a portion of their holdings in fixed-rate TES. As to the NBFS, it is important to highlight the

<sup>41</sup> In February, the share of these securities as a portion of the total was 77% for credit institutions and 69% for the non-bank financial system.

**VARIATIONS IN TES B HOLDINGS (\*)**  
(MILLION OF PESOS)

Subsector	Variation Due to Quantity	Variation Due to Price	Total Variation
<b>Total: Credit Institutions</b>	<b>(2,836,698)</b>	<b>(205,195)</b>	<b>(3,041,893)</b>
Commercial banks	(2,546,526)	(116,708)	(2,663,234)
Commercial finance companies	26,177	8,156	34,333
Superior-grade financial cooperatives	(929)	(388)	(1,317)
Finance corporations	(315,419)	(96,255)	(411,674)
<b>Total Non-bank Financial Sector</b>	<b>1,999,417</b>	<b>1,294,234</b>	<b>3,293,607</b>
<b>Brokerage firms</b>	71,824	(2,711)	69,113
Insurance and investment companies	584,032	43,691	627,723
Pension and severance-pay management funds	931,021	838,419	1,769,440
Trust companies	412,540	414,835	827,331

(\*) Variations between February 28 and August 29, 2006.  
Source: Banco de la República.

price effect on PMFs, given their shift towards RVU-denominated TES, which exhibited a favorable trend in prices following the stock market crisis in the second quarter of the year.

## 1. Sensitivity to TES B Rate Increases

The valuation loss that would occur with a hypothetical increase of 200 bp in *all maturities on the zero coupon yield curve* for fixed-rate TES<sup>42</sup> and RVU-denominated TES<sup>43</sup> was estimated to measure the financial system's exposure to changes in interest rates. As in the past, this exercise included only the trading book positions of these securities.<sup>44 45</sup>

The estimated loss for credit institutions, based on the portfolio at August 29, 2006, is Col\$807 b, which is equivalent to 25.7% of annualized profits at July 2006 (Table 10). Losses as a percentage of profits were less in

<sup>42</sup> This is the shock suggested by the Basel Committee on Banking Supervision for countries other than the G-10.

<sup>43</sup> It is assumed the real spread on the RVU reference rate for TES-RVU increased. A rise in inflationary expectations would provoke losses only on fixed-rate TES. There would be no change in the real return on RVU-denominated TES.

<sup>44</sup> The trading book is the portfolio of financial instruments each bank holds for the benefits to be derived from their short-term purchase and sale. In the Colombian case, it includes the positions in tradable securities available for sale.

<sup>45</sup> The RiskMetrics method was used to calculate the change in portfolio value. See the December 2005 edition of the Financial Stability Report for a more detailed explanation.

TABLE 10

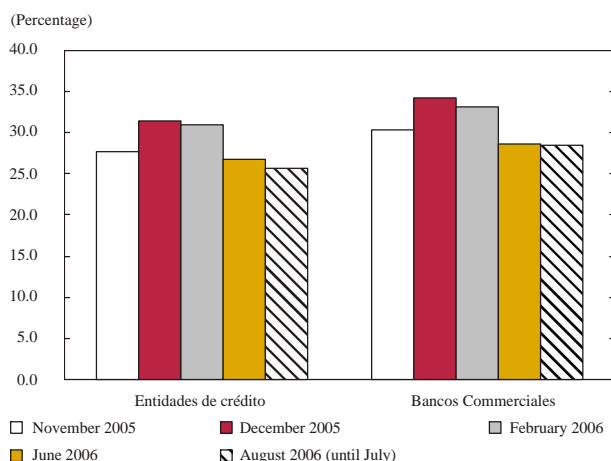
**VALUATION LOSSES  
SHOCK EQUAL TO THE CHANGE IN PRICES BETWEEN JUNE 28 AND 23, 2006  
(MILLIONS OF PESOS)**

	In pesos	In RVU	Total	Annualized Losses/ Profits (july) (%)
<b>Total: Credit Institutions</b>	<b>599,453</b>	<b>207,784</b>	<b>807,236</b>	<b>25.71</b>
Commercial banks	575,079	190,241	765,320	28.53
Commercial finance companies	3,123	843	3,965	5.20
Finance corporations	21,251	16,700	37,951	15.41
<b>Pension and severance-pay management funds</b>	<b>827,743</b>	<b>452,617</b>	<b>1,280,360</b>	<b>2.57 (*)</b>

Source: Banco de la República.

GRAPH 54

**VALUATION LOSSES AS A PERCENTAGE  
OF ANNUALIZED PROFITS,  
GIVEN A 200 BP SHOCK**



Source: Banco de la República.

June and August compared to the figures in February (Graph 54),<sup>46</sup> despite fewer reported profits during this period for credit institutions as a whole. This was because the considerable amount of securities liquidated in the second quarter of the year reduced their exposure to market risk.

The PMFs would have Cl\$1.2 t in losses, or 21.6% more than estimated in the simulation done for December 2005 (Col\$1.05 t). As a percentage of portfolio value, these losses are 16% and 21% more than those estimated in December and June, but 2% less than the estimate in February. Despite a larger amount of investments, the latter is due to the shift in portfolio composition. To begin with, the bulk of liquidated fixed-rate securities were those with longer residual maturity and duration, making the portfolio

less sensitive to changes in interest rates. Secondly, the purchase of RVU-denominated securities was distributed among different maturities. This had less of an impact on the portfolio's sensitivity and enabled the increase in losses to be less than the reduction in the fixed-rate portfolio<sup>47</sup> (Graph 55).

<sup>46</sup> The exercises in June and August pertain to the 28th and 29th day, respectively. The exercise in February was conducted with the portfolio on the 28th day of the month.

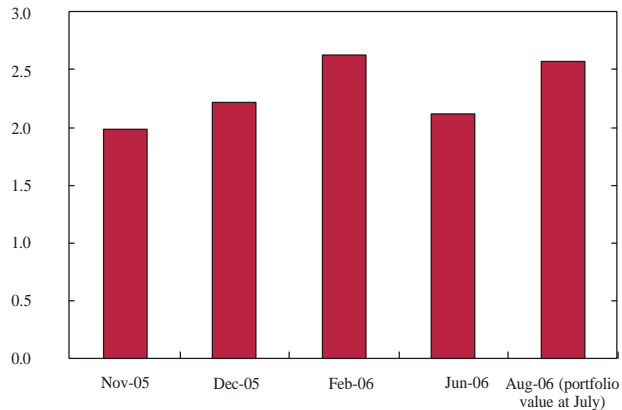
<sup>47</sup> Losses in RVU were up by 12%; those on fixed-rate securities declined by 15%.

A more detailed analysis of the losses incurred by the major players in each group shows some interesting differences. In the case of commercial banks, there were fewer losses on peso and RVU-denominated securities, due to the reduction in exposure mentioned earlier (Graph 56). The PMFs saw an increase in losses on securities in both denominations, but particularly on the RVU portfolio.<sup>48</sup> These exceeded the losses registered in December 2005 by 18% and accounted for 36% of total losses (Graph 57).

<sup>48</sup> With respect to June 2006, these losses increased by 34% compared to 21% for losses in pesos.

GRAPH 55

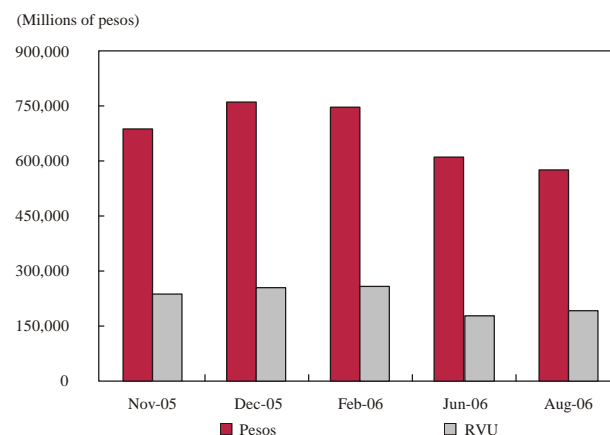
**PMF VALUATION LOSSES AS A PERCENTAGE OF THE PORTFOLIO VALUE, GIVEN A 200 BP SHOCK**



Source: Banco de la República.

GRAPH 56

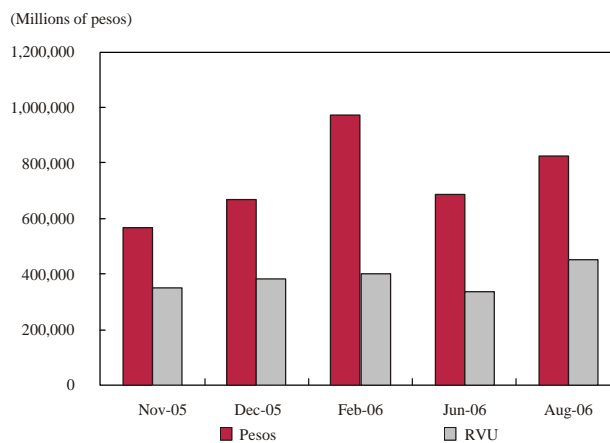
**COMMERCIAL BANK VALUATION LOSSES**



Source: Banco de la República.

GRAPH 57

**PMF VALUATION LOSSES**



Source: Banco de la República.

## DEVELOPMENTS ON THE TES B SECONDARY MARKET BETWEEN FEBRUARY AND JUNE 2006

During the period between February and June 2006, the secondary public domestic debt market was characterized by an upward trend in TES trading rates. The yield curve steepened during those months (affecting longer-term securities), then increased in the short section, before eventually moving in a parallel direction. This had an important impact on the investment portfolios of financial institutions, causing substantial valuation losses.

The purpose of this section is to arrive at a preliminary assessment of exactly how the market value of portfolios was affected by price variations between February and June. The impact on credit institutions and NBFS agents between February 28 and June 28, 2006 is assessed in the first segment to gauge the actual variation in portfolio value and to determine what portion of that variation pertains to fluctuations in the amount of securities and what portion responds to price changes.

However, this is not a valuation-loss exercise, as there is no information on when the securities were actually sold between the two periods, or at what price. For this reason, a stress test was done based on the assumption that agents face June 28 prices with the June 23 portfolio. The idea was to assess the potential losses they would incur, if forced to liquidate their portfolio at these new prices.

### 1. Change in Portfolio Value

When the portfolio-valuation exercise was done<sup>1</sup>, the financial system had nearly Col\$22.7 t in TES,<sup>2</sup> mostly held by commercial banks (Col\$21 t). These amounts are Col\$3.0 t and Col\$2.9 t less, respectively, than the value of the portfolio at the end of February (Table B5.1). For its part, the NBFS had Col\$22.6 t in TES, including Col\$16.2 t held by PMFs (Table B5.2). Here again, these amounts are Col\$3.6 t and Col\$3.2 t less than those at the end of February. This change, however, cannot be attributed entirely to the drop in price for certain issues; the change in outstanding TES (principal only) also had an impact (quantity effect).

<sup>1</sup> The valuation exercise is identical to the one described herein, specifically in the section on potential risks.

<sup>2</sup> The valuation exercise includes all TES B held by the agents (tradable, available for sale and up to maturity).



**TABLE B5.1**  
**OUTSTANDING TES B VALUED AT MARKET PRICES: CREDIT INSTITUTIONS**  
**(MILLIONS OF PESOS)**

	In pesos	At Variable Rates	In RVU	Total
<b>Amount Outstanding at February 28, 2006</b>				
Commercial banks	18,184,198	925,063	4,851,008	<b>23,960,269</b>
Commercial finance companies	64,998	0	23,784	<b>88,782</b>
Superior-grade finance cooperatives	10,730	0	0	<b>10,730</b>
Finance corporations	1,548,694	18,256	136,031	<b>1,702,982</b>
<b>Total: Credit Institutions</b>	<b>19,808,621</b>	<b>943,319</b>	<b>5,010,823</b>	<b>25,762,763</b>
<b>Amount Outstanding at June 28, 2006</b>				
Commercial banks	16,018,212	880,955	4,102,958	<b>21,002,124</b>
Commercial finance companies	111,879	0	22,828	<b>134,707</b>
Superior-grade finance cooperatives	14,893	0	0	<b>14,893</b>
Finance corporations	1,242,121	25,774	297,706	<b>1,565,601</b>
<b>Total: Credit Institutions</b>	<b>17,387,104</b>	<b>906,729</b>	<b>4,423,492</b>	<b>22,717,325</b>

Source: Banco de la República.

**TABLE R5.2**  
**OUTSTANDING TES B VALUED AT MARKET PRICES: NON-BANK FINANCIAL SECTOR**  
**(MILLIONS OF PESOS)**

	In pesos	At Variable Rates	In RVU	Total
<b>Amount Outstanding at February 28, 2006</b>				
Brokerage firms	274,006	1,635	157,314	<b>432,954</b>
Insurance and investment companies	1,456,089	193,921	902,854	<b>2,552,864</b>
Pension and severance-pay management funds	13,876,068	856,814	4,587,987	<b>19,320,868</b>
Trust companies	2,694,225	583,770	631,880	<b>3,909,875</b>
<b>Total: Non-bank Financial Sector</b>	<b>18,300,387</b>	<b>1,636,140</b>	<b>6,280,035</b>	<b>26,216,561</b>
<b>Amount Outstanding at June 28, 2006</b>				
Brokerage firms	473,599	1,228	118,169	<b>592,997</b>
Insurance and investment companies	1,427,997	176,142	1,153,455	<b>2,757,595</b>
Pension and severance-pay management funds	11,253,741	609,174	4,295,610	<b>16,158,525</b>
Trust companies	2,075,800	504,899	544,241	<b>3,124,940</b>
<b>Total: Non-bank Financial Sector</b>	<b>15,231,138</b>	<b>1,291,444</b>	<b>6,111,475</b>	<b>22,634,057</b>

Source: Banco de la República.

The total change in portfolio value is shown in Table B5.3. The drop in the value of the aggregate portfolio held by credit institutions is due to falling prices and the fact that they reduced their bond holdings. Interestingly enough, in the case of credit institutions, the price effect explains almost 80% of the change in portfolio value.

The NBFS survey is a bit different. Despite a drop in the market value of the NFBS portfolio, all establishments in the sector, with the exception of trust companies, increased their bond holdings. This raised the total stock by Col\$482 b. The PMFs were the ones affected the most during this period with respect to the value of their portfolio. Despite an increase of Col\$140 b in holdings, they suffered Col\$3.1 t in devaluation.

**TABLE B5.3**  
**VARIATIONS IN TES B HOLDINGS \***  
**(MILLIONS OF PESOS)**

Subsector	Variation Due to Quantity	Variation Due to Price	Total Variation	Percentage Explained by Price Changes
<b>Total: Credit Institutions</b>	(602,728)	(2,442,709)	(3,045,438)	80.2
Commercial banks	(665,091)	(2,293,053)	(2,958,144)	77.5
Commercial finance companies	44,659	1,266	45,925	2.8
Superior-grade finance cooperatives	3,279	883	4,163	21.2
Finance corporations	14,424	(151,805)	(137,381)	110.5
<b>Total: Non-bank Financial Sector</b>	481,761	(4,064,266)	(3,582,504)	113.4
Brokerage firms	201,206	(41,164)	160,042	-25.7
Insurance and investment companies	490,126	(285,396)	204,730	-139.4
Pension and severance-pay management funds	139,940	(3,302,283)	(3,162,343)	104.4
Trust companies	(349,511)	(435,423)	(784,934)	55.5

(\*) Variations between February 28 and June 28, 2006.  
Source: Banco de la República.

## 2. Stress Scenario

The following simulation was done to assess a possible loss scenario during the period in question. The value of the portfolio at June 23 (Table B5.4) was assessed with the prices in effect on June 28, then compared to its initial value (i.e. with June 23 prices). The exercise assumes the agents are obliged to liquidate their entire portfolio at the new prices (this is akin to assuming the price change is indefinite<sup>3</sup> and they have no time to recompose it). Therefore, the difference between portfolio values gives us the maximum valuation loss agents would incur due to the change in prices.

The outcome of the exercise is shown in Table B5.5. Credit institutions, as a whole, would report Col\$547 b in losses, as opposed to Col\$726 b for the NBFS. The

<sup>3</sup> The liquidated portfolio includes all positions (tradable, available for sale and up to maturity).

**TABLE B5.4**  
**OUTSTANDING TES B VALUED AT MARKET PRICES**  
**(MILLIONS OF PESOS) - JUNE 23, 2006**

	In pesos	At Variable Rates	In RVU	Total
<b>Total: Credit Institutions</b>	<b>17,757,836</b>	<b>833,221</b>	<b>4,502,901</b>	<b>23,093,957</b>
Commercial banks	16,416,896	807,779	4,181,746	<b>21,406,420</b>
Commercial finance companies	115,666	0	21,796	<b>137,462</b>
Superior-grade finance cooperatives	21,575	0	0	<b>21,575</b>
Finance corporations	1,203,699	25,442	299,359	<b>1,528,499</b>
<b>Total: Non-bank Financial Sector</b>	<b>15,761,645</b>	<b>1,300,997</b>	<b>6,377,463</b>	<b>23,440,105</b>
Brokerage firms	392,173	1,218	96,831	<b>490,222</b>
Insurance and investment companies	1,465,213	175,083	1,182,157	<b>2,822,452</b>
Pension and severance-pay management funds	11,867,982	604,848	4,536,786	<b>17,009,617</b>
Trust companies	2,036,277	519,848	561,689	<b>3,117,813</b>

Source: Banco de la República.

**TABLE B5.5**  
**VALUATION LOSSES**  
**SHOCK EQUAL TO THE CHANGE IN PRICES BETWEEN JUNE 28 AND 23, 2006**  
**(MILLIONS OF PESOS)**

	In pesos	At Variable Rates	In RVU	Total	Annualized Losses/ Profits (june)
<b>Total: Credit Institutions</b>	<b>453,157</b>	<b>(5,191)</b>	<b>98,542</b>	<b>546,508</b>	<b>17.4</b>
Commercial banks	434,808	(4,859)	89,775	<b>519,723</b>	<b>18.8</b>
Commercial finance companies	1,265	0	278	<b>1,543</b>	<b>1.9</b>
Superior-grade finance cooperatives	1,213	0	0	<b>1,213</b>	<b>6.0</b>
Finance corporations	15,872	(332)	8,489	<b>24,028</b>	<b>14.6</b>
<b>Total: Non-bank Financial Sector</b>	<b>510,403</b>	<b>(6,657)</b>	<b>222,630</b>	<b>726,375</b>	
Brokerage firms	6,645	(10)	2,583	<b>9,217</b>	
Insurance and investment companies	23,231	(1,059)	37,092	<b>59,263</b>	
Pension and severance-pay management funds	438,166	(2,578)	170,398	<b>605,986</b>	
Trust companies	42,361	(3,010)	12,557	<b>51,909</b>	

Source: Banco de la República.

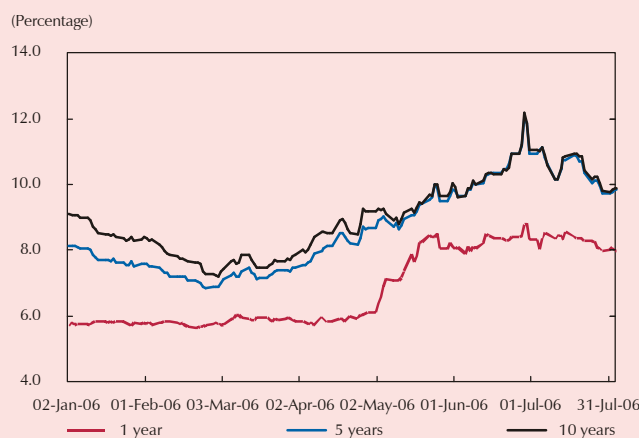
losses in the first case would be concentrated in commercial banks (Col\$520 b); in the second, the PMF portfolio would suffer the greatest impact (Col\$606 b). The losses would be due to the high concentration of longer-term securities in the TES portfolio (fixed and RVU-denominated).

