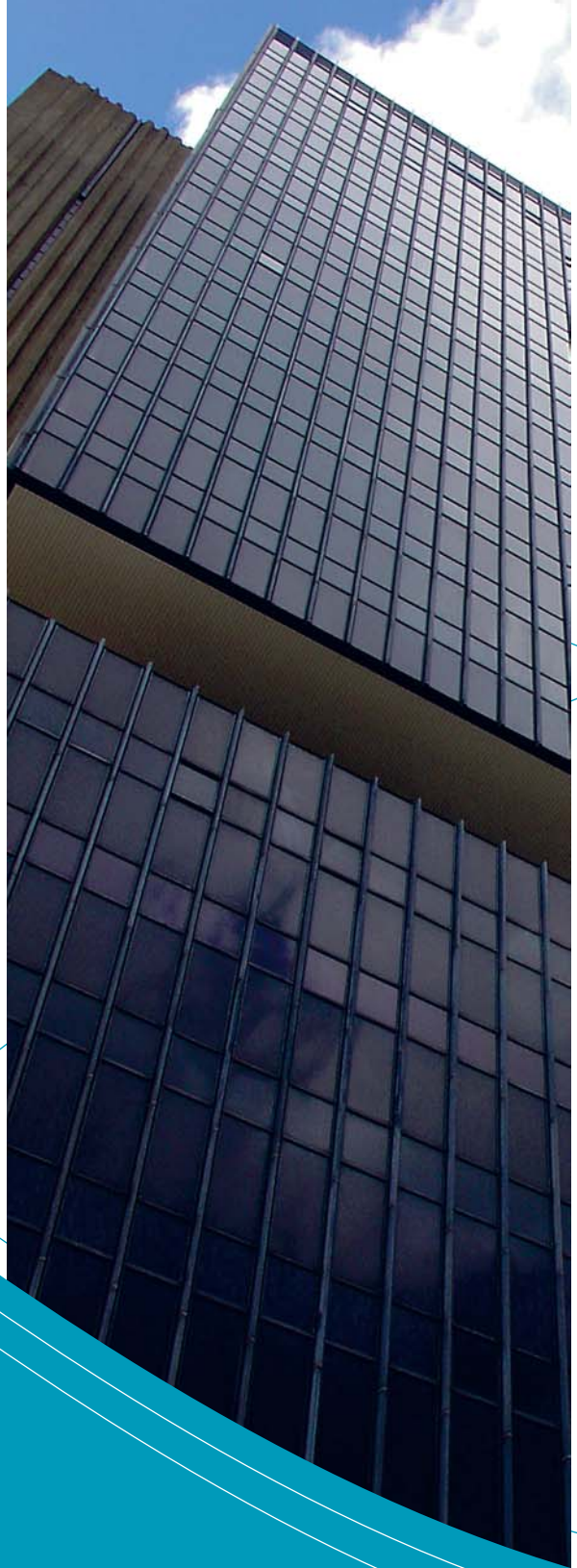


ISSN 1677-8138

Financial Stability Report

May 2005
Volume 4 – Number 1

BC 40 YEARS

BANCO CENTRAL DO BRASIL

BANCO CENTRAL DO BRASIL

BC 40 YEARS

Financial Stability Report

May 2005
Volume 4 – Number 1

ISSN 1677-812X
CGC 00.038.166/0001-05

Financial Stability Report	Brasília	v. 4	no. 1	May	2005	P. 1 - 195

Financial Stability Report

Half-year Banco Central do Brasil publication.

The texts and corresponding statistical charts and graphs are under the charge of the following departments:

Off-site Supervision Department (Desin)
(E-mail: desin@bcb.gov.br)

Research Department (Depep)
(E-mail: conep.depep@bcb.gov.br)

Financial System Regulation Department (Denor)
(E-mail: denor@bcb.gov.br)

Department of Banking Operations and Payments System (Deban)
(E-mail: deban@bcb.gov.br)

Open Market Operations Department (Demab)
(E-mail: gabin.demab@bcb.gov.br)

Department of Economics (Depec)
(E-mail: depec@bcb.gov.br)

Financial System Organization Department (Deorf)
(E-mail: copec.deorf@bcb.gov.br)

General Control of Publications

Banco Central do Brasil
Secre/Surel/Dimep
SBS – Quadra 3 – Bloco B – Edifício-Sede – M1
Caixa Postal 8.670
70074-900 Brasília – DF – Brazil
Phones: (5561) 414-3710 and 414-3567
Fax: (5561) 414-3626
E-mail: editor@bcb.gov.br

Number printed: 300

Statistical Conventions:

... Data not available.
\- nil or non-existence of the event considered.
0 ou **0,0** less than half the final digit shown on the right.
* preliminary data.

Hyphen between years indicates the years covered, including the first and last year.
A bar (/) between years (1970/75) indicates the average of the years covered, including the first and last year or even crop or agreement year, when mentioned in the text.

Occasional discrepancies between constituent figures and totals as well as percentage changes are due to rounding.

There are no references to sources in tables and graphs originated in the Banco Central do Brasil.

Banco Central do Brasil Information Bureau

Address: Secre/Surel/Diate
Edifício-Sede – 2º ss
SBS – Quadra 3 – Zona Central
70074-900 Brasília – DF – Brazil
Phones: (61) 414 (....) 2401, 2402, 2403, 2404, 2405, 2406
DDG: 0800 992345
Fax: (61) 321-9453
Internet: http://www.bcb.gov.br
E-mail: cap.secre@bcb.gov.br

Summary

Preface 7

Summary 9

Financial market evolution 13

1.1 Introduction 13
1.2 National financial market 14
1.3 International financial markets 20
1.3.1 International financial markets 20
1.3.2 International capital flows 22
1.3.3 Financial institutions 24
1.4 Conclusion 27

National Financial System supervision 29

2.1 Overview 29
2.2 Balance sheet structure 30
2.2.1 Assets 30
2.2.2 Liabilities 33
2.2.3 Net worth 34
2.3 Results 35
2.3.1 Composition and evolution 35
2.3.2 Operational cost and rate of return 36
2.4 Capital and limits 37
2.4.1 Basel Capital Ratio 37
Evolution 38
Concentration of PR and PLE 39
Consolidated banking segment I 39
Consolidated banking segment II 40
Consolidated banking segment III 41
Consolidated nonbanking segment 41
2.4.2 Fixed asset limit 41
Evolution 42
Consolidated banking segment I 42
Consolidated banking segment II 42
Consolidated banking segment III 43
Consolidated nonbanking segment 43
2.5 Risks 49

2.5.1 Credit operations 49
Operations written off as losses 51
Joint liabilities 51
Largest SFN debtors 51
Distribution of the one hundred largest debtors by economic sector 52
Classification of credit operations 52
Defaults 55
Provisions 55
Constituted provision/minimum provision 55
2.5.2 Exposure in foreign currencies and gold 58
Net exposure in the basket of currencies 58
Volume of long and short positions in the basket of currencies 59
Net exposure of the basket of currencies 59
Net exposure in currencies not included in the basket 61
Net exposure in the basket by segment 61
Volume of long and short positions in the basket by segment 62
SFN concentration 63
2.6 Stress scenarios 67
2.6.1 Universe analyzed 67
2.6.2 Credit risk stress 68
2.6.3 Interest and exchange rate stress 68
2.6.4 Evaluation of results 68
2.6.4.1 Initial situation 68
2.6.4.2 Upward stress scenarios 68
Increased credit risk 68
Increased interest and exchange rates 69
Increased interest rates, exchange rates and credit risk 69
2.6.4.3 Downward stress scenarios 69
Reduced interest and exchange rates 69
2.7 Conclusion 75

Brazilian Payments System 77

3.1 Introduction 77
3.2 Securities, derivatives and foreign exchange clearing and settlement systems 77
3.2.1 Especial System of Settlement and Custody 78
3.2.2 BM&F Derivatives Clearinghouse 78
3.2.3 BM&F Foreign Exchange Clearinghouse 78
3.2.4 Custody and Settlement Center 79
3.2.5 Brazilian Clearing and Depository Corporation 79
3.2.6 BM&F Securities Clearinghouse 80
3.3 Payment clearing and settlement systems 80
3.3.1 Central Clearing and Settlement System for Checks and Other Papers – Compe 80
3.3.2 Interbank Payments Clearinghouse 81
3.3.2.1 Deferred Settlement System of Interbank Credit Order Transfers 81
3.3.2.2 Funds Transfer System 82
3.3.3 Reserves Transfer System 82
3.4 Conclusion 83

National Financial System organization 85

4.1 Introduction 85
4.2 The strategies of market and quantity of institutions of the National Financial System 85
4.3 Reorganization processes, capital structure and operational dynamics of the SFN 88
4.4 Microcredit 90
4.4.1 Microentrepreneur credit companies 91
4.4.2 Credit cooperatives 92
4.4.3 Correspondents in the country 94

National Financial System regulation 97

5.1 Introduction 97
5.2 Main rules 97
I - Adjustment to Basel II recommendations 97
II - Group buyer associations 99
III - Credit Guarantee Fund 100
IV - Current investment deposit accounts and the savings deposit modality entitled to additional earnings 101
V - Microcredit operations 103
VI - Accounting procedures 105
VII - Repo operations 106

Selected studies 107

Measuring Banking Concentration: the Brazilian Case 109
Internal Models Validation in Brazil: Analysis of VaR Backtesting Methodologies 131
Behavior of Intraday Liquidity in the New Brazilian Payments System 155
Bankruptcy Law and Optimal Contract Design 175

Boxes

Concepts and Methodologies 44
Credit Classification Migration Matrix 53
Concepts and Methodologies – Credit Operations 57
Concepts and Methodologies – Exchange Exposure 65
Concepts and Methodologies – Stress Scenarios 71
Riskmetrics Methodology to Calculating Value-at-Risk 72
Hybrid Approach to Calculating Value-at-Risk 74

Appendix 189

Preface

The "Financial Stability Report" is a publication aimed at diagnosing the efficiency and solvency of the National Financial System (SFN). From the viewpoint of monetary authority transparency and the convergence of the expectations of economic agents, it is highly recommended that central banks publish their analyses of financial system performance.

This report, which is now in its sixth edition, is based primarily on data for the second half of 2004 and, in some sections, on figures for the early months of 2005. There are six chapters: Financial Market Evolution; National Financial System Supervision; Payments System; Financial System Organization; National Financial System Regulations; and Selected Studies.

The first chapter describes recent domestic and international financial market trends and their impact on monetary and credit policy implementation.

The following chapter focuses on the composition and evolution of assets, liabilities and net worth, analysis of results, adjustment to the Basel capital ratio and fixed assets limit, credit and market risks. The section dealing with stress scenarios considers both higher and lower rates of exchange and interest and deterioration in the quality of credits and presents an analysis of the impact of these factors on the process of adjustment to the Basel capital ratio.

The third chapter discusses the Brazilian Payments System (SPB), featuring an analysis of the consolidation of the measures adopted to adapt the system to the best practices and recommendations in the areas of security and efficiency. The objective is to minimize the risks involved in interbank settlements through utilization of the instruments required by the institution's role as overseer of the payments system. The chapter on financial system organization deals with the ongoing processes of reorganization of the system, their impacts on the stockholding structure of financial institutions,

as well as their operational characteristics within the financial market framework.

The question of prudential regulation is discussed in chapter five, which contains a summary of the principle measures taken to improve SFN organization and procedures. The chapter highlights those dealing with deposit accounts, the Credit Guaranty Fund (FGC), credit cooperatives, microcredit operations, the regulations on group buyer associations, repo operations and pension funds.

The final chapter presents selected technical studies on themes related to the role of the monetary authority in bank supervision and in monetary policy implementation. These articles were authored by Banco Central employees or by outside authors with the support of the institution. The titles of these papers are as follows:

i. Measuring Banking Concentration: the Brazilian Case;
ii. Internal Models Validation in Brazil: Analysis of VaR *Backtesting* Methodologies;
iii. Behavior of Intraday Liquidity in the New Brazilian Payments System; and
iv. Bankruptcy Law and Optimal Contract Design.

The base date used in this report is December 31, 2004, while the cutoff date for database formation was March 2, 2005. Information for the first two months of 2005 was utilized in some chapters. Possible differences in relation to the previous edition and to other publications issued by this institution are a consequence of documents that have been substituted by financial institutions in the Banco Central do Brasil Information System (Sisbacen).

Summary

Over the course of 2004, Brazil's Gross Domestic Product (GDP) expanded, while its external vulnerability decreased. Initially, the process of economic growth was rooted in the excellent results achieved by the export sector, coupled with a satisfactory performance in the segments focused on domestic demand due to an increased credits supply and gradual growth in family income.

The improved external financing conditions available to emerging countries, together with solid external accounts and efficient Brazilian economic policy management, are clearly reflected in the appreciation of the real against the United States dollar and in the sharp downward movement registered under Brazil risk.

Though considered remote, the possibility of increased volatility in the trajectory of the United States dollar and of continued high petroleum prices could result in an international market interest rate adjustment, generating negative pressures on the financing conditions of the country's external accounts.

Despite the relative degree of uncertainty that has marked the international economic scenario, the National Financial System (SFN) has clearly gained in strength, demonstrating that it is sufficiently capitalized to cope with the risks to which the member institutions are exposed.

Coupled with such economic factors as increased seasonal demand for funding by the productive sector, primarily as a result of expanded end-of-year sales activities and greater credit demand on the part of the business sector, mostly due to the dynamics of the farm sector, growth in credit channeled primarily into investments has generated a ripple effect and contributed significantly to sustaining the economic growth process.

Payroll loans and improvements in the family debt profile remained as the major causes underlying continued positive

performance under personal credit operations. Loans granted by national and foreign private banks, which accounted for the lion's share of overall credit system operations, were targeted basically to the segments of personal loans and operations with the retail sector.

The discrepancy between provisions for bad debts expected at the start of the first half of 2004 and the amount effectively set aside by financial institutions in the period showed a lesser degree of deterioration in the quality of credit operations, indicating that the perception of credit risk foreseen at the beginning of the period was not significantly altered in relation to the final result. This fact, reflected in the steady decline in default levels in recent half-year periods, demonstrates that there has been improvement in the adequacy of the level of provisions for bad debts, as is evident in the quality of credit operations.

Financial institutions, principally those connected to the national private sector, increased their net short exposure. This caused a reduction in net exchange exposure of the SFN basket of currencies, basically as a result of appreciation of the real against the United States dollar. On the other hand, the euro significantly increased its participation in the net composition of the basket of currencies.

The simulations of adverse economic scenarios carried out in order to evaluate SFN capital adequacy to the Basel capital ratio indicated a reduction in the number of financial institutions that could possibly register a Basel capital ratio below 11% in the stress scenario of higher interest rates, exchange rates and credit risk.

Other factors that contributed greatly to the strengthening of the SFN were important alterations in the Brazilian Payments System (SPB) as of February 2005, particularly with regard to the settlement of interbank liabilities related to checks and charging documents no longer settled through the Central Settlement System for Checks and Other Papers – Compe. This stage concluded the adjustment of this settlement center to the risk management regulatory requirements of the payments system and aided in diminishing the risk of contagion among financial institutions.

In the final six months of 2004, credit growth continued impacting financial institution structures, particularly in the retail and large bank segments which continued implementing their strategies of investing in the expansion of their portfolios. The pursuit of scale on the part of large institutions has shifted from acquisitions of other institutions to the

formation of associations or operational agreements among financial conglomerates and retail chains.

Though one cannot affirm that acquisitions among financial institutions have come to an end, recently adopted strategies have accounted for the absorption of the largest share of financial investments in SFN reorganization, clearly explaining the very small quantitative change in the number of institutions that occurred in the second half of 2004.

Going on to microcredit, the number of credit cooperatives dropped slightly while the number of micro-entrepreneur credit companies expanded, though this cannot yet be defined as a trend in this sector. One area that has expanded consistently has been that of providing banking services through correspondent outlets.

The events of the second half of 2004 did not result in any significant alterations in the functional aspects of financial institutions that could require reorganization processes that would lead to SFN structural modifications. Notwithstanding the operational dynamics of this process, there were no significant shifts in the relative participation of the various banking segment levels in the major accounting and financial aggregates.

The process of further refining SFN prudential regulations continued in the second half of the year. Communiqué 12,746, dated December 9, 2004, defined the implementation schedule of the new capital structure, based on the recommendations put forward by the Basel Banking Supervision Committee in the document entitled "International Convergence of Capital Measurement and Capital Standards: a Revised Framework" or "Basel II".

Several of the rules that regulate the procedures adopted by financial institutions were further refined, including that dealing with the bylaws and regulations of the Credit Guaranty Fund (FGC), adjusting them to the terms of the law that instituted the new Brazilian Civil Code; that which determined the minimum limit on credit operations granted by cooperatives authorized to freely admit members; that which created the conditions required for effective allocation of resources into microcredit operations, as foreseen by Law 10,735, dated September 11, 2003. Other rules were targeted at improving the regulations governing group buyer associations, deposit accounts in national and foreign currencies, repo operations, complementary pension funds and accounting records.

1 Financial market evolution

1.1 Introduction

The second half of 2004 marked consolidation of Brazilian economic growth and reductions in the country's external vulnerability. Despite a continued excellent performance on the part of the export sector, internal demand gradually substituted external demand as the major driving force underlying growth in the activity level. However, in light of the accentuated growth in utilization of installed output capacity and of the upward movement in inflation cores and expectations, the monetary authority initiated a cycle of monetary restrictions as of September, with the aim of achieving compatibility among the pace of aggregate demand growth, expansion of the economy's output capacity and inflation control.

Continued application of austere fiscal policies and prudent management on the part of the monetary authority were successful in curtailing inflation within the upper and lower parameters defined by the National Monetary Council (CMN). Parallel to this, it was possible to continue pursuing the goal of improving the profile of the internal Federal Public Securities Debt (DPMFi) and the nation's international reserve position. In the latter case, this process was also driven by continued exchange appreciation. In the second half of 2004, operational alterations and improvements of a structural nature were adopted within the context of SFN regulations and are expected to generate impacts in coming years.

At the end of 2004, international financial markets went through a process of adjusting portfolios as a result of the ongoing withdrawal of monetary incentives in the United States. However, contrary to what many had feared, this did not lead to an environment of exacerbated volatility in world markets as had occurred in 1994, when that country initiated a cycle of monetary restrictions. Expectations of a continued gradualist approach to the monetary squeeze in the United States and maintenance of flexible monetary

policies in most of the industrialized economies clearly favored recovery in the prices of the securities issued by both mature and emerging economies, following the brief period of turbulence that occurred between mid-April and mid-May. Simultaneously, the pursuit of more attractive financial returns in stock markets helped to offset the negative impacts on confidence generated by persistently high petroleum prices. In this scenario, financial intermediaries apparently absorbed the market interest rate high without any visible impact on profitability, while international financial markets registered low levels of volatility, in historic terms, between September 2004 and February 2005.

1.2 National financial market

The second half of 2004 was marked by consolidation of the economic growth process, in a context of an increasingly restrictive monetary policy and continued fiscal discipline. Alongside the still vigorous export sector which had previously been the primary locomotive of economic development, sectors linked to domestic demand assumed a predominant role, driven by growth in various credit modalities and gradually expanding income. Impacted by excellent results in the nation's external accounts, the attention of economic agents focused on the economy's capacity to maintain a sustainable growth trajectory.

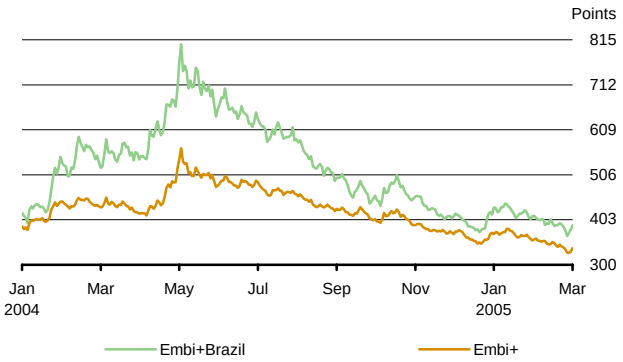
The foreign sales sector continued its strong performance in the first half of the year and was the determining factor in the continued process of reducing the country's external vulnerability in 2004. The accumulated year-over-year trade balance surplus in the second half of 2004 increased by 14.5%, rising to a level of US$33.7 billion in December 2004. This trajectory, which continued into the first months of 2005, was supported by growth in the volume of world trade in goods and services (8.8%) and world GDP (5%)[1], closing with a final balance of US$35.1 billion dollars – in February, exports accumulated over twelve months surpassed the mark of US$100 billion. Foreign direct investments also rose significantly in the period, moving from US$4 billion in the first half of 2004 to US$9.2 billion[2] in the second, reaching US$2 billion in the first two months of 2005.

As of the month of June, expectations that interest rates in the United States would rise only gradually, coupled with

1/ International Monetary Fund World Economic Outlook Database, September 2004.

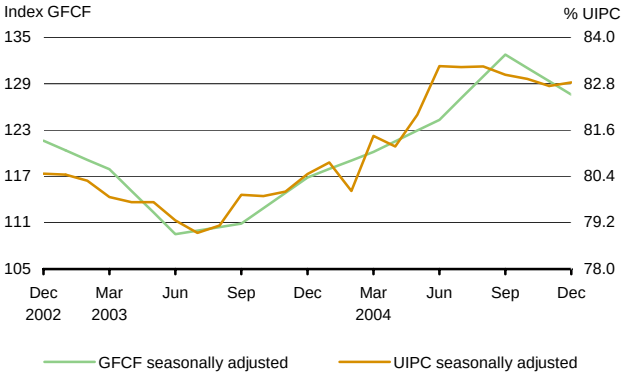
2/ Ignoring the exchange of stocks in the amount of US$4.89 billion between the AmBev and Interbrew beer companies.

Embi+ and Embi+Brazil

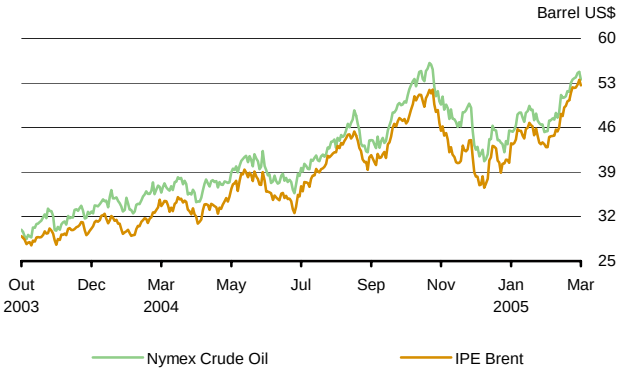


Source: Bloomberg

Gross fixed capital formation and utilisation of installed productive capacity



Oil



Source: Bloomberg

the good level of international market liquidity, improved the external financing conditions of the emerging countries. In the case of Brazil, the solidity of the nation's external accounts and careful management of its economic policy have also acted as an incentive to an increased inflow of resources, creating the conditions required for exchange rate appreciation and cutbacks in country risk, which closed at 383 points on December 31, 2004.

During the second half of the year, the government further strengthened its commitment to fiscal austerity by increasing the 2004 primary surplus target by 0.25 p.p. to 4.5% of GDP. The government then fulfilled its commitment with leeway of 0.11 p.p. (4.61%).

Despite strong growth in foreign trade flows, domestic demand substituted foreign demand as the principal driving force underlying economic activity. Growth filtered down to practically all segments of the economy that are more dependent on labor income, powered by expanding credit, a more flexible monetary policy between June 2003 and April 2004, recovery in employment and real overall wages during the course of the entire period[3].

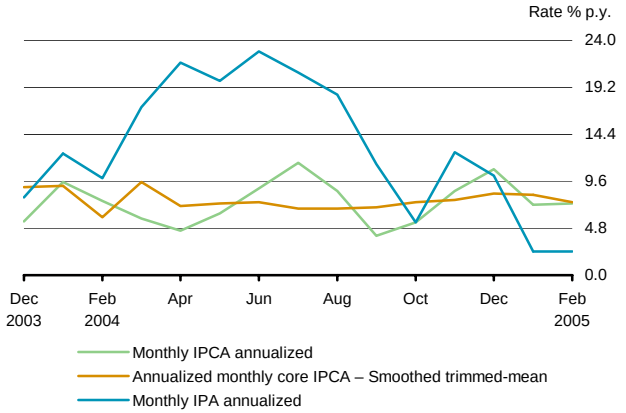
As industrial output moved to record levels, the pace of growth in the activity level in 2004 generated concerns regarding the sustainability of this process. Accentuated expansion in the level of utilization of installed industrial capacity, which surpassed 83% in June when calculated on the basis of seasonally adjusted figures, required constant and detailed monitoring of the pace of demand growth in relation to investment levels. This process resulted in adoption of incentives to gross fixed capital formation[4]. Starting in the month of July, expectations of a possible reduction in petroleum prices were frustrated by the perception that the increase in the per barrel price was a consequence of chronic insufficiencies in medium term supply, thus generating an additional source of pressure on current inflation and inflationary expectations.

From September onward, the various core rates of inflation and diffusion indices increased, at the same time as inflation expectations for 2005 rose. Aside from this, a growing lag between wholesale and retail prices further strengthened the outlook for a possible pass-through to consumer prices.

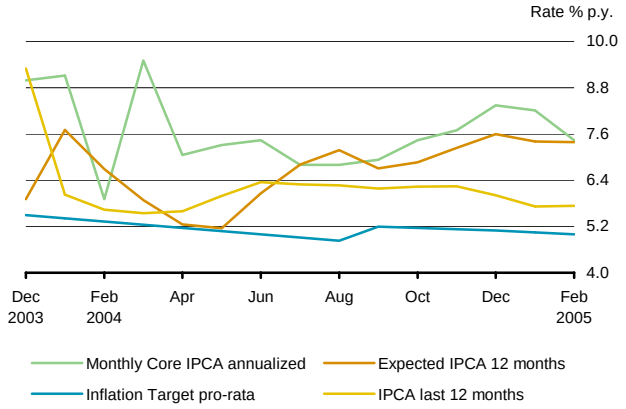
3/ In 2004, GDP expanded by 5.2%.

4/ Among these incentives, particular mention should be made of those defined in Provisional Measure 219, dated 9.30.2004, which reduced the cost of new capital goods, making it possible to use a share of their depreciation as credits against the Social Contribution on Net Profits and in Camex Resolutions 26 and 33, dated 10.5.2004 and 11.25.2004, which reduced the ad valorem rates of the import tax on a series of capital goods from 4% to 2% until December 31, 2006.

IPCA and IPA

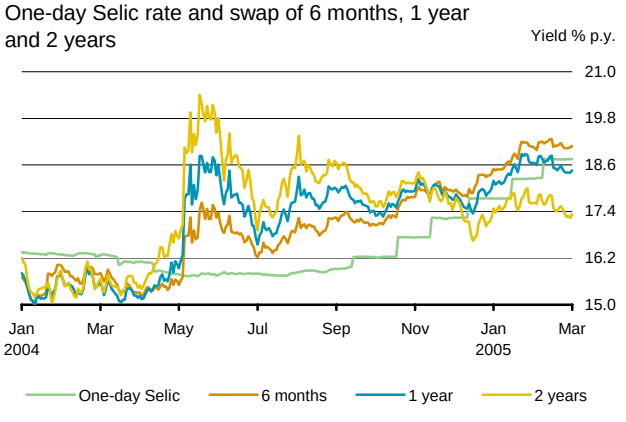


IPCA



Interest rates

One-day Selic rate and swap of 6 months, 1 year and 2 years



Sources: BM&F and Bacen

In response to the risks regarding the future trajectory of inflation, the Monetary Policy Committee (Copom) met in September and decided to initiate a moderate process of adjustment of the target to the Selic rate, raising it from 16% to 16.25%. At the same time, perception that the 2004 Amplified Consumer Price Index (IPCA) would go beyond the central target of 5.5% and the significance of the inertial impact on 2005 inflation led Copom, at the same meeting, to decide that part of this inertia would be absorbed into the tolerance bands determined by the CMN[5], from 2% to 7%, setting the focus of 2005 monetary policy at 5.1%.

At its subsequent meetings, Copom opted for increases of 0.5 p.p. in the Selic rate target, maintaining the IPCA for 2004 within the target interval[6] and reducing inflation expectations for the following year.

Once the risk of an accelerated monetary squeeze in the United States had dissipated, earnings on American securities dropped in the third quarter of 2004[7]. In its turn, Brazil risk dropped from 712 to 494 points between 6.1.2004 and 9.15.2004. In the same period, internal six month, one year and two year interest rates dropped from 17.5%, 18.7% and 19.9% to 17.2%, 17.7% and 18.2%, respectively, and the differentials in relation to the basic rate moved from 169 b.p., 293 b.p. and 415 b.p. to 122 b.p., 176 b.p. 219 b.p.

Over the entire second half of 2004, international market liquidity remained high. In the period under consideration, the trend toward devaluation of the American dollar against the major currencies stimulated the pursuit of financial assets issued by other countries. The reduction in Brazil's external vulnerability, mostly as a consequence of record trade balance surpluses coupled with the increased credibility of economic policy, made it more attractive for foreign investors to place their resources in assets denominated in real. This movement generated a significant impact on local interest rates curves and on exchange coupons rate curve. Increased demand for internal fixed rate assets influenced the interest rate curve incline which, in November 2004, became negative for longer term operations. At the end of the year, interest rates for six months, one year and two years reached respective levels of 18.3%, 17.8% and 17%, with a differential in relation to basic rate equivalent to 54 b.p., 6 b.p. and -73b.p.

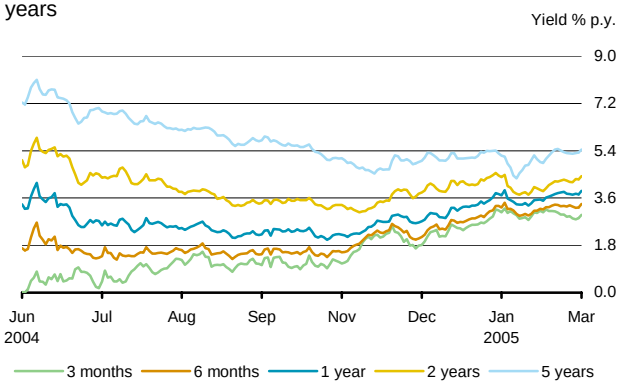
5/ Resolution 321, dated 6.30.2004 set the inflation target for 2006 at 4.5%, with a tolerance interval of 2 percentage points up or down.

6/ In 2004, the IPCA registered positive growth of 7.6%, still below the upper limit of 8% defined by the CMN.

7/ Earnings on ten year United States Treasury securities moved from 4.7% at the start of the second half of the year to 4.2% on September 15, 2004.

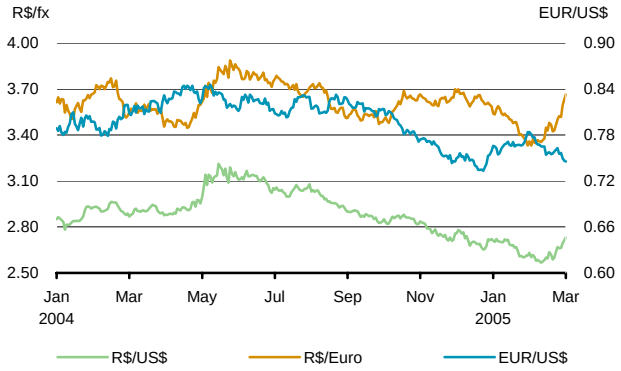
Dollar – Denominated spread

Rate of 3 months, 6 months, 1 year, 2 years and 5 years



Sources: BM&F and Bacen

Exchange rate



Source: Bloomberg

At the end of February 2005, following new increases in the Selic rate target, interest rates for six months, one year and two years moved to respective levels of 19.1%, 18.5% and 17.4%, with differentials in relation to the basic interest rate equal to 36 b.p., -28 b.p. and -133 b.p.

The exchange coupon rates, principally for longer terms, showed a downward tendency up to the final two months of the year. Rates for periods of 1, 2 and 5 years shifted from 3.1%, 4.8% and 6.7%, at the start of the second half of the year, to 2.5%, 3.2% and 4.7%, on November 24, the date on which Banco Central announced that it would resume the process of restoring international reserves which had been interrupted in February. Starting from that point, the positive exchange coupon rate curve incline diminished as shorter term rates increased more sharply. The rates for 1, 2 and 5 years came to respective levels of 3.9%, 4.5% and 5.2%, respectively, on February 1, 2005, the day on which Banco Central announced that it would begin holding auctions of reverse exchange swap contracts. In these operations, Banco Central assumes an active position in exchange rate and a passive position in internal interest rates, with the objective of more rapidly reducing the government's exchange rate exposure. Acting in this way tends to cause a downturn in the exchange coupon rate. Consequently, rates for 1, 2 and 5 years came to respective levels of 3.4%, 3.8% and 4.3% on February 9, 2005. Later on, the exchange coupon rate increased for all of the terms cited, primarily as a result of an increase in United States long-term interest rates. As a result, the rates for 1, 2 and 5 years closed March 10 at 3.7%, 4.3% and 5.3%, respectively.

The exchange rate trajectory moved from a level of 3.08 to 2.66 R$/US$ over the course of the second half of the year and not only reflected the excellent performance of the external sector of the Brazilian economy but, above all else, mirrored the process of devaluation of the American currency on international markets. At the start of 2005, however, recovery of the dollar on the major markets was not reflected in R$/US$ exchange rates, which continued on a downward slide, coming to a level of 2.57 R$/US$ on February 17, 2005. This is consistent with the process of devaluation of the real against the euro. In this case the rate came to 3.33 R$/EUR on February 07, 2005. At the beginning of March, the CMN[8] introduced reforms of a structural nature, expanding the term for the requirement of exchange coverage for export operations from 180 to 210 days and unifying the free and floating rate markets.

8/ Resolutions 3,266 and 3,265, both dated 3.4.2005.

Domestic federal debt held by the public[1/]

Exposure by type of return

R$ billion

Period		Fixed rate		Selic rate		Price index		Exchange rate		Others		Total
		Value	%	Value	%	Value	%	Value	%	Value	%	Value
1999	Dec	40	9	252	57	25	6	101	23	25	6	441
2000	Dec	75	15	267	52	30	6	114	22	24	5	511
2001	Dec	49	8	329	53	44	7	179	29	24	4	624
2002	Dec	14	2	288	46	78	13	231	37	13	2	623
2003	Dec	92	13	366	50	99	14	161	22	13	2	731
2004	Jan	93	13	376	51	100	14	155	21	13	2	737
	Feb	101	14	385	52	102	14	141	19	13	2	743
	Mar	117	15	391	52	103	14	135	18	14	2	760
	Apr	121	16	401	52	107	14	125	16	14	2	768
	May	123	16	378	51	110	15	124	17	14	2	748
	Jun	128	17	384	51	113	15	120	16	14	2	758
	Jul	115	15	408	54	115	15	107	14	14	2	759
	Aug	127	17	403	53	117	15	100	13	14	2	762
	Sep	135	17	409	53	118	15	95	12	15	2	771
	Oct	135	17	420	54	119	15	87	11	15	2	777
	Nov	147	19	422	54	120	15	81	10	15	2	785
	Dec	163	20	425	52	121	15	80	10	22	3	810
2005	Jan	155	19	463	56	120	15	66	8	22	3	827
	Feb	173	20	478	57	121	14	51	6	22	3	845

1/ Exchange rate swap of Banco Central do Brasil included.

The DPMFi profile improved over the course of the second half of 2004. The major advances refer to a reduction in exchange rate exposure and increased participation on the part of fixed rate securities. As a result of the 1.7 p.p. decline generated by the maturities that occurred in July, this participation increased by 5 p.p. up to December, closing the year at 20.1%. Continuing the process of reducing exchange rate exposure[9], the share of DPMFi tied to exchange rate dropped by half between the end of June 2004 and January 2005. This movement was also favored by appreciation of the real against the dollar. In February, the start of reverse swap operations accelerated the reduction in exchange exposure, which closed the month at 6% of DPMFi.

In December 2004, securitization of the federal debt raised the volume of securities indexed to the reference rate (TR) by R$7.4 billion. As a result, DPMFi closed the year at R$810.3 billion, corresponding to an increase of 6.9% in the second half of the year. In the first two months of 2005, DPMFi expanded by 4.3% and rose to R$845.4 billion. When open market operations are added in, the total comes to R$900.4 billion, an increase of 7.5% in the last eight months.