As to profits, the loss incurred by commercial banks would account for 18.8% of annualized profits at June 2006; the portion for credit institutions as a whole would be around 17.5%. This is a sizeable loss, inasmuch as the price change used as the shock occurred during only two trading days (Tuesday, June 27, and Wednesday, June 28).

## BEHAVIOR OF THE ZERO COUPON TES CURVE

During the first two months of the year, the domestic market for Colombian government bonds was characterized by a high trading volume and a downturn in interest rates on the primary and secondary markets (Graph B6.1), which hit historic lows during the last week of February. However, TES interest rates began to climb as of March, resulting in increased volatility and a reduction in the volumes traded.

**GRAPH B6.1**  
**ZERO-COUPON FIXED-RATE TES PESO CURVE AT 1, 5 AND 10 YEAR MATURITY**



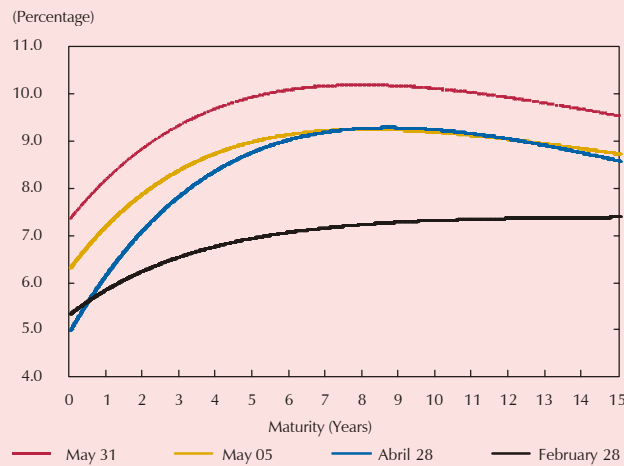
Source: Banco de la República.

This volatility was associated with uncertainty on the part of local agents about US monetary policy, specifically whether or not the Federal Reserve Bank (the Fed) would end its series of interest rate hikes. Throughout March and April, movement in the zero-coupon TES spot curve, especially the longest portion, was closely associated with the changes in those rates. This prompted a rise in the zero-coupon curve between February 28 and April 28.

At the end of April, *Banco de la República's* Board of Directors (BDBR) decided to raise the reference rate by 25 bp to 6.25%. This decision passed through to the market rates, and trading rates on the secondary market were up in the days following that announcement, particularly short and medium-term rates. This flattened out the zero-coupon fixed-term TES curve on May 5 (Graph B6.2).

In mid-May, the Fed raised its reference rate by 25 bp for the third time this year, placing it at 5%. Although investors had already discounted the increase, the announcement

**GRAPH B6.2**  
**ZERO-COUPON TES PESO CURVE, FEBRUARY 28 - MAY 31, 2006**



Source: Banco de la República.

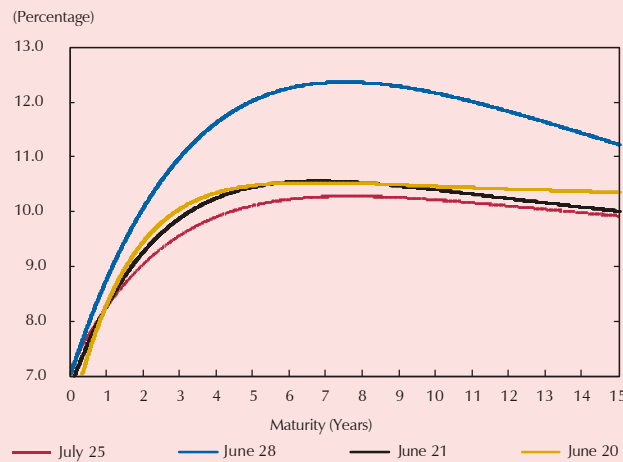
left open the possibility of further hikes in the reference rate. Faced with uncertainty about the trend in external rates, investors lowered their exposure by liquidating investments in emerging economies. This was mirrored in a sharp rise in the exchange rate and sent the stock markets in emerging economies plunging.

At the end of May, the trading rates on the domestic market for Colombian government bonds dipped slightly with the announcement that Banco de la República would not change its reference rate. However, the market continued to be influenced by the international volatility, which again boosted trading rates on the secondary market, as was reflected in a parallel shift in the zero-coupon curve during May (Graph B6.2).

The zero-coupon TES curve in June and July continued to be influenced largely by the volatility on international markets and by BDBR decisions. At its meeting on June 20, the BDBR raised the reference rate by 25 bp (to 6.5%). The zero-coupon curve leveled off at the news of this decision. The next day, this movement was reinforced by a 5 bp increase in the short portion and respective reductions of 13 and 10 bp in the medium and long portions of the curve (Graph B6.3). It appears the slight rise in the short portion was due to an advance move by the market to deal with a possible increase in the reference rate. This would explain the sizeable increase in the short and medium portions of the curve throughout May.

Nonetheless, some investors were nervous about the possibility of additional hikes in the Fed's reference rate and, as a result, shifted a major portion of their portfolios from TES to dollars. This development was reflected largely in the reference trading rate for maturity date 2020, which rose to a high of 12.08%, sharpening the curve (June 28).

**GRAPH B6.3**  
**ZERO-COUPON TES PESO CURVE, JUNE 20 - JULY 25, 2006**



Source: Banco de la República.

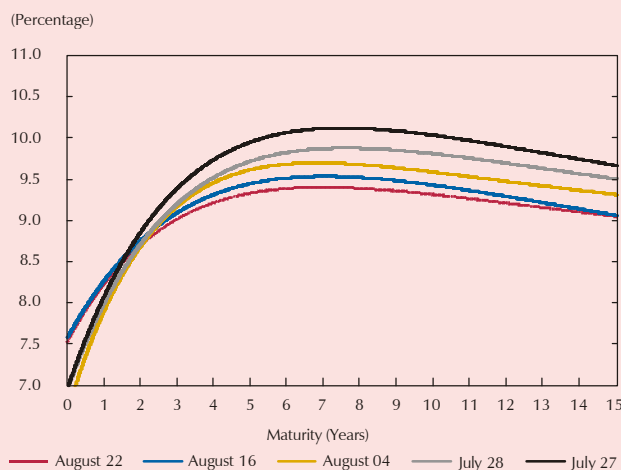
Even so, during July, the zero-coupon TES peso curve registered a correction in the upward trend observed since the end of June. The latest announcements by the Fed diluted the possibility of any new interest-rate hikes. This lowered trading rates on the market for Colombian government bonds, flattening the curve between June 28 and July 25, with an average 184 bp drop in the long portion.

On July 27, the BDBR decided not to change its intervention rate. Most government bond-market intermediaries seem to have anticipated this news and, when it was announced, the market not only maintained its trading levels, but the TES curve registered a parallel decline the next day. This was the combined result of more demand for the paper of emerging economies and the liquidity of the financial system.<sup>1</sup> The downward trend in the yield curve appeared to have accentuated in the first half of August, with average respective reductions of 2, 72 and 97 bp in the short, medium and long portions (Graph B6.4).

Consolidation of the downturn in mid-August also was accompanied by less volatile rates and further flattening of the curve, given an upward shift in the short portion, which rose by 37 bp between August 4 and 16. This increase was the result of market expectations as to whether Banco de la República would raise its reference rate by 25 bp at the BDBR meeting on August 18. It also explains the limited amount of movement between the curves on August 16 and 22 (before and after the increase).

<sup>1</sup> The major increase in liquidity in the system was due to: 1) TES repurchased by the Finance Ministry (nearly Col\$1.4 t between July 11 and 16) and 2) payment of Col\$ 4.9 t in TES maturities (July 25).

**GRAPH B6.4**  
**ZERO-COUPON PESO TES YIELD CURVE, JULY 27 - AUGUST 22, 2006**



Source: Banco de la República.

It is important to point out that market conditions have changed considerably in past months. There has been a noticeable decline in the amounts traded daily, while the volatility in rates on the TES secondary market has shifted from the short term to the medium and long term.

## B. CREDIT RISK

Two types of analysis of the financial system's exposure to credit risk are offered in the present section. The first uses information from credit institutions, while the second is based on the largest debtors in the private commercial loan portfolio.

### 1. Credit Institutions

As summarized earlier, the increase in credit has been accompanied by good loan portfolio quality and high loan-loss provisioning. Despite a slight decline in the repayment rate index (RRI) for consumer loans, the current levels are historically low. Therefore, at the moment, credit risk is not a short-term source of instability for the financial system.

Several exercises, such as those included in previous editions of this report,<sup>49</sup> were conducted to assess how an adverse macroeconomic situation would affect the soundness of financial institutions. The macroeconomic scenario used in those exercises is extremely or highly unlikely<sup>50</sup>. In this report, the soundness of credit institutions is assessed in terms of the capital adequacy ratio, which measures an institution's capacity to absorb unexpected losses.

The results, shown in Table 11, pertain to a sample of 18 institutions that account for 89% of the assets held by credit institutions. They suggest that credit risk would be a latent problem for the financial system, if macroeconomic conditions were to deteriorate seriously, as happened at the end of the nineties. A sharp rise in interest rates and a drastic reduction in economic activity would place the capital adequacy ratio of 12 banks below the required minimum (9%). When comparing the average capital adequacy ratio for the period, based on figures at June 2006, to the October 2005 period (8.5% and 8.9%, respectively), the actual drop in this indicator is more pronounced than was calculated previously. This means institutions took more risk, through a larger loan portfolio, without a similar increase in equity.

<sup>49</sup> See the December 2005 edition of the Financial Stability Report for a detailed explanation of those exercises.

<sup>50</sup> The exercises for consumer and mortgage loans assume a 6.8% decline in economic activity (as occurred in the second quarter of 1999), a 450 bp rise in the interest rate (as happened between May and June 1998) and an 8% drop in housing prices. This is equivalent to the average decline during 1996-2000. In the case of commercial loans, the exercise is based on a 9% reduction in sales, as reported during 1999.

**TABLE 11**

**NUMBER OF BANKS WHERE THE CAPITAL ADEQUACY RATIO WOULD DROP BELOW THE MINIMUM (12 MONTHS)**

	Shock 1 <sup>a/</sup>	Shock 2 <sup>b/</sup>	Shock 3 <sup>c/</sup>
Commercial	0	4	4
Consumer	2	2	3
Mortgage	0	0	0
Total	2	9	12
Stressed solvency at Jun-06 (%)	11.1	9.0	8.5
Stressed solvency at Oct-05 (%)	11.8	9.8	8.9

<sup>a/</sup> Interest rate (consumer and commercial loans) or housing prices (mortgage loans).

<sup>b/</sup> GDP (consumer and mortgage loans) or sales (commercial loans).

<sup>c/</sup> Combination.



## 2. Private Corporate Sector

### a. Probability of Default

A probit model was estimated to analyze the private corporate sector's exposure to credit risk and to calculate the probability of companies defaulting on their obligations to the financial system.<sup>51</sup> This probability is shown in Graph 58, where it is compared to the percentage of companies that effectively default, each year, on loans from the financial system. As shown in the graph, the probability of default peaked in 1999, as did the number of companies that defaulted on their obligations to the financial system. In 2005, both the probability of default and the percentage of companies in default were the lowest at any time during the period analyzed.

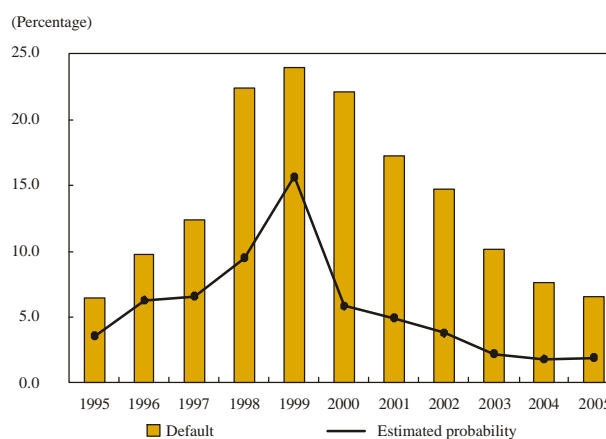
Given this estimated probability, the debt firms would not repay the financial system (debt at risk) is shown in Table 12.<sup>52</sup> It follows the trend in probability. In other words, it began to increase prior to the crisis,

<sup>51</sup> The sample used for this exercise includes an average of 1,043 companies during the period in question. They are among the financial system's 2,000 largest private debtors. On average, these 1,043 companies accounted for 47.4% of private commercial loans. See Box 5 for details on the estimated model.

<sup>52</sup> The debt at risk, per company, is equal to the company's estimated probability of default multiplied by the total debt to the financial system. Each company's debt at risk, each year, is added to arrive at the total for the sector. The assumed loss, in the event of default, is 100%.

GRAPH 58

#### ESTIMATED PROBABILITY OF DEFAULT COMPARED TO THE NUMBER OF COMPANIES IN DEFAULT



Source: Banco de la República.

TABLE 12

#### DEBT AT RISK AS A PERCENTAGE OF PRIVATE LOANS

Year	Billions of December 2005 Pesos		(Percentage)
	Debt at Risk	Private Loans	
1997	925	41,153	2.25
1998	1,382	37,022	3.73
1999	2,246	34,162	6.58
2000	659	30,200	2.18
2001	536	28,295	1.90
2002	402	30,699	1.31
2003	232	31,789	0.73
2004	195	36,083	0.54
2005	198	39,383	0.50

Source: Office of the National Superintendent of Financial Institutions and Banco de la República.

peaked in 1999 and, in 2004-2005, was well below the level registered prior to the crisis. On average, this debt at risk accounted for 2.19% of private commercial loans. In the worst year (1999), the proportion was equal to 6.58%. Last year, it was the lowest ever (0.50%).

If we analyze last year to gauge the current importance credit risk has for financial stability, the results are quite interesting. There were no major differences between the groups of companies that produce tradables and non-tradables. The big differences were among sectors. Construction was the sector most in default to the financial system last year (15.8% of the construction companies in the sample defaulted on their obligations). Following in order of importance were agriculture and transport (15% and 12.5%, respectively). These three sectors also had the highest estimated probability of default, although in a different order (7% transport, 5.8% construction and 3.4% agriculture).

Mining was the best sector for repaying its loans. Although it is a small in terms of the number of companies, its default rate was zero. Another is commerce; only 3.4% of the sector defaulted on loans from the financial system.<sup>53</sup>

Another important point is the fact that industry and commerce, which represented the largest portion of loans for the sample in 2005 (77%), also were the sectors with the lowest estimated probability of default, after mining. When classified by size, the biggest companies accounted for 91% of private commercial loans and their estimated probability of default was only 1%. This is an initial indication that credit risk posed by the large borrowers is not currently a threat to financial system stability.

A second exercise was conducted for the seven largest banks.<sup>54</sup> The estimated probability of default by the debtors of these institutions was 6.1% in 1995, 14.9% in 1999 and 2.5% in 2005. Although the estimated probability of default last year was quite low, one bank in particular showed a much higher probability than the rate for the entire group and raised the average.

#### *b. Stress Scenarios*

The following stress scenarios were considered based on unexpected changes in the interest rate and the real GDP growth rate within a three-month period:<sup>55</sup>

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<sup>53</sup> The estimated probabilities for these sectors were 0.3% and 1%, respectively.

<sup>54</sup> The largest banks were classified as such on the basis of the average value of their assets during the past 12 months.

1. A 500 bp increase in the interest rate
2. A 50% drop in the real GDP growth rate
3. A change involving scenarios 1 and 2 simultaneously

The purpose of this exercise is to analyze the probability of default by companies in response to these shocks, considering the real GDP growth rate affects it directly, depending on the model, while the interest rate affects it through asset yield.<sup>56</sup> Based on these two changes and using the sample at December, it is assumed the shocks occurred during the following quarter. This allows us to analyze what additional percentage of the loans would fall overdue in March 2006.

The findings are summarized in Table 13. They show that interest rate hikes have no significant impact on the probability of default on loans from the financial system. This virtually zero response appears to be due to the profits these companies earned last year, which ensure them enough cash flow to meet an increase in their financial expenses.

Inasmuch as the estimated probability of default did not change in response to these assumptions, no additional loans would fall overdue and credit risk would remain at December 2005 levels.

The outcome is different in the case of the real GDP growth rate. If the growth rate were half of what it was last year, the probability would increase from 1.80% to 2.54%. And, in the case of simultaneous shocks, the result is the same, since the change in interest rate has no impact.

<sup>55</sup> Although other shocks of different size were considered for the interest rate and the real GDP growth rate, this version only includes these three scenarios.

<sup>56</sup> An increase in financial spending that lowers profits. Hence, the profitability indicator is the channel through which asset yield is affected by interest rate hikes.

**TABLE 13**

**STRESS TESTS - COMMON COMPANIES: DECEMBER 2005 TO MARCH 2006**

Initial probability (estimated for December) = 1.80%  
 Initial debt at risk (March) = Col\$134 (billions of pesos)  
 Percentage of private commercial loans 0.33%

	<b>Final Probability (Percentage)</b>	<b>Debt at Risk: March (Billions of pesos)</b>	<b>Percentage of the Portfolio: March 2006</b>	<b>Percentage of the Portfolio that Would Migrate from A-B to C</b>
Shock 1	1.80	134	0.33	0.00
Shock 2	2.54	200	0.49	0.74

Source: Calculations by Banco de la República.

For the financial system, these findings imply an increase in non-performing loans, since a portion of what are considered “good” loans would fall overdue in March 2006.<sup>57</sup> The increase in probability with the second scenario is 0.74%, which means this percentage of type-A and type-B loans would become type-C loans. This increase in non-performing loans implies more spending on loan-loss provisioning for the financial system, as provisions for type-C loans come to 20% compared to 1% and 3.2% for type-A and type-B loans, respectively. Insofar as type-C loans can migrate to type D, and D to E, there would be a new expense for provisioning in each case. Although, with the information we have available, this is impossible to know for certain.<sup>58</sup>

The general conclusion, based on this exercise, is that credit risk from the largest private debtors in the commercial loan portfolio is controlled, inasmuch as the companies are meeting their obligations to the financial system. The figures show a very small percentage of companies defaulted during 2005, and the estimated probability leans in the same direction. For the time being, those who owe money to the country’s largest banks can be considered a good credit risk, and the stress tests indicate that changes in interest rates do not appear to affect their payments to the financial system. On the side of GDP growth, although there are increases in probability of default, they are extremely low compared to the estimates for the crisis period.

### C. LIQUIDITY RISK

As in previous editions of the *Financial Stability Report*, the uncovered liabilities ratio (ULR) is the instrument used to measure liquidity risk. However, in this edition, several changes in that indicator are introduced for a better approximation to the real impact of liquidity risk.

In the past, the ULR was used only to measure funding needs (understood as the difference between liabilities susceptible to redemption and liquid assets). The purpose was to gauge the possibility of a company not having enough backing to honor a portion of its liabilities, if called on to do so. However, in the event of the latter, market liquidity clearly affects a company’s ability to overcome the problem<sup>59</sup>. The new ULR is, therefore, an attempt to include this effect on a company’s liquidity position<sup>60</sup>.

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<sup>57</sup> The exercise was conducted with the figures available at December 2005. Consequently, since the shock lasts one quarter, the results of the stress situation would be reflected in the non-performing loans at March 2006.

<sup>58</sup> Unfortunately, there is no information on the number of days each loan is non-performing, so as to know exactly how the loans migrate between the different categories.

<sup>59</sup> For example, a company with liquidity problems is likely to have trouble liquidating its positions quickly and in an orderly manner.

<sup>60</sup> Box 8 offers a more detailed look at the structure of the SEN (electronic negotiation system) of the interbank market for domestic government securities, which is one source of this market liquidity.

## 1. Method

The following expression is used to calculate the new ULR for the set of companies as a whole, and for each one individually.

$$ULR = (PTr + PL) - [I IN + (AL - IN)] / AT - AL$$

where *PL* pertains to liquid liabilities, *PTr*, to the time component of all other liabilities, *IN*, to tradable securities, *AL*, to liquid assets and *AT*, to total assets.<sup>61</sup> In this expression, the sum of *PL* and *PTr* constitutes the liabilities susceptible to redemption. The support institutions have (in square brackets) is the sum of liquid assets other than tradable securities (*AL – IN*), plus tradable securities multiplied by a discount (*I*). This discount means the value of *IN* – in terms of liquidity risk – is somewhat less than their market value (*I* < 1), due to the market liquidity effect mentioned earlier.<sup>62,63</sup>

The ULR reads as follows:

ULR	Motive	Liquidity Risk
Positive	$PTr + PL > I IN + (AL - IN)$	High
Zero	$PTr + PL = I IN + (AL - IN)$	Medium
Negative	$PTr + PL < I IN + (AL - IN)$	Low

## 2. Evolution and Sensitivity Analysis

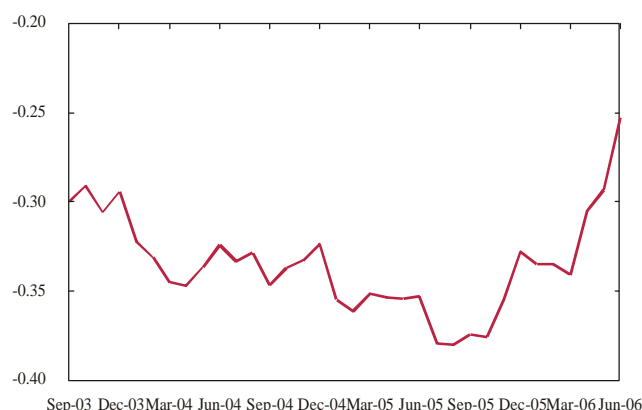
Graph 59 shows the recent ULR tendency for the financial system as a whole.<sup>64</sup> Liquidity risk is currently low, so much so that the ULR was -0.25 at the end

<sup>61</sup> It is assumed that all liquid assets are redeemable at any time. To determine the time component of all other liabilities, the Hodrick-Prescott filter is applied to the series of liabilities other than liquid liabilities. See Hodrick and Prescott, "Postwar U.S. Business Cycles: An Empirical Investigation," in *Journal of Money, Credit and Banking*, Vol. 29, No. 1, Ohio State University Press, 1997, pp. 1-16.

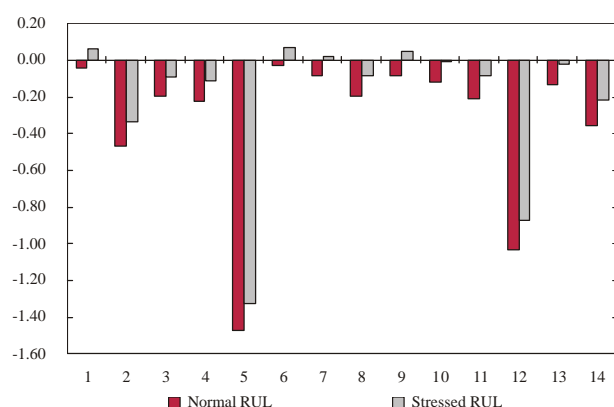
<sup>62</sup> *I* is calculated as (1-haircut), where the haircut is the discount Banco de la República applies to the value of credit institutions' loans in their repo transactions. This way, using the information on haircuts, it is possible to calculate the value of the tradable securities portfolio discounted for these transactions.

<sup>63</sup> According to Dziobek, Hobbs and Marston, "Toward a Framework for Systemic Liquidity Policy," in IMF Working Document No. 34 (2000), the difference between liabilities susceptible to redemption and liquid assets must be scaled by illiquid assets to prevent the largest banks from being favored by the indicators, as the amount of their operations is greater.

<sup>64</sup> Data on haircuts is available only as of 2003.

**GRAPH 59****CREDIT INSTITUTIONS' RUL**

Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de Colombia.

**GRAPH 60****SENSITIVITY ANALYSIS:  
RUL OF FINANCIAL INTERMEDIARIES**

Source: Office of the National Superintendent of Financial Institutions. Calculations by Banco de Colombia.

of the first six months of the year. Nevertheless, it is important to emphasize that the indicator was rapidly approaching zero during the last 11 months of the sample. In the first half of 2006, this process gained speed because of the drop in the value of domestic government bonds (the primary component of tradable securities). If these tendencies continue, credit institutions would eventually face a high liquidity-risk rate. Given the implications individual liquidity risk has for financial stability, this underscores the need to keep a close watch on how the liquidity position of financial intermediaries develops.

The results of a simulated bank run equivalent to 12% of deposits, in the context of the ULR, are shown in Graph 60 to assess credit institutions' vulnerability in the event of a serious impact on their liquidity position.<sup>65</sup> As illustrated, at the end of the first half of 2006, no intermediary has a positive ULR. This corroborates the information in Graph 60 in the sense that the incidence of liquidity risk is low.

According to the analysis, a shock like the one mentioned would result in a positive ULR for four of the five selected intermediaries. They account for nearly one fourth of the assets in the financial system. For them, the indicator would average 5%. This implies a high rate of liquidity risk in the shock scenario, insofar as nearly 5% of the illiquid assets in the financial system would have to be liquidated.<sup>66</sup>

In short, the fact that financial intermediation activities are currently positive has not reduced liquidity for credit institutions as a whole. However, in the event of a mass withdrawal of deposits, the portion of the financial system that would encounter liquidity problems is now larger than it was at the end of 2005. Consequently, developments in the system's liquidity position will have to be monitored closely.

<sup>65</sup> The size of the bank run is equivalent to an arithmetic average of the largest drop in deposit volume registered by one of these intermediaries during 1994-2006.

<sup>66</sup> At the close of 2005, the percentage of assets held by establishments that would have liquidity problems was near 7%.

## CREDIT RISK POSED BY COMPANIES

The present section offers an estimate of the probability of default by Colombian companies in 1995-2005.<sup>1</sup> The factors determining a company's probability of default on obligations to the financial system were identified with a probit model. Probability was then calculated, by company, and stress tests were done to analyze the company's response to unexpected shocks in macroeconomic variables.

### 1. An Estimate Based on the Model

The dependent variable is constructed with information on the companies that have defaulted on at least one loan from the financial system. The explicative variables were selected on the basis of the bankruptcy probability exercise for Colombian companies, which appeared in the December 2005 edition of the *Financial Stability Report*,<sup>2</sup> and on the duration model presented at the end of this report.

The results of the estimate are shown in Table B7.1. According to the size of the coefficients, asset yield (AY) appears to be an extremely important determinant of the estimated probability of default, and the sign is the expected one, which indicates the higher the AY, the less likely companies are to default on their obligations to the financial system.

Moreover, the size variable coefficient indicates the larger the company, the less likelihood of compliance. The same applied when they have foreign investment.

The indebtedness level also explains the probability of default on obligations to credit institutions. In this case, the more companies are indebted to the financial system, the more likely they are to default on their loans.

<sup>1</sup> See Footnote 63 for details on the sample of companies used in this exercise.

<sup>2</sup> Arango, Juan Pablo, Nancy Orozco, Inés. "Riesgo de crédito: un análisis desde las firmas," Reporte de Estabilidad Financiera, December 2005. The difference between the two exercises is based on the dependent variable. In the exercise presented in the December 2005 edition of this report, the estimate was on the probability of company bankruptcy. In this case, the estimate concerns the probability of default.

**TABLE B7.1**  
**ESTIMATED PROBABILITY OF DEFAULT (PROBIT PANEL - RANDOM EFFECTS)**

Variable	Coefficient	Standard Error
Profitability	-3.45849	0.20818
Indebtedness	0.53449	0.16710
Liquidity	0.00058	0.00066
Size	-0.21286	0.02398
Agricultural Sector	-0.09183	0.13963
Mining Sector	-0.59766	0.50184
Construction Sector	0.36513	0.12747
Commerce Sector	-0.48701	0.10896
Service Sector	-0.19435	0.12420
Transport Sector	0.40871	0.18218
Foreign Investment	-0.19962	0.08597
GDP	-0.08228	0.00804
Constant	1.74981	0.41454

No. of observations = 11,475  
No. of groups = 1,793  
Lnsig2u = 0.4617271  
Sigma\_u = 1.259687  
Rho = 0.6134238

A comparison of each sector to the manufacturing industry showed that being part of the construction, transport and telecommunications sectors can imply a higher probability of default, while being part of the commercial sectors makes companies “better” debtors. The real GDP growth rate was included for cycle control and the indication was that favorable economic performance, in general, has a positive impact on company performance at the individual level.

The liquidity variable in the regression model was not significant. The same can be said of the dummies for the agriculture, mining and service sectors.

#### Box 8

### **STRUCTURE OF THE MARKET FOR DOMESTIC GOVERNMENT BONDS TRADED THROUGH THE ELECTRONIC NEGOTIATION SYSTEM (SEN)**

Financial institutions manage a good portion of their liquidity through investments purchased and sold on the interbank market for domestic government bonds. Institutions can turn to this market as a source of liquidity when problems arise. For that reason, adequate liquidity-risk management depends largely on the proper



operation of this market. As mentioned earlier, interbank market liquidity can affect the liquidity-risk position of individual institutions.

The foregoing is the reason for this structural analysis of the domestic public debt market, particularly interbank securities traded through the electronic negotiation system (SEN in Spanish) operated by *Banco de la República*. Hereinafter, this market will be interpreted as a network: each bank is a node in that network and each particular transaction represents a connection between two nodes. An exercise for April 2002 and April 2006, as outlined below, shows how the structure of the SEN network has developed over the years.

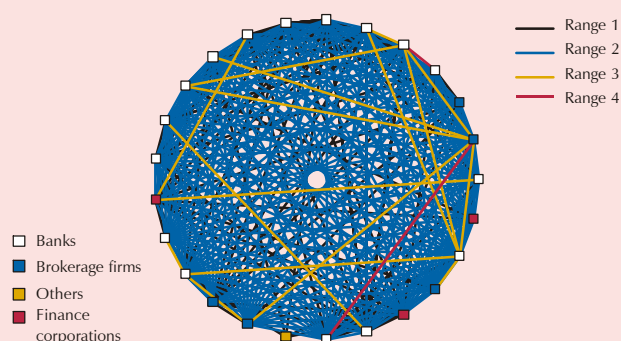
The following were the features of the SEN interbank market in April 2002:

- Total amount traded: Col\$22,757,000 m
- Average trade: Col\$1,925.28 m
- Smallest trade: Col\$500.21 m
- Largest trade: Col\$29,164.8 m

Banks accounted for the largest number of transactions on the SEN interbank market: 16,421 in all, including 7,487 purchases and 8,934 sales. The bank-group member with the most trades registered 3,114 transactions. However, it did not account for the largest average value. The agent with the highest value in purchases averaged Col\$2.4 b; the one with the highest sales value averaged Col\$2.5 b.

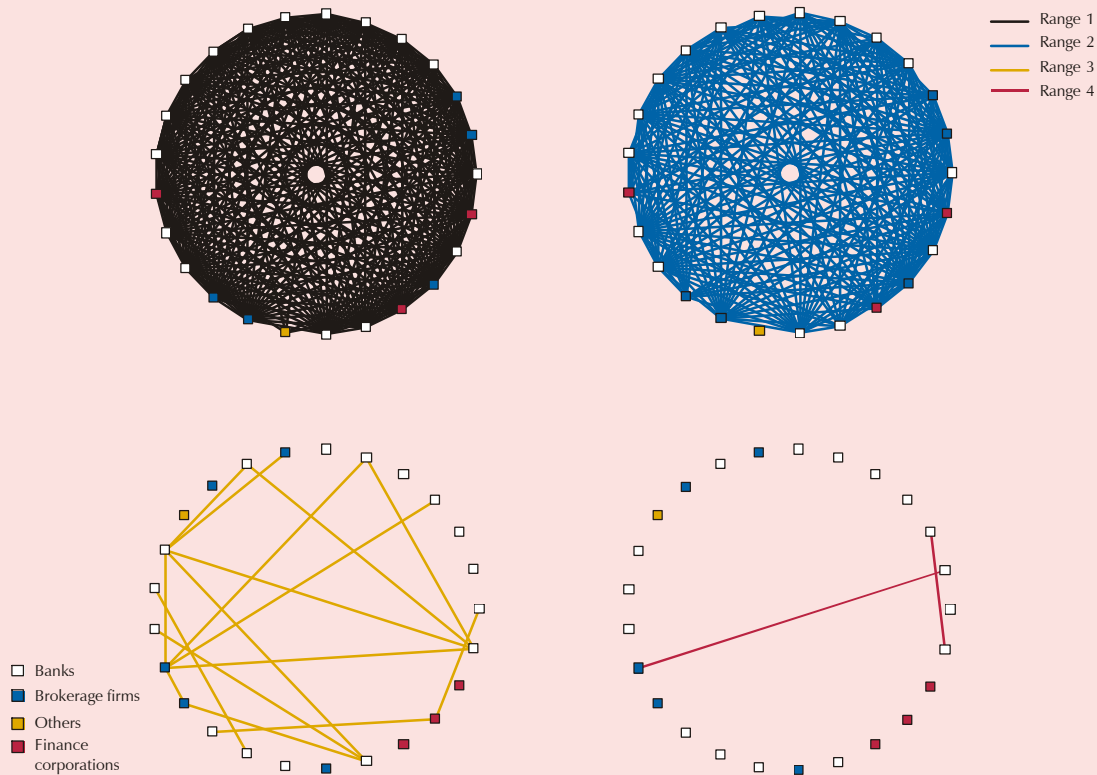
The SEN interbank market for April 2002 is represented in network form in Graphs B8.1 and B8.2. Each circle in these graphs represents an agent in the financial system. The color of the circle (white, light pink, dark pink or red) indicates the type of financial institution. The arches or connections between the circles (nodes) represent one or

**GRAPH B8.1**  
**NETWORK STRUCTURE OF THE INTERBANK**  
**GOVERNMENT-BOND MARKET (SEN), APRIL 2002**



Source: Calculations by Banco de la República.

**GRAPH B8.2**  
**NETWORK STRUCTURE OF THE INTERBANK GOVERNMENT-BOND MARKET (SEN),**  
**BY TRANSACTION RANGE, APRIL 2002**



Source: Calculations by Banco de la República.

more transactions between two agents in the market. The color of the arch represents the range of transactions conducted between the two agents in the financial system.

The ranges used to develop the graphs for 2002 and 2006 are shown in Table B8.1.

**TABLE B8.1**  
**TRANSACTION RANGES**

Range 1	0	2,661,518,853
Range 2	2,661,518,853	7,340,352,265
Range 3	7,340,352,265	12,019,185,677
Range 4	12,019,185,677	>12,019,185,677

Source: Calculations by Banco de la República.

As Graph B8.2 shows, the transactions are concentrated in ranges 1 and 2, which indicates most involved small amounts. This analysis, applied to April 2006, showed the following for the SEN market:

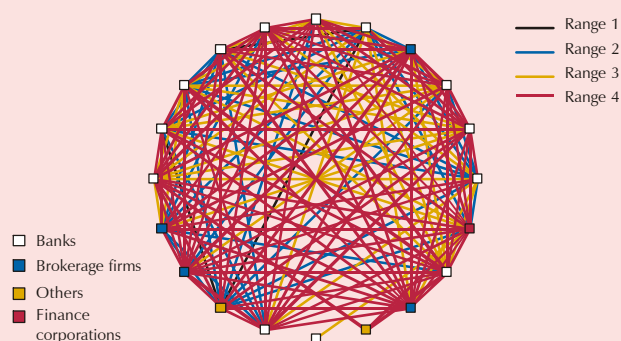
- Total amount traded: Col\$64,931,000 m
- Average trade: Col\$3,312.98 m
- Smallest trade: Col\$272,81 m
- Largest trade: Col\$69,091.12 m

Once again, banks were the institutional group responsible for the largest number of transactions on the SEN interbank market: 24,083 in all, including 11,463 purchases and 12,620 sales. However, the agent registering the most transactions during this period was not a bank, but a brokerage firm (5,650 transactions). Nonetheless, as in April 2002, that same agent did not account for the largest volume traded. The one with the highest value in purchases averaged Col\$25.9 b; the agent with the highest sales value averaged Col\$22.6 b.

In Graphs B8.3 and B8.4, the SEN interbank market for April 2006 is represented in network form. The colors pertain to ranges equivalent to those presented in Table B8.1.

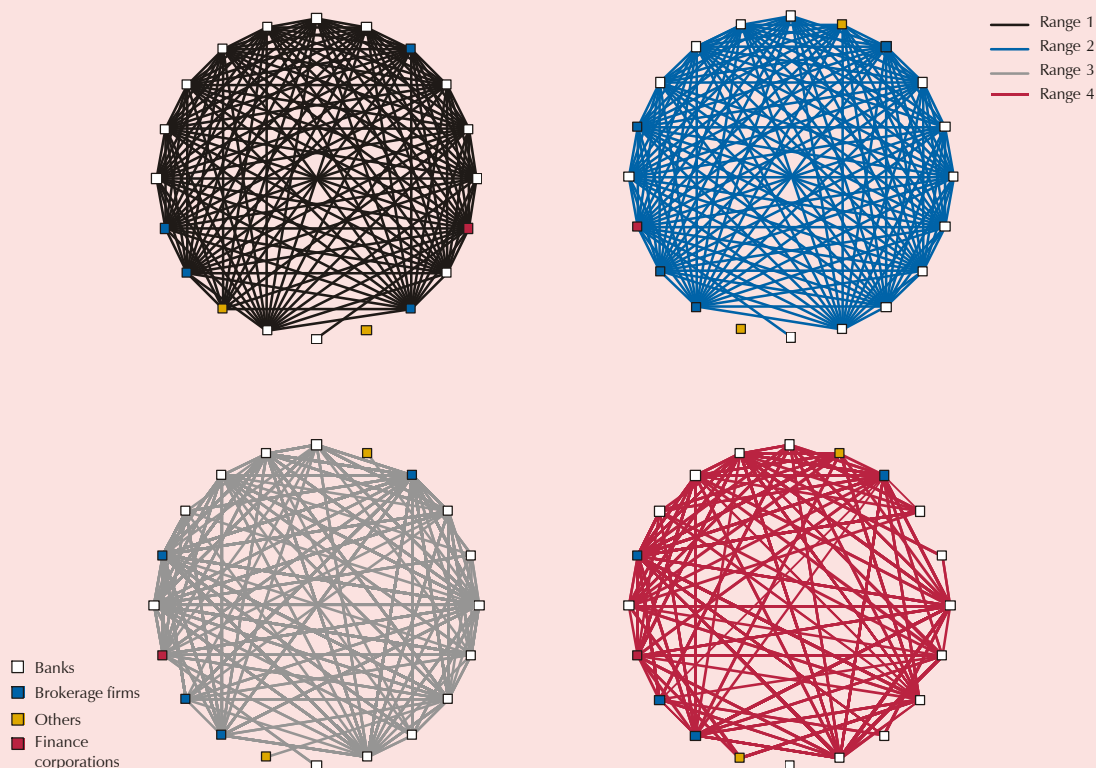
Contrary to the situation in April 2002, the transactions during April 2006 are distributed more evenly among the ranges. This suggests the market has grown considerably, insofar as both the number of transactions and their amount have increased.