Despite the gradual increase in the average term of issues in public offers, the average term of the DPMFi registered a drop of 1.8 months in the first half of the year to a minimum level of 28 months in November, as a result of the increased participation of fixed rate securities. The average issue term of fixed rate securities more than doubled between July 2004 and February 2005, moving from 7.4 to 15.8 months. In the case of the Selic indexed debt in the same period, the average term moved from 19.8 months to 30.7 months and was an additional factor in reversing the downward trend in the average term of the DPMFi. In this eight month period, the policy followed by the National Treasury Secretariat with the aim of lengthening the term of the debt through short-term LFT exchange auctions for longer term LFT (R$40.9 billion) was one of the factors that made it possible to improve the DPMFi profile without significant detriment to its average term. At the beginning of the second half of the year in the period between July and September, the share of the DPMFi to mature in one year increased by 5.2 p.p., before gradually dropping from that point forward to a level of 43.2% in February, just 1.3 p.p. above July.

9/ In August, there was just one partial renewal of swap operations in which Banco Central assumed a passive position in exchange and an active position in interest rates.

Bovespa index

Source: Bovespa

In its open market interventions, as of November 2004 Banco Central introduced a new type of operation with the purpose of reducing the banking liquidity expected for the first quarter of the following year. This operation consisted of LTN sales with maturity in April 2005 conjugated with purchases of LTN in the same financial amount due to mature in January 2005. In 2004, these operations amounted to R$10.9 billion.

In January 2005, Banco Central initiated sales of LTN from its own portfolio, with the purpose of further reducing excess banking liquidity. Sales of LTN came to R$ 11.2 billion up to March 10, with maturity in July 2005.

The stock market reflected the excellent performance of the economy, as the Bovespa Index (Ibovespa) registered an increase of 24% in the second half of 2004, reaching a record level of 26,196 points at the end of the year. After a slight drop in January 2005, stocks in general regained the upward trajectory that had begun in the middle of May 2004. As a result, the Ibovespa set a new record of 29,455 points on March 7. In the last eight months, this index rose by more than 35%.

Starting in the second half of 2004, various measures were taken with the aim of improving national financial market regulations. The impact of these measures is expected to be felt in the coming years. Analysis of the measures of a structural nature indicates that the following deserve mention: the start of investment account operations[10] on October 1; stock market incentives based on reduced taxation on variable income investments[11]; tax incentives for the lengthening of the maturities of financial investments[12] and for insurance operations[13]; and the requirement of increased transparency in the investment fund segment[14].

10/ Provisional Measure 179, dated 4.1.2004, created these deposit accounts to go into effect as of 8.1.2004. This date was later postponed to 10.1.2004 by Circular 3,248, dated 7.29.2004. This measure made it possible for investors to allocate their portfolios among different financial assets without being subject to levying of the Provisional Contribution on the Movement or Transmission of Values and Credits and Credits of a Financial Nature (CPMF). Up to that time, only those investors who had exclusive funds were able to take advantage of this exemption which is specifically reserved to Financial Investment Funds.

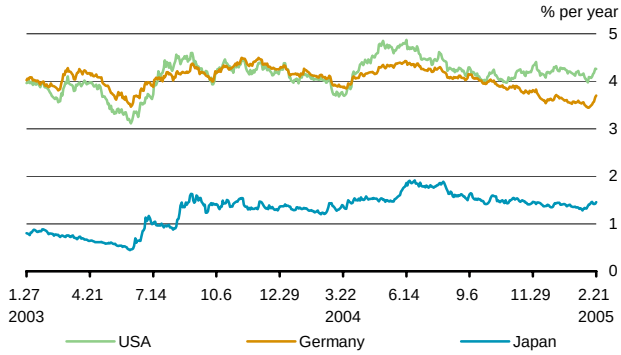
11/ Provisional Measure 206, dated 8.6.2004, reduced taxation on variable income from 20% to 15% and adopted a scale of taxation on fixed income operations that declines according to the term of the investment: 22.5% on investments of up to six months; 20%, from six months to one year ; 17.5%, from one to two years and 15% on operations with terms of more than two years.

12/ Aside from Provisional Measure 206, Provisional Measure 209, dated 8.26.2004, made it possible for complementary pension fund entities and insurance companies to opt for pension-type benefit plans instituted as of January 1, 2005 and, under the conditions specified therein, for a taxation system in which the income withholding tax decreases by five p.p. as the term accumulates, moving from 35% when less than or equal to two years, until reaching 10%, when longer than ten years.

13/ Decree 5,172, dated 8.6.2004, reduced the Financial Operations Tax (IOF) rate on life insurance operations from 7% to 4%, effective as of September 2004. In September 2005, the rate will drop to 2% and, in September 2006, to zero.

14/ CVM Normative Instruction 409, dated 8.18.2004.

Yields on Treasury bonds[1/]



Source: Bloomberg

1/ Nominal yields on 10 year's Treasury bonds.

Yields on Treasury Bonds[1/]

Average rate

% per year

Period		USA	Germany	Japan
2004	I	3.99	4.08	1.32
	II	4.58	4.26	1.60
	III	4.29	4.13	1.65
	IV	4.16	3.79	1.46
2005	I [2/]	4.17	3.56	1.38

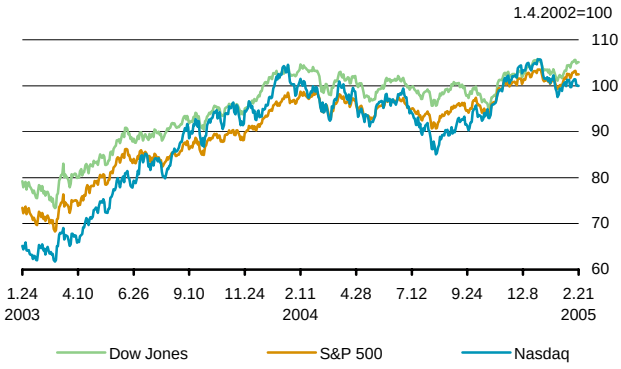
Source: Bloomberg

1/ Nominal yields on 10 year's Treasury bonds.

2/ Up to February 21.

Stock exchanges

USA



Source: Bloomberg

1.3 International financial markets

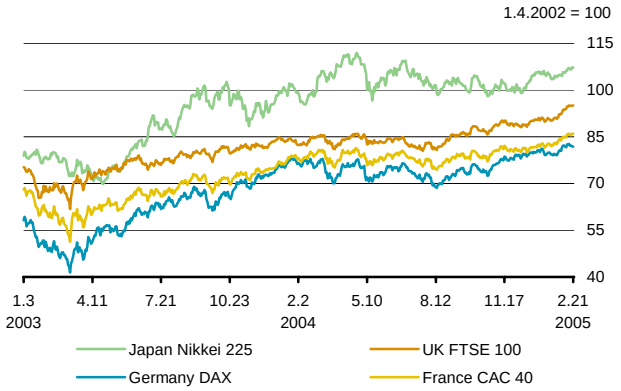
1.3.1 International financial markets

The Federal Reserve (Fed), the United States central bank, has gradually eliminated the expansionary character of its monetary policy and raised the basic rate of interest from 1% in July 2004, to 2.5% in February 2005, a pace of 0.125 percentage points per month. Since the month of June, short-term interest rates in the United States have moved into an upward curve, primarily as a consequence of a more restrictive monetary policy. At the same time, earnings on long-term securities have declined, provoking the leveling off of forward interest rates in that country. Analysis of the other industrialized economies shows that earnings on ten year public securities have kept pace with similar United States papers. Perception of the need for a monetary incentive to sustain the economic growth cycle in Europe and Japan, which is reinforced by appreciation in the value of the yen and the euro, also contributed to compression of returns on longer term fixed income assets.

In this sense, the generalized convergence of long-term fixed income earnings to historically low levels has been fostered by the conviction that the United States monetary authority has opted for a gradual approach and also by expectations that the more flexible monetary policies adopted in the major economic regions will not be abruptly reversed, since there is a clear perception that inflation is under control. It is important to emphasize that several different causes contributed to the decline in these earnings, the most important being high demand for longer term papers by Asian central banks, pension funds, insurance companies and mortgage securitization companies. At the same time, one cannot ignore the existence of movements of a speculative nature.

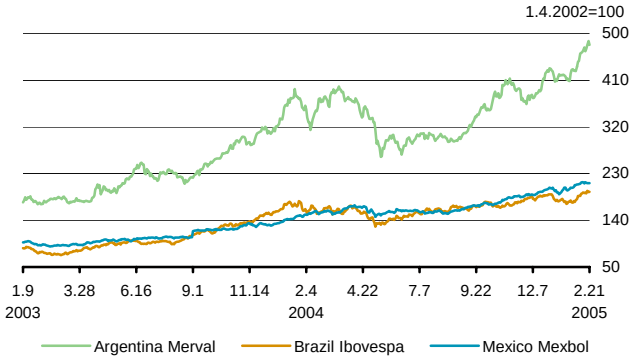
In 2004, the average annual yield of ten year United States securities dropped from 4.29% in the third quarter to 4.16% in the fourth. In the same period of time, average annual earnings on similar German and Japanese papers dropped from 4.13% to 3.79% and from 1.65% to 1.46%, respectively. In the first two months of 2005 up to February 21, average yields on papers issued by Germany and Japan fell to 3.56% and 1.38%, respectively, while returns on equivalent American papers stabilized in the range of 4.17%. As of the second half of February, it should be stressed that earnings followed an upward trajectory, reflecting uncertainties regarding inflation.

Stock exchanges
Japan and Europe



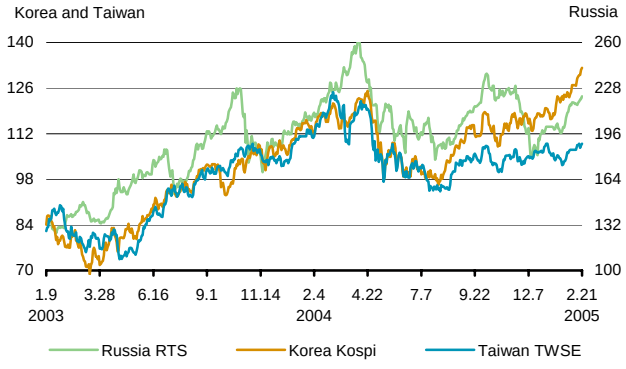
Source: Bloomberg

Stock exchanges
Emerging economies – Latin America



Source: Bloomberg

Stock exchanges
1.4. 2002 = 100



Source: Bloomberg

Stock markets remained sensitive to the uncertainties generated by the trajectory of petroleum prices and their potential impacts on the pace of world economic activity, primarily in the United States. The negative effects of the sharp and volatile rise in petroleum prices on confidence levels were offset by the migration of resources into higher yield assets, with particularly strong impacts on the stock exchanges of the emerging economies. In this context, in the period extending from September 21, 2004 to February 21, 2005, the Dow Jones, Standard & Poor's 500 and Nasdaq indices in the United States rose by 5.3%, 6.4% and 7.2%, in that order.

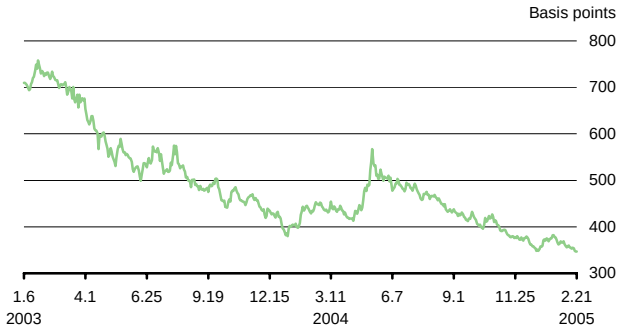
Using the same basis of comparison, the Japanese Nikkei expanded by 5.7%. It should be stressed that Japanese stocks did not register a better performance due to the evolution of internal economic indicators which, as of the second half of the year, pointed to only moderate economic activity. In Europe, stock markets were less volatile than in the United States and Japan. In the period between September 21, 2004 and February 21, 2005, the German Deutscher Aktienindex (DAX), the British Financial Times Securities Exchange Index (FTSE 100); and the French, Cotation Assistée em Continue (CAC) increased by 9.1%, 9.8% and 7.8%, in that order.

In the same period, the stock market's of the majority of the emerging economies also moved upward, primarily as a consequence of abundant credit and lesser aversion to risk. Parallel to this, attractive stock prices and publication of considerably more robust economic indicators also drove prices upward, particularly in Latin America. The principal Mexican and Argentine stock market indices increased by 26.2% and 40.9%, respectively, while the Brazilian indicator grew by 16.2%. The increase in stock prices in Korea (Kospi) came to 15.5%, while the Russian index (RTS) and that used in Taiwan (TWSE) gained 3.3% and 3.8%, in that order.

The somewhat more moderate recovery in the global economy, the low nominal and real earnings on the fixed income assets of the industrial economies and market receptivity to increasing exposure to risk have aided in steadily narrowing spreads measured by the Emerging Markets Bond Index Plus (Embi+), the proxy for measuring the risks associated to emerging economies.

This scenario was further reinforced by consolidation of the economic fundamentals of most of the countries involved. Compared to the peak registered on May 10, 2004, the Embi+ for Russia, Turkey, Brazil and Venezuela declined by an

Embi+



Source: Bloomberg

Emerging markets: Net capital flows and current account balance

US$ billions

	2001	2002	2003	2004
Current account balance (total)	26.3	79.1	120.7	159.8
Foreign private capital flows (total)	130.5	124.9	210.6	279.0
Africa				
Current account balance	7.4	6.4	9.9	13.7
Foreign private capital flows	9.4	1.5	3.5	9.2
Latin America				
Current account balance	-47.9	-9.1	11.2	22.6
Foreign private capital flows	52.9	17.3	25.2	26.1
Asia				
Current account balance	48.1	73.6	100.7	120.4
Foreign private capital flows	51.4	60.5	116.3	146.3
Europe				
Current account balance	18.7	8.2	-1.1	3.1
Foreign private capital flows	16.8	45.6	65.6	97.4

Source: IIF

average of 38% up February 21, 2005. On that date, the Embi+ stood at 341 points – the lowest value registered in the last five years – compared to 567 points on May 10, 2004. When one excludes the hypothesis of the occurrence of significant shocks in the central financial markets, there is no reason to expect any abrupt reversal in the current benign scenario for all types of financing over the medium term, including both private and sovereign debt; independently of whether borrowers are classified as investment grade or high yield risks.

1.3.2 International capital flows

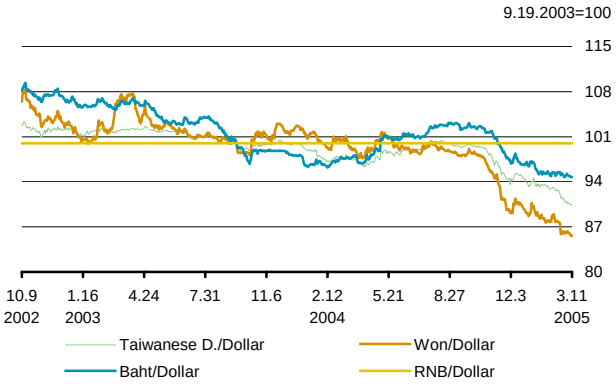
The more intense flows of private foreign capital into the emerging economies as a whole in the final quarter of 2004 was caused by expectations regarding the evolution of exchange policy in Russia and China and in other Asian emerging countries. This factor was even more important than the positive financial conditions that existed throughout 2004, with the sole exception of the second quarter, and the investment opportunities generated by increased commodity prices and strong growth in the emerging economies.

For many different reasons, those countries have registered high and recurrent surpluses in their current transactions with the rest of the world (estimated by the International Monetary Fund – IMF at 10.1% and 3.4% of GDP in Russia and China, respectively, and higher than an average of 4% in the other emerging countries of Asia). In the case of the latter countries, net inflows of foreign capital were particularly strong, mainly in the form of direct investments.

Starting in October 2004, with the decision taken by Russian authorities to increase the participation of assets denominated in euro in the composition of their international reserves and the interpretation that the increase in basic interest rates and the liberalization of bank interest in China were a sign that adoption of a more flexible rate of exchange could well be on the horizon, foreign investors and internal economic agents sought to position themselves in the currencies of those nations, leveraging international financial market resources for purposes of acquiring assets denominated in local currencies or postponing payments and seeking to anticipate inflows of resources abroad.

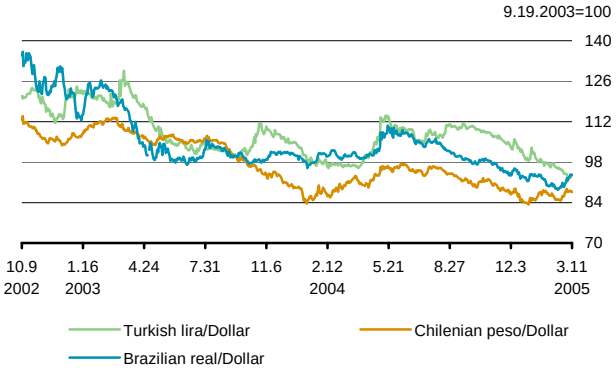
According to the Institute of International Finance (IIF), the impact of these expectations on foreign capital flows was responsible for the US$45 billion increase in estimates of capital flows to Russia and China in 2004 in the period

Emerging markets currencies
Managed exchange rate – Dollar exchange rates



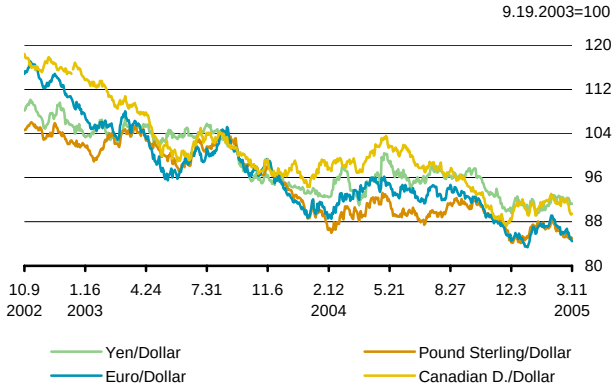
Source: Bloomberg

Emerging markets currencies
Flexible exchange rates – Dollar exchange rates



Source: Bloomberg

Developed countries
Dollar exchange rates



Source: Bloomberg

between the October 2004 report and that of January 2005, with 70.6% of this total referring to flows to the latter of the two countries.

Despite the very successful defense of the Chinese exchange system in the face of strong capital inflows, which resulted in imposition of limits on contracting of external loans by foreign banks headquartered in that country and intense accumulation of international reserves, expectations regarding changes in that system led to intense appreciation of the currencies of several of the major economies in the region. This was also a consequence of the fact that capital flows to these countries were influenced by exchange policies conditioned to productive integration with China and international market competition with the products of that country.

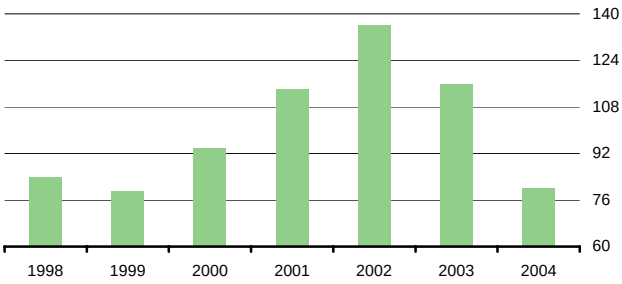
Consequently, the currencies of Thailand, Korea, Singapore and Taiwan gained in value at respective rates of 8%, 13.4%, 3.9% and 8.8% against the United States dollar when the average values in September 2004 are compared to those in effect in the 22 business days leading up to March 11, 2005.

In the same period of time, the currencies of emerging countries with more flexible exchange systems combined with positive balances in their current accounts with the rest of the world and/or strong inflows of foreign capital, also tended to increase in value against the dollar, clearly reflecting the positive liquidity conditions that existed on international financial markets. By way of example, the currencies of Brazil, Chile and Turkey registered respective appreciation rates of 10%, 6.7% and 16.4%.

Starting in the final quarter of 2004, several alterations were introduced into exchange policy in several of the emerging Asian economies. This process further reinforced the perception that the region is moving toward cutbacks in exchange rate controls. The following deserve mention: initiatives taken by the Chinese government to improve the mechanisms underlying exchange rate formation through creation of eight new foreign currency pars which, as of next May, will be negotiated on the internal interbank market, and steps taken by the Korean central bank to diversify the assets in which that country's international reserves may be invested, no longer limiting these operations to assets denominated in dollars.

The appreciation of the merging market currencies against the dollar contrasts with what has been observed since last December in the behavior of the major international payment currencies against the dollar.

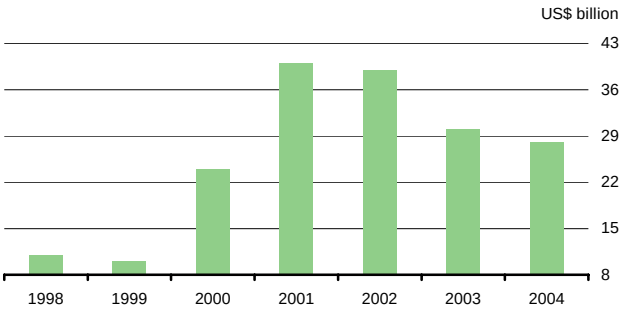
Number of "problems" institutions
USA[1/]



Source: FDIC, FDIC Quarterly Banking Profile, Fourth Quarter 2004

1/ Include commercial banks and savings institutions.

Assets of "problems" institutions
USA[1/]



Source: FDIC, FDIC Quarterly Banking Profile, Fourth Quarter 2004

1/ Include commercial banks and savings institutions.

1.3.3 Financial institutions

According to the FDIC Quarterly Banking Profile[15] for the fourth quarter of 2004, the United States banking system has demonstrated its robustness and vitality, absorbing the effects of successive interest rate increases adopted by the Fed with relative ease. Thus, capacity for internal generation of capital through accumulation of retained profits is still high, at the same time in which the number of bankruptcies is insignificant. Aside from this, the sector has continued moving toward consolidation.

Profits of commercial banks and savings institutions covered by the FDIC dropped to US$31.8 billion in the fourth quarter, as a result of greater outlays on mergers of large banks and lesser gains on sales of securities and other assets, which annulled the strong growth in loans and larger net profit margins. Despite this, this was the third best result in the FDIC series, representing a reduction of US$668 million in relation to the previous quarter which had already set a new record.

However when performance in the year is evaluated, the profits of the institutions covered set a new record for the fourth consecutive year, totaling US$123 billion, for an increase of US$2.5 billion compared to the previous period. This performance is explained by larger income on net interest as well as by lesser provisions set aside for bad loans. As regards the latter item, it reflects a process of steady improvement in the quality of these assets for the ninth consecutive quarter.

No financial institutions insured by the FDIC went bankrupt in the fourth quarter. In 2004, there was only one case of a commercial bank and another involving a savings institution. The number of institutions classified as problematic on the FDIC latest dropped from 116 in 2003 to 80 in 2004. The assets of these institutions fell from US$30 billion to US$28 billion in the same period of time.

European banks continued to benefit from the positive macroeconomic scenario brought about by strong global growth and the process of moderate recovery in the European economy. Aside from reducing risk aversion, this context also favored decreases in credit risk, above all for large companies. A survey carried out in October 2004 by the European Central Bank (ECB) detected a certain relaxation of the credit restrictions imposed by financial

15/ See http://www2.fdic.gov/qbp/2004/dec/qbp.pdf.

institutions, thus reversing the previous tendency toward more restrictive credit conditions. This change in behavior is attributed mostly to sharper competition in the unified financial markets of the euro zone countries. At the same time, profitability and solvency indicators continued on a positive curve that had begun during the recent cycle of the restructuring process that dates to the start of the decade.

According to the ECB, approximately one quarter of the financial institutions that existed in the euro zone and 9.4% of their branches went out of existence in the period between 1997 and 2003, as a result of restructuring and consolidation processes. This tendency is expected to continue into the coming years, particularly with regard to public banks and cooperative institutions. However, there has been a sharp downturn in mergers and acquisitions, in terms of both volume and the number of operations, compared to the periods immediately prior and subsequent to monetary unification. It is also worth underscoring the fact that mergers and acquisitions involving institutions from more than one country corresponded to 10% to 15% of the total.

Potential sources of risk continue to exist within European banking systems. Though solvency levels remain adequate, profitability is weak in some countries. Among the main determinants of this situation, the pressures of competition and low interest rate levels play an important role. In their turn, low returns on fixed income markets result in reduced risk aversion, increasing the pursuit of higher yields on markets characterized by less liquidity. The participation of fixed income instruments in total assets also increased in 2004, resulting in greater interest rate risks, which could materialize should there be an increase in long-term rates. Another potential source of risk is found in the increased exposure of European banks to emerging markets in the period between the end of 2003 and early 2004.

English banks made progress with regard to profitability and maintain adequate levels of capitalization. Over the course of the second half of 2004, large scale banks registered reductions in credit losses and were able to reduce new provisions. The most important individual category of banking system exposure was that of real estate loans and its recent growth has been higher than available household income. Despite this, positive growth in economic activity and substantial guaranties suggest no more than a low risk of losses in this sector. The corporate credit risk is also moderate, as demonstrated by the reduction in spreads on corporate papers and increases in profitability and stock values.

Japanese banks continued reducing their levels of Non Performance Loans (NPL). According to data released by the Financial Services Agency (FSA), total NPL for the entire banking system came to ¥ 23.8 trillion, a reduction of ¥ 2.8 trillion compared to march of the same year. This is a result of a reduction of ¥ 4.1 trillion in loans ranked for "special attention" and an increase of ¥ 1.3 billion in hard-to-recover loans, according to the classification found in the Financial Reconstruction Law. Cutbacks in total NPL in the period under consideration can be attributed to an improved economic environment and better corporate results.

At the same time, there was a new reduction in the NPL/ Total Credit Operations ratio of the eleven largest banks, closing at 4.6% in September 2004 as against 5.1% one year previously.

The relative success with which the Japanese banking system has been resolving the problem of NPL led the FSA to launch the Program for Further Financial Reform in December 2004. The major objectives of this program are: improve the quality of financial services, encourage more intensive use of technologies to improve competitiveness among financial institutions, better the country's position in international financial markets and revitalize regional economies through greater support to small and medium businesses.

The evaluation made by Japanese supervisory authorities is that, in the wake of the Financial Reconstruction Law and other measures aimed at eliminating NPL and achieving financial system stability, the system must now move forward to a phase in which emphasis on stability gives way to establishment of a more competitive and revitalized system.

The Chinese government has continued taking measures aimed at improving banking system performance and resolving the problem of high levels of NPL in state banks. Before the current year is out, the government intends to recapitalize and restructure the Industrial and Commercial Bank of China, one of that country's largest state banks. This operation will be similar to that carried out in 2003 with the bank of China (BoC) and the China Construction Bank (CCB). However recent announcement of an episode of corruption involving a major CCB executive increased financial market and Chinese government perceptions of the need for additional efforts, with the objective of improving management, transparency and control at these institutions.

The Chinese government expanded the number of cities in which foreign banks are able to operate from nine to eighteen. This marked an additional step forward in the

process of bank liberalization which is part of the agreement with the World Trade Organization (WTO) and should be completed by the end of 2006. The measure described above is an important step toward putting an end to the geographic restrictions imposed on the activities of these institutions.

In keeping with the objective of greater freedom in the formation of interest rates, improvements in banking system liquidity and more efficient commercial bank risk management, while also facilitating implementation of monetary policy, the government decided to reduce the interest rates paid on excess bank reserves deposited at The People's Bank of China from 1.62% to 0.99%.

However, one important source of concern at the Central Bank of China is the sharp increase in real estate prices in some Chinese cities. This could be a symptom of the formation of a real estate sector bubble and could become a factor of risk to financial system stability. For this reason, on March 17 of this year, a decision was made to abolish preferential interest rates for real estate purchases and to increase the down payments from 20% to 30% of the total value of the operation in regions in which prices are rising more sharply. The impact of such measures on real estate demand is still uncertain, but they do indicate that the Chinese government is attentive to this possible source of destabilization of the banking sector.

1.4 Conclusion

Sharp Brazilian economic growth in 2004 was due initially to export sector results. In the second half of the year, powered by credit expansion and gradual growth in income, the excellent performance of other sectors more dependent on internal demand also fueled growth. Nonetheless, record levels of industrial output and utilization of installed capacity, as well as the growing lag between wholesale and retail prices gave rise to concerns regarding the sustainability of this process. The increase in various inflation cores and diffusion indices as of September generated deterioration in inflation expectations for 2005. At its September meeting, Copom initiated a cycle of adjustments in the Selic rate in order to make the pace of economic growth more compatible with the trajectory of inflation targets. Parallel to this, the government announced an increase of 0.25 p.p. in the target for the primary surplus to be obtained in 2004, thus further reinforcing its commitment to fiscal austerity.

Improvement in the external financing conditions of the emerging nations, coupled with solid external accounts and effective management of Brazilian economic policy aided in increasing the flow of funding to the country, creating conditions for exchange rate appreciation and reductions in the Brazil risk. In November, Banco Central resumed its policy of restoring the nation's international reserves which had been interrupted in February 2004 and, in February 2005, announced that it would begin carrying out reverse swap auctions, with the objective of more rapidly reducing the government's foreign exchange exposure.

In these early days of 2005, international financial markets remain positive as a consequence of the ample supply of liquidity. In the absence of any expectations of deterioration in the evolution of monetary policy in the industrial economies, should any inflationary pressures occur, this scenario is expected to continue into the future. Parallel to this, the volatility of the trajectory of the United States dollar and persistently high petroleum prices tend to add to current uncertainties.

An adverse mix of these factors could result in a immoderate adjustment in market interest rates, leading to unordered reevaluation of both financial and real assets, such as real estate. In this context, in those economies in which the evolution of real estate prices has surpassed income growth, family indebtedness is quite high and mortgage contracts are mostly governed by floating rates of interest, a sharp adjustment in interest rates could seriously compromise the financial equilibrium of small businesses and families and even the pace of growth itself. The occurrence of this scenario, which is considered relatively remote, could exert adverse pressures on the financing conditions available to the emerging economies.

National Financial System supervision

2

2.1 Overview

For presentation purposes, the National Financial System was subdivided into two systems[16]: the banking system, composed of consolidated banking segment I, consolidated banking segment II and consolidated banking segment III; and the nonbanking system.

As already stated in the report "50 Largest Banks"[17], banking system assets at the end of the second half of 2004 corresponded to 99.1% of the SFN total, the same percentage as in the previous half-year period. Despite the reduction in the number of banking institutions – from 1561 in June 2004 to 1551 in December 2004 – net worth and total deposits remained concentrated at relatively stable percentage levels, indicating that the financial system is essentially a banking system.

Consolidated banking segment I, which is composed of 108 institutions, held 84.4% of assets, 81.1% of net worth and 94% of total deposits, practically the same results as registered in the previous half-year period. Net financial system profits continued concentrated in this segment, with 87.9%. In the two previous half-year periods, the level of concentration was 81.1% in June 2004 and 66.5% in December 2003. The participation of consolidated banking segment II in financial system profits declined. This segment is composed basically of the National Bank of Economic and Social Development (BNDES). Consolidated banking system III, composed of 1411 credit unions, registered slight growth in its participation in total financial system assets, though the number of institutions declined somewhat when compared to the preceding half-year period.

Distribution of segments – SFN
December, 2004

Itemization	Number of institutions	%	Total assets (R$ billion)	%
Total of the SFN	1 882		1 451	
Banking	1 551	82.4	1 437	99.1
consolidated I	108	5.7	1 224	84.4
consolidated I	32	1.7	195	13.4
consolidated I	1 411	75.0	18	1.3
Non-banking	331	17.6	14	0.9

Source: 50 banks in Brazil by total assets

Distribution of segments – SFN
December, 2004

R$ billion

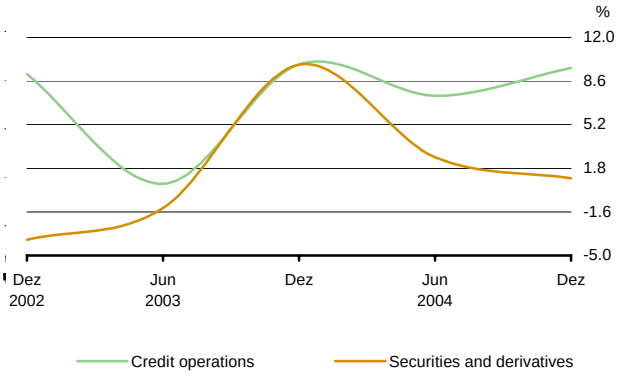
Itemization	Net worth	%	Net profit/loss	%	Total deposit	%
Total of the SFN	146		13		572	
Banking	141	96.5	12	95.7	570	99.6
consolidated I	118	81.1	11	87.9	538	94.0
consolidated II	19	13.2	1	5.2	24	4.2
consolidated II	4	2.9	0	2.4	8	1.4
Non-banking	5	3.5	1	4.3	2	0.4

Source: 50 banks in Brazil by total assets

16/ See Concepts and Methodologies on pages 44 to 48.

17/ Quarterly electronic publication issued by Banco Central do Brasil.

Main investments – SFN



In contrast to the first half of 2003, banking institutions tended to target their investments more intensively to credit operations, which expanded by 9.6% in the final six months of 2004, to the detriment of investments in securities, which increased only 1%. This trend followed an upward growth curve during all of 2004. Credit operations accounted for the major share of bank investments, with R$ 499.9 billion, while funding channeled into securities came to R$ 363.2 billion.

Gross Domestic Product (GDP) expansion in recent months was reflected in positive growth in the volume of credit, with a particularly strong increase under investment credits. The major cause of credit expansion in the second half of 2004 was continued growth in the pace of economic activity. Another factor that should be stressed is increased seasonal demand for resources by the productive sector, brought about by the upturn in activities consequent upon end-of-year sales and a dynamic performance in farm activity. Growth in BNDES onlending operations reflected greater business sector demand for financing. Insofar as individual consumers are concerned, the system of payroll loans consolidated its position and accounted for rising credit demand.

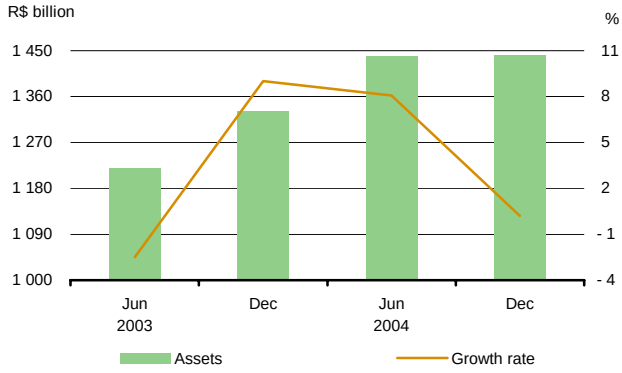
2.2 Balance sheet structure

2.2.1 Assets

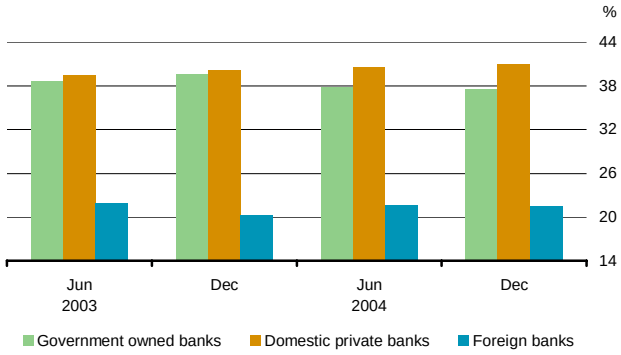
In the second half of 2004, SFN assets remained practically stable at R$ 1,441 billion. Though credit portfolios expanded by 8.9%, assets were affected by cutbacks in repo operations, reductions in clearing services involving checks and other papers in line with the strategy adopted in the SPB framework, as well as by the effects of dollar devaluation on exchange indexed asset operations. Another item that deserves highlighting was the November 2004 intervention in Banco Santos. Since the institution in question did not consolidate its data on base date December 31, 2004, this intervention had the effect of reducing total SFN assets registered in June 2004 by R$ 6.4 billion.

According to the system of consolidation adopted by Banco Central do Brasil, consolidated banking segment I registered assets of R$ 1,216 billion, corresponding to 84.4% of total SFN assets. Broken down according to the type of stock control, these assets were distributed among the segments of public banks, 37.6%, national private banks, 41% and foreign banks, 21.4%.