**GRAPH B8.3**  
**NETWORK STRUCTURE OF THE INTERBANK GOVERNMENT-BOND**  
**MARKET NETWORK (SEN), APRIL 2006**



Source: Calculations by Banco de la República.

**GRAPH B8.4**  
**NETWORK STRUCTURE OF THE INTERBANK GOVERNMENT-BOND MARKET NETWORK (SEN),**  
**BY RANGE OF TRANSACTION AMOUNT, APRIL 2006**



Source: Calculations by Banco de la República.

The findings for April 2002 and April 2006 also indicate the structure of the SEN interbank market is not particularly concentrated. This is visually evident in the way transactions are dispersed among the agents that participate in the market. A concentrated structure is easily identifiable, if a large portion of the transactions pertain to a particular institution, which is not the case with SEN during the two months in question. In other words, during both periods, many of the agents (nodes) are connected to practically all other agents. This represents an active volume of market transactions among all participating agents.

This last finding has interesting implications for the liquidity risk financial institutions face. If the market is highly concentrated, risk management depends largely on the performance of a few institutions, since the problems of one are passed on to other institutions through the securities market. As this is not the case with SEN, there is little possibility of any such “contagion” being passed on to the financial system, through the market.

In short, the findings suggest a growing market, but not a concentrated one. This is conducive to good liquidity-risk management on the part of financial entities. The

recent decline in the share of total electronic domestic-government-debt transactions through SEN is an important factor to bear in mind. An analysis of data from other environments (e.g. the MEC of the Colombian Stock Exchange) will contribute to a better understanding of the general structure of the market for domestic government bonds in Colombia.

### **OBSERVATIONS ON INTERNATIONAL CONVERGENCE WITH THE CAPITAL ADEQUACY FRAMEWORK OF THE BASEL COMMITTEE ON BANKING SUPERVISION**

The Office of the National Superintendent of Financial Institutions has done much to refine and improve the mechanisms used to measure and monitor the various risks to the financial system, and to calculate capital adequacy requirements consistent with exposure to those risks. The guidelines proposed by the Basel Committee are fundamental in this respect, as they provide a relatively well-accepted framework for supervision. Nonetheless, and without ignoring what has been accomplished by the Office of the National Superintendent of Financial Institutions, it is important to analyze the criticism leveled against the Basel model, particularly with respect to credit and market risk. Understanding its limitations is the best foundation for building a better framework of regulations to contain panic on the markets in Colombia.

In essence, the criticism is summarized by one of the features that differentiates Basel II from Basel I; namely, having risk-sensitive capital requirements. Basel II wants regulatory capital to be reflected in economic capital.<sup>1</sup> As will be explained later, this creates procyclicality problems in the requirements, and a convergence in calculation methods, which could result in possible systemic flaws if these methods are not the most appropriate.

#### **1. Credit Risk**

With Basel II, banks may choose one of two options for calculating their risk and assigning capital. For the small and less-sophisticated banks, it proposes a simple method known as the standard model, which requires their risks to be weighed using the risk calculations developed by accredited risk calculators for different types of assets. Or, banks may use

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<sup>1</sup> Economic capital is understood as the capital each bank considers necessary to operate efficiently.

an internal rating system (IRB), which must be approved in advance and monitored by the regulators.

Because the risk posed by assets varies with the economic cycle, asset risk rating (whether internal or external) would be expected to reflect this tendency. Procyclicality in risk ratings will translate into procyclicality in capital adequacy requirements. Consequently, banks would have less capital and more outlays at the peak of the cycle, when the potential for systemic risk is greatest. During a slowdown, when macroeconomic stabilization would require an increase in credit, the situation would be just the opposite (Danielsson *et al.*, 2001). One possible alternative would be to relate the risk weights to the cycles, in an attempt to soften the requirements. This is the idea behind the model used by the Office of the National Superintendent of Financial Institutions, which has different transition matrices for *good* times and *bad* times. Methods of this sort require a good prediction of the economic cycle. However, as indicated widely in literature, this is not easy to achieve.

Procyclicality is, however, not the only potential problem with the method. Countries like the United States are more concerned with the potential advantages “big” banks can have over small and medium-sized banks when calculating their requirements. Banks that use an IRB approach can update their risk calculations quicker and more reliably than less sophisticated banks. This allows them to recompose their portfolio to include a greater (or lesser) proportion of assets subject to fewer (more) requirements (*The Economist*, May 2006). Small banks, which do not have the same data and information systems, would end up concentrating on the worst assets without even knowing it. The result would be a process of adverse selection.

In fact, according to the study cited in *The Economist* (May 2006), the advantages enjoyed by sophisticated banks could eventually lower current capital requirements by about 15%, particularly for the big banks, giving them even more of an advantage over the smaller ones. The same study also underscores the potential danger of the discretionary authority wielded by banks that use the IRB approach, showing that different banks assign weights in a range of 5% to 80% for apparently similar risks. In short, regulators must be extremely precise in their efforts to ensure that banks are doing their job the right way.

## **2. Market Risk**

With respect to market risk, Basel II proposes a set of conditions similar to those for credit risk. In other words, banks have the option of using either a standard or advanced approach. The former uses a model provided by the regulators; the latter offers banks the possibility of developing their own risk-rating systems.



As mentioned earlier, much of the criticism leveled against the Basel agreement stems from the possibility of calculating requirements based on the internal models banks use to predict risk. In the case of market risk, most of these internal methods are founded largely on VaR and similar methods, which have sparked serious questions. To begin with, they address risk as exogenous,<sup>2</sup> which is not always the case. Market volatility is at least partly the result of the interaction among market agents and is, therefore, endogenous (Danielsson *et al.*, 2001).

That endogenousness is especially important in times of crisis, particularly if agents behave more homogeneously. By using similar risk models (fed with similar data), agents might follow analogous strategies to mitigate the adverse effects of the crisis at hand, in which case individual actions will tend to be reinforced. This is a typical problem with externality. When making decisions based on models of this type, individual banks do not consider how their actions affect the system. Therefore, the model fails precisely at a time (i.e. crisis) when the regulations demand that it work best (Danielsson *et al.*, 2001).

In the second instance, VaR is a deceptive measurement of risk when returns are not distributed normally (as with credit and market risk). This is because the assumption of normality does not allow the existing risk to be captured correctly in the distribution tails. As a result, the risk to which agents are effectively exposed is underestimated. Furthermore, VaR-type methods provide only a point estimation of the loss distribution, generally at the 1<sup>st</sup> percentile (Danielsson, 2000; Embrechts, McNeil and Strauman, 1999). However, a risk manager is interested in distribution of the loss, since a particular extreme threshold has been crossed. In other words, knowing the shape of the tail beyond the 1st percentile is of paramount interest. One possible alternative to overcoming the normality and tail distribution problem would be to develop the extreme value theory further (Embrechts, 2000), so as to better depict the risk an institution faces.

Finally, regulations based on risk-sensitive models can lead to market collapses that would not occur with other types of regulation. For example, when asset prices drop, banks must liquidate risky assets to meet their capital requirements. In the absence of this type of regulation, banks that are less adverse to risk would be willing and able to supply the necessary liquidity through the purchase of these assets. However, in a regulated economy where the agents use similar modeling techniques, regulatory constraints restrict the ability of banks to act, leading the markets for those assets to eventually collapse. Therefore, calculating risk-sensitive capital requirements will lead

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<sup>2</sup> The models assume the actions of a bank, based on its volatility forecasts, do not affect future volatility itself.

to more homogeneous market agents in terms of their aversion and trading strategies, making the financial system less stable.

It is important to emphasize that homogeneity in the way agents respond is not due to use of the advance approach. With a standard approach, all agents have the same models and the same risk weighers provided by the regulators. In this case, the regulators end up as modelers of last resort for the system. So, when the market agents use the same model designed by the regulators, their responses are homogeneous. This is extremely dangerous in times of crisis.

### **3. Conclusion**

It is often said that Basel II was designed not for emerging economies, but for internationally active banks (*The Economist*, May 2006). This spells problems for its implementation in some countries. The possibility of adopting a standard approach seems to be the most appropriate for the majority of banking systems that lack the technology required to implement the advanced approach. However, the potential advantages this could imply for more sophisticated banks that do use the internal model spark fears about the end result of adopting Basel II.

Moreover, in the case of market risk, if less sophisticated banks decide to adopt the advanced approach to reduce their capital requirements,<sup>3</sup> they will tend to concentrate on VaR methods, which are the most common in literature on risk management. However, as mentioned earlier, they are not always the most adequate.

It is, therefore, important to examine the United States decision on implementing Basel II, and particularly to understand the gradual adjustment to be made. The United States announced it would begin to implement Basel II in 2008, during a three-year transition period. Effective quantitative limits will be placed on the reduction in capital requirements generated by use of that model, together with a set of more flexible standards for the small banks than Basel I, but simpler than Basel II. Also, the regulators will set a minimum capital adequacy ratio for all banks.

In short, Colombia has made enormous strides towards regulations in keeping with the Basel framework, and there have been many advantages. However, the development of financial markets, the heterogeneity of the agents comprising those markets, and technological progress demand that we continue to move forward on the aspects involved in measuring the risk to Colombia's financial system.

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<sup>3</sup> This is because the standard model does not consider the correlation between assets, or between maturity dates of the same asset.



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ANALYSIS OF CONDITIONAL PROBABILITY OF DEFAULT BY THE MAJOR PRIVATE DEBTORS IN THE COLOMBIAN FINANCIAL SYSTEM JOSÉ EDUARDO GÓMEZ INÉS PAOLA OROZCO NANCY EUGENIA ZAMUDIO	93
A LIQUIDITY-RISK MEASUREMENT, MONITORING AND REGULATION PROPOSAL FOR COLOMBIA JUANITA GONZÁLEZ DANIEL ESTEBAN OSORIO	103
CREDIT SUPPLY DETERMINANTS IN THE COLOMBIAN FINANCIAL SECTOR ANDRÉS MURCIA JOSÉ HERNÁN PIÑEROS	112
SPATIAL COMPETITION IN THE COLOMBIAN DEPOSIT MARKET SANDRA ROZO DAIRO ESTRADA	125

# ANALYSIS OF CONDITIONAL PROBABILITY OF DEFAULT BY THE MAJOR PRIVATE DEBTORS IN THE COLOMBIAN FINANCIAL SYSTEM

José Eduardo Gómez González  
Inés Paola Orozco Hinojosa  
Nancy Eugenia Zamudio Gómez\*

## I. INTRODUCTION

The private corporate sector is the primary debtor in the Colombian financial system (commercial loans account for 54.9% of the total gross portfolio). Consequently, it is extremely important to measure and monitor the risk this sector of the economy might pose to the financial system. Ever since the crisis in the late nineties, Colombian companies have not experienced a comparable situation. Today, the quality indicators for the commercial loan portfolio are at historic lows, and the portfolio has begun to grow, following the standstill in 2003-2005. The non-performing/total loan ratio for companies was 1.63% at June 2006, while real growth in the private commercial loan portfolio was 18.3%.

Coupled with a good economic situation and good corporate performance in recent years, the foregoing poses no imminent risk to financial stability. However, the mid-term risks are still out there, which means this type of risk must continue to be measured and monitored. For example, a hefty increase in commercial loans is good, as it helps to fund investment projects. Nonetheless, an unexpected shock to corporate creditworthiness might be a source of risk to the financial system, because of possible deterioration in the loan portfolio.

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The objective of this paper is to discover the primary determinants of the risk rate<sup>1</sup> or conditional probability of default on financial obligations by companies in the Colombian private sector.<sup>2</sup> Estimates of maximum partial verisimilitude were done with a duration model, using the Camel<sup>3</sup> model variables as input.

The results indicate the size of the debt is the main determinant of conditional probability of default on corporate obligations to the financial system: specifically, the larger the corporate debt the greater the probability of corporate default. Profitability, size and belonging to certain sectors of the economy are other variables that determine this probability. Finally, probability of default on financial obligations was found to be negatively dependent on duration; that is, the longer a company's time to default, the less it is likely to default.

This paper is divided into four parts, including this introduction. The second part contains a theoretical review of the duration model, with emphasis on the risk function proposed by Cox (1972), and a description of the estimation procedure. The figures and results of the estimate are presented in the third section and the conclusions, in the fourth.

## II. THE DURATION MODEL

The duration model used to estimate the probability of major corporate borrowers defaulting on loans from the Colombian financial system is described in this section, as is the procedure for arriving at that estimate. A duration model was used to analyze the time it takes companies to default. The particular question to be answered with a model of this type is: what is the probability that a company will default on its financial obligations at moment  $t$ , given that it has not done so up to that point?

Duration models have been used widely in labor economics to determine how long agents remain unemployed and how this variable changes with the economic cycle. Recently, these models were applied in studies on financial economics, such as the one by Gómez and Kiefer (2006), where the authors used a duration model to estimate the amount of time before credit institutions in Colombia's financial system fail in the wake of a negative economic shock.

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<sup>1</sup> In this paper, the term risk is equivalent to the concept of *hazard* in duration models.

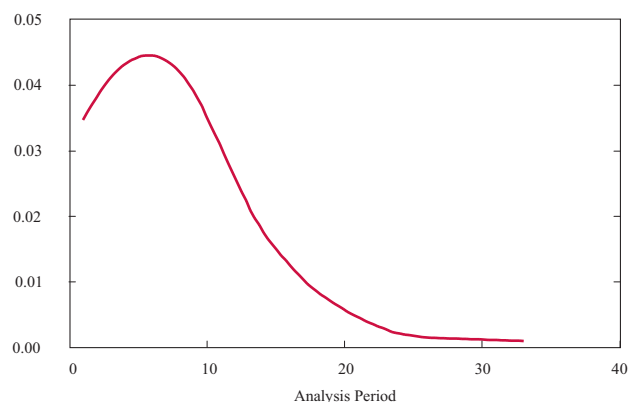
<sup>2</sup> The probability of default is conditioned by companies not having defaulted on obligations to the financial system up to moment  $t$ .

<sup>3</sup> Camel is the acronym for capital protection, asset quality, management efficiency, earning strength and liquidity risk.

The model applied in the present study is the one most widely used in literature: Cox's semi-parametric proportional risks model (1972). The justification for selecting it and not others, such as the exponential model or Weibull's model, is the non-monotonicity of the risk function. As Graph 1 illustrates, in the early periods, this function increases to a maximum, then declines monotonically.<sup>4</sup>

Studies based on the assumption that the passage of time will have a particular effect on conditional risk suppose, for example, that the impact of changes in macroeconomic conditions that affect all institutions equally generates a monotonic change in conditional risk that continues over time. One of the advantages of developing non-parametric estimates of the risk rate, such as the ones in this paper, is that they do not imply assumptions of this type. This allows for a more adequate and reliable estimate of the coefficients in the conditional model.

SMOOTHED RISK FUNCTION



## A. Risk Functions and Survival<sup>5</sup>

The probability distribution of the durations is defined as:

$$(1) \quad F(t) = \text{Prob}(T < t)$$

It is, however, common to define the “survival” function in models of this type:

$$(2) \quad \begin{aligned} S(t) &= 1 - F(t) \\ S(t) &= \text{Prob}(T \geq t) \end{aligned}$$

The equation (2) is defined as the probability that random variable  $T$  is equal to or greater than a certain value  $t$ . Working with a survival function is equivalent to working with a probability function, whatever it may be.

The most useful function in a duration model analysis is the risk function that determines the conditional probability of a company defaulting on its obligations, given that it has not defaulted so far. It is defined as:

<sup>4</sup> Exponential distribution and Weibull's distribution impose a certain parameterization of the risk function. The former assumes it should be constant over time; the latter assumes it should grow continuously, decline or remain constant.

<sup>5</sup> See Kiefer (1988) for a more detailed explanation of duration models.

$$(3) \quad h(t) = f(t) / S(t)$$

Where  $f(t)$  is the probability density function. In the case of the Cox model (1972), the specific risk function is provided by:

$$(4) \quad h(t) = h_0(t) \psi(x, \beta)$$

Where  $h_0(t)$  is the baseline risk function (namely, an unknown parameter that has to be estimated), and  $\psi(x, \beta) = \exp(x'\beta)$  is a vector of explicative variables and unknown coefficients. It is convenient to assume that the form of function  $\psi(x, \beta)$  is exponential, as this ensures the risk function is not negative, without imposing sign constraints on the interest parameters.

## B. Maximum Likelihood Estimation

This method, developed by Cox (1972), allows us to estimate the  $\beta$  parameters without having to specify a particular baseline risk function form  $h_0(t)$ . The crucial point of this estimate is that the contribution to the partial verosimilitude function of duration  $i$  is provided by:

$$(5) \quad \frac{h(t_i, x_i, \beta)}{\sum_{j=1}^n h(t_i, x_j, \beta)}$$

This implies that:

$$(6) \quad \frac{h(t_i, x_i, \beta)}{\sum_{j=1}^n h(t_i, x_j, \beta)} = \frac{h_0(t) \psi(x_i, \beta)}{h_0(t) \sum_{j=1}^n \psi(x_j, \beta)} = \frac{\psi(x_i, \beta)}{\sum_{j=1}^n \psi(x_j, \beta)}$$

And, therefore, this does not depend on the duration.

The verosimilitude function is constructed as the product of the individual contributions given in equation (6). The logarithm of this function is provided by:

$$(7) \quad l(\beta) = \sum_{i=1}^n \{ \ln \psi(x_i, \beta) - \ln [\sum_{j=1}^n \psi(x_j, \beta)] \}$$

As equation (7) shows, given the absence of the baseline risk function, the order of the durations contains information on the unknown coefficients, which are obtained by maximizing that function.

### III. EMPIRICAL EXERCISE

#### A. Data and Variables

Figures on the two thousand primary debtors in the Colombian financial system were used for this exercise. They contain the history of each firm's loan portfolio classifications, are quarterly and extend from 1997-IV to 2006-I.<sup>6</sup> After some weeding, the total number of companies comes to 989.<sup>7</sup>

A Camel-type model<sup>8</sup> was chosen as the base model for the estimate. Although generally used in bank assessment and ranking exercises, some of its variables can be regarded as possible determinants of the probability of company default; others can be eliminated or substituted with better indicators.

Capitalization, asset quality, management or efficiency, profits and liquidity are the variables that represent the Camel model. According to the *Financial Stability Report*, particularly its regular review of stylized events in Colombia's private corporate sector, two variables in this model are irrelevant to explaining the financial difficulties of Colombian firms, or are not equivalent for the case of banks, which is precisely where the applications of this model are concentrated. For example, asset quality is not a determinant variable of corporate difficulties; in the case of banks, the loan portfolio quality index is. Moreover, the variable generally used to measure efficiency is the ratio of administrative and labor costs to assets. In the case of companies, this is more a size variable, than one of efficiency or management.

The variables included in the model and several statistics descriptive of these variables are presented in Table 1. The *time to failure* variable is equal to the number quarters before a company's loan portfolio rating changes from A/B to C/D/E, or what is considered herein as failure or default. Two important aspects with respect to this variable are shown in Table 1. First, the companies in this sample take 15 quarters, on average, to default on their obligations to the financial system. Secondly, the sample contains companies that defaulted and companies that never defaulted.

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<sup>6</sup> Data as of 1997 were used to cover the period prior to the crisis in the late nineties.

<sup>7</sup> The sample was trimmed several times before the estimate was made. The initial quarter is 1997-IV, which is considered the base period. With this assumption, the companies that defaulted on loans during the base period were the first to be eliminated, followed by those with no available information for the next quarter (1998-I). The final criterion for remaining in the sample was having balance sheet and earning statement data for the base period.

<sup>8</sup> See Gilbert, Meyer and Vaughn (2000) for a more detailed explanation of this model.

TABLE 1

## DESCRIPTIVE STATISTICS OF THE VARIABLES INCLUDED IN THE MODEL

	Average	Deviation	Minimum	Maximum
<i>Time to failure</i>	15.341	12.681	1.000	33.000
Debt	0.334	0.182	0.000	1.314
Liquidity	2.015	7.021	0.058	204.356
Size	16.602	1.480	7.631	20.876
Capitalization	0.437	0.223	-0.898	0.989
Dummy profitability	0.497	0.500	0.000	1.000
Dummy industry	0.434	0.496	0.000	1.000
Dummy construction	0.131	0.338	0.000	1.000

Source: Office of the National Superintendent of Financial Institutions, National Superintendent of Corporate Affairs, and the authors' calculations.

The *debt* is the debt over assets ratio. It was 33% on average. The liquidity indicator is the ratio of liquid assets to liquid liabilities. On average, it shows the companies' short-term assets covered more than twice the liabilities nearest to maturity. The size measure was constructed as the sales logarithm, and capitalization is equal to equity over assets.

Three dichotomic variables were included in the estimate; profitability was constructed as profit before taxes over assets, and the respective dummy variable is equal to 1 when the company has negative profitability. On the basis of Table 1, we can infer that approximately half the companies in the sample showed negative profitability in 1997. Two sector variables for industry and construction were developed the same way. They are equal to 1, if the company belongs to these sectors and to 0 if it does not.<sup>9</sup>

## B. Estimate and Results

The results of the estimate are presented in Table 1. To facilitate interpretation, it shows the coefficients and not the risk rates.<sup>10</sup> The combined significance test indicates the included variables are relevant to explaining duration. All the variables show the expected sign, except the liquidity variable, but it is not significant. Therefore, one can assume that its effect on the risk rate is 0.

<sup>9</sup> The intention of these dichotomic variables is to control sectoral effects. The industrial sector was chosen because it is the most representative of the sample, and the construction sector, because it is one of the most fragile throughout the period in question.

<sup>10</sup> The estimate shows the hazard ratios rather than the coefficients. The hazard ratios logarithm is calculated to obtain the coefficients.



## ESTIMATE BY MAXIMUM PARTIAL VEROSIMILITUDE

Variable	Coefficient	Standard Error
Dummy Profitability	0.375242 ***	0.0993396
Debt	1.314651 ***	0.3511115
Liquidity	-0.000951	0.0052542
Size	-0.076329 **	0.0347549
Capitalization	-0.246420	0.3022769
Dummy Industry	-0.277751 **	0.1104563
Dummy Construction	0.513085 ***	0.1334809
Number of Observations	989	
Likelihood Log	-3049.3886	
LR chi2(7)	151.2	
Prob > chi2	0.0000	

\*\* 95% significant.

\*\*\* 99% significant.

One of the most important results is the effect of the debt. It has the largest coefficient and indicates that, all else being constant, an increase in the companies' debt spells greater conditional probability of default during the period analyzed. With the profitability variable coefficient, the indication is that a company's loss increases the risk rate. The size variable indicates the largest companies are less likely to default, since they are regarded as firms in a higher category, where default on debts can be more costly.

Finally, belonging to certain sectors of the economy can influence the risk rate. For example, being part of the industrial sector is tantamount to being part of a less volatile sector in terms of income. This implies a lower risk rate.<sup>11</sup> However, all things being constant, being part of the construction sector involves a higher probability of default. This result has been a constant in other exercise used to estimate corporate probability of failure (be it based on bankruptcy or default).<sup>12</sup>

Proportional risks are the primary assumption in Cox's model (1972); hence, the importance of validating it. The results of the proportional risks test are

<sup>11</sup> Approximately 50% of the sample belongs to the industrial sector.

<sup>12</sup> See the work by Arango, Zamudio and Orozco (2005) in the case of bankruptcy. See Chapter IV of this report in the case of default. The reason for this result is that the exercises consider a company's entire history. Therefore, although the construction sector has recovered and is in better situation, it faced adverse circumstances during the crisis in the nineties. The exercise includes those circumstances.

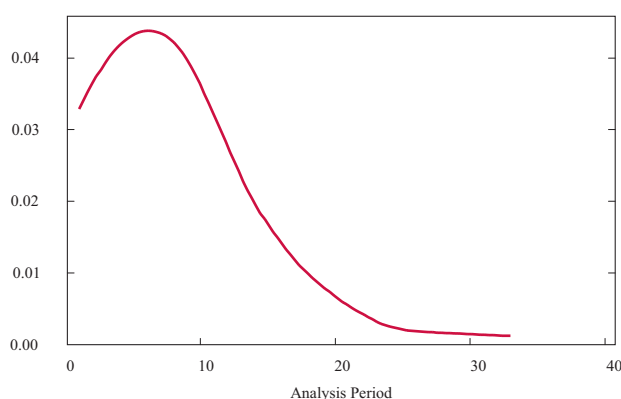
TABLE 3

## PROPORTIONAL-HAZARDS ASSUMPTION TEST

	Rho	$\chi^2$	Degrees of Freedom	Prob > $\chi^2$
Dummy Profitability	0.029	0.430	1	0.514
Debt	0.007	0.020	1	0.891
Liquidity	0.029	0.480	1	0.490
Size	0.047	1.090	1	0.297
Capitalization	0.041	0.680	1	0.408
Dummy Industry	-0.061	1.810	1	0.178
Dummy Construction	-0.007	0.030	1	0.871
<b>Global Test</b>		<b>3.5</b>	<b>7</b>	<b>0.835</b>

GRAPH 2

## COX PROPORTIONAL-HAZARDS REGRESSION



shown in Table 3, where the null hypothesis is that the slope of the coefficients is equal to 0. In other words, the coefficients would not vary over time. The test shows the individual results for each coefficient and for the global test. In each case, we cannot rule out the null hypothesis, which maintains the coefficients do not vary over time. Therefore, it is possible to conclude that the Cox proportional-hazards assumption is adequate in this case.

The estimated risk function of the model can be obtained once the estimate and the proportional-hazards test have been done. This function is presented in Graph 2 for the average values of the variables. Their pattern is similar to the risk function shown in Graph 1.<sup>13</sup> Conditional probability increases to a maximum point, then declines and is now at its lowest level, indicating a negative correlation between probability of default and duration. In other words, the longer it takes a company to default, the less its probability of default.

Graph 3 shows the risk function estimated for three types of situations. In the upper panel (A), the function is divided between companies with negative profitability and those with above-0 profitability. Both groups follow the same tendency; however, there is a major difference in level;

<sup>13</sup> Graph 1 is the non-parametrically estimated risk function and pertains to the instantaneous conditional probability of default (in other words, it does not depend on the model's exogenous variables). Graph 2 shows the estimated risk function, where the risk function is expected to be similar to the one obtained non-parametrically, as is the case. This indicates the estimated model adjusts appropriately to the non-parametric model, which is closest to the empirical distribution of the duration.

the estimated conditional probability is greater for the group with losses in 1997, although the gap has been closing recently.

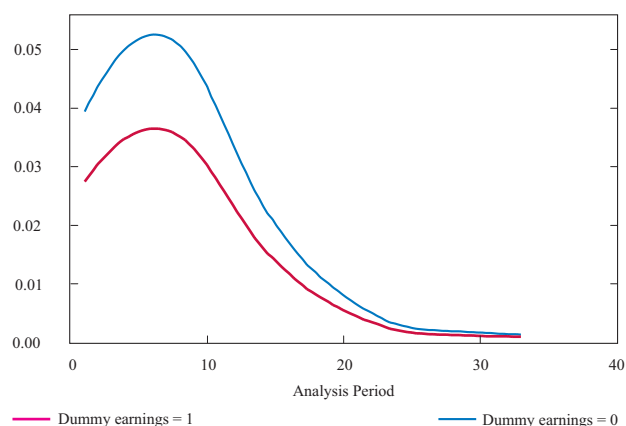
The estimated risk function for companies in the industrial sector is shown in the middle panel (B), compared to those in the other sectors. The lower panel (C) shows the conditional probability for companies in the construction sector compared to companies in the other sectors of the economy. The graphs show the tendency for all the groups is the same, but there are some differences in level. In particular, compared to the other sectors, being part of the industrial sector implies less conditional probability of default. On the contrary, being in the construction sector leads to a higher risk rate. As with profitability, these differences are becoming less and the gap is closing steadily.<sup>14</sup>

#### IV. CONCLUSIONS

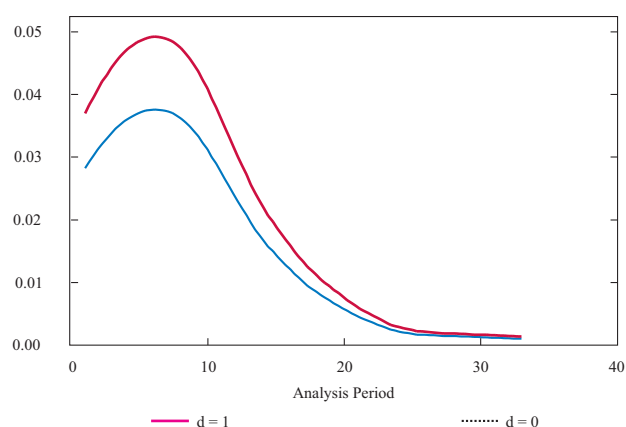
Using a duration model, this work estimates the conditional probability of loan default by firms in the private corporate sector. Specifically, it uses the Cox proportional-hazards model (1972) and develops an estimate of maximum partial verisimilitude, where the variables used originate initially with a Camel model adapted for the case of Colombian companies.

The results show the extent of corporate debt is the primary determinant of conditional probability of default. Other less important variables are company size and profitability. The impact belonging to certain sectors of the economy has on conditional probability of default is an interesting result. In particular, being part of

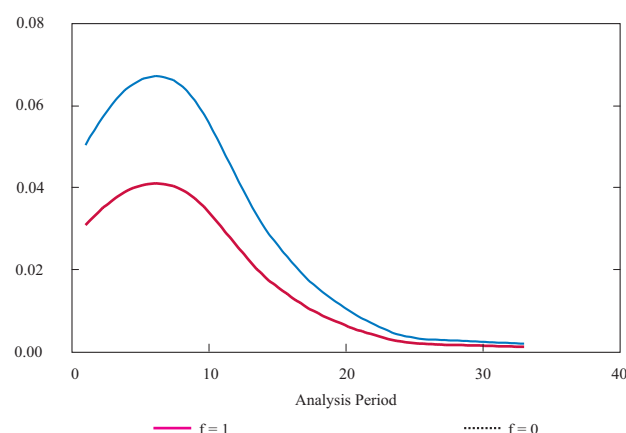
A. COX PROPORTIONAL-HAZARDS REGRESSION FOR PROFITABILITY



B. COX PROPORTIONAL-HAZARDS REGRESSION FOR THE INDUSTRIAL SECTOR



C. COX PROPORTIONAL-HAZARDS REGRESSION FOR THE CONSTRUCTION SECTOR



<sup>14</sup> The reduction in the gap between company groups also might be due to the convergence of non-conditional probability of default towards 0.

industry generates less probability, while being part of the construction sector translates into higher probability.

One implication of the results is the negative correlation between probability of default and duration. In other words, the longer a company takes to default the less its probability of default. Finally, considering the excellent economic situation and good business performance in recent years, the private corporate sector clearly implies no imminent risk to financial stability at this time. Nevertheless, the mid-term risks continue, which means efforts to measure and monitor them must continue as well.

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# LIQUIDITY-RISK MEASUREMENT, MONITORING AND REGULATION PROPOSAL FOR COLOMBIA

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## I. INTRODUCTION: DEFINITIONS

The importance of properly monitoring and regulating liquidity risk is associated with systemic risk and with stability of the financial system. If institutions do not measure liquidity risk adequately and if it is not well regulated, financial institutions could see their positions affected by a liquidity shock. Before designing a regulatory scheme, an operational definition of liquidity risk must be established. Literature offers two complementary definitions of liquidity risk.<sup>1</sup> The first is associated with a bank's inability to honor its obligations on time, because it does not have the liquid resources to do so (Basel Committee on Banking Supervision, 2000).

According to this definition, the structure of the bank balance sheet is divided into short-term and long-term assets and liabilities. When an institution does not have the liquid assets to meet current and maturing obligations, the liquidity risk is high. This "liquidity shortage" must be covered, either by liquidating a portion of the liquid portfolio, or by substituting liquid liabilities with other longer term liabilities.

Two conditions for good liquidity-risk management can be derived from the foregoing. The first consists of measuring the liquidity shortage as precisely as possible. This implies knowing, for example, when assets and liabilities mature, and the likelihood of their being renegotiated. The second implies having enough capacity to convert illiquid assets into cash or to substitute liabilities, when necessary.

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<sup>1</sup> The term "operational" means the definition must be quantifiable and easy for financial institutions and regulators to monitor.

Ever since the financial crisis in the late nineties, but particularly after the events that led to the “ordered” liquidation of LTCM (Long Term Capital Management) in 1998 by the Federal Reserve Bank of New York, some works have proposed a new notion of the liquidity risk that financial institutions face.

The idea underlying these works deals with the fact that measuring liquidity shortage, as the traditional version suggests, does not detect an institution’s liquidity needs adequately during times of stress.<sup>2</sup> In such situations, a rapid attempt by an institution to sell part of its illiquid assets (to reduce its liquidity shortage) can be curbed by market liquidity. And, in the event of a systemic shock, that liquidity becomes a constraint to solving the institution’s liquidity shortage. However, the first definition does not take that potential constraint into account.

Any scheme to regulate liquidity risk must attempt to deal with these two definitions, if it is to minimize the materialization of risk in the form of a liquidity crisis. The objective of this article is to propose an alternative for measuring, monitoring and regulating liquidity risk in Colombia’s financial system. The article is divided into six sections, the first being this introduction. The current regulatory scheme and its primary drawbacks are described in the second section. The third outlines several alternative methods for measurement that are now being used and will serve as a basis for our proposal. Section four contains the proposal itself. Some of the conditions for its practical application are examined in section five. Finally, several thoughts on the scheme are presented in section six by way of conclusion.

## II. CURRENT REGULATIONS ON LIQUIDITY RISK IN COLOMBIA

### A. Liquidity Gap

The current regulations on liquidity risk in Colombia are outlined in External Circular 100 of 1995, Chapter IV, issued by what was then the National Banking Authority. They stipulate that institutions must determine the extent of their exposure to liquidity risk by analyzing the maturity mismatch among assets, liabilities and off-balance sheet positions. This is done by distributing the balances outstanding on each instrument into time bands, according to their contractual or expected maturity dates. “Expected maturity” is

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<sup>2</sup> The following paragraphs are based on the works of Muranga and Ohsawa (1997), Upper (2000), Borio (2004), Allen and Gale (2002), Bangia et al. (1998).

understood as maturity that must be estimated through a statistical analysis of historic data, as it is not known when some items on the balance sheet will mature.

The liquidity gap for the period, which is defined as the difference between assets, plus contingent liabilities and liabilities, plus contingent assets, is determined on the basis of the foregoing. When the accumulated liquidity gap for three-month maturity is negative, it is known as “value at liquidity risk”. According to the regulations, a credit institution may not present, in two consecutive assessments, a value at liquidity risk that is higher, in absolute terms, than the value of its net liquid assets<sup>3</sup>. What is more, these assessments must be done monthly.

## **B. Main Drawbacks**

There are two main drawbacks to the liquidity gap that undermine its validity as an instrument that can be used to identify liquidity risk in accordance with the definitions presented above. To begin with, liquidity risk is a phenomenon that materializes during very short periods of time. However, the liquidity gap is calculated monthly, for a three-month horizon. Such a long measurement period makes it difficult to identify a liquidity crisis well enough in advance. Secondly, the liquidity gap components have measurement problems. Hence, liquidity requirements and, consequently, the actual liquidity risk each institution faces are not properly identified by the measurement. From the standpoint of liabilities, the current regulations make it impossible for the National Banking Superintendent to know how institutions calculate expected maturities. Furthermore, in a scenario where that calculation is difficult to come by, there are no frames of reference on how it should be done. Lastly, the liquidity gap assumes that institutions have a portfolio of net liquid assets that can be redeemed on the market at the prices observed at the time of valuation. However, as noted earlier, this assumption is difficult to sustain if market liquidity is included in liquidity risk calculation.

## **III. METHODS CURRENTLY IN USE**

Outlined in this section are two methods for calculating liquidity risk that will be used to design an alternative to the current liquidity gap.

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<sup>3</sup> Net liquid assets consist of ready cash, interbank loans sold and resale agreements, minus interbank loans purchased, repurchase agreements and tradable securities.

### **A. The Uncovered Liabilities Ratio (ULR) Calculated by the Financial Stability Department at Banco de la República**

Banco de la República's Financial Stability Department bases its liquidity-risk measurement on a statistical calculation of the liabilities of financial institutions that are susceptible to redemption.<sup>4</sup> These are comprised of all liquid liabilities (LL), plus the temporary component of all other liabilities (*TLr*)<sup>5</sup>. This calculation assumes that all liquid liabilities are susceptible to redemption in the short term. To meet its liquidity needs, an institution has all its liquid assets (LA), which it can redeem if such needs arise.

Using data from the balance sheets of financial institutions, liquidity risk is measured by the ULR, which is calculated as follows<sup>6</sup>.

$$(1) \quad ULR = [TLr + LL] - LA / [TA - LA]$$

where *TA* represents total assets; the other elements are as defined earlier. The numerator in the expression is the difference between liabilities susceptible to redemption and liquid assets. The illiquid assets<sup>7</sup> constitute the denominator. If the ULR is positive, the institution does not have enough liquid assets to cover its liabilities susceptible to redemption. This signifies a high liquidity risk.

In contrast to the FS liquidity gap, the ULR explicitly offers a statistical method for calculating expected maturity (in the sense proposed by External Circular 100/1995). By being based on data from the same institution, the only possibility of increasing the monitoring frequency of the indicator would be to increase the frequency with which the FS collects balance-sheet data from financial institutions.

### **B. The Sterling Stock Liquidity Ratio (SSLR) of the United Kingdom Financial Services Authority (FSA)**

The Financial Services Authority in the United Kingdom, which is responsible for liquidity-risk monitoring, insists on the construction of an indicator using

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<sup>4</sup> This method was used up to the March 2006 edition of the *Financial Stability Report*.