Assets – SFN



Assets
Banking-consolidated I by control type

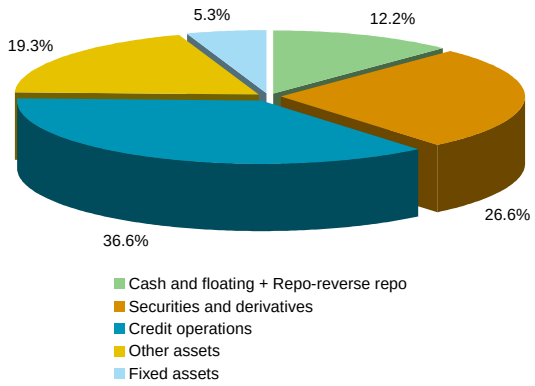


Assets – Banking-consolidated I
Top banks

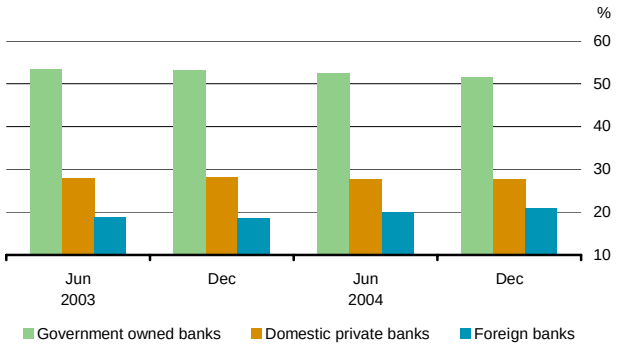
%

Itemization	2003		2004	
	Jun	Dec	Jun	Dec
Top 10	77.6	79.5	77.9	79.3
Top 20	89.9	90.4	90.6	91.5
Top 50	97.4	97.5	97.9	98.2

Main investments – SFN
December, 2004



Securities and derivatives
Banking-consolidated I by control type



When these percentages are compared to those published in the previous edition of this Report, base date June 2004, one perceives that the participation of the segment of national private banks increased while the share held by public banks and foreign banks declined, though these alterations were not significant.

The rise in the share held by the segment of national private banks confirms a tendency highlighted in previous reports and was a consequence of the strong competitive power held by these institutions.

The share held by national private banks increased by 0.5 p.p., mainly as a result of growth in their credit portfolios. At the same time, the participation of public banks and foreign banks moved in the opposite direction, with respective reductions of 0.3 p.p. and 0.2 p.p. The reduction registered in the assets of foreign banks was concentrated under exchange portfolios and investments in repo operations, while the assets of public banks dropped mostly as a result of cutbacks in their investments in repo operations.

On December 31, 2004, the assets of the 10, 20 and 50 largest banks accounted for 79.3%, 91.5% and 98.2% of the total assets of consolidated banking segment I, respectively. For the most part, the increase in the percentages of these three groups was due to growth in the assets of the ten largest banks brought about by reductions in the total assets concentrated between the 11th and 50th positions. This shift was, to a great extent, caused by the exclusion of Banco Santos from this consolidated segment, as a result of Banco Central intervention in that institution since November 2004.

The investment categories into which total SFN assets are distributed were led once again by the credit portfolio, with 36.6%, followed by stocks and securities and derivative instruments with 26.6%. The 2.9 p.p. increase in credit operations was basically caused by implementation of the system of payroll loans by a number of public and private institutions attracted to this segment by less risk and more competitive rates.

With regard to the SFN, the institutions included in consolidated banking segment I in December 2004 held 94.8% of securities and derivative instruments, corresponding to R$ 363 billion. Of this amount, 51.4% was held by public banks, 27.7% by national private banks and 20.9% by foreign banks. The strong position held by

Securities
Banking-consolidated I

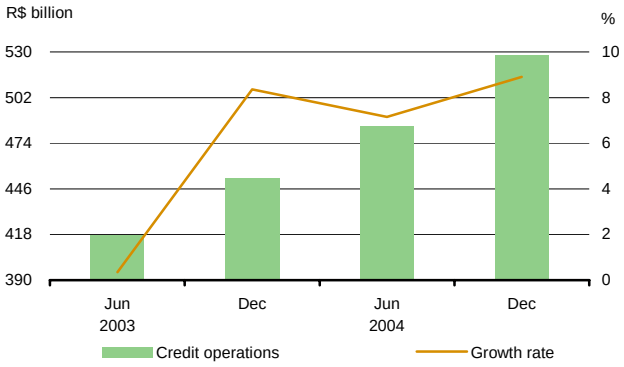
Securities
Banking-consolidated I

%

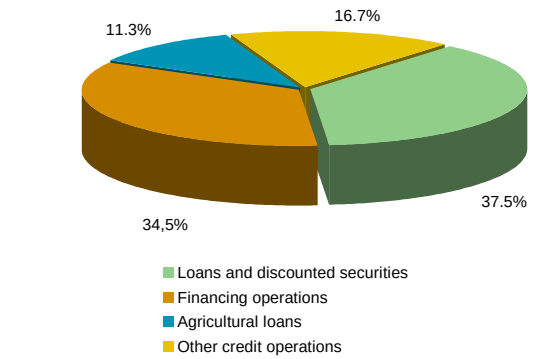
Itemization[1/]	Trading book	Available for sale	Held to maturity
Banks			
government owned	31.8	24.9	43.3
domestic private	55.2	30.6	14.2
foreign	36.1	51.4	12.5

1/ Control type.

Credit operations – SFN



Credit operations – SFN
Dezembro, 2004



public banks in this type of investment was a consequence of ongoing restructuring processes and the role of these institutions as the principal executors of government policies.

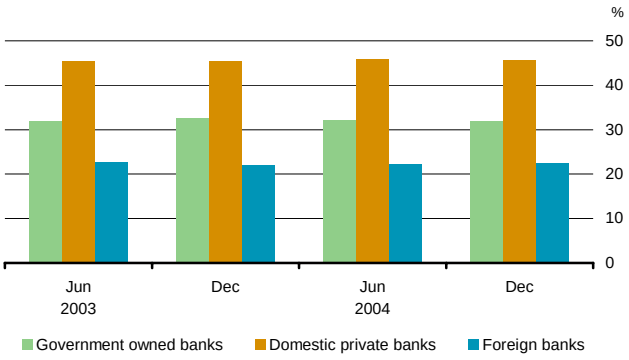
In comparison to the previous half-year period, the SFN securities portfolio increased by 1.69% or, in other words, from R$ 355 billion to R$ 367 billion. Using the same basis of comparison, consolidated banking segment I registered an increase of 3.6%, moving from R$ 336 billion to R$ 348 billion. This expansion was concentrated under securities for negotiation and those available for sale, which evolved by 9.9% and 10.8%, respectively. This result was partially offset by a 10.2% decline in papers held to maturity, reflecting a change in the strategies adopted by these institutions. In this way, the most representative papers were those set aside for negotiation, equivalent to 38.9% of stock and security portfolios (TVM), while those available for sale and held to maturity accounted for 31.6% and 29.5%.

When examined according to bank segments broken down by type of control, the classification structure of the TVM portfolio turned in distinct configurations.

In the half-year period, papers classified as held to maturity registered reductions in all segments, in a total amount of R$ 11.6 billion. In relative terms, the sharpest falloff occurred in the segment of foreign banks, moving from 20.1% to 12.5% and, in value terms, the greatest drop occurred in the segment of public banks, R$ 6 billion. Despite these occurrences, public banks continued holding the largest percentage, 43.3% of their investments according to this classification, while national private banks and foreign banks held the major share of their investments in papers for negotiation (55.2%) and in securities available for sale, 51.4%, respectively.

Without deducting approximately R$ 35 billion in provisions for bad loans, the gross SFN credit portfolio in the grouping of other assets totaled R$ 527.7 billion. This value registered growth of 8.9% in the second half of the year and was based on the aggregate of the accounting balances registered at financial conglomerates and individual institutions, thus including information on the classified credit portfolios of subsidiaries and offices abroad belonging to institutions that are part of Brazilian financial conglomerates. This evolution, which occurred mostly in operations with individual persons, reflects growth in the flow of payroll loans during the period.

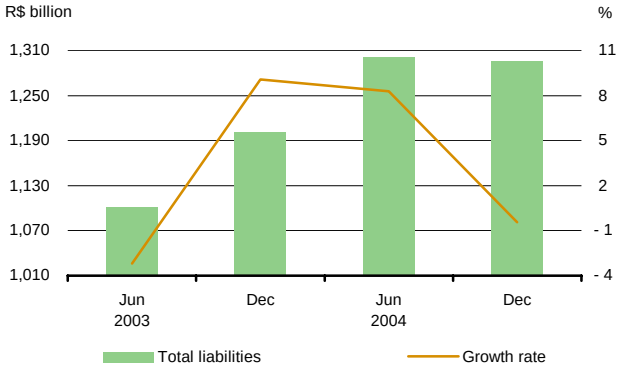
Credit operations
Banking-consolidated I by control type



Loans and securities discounted and financing operations were the principal modalities of credits registered within the SFN and accounted for 37.5% and 34.4% of the credit portfolio total, respectively.

With regard to the institutions included in consolidated banking segment I, credit operations totaled R$ 428 billion or 81.1% of the SFN credit portfolio. This amount was distributed in proportions identical to the previous year or, in other words, 31.9% with public banks, 45.6% with national private banks and 22.4% with foreign banks.

Liabilities – SFN

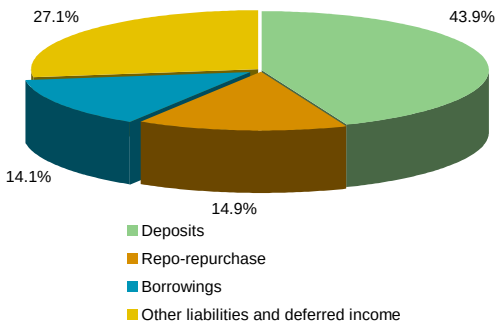


2.2.2 Liabilities

At the end of December 2004, callable liabilities totaled R$ 1,295 billion. Compared to the previous half-year period, liabilities dropped by 0.4%. Of this total, deposits accounted for R$ 569 billion, R$ 193 billion were obtained on the open market, R$ 182 billion corresponded to liabilities for loans and onlendings and R$ 351 billion for other liabilities and results of future fiscal years.

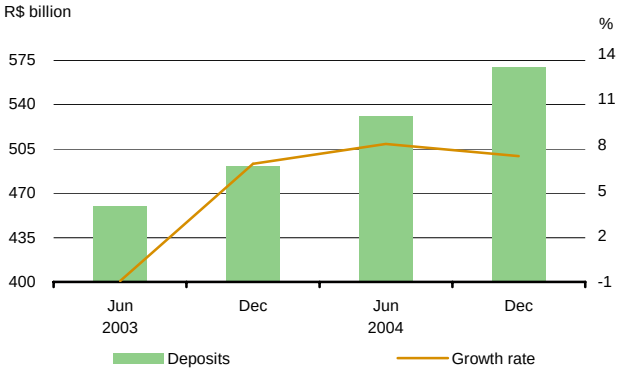
Deposits continued as the major SFN mechanism for obtaining resources and registered growth of 7.3% in the period, closing with a total of R$ 39 billion corresponding to 43.9% of callable liabilities. For the most part, this growth was due to expansion of R$ 16.9 billion under time deposits and R$ 9.6 billion under savings deposits. Of total SFN deposits, 94% were held by institutions classified in consolidated banking segment I, with 46% in public banks, 36% in private national banks and 18% in foreign banks. In comparison to June 2004, there were no significant alterations in these shares.

Main liabilities – SFN
December, 2004



The concentration of deposits registered among the 10, 20 and 50 largest banks in consolidated banking segment I remained at the same level as in June 2004. In more specific terms, on base date December 2004, these banks accumulated respective levels of 86.5%, 94% and 98.7% of total deposits in this consolidated segment. On the other hand, just as occurred under assets, the share held by the ten largest banks increased by 13.5% when compared to the previous half-year period. Just the contrary occurred under deposits in the other classification brackets.

Deposits – SFN



Liabilities for loans and onlendings corresponded to 14.1% of total third party resources in the SFN and registered a 5.7% reduction in the final six months of 2004. This decline was particularly strong under loans taken abroad

Total deposits – Banking-consolidated I

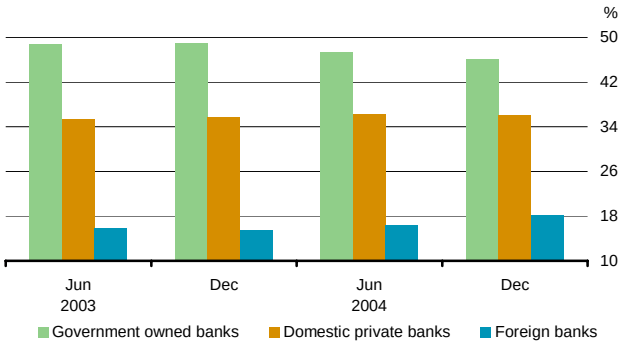
Top banks

%

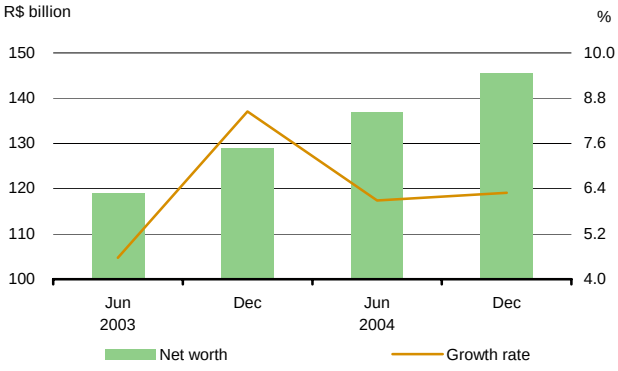
Itemization	2003		2004	
	Jun	Dec	Jun	Dec
Top 10	85.4	86.3	81.6	86.5
Top 20	92.9	93.5	93.2	94.0
Top 50	98.1	98.2	98.5	98.7

Deposits

Banking-consolidated I by control type

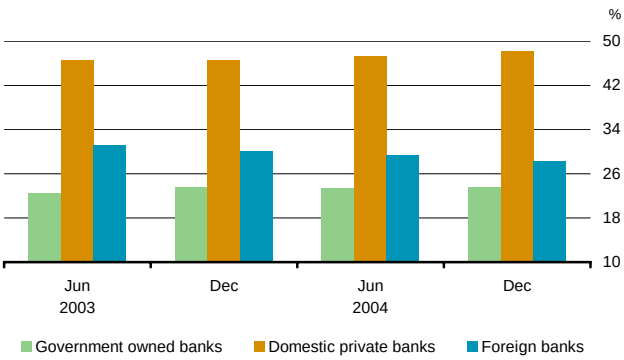


Net worth – SFN



Net worth

Banking-consolidated I by control type



which diminished by R$ 11.7 billion, due for the most part to the impact of 14.6% appreciation of the real against the United States dollar.

Other liabilities totaled R$ 351 billion and were the second most important heading under SFN liabilities in the period, with 27.1%. In comparison to June 2004, this heading declined by 8.1% due mostly to cutbacks in the exchange portfolio, which represented 12.3% of all liabilities.

Funding obtained on the open market corresponded to 14.9% of liabilities and decreased by 1.3% in the final six months of 2004. Basically, these operations represent liabilities for repo operations constituted for purposes of financing institutions' own portfolios which, even though they expanded by R$ 21 billion in that period, did not offset the reduction of R$ 17.2 billion under third party portfolio financing operations and R$ 6.5 billion under freely operated portfolios. Growth in liabilities for repo operations can be explained by the strategy change adopted by institutions which opted to diminish their brokerage operations.

2.2.3 Net worth

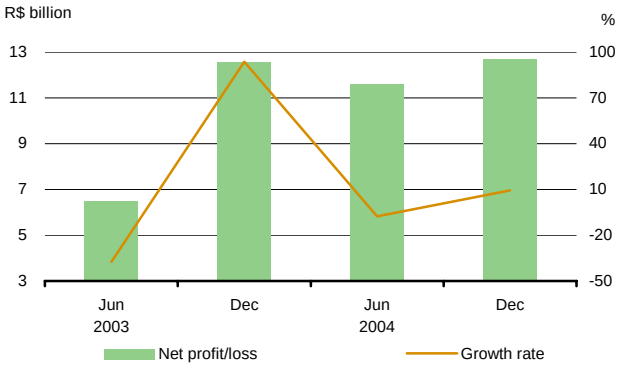
SFN net worth expanded by 27.2% in the period extending from December 2002 to December 2004. In the second half of 2004, growth came to 6.3% and was impacted primarily by retention of profits on the part of member institutions.

With regard to the institutions included in consolidated banking segment I, net worth rose from R$ 110 billion, on June 30, 2004, to R$ 117.5 billion on December 31, 2004, corresponding to expansion of 7.1%.

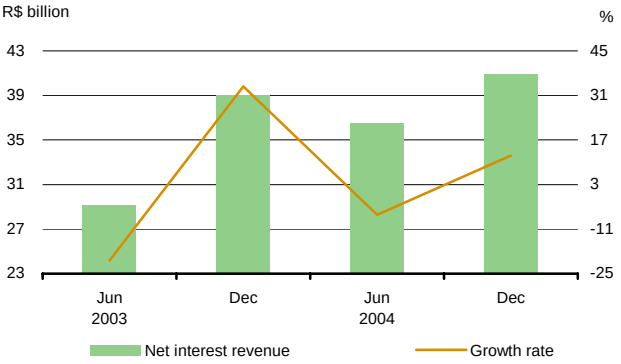
In comparison to SFN net worth, this figure represented 80.8% as against 80.3% on June 30, 2004.

Viewed under the prism of consolidated banking segment I, on the base date under consideration, national private banks held 48.2% of their own resources, foreign banks held 28.3% and public banks accounted for 23.5%. While the share held by foreign banks expanded by 0.6 p.p. in the first half of 2004, there was a decline of 1.1 p.p. in the second half of the year. Just the opposite occurred at national private banks, as they increased their participation by 1 p.p.

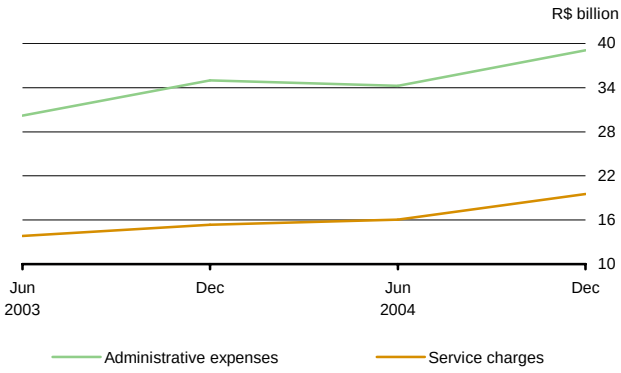
Net profit/loss – SFN



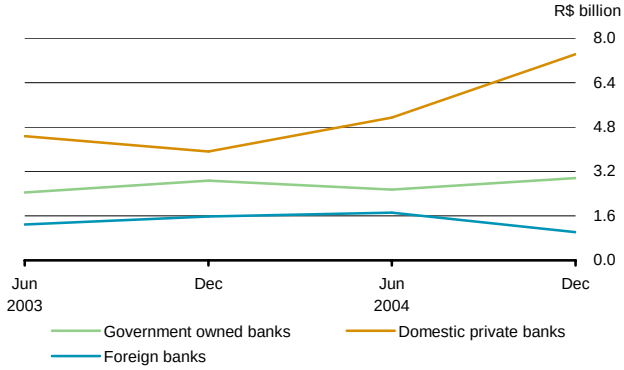
Net interest revenue
Growth rate



Administrative expenses and service charges



Net profit/loss
Banking-consolidated I by control type



2.3 Results

2.3.1 Composition and evolution

At the end of December 2004, SFN net profits came to R$ 12.7 billion.

Basically, this result is composed of proceeds earned on financial intermediation and revenues on services and was 9.3% higher than in June 2004. For the most part, this was a result of reductions in outlays on liabilities for loans and onlendings and a simultaneous increase in the result of derivative operations.

Given the behavior of spending on funding operations and income on derivatives, the results of financial intermediation, which closed at R$ 41 billion, were 12.1% greater than in the previous period. This result was obtained despite a cutback of 3.7% in income on securities and maintenance of income generated by credit operations at the same level as in June 2004.

The most representative share of the revenues generated by financial intermediation, with R$ 105 billion, originated in credit operations, with 59.4% of the total. Annualized returns on these operations came to 23.7% in the second half of 2004, as compared to 25.4% in the first six months. On the other hand, operations with stocks and securities contributed 33.1% of revenues on financial intermediation.

Total revenues on financial intermediation came to R$ 105 billion in the half-year period, as 40.4% or R$ 42.5 billion and 2.7% or R$ 9.1 billion were consumed by funding outlays and spending on liabilities for loans and onlendings.

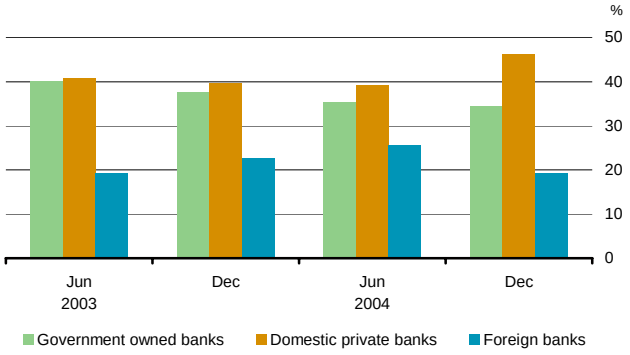
Taken as a whole, the SFN registered a significant 21.7% increase in revenues on services rendered.

These revenues totaled R$ 16.1 billion on June 30, 2004, compared to a total of R$ 19.6 billion on December 31, 2004.

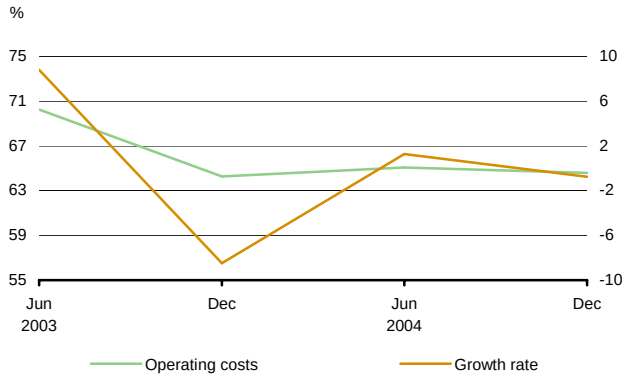
The major share of these revenues, 70.3%, originated in income from events directly related to the charging of fees consequent upon the relations of institutions with their clients: 7.2% were generated by charging services and 63.1% by other services.

Other revenues on services rendered, 29.7%, originated in income on services not directly related to the charging of

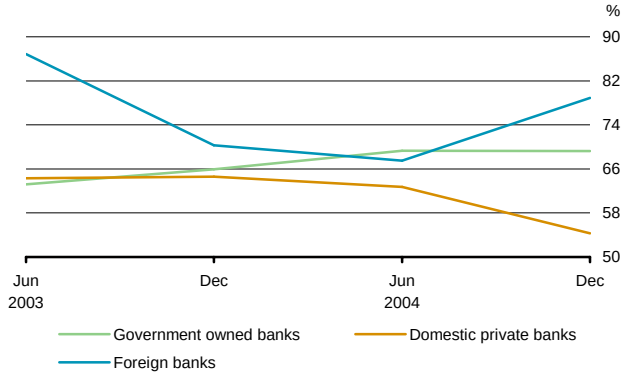
Net interest revenue
Banking-consolidated I by control type



Operating costs – SFN



Operating costs
Banking-consolidated I by control type



fees. Of this grouping, 13.5% corresponded to investment fund management, 6.7% to management of funds and programs and 7.6% to income on other services.

A breakdown of total service revenues indicates that 2% originated in income for guarantees granted.

In the second half of 2004, total income on services represented 50% of administrative outlays, while the first six months of the year registered a ratio of 46.9%.

The net profits of consolidated banking segment I totaled R$ 11.7 billion, registering expansion of 21.3% in comparison to the previous half-year period, accounting for 89.9% of SFN net profits. This growth was impacted principally by expansion in the result of financial intermediation and service revenues. When compared to the first six months, significant alterations occurred in distribution. In that half-year period, the ratio was 54.7% for private national banks, 27.1% for public banks and 18.2% for foreign banks, as against 65.1%, 26% and 8.9% in the second half of the year, respectively.

The institutions included in consolidated banking segment I obtained 91.8% of the value of the SFN result on financial intermediation in the second half of 2004, as against 91.3% in the first half.

National private banks participated with 46.3% of this total, while public banks accounted for 34.4% and foreign banks for 19.3%.

This distribution reflected significant changes compared to the previous half-year period, generated by an increase of 7.2 p.p. under national private banks and a reduction of 6.3 p.p. under foreign banks and 0.9 p.p. under public banks.

2.3.2 Operational cost and rate of return

The operational cost, which is obtained by dividing administrative outlays, including personnel, by the sum total of the result of financial intermediation and revenues on services rendered, continued on the downward trajectory that dates to the second half of 2003. This trend is evident in the December 2003 result of 64.3%, followed by 65.1% in June 2004 and 64.6% in December 2004. The reduction of 0.5 p.p. in operational costs in the second half of 2004 was generated by growth in the result on financial intermediation and in revenues on services rendered, which offset the increase in administrative outlays.

Rate of return[1/]
Banking-consolidated I

%

Itemization	2003		2004	
	Jun	Dec	Jun	Dec
Banks				
Government owned				
Return on				
Equity	22.2	23.5	19.9	21.5
Assets	1.2	1.3	1.1	1.3
Domestic private				
Return on				
Equity	19.7	16.2	19.8	26.2
Assets	2.2	1.7	2.1	3.0
Foreign				
Return on				
Equity	8.5	10.1	10.6	6.1
Assets	1.1	1.4	1.3	0.8
Banking-consolidated I				
Return on				
Equity	16.7	16.1	17.1	19.4
Assets	1.6	1.5	1.5	1.9

1/ Annual taxes.

Return on equity – Banking-consolidated I[1/]
Top banks

%

Itemization	2003		2004	
	Jun	Dec	Jun	Dec
Top 10	20.3	15.7	18.8	23.3
Top 20	18.5	15.8	18.0	20.9
Top 50	17.5	16.1	17.4	19.8

1/ Annual taxes.

Return on assets – Banking-consolidated I[1/]
Top banks

%

Itemization	2003		2004	
	Jun	Dec	Jun	Dec
Top 10	1.7	1.3	1.6	2.1
Top 20	1.6	1.4	1.5	1.9
Top 50	1.6	1.4	1.5	1.9

1/ Annual taxes.

In December 2004, foreign banks registered the highest operational costs, with an increase of 11.4 p.p. due to a lesser result under financial intermediation and growth in administrative expenditures. Public banks registered a reduction of 0.1 p.p., while national private banks reduced their operational costs by 8.4 p.p. due to expansion in the result on intermediation and revenues on services rendered.

The index that demonstrates the proportion between net profits and net worth (RSPL) in consolidated banking segment I closed at 19.4%, compared to 17.1% in the first half of 2004. The index that reflects the ratio between net profits and assets (RSAT) increased from 1.5% to 1.9%.

Among public banks, the indices of returns on assets and on net worth came to 1.3% and 21.5%, respectively, as against 1.1% and 19.9% in June 2004. This performance was a consequence of 16.6% growth in the net profits of these banks when compared to the previous half-year period.

National private banks turned in growth in their indices of returns on assets and net worth in the second half of 2004. The factor that made this possible was growth of 44.5% in net profits when viewed against the previous period. In this way, returns on assets came to 3% and returns on net worth to 26.2%, as compared to 0.1% and 19.8% in June 2004, respectively.

Going on to foreign banks, the change in the indices was compatible with the sharp drop of approximately 41% in net profits. Thus, in the second half of the year, returns on assets came to 0.8% and returns on net worth to 6.1%, as against 1.3% and 10.6% in the first half of 2004, in that order.

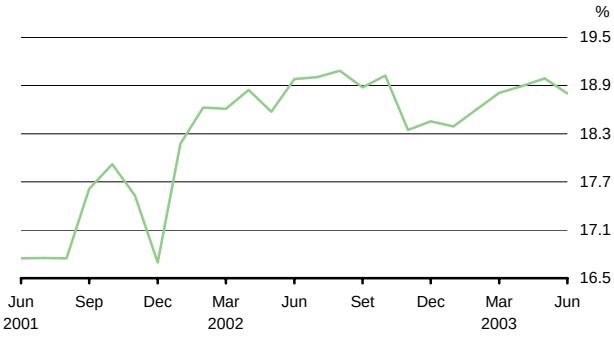
Returns on assets for the 50 largest banks which had closed June 2004 at 1.5%, increased to 1.9% in December. At the same time, the corresponding figures for net worth were 17.4% and 19.8%, respectively.

2.4 Capital and limits

2.4.1 Basel Capital Ratio

This section discusses the result of the analysis of the adequacy of SFN institutions and segments in relation to the Basel Capital Ratio. Furthermore it deals with the components of the limit or, in other words, Base Capital (PR) and Required Net Worth (PLE).

Basel capital ratio
SFN



Evolution of capital base and required net worth[1/]

R$ million

Itemization	2004 Jun		2004 Dec		Half-year change
	Value	%	Value	%	%
Capital base	162 388	100.0	171 733	100.0	5.8
Tier I	133 696	82.3	143 871	83.8	7.6
Tier II	28 692	17.7	27 862	16.2	-2.9
Required net worth	97 185	100.0	101 058	100.0	4.0
Assets	84 491	86.9	90 442	89.5	7.0
Interest rate	4 502	4.6	2 743	2.7	-39.1
Exchange rate	5 659	5.8	5 450	5.4	-3.7
Swap	2 532	2.6	2 422	2.4	-4.3

1/ The required net worth represents the minimum capital base demanded by the Banco Central do Brasil.

Evolution

The SFN Basel Capital Ratio was 18.8% in December, 2004 or, in other words, 7.8 p.p. above the minimum limit required by the current rules enforced in Brazil (11%). In the 24 previous months, the ratio registered fluctuations between 16.7% and 19.1%, the highest level since the ratio was first monitored. As of June 2003, when the ratio registered its lowest level in the period, the trend has been steadily upward until reaching the mark of 19.1% in February 2004. From that point forward, the index has registered small variations in the range of 0.8 p.p., which has in no way jeopardized SFN adequacy in relation to the limit.

Since the second half of 2003, the Brazilian economy has recovered sharply and this clearly impacted the Basel Capital Ratio in the second half of 2004. Despite the process of rising Selic rates, the volume of credit operations has continued expanding as a result of increased economic activity and greater productive sector seasonal demand for resources. The underlying causes of this demand have been expanded activity consequent upon end-of-year sales and the dynamics of the business operations generated by agricultural activities. Parallel to this, there has been strong improvement in Brazilian external accounts, consolidating the tendency that marked the first half of 2004 and aided in minimizing the impacts of adverse external events.

In December 2004, PR closed at R$ 171.7 billion, for growth of 5.8% compared to the previous half-year period. Analysis of PR components indicates growth of 7.6% in Tier I Capital, while Tier II Capital dropped by 2.9%. With this, the participation of Tier II Capital in PR dropped by 1.5 p.p. and closed at 16.2%, thus reversing a trend evident since the first half of 2004.

PLE expanded by 4% in the half-year period, totaling R$ 101.1 billion. Growth was registered in just one of the components: capital requirements for assets weighted by risk, with 7%. The following reductions were registered under the other components: -39.1% under capital requirements for pre-interest risk, -3.7% for exchange risk and, finally, -4.3% for swap risk.

In June 2004, all of the PLE components had expanded in comparison to December 2003.

The increase in APR was generated mostly by assets weighted to 100% which, in turn, registered its most

significant increase under the heading of Financing, just as had occurred in the first half of 2004.

When compared to June 2004, SFN exchange exposure diminished. When added to the sharp drop in the rate of exchange, capital requirements for exchange risk fell by 3.7%, compared to June 2004 data.

Capital requirements for pre-interest risk fell sharply, as a consequence of less volatility under preset interest rates in the period from June to December 2004.

Concentration of PR and PLE

For purposes of analyzing the concentration of the PR and PLE components in the SFN, institutions were classified in decreasing order, according to the values registered in each one of the components of PR (Tier I Capital and Tier II Capital) and PLE (capital requirements for assets weighted by risk, for preset interest rates, for exchange risk and for swap risk). Later on, the participation levels were accumulated and segregated among the 5, 10, 20 and 50 institutions that registered the highest values under each one of the components.

In December 2004, concentration under these components indicated that there was no significant difference in relation to the previous half-year period. In this context, the following deserve mention:

a) In PR, Tier II Capital remained the most heavily concentrated: five institutions held 87.8% of the total, or 1.1 p.p. more than in June 2004;

b) In PLE, the concentration of capital requirements for exchange risk increased: the five institutions with the highest values under this component increased their participation by 7.6 p.p. or, in other words, moving from 73.4% in June 2004, to 81%, in December 2004.

Consolidated banking segment I

The Basel Capital Ratio of consolidated banking segment I, which accounts for 80.6% of the total PLE of the SFN, as calculated in December 2004, moved to 18.5% or 0.6 p.p. above the June 2004 level. This increase was a consequence of expansion in the result registered by banks due to growth in the volume of credit operations. The

Capital base and Required net worth – Concentration[1/]
December, 2004

%

Itemization	Number of financial institutiions			
	5	10	20	50
Capital base	53.5	69.7	82.8	90.9
Tier I	47.4	65.5	80.4	89.6
Tier II	87.8	94.2	97.7	99.7
Required net worth	57.5	74.1	87.1	94.8
Assets	58.1	74.8	87.2	94.8
Interest rate	54.9	70.5	85.7	94.4
Exchange rate	81.0	91.6	97.5	99.9
Swap	63.9	81.9	95.4	99.8

1/ Participation of the financial institutions in the total of the SFN by item.

Required net worth – Components
December, 2004

R$ million

Itemization	Total	Assets	Interest rate	Exchange rate	Swap
Total of the SFN	101 058	90 442	2 743	5 450	2 422
Banking					
consolidated I	81 476	72 271	2 536	4 316	2 353
Banks					
government					
owned	21 096	20 151	651	8	286
domestic					
private	39 919	34 664	784	3 715	756
foreign	20 460	17 456	1 101	593	1 311
consolidated II	17 021	15 763	78	1 118	62
consolidated III	1 343	1 292	51	0	0
Non-banking	1 218	1 116	78	17	7

Capital base – Components
December, 2004

R$ million

Itemization	No.	Capital base			BCR[1/]
		Total	Tier I	Tier II	
Total of the SFN	1 753	171 733	143 871	27 862	18.8
Banking					
consolidated I	108	136 791	116 265	20 527	18.5
Banks					
government					
owned	13	33 703	27 154	6 548	17.6
domestic					
private	58	68 473	56 327	12 146	18.9
foreign	37	34 616	32 784	1 832	18.6
consolidated II	32	26 390	19 160	7 230	17.1
consolidated III	1 363	4 189	4 130	59	35.1
Non-banking	250	4 363	4 316	47	58.4

1/ Basel capital ratio.

importance of this heading within the SFN can not be ignored. As a result, growth in the Basel Capital Ratio of this segment had a significant impact on the SFN ratio. Both the segment of national private banks and that of public banks were responsible for this increase, while the segment of private foreign banks turned in a slight reduction when compared to June 2004.

Public banks registered increases under both PR and PLE, with 9.2% and 2.8%, respectively, when compared to data for June 2004. In the case of PLE, capital requirements for assets weighted by risk and for swap increased, while requirements for exchange risk and pre-interest risk decreased. Under PR, Tier I Capital increased by 9.7% and Tier II Capital by 7.3%. The impact on the Basel Capital Ratio was 1.1 p.p.

Going on to national and foreign private banks, the growth figures came to 5.4% under PR and 3.4% under PLE. As a result, the Basel Capital Ratio moved to 18.8%, corresponding to growth of 0.4 p.p. when compared to June 2004. In the case of PR, Tier I Capital rose by 7.8% and Tier II Capital dropped by 7.3%. PLE registered an increase in capital requirements for assets weighted by risk and for exchange risk and reductions under pre-interest and swap risk.

Just as occurred in June, one banking institution registered PR below PLE, though the importance of this institution is very small when compared to the SFN as a whole. Aside from this, this institution is now in the process of withdrawing from the financial market.

Consolidated banking segment II

When the values for base dates June 2004 and December 2004 are compared, the PLE of consolidated banking segment II expanded by 6.9%, while the PR registered a lesser increase of 2%. With these results, the Basel Capital Ratio dropped from 17.9% to 17.1%, thus reversing the trend in effect up to the previous half-year period.

For purposes of this analysis, the PLE of consolidated banking segment II represented 16.8% of the PLE of the SFN as a whole. No institutions were noncompliant in this consolidated segment.