<sup>5</sup> The Hodrick-Prescott filter is applied to the liability series to determine its temporary component (See Hodrick and Prescott, 1997). To detect the individual volatility of deposits, this calculation is done for the system as a whole and separately for each institution.

<sup>6</sup> The expression is based on the work of Dziobek, Hobbs and Marston (2000).

<sup>7</sup> According to Dziobek, Hobbs and Marston (2000), the difference between liabilities susceptible to redemption and liquid assets should be scaled by illiquid assets, so as not to favor the larger banks, as the amount of their operations is greater.



balance-sheet data from institutions in the financial system. It shares the basis of the liquidity gap and the ULR by attempting to differentiate between liabilities subject to redemption and the support provided by liquid assets. Nevertheless, as an alternative to these indicators, it calculates not the difference, but the ratio between these two balance-sheet components. The SSLR is expressed as follows:

$$(2) \quad SSLR = (TO)/(FN + 5\% DPM)$$

where  $FN$  is to the net flow of payments the bank is obliged to cover during the five working days after the indicator is calculated, and  $DPM$  represents short-term retail deposits.

Contrary to what the FS does, the FSA monitors this indicator daily for each bank in the system. In practice, each bank is required to report the value of its SSLR to the FSA on a daily basis and must keep it above 1. At the very least, this means the liquid portfolio must be equal to the expected maturity. Furthermore, the flow of payments is calculated for a five-day horizon, which makes it possible to monitor developments in the institution's liquidity requirements more closely, just as the ULR explicitly indicates how expected maturity should be calculated.

#### IV. REGULATORY PROPOSAL

Given what has been said up to now about the drawbacks of the liquidity gap as a tool for regulating liquidity risk and the advantages associated with the two measuring instruments summarized earlier, this section proposes a new method for measuring, monitoring and regulating liquidity risk. Like the previous methods, the new proposal is based on a continuous effort to monitor the balance sheets of institutions that are supervised by the regulators. The following liquidity-risk indicator (LRI) is proposed to do just that:

$$(3) \quad LRI = FNC + X\%D - ALM$$

where  $FNC$  is the net flow of payments of contractual origin in a horizon of five, thirty or ninety working days;  $D$  is the volume of deposits reported by the institution and  $ALM$  is the portfolio of net liquid assets, calculated to include market liquidity elements. Accordingly, if the LRI is positive, the liquidity risk is high, because the support provided by liquid assets does not cover the institution's liquidity needs; on the contrary, if the LRI is 0 or is negative, the liquidity risk is low. This method represents an improvement on two fronts associated with the drawbacks mentioned in relation to the liquidity gap. To begin with, the indicator is step forward when it comes to measuring the components that comprise the liquidity gap. In the case of liabilities, it is based on the method used in the United Kingdom (SSLR) to estimate the component susceptible to redemption. Specifically, it implies calculating the flow of

payments stemming from contractual obligations (the nature of which is not uncertain), then arbitrarily adding an  $X$  percentage of the deposit stock, which varies according to the LRI measurement horizon<sup>8</sup> (these two elements summarize the potential shortage an institution faces). On the other hand, the ALM calculation differs from the methods described earlier, inasmuch as assessment of the liquid portfolio explicitly includes the effect of market liquidity on the value of that portfolio and, therefore, on the price it would fetch on the market. In this sense, the ALM captures the actual size of the bank's support, which eventually would be used to pay what is lacking in liquidity.

In this regard, one variable that helps us to detect the impact of market liquidity on the price institutions face is the discount BR offers on domestic government bonds in repo transactions with financial institutions (haircut). Because BR is the lender of last resort, the haircut is the worst discount an institution would be prepared to accept on its investment portfolio. Therefore, when it comes to liquidity risk, that portfolio does not have to be valued at market prices, but at prices corrected by the haircut ( $\hat{P}$ ):

$$(4) \quad \hat{P} = P*(1 - h)$$

where  $P$  is the market price and  $h$  is the haircut BR applies to tradable securities.

Because the net liquid assets in the FS liquidity gap include balance-sheet positions that constitute immediate liquidity (e.g. available and interbank funds), the only liquid assets to value when considering market liquidity are tradable securities and the net foreign currency position. Accordingly, in addition to the aforementioned haircut on tradable securities, a haircut has to be calculated for the net foreign currency position:

$$(5) \quad \hat{P}_{me} = P_{me}*(1 - h_{me})$$

where  $P_{me}$  is the market value of the net foreign-currency position<sup>9</sup>.

Therefore, the net liquid-asset portfolio is valued as follows, according to the price calculated with the foregoing expressions:

<sup>8</sup> The shorter the time horizon, the larger the percentage ( $X$ ) should be.

<sup>9</sup> The Financial Stability Department is constructing the discount for foreign-currency positions. VaR at one day for dollars and the use of implicit devaluation calculated by Market Development Department are the two proposals found in the study.

$$(6) \quad ALM = \hat{P} * IN + \hat{P}_{me} * PNME + (AL - IN - PNME)$$

where PNME is the net foreign-currency position.

In this way, including the LRI when measuring liquidity risk overcomes the problems encountered in calculating the liquidity-gap components, and offers a better approximation to the real impact of liquidity risk.

Last but not least, the monitoring frequency is the second front on which the LRI constitutes a step forward with respect to the traditional measurement of liquidity risk. The following section explores the practical requirements involved in putting this method into practice.

## V. PUTTING THE REGULATORY SCHEME INTO PRACTICE

LRI monitoring must be daily. As such, it can follow FSA operational practices closely. Insofar as institutions supply LRI figures on a daily basis and make sure the indicator is equal to or less than zero, practical application requires daily information from the balance sheets of institutions that are supervised by the banking authority and information on the haircuts used by BR.

According to the capital requirements adopted by the Basel Committee, the LRI calculation method described herein should be regarded as the standard method to which supervised institutions may adhere. However, they must be allowed the possibility of designing their own LRI calculation methods, particularly when it comes to measuring expected maturity.

The FS will have to evaluate the relevance of the method each institution chooses to determine the liquidity-risk rate implied by expected maturity. Therefore, application of this method, in practice, will demand a great deal of supervisory capacity on the part of the FS. It is important to note that the general form of the LRI would not vary from one institution to another. In other words, it demands only that the difference between its two components be equal to or less than zero day after day. Still, the authorities must decide whether institutions will have to adhere to the calculation parameters established by the FS or be allowed to construct their own method for calculating the LRI components.

## VI. CONCLUSIONS

Instituting an LRI-based regulatory scheme raises several additional questions. In practice, the scheme being suggested is tantamount to imposing a liquidity requirement on financial institutions. In this sense, is equivalent to what has been done with the liquidity gap.

Based on the experience of the Chilean financial system, the possibility of a variation in LRI components according to the nature of an institution's liabilities is an interesting suggestion. Particularly, the distinction between wholesale and retail liabilities would help us do a better job of detecting the dynamics of the risk. Nevertheless, in Colombia, information of this sort is limited.

An element missing from the proposal outlined in the previous section is the penalty institutions would face for not keeping their LRI negative. The penalty would have to depend on the nature of the shock that results in an institution being unable to comply with this requirement. The FS would have to analyze and establish the means for instituting any such penalty.

The FS also will have to design ways and means to publicize information on the LRI position of institutions. Appropriate circulation of such information can reduce financial panic when liquidity problems in an institution do not imply capital adequacy problems. However, the method of dissemination must be accompanied by a far broader strategy to divulge information on the institution's financial situation<sup>10</sup>.

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<sup>10</sup> The impact of market liquidity on institutions' risk position can be calculated by means other than a haircut. One interesting alternative recently explored in literature is to include the liquidity risk measurement when calculating capital requirements associated with market risks. Specifically, calculating a liquidity value at risk (LVaR) that can be added to the values at risk associated with the measurement of market risk is one option that can be explored (see Hisata and Yamai, 2000; Dowd, 2005, and Erwan, 2002).

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# CREDIT SUPPLY DETERMINANTS IN THE COLOMBIAN FINANCIAL SECTOR

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José Hernán Piñeros Gordo\*

## I. INTRODUCTION

Elements of both supply and demand interact during a financial crisis, which explains the precarious growth in credit. Nonetheless, it is important that demand-side incentives be generated *ex post*. These also help to reactivate loans by fueling the supply of credit. The latter usually remains depressed due to aspects that become relevant during and after a crisis, such as low bank capitalization and the increased risk aversion banks experience with a high rate of non-performing and doubtful loans. This situation can balance out when banks find investment alternatives in the financial market that might not provide a great deal of return, but keep risks low compared to the risk of extending credit at that particular moment.

<sup>1</sup>

Clearly, after one of the worse financial crises in times recent (1998-1999), a number of elements emerged in Colombia that did, in fact, encourage the demand for credit. The reduction in interest rates at a time of generous liquidity, the growth in domestic and foreign investment, and good export performance are some examples, all of which have stimulated the growth in revenue. Moreover, the behavior of agents in the economy, particularly households, shows a low indebtedness level. This surely allowed for a certain amount of momentum in bank loans, which helped put the Colombian economy back on the path to growth. However, to achieve the growth required, for example, to lower the jobless rate and to provide greater well-being, we must identify the barriers might explain the slow growth in loans, especially mortgage loans, and determine if these barriers remain on the supply side.

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\* The authors are researchers with the Financial Stability Department at Banco de la República. The opinions expressed herein imply no commitment on the part of Banco de la República or its Board of Directors. The valuable comments from Dario Estrada are gratefully acknowledged. This article is a summary of Murcia and Piñeros (2006b), which contains a more complete and detailed analysis.

<sup>1</sup> These characteristics were found in the financial institution surveys done by Banco de la República (see Murcia and Piñeros, 2006a).

Therefore, we must find out if, after almost five years, there still is evidence of a credit crunch, and if the factors of the crisis period remain in play, or if others have emerged to preserve this phenomenon. Three factors can be identified to explain the limited growth in loans. First of all, credit is limited because financial institutions do not have the capacity to loan. In other words, they are forced to reduce or limit their credit supply because of capital and/or deposit-taking constraints. Aversion to extending loans is a second factor. For example, although financial institutions may have the capacity to loan, they prefer not to. This is because of problems in identifying clients with high-risk

and/or due to a special preference for less-profitable but highly liquid assets that imply little risk of default (e.g. government bonds). A third factor is the decline in lending because of less demand as a result of less economic activity. In response, many companies close down because of a steady decline in sales, or simply decide to shift the source of their liabilities from loans to the issue and sale of stocks or bonds.

The objective of this article is to evaluate the first two factors (which deal with supply) as essential elements of the credit crunch. The assumption is that they might have prevailed after the financial crisis in the late 1990s, creating temporary imbalances between credit supply and demand that might have been absorbed through quantities rather than prices (interest rates), considering the good liquidity environment and the decline interest rates registered since then.

## II. A REVIEW OF THE LITERATURE

It is important to differentiate between two concepts that appear in the literature on this subject: credit rationing and credit crunch. The first, according to Stiglitz and Weiss (1981), is a tightening of supply caused exclusively by information problems that prevent banks from knowing the real return or the risk involved in projects potential clients want to finance. This prompts banks to set lending rates below the interest rate that clears the market. The result is a demand surplus. In other words, the existence of asymmetric or imperfect information creates incentives for banks not to raise their lending rates and to extend whatever loans they want, even though the volume might not fully satisfy the demand.

The concept of a credit crunch is very similar to that of credit rationing. However, a credit crunch is generated by factors in addition to asymmetric or imperfect

information. Problems can arise when bank loan capacity is limited by capital constraints or by a reduction in loan sources (i.e. deposits). Therefore, when examining some of the determinants of loan portfolio growth from the standpoint of supply factors that reflect the capacity to loan, on the one hand, and the desire of financial intermediaries to extend loans, on the other, we must speak of a credit crunch in the strict sense. For the purpose of this work, both concepts are used indistinctly; however, it is important to remember that the reasons for a credit crunch or credit rationing in the economy are different.

In the loan market, asymmetric information stems from the difficulty in differentiating less risky projects from those with greater risk. Accordingly, banks are motivated to keep the supply of credit (at the same interest rate) below the supply that eliminates surplus demand. The assumption is that, with a higher rate, only the riskiest borrowers would apply for loans. Under these circumstances, lending rates would not be expected to adjust immediately to a change in market rates. For lack of complete information on client performance and credit rating, financial intermediaries prefer to make the adjustment themselves by rationing credit. Consequently, one way to identify the existence of a credit crunch is to determine whether or not lending rates show a certain amount of rigidity to changes in the market rate.

For the Colombian case, there are a number of studies that attempt to identify the presence of a credit crunch;<sup>2</sup> we will present only two. One is the study by Echeverry and Salazar (1999), who try to explain why the supply of credit tightened during the financial crisis in the late 1990s. According to their findings, it was largely because of capital adequacy ratios, the deterioration in loan portfolio quality, and less of a return on equity for financial institutions. Urrutia (1999), on the other hand, identifies the primary factors that disrupted credit supply growth, such as credit risk, equity reduction, the loss of loan collateral value (value of real estate and companies) and the reduction in banking operations, which spelled less liquidity. Both Echeverry and Salazar (1999) and Urrutia (1999) focus on the problem of asset impairment in the financial sector and the desire of banks to tighten credit in response to more risk.

### III. STYLIZED EVENTS THAT ASSUME CREDIT RATIONING

Developments in the loan portfolio of the financial sector as a whole show a cycle that can be divided into three periods (See Graph 1A). The first,

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<sup>2</sup> See Murcia and Piñeros (2006b) for reference to other studies.



from 1994 to the third quarter of 1998, saw a sizeable increase in that portfolio. This was called a *credit bubble*, given the highly atypical pattern of loans during those years, based on macroeconomic fundamentals that were far less dynamic (Graph 1B). In fact, the loan portfolio rose from approximately \$60 to \$90 trillion (t) (in September 2005 constant pesos), which is equivalent to a real increase of 50%.

The second period involves the financial crisis in the late 1990s and early 2001, which was marked by an abrupt drop in the loan portfolio to below the level registered at the start of 1994. During that lapse, the value of the portfolio accumulated over a period of more than four years was reduced by half. The third period is characterized by a gradual recovery in loan growth that persists to this day and, after five years, has barely managed to reinstate a third of what was lost during the crisis.

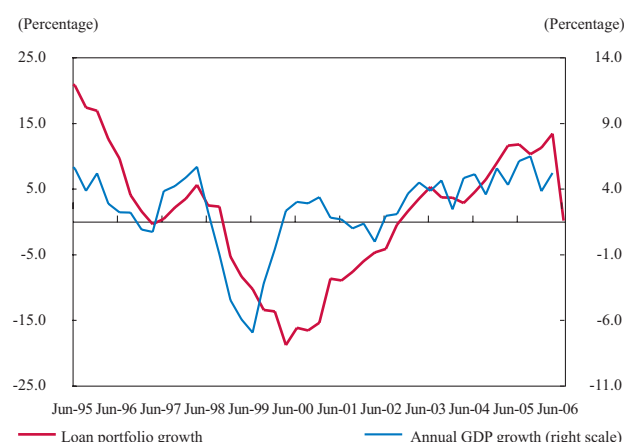
Identifying what determines credit supply in Colombia is no simple task, particularly because some factors might have had more of an impact than others at various stages during the period in question. At the time of the crisis, one of the repercussions of equity reduction was a tighter credit supply. Financial intermediaries saw their equity position (capital adequacy ratio) fall sharply to 9.64% in December 1998. This is a historic low. However, after that year, the capital adequacy ratios of loan institutions recovered quickly and they are now at a satisfactory level (12.4% in July 2006).

Loan portfolio quality is another supply determinant that influenced the pattern of loans, and apparently still does, given the banks' aversion to risk. Although the ratio of non-performing loans to the total gross loan portfolio is now at an all-time low, it rose substantially during the crisis, aggravating risk aversion and affecting portfolio growth. Nevertheless, at the time of the surge in credit, and at present, the index seems to have no implications that would obstruct the good momentum in loans. Moreover, credit-reporting agencies clearly have better financial information about debtors in the loan sector and cover many more clients. Therefore, within the range of factors that can lead to credit rationing in Colombia, asymmetric or imperfect information is expected to become less relevant.

# **A. TOTAL GROSS LOAN PORTFOLIO OF THE FINANCIAL SYSTEM**



# **B. REAL ANNUAL GROWTH IN THE FINANCIAL SYSTEM'S LOAN PORTFOLIO AND IN ECONOMIC ACTIVITY**



Source: A) Office of the National Superintendent of Financial Institutions and the authors' calculations. B) DANE, Office of the National Superintendent of Financial Institutions and the authors' calculations.

The fact that the intermediaries restructured their assets after the crisis in the late the 1990s is another important element of credit growth in financial system. Investments, largely in domestic government bonds, now account for 28.2% of the financial system's assets, as opposed to only one third (10.6%) in December 1994. Lending activity has borne the cost of that shift. In December 1994, the loan portfolio accounted for 61.1% of all assets in the system; the proportion is now 54.9%.

Deposits, as a source of loanable funds for financial intermediaries, have evolved in line with the trend in credit. During the crisis, between June 1998 and December 2000, they declined at real annual rate of -6.61%, on average. However, assets dropped at an even greater rate (- 7.31% in the same period).

#### IV. TESTS APPLIED TO IDENTIFY THE PRESENCE OF CREDIT RATIONING

Two separate tests were conducted to detect the presence of credit rationing in the Colombian economy. The first is designed to determine if the lending rate is somewhat rigid or inflexible to variations in the market interest rate. The second attempts to identify any changes in the determinants of credit supply growth in recent years.

##### A. Degree of Rigidity in Lending Rates to Changes in the Market Interest Rate

Some rigidity in interest rate adjustments in the Colombian economy could be understood as a necessary condition, but not enough in itself, to identify the existence of credit rationing at the aggregate level and by portfolio type. As mentioned earlier, in a credit rationing environment, banks do not adjust their lending rate; doing so could increase their credit risk, as they expect new borrowers to be those with projects that have higher expected returns, which also makes them the riskiest.

The behavior of the interbank rate (TIB in Spanish), which was used as a proxy of the market rate and the lending rate by portfolio type, is shown in Graph 2. As illustrated, TIB performance varied considerably after the inflation targeting system was adopted, when the monetary aggregate goals were substituted and the interest rate became the primary monetary-policy tool.

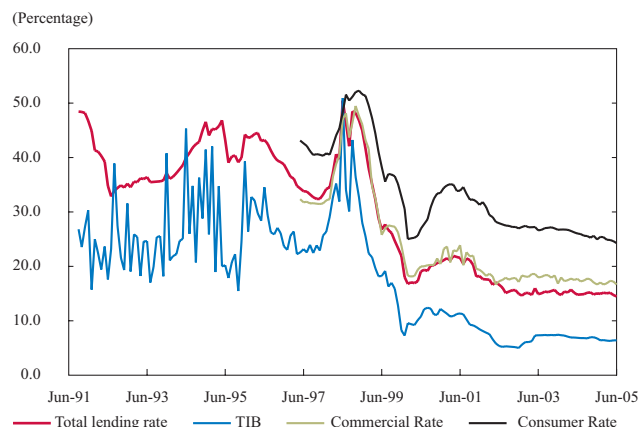
Afonso and St. Aubyn (1998) say that stationarity tests are one way to identify rigidity in interest rate adjustment. These tests start by determining if the interest rate series are stationary in levels. The results, using the augmented Dickey-Fuller statistic (ADF), are shown in Table 1. As

illustrate, none of the interest rates is stationary in levels at 5% significance. The lending rate spread is defined as the difference between the respective lending rate and the TIB. For example, *spreadcom* is the difference between the commercial rate and the TIB. The same stationarity test done on interest rates in levels is then done on these variables. The results are shown in Table 2.