Consolidated banking segment III

The PLE of consolidated banking segment III, which is composed of credit unions, represented 1.3% of the PLE of the SFN in December 2004, as compared to 1.2% in June 2004. In keeping with a trend that has been evident in recent half-year periods, out of a total of 1,363 credit unions, 57 were noncompliant, as compared to 80 in June 2004. The sum total of the PLE of the noncompliant entities accounted for 0.03% of the PLE of the SFN as a whole.

Consolidated nonbanking segment

In December 2004, the PLE of the consolidated nonbanking segment accounted for 1.2% of the SFN total, the same percentage registered in June 2004. Three institutions were noncompliant. However, the PLE of these institutions represented an almost negligible share when compared to the PLE of the SFN.

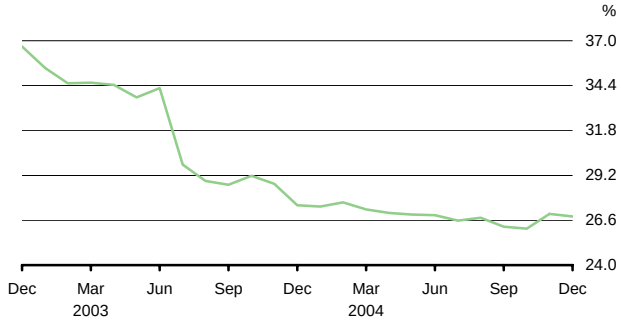
2.4.2 Fixed asset limit

In December 2004, the fixed asset ratio of the SFN was 26.8%, reflecting relative stability during the entire year (varying between 27.6% and 26.1%). On the base date in question, Permanent Assets and Adjusted Base Capital (PRA)[18] of the SFN came to R$ 45.7 billion and R$ 170.4 billion, respectively. The volume of resources channeled into Permanent Assets remained below the limit of 50% of PR defined in Resolution 2,669/99.

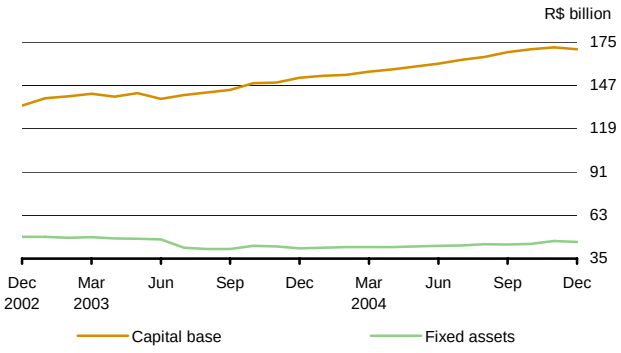
Of the 1753 SFN institutions evaluated on the base date in question, 118 (6.7%) were noncompliant. Once again, the majority of the noncompliant institutions were classified in consolidated banking segment III.

Permanent assets and PRA registered similar growth results, with 5.4% and 5.7%, respectively, in the period extending from June to December 2004. As a result the fixed asset ratio on the base date remained practically identical to that of the previous half-year period.

Fixed assets to equity ratio
SFN



Evolution of capital base and fixed assets
SFN



18/ See Concepts and Methodologies on pages 44 to 48.

Adjusted capital base and fixed assets
Banking system

Itemization	Number of institutions		Adjusted capital base[1/]		Fixed assets[1/]		Fixed assets to equity ratio[2/]	
	Jun	Dec	Jun	Dec	Jun	Dec	Jun	Dec
Total of the SFN	1 790	1 753	161	170	43	46	27.5	26.9
Banking								
consolidated I	108	108	128	136	37	40	29.2	29.1
Banks government								
owned	13	13	31	34	7	8	23.6	24.1
domestic								
private	58	58	63	68	23	23	36.2	34.2
foreign	37	37	34	34	7	8	21.2	24.0
consolidated II	30	32	26	26	5	5	19.9	19.5
consolidated III	1 399	1 363	4	4	1	1	18.3	17.5
Non-banking	253	250	4	4	0	0	4.4	4.4

1/ R$ billion.
2/ The maximum allowed is 50%.

Evolution

The fixed asset ratio calculated in the period from December 2002 to December 2004 confirms the trend toward an initial decline, followed by stability. After June 2003, the level remained below 30%. This reflects not only an increase in financial institution assets, but also their adjustment to the more rigid limits defined by current rules.

In the period extending from December 2002 to December 2004, the fixed asset ratio dropped from 36.7% to 26.8%. While Permanent Assets declined by 7%, dropping from R$ 49.2 billion to R$ 45.7 billion, the PRA increased by 27.2%, shifting from R$ 134 billion to R$ 170.4 billion.

In the second half of 2004, the falloff in the ratio was 0.1 p.p., a figure that did not reveal either an upward or downward trend.

Consolidated banking segment I

Of total SFN Permanent Assets on December 31, 2004, consolidated banking segment I held 87%.

In this consolidated segment, Permanent Assets came to R$ 39.7 billion, divided by PRA in the amount of R$ 136.1 billion, resulting in a fixed asset ratio of 29.1%.

In the second half of 2004, there were no significant changes in the fixed asset ratios of the segments of public banks, national private banks and foreign banks. The largest alteration occurred as a result of an increase in the ratio of the latter group, which moved from 21.2% to 24%.

In December 2004, three institutions from consolidated banking segment I – one state level public institution and two foreign banks – registered fixed asset ratios above the permitted limit. The Permanent Assets of these financial institutions totaled R$ 104.4 million or 0.3% of the consolidated segment. The reduction required for these institutions to achieve compliance with the established limit would be equivalent to R$ 84.7 million, or 0.2% of this SFN heading.

Consolidated banking segment II

In this consolidated segment, the fixed asset ratio was 19.5% with Permanent Assets of R$ 5.1 billion, accounting for 11.2% of the SFN total, while its PRA came to R$ 26.3

billion. Among the 32 institutions evaluated on the base date, none of them were noncompliant.

Consolidated banking segment III

The Permanent Assets of credit unions came to R$ 731.7 million, representing 1.6% of the SFN total, while PRA totaled R$ 4.2 billion, resulting in a fixed asset ratio of 17.5%. Among the 1,363 institutions, 97 were noncompliant with the fixed asset ratio in December 2004 and 36 of these institutions registered negative PRA. This consolidated segment continued registering the largest number of noncompliant institutions in the SFN, with 82.2% of the total of all noncompliant institutions. When recent half-year periods are considered, the fixed asset ratio has tended downwards.

Consolidated nonbanking segment

On the base date in question, the nonbanking system was composed of 250 institutions, with a fixed asset ratio of 4.4%, registering a PRA of R$ 3.9 billion and Permanent Assets of R$ 169.8 million (0.4% of SFN permanent assets). In this universe, eighteen institutions were noncompliant. In relation to the Permanent Assets of the consolidated segment, they represented 9.9%.

Concepts and Methodologies

Concepts

a) Cosif: Accounting Plan of SFN institutions.

b) National Financial System: For the purposes of this report, this concept is restricted to institutions authorized to operate by Banco Central do Brasil – with the exception of group purchasing pool administrators – independently of whether they are or are not grouped into conglomerates.

c) Banking system: encompasses banking conglomerates and independent banking institutions, as defined below.

d) Nonbanking system: includes leasing companies, stock and security brokerage companies, credit, finance and investment companies, financial conglomerates, real estate credit companies and savings and loan associations, security distribution companies and mortgage companies.

e) Independent banking institutions I: financial institutions that operate as commercial banks, multiple banks with commercial portfolios or savings banks that are not part of conglomerates, referring to Cosif documents 4010 and 4016.

f) Independent banking institutions II: Financial institutions of the multiple bank type without commercial portfolios, investment banks and development banks that are not part of conglomerates.

g) Independent nonbanking institutions: other financial institutions, except those classified as independent banking institutions I or II and credit unions.

h) Banking conglomerate: grouping of financial institutions that consolidate their financial statements, utilizing Cosif documents 4040 and 4046.

i) Banking conglomerate I: conglomerate in which at least one institution is a commercial bank or multiple bank with a commercial portfolio.

j) Banking conglomerate II: conglomerate in which there are no commercial banks and multiple banks with commercial portfolios, but that have at least one institution of the multiple bank type without a commercial portfolio, investment bank and development bank.

k) Nonbanking conglomerate: conglomerate of financial institutions not classified within the concepts of banking conglomerate I or II.

l) Consolidated SFN: corresponds to the aggregation of all the documents considered. Should not be confused with or compared to other statistics published by Banco Central do Brasil, which deal with information on each institution in the different SFN segments.

m) Consolidated banking segment I: grouping of the accounting positions of the banking institutions of the type banking conglomerate I and independent banking institutions I.

n) Consolidated banking segment II: grouping of the accounting positions of the banking institutions of the type banking conglomerate II and independent banking institutions II.

o) Consolidated banking segment III: grouping of the accounting positions of credit unions.

p) Type of control: identifies the origin of the capital control of banking conglomerates or independent banking institutions. Subdivided into the following segments

1. Public;
2. National private;
3. Foreign.

q) Base Capital (PR): for purposes of calculating operational limits, this concept is defined as the sum total of Net Worth and asset and liability accounts as itemized below:

1. Tier I Capital – arithmetic result of the balances of the accounting headings: net worth, credit or income accounts, debtor income accounts. For final calculation purposes, the following should also be excluded: revaluation reserves, contingency reserves and special profit reserves related to obligatory non distributed dividends, deducting the amounts referring to noncumulative preferred shares and redeemable preferred shares;

2. Tier II Capital – Arithmetic result of the balances of the following accounting headings: revaluation reserve, contingency reserve, special profit reserves for all obligatory non distributed dividends, noncumulative preferred shares and redeemable preferred shares; eligible subordinate debts and hybrid capital and debt instruments limited to the volume of Tier I, among other restrictions.

r) Adjusted Capital Base (PRA): defined as the PR used for purposes of calculating the Fixed Asset Ratio, as defined in letter l, subitem I.

s) Required Net Worth (PLE): calculated on the basis of credit and market risks (exchange and preset interest) and swap operations, as described in item "c" of the methodology. Represents the minimum amount required for PR, with the objective of withstanding the risks existent in the capital structure.

t) Basel Capital Ratio: concept defined by the Basel Committee which recommends a minimum ratio of 8% between PR and total assets weighted by risk, as demanded by current regulations. In Brazil, the minimum required ratio as of December 2002 is 11% for central credit unions and single credit unions affiliated to central credit unions, 15% for all other credit unions, 30% for development agencies and 11% for all other financial institutions.

Methodologies

a) The analyses are developed on the basis of accounting data remitted monthly by institutions to Banco Central. When the financial statements for the base date under analysis are not available, the immediately previous statement is used.

b) The Basil Capital Ratio and Fixed Asset Ratio are based on the accounting data of financial conglomerates or institutions. The accounting statements of banks and financial conglomerates are used when these institutions opt for the system of consolidated calculation. In the case of conglomerates that do not make this option, the ratios are calculated for each institution as if they were independent.

c) PLE is calculated through utilization of the data recorded by financial institutions in their asset and liability accounts and clearing accounts referring to capital requirements for Assets Weighted by Risk, Swap Credit Risk, Exchange Exposure Risk and Interest Rate Risk. In more simple terms, the PLE formula is described below:

PLE=F . (Assets Weighted by Risk)+ Swap Credit Risk + Exchange Exposure Risk + Interest Rate Risk.
Factor F = Factor applicable to assets weighted by risk, stipulated at 0.11 for central credit unions and independent credit unions associated to central credit unions; 0.15 for other credit unions; 0.30 for development agencies; and 011 for other financial institutions.

d) Assets Weighted by Risk = total of the heading of Current Assets and Long-Term Assets multiplied by the corresponding risk factors + Joint Liabilities and Risks in Guarantees Rendered multiplied by the corresponding risk factors.

e) Capital Requirements for Swap Credit Risk = $F' \cdot \sum_{i=1}^{n1} RCDi_i$

F' = factor applicable to the credit risk of swap operations, equal to 0.20 (twenty hundredths);
n1 = number of swap operations registered under Cosif account 3.0.6.10.60-4;
RCDi= credit risk of the i-th swap operation registered under Cosif account 3.0.6.10.60-4, consistent in the weighting of the reference value of the operation at the moment of the respective contracting operation (Vni) by the corresponding potential risk factor, taking due account of the term to elapse.

f) Capital Requirements for Interest Rate Risk = $F'' \cdot \max\{ (\sum_{i=1}^{n2} Aprc_i - k \cdot PR);0 \}$, in which:

F' = factor applicable to operations with gold and assets and liabilities referenced to exchange, including those carried out on derivative markets, equal to 0.5.
n2 = number of net positions in each currency and in gold;

$\sum_{i=1}^{n2} Aprc_i$ = sum total of the absolute values of the net position in each currency and in gold;

k = 0.05 (five hundredths) for $\sum_{i=1}^{n2} Aprc_i$ /PR less than or equal to 0.05 (five hundredths)

k = 0 for $\sum_{i=1}^{n2} Aprc_i$ /PR greater than 0.05 hundredths).

g) Capital Requirements for Interest Rate Risk = $\sum_{i=1}^{n3} ECi$, in which:

n3 = number of shares representative of the value of PLE for coverage of interest rate market risk in a specific currency/basis of earnings;
Eci = Share representative of the value of PLE for coverage of interest rate market risk in a specific currency/basis of earnings.

h) Basel Capital Ratio = $\frac{PR \cdot 100}{\{ Apr + [\frac{1}{F} \cdot (Interest\ Rate + Foreign\ Exchange\ Rate + Swap)] \}}$.

i) The values presented in the texts and tables have been rounded off. However, their percentage changes reflect the original figures, considering all of the decimal places.

j) The Fixed Assets Limit indicates the percentage of commitment of PRA in relation to Permanent Assets. The maximum limit permitted is 50%.

k) The following formula is used to obtain the Fixed Assets Ratio:

Fixed Assets Ratio = $\frac{Fixed\ Assets}{Adjusted\ PR} \cdot 100$

I. for calculation of the PRA:

Tier I Capital
(+) Tier II Capital
(-) Stock Exchange Capital Securities
(-) Commodities and Futures Market Capital Securities
(-) Cetip Capital Securities
(-) (-) Stocks and Quotas of Clearing and Custody Companies linked to Exchanges
(-) (-) Provisions for Losses in Capital Securities*
(-) Capital Securities – Others*
(-)Premiums in Acquisitions of Capital Securities*
(=) PRA

II. For calculation of Fixed Assets

Fixed
(-) Fixed Assets Leased
(-) Losses in Leasings to be Paid
(-)(-)Accumulated Amortizations of Deferred – Losses in Leasings to be Paid
(-) Stock Exchange Capital Securities
(-) Commodities and Futures Exchange Capital Securities

(-) Cetip Capital Securities
(-) Stocks and Quotas of Clearing and Custody Companies Linked to Exchanges
(-)(-) Provision for Losses in Stocks and Quotas of Clearing and Custody Companies Linked to Exchange
(-)(-) Provision for Losses in Capital Securities*
(-) Capital Securities – Others*
(-) Premiums in Acquisitions of Capital Securities*
(=) Fixed Assets to Fixed Assets Ratio

All references to Fixed Assets in this paper concern Fixed Assets to Fixed Assets Ratio.

* Since the "Provision for Losses in Capital Securities" refers to all the headings of fixed capital, as well as premiums, it was determined that it would only be included in calculations of Adjusted PR and Fixed Assets – Investment when its absolute value exceeds the sum of the headings "Capital Securities – Others" and "Premiums in Acquisitions of Capital Securities". In these cases, the value of the provision to be considered is limited to the amount that exceeds the sum total of the balance of "Capital Securities – Others", with the balance of "Premiums in Acquisitions of Capital Securities".

2.5 Risks

2.5.1 Credit operations

At the end of 2004, 98.5% of SFN credit operation demand had been met by the banking system, while the nonbanking system accounted for the remainder. A breakdown on the basis of segments indicates that consolidated banking segment I accounted for the largest share, with 81.1% of the credit stock of this grouping.

In December 2004, financial system credit operations totaled R$500 billion, for growth of 9.6% compared to the balance at the end of the first half of the year, corresponding to an additional R$44 billion. The 9.7% expansion in the credit operations of consolidated banking segment I accounted for 70.4% of the growth in overall SFN credits. More accentuated growth figures were registered in consolidated banking segment II, with expansion of 15.8% or R$11.6 billion, and in consolidated banking segment III, with growth of 18.2% corresponding to R$1.3 billion. In the same period of time, total credit operations in the nonbanking segment increased by 7%, equivalent to R$481 million. Aside from this, it is important to stress the behavior of exchange during the second half of 2004, as the real appreciated by 17.1% against the United States dollar and generated significant impacts on the balance of operations referenced to foreign currency. In December 2004, this balance stood at 17% of operations with nonearmarked resources which, in turn, accounted for 56% of total SFN credits.

In December 2004, the participation of private national banks corresponded to 45.5% of total credit operations registered by consolidated banking segment I, while the participation of public banks came to 32.1% and foreign banks closed with a share of 22.4%. In comparison to base date June 2004 when the respective figures came to 45.7%, 31.6% and 22.7%, there were no significant changes in these participation levels.

The volume of credit operations granted abroad by branches and subsidiaries of banking institutions headquartered in Brazil totaled R$39.4 billion at the end of December 2004. This figure represented 7.9% of the consolidated total of credits granted by financial institutions in the country and abroad. This percentage was just below the 9.1% figure registered in the first half of 2004. Here, it is important to consider the impact of appreciation of national currency on the balance of these operations.

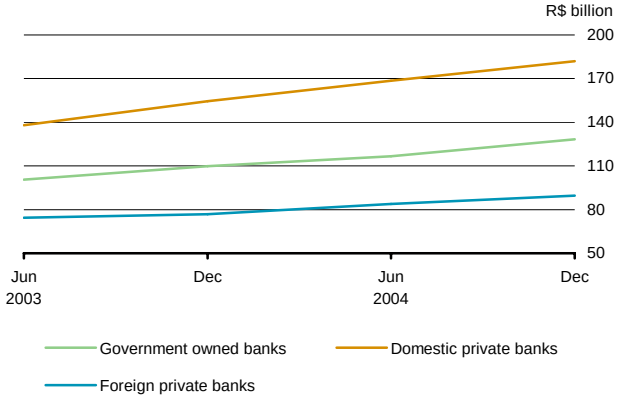
Credit operations – Domestic and abroad
December, 2004

R$ million

Itemization	Domestic credit operations	Abroad credit operations	Eliminated[1/]	Consolidated credit operations
Total of the SFN	499 944	39 388	-10 583	528 749
Banking	492 635	39 388	-10 583	521 440
consolidated I	399 661	39 388	-10 583	428 466
Banks				
government				
owned	128 228	13 421	-4 473	137 177
domestic private	181 887	20 376	-5 645	196 618
foreign	89 546	5 591	- 465	94 671
consolidated II	84 679	0	0	84 679
consolidated III	8 294	0	0	8 294
Non-banking	7 309	0	0	7 309

1/ Eliminations of credit operations realized in the country and abroad between financial institutions owned by the same financial conglomerate.

Credit operations
Consolidated I by control type



Top conglomerates/banks
Participation in the credit of the consolidated I

%

Itemization	2004	
	Jun	Dec
10 largest	80.7	82.2
20 largest	92.2	92.6
50 largest	98.5	98.6

Credit operations

Individuals and legal entities participation

%

Itemization	2004			
	Jun		Dec	
	Quantity	Loans and leases portfolio	Quantity	Loans and leases portfolio
Total	100.0	100.0	100.0	100.0
Individuals	92.3	38.4	93.1	41.3
Banking				
consolidated I	89.9	35.0	81.2	36.7
Banks				
government				
owned	25.0	15.1	21.4	15.2
domestic private	41.2	12.6	37.3	13.7
foreign	23.6	7.3	22.5	7.8
consolidated II	0.3	1.7	10.1	2.9
consolidated III	1.0	1.2	0.8	1.2
Non-banking	1.1	0.5	1.0	0.6
Legal entities	7.7	61.6	6.9	58.7
Banking				
consolidated I	7.4	46.1	6.6	43.4
Banks				
government				
owned	2.8	10.4	2.5	10.4
domestic private	3.3	24.7	3.1	23.0
foreign	1.3	11.0	1.0	10.1
consolidated II	0.2	14.2	0.2	14.0
consolidated III	0.1	0.3	0.1	0.3
Non-banking	0.0	1.0	0.0	0.9

Credit operations in value range

%

Range (R$)	Banking						Non-banking	
	consolidated I		consolidated II		consolidated III			
	2004		2004		2004		2004	
	Jun	Dec	Jun	Dec	Jun	Dec	Jun	Dec
Under 5 thousand	15.3	15.7	9.6	13.3	16.7	14.5	16.7	19.6
5 to 100 thousand	29.5	31.3	7.5	8.8	60.6	61.6	19.7	20.4
100 thousand to 1 million	12.9	14.4	6.6	6.7	19.0	20.6	23.6	23.3
1 to 50 millions	27.2	26.8	16.0	15.8	3.7	3.3	30.4	30.2
Over 50 millions	15.1	11.7	60.3	55.5	0.0	0.0	9.6	6.5

The level of concentration of credit operations in the grouping of the ten largest conglomerates and financial institutions included in consolidated banking segment I increased by 1.5 p.p. in the half-year period, moving from 80.7% in June to 82.2% in December 2004. The participation of national private banks in this grouping increased from 43.8% to 44.3%, as compared to a decline in the participation of public banks from 33.6% to 33.4% and in that of foreign banks from 22.6% to 22.2%. The level of concentration remained practically unaltered in the grouping of the fifty largest financial conglomerates and institutions.

In December 2004, individuals accounted for 93% of the number of credit operations registered in the Credit Information System (SCR), corresponding to 41.3% of the total value of these operations. In their turn, corporate entities accounted for 7% of the quantity of operations and 58.7% of the value. The increase in the participation of legal entities in the volume of credits registered in the SCR came to 2.9 p.p. in the half-year period and resulted from expansion in the modalities of consumer credit, particularly payroll loans. Furthermore, it is important to stress that the participation of consolidated banking segment II in the number of operations with individual moved sharply upward from 0.3% to 10.4%, as a consequence of the initial operations of a credit institution with a large retail market credit portfolio.

Between June and December 2004, consolidated banking segment I, which is the major grouping within the banking system, registered an increase in the level of concentration of its credit operations in the brackets between R$5 thousand and R$100 thousand, moving from 29.5% to 31.3%. The bracket between R$1 million and R$50 million, which is the second most important bracket in the consolidated segment under consideration, registered a drop of 4.8 p.p., shifting from 60.3% to 55.5%. Parallel to this, in the case of consolidated banking segment III, which is composed exclusively of credit unions, 61.6% of the value of these operations were concentrated in the bracket between R$5 thousand and R$100 thousand and in the nonbanking system, in which development agencies and leasing companies predominate, with 30.2% of the value of the debts concentrated in the bracket from R$1 million to R$50 million.

Credit operations in value range

Consolidated I by control type

%

Range (R$)	Government owned		Private domestic		Private foreign	
	2004		2004		2004	
	Jun	Dec	Jun	Dec	Jun	Dec
Under 5 thousand	15.9	15.3	14.6	15.3	16.0	17.1
5 to 100 thousand	42.3	41.6	22.2	25.2	26.5	28.9
100 thousand to 1 million	15.8	17.6	12.4	13.6	9.8	11.3
1 to 50 millions	16.4	17.1	31.8	31.4	32.9	31.8
Over 50 millions	9.7	8.4	19.0	14.5	14.8	10.9

Joint liabilities and write-offs

R$ million

Itemization	Commitments		Write-offs	
	2004		2004	
	Jun	Dec	Jun	Dec
Total of the SFN	49 062	49 138	57 899	45 869
Banking				
consolidated I	47 505	47 478	51 912	39 635
Banks				
government				
owned	8 850	7 187	25 807	13 338
domestic private	22 410	23 981	15 361	15 940
foreign	16 244	16 309	10 744	10 356
consolidated II	661	503	5 091	5 245
consolidated III	651	788	267	284
Non-banking	245	370	629	706
Percentage[1/]	10.8	9.9	12.7	9.2

1/ Percentage of joint liabilities and write-offs over the SFN credit operations.

Operations written off as losses

Credits written off as losses[19] diminished by 21% in the second half of 2005, moving from R$57.9 billion in June 2004 to R$45.9 billion in December. The ratio between the total SFN credit portfolio and credits written off as losses dropped from 12.7% to 9.2%. Public banks accounted for the totality of this decline, which was a consequence of the elimination of losses registered more than 48 months before. However, the stock of losses of consolidated banking segments II and III and of the nonbanking system increased by 3%, or R$154.2 million, 6.4% or R$17 million and 12.2% or R$77 million, respectively.

Joint liabilities

The volume of liabilities[20] remained stable in the second half of 2004, with a high of 0.2% in nominal value and a falloff of 0.9 p.p. in participation in the overall SFN credit portfolio. The most significant variations were registered internally in consolidated banking segment I, with a reduction of 19%, or R$1.7 billion in the volume held by public banks and growth of 7%, or R$1.6 billion in the volume held by national private banks.

Largest SFN debtors

The one hundred largest debtors[21] were selected on the basis of the debts recorded in the asset portfolio, without deduction of provisions. In December 2004, these values, which are composed exclusively of legal entities, represented 15.3% of total SFN credits, as against 17.6% in the previous half-year period.

The volume of credit operations of the one hundred largest SFN debtors underwent a reduction of 4.5% in the half-year period, corresponding to R$80.1 billion in June 2004 and R$76.4 billion in December 2004. The average provisions for these debtors stood at 3.3% and remained practically unaltered in the period.

19/ In face of the migration of the Credit Risk System (CRC) to the new Credit Risk Center (SCR), it will be considered, as of this edition, the total of the credits written off as losses in the last 48 months, differently from the previous versions that considered the credits written off as losses in the last 60 months. For the same reason, the concessions of credit with joint liability have been included in the total of the joint liabilities.

20/ Idem 19.

21/ Selection of the one hundred largest debtors is carried out on each base date or, in other words, the debtors may not be the same. See table on page 55.

Largest debtors

R$ billion

Debtors	2004					
	Jun			Dec		
	Portfolio[1/]	Debt[2/]	Average[3/]	Portfolio[1/]	Debt[2/]	Average[3/]
100 largests	80.1	93.3	3.1	76.4	87.3	3.3
1º - 10º largest	21.2	22.1	0.6	21.7	23.2	0.6
11º - 20º largest	11.9	14.6	4.4	11.2	12.6	6.8
21º - 50º largest	24.1	28.7	4.7	21.5	26.1	4.9
51º - 100º largest	22.9	27.8	2.9	22.0	25.4	2.5
Total	456.0	563.0	6.9	498.8	593.8	6.5

1/ Loans and lease operations.
2/ Portfolio + joint liabilities + write-offs.
3/ Average provision - % (portfolio).

Largest debtors

Banks by control type

R$ billion

Itemization	2004					
	Jun			Dec		
	Portfolio[1/]	Debt[2/]	Average[3/]	Portfolio[1/]	Debt[2/]	Average[3/]
100 largests	80.0	93.3	3.1	76.4	87.3	3.3
Banking						
consolidated I	47.1	60.1	1.2	40.5	51.3	1.1
Banks						
government						
owned	9.7	10.0	1.6	8.6	9.0	1.7
domestic						
private	25.6	32.4	0.9	22.3	28.1	0.8
foreign	11.8	17.7	1.4	9.7	14.2	1.3
consolidated II	32.6	32.7	5.7	35.5	35.6	5.8
consolidated III	0	0	0	0	0	0
Non-banking	0.4	0.4	1.4	0.4	0.4	0.7

1/ Loans and lease operations
2/ Portfolio + joint liabilities + write-offs.
3/ Average provision - % (portfolio).

Credit operations by levels of risk – SFN

%

Levels of risk	2003		2004	
	Jun	Dec	Jun	Dec
AA	26.6	28.8	28.8	24.3
A	33.2	35.0	32.9	37.0
B	16.8	15.0	17.1	18.4
C	10.0	9.0	10.2	9.8
D	4.8	4.5	4.4	4.1
E	1.8	1.6	1.3	1.2
F	1.1	0.9	1.2	0.8
G	1.5	0.7	0.6	0.8
H	4.4	4.4	3.6	3.5
Total	100.0	100.0	100	100.0

The largest increase in the average provision was registered in the group between the 11th and 20th largest debtors, moving from 4.4% to 6.8%. At the same time, the sharpest downward movement occurred in the grouping from the 51st to the 100th largest debtors. The average provision for the one hundred largest debtors came to 3.3% and was below the average of 6.5% registered for the SFN as a whole, when the System's total credits are considered, including those in amounts of less than R$5 thousand.

Distribution of the one hundred largest debtors by economic sector

The participation of the electricity generation and distribution sector increased from 23.3% to 26% over the course of the second half of 2004, when compared to the total credit portfolio of the one hundred largest debtors. The sectors of telecommunications and the manufacturing of automobiles, pickups and utility vehicles accounted for 11% and 8%, respectively. In June 2004, these sectors accounted for 11.7% and 8.1%, in the same order.

Classification of credit operations

Viewed under the prism of risk levels, analysis of the distribution of SFN credits indicated a decline in the participation of credits classified at level AA. Level AA registered a reduction from 28.8% to 24.3% over the course of the second half of 2004. This variation was generated by the adjustments that occurred in the credit portfolios of several public banks, mainly involving transfers of credits from level AA to level A. Consequently, the representivity of the credit operations classified from levels A to C increased by 5 p.p., moving from 60.2% to 65.2%, while the participation of credits classified under levels E to H dropped by 0.4 p.p. from 6.7% to 6.3%, using the same basis of comparison.

Based on the terms of Resolution 2,682/99, the minimum provision calculated for total SFN financial institutions diminished by 0.2 p.p. in the half-year period, shifting from 6% in June 2004 to 5.8% in December 2004. This downward movement reflected the downturn in the participation of the higher risk levels in the period.

The distribution of credits granted by branches abroad remained stable when compared to the previous six month period, with participation of 64.4% at level AA, 34.1% at levels A to C and 1% at levels E to H, as against 62.7%, 35.6% and 1.2%, respectively, in the month of June 2004. The minimum provision for these operations remained stable at 1.2%.

Credit Classification Migration Matrix

The Credit Classification Migration Matrix indicates the movements that occurred in the identified credit classifications – debtors with liabilities of more than R$5 thousand – registered in the Credit Information System (SCR), at the same time in which it makes it possible to analyze variations in the risk level of operations in the six month period, the consistency of the classification of financial institution credit operations and, consequently, their respective internal classification models.

The Credit Classification Migration Matrix is composed of the migrated value, utilizing the value of the operation. Thus, the percentages viewed horizontally in each risk level represent the value that migrated from one risk level to another. The values presented diagonally in boldface correspond to the amounts remaining in the respective original risk levels.

Risk Level Transition Matrix

Percentage

Risk level		2004 Dec											Total	R$ million
		AA	A	B	C	D	E	F	G	H	Write-offs	Reductions[1/]		Loans and lease operations Jun/2004
Jun/2004	AA	**59.2**	13.1	2.3	0.8	0.2	0.1	0.0	0.0	0.1	0.0	24.2	**31.6**	116 457
	A	5.3	**54.4**	9.4	2.4	1.0	0.3	0.2	0.2	0.2	0.0	26.6	**31.0**	114 484
	B	2.2	11.2	**54.3**	7.0	1.5	0.7	0.4	0.3	0.5	0.0	21.9	**18.7**	68 961
	C	1.4	4.7	12.4	**51.1**	5.1	1.1	0.9	0.7	2.0	0.0	20.5	**9.4**	34 544
	D	0.9	3.3	4.2	7.9	**52.5**	3.6	1.8	2.5	5.8	0.1	17.4	**3.8**	14 181
	E	1.0	12.7	3.7	2.7	4.0	**39.9**	3.2	1.9	16.3	0.3	14.3	**1.2**	4 517
	F	0.7	1.0	1.1	2.4	3.3	2.4	**20.0**	30.3	26.7	0.5	11.8	**1.1**	3 960
	G	1.4	1.2	0.7	1.2	1.5	0.8	1.6	**38.9**	34.6	4.0	14.2	**0.7**	2 489
	H	0.3	0.8	0.7	0.6	1.1	0.4	0.5	1.3	**46.3**	44.8	3.2	**2.5**	9 344
Total		**20.9**	**23.9**	**15.2**	**7.5**	**3.3**	**1.0**	**0.6**	**0.9**	**2.6**	**1.2**	**23.0**	**100.0**	
R$ million	Loans and leases operations Dec/2004	77 256	88 051	56 053	27 544	12 083	3 804	2 177	3 401	9 174	4 365	85 029		368 936 [2/]

1/ Represented by the liquidations of operations and concessions of credit.

2/ This value only includes identified credit operations whose debtors owe at lest R$ 5 thousand.

Analysis of the Credit Classification Migration Matrix indicated that 54.6% of the credits that existed in June 2004 remained at the same risk level in December 2004. When the reductions of 23% in the period are added to this percentage, the final figure comes to 77.6% of total credits identified or slightly less than the 79.7% registered in the previous half-year report. Parallel to this, 7.1% of credits diminished their risk level, while 14% deteriorated and 1.2% were written off as losses.

As expected, those credits that registered the sharpest deterioration in relative terms were concentrated at levels E, F and G, with 21.7%, 57.5% and 38.6% migrating to higher risk levels, including losses. At the same time, 44.8% of the credits classified at risk level H in June 2004 were downgraded to losses in December 2004.

In nominal terms, the largest migrations in the period were registered under credits classified under levels AA and A. At level AA, 16.6% were downgraded, mainly to level A. In the case of level A, 13.7% migrated to levels of greater risk and principally to level B.

Analysis of the Credit Classification Migration Matrix showed slight deterioration in the quality of credit operations. Here, stress should be given to the difference of 1 p.p. between the average provision of 4.9% in June 2004 and 5.9% in December 2005, considering only those operations in amounts of more than R$5 thousand. This is not an accentuated discrepancy and indicates that the perception of credit risk at the start of the period underwent no significant alterations in relation to the end of the year.

Transition in the risk level classification – SFN
From June/2004 to December/2004

R$ million

Risk level	Remained at the same level			Transferred to			Total
	Remained	Reductions	Total	a higher level	a lower level	write-offs	
AA	68 894	28 217	97 111	-	19 344	2	116 457
A	62 262	30 421	92 684	6 078	15 716	7	114 484
B	37 428	15 077	52 505	9 259	7 187	11	68 961
C	17 665	7 091	24 755	6 387	3 393	9	34 544
D	7 443	2 463	9 906	2 324	1 935	15	14 181
E	1 801	645	2 446	1 088	970	13	4 517
F	790	466	1 256	428	2 255	21	3 960
G	968	352	1 321	208	861	99	2 489
H	4 327	297	4 624	530	-	4 189	9 344
Total	201 579	85 029	286 608	26 302	51 661	4 365	368 936

Transition in the risk level classification and difference of Provision

%

Period		Remained at the same level		Transferred to			Initial provision	Final provision	Difference
		Remained	Reductions	a higher level	a lower level	write-offs			
2003 Jun	2003 Dec	54.6	22.5	9.4	11.4	2.1	6.3	7.6	1.3
2003 Dec	2004 Jun	57.9	21.8	6.4	12.1	1.9	5.5	6.6	1.1
2004 Jun	2004 Dec	54.6	23.0	7.1	14.0	1.2	4.9	5.9	1.0

Largest debtors – Economic sectors

100 largest debtors – December, 2004

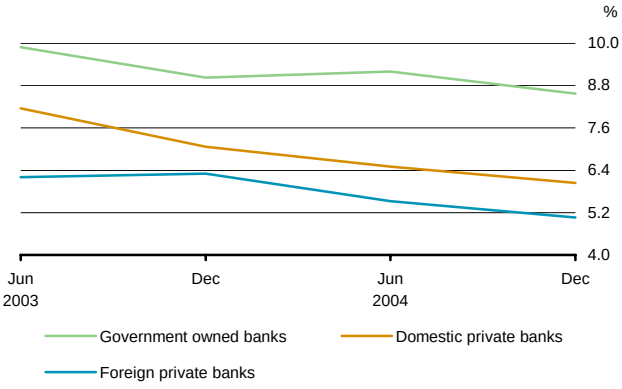
R$ billion

Itemization	Portfolio[1/]	Debt[2/]	Average[3/]
Total – 100 largest debtors	76.4	87.3	3.3
Total – 20 biggest sectors	69.8	79.7	3.0
Eletric energy production and distribution	19.9	21.1	0.9
Telecommunication	8.3	9.7	0.3
Production of vehicles, pickups and utilitarians	6.0	7.4	0.9
Public administration, defense and social security	5.3	5.3	17.9
Non-specialized retailing	4.3	4.7	0.3
Cellulose, paper and paper products manufacturing	3.7	5.0	0.4
Financial intermediation, excluding insurance and private pension plan	2.8	2.8	0.3
Slaughter and preparation of meat and fish products	2.5	3.1	0.5
Overland transportation	2.3	2.4	33.7
Siderurgy	1.9	2.6	0.2
Metallurgy of non-iron metals	1.9	2.2	0.3
Production of pig iron and iron-alloys	1.8	2.5	0.4
Aircraft manufacturing, assembling and repairing	1.8	2.2	0.2
Production of organic chemistry products	1.3	1.3	0.2
Trucks and buses production	1.2	1.3	0.1
Fabricação de resinas e elastômeros	1.1	1.2	1.0
Proces., preserv.e prod. de conservas de frutas, legumes, outr. vegetais	1.0	1.1	0.2
Petrochemicals manufacturing	1.0	1.3	0.4
Personal care and home care whosesale	0.9	0.9	1.1
Production of bevereges	0.8	1.6	0.1
Others	6.7	7.6	6.4

1/ Loans and lease operations
2/ Portfolio + joint liabilities + write-offs.
3/ Average provision - % (portfolio).

Provision/credit operations

Consolidated I by control type



Defaults

The volume of defaults[22] in the SFN came to R$15 billion – concept encompasses totally matured credit operations and those in which shares have been matured for longer than 90 days – and did not change in relation to the first half of 2004. Viewed together with the 9.6% increase in the stock of credit operations in the period, this fact resulted in a reduction in the default indicator from 3.3% in June 2004 to 3% in December of last year. The factor most responsible for this reduction was the falloff in the default indicator from 3.3% in June 2004 to 3.1% last December. The most important contribution to this decline was the reduction of the default indicators of national private banks (3.4% to 3.1%) and of foreign banks (3.9% to 3.2%).

Provisions

The 4.8% increase from R$31.2 billion in June 2004 to R$32.7 billion in December 2004 in the stock of provisions constituted in the SFN was not sufficient to avoid a new drop in the ratio between constituted provisions and total SFN credit operations from 6.9% to 6.5%. With the sole exception of consolidated banking segment II, which increased the level of its provisions from 5.1% to 5.9% of total credits, all of the other segments maintained the downward trajectory registered in the previous half-year period.

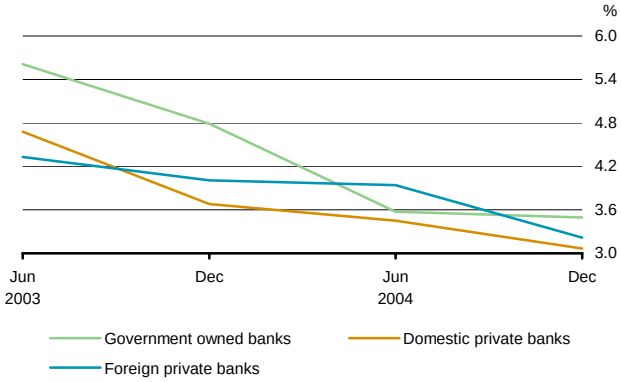
Despite the comparative differences in the behavior of defaults and constituted provisions in absolute terms – stability in the volume of the former and a decline of 4.6% in the balance of the latter – these two headings turned in results that were quite similar to those of previous half-year periods, with respective reductions of 0.3 p.p. and 0.4 p.p.

Constituted provision/minimum provisions

Calculated on the basis of the classification of credit operations, the ratio between constituted provisions and minimum provisions at the end of the second half of 2004 indicated that the volume of constituted SFN provisions was 13.2% more than the minimum required

22/ As of this issue, the concept of default will be the international standard of nonperforming loans (credits past due for more than 90 days), in contrast to previous issues that classified credit operations with installments more than fifteen days past due as fully matured.

Default/credit operations
Consolidated I by control type



provision as compared to 14.9% in the previous half-year period. Here, the most significant change was registered under consolidated banking segment I and, more specifically, under public banks, which registered a falloff in the margin from 14.5% in June 2004 to 9.3% in December. Private national banks occupied the lead position with provisions that were a full 31.2% above the required minimum.

Default versus constituted provision[1/]

%

Itemization	2004			
	Jun		Dec	
	Default	Provision constituted	Default	Provision constituted
Total of the SFN	3.3	6.9	3.0	6.5
Banking				
consolidated I	3.6	7.1	3.2	6.6
Banks				
government				
owned	3.6	9.2	3.5	8.6
domestic private	3.4	6.5	3.1	6.0
foreign	3.9	5.5	3.2	5.1
consolidated II	1.1	5.1	1.5	5.9
consolidated III	1.8	4.7	1.7	4.2
Non-banking	9.1	12.5	8.4	11.6

1/ Comparison between default percentage and constituted provision percentage.

Constituted provision versus required provision[1/]

%

Itemization	2004			
	Jun		Dec	
	Provision		Provision	
	constituted	required[2/]	constituted	required
Total of the SFN	6.9	6.0	6.5	5.8
Banking				
consolidated I	7.1	6.1	6.6	5.7
Banks				
government				
owned	9.2	8.0	8.6	7.8
domestic private	6.5	5.1	6.0	4.6
foreign	5.5	5.2	5.1	4.8
consolidated II	5.1	5.1	5.9	5.8
consolidated III	4.7	4.2	4.2	3.8
Non-banking	12.5	12.7	11.6	11.9

1/ Comparison between constituted provision percentage and required provision percentage.
2/ By classification (Res. 2.682/99–BC).

Concepts and Methodologies – Credit Operations

Credit operations

Concept

a) Banking system: encompasses independent banking institutions and banking conglomerates and is distributed into the following categories: consolidated banking segment I, consolidated banking segment II and consolidated banking segment III, as defined under items “e” to “j” and “n” to “q” of pages 46 and 47 of this Report.

b) Nonbanking system: composed of leasing companies, credit, finance and investment companies, among others, that do not belong to financial conglomerates in which the lead component is a banking institution.

c) Minimum provision: the provision calculated according to the minimum parameters defined by Resolution 2,682, dated December 22, 1999.

d) Default: concept in line with the international standard of nonperformance loans, encompassing credits matured for more than 90 days.

e) Constituted provision: the stock of provisions stated in the balance sheets of financial institutions.

Methodology

a) The volumes of National Financial System (SFN) credit operations were calculated on the basis of documents (balance sheets and Credit Risk Center records) and were aggregated according to member institutions and also on the basis of documents provided by independent financial institutions.

b) The concept is limited to the volume of credit effectively granted by the SFN to economic agents in Brazil and, therefore, excludes the amounts granted by the branches and subsidiaries of Brazilian banks headquartered abroad It also excludes credit operations contracted by microentrepreneur credit companies and credit unions, as well as the amounts involved in onlendings to financial intermediaries, which are normally defined as public or private sector companies that perform financial intermediation activities.

2.5.2 Exposure in foreign currencies and gold

The evolution of aggregate net exposure[23] in the basket of currencies for the period extending from July to December 2004, broken down by segment of SFN institutions, excluding BNDES, is presented below. Data referring to the period from January to February 2005 are considered only in those cases in which relevant facts occurred.

The highlights of the period were as follows:

- Reduction of 26% in net exposure in the basket of currencies, caused by the evolution of positions in dollars, the most representative of the currencies involved, due mainly to institutions from the national private segment;
- Devaluation of the dollar, the most probable cause of the decline in net participation in the basket of currencies, in contrast to increased participation of the euro;
- The increase in the net exposure of the institutions holding short positions compared to those holding long positions was caused mostly by institutions from the national private segment and was heavily concentrated in that segment.

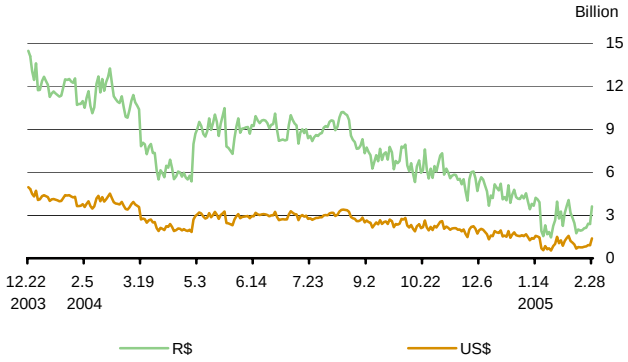
Net exposure in the basket of currencies

Expressed in reals, net exposure in the basket of currencies was long in the period, with a daily average of R$ 7 billion, a figure below the level of the previous period (January to June 2004), R$ 9.7 billion. This performance maintained the tendency registered in the previous period and turned in a decrease from R$ 8.2 billion on July 1, 2004 to R$ 4.3 billion on December 31, 2004. It is important to stress that the net exposure of the dollar represented an average of 83% of the net exposure of the basket of currencies in the period. Expressed in dollars, the same exposure came to an average of US$ 2.4 billion, 26% less than in the previous period, US$ 3.3 billion, registering a drop of US$ 1 billion, moving from US$ 2.7 billion on July 1, 2004 to US$ 1.6 billion on December 31, 2004.

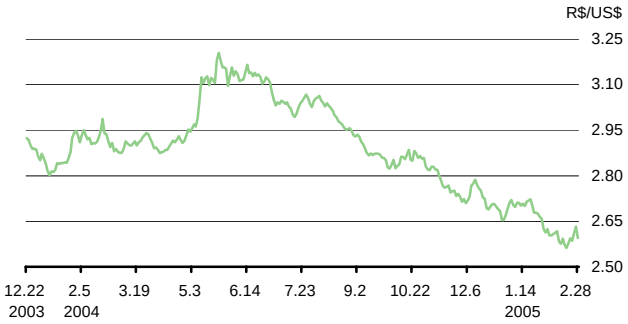
The rate of exchange also fell during the period, moving from R$ 3.07/dollar on July 1, 2004 to R$ 2.65/dollar on December 31, 2004. The highest rate, R$ 3.07/dollar, occurred on the first day of that period and the lowest, R$ 2.65/dollar, occurred on December 30 and 31, 2004.

23/ See Concepts and Methodologies on pages 65 to 66

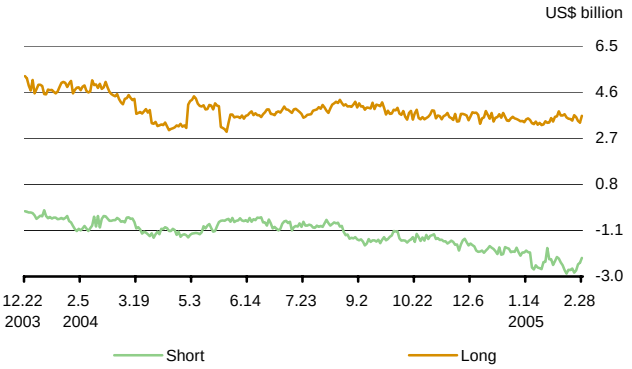
Net exposure



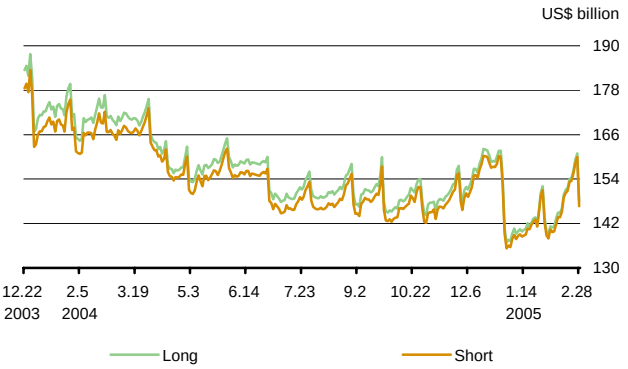
Exchange rate



Net exposure – Long and short in currency basket



Volume of currency basket's positions



The net exposure of the institutions holding long positions also continued the tendency of the previous period, with a reduction of US$ 256 million moving from US$ 3.7 billion to US$ 3.4 billion in the period extending from July 1 to December 31, 2004, reflecting a reduction of 7%. Parallel to this, there was an increase of US$ 804 million, or 80%, in the exposure of institutions holding short positions, which moved from US$ 1 billion to US$ 1.8 billion from the start to the end of the period.

Therefore, the increase in the net exposure of institutions holding short positions, mostly involving the national private segment, was the major cause of the reduction in the net exposure of the SFN basket.

Volume of long and short positions in the basket of currencies

The volumes of long and short positions in the basket of currencies declined in the period from July 1 to December 31, 2004, moving from US$ 150 billion to US$ 141 billion and from US$ 147.5 billion to US$ 139 billion, for respective declines of the 6.2% and 5.6%. The average amounts were US$ 151 billion and US$ 148.7 billion, which were 8.7% and 8.4% below the average values registered in the previous period: US$ 165.2 billion and US$ 162.3 billion. In absolute terms, the reduction in long positions, R$ 9.2 billion, was greater than the reduction in short positions, R$ 8.2 billion, by a full R$ 1 billion, thus causing the reduction in the net exposure of the SFN basket.

In its turn, net exposure corresponded to an average of 1.6% of the volume of the long position in the basket of currencies, a percentage level below that of the previous period, 2%, dropping from 1.8% to 1.1% between July 1 and December 31, 2004.

Net exposure of the basket of currencies

As already stated, net exposure in dollars was responsible for the major share of the basket in the period under consideration, with an average of 83%, somewhat below the figure for the previous period, 89%. The total value for the SFN came to a long position in that period, with an average value of US$ 2 billion, 30% less than in the previous period, US$ 2.9 billion. At the same time, it maintained the trend that marked the previous period, declining from US$ 2.2 billion on July 1, 2004 to US$ 1.2 billion on December 31, 2004, corresponding to a reduction of 44% caused most probably by devaluation of the dollar against the real.

It is important to underscore that, though net exposure of the dollar has declined, thus reducing the participation of the dollar in the basket, the dollar's share of the volume of both long and short positions remained stable in the range of 92%.

Total SFN net exposure in euro, which came to an average of 15.6% in the basket, was always long, with an average of US$ 358 million, somewhat higher than in the previous period, R$ 327 million. However, this exposure dropped by 15.6% from the start to the finish of the period, moving from R$ 434 million on July 1, 2004 to R$ 366 million on December 31, 2004.

Practically all the net exposure in the basket was composed of dollars and euros, with an average of 98.8%, or just slightly less than the 99.5% figure registered in the preceding period. In this sense, the participation of net dollar exposure in the basket of currencies dropped by 8.9%, while the participation of net euro exposure rose by 40%.

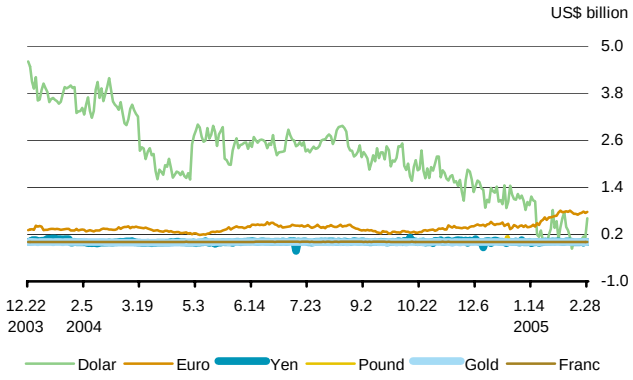
One should note the fact that there is a clear negative correlation in the basket between the participation of net exposures in these two currencies. In other words, the reduction in the exposure of these institutions to the dollar, which is the major currency in the basket, has been offset by increased exposure in euro.

In their turn, the yen, gold, pound and franc, the sum total of which have average participation in the basket equivalent to just 1.2%, registered average net exposures of US$ 12.1 million; US$ 7.6 million; US$ 5.4 million and US$ 1.2 million, respectively.

An analysis of the institutions that registered long and short exposure, considering the dollar and the euro individually, shows that there was a reduction in long exposure in both euros and dollars, at the same time in which short exposure has also increased under both currencies. The shift of greatest value was due to the growth registered in the net dollar exposure of institutions carrying short positions, with US$ 816.6 million.

As relevant facts in the period from January to February 2005, it should be emphasized that net dollar exposure registered a sold position on January 26 and February 16, 2005 and that, as of January 19, 2005 up to the end of February, net SFN exposure was greater than net dollar exposure, with the sole exception of one day – January 31, 2005. Aside from this, starting on January 18, 2005, strong

Net exposure – Currencies of currency basket

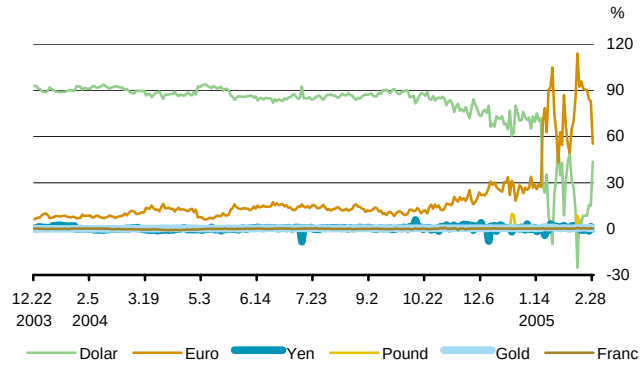


Currency basket´s composition – Comparison of the two last semesters

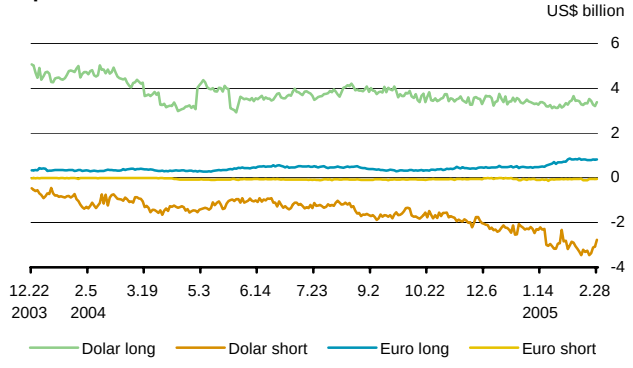
%

Currencies	Average 1st semester of 2004	Accrued	Average 2nd semester of 2004	Accrued
Dolar	89.0	89.1	83.1	83.1
Euro	10.5	99.5	15.6	98.8
Yen	0.1	99.6	0.5	99.6
Pound	0.4	100.0	0.3	99.1
Gold	0.2	100.1	0.3	99.9
Franc	-0.1	100.0	0.1	100.0

Currency basket´s composition – Net exposures



Net exposure – Long and short dolar and euro positions



fluctuations were registered in the participation of the dollar and euro in the basket. This was caused by variations that were registered for the most part by one public segment institution and two domestic private institutions, all of which are classified as large size.

Net exposure in currencies not included in the basket

Average net exposure in currencies not included in the basket was US$ 51 million, less than the figure of US$ 62.6 million registered in the previous period. This figure represented an average of 5% of the net exposure of the basket, surpassing the 2% figure registered in the previous period.

Net exposure in the basket by segment

In the period from July 1 to December 31, 2004, the segment of foreign banks registered the highest net exposure average, carrying a long position in the basket of currencies. This daily average of US$ 3.2 billion was 7.7% below the figure for the previous period.

The net long exposure of this segment declined from US$ 3.1 billion to US$ 3 billion, thus confirming the tendency that marked the previous period.

The most probable cause of the reduction in net long exposure was appreciation of the value of the real against the United States dollar.

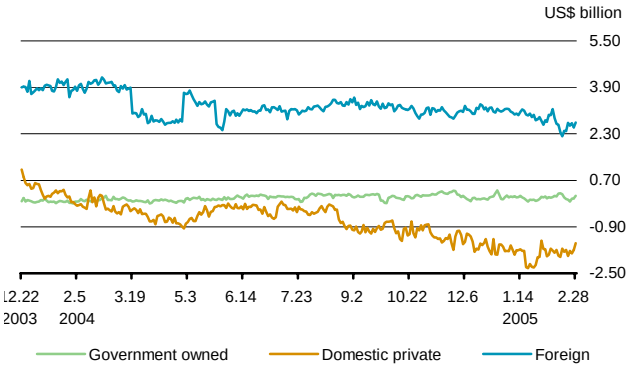
On the other hand, this segment of national private banks registered the second highest net exposure average, carrying a short position in the basket equivalent to US$ 900 million or 352.5% higher than in the previous period when the value came to US$ 200 million.

At the end of the period under analysis, the net short exposure of the segment of national private banks came to US$ 1.5 billion.

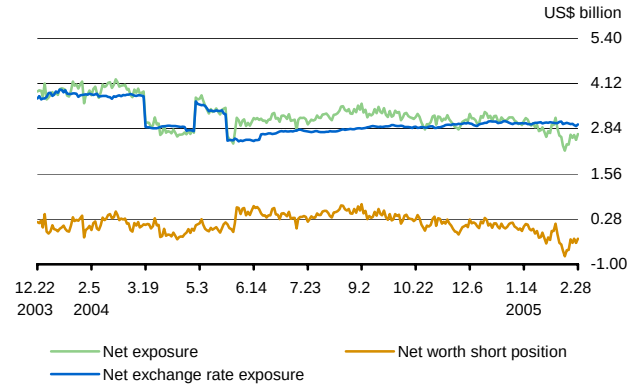
The net long exposure of the institutions belonging to the foreign bank segment normally closes at a level higher than the other segments, as a consequence of the need for contracting hedge for coverage of their PLA.

While the segment of public banks registered average long net exposure in the period equivalent to US$ 150 million,

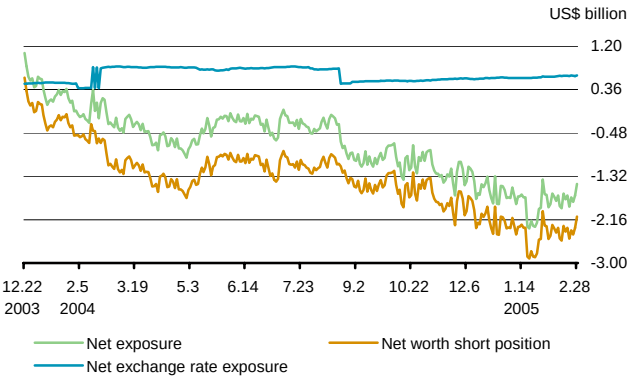
Net exposure by segment



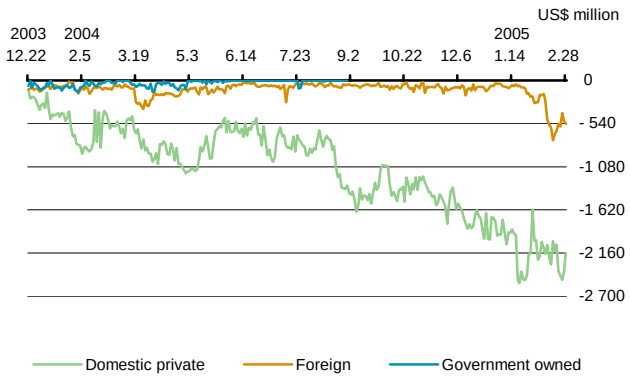
Foreign banks segment



Domestic private banks segment



Net short exposure by segment



the nonbanking segment registered the opposite result or, in other words, average net short exposure of US$ 1.5 million.

A comparison of these two situations with the previous period shows growth of US$ 119 million in long exposure for this segment of public banks and inversion of the US$ 4.1 million long position to a short position of US$ 1.5 million in the nonbanking segment.

Though net long exposure of the foreign bank segment has declined, its participation in total SFN evolved by 73 p.p. This effect was generated by the reduction in net SFN exposure in a proportion greater than the reduction in the net exposure of the foreign bank segment. The principal reason underlying the reduction in net SFN exposure was the increase in the net short exposure of this segment of national private banks, with US$ 987 million.

In the period from July 1 to December 31, 2004, the PLA of the foreign bank segment moved from US$2.74 billion to US$ 3 billion, registering an average of US$ 2.9 billion or less than the US$ 3.3 billion figure registered in the previous period. In its turn, the exchange exposure of this segment, which considers the PLE as a short position, registered a daily average of US$ 300 million, well above the US$ 1.44 million figure registered in the previous period.

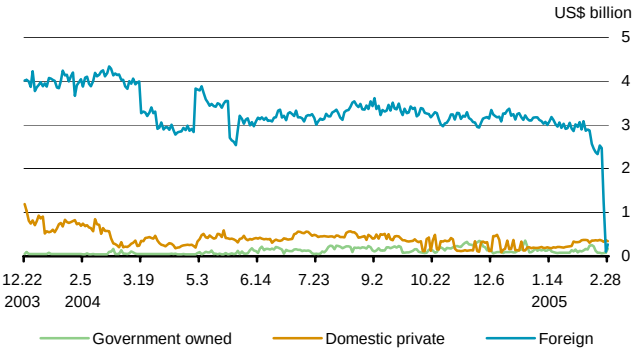
Going on to the segment of national private banks, PLA dropped from US$ 787 million to US$ 598 million in the period from July 1 to December 31, 2004. In this case, the average volume was US$ 611 million or less than in the previous period, US$ 687 million. Notwithstanding the reduction in the PLA of the institutions belonging to this segment, their short exchange exposure increased by US$ 798 million or, in other words, growth from US$ 1.3 billion to US$ 2.1 billion.

On the basis of these figures, one can infer that this segment of private national institutions accounted for the reduction in net SFN exposure, since this reduction occurred mainly as a result of the increase in the exposure of the institutions that registered short positions, precisely those belonging to this segment.

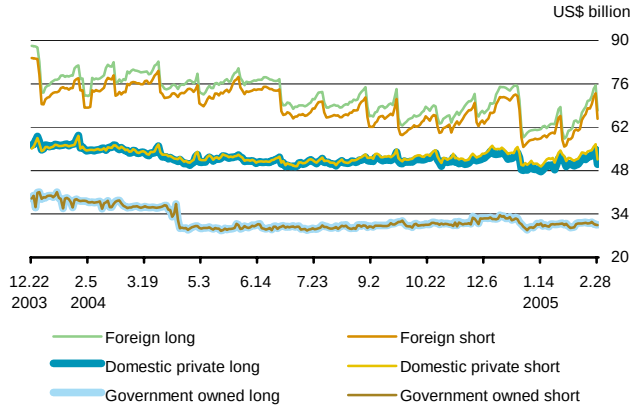
Volume of long and short positions in the basket by segment

While the institutions of the foreign bank and national private bank segments registered reductions in both their long and short positions, the public bank segment turned in a slight

Net long exposure by segment



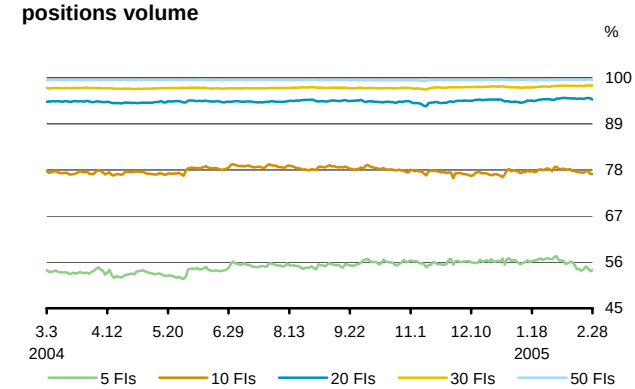
Volume of positions by segment



Exchange rate exposure report
Institutions by segment

Itemization	2004	
	Jul	Dec
Total	123	119
Banking consolidated I		
Banks		
government owned	10	10
domestic private	39	37
foreign	38	39
Non-banking	36	33

Financial institutions concentration by long positions volume



rise in both volumes in the period from July 1 to December 31, 2004. The nonbanking segment did not register significant positions.

The average volumes of the segments of foreign banks, national private banks and public banks were long positions of US$ 68.7 billion, US$ 51.3 billion and US$ 30.7 billion, and short positions of US$ 65.5 billion, US$ 52.2 billion and US$ 30.6 billion, as compared to US$ 77.6 billion, US$ 53.4 billion and US$ 34.2 billion and US$ 74.2 billion, US$ 53.6 billion and US$ 34.2 billion in the previous period, respectively.

In terms of volume, the sharpest change occurred under the segment of foreign banks. In this case, the volume of long positions dropped by US$ 7.3 billion, moving from US$ 69 billion on July 1, 2004 to US$ 61.8 billion on December 31, 2004, while the volume of short positions dropped by R$ 7.2 billion, shifting from US$ 66 billion to US$ 58.7 billion, in the same period.

Next comes the segment of national private banks, with a reduction of US$ 2.2 billion in the volume of long positions, moving from US$ 50.5 billion on July 01, 2004 to US$ 48.3 billion on December 31, 2004, while the volume of short positions slipped by R$ 1.2 billion, changing from US$ 51 billion to US$ 49.8 billion in the same period.

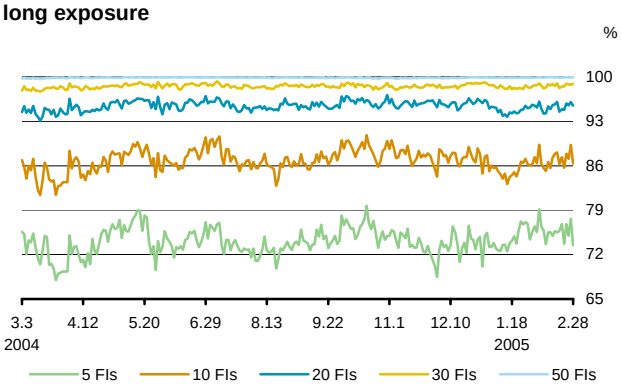
Since the net exposure of the SFN basket dropped by US$ 1 billion as a consequence of the reduction in the volume of long positions in a proportion greater than the reduction in the volume of short positions, the change of US$ 987 million in the volume of positions held by banks belonging to the national private segment accounted for 93% of the change in the SFN as a whole.

SFN concentration

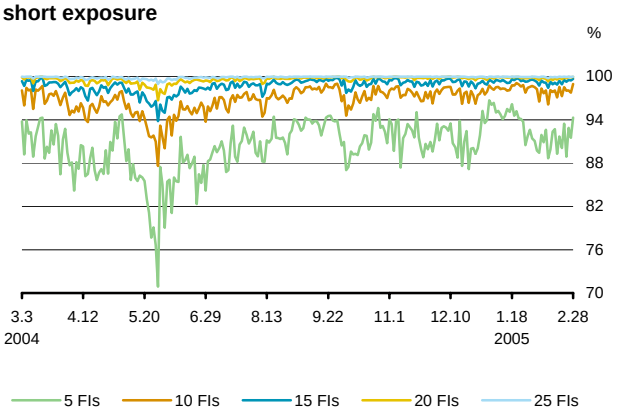
On July 1, 2004, 123 institutions provided information to Banco Central do Brasil with regard to their exchange exposure positions, as required by the regulations in effect. Of these institutions, 38 belonged to the foreign bank segment, 39 to the segment of national private banks, 36 to the nonbanking segment and ten to the public bank segment. On December 31, 2004, 119 institutions provided such information with respective distribution of 39, 37, 33 and 10 institutions.

Concentration of the volume of long positions in the basket among SFN institutions remained constant from July 1 to

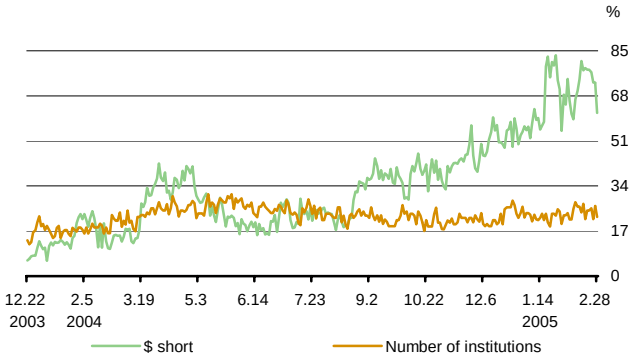
Concentration of financial institutions with net long exposure



Concentration of financial institutions with net short exposure



Analysis of financial institutions with net short exposure



December 31, 2004. On average, 58 institutions accounted for 55.6% of the total. When the 10, 20 and 30 institutions with the largest positions are considered, the percentages come to 78.1%, 94.4% and 97.6%, quite close to the results of the previous period.

The institutions with net long exposure registered the greatest concentration and highest degree of fluctuation. The average percentages registered by the 5, 10, 20 and 30 with the largest exposures were 74.1%, 87.4%, 95.7% and 98.6%, respectively, also quite close to the results of the preceding period.

The institutions with net short exposures were even more heavily concentrated. Their average percentages were 91.5%, 97.4%, 99.1% and 99.8% for the 5, 10, 15 and 20 institutions with the highest exposure levels. These percentages were slightly higher than those of the previous period: 89.1%, 96.1%, 98.5% and 99.5%.

It is important to observe that the sum total of the net exposure of the institutions with short positions represented an average of 36.5% of the sum total of the net exposure of institutions with long positions, as compared to 21.3% in the previous period. Following the tendency of the previous period, this percentage increased, moving from 27.6% on July 1, 2004 to 53.2% on December 31, 2004.

The average percentage of the number of institutions with net short exposure in relation to total SFN institutions that notified their exposures to Banco Central was 22.3%, practically the same figure as the 22.5% registered in the previous period. This means that the number of institutions that registered short positions remained stable, while their exposure increased. Note also that the increase in net short exposure was, for the most part, caused by only three domestic private institutions.

Concepts and Methodologies – Exchange Exposure

Exchange exposure

According to current rules, exchange exposure is defined as the net value resulting from positions held in assets and liabilities[1] referenced to variations in the value of exchange and gold assumed by financial institutions and their directly and indirectly controlled entities, including positions on derivative markets and the exchange market itself. Exchange exposure is calculated separately in each currency and converted into reals.

Derivative markets include positions in futures, forward operations, options, swaps and commodities in which the value of the contract is subject to changes in foreign currency or gold values. The determination of assets and liabilities is not clearly defined for these instruments, making it necessary to accompany them through the use of extra-accounting documents.

The exchange market is the environment in which the foreign currencies used to back the other items referenced to them are negotiated. The institutions are duly authorized by Banco Central do Brasil and must comply with specific limits that are not discussed in this chapter. Purchases and sales of foreign currency require accounting records under specific headings in the National Financial System Institutions Accounting Plan (Cosif) which are also taken into consideration in calculating exchange exposure.

Definitions

Long exposure: The sum total of the assets exposed to exchange risk that increase in national currency value and of the liabilities that decrease in value as a result of devaluation of the national currency in relation to other currencies.

Short exposure: the sum total of the assets exposed to exchange risk that decrease in national currency value and of the liabilities that increase in value as a result of devaluation of the national currency in relation to other currencies. (Definitions: Circular 2,894/1999)

Exposure limit: the net exposure of the institutions as defined above and may not be greater than 30% of Base Capital (PR) – Circular 3,156/2002)

1/ All of the asset and liability statement items in some way related to the value of the foreign currency or gold are considered, such as credit operations, securities, investments abroad, credit lines utilized abroad and others.

The exchange exposure of the institution is obtained through the sum total of exchange exposure in each currency in the module:

$$\text{Exchange Exposure} = \sum_i \left| \sum \textit{Long Position} - \sum \textit{Short Position} \right|.$$

In which I = currency

Circular 3217 dated December 23, 2003, later substituted by Circular 3229, dated March 25, 2004, instituted the concept of "basket of currencies", making it possible to offset contrary positions in United States dollars, euros, pounds sterling, yen, Swiss francs and gold, in the place of the sum total of the modules of each one.

According to current rules, the share of foreign capital included in the Base Capital of financial institutions may, on the basis of a request submitted to Banco Central do Brasil, be considered as an institution's exchange exposure and is designated the PLA-V (Adjusted Net Worth – Short). However, this provision was not adopted in this Report, since the objective is to demonstrate the real exposure of the institutions defined as Net Exposure, which is calculated through the following formula:

$$\text{Net Exposure} = \sum_i \left| \sum \textit{Long Position} - \sum (\textit{Short Position} - \text{PLA\_}\textit{Short}) \right|.$$

2.6 Stress scenarios

Stress scenarios are simulations utilized to evaluate capital adequacy in relation to the Basel capital ratio on a specified date. Its objective is to measure the capacity of the PR of SFN member banking institutions to support changes in the PLE provoked by sharp fluctuations in credit, exchange rate and preset interest risk. Since risks and their proportions are taking into consideration in calculating PLE, this concept is utilized as a tool for measuring system risk. In this way, the need for capitalizing noncompliant institutions would represent the amount of risk not covered by the institutions' own capital.

These scenarios were not applied to all institutions since it is not obligatory to remit information below certain minimum values defined by Banco Central in light of the relevance of the risk to the institution and to the system or for the simple reason that not all institutions have credit portfolios.