In the case of the commercial rate and the total lending rate in the system, the spreads proved to be stationary under identification with intercept. Therefore, it is possible to say that a change in the market rate will lead to a significant change in the lending rate. In other words, the rate adjustment could very well be complete, since the rate rigidity characteristic of credit rationing periods does not exist. However, the series is not stationary in the case of consumer interest rates, perhaps because this was one of the first sectors to be rationed, particularly during the crisis. Major changes in the TIB at the time were not absorbed by the interest rate on consumer loans. This produced sharp variations in the spread series. For example, the TIB rose by nearly 2,000 basis

GRAPH 2

# INTEREST RATES



Source: Office of the National Superintendent of Financial Institutions, Banco de la República and the authors' calculations.

TABLE 1

## STATIONARITY TESTS ON INTEREST RATES: ADF STATISTIC (\*)

	With Intercept	With Tendency & Intercept	Without Tendency or Intercept
TIB	-1.94	-3.37	-1.29
Total lending rate	-1.55	-2.87	-1.39
Consumer rate	-1.37	-3.00	-1.10
Commercial rate	-0.97	-2.81	-1.20

(\*) Stationary variable at the 5% level.

TABLE 2

## STATIONARITY TESTS ON INTEREST RATE SPREADS: ADF STATISTIC

	With Intercept	With Tendency & Intercept	Without Tendency or Intercept
<i>Spreadactiva</i>	-5.18 *	-	-
<i>Spreadcons</i>	-2.24	-2.3	-0.5
<i>Spreadcom</i>	-5.71 *	-	-

\* Stationary variable at the 5% level.

points (bp) during a single month in 1998. During that same period, these variations boosted the commercial interest rate by 700 bp and the consumer rate by 300 bp. In the months thereafter, these rates continued to rise, with the commercial lending rate accelerating more than in the rate on consumer loans.

A time series analysis<sup>3</sup> was done to quantify the effects of a TIB change on the various lending rates in the system. The impulse-response functions show a highly similar pattern for these rates (Attachment 1). An increase in the TIB is accompanied by a lending rate increase with a maximum effect about two months later, which is lost about one year thereafter. For the consumer rate, the adjustment is slower compared to the adjustment in the commercial rate and the total lending rate.<sup>4</sup>

In summary, the results of the rate adjustment exercises do not support the credit rationing hypothesis for the Colombian economy, simply because the lending rate adjustment in response to a change in the market rate is complete in the case of the total rate and the commercial rate. As for the consumer rate, the stationarity test to determine the difference in rates (*spread*) suggests a rigidity that can be explained by risk aversion and the rationing that follows. This series is stationary for the remainder of the period, suggesting a full rate adjustment. The estimate of autoregressive vectors and the Granger causality test (Attachment 1) show a close relationship between the changes in the market rate, which cause changes in lending rates shortly thereafter.

## **B. Changes in Credit Supply Determinants: 1996-2005**

The assessment of agent loan capacity is based, essentially, on the quarterly balance sheets of the country's major financial agents (commercial and

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<sup>3</sup> Autoregressive vectors and the respective impulse-response functions were used. The Granger causality test was run; in all cases the results show the TIB causes a change in lending rates. It is, therefore, logical to find shocks in the market rate variable and to see their impact on lending rates. The results are presented in Attachment 1.

<sup>4</sup> It is important to bear in mind that the exercise for the total lending rate in the system involved a longer period (since June 1992), which includes a time of considerable change in the market rate.

mortgage banks). The period in question is from June 1996 through June 2005. The method used is similar to the one employed by Echeverry and Salazar (1999) to identify the presence of a credit crunch in the Colombian economy at the end of the 1990s. It consists of a crosscut estimate where loan growth ( $\Delta cartera_t$ ) is the dependent variable. Loan growth is represented by the quarterly percentage variation in the gross loan portfolio<sup>5</sup> for each financial institution during a particular period. The supply indicators for the same institutions during a previous period ( $X_{t-1}$ ) were used as the independent variables to determine if the growth in loans is related to supply-side constraints. The following is the equation used to estimate each variable of supply  $X$ :

$$(1) \quad \Delta cartera_t = \beta_0 + \beta_1 X_{t-1} + \varepsilon_t$$

The first independent variable ( $X_{t-1}$ ) is loan portfolio quality, measured as the non-performing portfolio over the total loan portfolio. During a credit crunch, financial intermediaries would be expected to reduce their loan supply in response to the increased decline in loan portfolio quality. Therefore, the sign is expected to be negative: the more deterioration in portfolio quality, the greater the perception of risk. This prompts banks to become more cautious in selecting loan clients, which leads to the problem of credit rationing.

The investment-asset ratio is the second independent variable.<sup>6</sup> As mentioned earlier, financial institutions have moved in the direction of assets that are more liquid and imply less risk of default. Domestic government bonds are one example. That shift has reduced the credit supply; therefore, the expected sign for this variable is negative.

Return on equity (ROE)<sup>7</sup> was used to capture the effect of equity constraints on credit supply: the more equity an institution has, the more it is expected to enlarge its credit supply. Hence, the sign for this variable is expected to be positive. In other words, banks with larger returns are expected to place more loans.

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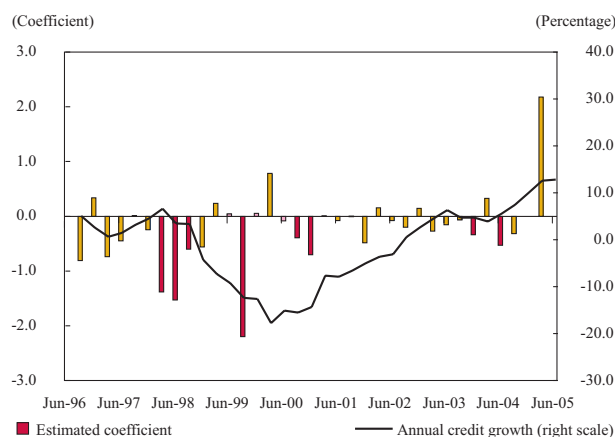
<sup>5</sup> In their work, Echeverry and Salazar (1999) used the net portfolio. However, with portfolio deterioration, the provision increased, which meant the net portfolio declined without a reduction in credit as such. This is why we used the gross portfolio in our study.

<sup>6</sup> We also wanted to determine the relationship between loan growth and the extent of loanable funds. The deposit-asset ratio was used to identify the loan sources available to financial institutions. However the results in this estimate were not conclusive.

<sup>7</sup> Estimates also were developed with return on assets (ROA) and the capital adequacy ratio (the results are quite similar).

**GRAPH 3**

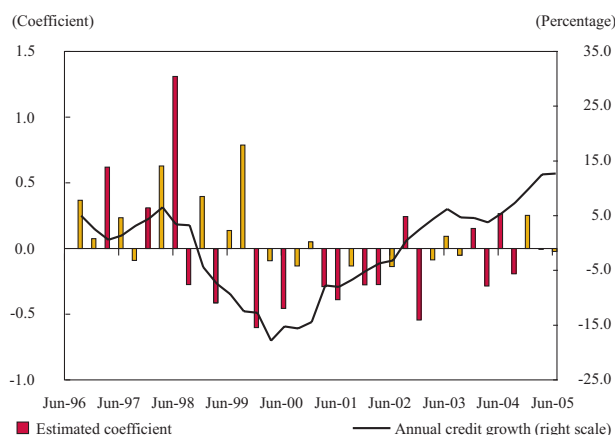
**ESTIMATED COEFFICIENT OF THE IMPACT  
OF PORTFOLIO QUALITY ON CREDIT  
AND THE CREDIT CYCLE**



Source: Office of the National Superintendent of Financial Institutions and the authors' calculations.

**GRAPH 4**

**ESTIMATED COEFFICIENT OF THE IMPACT  
OF INVESTMENTS ON CREDIT  
AND THE CREDIT CYCLE**



Source: Office of the National Superintendent of Financial Institutions and the authors' calculations.

The results for portfolio quality, as an explicative variable, are presented in Graph 3. It shows the estimated regression coefficient of Equation (1) over the course of time and the evolution in credit, making it possible to pinpoint the different phases of the loan cycle on the graph. The dark colored bars represent the statistically significant coefficients. For example, the limited loan-portfolio growth witnessed during the first three quarters of 1998 is associated with deterioration in the quality of that portfolio. This is precisely what is found in the different studies in literature on the financial crisis period. For the most recent period, the substantial improvement in portfolio quality is associated with the growth in loans during two quarters. Consequently, although portfolio quality was a serious constraint to credit growth, it could be regarded as an incentive in the last few years, given the apparent reduction in banks' aversion to risk at seeing the quality of the loan portfolio improve.

An analysis of investments as a portion of assets in the financial sector and as a possible alternative to credit (Graph 4) indicates they are an important factor in explaining credit growth. Ever since the financial crisis, credit institutions have shown a strong preference for investments in highly liquid securities with low risk. This is due to their increased perception of risk and has limited loan portfolio growth. Even if the expected signs are not found in every quarter,<sup>8</sup> one sees that investment (e.g. TES) had a negative impact on credit growth during different periods. In other words, this market could contain evidence of a crowding out effect since the start of the crisis.

This pattern continued during the latest period, but has become less relevant, meaning that it does not pose a constraint to further growth in credit. This result is consistent with the findings in Murcia and Piñeros (2006a), which show that credit institutions are opting, once again, for loan activity as the primary use for surplus liquidity. This

<sup>8</sup> As noted earlier, the expected sign for this variable is negative. However, the high return on these investments can give financial institutions a better balance sheet and can increase their credit capacity as a result. This might be why the coefficient of the estimate is positive in several quarters.

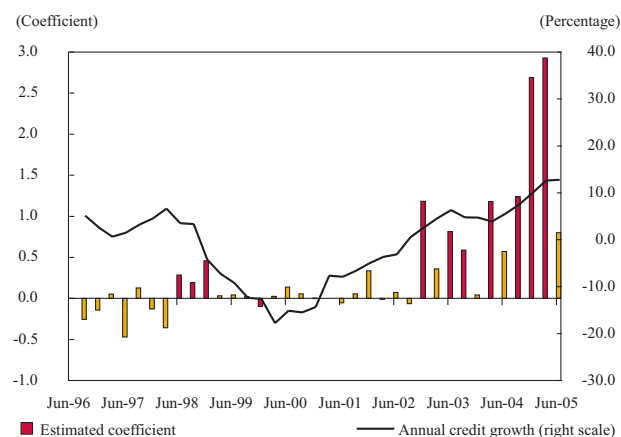
has been detrimental to the acquisition of investments.

As mentioned earlier, the ROE indicator was used to evaluate equity capacity. During a credit crunch, a tighter supply of credit would be associated with fewer profits for credit institutions. The results of this estimate are shown in Graph 5 and corroborate what Echeverry and Salazar (1999) found for the crisis period; that is, when institutions have equity problems, they would be expected to reduce their loan supply. This happened during the latter half of 1998. After that year, the ROE results show no major restrictions. In the second half of 2002, when the total loan portfolio of the financial system began to grow at positive rates, profitability again became a source of credit growth.

Except for the regression found in the investment variable, the others have one particular result in common: the lack of significance for the supply variables estimated for the period from mid-2000 to mid-2002. They, in contrast, are more robust during the crisis periods and in recent years. These statistical events can be attributed to supply factors, to explain the sharp drop in credit at the end of the 1990s, but also to the fact that they are no longer a constraint to maintaining the credit growth seen in recent years, as changes in the loan portfolio are supported by the favorable behavior of such elements. It is, therefore, evident that supply variables seem to pose no limit to credit growth during the current decade. This suggests that problems with demand cause a slowdown in credit, particularly in sectors such as mortgage loans, where the recovery in credit is not yet complete.

GRAPH 5

#### ESTIMATED COEFFICIENT OF THE IMPACT ON RETURN ON CREDIT AND THE CREDIT CYCLE



Source: Office of the National Superintendent of Financial Institutions and the authors' calculations.

## V. CONCLUSIONS

Understanding the credit cycle in Colombia and its determinants is no simple task. Supply and demand factors interact at different stages, making it impossible to clearly distinguish the determinants or their relative importance. Different ways to detect credit rationing are identified in literature. One is based on the degree of rigidity in lending rates to changes in the money market rate. Extreme rigidity can cause a risk aversion

problem among financial institutions. The evidence for the Colombian case does not support the assumption of credit rationing, as lending rates adjust fully to changes in the market rate.

Secondly, the balance sheets of financial institutions were used to evaluate the presence of credit rationing. Cross-section regression exercises were proposed to determine if credit growth is associated with supply variables. If so, this would mean that periods of low growth or tight credit are related to capacity problems and/or to the desire of financial institution to loan. The results point to the presence of credit rationing in the late 1990s. However, in the years thereafter, variables such as loan portfolio quality and return ceased to pose a constraint to credit growth. Accordingly, the low growth during that period can be explained, primarily, by demand factors and by the shift in financial sector assets towards investments. This last phenomenon accentuated the drop in credit during the crisis and mollified its subsequent recovery. Therefore, credit activity was cut short by a risk aversion problem among financial institutions. They preferred to acquire less profitable assets but ones with more liquidity and less risk of default, than to extend credit to the private sector. Nonetheless, this effect seems to have become less significant as of late.

Presently, some of the factors that affect credit supply, such as loan portfolio quality and profitability, have regained importance in explaining the momentum in credit. However, given the recent good results for these indicators, one can assume the supply of credit has become more dynamic and the low growth in commercial and mortgage loans probably is more related to problems with demand.



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## ATTACHMENT 1

### Lending Rate and TIB

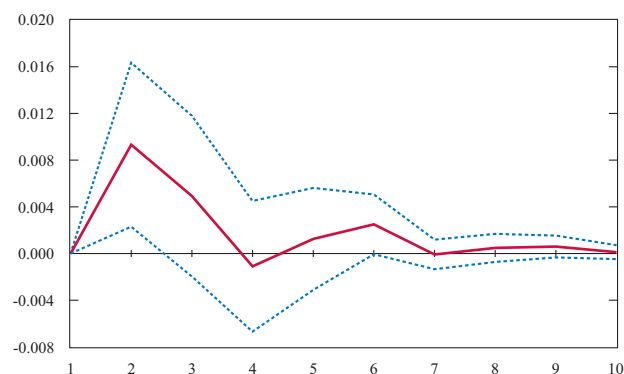
According to the causality test, changes in the interbank rate cause changes in the system's lending rate, but not vice versa (Graph A.1).<sup>1</sup>

GRAPH A.1

#### GRANGER CAUSALITY TEST

Sample: 1991M09 2005M06		
Lags: 3		
Observations: 162		
Null hypothesis:	F Statistic	Probability
DIFLTIB no cause DIFLTACT	2.99759	0.03252
DIFLTACT no cause DIFLTIB	1.37975	0.25107

#### IMPULSE-RESPONSE FUNCTION



<sup>1</sup> The autoregressive vectors estimated for all types of loans are shown in Murcia and Piñeros (2006b).

## Commercial Rate and TIB

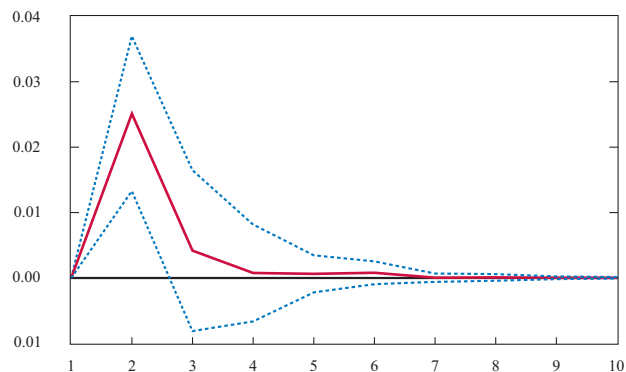
The causality test shows that changes in the interbank rate cause changes in commercial lending rates, but not vice versa (Graph A.2).

GRAPH A.2

### GRANGER CAUSALITY TEST

Sample: 1991M09 2005M06		
Lags: 3		
Observations: 94		
Null hypothesis:	F Statistic	Probability
DIFLTCOM no cause DIFLTIB	0.30389	0.82251
DIFLTIB no cause DIFLTCOM	9.76656	1.3E-05

### IMPULSE-RESPONSE FUNCTION



## Consumer Rate and TIB

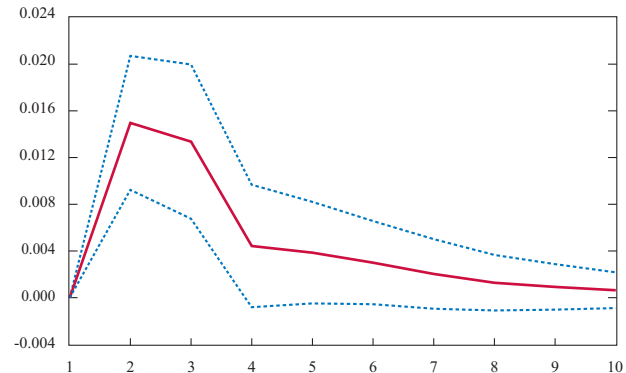
The causality test shows that changes in the interbank rate cause changes in consumer lending rates, but not vice versa (Graph A.3).

GRAPH A.3

### GRANGER CAUSALITY TEST

Sample: 1991M09 2005M06		
Lags: 3		
Observations: 94		
Null hypothesis	F Statistic	Probability
DIFLTIB no cause DIFLTCONS	19.4376	9.8E-10
DIFLTCONS no cause DIFLTIB	0.05910	0.98104

### IMPULSE-RESPONSE FUNCTION



# SPATIAL COMPETITION IN THE COLOMBIAN DEPOSIT MARKET

Sandra Rozo  
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## I. INTRODUCTION

As Freixas and Rochet (1997) mention, in perfect competition the optimal choice for banks is determined by the point where intermediation margins are equal to operating costs. In this scenario, market equilibrium is not affected by a bank's actions. In contrast, when a bank has market power, it can affect prices, which will lead to higher lending rates and lower deposit rates. In this way, part of the consumer surplus is passed to the banks and efficiency is lost through a reduction in the volume transacted on the market. Therefore, regulations to limit the creation, spread and use of market power are entirely justified.

Nevertheless, the only guides to implementing such regulations in an ideal way are the empirical studies of competition that describe the characteristics of the relevant market, which is why they are so important.

In Colombia, existing empirical literature on the study of competitive conditions in the banking system has, by tradition, followed one of two tendencies. The focus is either on price or volume to explain the way banks behave, ignoring the possibility that banks might consider other types of strategic variables, or the market structure is invariably analyzed from a national standpoint, without asking if the conclusions for the domestic market are applicable on a regional scale.

This summary outlines a competition oligopoly model where banks use other variables, besides price, to compete on the market. Specifically, the relevance of geographic variables, such as the number of branch offices, is analyzed to explain the strategic behavior of banks in Colombia. A two-stage model is

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\* This document is a summary of "Multimarket Spatial Competition in the Colombian Deposit Market" by Estrada and Rozo (2006). The opinions expressed herein imply no commitment on the part of Banco de la República or its Board of Directors. Please contact the author for doubts or clarification. E-mails: destrada@banrep.gov.co, srozovil@banrep.gov.co.

suggested in this scenario, where banks select the optimal interest rate with which they will compete throughout the country during the first period. In the second period, given that interest rate, they select the optimal number of branch offices to be opened in each region.