For purposes of analysis, four stress scenarios were constructed that consider fluctuations in preset interest rates and exchange rates and the downgrading of credit operation risk classifications, both individually and simultaneously. The data utilized in these scenarios refer to the end of December 2004.

Based on data from accounting, exchange exposure and exposure to preset interest rates, the results and respective tax effects were calculated for each scenario and the PR, PLE and Basel capital ratio were recalculated.

Stress scenarios

Number of financial institutions and conglomerates

Itemization	Exchange or interest rate		Credit risk	
	A[1/]	B[2/]	A[1/]	B[2/]
Banking				
consolidated I	77	28	94	11
Banks				
government owned	10	3	13	0
private	67	25	81	11
domestic	38	18	52	4
foreign	29	7	29	7
consolidated II	17	14	23	8
Total	94	42	117	19

1/ Number of institutions included in the stress test.
2/ Number of institutions not included in the stress test.

2.6.1 Universe analyzed

A universe of 136 banking institutions, excluding credit unions, possessing information on at least one of the factors analyzed and representing 96% of the PLE of the SFN was chosen for application of the stress scenarios. Of this total, 94 institutions submitted information on market risk (interest and/or exchange) and 117 on credit risk. It should be mentioned that one institution was not incorporated into the analysis since it is in the process of withdrawing from the financial market. This procedure was also adopted in the previous issue of this Stability Report. When compared to the PLE of the universe analyzed, the figure for that institution represented a negligible share.

2.6.2 Credit risk stress

The objective of credit risk stress is to measure the impact of deterioration in the credit portfolios of financial institutions on capital adequacy levels.

2.6.3 Interest and exchange rate stress

The scenario chosen was the largest result among calculations based on two risk models, Value at Risk (VaR)[24] (parametric model) and the hybrid model (nonparametric model).

The scenarios of upward movement consisted of parallel shifts in the futures interest curve by 7.6 p.p. and an increase in the rate of exchange equivalent to R$ 0.438/US$, from R$ 2.654/US$ to R$ 3.092/US$.

The scenarios of downward movement considered the parallel shifts of the futures interest curve by -1 p.p. and a decline in the rate of exchange equal to R$ 0.329/US$, with variation from R$ 2.654/US$ to R$ 2.325/US$.

2.6.4 Evaluation of results

2.6.4.1 Initial situation

In December 2004, the 136 institutions selected had PR of R$ 162 billion and PLE of R$ 97 billion, corresponding to 94.4% of the PR and 96% of the PLE of the SFN, with a Basel capital ratio of 18.4%.

Stress test – Initial situation
December, 2004

Itemization	Basel capital ratio ranges		
	Lower than 11	Higher than 11	Total
Banking			
consolidated I			
Banks			
government owned			
Number of institutions	-	13	13
Basel capital ratio (%)	-	17.6	17.6
domestic private			
Number of institutions	-	56	56
Basel capital ratio (%)	-	19.0	19.0
foreign			
Number of institutions	-	36	36
Basel capital ratio (%)	-	18.6	18.6
consolidated II			
Number of institutions	-	31	31
Basel capital ratio (%)	-	17.5	17.5
Total			
Number of institutions	-	136	136
Basel capital ratio (%)	-	18.4	18.4

2.6.4.2 Upward stress scenarios

Increased credit risk

The increase in credit risk would reduce the Basel capital ratio to 15.6% as a result of contraction of the PR to R$ 137.4 billion. The largest impact would be felt by the segment of public banks with a reduction of 28.5% in PR and lowering of the Basel capital ratio from 17.6% to 12.5%. In this scenario, eight institutions from consolidated banking segment I (two public, three foreign and three national) registered capital needs of 0.6% of the PLE of the universe analyzed; five institutions from consolidated banking segment II required inflows equivalent to 0.5% of the PLE

24/ See Concepts and Methodologies on pages 72 to 74

Credit risk stress test
Increase in the credit risk

Itemization	Basel capital ratio ranges			
	Lower than 11	Higher than 11	A[1/]	Total
Banking				
consolidated I				
Banks				
government owned				
Number of institutions	2	11	-	13
Basel capital ratio (%)	9.7	13.2	-	12.5
domestic private				
Number of institutions	3	49	4	56
Basel capital ratio (%)	9.8	16.6	122.2	16.9
foreign				
Number of institutions	3	26	7	36
Basel capital ratio (%)	9.6	16.5	48.7	16.8
consolidated II				
Number of institutions	5	18	8	31
Basel capital ratio (%)	7.6	15.4	27.1	14.9
Total				
Number of institutions	13	104	19	136
Basel capital ratio (%)	9.2	15.7	52.6	15.6

1/ Number of institutions not included in the stress test.

Higher interest and foreign exchange rates stress test

Itemization	Basel capital ratio ranges			
	Lower than 11	Higher than 11	A[1/]	Total
Banking				
consolidated I				
Banks				
government owned				
Number of institutions	-	10	3	13
Basel capital ratio (%)	-	16.6	33.9	16.7
domestic private				
Number of institutions	7	31	18	56
Basel capital ratio (%)	8.2	13.7	35.6	13.9
foreign				
Number of institutions	6	23	7	36
Basel capital ratio (%)	10.3	15.7	18.4	14.1
consolidated II				
Number of institutions	3	14	14	31
Basel capital ratio (%)	6.0	12.4	34.9	12.6
Total				
Number of institutions	16	78	42	136
Basel capital ratio (%)	9.6	14.3	22.1	14.2

1/ Number of institutions not included in the stress test.

of the universe analyzed. The sum total of the PLE of these thirteen institutions represents 7% of the PLE of the universe analyzed, after the simulation. The quantity of noncompliant institutions was smaller when compared to June 2004. That simulation registered eighteen noncompliant institutions.

Increased interest and exchange rates

The Basel capital ratio would be reduced to 14.2%, PR would total R$ 156.7 billion and PLE would come to R$ 121.4 billion. In consolidated banking segment I, domestic private institutions would be the most heavily affected, since they would register a reduction of 5.1 p.p. in the Basel capital ratio and seven of them would go beyond the limit. In this scenario, thirteen institutions from consolidated banking segment I (seven national private and six foreign institutions) and three from consolidated banking segment II would need additional capital of approximately 1.4% of the PLE of the universe analyzed. The sum total of the PLE of these sixteen institutions represents 11.3% of the PLE of the universe analyzed after simulation.

Increased interest rates, exchange rates and credit risk

Among the various scenarios, there is no doubt that this scenario registered the worst result, considering that the Basel capital ratio would be cut to 12%. PR and PLE would total R$ 132.2 billion and R$ 121.6 billion, respectively. Institutions from consolidated banking segment II would be the most heavily impacted, since PR would be reduced by 15.9% and PLE would be increased by 38.1%, resulting in a Basel capital ratio of 10.7%. In this scenario, 23 institutions from consolidated banking segment I (four public institutions, nine national private and ten foreign) and eight from consolidated banking segment II would be considered noncompliant, with capitalization requirements of 5.5% of the PLE of the universe analyzed. The sum total of the PLE of these 31 institutions represented 36.2% of the PLE of the universe analyzed, after the simulation was carried out.

2.6.4.3 Downward stress scenarios

Reduced interest and exchange rates

In comparison to the other scenarios presented, the smallest reduction in the Basel capital ratio would occur in this case.

Higher interest and foreign exchange rates and credit risk stress test

Itemization	Basel capital ratio ranges			
	Lower than 11	Higher than 11	A[1/]	Total
Banking				
consolidated I				
Banks				
government owned				
Number of institutions	4	6	3	13
Basel capital ratio (%)	9.3	12.8	31.3	11.9
domestic private				
Number of institutions	9	29	18	56
Basel capital ratio (%)	7.0	12.1	32.6	12.2
foreign				
Number of institutions	10	19	7	36
Basel capital ratio (%)	9.0	16.0	17.4	12.6
consolidated II				
Number of institutions	8	9	14	31
Basel capital ratio (%)	9.8	25.2	32.7	10.7
Total				
Number of institutions	31	63	42	136
Basel capital ratio (%)	9.3	12.7	20.8	12.0

1/ Number of institutions not included in the stress test.

Lower interest and foreign exchange rates stress test

Itemization	Basel capital ratio ranges			
	Lower than 11	Higher than 11	A[1/]	Total
Banking				
consolidated I				
Banks				
government owned				
Number of institutions	-	10	3	13
Basel capital ratio (%)	-	17.5	33.9	17.6
domestic private				
Number of institutions	-	38	18	56
Basel capital ratio (%)	-	18.4	35.6	18.8
foreign				
Number of institutions	-	29	7	36
Basel capital ratio (%)	-	18.6	18.4	18.5
consolidated II				
Number of institutions	-	17	14	31
Basel capital ratio (%)	-	17.0	34.9	17.5
Total				
Number of institutions	-	94	42	136
Basel capital ratio (%)	-	18.0	22.1	18.3

1/ Number of institutions not included in the stress test.

PR would total R$ 163.4 billion (increase of 0.8%); and PLE would come to R$ 98.4 billion (increase of 1.4%). With this, the Basel capital ratio would be reduced to 18.3%, or just 0.1 p.p. In consolidated banking segment I, public banks would have the same Basel capital ratio; national private banks and foreign banks would register a small reduction in the ratio: 18.8% and 18.5%, respectively. In consolidated banking segment II, the ratio would continue unaltered at 17.5%. In this scenario, no institutions would be noncompliant when compared with the initial situation.

Concepts and Methodologies – Stress Scenarios

Stress scenarios

For purposes of credit risk stress, the classification of all clients of financial institutions are downgraded two levels, based on balance sheet data — ranked portfolio. A new provision requirement is obtained as a result of the new classification. Real provisions are subtracted from this result in order to determine the required increase in provisions. After that, the impact of the increased provision on PLE and PR is calculated, thus revealing the impact on the Basel capital ratio.

For purposes of identifying the parameters used in market risk stress scenarios (preset interest and exchange rates), we utilized the largest value obtained through application of the two models: VaR and Hybrid. With regard to VaR the basic methodology is the RiskMetrics methodology which operates on the basis of the hypothesis of normal behavior for the algorithm of the returns of the variables under analysis. In its turn, the hybrid model utilizes historic data but does not draw hypotheses on the distribution of the returns of the variables analyzed, making use of the technique of exponential smoothing – combining several characteristics of the VaR, of RiskMetrics – and of the historic simulation methods.

For these two models, the confidence level of 99.6% (equivalent to one error per year) and a period of position maintenance of ten business days are utilized. With regard to the technique of exponential smoothing, which has the purpose of attributing greater weight to more recent observations, diverse factors of decline between 0.9 and one were utilized. Basically, these factors generate equal weights for all the days of the series, noting that only decline factors between 0.94 and 0.9 were used for the rate reductions scenarios. On each date on which the calculation is made, a series of data encompassing the first business day of January 1999 to the business day immediately prior to the calculation date is used, and the exponential decline chosen is that which generates the largest result.

In applying market risk stress to the PLE, the results of fluctuations in the rates were considered only in the amount of the requirement for market risk (interest + exchange), without altering Assets Weighted by Risk (APR). In PR, the financial impact of exchange variations on net exposure and of changes in interest rates on financial flows of the institutions were considered.

Riskmetrics Methodology to Calculating Value-at-Risk

The RiskMetrics methodology (1994) was developed by the J.P. Morgan financial institution and proposes that value-at-risk (VaR) be calculated through the following equation:

$VaR_t = VMTM \times z_\alpha \times h_t \times \sqrt{\Delta t}$, in which

VMTM Is the value of the assets marked-to-market on date t;
Z_α is the quantile of the normal distribution equivalent to the degree of confidence of the estimate of VaR;
H_t is the conditional volatility on date t for the asset;
Δt is the time interval chosen for calculating VaR.

Principal underlying hypothesis is that of log-normality of asset prices[1].

In order to estimate conditional volatility, RiskMetrics recommends utilization of the Exponentially Weighted Moving Average (EWMA), as shown in the equation below:

$h_t = \sqrt{\lambda h_{t-1}^2 + (1-\lambda) r_{t-1}^2}$, in which

r_t is the return of the asset for period t, defined as $r_t = 1n(P_t/P_{t-1})$, in which P_t price of λ asset in t;
λ is the decline factor, so that $0<\lambda<1$.

The most commonly used EWMA formulation in financial series allows for the hypothesis that the average of the daily returns of the assets is equal to zero[2].

With respect to the decline factor, RiskMetrics suggests $\lambda=0.94$ for daily data. However, models exist for the choice of optimum λ, such as the maximum verisimilitude and the principle of average squares. The value of λ close to one reproduces the stylized fact of the volatility being highly persistent.

In the forecast of EWMA, the conditional variants of the returns is composed of two terms. The first [λh_{t-1}] is composed of a self-regressive term that expresses the temporal dependence of the return variance, the stylized fact present in financial series. The second [{1-λ)] represents the contribution of the most recent observation (innovation) for the estimated variance.

1/ It should also be noted that to utilize the time root to convert from one VaR calculation horizon to another, it is admitted that the prices are log-normally distributed and follow a Markov process.

2/ RiskMetrics also presents the equation in which a median of return different from zero is admitted.

The calculation of the VaR of the portfolio is given by:

$VaR_t = \sqrt{VaR' \rho \, VaR}$, in which

VaR is the vector nx1 containing the VaR of each asset in the portfolio, and n is the number of instruments in the portfolio;
VaR' is the vector 1 x n, vector transposed from vector VaR;
ρ is the matrix nxn containing the correlations among the assets included in the portfolio

The correlation on day t among the assets i and j is calculated through the following formula:

$$\rho_{(i,j),t} = \frac{h_{(i,j),t}}{h_{i,t} h_{j,t}}, \text{ in which}$$

$H_{(i,j),t}$ denotes the conditional covariance i and j on date t, which possesses the same principle of conditional variance calculation, and is obtained by the formula:

$$h_{(i,j),t} = \sqrt{\lambda h_{(i,j),t-1} + (1-\lambda) r_{i,t-1} r_{j,t-1}}.$$

Hybrid Approach to Calculating Value-at-Risk

This box synthesizes the work of Boudoukh et al., published in the Resenha BM&F 122/1998, utilized to calculate value-at-risk in interest and exchange rate stress scenarios. Classified as the hybrid model, this approach consists in recognizing the existent trade-offs in the different methods utilized to calculate value-at-risk and combine these methodologies in such a way as to optimize these trade-offs, while seeking to preserve their respective advantages.

The best known and most commonly used methodologies for calculating value-at-risk consist of the technique of exponential smoothing (the classic example is the RiskMetrics methodology) which uses decreasing weights for past returns, making it possible to perceive the behavior of volatility and historic simulation which ignores hypotheses on the distribution of the returns and utilizes the empirical percentages of the historic distribution of the returns.

The hybrid approach combines these two approaches. The approach of historic simulation uses equal weights to calculate conditional distribution. The proposal is that of using declining weights for past data with these weightings being calculated in a manner similar to the method of exponential smoothing

On making this combination, two undesirable properties of the traditional methods are put aside. On the one hand, the approach of exponential smoothing assumes a multivaried normality, which causes problems as a result of the heavy tails that are found in most financial assets. The historic simulation approach neglects hypotheses on distribution but assumes constant weights for observations of the sampling. The latter hypothesis is quite unrealistic, since the information contained in the returns on current distribution diminishes over time.

In this way, the hybrid approach consists of applying decreasing weights to past returns and encountering the appropriate percentage of this weighted empirical distribution in time. Boudoukh et al. tested the hybrid model for the rate of exchange of the German mark per United States dollar, the spot price of Brent type petroleum, Standard & Poor's 500 index and a generic index of Brady Bonds (J.P. Morgan Brady Bond Index) and concluded that the empirical results show that the hybrid model is superior to the other two, principally in the case of data with heavy tails such as those of the series of petroleum prices and Brady bonds.

2.7 Conclusion

Despite the occurrence of liquidity problems in one institution that provoked a process of monetary authority intervention, the SFN remained solid in the second half of 2004. Assets registered slight growth primarily as a consequence of increased credit operations resulting from the good performance of the export and agribusiness sectors and also of strong expansion in the system of payroll loans and direct consumer credit. Liabilities performed in the opposite direction, as the real appreciated against the United States dollar, which is the currency used in most foreign currency loans and onlendings.

Positive growth of 1% in operations with securities compared to expansion of 9.6% in credit operations indicates a positive tendency among banks to prioritize the channeling of resources into the financing of economic activities and consumption.

Net worth and profits registered growth, principally as a result of retention of profits, results generated by financial intermediation and revenues on services.

Stress tests demonstrated that the levels of capital and net worth of SFN institutions are sufficient to support possible extreme fluctuations in interest rates, exchange rates as well as deterioration in credit portfolios.

Brazilian Payments System

3

3.1 Introduction

Important alterations regarding settlement of interbank liabilities involving checks and charging instruments were introduced into the Brazilian Payments System as of February 2005. As a result, these papers are no longer processed through the Compe Clearance Center. The following changes deserve highlighting:

a) Checks and charging documents in individual amounts equal to or greater than the reference values – VLB-Check and VLB-Charging – are now settled bilaterally directly within the Reserve Transfer System (STR);
b) Charging instruments in amounts below the VLB-Charging are settled through the Deferred Settlement System of Interbank Credit Order Transfers – Siloc.

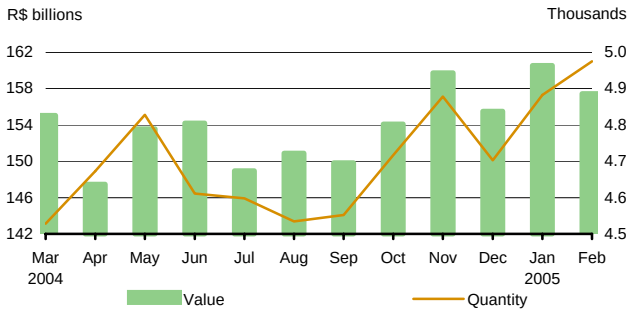
These alterations concluded the process of adjusting Compe to the risk management regulatory requirements of the SPB and generated important repercussions in terms of minimizing propagation of individual risks among the financial institutions participating in the payments system.

No significant alterations were introduced into other systems, as the process of consolidating the changes adopted during restructuring of the SPB moved forward.

3.2 Securities, derivatives and foreign exchange clearing and settlement systems

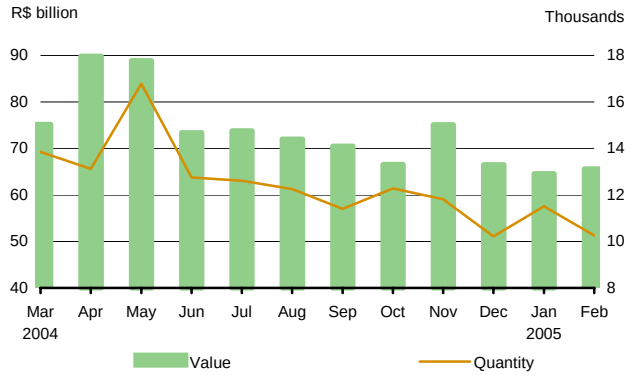
This section will describe the operations of securities, derivatives and foreign exchange clearing and settlement systems in the period extending from March 2004 to February 2005. The indicators utilized are the average daily

Selic
Repo and outwriting operations[1/]
Daily average



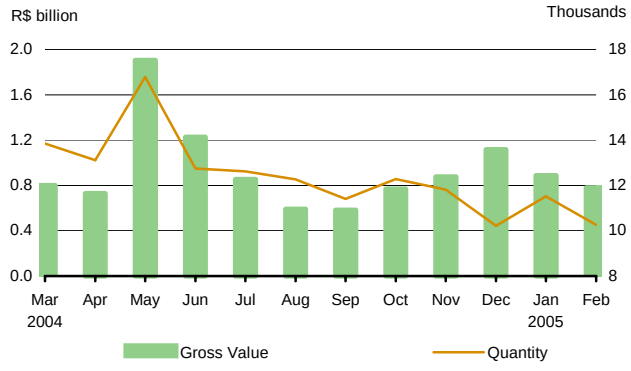
Sources: Bacen and Selic
1/ Central Bank transactions not considered.

BM&F – Derivatives clearinghouse
Turnover – Notional value – Daily average



Sources: BM&F Derivatives Clearinghouse and Bacen

BM&F – Derivatives clearinghouse
Turnover – Gross value – Daily average



Sources: BM&F Derivatives Clearinghouse and Bacen

value and quantity of transactions and average daily clearing capacity[25].

3.2.1 Special System of Settlement and Custody

The Special System of Settlement and Custody (Selic) is the central depositary and settlement system of the federal public securities issued by the National Treasury and Banco Central. When one considers both outwriting and repo operations[26], including those related to Banco Central discount window operations, the system settled an average of 4,700 operations per day, representing average daily volume in the range of R$ 154 billion in the period under analysis.

3.2.2 BM&F Derivatives Clearinghouse

In the BM&F Derivatives Clearing House (BM&F - Derivatives), the daily average notional value of the contracts negotiated[27] was R$73.5 billion and the gross financial value[28] was R$926 million. The highest average notional value (R$90 billion) and the lowest average gross financial value (R$730 million) were registered in April 2004, reflecting the decreased volatility of derivative contract prices negotiated at the Clearinghouse. In that month, the major operations carried out at the Clearinghouse involved interest rate derivative contracts, accounting for 80% of the total notional value of the contracts negotiated.

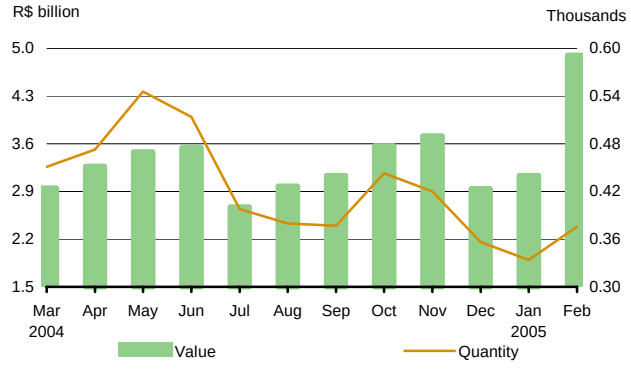
Average BM&F – Derivatives clearing capacity was 68%, corresponding to daily average intraday liquidity savings of R$630 million.

3.2.3 BM&F Foreign Exchange Clearinghouse

The BM&F Foreign Exchange Clearinghouse (BM&F – Foreign Exchange) registered a daily average transaction

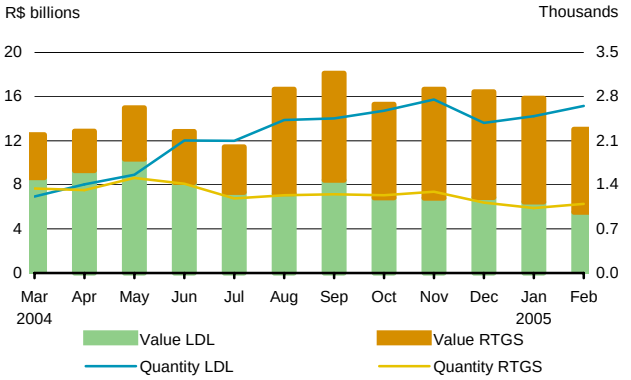
25/ The clearing capacity of the system is the percentage difference between the total value of operations and the value of the respective settlement. It therefore represents the liquidity savings consequent upon clearing of the operations.
26/ Operations with Banco Central do Brasil not included.
27/ Total contract value including the value of the underlying assets.
28/ Gross financial value represents the sum total of all amounts originating from the negotiations, direct and indirect costs, including the guarantee margin, when given in cash. This amount is composed of the daily and periodic adjustments of derivative contracts, by option premiums, by spot, forward and over-the-counter settlements, by the exercise of options and by operational costs.

BM&F – Foreign exchange clearinghouse
Turnover – Daily average



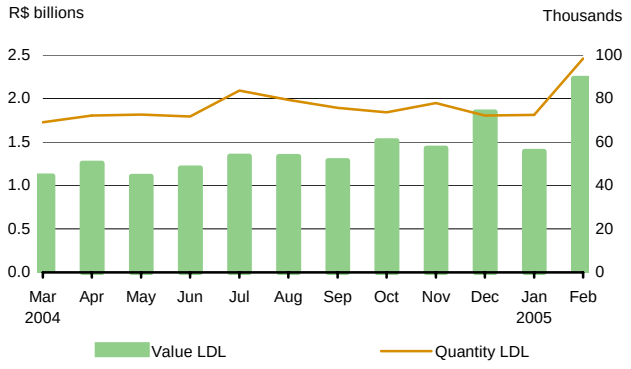
Sources: BM&F FX Clearinghouse and Bacen

Cetip – Clearinghouse
Turnover – Daily average



Sources: Cetip and Bacen

CBLC – Clearinghouse
Turnover – Daily average



Sources: CBLC and Bacen

value of R$3.4 billion[29]. In February 2005, 380 thousand operations were settled in a daily average of R$4.9 billion, the largest volume settled through this system since its creation, representing 81% of the total interbank exchange market[30].

Average clearing capacity was 72% and the average value settled was R$944 million, reflecting a daily average intraday liquidity savings of R$ 2.4 billion.

3.2.4 Custody and Settlement Center

The average stock of private securities on deposit at the Custody and Settlement Center (Cetip) was R$509 billion, corresponding to 92% of total securities registered. Operations settled in the multilateral modality (primary market operations) came to a daily average value of R$ 7.7 billion. The highest average registered was R$ 10.3 billion (May 2004), the month that marked the start of the downward slide in these values. Average clearing capacity of the center was 64%, representing a daily average intraday liquidity savings of approximately R$5 billion.

As of May 2004, when the value of operations settled in the gross modality (primary and secondary markets) is considered, the average increased (maximum value of R$ 9.9 billion, in November 2004).

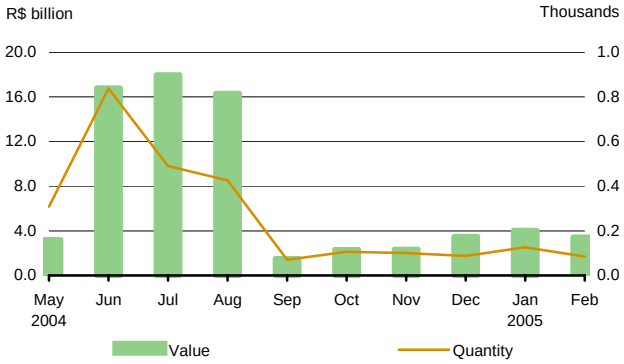
3.2.5 Brazilian Clearing and Depository Corporation

Operations are settled predominantly in the multilateral modality (daily average value of R$1.4 billion and daily average volume of 77 thousand operations). Security issue operations are settled in the gross modality and registered daily average value of R$50 million and daily average volume of ten operations. February 2005 witnessed the highest values for multilateral clearing (R$2.2 billion and 98 thousand operations). Average clearing capacity of the Clearing House was 87%, corresponding to daily average intraday liquidity savings of R$1.2 billion.

29/ Only one side of the negotiation is considered (purchase or sale).

30/ Exchange contracts may also be settled directly in the STR.

BM&F – Securities clearinghouse
Turnover – Daily average



Sources: BM&F Securities Clearinghouse and Bacen

3.2.6 BM&F Securities Clearinghouse

The BM&F Securities Clearing House (BM&F – Securities) has been operating since May 2004. In the first three months of operation, it granted exemptions from fees and charges on its operations. During that period, the Clearing House performed an evaluation of its participants, with the objective of selecting those that would be accredited as market makers. This strategy resulted in a significantly high value of operations in the period (averages of R$17 billion and 585 operations per day).

As of September 2004, the daily average value of the transactions settled by the Clearing House was R$2.9 billion, with a daily average of 96 operations. In the same period, the institution's clearing capacity came to an average of 75%, resulting in a daily average intraday liquidity savings of 2.4 billion.

3.3 Payment clearing and settlement systems

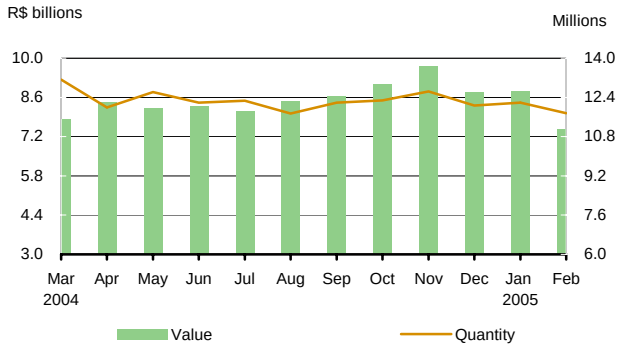
3.3.1 Central Clearing and Settlement System for Checks and Other Papers – Compe

Implementation of gross bilateral settlement of checks and charging documents and the shift of the credit order settlement environment from Compe to Siloc sharply altered the distribution of payments among the different settlement systems.

With the measures adopted as of February 18, 2005, the following alterations were introduced into interbank payment settlement operations:

a) Clearing and setlement of charging documents in amounts below the Gross Settlement Reference Value for Charging Documents (VLB-Charging), which was defined as R$5 thousand, were transferred to Siloc;
b) Settlement of charging instruments in amounts equal to or greater than the VLB-Charging became the task of the STR, bilaterally and at aggregate value;
c) Settlement of checks in amounts equal to or greater than the Gross Settlement Reference Value for Checks (VLB-Check), set at R$ 250 thousand, also became the task of the STR, bilaterally and at aggregate value.

Compe
Value and quantity – Daily average



Sources: Bacen and Compe

With this, R$4.2 billion in daily turnover was withdrawn from Compe, as average financial volume of settlements dropped to R$3.9 billion.

The withdrawal of checks in individual amounts equal to or greater than R$250 thousand and of charging instruments consolidates the process of adjusting Compe to risk management regulatory criteria.

The immediate impact of these alterations can be seen when one separates the February 2005 daily average into two periods: one prior to the new rules going into effect (February 1 to 17) and the other after that period (February 18 to 28).

The daily average Compe turnover as of February 18, 2005, involving checks in amounts of less than R$ 250 thousand, closed at R$3.9 billion, approximately half the total daily average turnover of Compe prior to implementation of the measures described above.

The objective attained was to adequately segregate critical payments from Compe, determining that these payments would be settled bilaterally at their gross value. In this way, it was possible to minimize the risk of contagion in the system which came to be classified as systemically non important by Circular 3,057[31].

3.3.2 Interbank Payments Clearinghouse

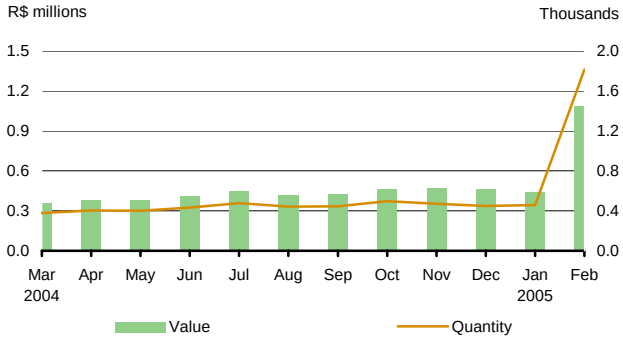
3.3.2.1 Deferred Settlement System of Interbank Credit Order Transfers

The measures adopted to reduce the financial volume settled through Compe determined that interbank settlements of charging documents with individual values of less than R$5 thousand (VLB-Charging) should migrate to a settlement system approved by Banco Central, based on terms agreed upon by the banking system.

An agreement formalized by bank associations decided that these transactions would be settled through Siloc which, up to that time, had operated exclusively in the settlement of DOCs.

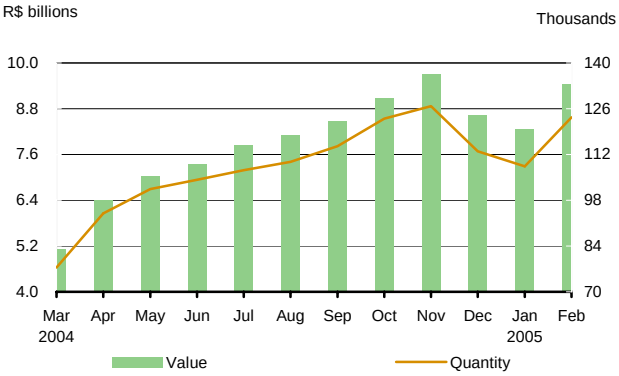
31/ Circular 3,057 determines that all settlement systems are considered systemically important, except fund transfer systems, in which the value in real of the largest operation not accepted in the system on a specific business day in the last six months (K1) is above R$10 million or in which the daily aggregate value in real of operations accepted in the system on a specific business day in the last six months (K2) is greater than R$5 billion.

CIP – Siloc
Value and quantity – Daily average



Source: Bacen and CIP

CIP – Sitraf
Turnover – Daily average



Sources: CIP and Bacen

As a result, Siloc took on the task of clearing and settling only DOCs and charging documents in amounts of less than R$5 thousand. Thus, as of February 18, 2005, these operations came to a daily average of 4.4 million transfers in an overall amount of R$2.1 billion, with DOCs accounting for 460 thousand transfers and R$500 million and charging documents for 3.5 million transfers and R$1.6 billion, respectively, meaning that Siloc is still a systemically non important system.

3.3.2.2 Funds Transfer System

The average daily financial volume settled in Sitraf came to R$9.7 billion in November 2004, the largest value since the system first went into operation. In the same month, the daily average quantity of transfers settled was 127 thousand operations. In February 2005, the daily average turnover of Sitraf was R$9.4 billion, with average processing of 123 thousand credit orders per day.

The largest share of transfers – 92.8%, in February 2005 – is still processed bilaterally at gross value as soon as the operations are received by the system. Consequently, these operations generate immediate impacts on the balances of the financial institutions involved.

In the processing of transfers in the multilateral modality, which accounts for 59.5% of the financial volume of total daily settlements, the average time in the queue was nine minutes, with a standard deviation of three minutes.

In the period under analysis, Sitraf clearing capacity varied between 75% and 80%.

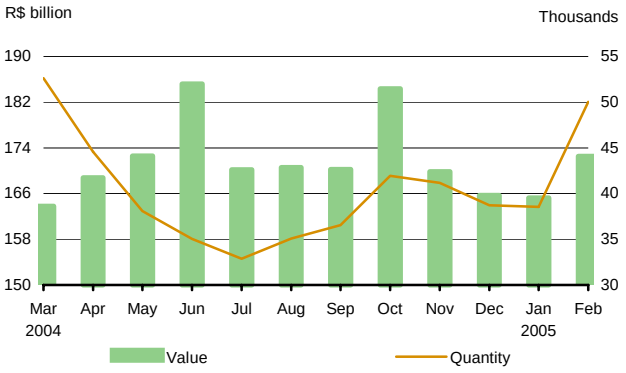
3.3.3 Reserves Transfer System

When discount operations carried out by financial institutions with Banco Central are excluded, the daily average value of payments settled through the STR came to R$172.5 billion in February 2005.

With regard to client account transfers, daily average credit orders increased from 24.4 thousand in October 2004 to 35.5 thousand in February 2005.

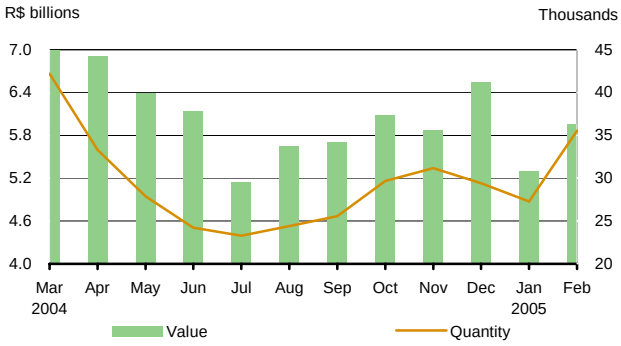
Bilateral settlements of checks and charging documents in amounts equal to or greater than R$250 thousand and R$5

STR – Funds transfer system
Payments – Daily average



Source: Bacen

STR – Funds transfer system
Payments on behalf of customers
Daily average



Source: Bacen

thousand, respectively, generated a daily average of 948 payment messages, with an overall value of R$ 2.6 billion.

3.4 Conclusion

Implementation of bilateral settlement of high value checks and charging documents and the change in the settlement environment of retail charging documents consolidated the first stage of SPB restructuring, adjusting Compe to risk management regulatory requirements and aiding in reducing the risk of contagion among financial institutions.

With this, from the point of view of the distribution of payments among the various systems, the funds transfer clearing and settlement infrastructure in Brazil is now more efficiently balanced as far as management of the risks involved in interbank settlement operations is concerned.