The proposed model is intended to evaluate the extent of competition in Colombia's regions and departments. More specifically, the working hypothesis suggests that the aggregated measures used traditionally to examine market power in Colombia leave aside certain regional and departmental features. This can lead to erroneous conclusions. In other words, analyzing the market structure in a more disaggregated way can produce more precise results, thereby making it possible to identify the regions where anti-competitive pressures might occur that cannot be detected at the aggregate level

## II. THE MODEL

The model was developed pursuant to the approximations by Canhoto (2004), and Freixas and Rochet (1997). In this context, a static partial equilibrium oligopoly model was suggested where banks operate in the securities, deposit and loan markets. There is product differentiation in the deposit and loan market, but a great deal of elasticity in substitution, which means the bank's demand for deposits and its supply of loans are dependent on its own interest rate and on the vector of the rates charged by its competitors. Moreover, there is separability between the loan and deposit markets, and banks are price-takers in the securities market.<sup>1</sup>

The model is executed in two periods throughout which the banks have two strategic variables: interest rates and the number of branch offices. In this context, each bank chooses the interest rates that maximize its target function in the first period, pursuant to a Bertrand model.<sup>2</sup> In the second period, given the optimal rates selected during the first period, the bank determines the optimal number of branch offices to be established in each region. More specifically, each bank sets the same interest rate for all its branch offices.<sup>3</sup>

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<sup>1</sup> The market separability assumption has been used widely in literature. For example, Chiappori, Perez-Castrillo and Verdier (1993) and Barros (1997) used it to examine the deposit market.

<sup>2</sup> The Bertrand model fits this scenario because, as mentioned by Chiappori, Perez-Castrillo and Verdier (1993), prices should be regarded as the bank's primary means of competition.

<sup>3</sup> In Colombia, each bank sets a benchmark rate for the deposit market nationwide. Each office or branch may use that rate to establish one that is a bit different. However, there is no information on these margins, which is why the rate is assumed to be the same throughout the country.

## A. First Period

Under the assumptions noted earlier, each bank chooses the interest rate that maximizes its profits during the first period. The profit function of bank  $i$  in this period would be provided by:

$$(1) \quad \pi_i = r_i^l + (r^s(1-p) + mp - r_i^d)D_i - C_i(D_i, L_i, S_i, n_i)$$

where  $L_i$ ,  $S_i$  and  $D_i$  represent, respectively, the amount of loans, the stock of securities and the volume of deposits received by bank  $i$ ;  $r$  is the interest rate in each market;  $p$  is the reserve requirement rate;  $m$  is the return on the amount in reserve;  $n_i$  is the number of offices bank  $i$  has throughout the country; and  $C_i$  represents the cost function of bank  $i$ , where the assumption of separability allows for the conclusion that variable costs are also separable for each activity.

The assumption of separability between the deposit and loan markets allows us to specify the supply of deposits for bank  $i$  as:

$$(2) \quad D_i = D_i(r_i^d, r_{-i}^d, Z_i)$$

where  $r_{-i}^d$  is the vector of deposit rates set by rival banks in the market and  $Z_i$  represents the other exogenous variables that affect the deposit supply for bank  $i$ . In this context, the deposit supply for each bank is determined by the interest rates of all its rival banks. This, in itself, is a complicated problem. We simplify it by using Canhoto's method (2004), which replaces the vector of the competitors' interest rates with a weighted average of those rates, so that:

$$(3) \quad r_{Ri}^d = \sum_{j \neq i} \left[ \frac{D_j}{\sum_{j \neq i} D_j} \right] * r_j$$

Given this definition, theory says that the amount of deposits supplied to bank  $i$  by the public will increase if its own interest rate goes up, and will decline with a reduction in the weighted average of its competitors' rates. Based on these specifications for the deposit supply and the profit function, the first order condition for bank  $i$  with respect to the interest rate would be given by:

$$(4) \quad r_i^{*d} = \left( r^s(1-p) + mp - \frac{\partial C_i(D_i)}{\partial D_i} \right) - D_i \lambda$$

where  $\lambda$  can be written as:

$$(5) \quad \lambda = \left( \frac{\partial r_i}{\partial D_i} \right) = \frac{1}{\left[ \left( \frac{\partial D_i}{\partial r_i^d} \right) + \left( \frac{\partial D_i}{\partial r_{Ri}^d} \right) \left( \frac{\partial r_{Ri}^d}{\partial r_i^d} \right) \right]} = \frac{1}{\left[ \left( \frac{\partial D_i}{\partial r_i^d} \right) + \left( \frac{\partial D_i}{\partial r_{Ri}^d} \right) \gamma \right]}$$

In this expression,  $\gamma = \left( \frac{\partial r_{Ri}^d}{\partial r_i^d} \right)$  represents the firm's conjectural parameter, which is defined as the change in the other firms' interest rates, anticipated by firm  $i$  as the response to an initial change in its own interest rate. As illustrated by equations (4) and (5), *ceteris paribus*, the value of this parameter defines if the interest rates are higher or lower by determining the value of  $\lambda$ . Accordingly, in a competitive market, one would expect bank  $i$  to pay higher deposit rates as a way of attracting more customers. By the same token, in a less competitive market, the bank would be expected to do just the opposite, given its market power. In this way,  $\gamma$  allows us to measure the amount of competition in the market by identify the interest rate value. More specifically, the case where  $\gamma = 0$  represent Nash equilibrium is a scenario where the representative bank is not acting in response to the actions of its competitors.<sup>4</sup> If  $\gamma$  is negative, the interest rate will be higher than when  $\gamma = 0$ , in which case we would find a more competitive scenario than Nash equilibrium. If the opposite occurs, and  $\gamma$  is positive and greater than 1, the deposit rate will be less than when  $\gamma = 0$  and we would find a more collusive scenario than Nash equilibrium.<sup>5</sup> For the sake of simplicity, for  $\gamma$  values such as  $0 \leq \gamma \leq 1$ , we will contrast the value of the interest rate for Nash equilibrium ( $\gamma = 0$ ) with the value of the interest rate obtained with the estimated  $\gamma$  value, and determine, on the basis of that comparison, if the scenario is more or less competitive than Nash equilibrium.

Although the loan market is not the target of this study, it is important to clarify that banks also choose their lending rate using a demand credit function given by:

$$(6) \quad L_i = L_i(r_i^l, r_{Ri}^l, w_i)$$

where  $w_i$  represents the exogenous variables that affect the demand for credit from bank  $i$ .

<sup>4</sup> In this scenario, given the strategies of their competitors, banks have no incentive to change theirs.

<sup>5</sup> It is important to spell out the difference between Nash equilibrium and competitive equilibrium. The former is a situation where a set of strategies provide no incentive for any one bank to change its strategies as long as the others do not change theirs. Competitive equilibrium describes a vector of prices and quantities that empties out the market. Based on these definitions, the conclusion is that the definition of Nash equilibrium is more consistent with existing circumstances, bearing in mind that it allows for an imperfect result on competition.

## B. Second Period

Once each bank has set an optimal interest rate for the entire country, it decides on the optimal number of branch offices to be opened in region  $k$  of the geographic area in question.<sup>6</sup> The profit function for bank  $i$  in region  $k$  is provided by:

$$(7) \quad \pi_{ik} = r_i^{l*} L_{ik} + (r^s(1-p) + mp - r_i^{d*}) D_{ik} - C_{ik}(L_{ik}, D_{ik}, S_{ik}, n_{ik})$$

where  $r_i^{l*}$  and  $r_i^{d*}$  represent the optimal interest rates selected by each bank during the first period, and  $n_{ik}$  is the number of offices bank  $i$  has in region  $k$ .

Within a particular region, we would expect banks with more offices to take in more deposits, as this would make it easier for the public to conduct transactions or to withdraw funds from the bank. In this sense, the deposit supply for bank  $i$  would be related positively to the number of branch offices it has, and negatively to the number of branches rival banks have. Accordingly, the deposit supply would be estimated by:

$$(8) \quad D_{ik} = D_i(r_i^{d*}, n_{ik}, n_{-ik}, W_{ik})$$

where  $W_{ik}$  represents the exogenous variables that affect the deposit supply for bank  $i$  in region  $k$ . The first order condition of bank  $i$  in region  $k$  with respect to the number of offices is derived from these equations. It is written as:

$$(9) \quad \left( r^s(1-p) + mp - r_i^{d*} - \frac{\partial C_{ik}(n_{ik})}{\partial n_{ik}} \right) \psi = \frac{\partial C_{ik}(n_{ik})}{\partial n_{ik}}$$

where  $\psi$  can be expressed as:

$$(10) \quad \psi = \left( \frac{\partial D_{ik}}{\partial n_{ik}} \right) + \left( \frac{\partial D_{ik}}{\partial n_{-ik}} \right) \left( \frac{\partial n_{-ik}}{\partial n_{ik}} \right) = \left( \frac{\partial D_{ik}}{\partial n_{ik}} \right) + \left( \frac{\partial D_{ik}}{\partial n_{-ik}} \right) \phi$$

As in the first period,  $\phi$  in this expression represents the conjectural parameter of bank  $i$  in region  $k$ , which is defined in this period as the change in the number of branch offices operated by the competition, anticipated by firm  $i$ , in response to an initial change in the number of its own offices. If the value of this parameter is neutral ( $\phi = 0$ ), it would describe a scenario consistent with

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<sup>6</sup> As illustrated later with the empirical application, the total geographic area is the country and its regions, organized by departments.

Nash equilibrium. A positive reading ( $\phi > 0$ ) would indicate a less competitive scenario than Nash equilibrium. As shown in equations (9) and (10), this would indicate the representative bank can have higher marginal costs per office. Negative values, in contrast, point to a more competitive scenario, with a lower marginal cost per office.

In short, the model presented herein creates two first order conditions, one for each period. These two functions allow us to measure the extent of competition among banks in the regions and, in particular, to identify the regions where the banks have market power by analyzing the value of parameter  $\phi$ .

### III. EMPIRICAL APPLICATION

#### A. Functional Forms

The model is estimated in two stages, one for each period. The empirical application for the first period is quite similar to Canhoto's (2004), where specification of the deposit supply and the marginal cost of deposits is given by:

$$(11) \quad D_i = a_0 + a_1 r_i^d + a_2 r_{Ri}^d + a_3 gdp + a_5 emp_i + e_i$$

$$(12) \quad \left( \frac{\partial C_i(D_i)}{\partial D_i} \right) = MC_i^d = b_0 + b_1 wl_i + b_2 wk_i + b_3 D_i + \varepsilon_i$$

where  $gdp$  is the gross domestic product (GDP) of the entire geographic area analyzed,<sup>7</sup>  $emp$  is the total number of employees of bank  $i$ ;  $wl$  and  $wk$  represent the price per unit of labor and per unit of physical capital, respectively, and  $\varepsilon_i$  and  $e_i$  represent the error.<sup>8</sup> Theory says, *ceteris paribus*, that the deposit supply of bank  $i$  would depend positively on the interest rate and  $gdp$ . In contrast, it would be inversely related to the average rate of its rivals. The number of employees ( $emp$ ) is an exogenous variable that controls the size of the banks in the market and increases with the amount of deposits from the public.<sup>9</sup> The suggestion is that marginal costs are positively related to the price of capital and labor; therefore, one would expect positive signs for  $a_1$  and  $a_2$ . The sign for  $a_3$  would depend of the returns of scale for bank  $i$ .

The following equations are specified for the second period:

<sup>7</sup> In this case, the area includes the entire country.

<sup>8</sup> It is assumed the stochastic errors are distributed normally.

<sup>9</sup> To overcome the industrial organization assumption that the marginal cost is not directly identifiable in the firms' behavior, we will not estimate it independently (See Canhoto (2004) and Bresnahan (1982)).



$$(13) \quad D_{ik} = c_0 + c_1 r_i^{d*} + c_2 n_{ik} + c_3 n_{-ik} + c_4 gdp + c_5 (pob/km^2) + u_i$$

$$(14) \quad \left( \frac{\partial C_i(D_i)}{\partial D_i} \right) = MC_{ik}^d = f_0 + f_1 w l_{ik} + f_2 w k_{ik} + f_3 D_{ik} + v_i$$

In the case of the regional deposit supply, the interest rate selected by the bank in the first period is given by the optimal value selected during that same period. Accordingly, we expect  $c_1$  to be positive, since the interest rate should be relevant for the regional level as well. Also, as mentioned in the previous section, we expect the volume of deposits to increase with the number of offices, and to decrease if the bank's rivals open more offices in the region. As in the first period, the GDP is included in the estimate, because it explains an important part of individual income and the performance of deposits. The population/square kilometer variable was included to control for regional population density.

The same variables from the first period were included for the functional form of the regional marginal costs of bank  $i$ , but for a regional dimension. Therefore, the signs for  $f_1$  and  $f_2$  are expected to be positive.

## B. Data and Estimation

The quarterly figures used to estimate the model cover the period from January 1994 through September 2005. The frequency is quarterly.<sup>10</sup> The sample includes 26 banks, which accounted for 94.4% of all deposits in the Colombian banking system during the period in question.<sup>11</sup>

The model is estimated in two stages: one for each period. The procedure used in Canhoto (2004) was followed for each stage, where a pool is constructed with the data.<sup>12</sup> Aggregate data for the entire country were used for the first period, while two estimates were done for the second: one for Colombia's regional division and another for its political division. In the first estimate for the second period, the country was divided according to the five traditional geographic regions.<sup>13</sup> Two estimates were developed for the Andean

<sup>10</sup> It was obtained from documents published by the Office of the National Superintendent of Financial Institutions, the National Department of Planning (DNP) and Atlas Colombiano, which is published by the Instituto Geográfica Agustín Codazzi.

<sup>11</sup> Proxy variables were constructed for the factor prices. Weights were constructed, then multiplied by the national prices to obtain the regional prices. It is assumed the reserve requirement rate is quite small; that is,  $m = 0$ .

<sup>12</sup> The estimate was done with TSP 4.5.

<sup>13</sup> Andean, Caribbean, Orinoquía, Pacific and Amazon.

region in particular: one that included Bogotá (Andean 1) and another that did not (Andean 2). Finally, for the second estimate, the country was divided according to the 32 departments, plus the capital city.

In the first stage, equations (4) and (11) were estimated using with the full information maximum likelihood method (FIML), replacing marginal cost function (12) in the first order condition for the interest rate. Using the same method, equations (9) and (13) were estimated for each of the regions and departments, replacing marginal cost function (14) in the first order condition for the number of offices.

### C. Results

The parameters obtained for the first period are statistically significant and consistent with the theory (Table 1). For the deposit supply, the coefficient that accompanies the banks' own interest rate is positive, while the coefficient that accompanies the weighted average interest rate of its rivals is negative. Moreover, the relation between deposit supply and gross domestic product is positive, and the number of employees, which was used as a proxy of bank size, shows the largest banks have a larger stock of deposits. The results for the marginal cost function also are satisfactory, showing positive signs for  $b_1$ ,  $b_2$  and  $b_3$ .

For this estimate, conjectural parameter rejected the existence of market power in the deposit market, as the estimate for the coefficient is less than zero. These results are consistent with the empirical studies by Estrada (2005) and

TABLE 1

#### ESTIMATE RESULTS FOR THE FIRST PERIOD

	Coefficients	Error	P-value
$a_0$	3.91E+08	4.79E+08	[0.414]
$a_1$	1.62E+09	7.61E+08	[0.033]
$a_2$	-1.22E+10	1.03E+09	[0.000]
$a_3$	55.8	200.602	[0.005]
$a_4$	478833	21222.9	[0.000]
$b_0$	-0.99722	0.0892	[0.000]
$b_1$	7.83E-03	1.76E-03	[0.000]
$b_2$	0.016598	4.22E-03	[0.000]
$b_3$	0.037086	4.21E-03	[0.000]
$\lambda$	-2.6108	0.395549	[0.000]

Source: cálculos de los autores.

Salamanca (2005), which found evidence of a more competitive market structure than Nash equilibrium.<sup>14</sup>

The second-period estimate, for which the country was divided into five regions, did not show significant results for Amazonas or Orinoquía. This could be explained by the size of the market and by the limited development of those regions. The others, however, did show significant parameters with the expected signs.<sup>15</sup> As to the conjectural parameters ( $\phi$ ), all the regions appeared to have competitive markets.<sup>16</sup> The Caribbean region had the lowest conjectural parameters ( $\phi = -1,023.81$ ), followed by the Pacific ( $\phi = -962.381$ ) and Andean region 1 ( $\phi = -640.028$ ).

For the more disaggregated estimate of the second period, when the country was divided into 32 departments, plus the capital city, the coefficients found for Arauca, Casanare, Guainía, Chocó, Guaviare, Quindío, Sucre, Tolima, Vaupés, Meta, Huila and Putumayo were not significant. For the rest of the departments, the conjectural parameter is significant and the signs are consistent with the theory. In this estimate, some areas show evidence of market power. Specifically, we found that Caquetá ( $\phi = 2,569$ ), Cauca ( $\phi = 1,848$ ) and Norte de Santander ( $\phi = 793$ ) are the least competitive regions of the country.

In short, although the national deposit market was found to be competitive, a more disaggregated analysis revealed the departments where banks have market power. Hence, the recommendation is that regulatory policies be laid out carefully in local markets of this type, so as to avoid more serious problems and, if possible, to resolve them.

These results prove the market structure in extremely large markets is not analyzed properly, because the results are overly general. This can lead to regulatory measures that are erroneous.

#### IV. CONCLUSIONS

In this study, a spatial competition oligopoly model was developed where banks compete with prices (interest rates) and geographic variables (number of branch offices). In this scenario, each bank selects the optimal interest rate in the first period. In the second period, depending on that interest rate, each bank selects the optimal number of branches to be opened in each region.

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<sup>14</sup> In international literature, Bikker and Haaf (2000) also found evidence of competitive behavior in the deposit market for a group of European countries.

<sup>15</sup> There were some problems with the signs of the marginal cost coefficients. However, problems with the incoherence of marginal cost coefficients are common in the literature on conjectural parameters.

<sup>16</sup> Excluding Amazonas and Orinoquía, where the parameter is not significant.

Two estimates were done for the second period. In one, the country was divided by the five traditional regions. In the other, it was divided by the 32 departments, plus the capital city.

The purpose of this study was to analyze competitive conditions in the Colombian deposit market, based on a more disaggregated approach; specifically, one designed to determine if the results obtained in this estimate are consistent or not with those obtained when the national market is analyzed as a whole.

The empirical results for the first period suggest the national deposit market has a more competitive structure than Nash equilibrium. The estimate for the second period, with the country divided into the five traditional regions, showed the Caribbean, Pacific and Andean regions are competitive markets as well. However, the estimate for the second period, with the country was divided by departments, identified three critical markets where banks have market power: Caquetá, Cauca and Norte de Santander.

Accordingly, the suggestion is that regulatory policies in these geographic areas should be administered carefully to avoid more serious problems and, if possible, to resolve them. The results also show the market structure in larger markets is analyzed in a way that is far too superficial. More disaggregated results include certain regional features that allow for a more in-depth analysis of the market. Specifically, the conclusion is that national results are too general and can lead to erroneous regulatory measures.

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