National Financial System organization 4

4.1 Introduction

The austerity that marked monetary and fiscal policy in the second half of 2004 did not impact the expanded credit supply available to the lower income bracket of the population. Demand for credit within this population group followed a steady growth trajectory, primarily as a result of successive declines in basic interest rates as of the second half of 2003 up to April 2004.

The movement toward an expanded credit supply continued impacting financial institution structures, albeit with less intensity, primarily among retail segment institutions, especialy large banks, which maintained their strategies of investing in expansion of their portfolios. It is widely thought that the institutions that operate in this market niche are convinced that the upward movement in the Selic rate is a passing phenomenon. For this reason, there has been no turnaround in expectations of an interest rate decline over a longer horizon, as these institutions have continued orienting their policies toward increased scale, either through acquisitions or organic growth.

4.2 The strategies of market and quantity of institutions of the National Financial System

However, in the case of the private financial sector, the strategies aimed at increasing scale have important particularities. The pursuit of scale by the larger institutions has shifted away from acquisitions (transfers of stock control or incorporations, as occurred in the operation in which the União de Bancos Brasileiros S.A. – Unibanco acquired the Banco BNL S.A., in the period under consideration) toward formal association contracts or

operational agreements among financial conglomerates and retail trade networks or, in some cases, with small and medium size financial institutions.

The fact of the matter is that these are not new strategies, though they have intensified in recent months. In previous years, Unibanco formed an association with the Ponto Frio and Luiza Magazine groups and, more recently, the Itaú conglomerate created an association with the CBD (Pão de Açúcar) group, while the Bradesco conglomerate and Casas Bahia came together with the same purpose in mind or, in other words, providing financing to the clients of these stores. At the same time in which these strategies finance the sales of these groups, they also make it possible for the financial institutions involved to generate a potential portfolio of clients represented by consumers of the goods offered by these large scale chains. Parallel to this, there is also the possibility of attracting these clients to become consumers of other financial products.

Another strategy used with the objective of increasing scale involves operational agreements among larger financial conglomerates and small and medium size financial institutions. In this case, these agreements have focused on the market niche created by the recent institutionalization of payroll loans, available both to the employees of public sector institutions, including retirees and pensioners, and persons working at private companies. On the basis of these agreements, the conglomerates acquire the portfolios of these operational modalities from the original institutions, making it possible for them to create new portfolios. Though these portfolios are restricted to the operational limits of the latter grouping of institutions, this mechanism has become an important instrument in creating greater leverage.

It is important to stress that, as of the second half of 2004, this operational modality – payroll loans instituted by law 10,820, dated December 17, 2003 – became an important mechanism of consumer financing. These operations were responsible for considerable growth in credit since they operate at interest rates lower than those normally practiced by the market. This credit modality has clearly met demand on the part of both public and private sector employees, including those now working and retirees and pensioners, and is now considered an important credit mechanism within the retail financing system.

Though it is not yet possible to affirm that acquisition processes among financial system institutions have come

Total amount of financial institutions

Itemization	2002	2003	2004	
	Dec	Dec	Jun	Dec
Banks				
Multiples	143	141	139	140
Domestic	80	82	82	83
With foreing participation	11	9	9	10
Under foreing control	52	50	48	47
Commercial and foreign banks full branches	23	23	24	23
Nacional	11	11	12	12
With foreing participation	-	-	-	-
Under foreing control	3	3	3	2
Foreing banks full branches	9	9	9	9
Development	4	4	4	4
Investment	23	21	21	21
Saving banks	1	1	1	1
Associations				
Leasing	65	58	54	51
Consumer finance companies	46	47	47	46
Saving and loan companies and saving and loan associations[1/]	18	18	18	18
Securities brokers	161	147	145	139
Exchange brokerage companies	42	43	45	47
Securities dealers	151	146	141	138
Development agencies	10	11	12	12
Mortgage companies	6	6	5	6
Subtotal	693	666	656	646
Credit unions	1 430	1 454	1 447	1 436
Microentrepreneur credit companies	37	49	48	51
Subtotal	2 160	2 170	2 151	2 133
Consortium managers	376	365	364	364
Total	2 536	2 535	2 515	2 497

1/ Institutions that do not catch resources of the public.

to an end, in the second half of 2004 the strategies described above were responsible for absorbing the major share of investments in the reorganization of these institutions. This explains the very small change in the quantity of institutions, particularly among multiple and commercial banks as indicated in the chart on the number of authorized financial institutions.

The small change that occurred in the case of multiple banks was a consequence of operating authorization granted to Credicard Banco S.A., thus increasing the number of institutions in the category of national multiple banks from 82 to 83, and of authorization for the acquisition of Banco BNL do Brasil S.A. by Unibanco, raising the institutions classified as national multiple banks with foreign participation from nine to ten and reducing the number of institutions in the category of national multiple banks with foreign control from 48 to 47. In the case of commercial banks, this movement was restricted to the classification of banks under foreign control, with a drop from three to two, as a result of the change in the declared corporate objective of Banco Unión Brasil S.A., which withdrew from the financial system.

Utilization of acquisitions, association contracts or operational agreements to achieve greater scale has been concentrated mostly in the private financial sector. In the public financial sector, expansion strategies have been based primarily on organic growth. By way of example, both Banco do Brasil S.A. and the Federal Savings Bank have sought to increase the volume of their operations by expanding their own branch networks and making added use of correspondents in the country. In the case of Banco do Brasil, its subsidiary -BB Banco Popular do Brasil S.A., an institution that focuses on microcredit operations - has sharply expanded the volume of its operations in this segment through the use of correspondents.

Though private sector financial institutions have expanded their branch networks, Banco do Brasil S.A. and the Federal Savings Bank were the institutions that invested most heavily in expansion in the second half of 2004, raising the number of their branches by 67 and 141, respectively.

Going on to microfinancing, it is important to stress two opposite movements involving the more popular levels of this market niche. The number of credit cooperatives climbed slightly and the number of microentrepreneur credit companies increased. As can be noted in their trajectory between 2002 and 2004, these movements are

more a result of the organic characteristics of the microfinance segment itself and do not represent tendency in this sector. With regard to the third element included in this segment, that of correspondents in the country, the numbers registered in the period reaffirm a consistent growth trend under this modality of banking services.

4.3 Reorganization processes, capital structure and operational dynamics of the SFN

The events that occurred in the second half of 2004 did not produce any significant alterations in the functionalities of financial institutions to an extent that would require reorganization processes of a magnitude capable of generating structural changes in the SFN.

With the exception of the purchase of Banco BNL do Brasil S.A. by Unibanco, reorganization processes were restricted to internal procedures implemented by financial institutions and conglomerates as a result of past acquisitions that required the reordering of their stock participation flowcharts.

In this sense, movements within the system were a consequence of normal processes of entry and withdrawal of institutions, with no significant impact on the overall structure. Almost all SFN segments registered movements with these characteristics. The most important was creation of the Credicard Banco S.A. (multiple bank), Banco Safra de Investimentos S.A., Lecca Distribuidora de Títulos e Valores Mobiliários Ltda., as well as three institutions in the segment of microentrepreneur credit companies and two exchange brokers. In the segment of credit cooperatives, 29 institutions were authorized to operate while 31 withdrew from the market, resulting in a decline of eleven in the period. As already mentioned, the second half of 2004 was marked by association contracts and operational agreements among large financial conglomerates and retail chains, on the one hand, and small and medium size financial institutions, on the other. In the first case, these operations involved financing of consumer goods sales and, in the second, payroll loans.

As is already widely known, these operations were responsible for the significant growth registered by credit operations in the country in recent months. For the most part, these operations have been targeted to the low income population

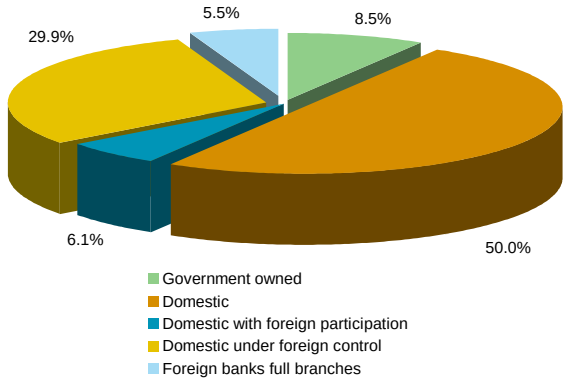
Banking participation in the main financial aggregates of the Mandatory Chart of Accounts of the Brazilian Financial System
December, 2004

%

Itemization	Amount	Equity	Total assets[5/]	Deposits	Credit operations
Banking[1/]					
Government owned[2/]	14	17.91	34.94	39.84	31.99
Private	150	82.08	65.06	60.16	68.01
Domestic	82	37.83	25.00	21.27	23.22
Domestic with foreign participation[3/]	10	16.46	17.31	18.69	19.08
Domestic with foreign ownership[4/]	49	26.57	21.92	19.95	25.22
Foreign banks full branches	9	1.22	0.83	0.25	0.49
Total	164	100.00	100.00	100.00	100.00

1/ It includes multiple, commercial bank and Caixa Econômica Federal.
2/ It includes Caixa Econômica Federal.
3/ Foreign participation equal to or greater then 10% and lower than 50%.
4/ Multiple and commercial banks with foreing control.
5/ It is not diminished by the brokerage.

Distribution of the banking system sorted by capital origin
December, 2004



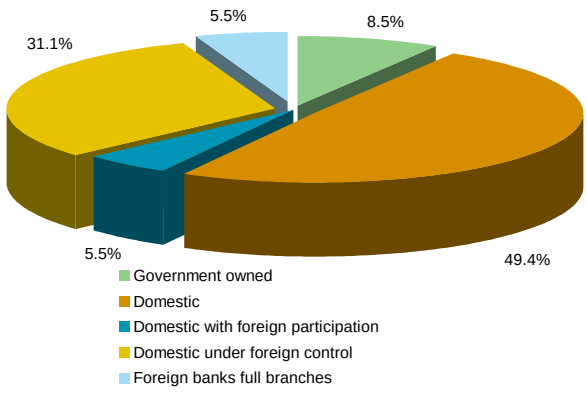
Banking participation in the main financial aggregates of the Mandatory Chart of Accounts of the Brazilian Financial System
June, 2004

%

Itemization	Amount	Equity	Total assets[5/]	Deposits	Credit operations
Banking[1/]					
Government owned[2/]	14	17.1	35.2	40.7	31.8
Private	150	82.9	64.8	59.3	68.2
Domestic	81	36.5	22.6	21.2	20.6
Domestic with foreign participation[3/]	9	18.1	18.9	19.2	22.0
Domestic with foreign ownership[4/]	51	26.9	22.3	18.7	24.8
Foreign banks full branches	9	1.4	1.0	0.2	0.8
Total	164	100	100	100	100

1/ It includes multiple, commercial bank and Caixa Econômica Federal.
2/ It includes Caixa Econômica Federal.
3/ Foreign participation equal to or greater then 10% and lower than 50%.
4/ Multiple and commercial banks with foreing control.
5/ It is not diminished by the brokerage.

Distribution of the banking system sorted by capital origin
June, 2004



– a demand heading that was not met by traditional credit lines in the past – and channeled into consumption.

In order to take advantage of credit growth in this market niche – financing consumption through either direct consumer credit or payroll loans – financial institutions have joined together with large retail chains (supermarkets, department stores etc.). These association contracts have taken on distinct configurations. There are two modalities that are most representative of this strategy. The first involves creation of a financial institution specialized in direct consumer credit – finance and investment credit companies. In this case, control is shared between the financial conglomerate and the retail group, with the primary objective of operating in the financing of sales and placement of other financial products (transforming retail clients into bank clients). The other modality involves simple agreements with specified duration through which the contracting financial institution takes on the task of financing new direct consumer credit operations, with the possibility of also selling other financial products. In this case, no specific financial institution is created for this purpose.

Another instrument that has been utilized by large conglomerates to expand their portfolios are operational agreements with small and medium size institutions with the purpose of purchasing the payroll loan portfolios contracted by the latter institutions with public and private sector employees. Similar contracts have been formalized with retirees and pensioners. This new loan modality has been shown to be responsible for credit growth in recent months. At the same time, the targeting of these operations into consumption has leveraged the operations of the retail trade sector and, consequently, industry and its suppliers, with a corresponding increase in the job supply.

However, the operational dynamics of the financial system did not significantly alter distribution of the relative participation of the different banking segments in the major financial aggregates stated in the National Financial System Institutions Accounting Plan (Cosif) in the second half of 2004, compared to the first half of the same year. This becomes clear when one analyzes the charts on the participation of banking segment institutions in the major accounting aggregates.

Foreign investments in the SFN in the period did not change in any significant way, as demonstrated by the numbers in the accompanying chart. Banco Unión Brasil S.A., which is based in Venezuela, altered its corporate objective and

National banks with foreign ownership or foreign banks in Brazil

December, 2004

Amount

Itemization	Banks in Brazil						
	Under foreign control				Foreign[1/]	Total	%
	Multi-ples	Commer-cial	Sub total	%			
South America	2	-	2	4.1	3	5	8.6
Uruguay	2	-	2	4.1	1	3	5.2
Argentina	-	-	-	0.0	2	2	3.4
Asia	4	1	5	10.2	-	5	8.6
Japan	4	-	4	8.2	-	4	6.9
South Korea	-	1	1	2.0	-	1	1.7
USA	12	-	12	24.5	3	15	25.9
Europe[2/]	29	1	30	61.2	3	33	56.9
United Kingdom	3	-	3	6.1	1	4	6.9
Switzerland	2	-	2	4.1	-	2	3.4
Sweden	1	-	1	2.0	-	1	1.7
Euro area	23	1	24	49.0	2	26	44.8
Netherlands	8	-	8	16.3	1	9	15.5
Germany	5	-	5	10.2	1	6	10.3
Spain	4	1	5	10.2	-	5	8.6
France	4	-	4	8.2	-	4	6.9
Portugal	2	-	2	4.1	-	2	3.4
Total	47	2	49	100.0	9	58	100.0

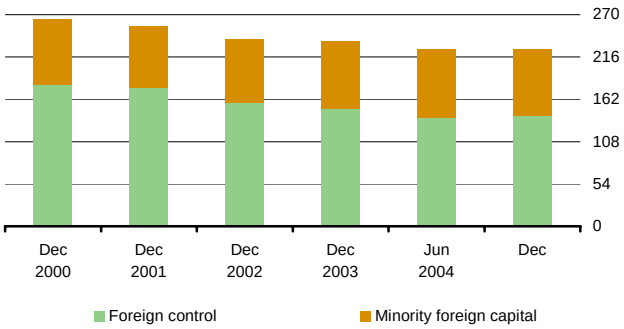
1/ Foreign banks full branches.
2/ It includes euro area countries.

National financial institutions under foreign control or with foreign participation[1/]

Itemization[2/]	2001	2002	2003	2004	
	Dec	Dec	Dec	Jun	Dec
Foreign control	176	158	150	139	141
Minority foreign capital	79	81	86	87	85
Total	255	239	236	226	226

1/ Banking institutions and other types financial institutions.
2/ Participation in voting capital.

Total amount of financial institutions under foreign control or with foreign participation



withdrew from the SFN, while Banco BNL do Brasil which was controlled by capital resident in Luxembourg, was acquired by Unibanco.

Here, one should also underscore the fact that the movement of foreign investments within the SFN in the last three years has consisted mostly of the sale of some institutions to major national conglomerates with strong presence on the market and in no way reflected a situation of capital out flow. Quite to the contrary, this movement can be considered as inherent to the dynamics of the financial system itself. In this context, the scenario of economic stability that now characterizes the nation has generated the conditions required for new external investments in the SFN.

4.4 Microcredit

The figures presented in the charts referring to credit cooperatives, microentrepreneur credit companies (SCM) and correspondents in the country confirm the growth trend that has marked the microcredit sector in previous half-year periods.

However, these numbers do not reflect the institutional measures adopted by the federal government, some with the participation of Banco Central. Among these measures, it is important to highlight expansion of the different types of credit cooperatives, access to funding sources for purposes of providing backing to microcredit operations; creation of the simplified current account and savings account; exemption from bank fees and presentation of proof of income and address in operations with the low income population; regulation of payroll loans for workers and INSS retirees; exemption from the CPMF in microcredit operations when withdrawals are made directly at financial institution outlets.

With respect to credit cooperatives, the regulatory measures adopted generated strong impacts on the organizational and operational structures of the institutions that intend to take advantage of the new opportunities provided to the sector and, initially, tended to stimulate mergers and incorporations that resulted in a reduction in the number of companies in operation. This movement is a natural response on the part of the segment in its pursuit of a stronger asset and structural foundation to support its operations.

The outlook is that these measures will generate their most important impacts in the coming years as the number of credit cooperatives and microentrepreneur credit companies expands in all regions of the country, strengthened by more professional management capable of consolidating this financial system segment as a competitive alternative for the providing of credit in the niches in which they operate.

4.4.1 Microentrepreneur credit companies

The chart on the evolution of the financial aggregates of Microentrepreneur Credit Companies (SCM) demonstrates that this segment maintained its growth trajectory in the second half of 2004. As a matter of fact, the number of institutions rose from 48 to 51 in the period in question, while net worth increased by 39%, total assets grew by 21%, credit operations expanded by 30% and indebtedness declined 11%.

In step with this growth, important institutional changes were introduced in the period. Resolution 3,229, dated August 26, 2004, introduced two other regulatory instruments – Resolution 3,109, dated July 24, 2003, and Resolution 3,212, dated June 30, 2004 – which regulated an important source of funding for the financing of operations within the microcredit segment, determining that 2% of demand deposits received by financial institutions must be channeled into microcredit operations[32].

In this case, the improvement consisted of the fact that permission was granted so that resources transferred to the SCMs and targeted to productive microcredit operations, at rates of up to 4% per month, as well as targeted productive microcredit operations acquired from SCM, Oscip and ONG[33], with interest rates of up to 4% per month charged to the borrower, could be included within the specified percentage.

Another important decision adopted in the second half of 2004, dated November 29, 2004, converted in to Law 11.110, dated April 25, 2005, which instituted the National Targeted Productive Microcredit Program (PNMPO), with the

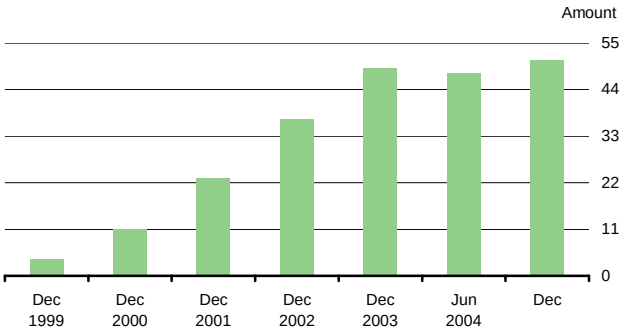
Microentrepreneur credit companies – SCMs
Evolution of financial aggregrates

R$ thousand

Period		Amount	Equity	Total assets[1/]	Credit operations	Liabilities accounts[2/]
1999	Dec[3/]	4	0	0	0	0
2000	Dec	11	2 075	2 262	1 146	187
2001	Dec	23	4 894	7 636	4 734	2 743
2002	Dec	37	7 411	14 680	10 831	7 270
2003	Dec	49	18 014	29 889	17 661	11 875
2004	Jun	48	22 446	34 718	20 920	12 271
2004	Dec	51	31 328	42 217	27 206	10 889

1/ It excludes memorandum accounts, but it includes credit operations.
2/ It is equal to total liabilities, dismished by memorandum accounts and net worth.
3/ Since oct/1999 there have been created SCMs, based on Resolution 2,627, but operations began in feb/2000.

Microentrepreneur credit companies



Distribution of SCMs by region

Amount of SCMs

Region	2000	2001	2002	2003	2004	
					Jun	Dec
Northeast	0	2	3	4	4	4
North	0	0	1	1	2	2
Center-West	1	1	1	0	0	1
Southeast	9	18	25	36	35	35
South	1	2	7	8	7	9
Total	11	23	37	49	48	51

32/ Law 10.735, dated September 11, 2003, determined that financial institutions were obligated to target 2% of their demand deposits into microcredit operations, under the conditions specified therein.

33/ Oscip – Public Interest Civil Society Organizations: NGO – Non Governmental Organizations

objective of stimulating generation of jobs and earnings among low income microentrepreneurs.

This Provisional Measure disciplined the organization of micro and small undertakings by individuals and legal entities with a view toward making them beneficiaries of the resources set aside by law 10.735, dated September 11, 2003, regulated by the Resolutions cited above, and of the Workers Support Fund (FAT), under the conditions specified therein.

On the credit supply side, these two instruments made it possible to expand the sources of financing, aggregating FAT resources to those drawn from demand deposits, and to take a more flexible approach to compliance with credit requirements while, on the demand side, increasing the scope of these resources by including important segments of the population.

On November 18, 2004, the United Nations Organization, complying with a decision taken in 1998 by the General Assembly, established 2005 as the international year of microcredit, in light of the importance of this financial segment in providing the resources needed by the low income population.

4.4.2 Credit cooperatives

Despite such important institutional improvements introduced into the Brazilian credit cooperative movement in recent years as the changes adopted by Banco Central for the purpose of disciplining the constitution and operations of credit cooperatives, this segment of the SFN must make additional progress in the process of its consolidation as a competitive credit alternative for micro, small and medium businesses and the low income population. In this context, the culture of cooperativism must be further disseminated within society and backed by professional management standards and economic-financial solidity at the institutional level, so that this type of undertaking will be viewed as feasible and reliable.

The credit cooperative movement plays a preponderant role in the pursuit of government objectives of social inclusion and easier access to traditional financial services. In doing so, it is essential that credit cooperatives be characterized as professionally managed institutions capable of ensuring the sustainability of the undertakings they finance. Consequently, it is essential that they give due attention to the qualifications of their directors and the question of

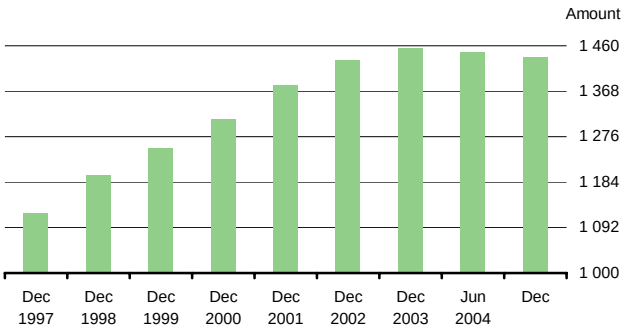
Credit union participation in the main financial aggregates of Mandatory Chart of Accounts of the Brazilian Financial System[1/]

%

Period	Amount	Equity	Total assets	Deposits	Credit operations
1997 Dec	1 120	1.6	0.4	0.5	0.7
1998 Dec	1 198	1.6	0.5	0.6	0.9
1999 Dec	1 253	1.8	0.7	0.8	1.1
2000 Dec	1 311	2.0	0.8	1.0	1.2
2001 Dec	1 379	2.0	0.9	1.3	1.6
2002 Dec	1 430	2.2	1.0	1.5	1.8
2003 Dec	1 454	2.2	1.3	1.8	2.1
2004 Jun	1 447	2.4	1.4	1.5	2.2
2004 Dec	1 436	2.6	1.4	1.4	2.3

1/ It includes multiple banks, commercial banks, saving banks and credit union.

Credit unions



operational security. In this context, the most recent measures introduced into regulations are included in Resolution 3,106, dated June 25, 2003, and Appended Regulations, and have the purpose of disseminating this culture while expanding the requirements for such associations, firmly based on economic-financial feasibility studies of the undertakings and the professional qualifications of their directors. In this framework, a role of fundamental importance was attributed to the Central Credit Cooperatives in the monitoring and control of their affiliated cooperatives. The basic premise of the new regulations is constitution of economically feasible institutions able to compete over a long-term horizon and achieve sustainable growth.

Current requirements for constituting credit cooperatives are viewed as essential to the success of these undertakings and their growth since, in the future, the simple good intentions of their organizers will not be sufficient and will have to be replaced by highly professional knowledge and project management. In this way, undeniable quality gains will be ensured, making it possible to more fully evaluate the participation of this segment in the highly competitive environment of the financial system, preparing it for the true challenge of sustainable growth.

Discussions on interest rates and their tendencies in the macroeconomic environment, questions of scale, productivity and costs, as well as management strategies, have become a part of the daily operations of the credit cooperative segment as a result of the incentives generated by the new rules applicable to constitution of these entities. The first reaction to these alterations was proliferation of new institutions created at the impulse of their founders. Soon afterwards, however, they were substituted by culturally more dense institutions born of deeper reflection on the extension and depth of the recently implemented regulations, as reflected in projects founded upon considerably more mature ideas.

A comparison of this scenario with the performance of the credit cooperative system in the second half of 2004 is not a question of simply measuring results based on the number of cooperatives in operation but, above all else, it is an evaluation of the qualitative actions adopted by the majority of the institutions operating in this segment in their pursuit of progress. In this framework, over the short and medium-terms it is expected that there will be a reduction in the number of cooperatives, as a result of incorporations and mergers, with evident benefits in terms of efficiency and minimum risk of unfeasibility.

Targeting of non-earmarked resources for credit operations

R$ bilions

Segments	2002		2003		2004	
	Jun	Dec	Jun	Dec	Jun	Dec
National Financial System (%)	29	25	30	31	31	35
Non-earmarked resources[1/]	400	494	516	557	610	673
Loans net[2/]	117	122	152	174	187	235
Credit Unions(%)	44	43	42	44	53	59
Non-earmarked resources[1/]	7.7	9.0	10.4	11.7	11.0	11.7
Loans net[2/]	3.4	3.9	4.4	5.2	5.8	6.9

Source: Sisbacen

1/ Considered deposits plus working capital.

2/ On-lending excluded, this occurs because these operations possess defined source of funding of resources.

This perception is corroborated by the first movements in the period following introduction of the new rules, indicating that the number of cooperatives has not increased. However, there has been a clear upgrade in the quality level as a result of the processes of reorganization aimed at adjusting these institutions to the new market environment, particularly with regard to their transformation into the modalities authorized to freely admit members, businesspersons and representatives of microbusinesses. It is important to observe that, among the 201 operating authorization requests received for these new modalities, 139 (66%) involve questions of transformation and 62 (34%) with constitution.

Also with regard to the credit cooperative system, attention should be given to the question of the targeting of the so-called nonearmarked resources, including deposits and working capital. One can observe greater optimism within the cooperative system as regards the possibility of meeting credit demand, as projections point to an upward trend over time, in some cases, reaching full capacity (approximately 60% of available resources), as compared to 35% in the traditional financial system.

As is clear, in terms of resources, Brazil still has a very low level of investments in so-called productive credit operations, though expansion in recent years can not be ignored. This growth has been particularly strong in the cooperative segment which, in relative terms, invests much more in credit operations than traditional institutions.

As a result of these actions, it is possible to observe that participation of cooperatives in the SFN has been evolving, though this growth is still rather timid in relation to expectations due, to some extent, to the fact that there has not yet been sufficient time for these entities to fully adapt to the new rules. However, they have generated results that are in keeping with the principles of social inclusion, in terms of the increased volume of resources channeled by them into productive activities and of the increase in the number of people who have benefited from these operations.

4.4.3 Correspondents in the country

In the second half of 2004, significant growth was registered in the number of correspondents in the country. This movement which, in keeping with the strategies adopted by financial institutions to achieve organic growth, is concentrated mainly among those that have not opted to

Outlets representatives

Contractor	2002	2003	2004	
	Dec	Dec	Jun	Dec
Caixa Econômica Federal	12 232	12 702	13 959	14 268
Lemon Bank	1 705	4 607	5 543	5 544
Banco do Brasil[1/]	1 082	1 182	1 257	4 695
Banco Bradesco	2 689	4 276	4 276	4 276
Banco ABN AMRO Real	3 469	3 516	3 516	3 516
Banco Nossa Caixa	16	172	172	845
Banco BMG	568	760	760	760
Banco Lloyds TSB	343	608	608	608
Unibanco	348	404	404	405
Banco Investcred Unibanco	-	348	348	348
Banco Panamericano	327	327	327	327
Banco Fininvest[2/]	132	318	318	318
ASB CFI	180	210	210	210
Malcon Financeira CFI	174	180	180	180
Banco Matone	136	176	176	176
Finaustria CFI	138	138	138	138
Ibibank	102	137	137	137
Banco Finasa[3/]	100	110	110	110
Banco Schahin	5	105	105	105
Banco Cargill	103	103	103	103
Banco do Estado de Sergipe	66	70	71	93
OMNI CFI	79	89	89	89
Banco Citibank N.A.	63	74	74	74
Banco Alvorada[4/]	72	72	72	72
Portocred CFI	68	68	68	68
Banco Pine	-	66	66	66
Banco Morada	26	64	64	64
Banco BBM	61	61	61	61
Subtotal	24 284	30 943	33 212	37 656
Other institutions[5/]	425	481	475	502
Totais	24 709	31 424	33 687	38 158

1/ It includes outlet contractors authorized to BB Banco Popular do Brasil.
2/ Banco Fininvest had acquired Creditec CFI and its assets.
3/ Banco Finasa (former Continental) had acquired Banco Zogbi and its assets.
4/ Banco Alvorada had acquired Banco BCN and its assets.
5/ Amount of 52 institutions with less than 50 outlets each contractor.

acquire other institutions, confirms the trend toward expansion in the providing of this type of service to the population. Though it certainly does not substitute a traditional branch network, it is a less burdensome alternative for providing financial services, making it possible to extend these services into localities where installation of bank branches is not economically feasible.

The leading institutions among those that contracted correspondents in the country in the period under consideration were Banco do Brasil, the Federal Savings Bank, Nossa Caixa and Banco do Estado de Sergipe. In the case of Banco do Brasil, the network of correspondents increased by 273%, mostly for the purpose of creating a system that would give its subsidiary, the Banco Popular do Brasil, which is specialized in the microcredit segment, the capillarity required to support its activities in this market niche considered to be essential to impacting those communities that do not have access to traditional credit instruments.

Maintaining the trend that marked previous periods of time, the Federal Savings Bank expanded its network of correspondents by 2.21% in the second half of 2004. This was achieved through the network of lottery shops, since contracting of the shops involved even lower costs than would have been incurred in the contracting of another type of legal entity to perform this function, since lottery shops already possessed the needed infrastructure.

Surprising growth was also registered in the period in the networks of banking correspondents at Nossa Caixa (391%) and Banco do Estado de Sergipe S.A. (31%). In the case of the latter institution, the correspondent network has increased in consecutive half year periods, albeit at varying rates.

If one were to totalize growth in the overall network of correspondents in December 2004, the final figure would come to 13,27%, confirming the growth trend that has occurred in this bank service modality in the last two years. It is evident, therefore, that this instrument has become a consolidated market alternative in providing financial services to populations in distant areas of the country that did not previously have access to these services and in large urban centers.

National Financial System regulation 5

5.1 Introduction

In the second half of 2004, the highlight of the process of improving prudential regulation was the issue of Communiqué 12,746, dated December 9, 2004, which defined the schedule to be observed in adapting the SFN to the recommendations issued by the Basel Committee on Banking Supervision, as stated in the document "International Convergence of Capital Measurement and Capital Standards: a Revised Framework" or "Basel II".

Among the measures issued in the second half of 2004 with the aim of improving SFN organization and procedures, the most important are those concerning deposit accounts (in national and foreign currencies), the FGC, microcredit operations, group buyer association regulations, repo operations, together with those designed to improve accounting procedures.

5.2 Main rules

I – Adjustment to Basel II recommendations

Communiqué 12,746, dated December 9, 2004, released the procedures to be adopted in implementing the new capital structure based on the recommendations of the Basel Committee on Banking Supervision contained in the document "International Convergence of Capital Measurement and Capital Standards: a Revised Framework" or "Basel II". This document deals with the definition of criteria governing regulatory capital requirements better suited to the risk levels associated with operations carried out by financial institutions. At the same time, the Communiqué has the objective of adapting these guidelines to the conditions, peculiarities and characteristics of the Brazilian market.

While emphasizing that the recommendations contained in Pillar 2 (Supervisory Review) and in Pillar 3 (Transparency and Market Discipline) will be applied to all SFN institutions, Banco Central announced that, with respect to the guidelines related to Pillar 1 (Capital Requirements), ratings assigned by external credit risk classification agencies will not be used for purposes of calculating capital requirements and that a simplified standard approach consisting of improvements in the current approach should be applied to the majority of financial institutions. Larger institutions will have the right to use the advanced approach, founded upon an internal risk classification system.

With respect to operational risk, it was announced that studies and tests carried out by the Banco Central do Brasil technical staff will be used to identify the methodology best suited to the SFN and the best way in which to implement it. It is hoped that the institutions eligible to utilize the advanced approach, based on an internal credit risk classification system, will also become eligible to utilize advanced approaches to the measuring of operational risk. Insofar as market risk is concerned, the recommendations contained in the Amendment to the Basel Accord, published in 1996 and not altered by "Basel II", will be incorporated, thus extending the capital requirement rule to include exposures not yet covered, making it possible to use internal models for those institutions in compliance with the eligibility criteria to be announced.

The rules and criteria referring to implementation of Basel II will be the same for national and foreign capital institutions. In this sense, the requirements and demands for validation of internal credit, market and operational risk classification systems will be the same for all institutions operating in Brazil.

The communiqué included the implementation schedule of the new capital requirement structure, consisting of the following stages:

I. Up to the end of 2005: review of credit risk capital requirements for purposes of adopting the simplified approach and introduction of capital requirement for market risk, not yet covered by the regulations, as well as development of impact studies at the market level for the simpler approach for operational risk foreseen in Basel II;

II. Up to the end of 2007: definition of eligibility criteria for adoption of the internal market risk models and planning of validation of these models, definition of eligibility criteria for purposes of implementation of the approach based on internal credit risk classifications and definition of the capital requirement for operational risk (the basic indicator approach or standardized alternative approach);

III. 2008-2009: validation of internal market risk models, definition of the schedule for validation of the approach based on internal credit risk classifications (fundamental or basic), start of the process of validation of the internal credit risk classification systems and release of criteria for recognition of internal operational risk models;

IV. 2009-2010: validation of the internal classification systems through the advanced approach to credit risk and definition of the validation schedule for the advanced operational risk approach;

V. 2010-2011: validation of internal methodologies for calculating capital requirements for operational risk.

II – Group buyer associations

Circular 3,260, dated October 28, 2004, introduced new regulations on the granting of authorization and cancellation of authorization to manage group buyer associations, transfers of stock control, split-ups, mergers, incorporations and other acts, while also defining conditions for exercising positions on the boards of administration and fiscal councils of these associations, updating the regulatory provisions set down by Circular 3,070/2001, and incorporating innovative aspects instituted through Resolution 3,048/2002 and applicable to financial institutions.

Circular 3,261, dated October 28, 2004, represents another step forward in the regulating of group buyer associations, determining that the resources collected from buyer groups and invested in investment funds must not surpass the limit of 20% of the net worth of the fund. Investments in funds operating on the derivatives market and generating exposure of more than one times the respective net worth of the fund and that receive investment resources from the administrative entity itself are prohibited to these associations. The Circular also altered the formula used in calculating the leverage limit for group buyer association operations. The sum total of the balance of liability operations

plus the balance of available resources as stated in the Statement of Changes in the Available Resources of Consolidated Groups can not surpass the limit of six times the value of Adjusted Net Worth (PLA). Finally, it determined that the person responsible for information pertinent to the activities of the association must be a director of the entity.

Parallel to this, considering the need to improve the accounting standards applicable to group buyer associations so as to foster analysis of the performance of these groups according to logical-accounting reasoning, Circular Letter 3,147, dated September 29, 2004, implemented a new system of keeping accounting records and issuing clearer and simpler financial statements that, at the same time, better reflect the real situation of these groups. In order to satisfy the varied information demands made by the different components of the group buyer association system in Brazil, particularly on the part of the members of these associations, potential clients, and administrators and Banco Central itself, an accounting system similar to that applied to other entities was extended to group buyer associations, duly respecting their peculiarities.

III – Credit Guarantee Fund

Resolution 3,251, dated December 16, 2004, introduced several alterations into the FGC bylaws and regulations, particularly with regard to the operation of general assemblies, council of administration and executive boards of directors. The objective of these alterations was to adjust provisions in Resolution 3,024/2002 (modified by Resolution 3,161/2003) to the precepts set down in law 10,406/2002, which instituted the new Brazilian Civil Code. This code contains disciplinary measures aimed at enhancing the efficacy of contracts formalized within the framework of private companies and other organizations. The new provisions of a civil nature went into effect on January 11, 2003.

This Resolution also introduced alterations into the rules applicable to the FGC, such as inclusion of balances maintained in current investment deposit accounts (investment accounts), instituted by law 10,892, dated July 13, 2004, and regulated by Circular 3,248/2004, among the credits subject to the guaranties provided to associated financial institutions by that entity. The protection ensured by the fund was extended to investors in general, when their resources are not immediately transferred for purposes

of settlement of financial investments nor immediately redeemed to their respective current deposit accounts.

The rule of noncoverage foreseen in FGC regulations was also extended to judicial deposits originating in the state court system. Formerly, this rule was restricted to judicial deposits at the federal level, as determined in Resolution 3,161/2003. The objective of this measure was to standardize operational procedures in both hypotheses. The rule made it clear that bank deposit certificates authorized to be included in Tier II Base Capital (PR), as dealt with in Resolution 2,837/2001, are not subject to the coverage provided by the FGC, considering that payment of operations of this type should be subordinated to payment of the other liabilities of the issuing institution, according to the characteristic demanded for their inclusion in the cited Tier II of PR.

Finally, the Resolution allowed the FGC to invest resources in acquisitions of credit rights from financial institutions and leasing companies, as well as operations carried out in the manner determined in Resolution 2,921/2002, so as to allow these funds to more effectively pursue their objectives.

IV – Current investment deposit accounts and the savings deposit modality entitled to additional earnings

Circular 3,248, dated July 29, 2004, was issued with the dual purpose of consolidating the rules set down in Circular 3,235, dated April 22, 2004, and adapting the text of those regulations to the provisions of law 10,892, dated July 13, 2004. The aforementioned law modified Provisional Measure 179, dated April 1, 2004[34] which, among other measures, instituted current investment deposit accounts (investment accounts). Among these alterations, the most important were the following: postponement of the date of effectiveness of the measures introduced to October 1, 2004; exclusion of the daily adjustment in operations contracted on organized futures settlement markets from transiting through investment accounts; elimination of the option that allowed resources redeemed from saving deposit accounts existent on September 30, 2004 to be deposited in investment accounts as of October 1, 2006; prohibition as of October 1, 2004, of the right to maintain joint accounts in the name of legal entities; and the stipulation

34/ Provisional Measure 179, dated April 1, 2004, was sent to the National Congress by the executive branch with the objective of altering articles 8 and 16 of law 9,311, dated October 24, 1996.

that financial institutions may not charge fees on operations referring to investment accounts in amounts greater than those defined for other operations of the same nature, with due compliance with the rules issued by the CMN.

Aside from this, the Circular in question includes several regulatory provisions aimed at resolving doubts that arose when Circular 3,235, dated April 22, 2004, was released, such as:

a) At the moment in which the investment account is opened, institutions must obtain client agreement before making the first financial investment. This agreement is not necessary if no fees are charged for opening, maintaining and closing such accounts;

b) A single investment account may be opened and used by the investor to make financial investments in any institution, without the need for transiting the resources through any other investment account. In this case, the movement of resources should be done through the use of Available Electronic Transfers (TED) and debited to the account in question;

c) Financial investments made by foreign investors according to the terms of Resolution 2,689, dated January 26, 2000 are dispensed from the necessity of opening investment accounts. Also excluded are those investment funds and investment clubs and individuals or legal entities, when financial operations are not subject to payment of the Provisional Contribution on Movement or Transmission of Values and Credits and Rights of a Financial Nature (CPMF);

d) Investment accounts may also be operated to the debit and credit of current accounts that do not utilize checks, such as those maintained at investment banks and stock and security brokerage and distribution companies, among other institutions that do not manage demand deposit current accounts;

e) In contracts dealing with the opening of investment accounts, minimum parameters should be defined for purposes of rescinding such contracts, in keeping with the provisions of Resolution 2,025, dated November 24, 1993, with the text provided by Resolution 2,747, dated June 28, 2000;

f) Clients will have the option of associating savings deposit accounts opened as of October 1, 2004, to investment accounts;

g) Total or partial withdrawal of financial investments or cash deposits directly into investment accounts will not be permitted for purposes of coverage of possible negative balances in investment accounts found to exist at the end of each day;

h) In those cases in which banking fees are charged on the opening, maintenance and operation of investment accounts, the amounts, system of charging and other applicable conditions must be expressly stated in the corresponding service contract, in due compliance with current regulations on the matter.

Aside from the provisions listed above, the Circular altered the text of article 4 of Circular 3,235/2004, in order to eliminate the possibility of opening and maintaining investment accounts according to the model of simplified accounts, as defined in Resolution 3,211/2004.

With issue of Provisional Measure 206 on August 6, 2004, adjustments had to be introduced into the regulatory provisions set down in Circular 2,248. This was done through Circular 3,256, dated September 2, 2004. These adaptations were required since article 10 of the legislation cited had permitted utilization of investment accounts for purposes of making stock and bond investments related to stock purchase and sale operations, carried out at stock markets or through stock market trading systems and the organized over-the-counter market; contracts referenced to stocks or stock indices, negotiated at stock exchanges, commodities and futures exchanges and mediated by financial institutions, stock and security brokerage companies, stock and security distribution companies and commodity brokerage companies; and daily adjustments required on organized futures settlement markets and specific to the operations contracted on those markets.

V – Microcredit operations

The regulations on microcredit operations targeted to the low income population and microentrepreneurs, as defined by law 10,735, dated September 11, 2003, determined that compliance with minimum investment requirements is to be verified on the 15th business day of August of each year, encompassing those investments made in the annual period

extending from August of one year to July of the following year. Therefore, according to current rules, in August 2004, financial institutions were to submit data on investments made and, should these investments fall short of the minimum percentages required, they would then be obligated to deposit the amount corresponding to the calculated deficiency at Banco Central. These funds will then remain unavailable and bear no earnings until the next annual adjustment period.

Data obtained from the major private and public financial system institutions indicated that the required investment levels had not been reached. As a way of creating the conditions needed for effective allocation of resources and, in this way, complying with the objectives underlying the aforementioned law 10,735/2003, Resolution 3,220, dated July 29, 2004, determined that, as of September 2004, verification of compliance in operations of this type would be carried out monthly. For purposes of this verification, the average daily balances of the eligible operations in the twelve months immediately prior to the month in which the verification is being carried out will be compared to the required investment level, expressed as the average value resulting from investment of the minimum required percentages of the daily balances of demand deposits in the twelve month period prior to the month that occurred immediately before the month in which the verification is being carried out. The value of any investment deficiency must be deposited at Banco Central and will remain unavailable up to the date of verification of compliance in the following month.

The Resolution set the 20th of each month as the date for verification of compliance and determined that these data must be provided up to the previous business day. Institutions are subject to fines by reason of rectification of their data or noncompliance with the deadlines for providing such information, as well as to daily financial costs for not making the deposit or for making only partial deposit of the non-invested resources. As already stated, the resources not invested must be deposited at Banco Central in cash and without earnings. Consequently, Circular 3,253, dated August 30, 2004, defined rules for the transition period from the annual verification system to the monthly system.

Aside from this, Resolution 3,229, dated August 26, 2004, was issued with the objective of stimulating contracting of microcredit operations targeted to microentrepreneurs, as foreseen in law 10,735/2003, by SCMs and other

nonfinancial entities specialized in targeted productive microcredit operations. In order to achieve this objective, the Resolution allowed financial institutions to compute the resources transferred to SCMs through Interbank Deposits Earmarked to Microcredit Operations (DIM), to be used in targeted productive microcredit operations, as well as operations of this type that are acquired from SCM, Civil Society Public Interest Organizations (Oscip) and Nongovernmental Organizations (NGOs), up to a limit of 30% for purposes of compliance with the minimum investment requirements, provided that the effective rates of interest charged to microentrepreneurs be no more than 4% per month.

Targeted productive microcredit is understood as the credit granted to meet the financial needs of micro and small businesses whether they be informal or formal, utilizing a methodology founded upon direct relations with the entrepreneurs in the locality in which the economic activity is performed. It should also be noted that these services are provided by persons specifically trained to carry out socioeconomic surveys and provide educational guidance on business planning, in order to define the credit and management needs required for development of the undertaking. This relationship must give due consideration to personal contact during the entire credit period in order to be able to monitor and provide guidance and, in this way, take better advantage of the loan resources invested, while also seeking to move the economic activity in question toward growth and sustainability. Finally, the value and conditions of the credit defined after evaluating the activity in question and the debt capacity of the borrower will be analyzed, always in close contact with the borrower of the resources.

VI – Accounting procedures

Banco Central do Brasil has made every effort to harmonize the accounting procedures adopted by financial institutions in Brazil with the major international recommendations, particularly the standards established by the International Accounting Standards Board (Iasb). At the same time, it has paid very close attention to the specific supervisory needs and characteristics and maturity of the national market. In this framework, the institution is developing detailed analyses of IAS 39 – Financial Instruments: Recognition and Measurement, originally issued by Iasb in December 1998 and revised in 2000 and, more recently, in December 2003, with the objective of providing additional guidance with regard to specific items

such as the write-off of financial assets, evaluation of financial assets and liabilities at market value, definition of market value and accounting of hedge operations.

As a consequence of this review, a need was recognized for improving the accounting records of repo operations with free operation agreements. The major change introduced by Circular 3,252, dated August 25, 2004, which determines that, in relation to the previously adopted procedure, the new rule states that the seller must reclassify the security utilized as backing of the separation operation in the subgrouping Nonearmarked for the heading SECURITIES SUBJECT TO FREELY OPERATED REPO OPERATIONS, and that the buyer must register the papers received as backing of the operation in clearing accounts together with the liability referring to the obligation of returning the security, evaluated at market value, and at the time of definitive sale of the security must reclassify the repo operation to the heading Resale to be Settled – Short Position and recognize variations in the market value of the security in the results for the period.

VII – Repo operations

Circular 3,265, dated December 15, 2004, altered the structure of operational limits for carrying out repo operations, as dealt with in the Regulations appended to Resolution 2,950, dated April 17, 2002, giving due consideration to the change in the economic and regulatory conditions in which these limits had previously been defined. Among these advances, it is important to highlight the fiscal adjustment process, growth in the federal tax inflow, increased export revenues, and stability in inflation indicators, as well as improved perceptions on the part of international investors regarding the trajectory of our economy. All of these factors have come together to make it possible to construct a different structure for the federal public securities debt and for the carrying out of repo operations. In this sense, not only Treasury Financing Bills (LFT) and Banco Central do Brasil Bills (LBC), but all operations with papers issued by the National Treasury or Banco Central do Brasil are now subject to a maximum limit of 30 times the value of PR, thus eliminating the previous restriction regarding other papers, particularly those indexed to exchange. In their turn, the limit on operations with private papers was altered from two to five times the value of PR.

Selected studies

6

The objective of this chapter is to publish papers on themes correlated to those dealt with in the Report.

These studies are the exclusive responsibility of the authors and do not necessarily reflect positions held by Banco Central do Brasil.

The current issue contains the following studies:

a) Measuring Banking Concentration: the Brazilian Case;

b) Internal Models Validation in Brazil: Analysis of VaR *Backtesting* Methodologies;

c) Behavior of Intraday Liquidity in the New Brazilian Payments System;

d) Bankruptcy Law and Optimal Contract Design.

Measuring Banking Concentration: the Brazilian Case

Eui Jung Chang[35]
Solange Maria Guerra[36]
Rodrigo A. de Souza Penaloza[37]
Benjamin Miranda Tabak[38]

Abstract

This article presents measures of concentration in the banking sector for the Brazilian banking system in the recent period 2001-2004. The article proposes the utilization of the dual approach of the Hirschman-Herfindal Index as a more informative measure of the banking concentration in Brazil. Finally, the relation between the banking structure (level of concentration) and price is studied using panel data model, macroeconomic and risk variables being controlled. There is no evidence that banking concentration leads to uncompetitive practices and explains the banking spreads adopted in Brazil.

35/ Banco Central do Brasil Department of Studies and Research: eui.jung@bcb.gov.br.

36/ Banco Central do Brasil Department of Studies and Research: solange.guerra@bcb.gov.br.

37/ Department of Economics – University of Brasília: penaloza@unb.br.

38/ Banco Central do Brasil Department of Studies and Research: Benjamin.tabak@bcb.gov.br.

1. Introduction

In recent decades, the banking industry has undergone countless transformations generated by new technologies, new financial instruments and changes in banking regulations, among other factors. During this process, several tendencies have clearly consolidated in the banking systems of the developed countries and the emerging nations. In most countries, banking consolidation through mergers and acquisitions was a common practice. For example, in the USA, the number of banking institutions plunged from 18,711 in 1980 to 10,070 in 1999[39].

In banking literature, one of the most hotly debated questions is whether this process of mergers and acquisitions has led to efficiency gains for the banking system. Most empirical evidence suggests that, on average, mergers and acquisitions do not substantially reduce (increase) costs (profits) or increase stock values significantly. Amel et al. (2004) argue that these results may be due basically to three factors, one of which involves changes in banking regulations. At the time in which these mergers and acquisitions took place, current legislation hampered institutions from taking full advantage of the economies of scale and scope that could have been derived from the process. Another possibility is found in the difficulties inherent to efforts to measure efficiency gains. Finally, it may be that the impacts will only be felt over the long-term and that studies limited to evaluating short-term impacts are unable to fully perceive the effects of mergers and acquisitions.

One of the possible effects of this process of mergers and acquisitions is to increase banking concentration and, consequently, diminish competition. Changes in banking structures and competition may, on the one hand, produce more fragile banking systems and, on the other, result in greater market power for those banking institutions with higher spreads.

In a recent paper, Allen and Gale (2001) use a simple model to show that there is a relation between banking structure (measured by the number of banks) and financial fragility, understanding financial fragility as a greater appetite for risk on the part of financial institutions. The authors found that increased competition (growth in the number of banks) leads to greater equilibrium in assuming risks. Consequently,

39/ Though part of this reduction was due to bank failures, mergers and acquisitions accounted for the major share of this decline. See Group of Ten (2001).

it was demonstrated that there is a positive aspect to banking concentration. In banking literature, this argument is known as the "concentration-stability" approach, meaning that in more concentrated banking economies with a lesser number of large scale institutions, banks can be more profitable, diversify their risks more efficiently, can be more effectively monitored and, consequently, are more resistant to shock.

Recently, Grochulski and Kareken (2004) demonstrated that small alterations in the Allen and Gale (2001) model lead to results in which banking structure and financial fragility are independent.

Beck et al. (2003) study the relation between banking concentration and crises, utilizing a cross-section of 70 countries in the period extending from 1980 to 1997. The authors present evidence that banking crises (financial fragility) are less probable in economies with more developed banking systems, lesser restrictions on competition and banking activity and national institutions that stimulate competition.

In a later study, Allen and Gale (2004) diversified the spectrum of models used to evaluate the relation between banking structure and financial stability and demonstrated that different models generate different responses.

In their survey of literature on competition and financial stability, Carletti and Hartman (2002) show that there exists another approach known as "concentration-fragility" which refutes the previously described relation. The principal argument is found in the fact that, in economies with few large scale banks, banking institutions may take on greater risk than would be desirable due to implicit operation of the "to big to fail" theory. Thus, banking literature has not been able to come to a consensus as to whether increases in banking concentration or competition within banking systems result in increases/reductions in financial stability. However, there is no doubt that alterations in the banking structure generate impacts on financial stability, suggesting that it is essential for banking regulation activities to closely monitor the evolution of the structure of the banking market and the degree of competition in that market.

Another vector in banking literature studies the price-banking concentration relationship. If, on the one hand, increases in concentration may lead to gains in terms of financial stability, on the other, such increases could lead banks with significant market participation to increase their

market share and adopt abusive (anticompetitive) prices, with evident adverse impacts on society as a whole.

Few studies exist with regard to the degree of banking sector competitiveness in Brazil. Nakane (2001) demonstrates that, while banks in Brazil have a certain degree of market power, they do not act as a cartel. Rocha (2001) evaluates the evolution of banking concentration in Brazil in the period from 1994 to 2000. The author utilizes the Hirschman-Herfindahl index (HHI) and shows that there was a general trend toward increased concentration in that period, despite a high degree of data variability. Going further, Tonooka and Koyama (2003) tested the relation between interest rates and banking concentration in Brazil and found no statistically significant relationship.

The present article seeks to introduce a new methodology to measure banking concentration that may be used to evaluate the evolution of concentration in time and to compare different countries. It carries out an analysis of the evolution of the banking concentration indexes in the recent past in Brazil, which may be used to study the relation between the banking structure and other important variables, such as financial stability. Moreover, using a panel data model, the relation price-concentration is studied where the concentration is measured with the index proposed in this work.

The next section describes the data used in this study and presents some descriptive statistics. In section 3, the methodology proposed for calculating banking concentration is discussed. In this section an improvement in the Hirschmann-Herfindahl Index is discussed. Section 4 presents the results for the Brazilian economy for the period extending from 2001 to 2004. Section 5 presents a data panel model that will be used to test the price-concentration relation for the Brazilian banking industry. Finally, the conclusions of this article are found in section 6.

Table 1 – Number of instituitions by control type and by size

Itemization	2001-I	2001-II	2002-I	2002-II	2003-I	2003-II	2004-I
	Control type						
State owned	18	16	15	15	15	15	14
Domestic private	64	60	56	56	56	56	56
Foreign controlled private	7	7	5	2	2	2	2
Foreign participation private	42	42	41	40	40	38	37
	Size						
Big	11	13	13	13	13	13	13
Medium	15	18	13	13	15	15	15
Small	55	53	50	50	45	45	40
Micro	50	41	41	37	40	38	41
Total	131	125	117	113	113	111	109

2. Data

All the information used in this study was obtained from the Banco Central do Brasil database.

Half-yearly data are used from the second half of 2001 to the first half of 2004. The sample is composed of the banks included in consolidated banking segment 1, defined on the Banco Central do Brasil site as financial institutions classified as commercial banks, multiple banks with commercial

Table 2 – Descriptive statistics

Itemization	2001-I	2001-II	2002-I	2002-II	2003-I	2003-II	2004-I
	Total assets						
Mean	2 953	3 221	2 975	2 669	3 224	3 556	3 635
Std. deviation	8 601	9 325	8 465	7 993	9 969	11 138	10 757
Skewness	4.65	4.84	4.50	4.70	4.79	4.77	4.46
Kurtosis	27.03	29.57	25.15	27.27	27.74	27.55	24.35
Jarque-Bera	3 595	4 131	2 764	3 160	3 284	3 179	2 410
P-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Demand deposits						
Mean	174	214	184	199	207	251	251
Std. deviation	703	874	735	807	848	1 058	1 065
Skewness	6.44	6.67	6.29	6.12	6.36	6.58	6.61
Kurtosis	50.10	53.67	47.17	44.39	47.87	51.24	51.47
Jarque-Bera	11 722	13 155	9 666	8 385	9 696	11 040	10 624
P-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Time deposits						
Mean	555	619	594	541	697	731	797
Std. deviation	1 728	1 757	1 666	1 543	2 035	2 073	2 112
Skewness	5.22	4.54	4.28	4.30	4.53	4.30	3.86
Kurtosis	32.68	25.32	22.29	23.55	26.25	23.82	18.98
Jarque-Bera	4 783	2 661	2 004	2 171	2 725	2 135	1 273
P-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Total deposits						
Mean	1 148	1 278	1 204	1 111	1 376	1 486	1 530
Std. deviation	4 251	4 511	4 130	3 862	4 829	5 192	5 151
Skewness	5.59	5.35	5.11	5.05	5.15	5.15	5.03
Kurtosis	36.08	33.24	30.19	30.03	31.18	31.65	30.39
Jarque-Bera	6 251	5 104	3 970	3 849	4 126	4 172	3 724
P-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Adjusted net worth						
Mean	256	289	267	231	305	328	327
Std. deviation	668	744	661	565	788	856	844
Skewness	4.10	4.07	3.87	3.67	3.83	3.75	3.66
Kurtosis	19.99	19.79	18.48	16.58	17.71	16.90	16.13
Jarque-Bera	1 927	1 799	1 448	1 113	1 283	1 143	1 018
P-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Total revenues						
Mean	648	782	728	1 192	1 033	745	737
Std. deviation	1 613	1 864	1 617	2 734	2 399	1 992	2 135
Skewness	3.47	3.51	3.11	2.96	3.05	3.82	4.72
Kurtosis	15.20	16.14	13.15	11.34	12.12	17.98	28.97
Jarque-Bera	1 067	1 147	685	488	562	1 295	3 437
P-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	Interest income						
Mean	322	366	342	438	381	350	310
Std. deviation	801	955	840	1 156	1 089	1 054	881
Skewness	3.48	3.93	4.03	4.37	4.29	4.47	4.21
Kurtosis	14.91	18.62	21.31	23.73	21.72	23.75	21.84
Jarque-Bera	1 030	1 580	1 934	2 362	1 979	2 340	1 916
P-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: Means and standard deviations in US$ millions.

portfolios or savings banks that are not part of conglomerates, and conglomerates in which there is at least one institution classified as a commercial bank or multiple bank with a commercial portfolio. Therefore, all data used in this work refers to banking conglomerates. In the first half of 2004, this sample represented 86.8% of the assets of the Brazilian banking system.

The total number of banks in the sample varies in each half-year period, as shown in table 1.

In calculating concentration measurements, we utilized the following series: total assets, demand deposits, time deposits, total deposits, adjusted net worth, total revenues and financial intermediation revenues.

Based on the Jarque-Bera statistics presented in table 2, we rejected the null hypothesis of normality of all these variables, showing the existence of heterogeneity in the sample used.

The average kurtosis for the variables to be analyzed is 26.9, while the asymmetry coefficient is an average of 4.6, suggesting that the kurtosis plays a preponderant role in the rejection of the normality hypothesis of these variables.
Aside from the concentration index of these seven aggregates drawn from the assets and liability statement, we also calculated the level of concentration of diverse modalities of credits granted with nonearmarked resources to corporate entities (hot money, invoice discounting, promissory note discounting, working capital, acquisitions of goods and vendor operations) and to individual persons (special overdraft checks, personal credit, acquisitions of goods – vehicle and nonvehicle acquisitions).

In order to test the price-concentration relationship, we utilize the volume, annualized interest rate and average loan term for each modality of credit granted. Fiscal and operational charges are included in the interest rate.

These variables are available individually for each institution and not for conglomerates. The volume for conglomerates was obtained by aggregating individual volumes of their respective institutions. The half-yearly interest rate and average term for each credit modality were obtained for each conglomerate through the use of the average weighted by the volume of credits granted by each institution included in the conglomerate.

Before estimating the price-concentration relation, one must control this relation in line with the individual characteristics of the banks. The risk variables were chosen as those used

in the CAMEL bank rating system. The acronym CAMEL is based on five elements used to measure the characteristics of a financial institution: capital adequability, asset quality, management, earnings and liquidity.

In measuring capital adequability, we use the Basel Index calculated by Banco Central do Brasil, based on the definition given by the Basel Committee.

Using this index, Banco Central evaluates whether an institution has sufficient equity to cover the risks to which it is exposed. Currently, in the case of banks, legislation applicable to the Brazilian financial system determines a minimum ratio of 11% between Base Capital (PR) and the Required Net Worth Limit (PLE)[40]. If the Basel Index is greater than 11%, then PR>PLE and, therefore, the institution is in compliance with regulatory capital requirements; should the opposite occur, the institution is noncompliant.

In measuring asset quality, we use the ratio between credits granted in default and total credits. We take the sum total of credits granted classified into risk levels G and H as credits granted in default. This ratio measures the percentage of loans that a bank may have to record as losses.

Bank efficiency is measured by the management variable, defined in this paper as the ratio between nonfinancial outlays and total assets. However, cases may exist in which the offering of better services results in greater outlays.

In order to measure profitability, we take the ratio of returns over assets (ROA), utilizing net profits as the measuring tool for returns.

Liquidity is measured according to the ratio between net assets and total assets. Net assets were obtained on the basis of the sum total of available resources, interbank investments and TVM and derivative financial instruments, as included in the accounting information of the 50 largest banks on the Banco Central do Brasil site.

In table 3, the descriptive statistics from the CAMEL variables are presented, one can see that these variables are not normally distributed.

The Hirschman-Herfindahl indices are presented in the next section together with their dual for the evaluation of banking concentration.

40/ PR and PLE are defined in Resolution 2,837, dated May 30, 2001, and Resolution 2,099, dated August 17, 1994 (with later alterations), both issued by Banco Central do Brasil.

Table 3 – Descriptive statistics for CAMEL variables

Itemization	2001-I	2001-II	2002-I	2002-II	2003-I	2003-II	2004-I
	Capital adequability						
Mean	0.287	0.287	0.266	0.275	0.327	0.414	0.407
Std. deviation	0.219	0.245	0.236	0.211	0.443	0.940	0.915
Skewness	2.573	3.332	3.799	3.026	5.844	8.336	6.912
Kurtosis	12.895	17.409	21.063	14.331	43.583	76.924	53.690
Jarque-Bera	596	1 176	1 712	715	7 729	24 407	10 812
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Asset quality						
Mean	0.045	0.045	0.046	0.045	0.046	0.046	0.047
Std. deviation	0.079	0.079	0.081	0.082	0.089	0.090	0.094
Skewness	5.086	5.049	4.926	5.007	5.515	5.475	5.302
Kurtosis	35.410	34.964	33.303	33.679	39.733	39.043	36.384
Jarque-Bera	4 712	4 541	3 892	3 819	5 394	5 085	4 039
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Management						
Mean	-0.155	-0.251	-0.238	-0.468	-0.373	-0.189	-0.135
Std. deviation	0.177	0.423	0.477	0.796	0.711	0.229	0.174
Skewness	-2.964	-6.065	-6.959	-3.166	-4.535	-3.676	-5.121
Kurtosis	12.763	49.480	60.163	13.621	28.797	20.752	37.330
Jarque-Bera	625	10 768	15 432	663	3 240	1 569	5 027
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Earnings						
Mean	0.008	0.006	0.013	0.011	0.001	0.004	0.002
Std. deviation	0.037	0.031	0.021	0.058	0.035	0.059	0.080
Skewness	-6.194	-5.230	0.223	-5.579	-3.157	-7.152	-8.170
Kurtosis	55.307	41.000	10.483	51.178	16.484	61.959	75.116
Jarque-Bera	13 845	7 249	251	10 598	961	15 643	21 415
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Liquidity						
Mean	0.426	0.446	0.444	0.466	0.463	0.490	0.463
Std. deviation	0.218	0.213	0.212	0.226	0.224	0.237	0.232
Skewness	0.350	0.307	0.235	0.297	0.262	0.116	0.111
Kurtosis	2.396	2.285	2.351	2.252	2.253	2.196	2.202
Jarque-Bera	4	4	3	4	4	3	3
P-value	0.129	0.126	0.239	0.138	0.164	0.226	0.261

3. The Hirschman-Herfindahl index and its dual

The Hirschman-Herfindahl index (HHI) is a measuring tool frequently used to evaluate banking industry concentration. Gelos and Roldós (2004) utilize it to examine the evolution of the banking structure in emerging countries, including Brazil. Nissam (2004) evaluates the degree of banking concentration in developed and developing countries through use of the HHI, indicating a higher level of banking industry concentration in the developing countries than in the developed countries. Valverde et al. (2003) utilize this index to compare the effects on banking competition in Spain generated by mergers and the release of branches from certain restrictions[41].

In Brazil, Rocha (2001) evaluates the evolution of banking concentration in the period from 1994 to 2000 by analyzing the HHI of the following series: total assets, total deposits, credit operations and adjusted net worth. In 2000, HHI values for banking groups of each one of the series studied were 0.0812 – 0.1023 – 0.0974 – 0.0736, respectively. The author concludes that these values "are not high when compared to international standards".

The Hirschman-Herfindahl index (HHI) is obtained by the sum total of participations proportionate to the square of all banks on the market, following the formula below.

$$IHH = \sum_{i=1}^{n}\left(\frac{x_i}{x}\right)^2$$, In which x_i represents the bank *i* and $x = \sum_{i=1}^{n} x_i$

By raising the participation of each bank to the square, greater weight is given to the large banks, reflecting the fact that the larger the institution, the larger will be its market power.

The HHI varies from $1/n$, when there is perfect competition in the banking industry and reaches its maximum value of one, when a monopoly exists. Therefore, its minimum tends toward zero if the number of banks n is large.

Since no measurement manages to reflect all the complexity of the behavior of these institutions, it is only natural that, in some cases, it will not perceive what is truly happening on the market. Despite being used very frequently, the HHI analysis does not always make it clear in some situations whether there is or is not banking concentration; or whether banking concentration is moderate or accentuated.

41/ Tonooka and Koyama (2003) utilize HHI as an explicative variable to explain the interest rates of different credit modalities.

Besides this, the HHI can lead to erroneous conclusions when the market is composed of a reasonable number of institutions, in which a small number of banks hold a significant share of the market (though less than 50%) and the vast majority of banks individually have only very small market shares.

In order to illustrate the two situations above, let's take a glance at two examples. In the first, we will consider a market with ten banks, with the following proportionate shares of the market: 21%, 16%, 17%, 18%, 6%, 5%, 3%, 4%, 6%, 4%. In this case, the concentration index of this market is HHI_1 equal to 0.1448. If the number of institutions were larger, we would certainly consider this a market with moderate concentration. However, when the number of banks is small, it becomes more difficult to reach this conclusion since HHI is relatively close to the minimum value of HHI which is 0.1.

Though the following example may seem to be an anomaly, one should recall that it is possible to construct more realistic examples with these same characteristics. We opted for this example since it is quite easy to explain.

Let's presume a market with 200 institutions, in which one institution accounts for 20.4% of the market and the others have equally proportionate participation of 0.4%. If we were to analyze the concentration of this market using the HHI, we would conclude that it is not a concentrated market, since its concentration index (HHI_2) is equal to 0.0448.

The dual of HHI (d), which will be explained further on, provides a clearer and more objective measurement of banking concentration. Based on analysis of the two examples above, we conclude that the market in the first example is concentrated in the hands of 70% of the banks, while the other 30% would not have market shares. In the second example, the dual analysis indicates that 11% of the institutions hold the entire market. These numbers reflect reality more effectively, principally in the second case. According to the HHI the market is not concentrated (0,0448), but the dual indicates that this structure is concentrated. The majority of authors suggest that values below 0.10 for the HHI would represent a diversified structure, which does not necessarily correspond to the truth, as exemplified above. See Souza and Penaloza (2005) for the different applications of the dual to concentration indices[42].

42/ See also Souza (1977).

The idea of the dual analysis is to associate another series Y to the series X, which represents the market, and to its HHI. This series, called the HHI-dual of X, is constructed as follows:

a) Y Has the same number of observations as the original series, with k constant observations and equal to C and n-k observations equal to zero;

b) $\sum_{i=1}^{n} x_i = \sum_{i=1}^{n} y_i$

c) $HHI_Y = HHI_X$, or in other words, y presents the same HHI as x.

Y represents a theoretical banking structure which preserves some properties of the original banking structure, with the advantage of being stratified into two groups: the first, the dominant group, which holds total participation of the market, and the second composed of members who do not participate in the market. Besides this, the participation of each member of the dominant group is uniform. In this way, it is possible to quantify the percentage of the banks that dominate the segment analyzed.

Based on the suppositions above, the dual of the HHI is defined as the percentage $d = 1 - \frac{k}{n}$ which represents the fraction of the banks that do not have market participation. Another way of viewing this is that banking concentration measured by the HHI is equivalent to the banking concentration of a banking industry - also measured by the HHI - in which one fraction 1- d of the banks is appropriated from the entire market.

The value of d in relation to the HHI of the series to which it is related is obtained on the basis of the assumptions used in constructing series Y.

We have: $Y = \{\underbrace{C,...,C}_{k}, \underbrace{0,...,0}_{n-k}\}$

Thus, according to assumption (b):

$$\sum_{i=1}^{n} y_i = k.C = \sum_{i=1}^{n} x_i = n.\bar{x} \quad \Rightarrow \quad C = \frac{n.\bar{x}}{k}$$

$$IHH_y = \sum_{i=1}^{n}\left(\frac{y_i}{y}\right)^2 = \sum_{i=1}^{k}\left(\frac{C}{x}\right)^2 = \sum_{i=1}^{k}\left(\frac{C}{n.\bar{x}}\right)^2 = \sum_{i=1}^{k}\left(\frac{1}{k}\right)^2 = \frac{1}{k}$$

Since, $IHH_x = IHH_y \quad \Rightarrow \quad k = \frac{1}{IHH_x}$

Therefore, the dual of the HHI of series X is $d = 1 - \frac{1}{n.IHH_x}$

The dual of the HHI – d – increases when the HHI increases. Therefore, d is an increasing function of the HHI. Since the HHI varies from $1/n$ to 1, d has the maximum value of $1 - 1/n$ and, therefore, the maximum approaches 1 for a large number of banks, the minimum value being zero.

In the next section, we present the results for banking concentration, using the dual (d) for important variables like assets, revenues, among others, as well as for different loan modalities.

4. Banking concentration in Brazil

Gelos and Roldós (2004) studied the relation that exists between consolidation and market structure for emerging countries. Table 1 (page 130), presents the HHI for different emerging countries for total deposits in 1994 and 2004. In 2000, Brazil is classified in third place in this comparison, in terms of concentration, with HHI equal to 0.128 (193 banks), following only Mexico (HHI of 0.136 and 23 banks) and the Czech Republic (HHI of 0.176 and 42 banks).

Logan (2004) presents the degree of banking concentration in the United Kingdom for the period extending from 1989 to 2003. The author shows that the HHI for deposits and loans is approximately 0.12 and 0.14 in 2003, respectively.

Table 4 presents the HHI for Brazil for the variables total assets, demand deposits, time deposits, total deposits, adjusted net worth, total revenues and revenues on financial intermediation. The results are in keeping with those obtained by Logan (2004) for the United Kingdom and by Gelos and Roldós (2004).

One of the problems involved in using these indices for purposes of comparing countries is found in the fact that different countries possess highly varied numbers of banks. Therefore, it is difficult to compare HHI, without additional information on the number of banks in each country. This is important for countries in which the number of banks changes over time. Given a single market structure, the HHI can change simply because the number of banks that exist in the economy changed. This could lead one to conclude erroneously that the banking structure changed in that period[43].

Table 4 – Hirschman-Herfindahl Index (HHI)

Variables	2001-I	2001-II	2002-I	2002-II	2003-I	2003-II	2004-I
Total assets	0.072	0.075	0.078	0.088	0.094	0.097	0.090
Demand deposits	0.147	0.153	0.154	0.160	0.165	0.176	0.186
Time deposits	0.092	0.082	0.081	0.086	0.090	0.089	0.082
Total deposits	0.119	0.112	0.112	0.117	0.120	0.121	0.116
Adjusted net worth	0.059	0.061	0.061	0.062	0.068	0.071	0.070
Total revenues	0.055	0.054	0.051	0.056	0.057	0.073	0.086
Interest income	0.055	0.063	0.060	0.071	0.081	0.091	0.083

43/ Table 1 makes it clear that this influences the Brazilian case.

To resolve the problem cited above, we calculate index d. Comparing the HHI presented in table 4 with index d, presented in table 5, one observes that the dual index allows for a clearer reading with respect to banking concentration. The complementary 1-d, which can be obtained on the basis of table 5, provides us with the percentage of banks that dominate the market. As we can see, 10.3% of the banks accounted for 100% of total assets in the first half of 2004, that is, 11 banks are responsible for 100% of the total assets. In the case of demand deposits, just 5% of the banks answer for their total, in the same period.

Table 5 – Dual index (d)

Variables	2001-I	2001-II	2002-I	2002-II	2003-I	2003-II	2004-I
Total assets	0.894	0.893	0.889	0.899	0.905	0.907	0.897
Demand deposits	0.948	0.947	0.944	0.944	0.946	0.948	0.950
Time deposits	0.916	0.901	0.894	0.897	0.901	0.898	0.887
Total deposits	0.935	0.928	0.923	0.924	0.926	0.925	0.920
Adjusted net worth	0.871	0.868	0.858	0.855	0.868	0.871	0.868
Total revenues	0.860	0.849	0.830	0.839	0.842	0.876	0.893
Interest income	0.860	0.871	0.857	0.874	0.890	0.900	0.889

One important variable refers to loans made by the banking system. The degree of concentration of the loans was calculated for the different credit modalities.

Table 6 presents the HHI for different credit modalities, while table 7 presents index d. On Table 7 it can be seen that, for some credit types, less than 5% of the banks answer for the total of concessions. In the case of overdrafts, the HHI jumps from 0.117 to 0.133, from the first half of 2001 to the first half of 2004, which may lead to the perception that the concentration slightly increased. However, according to the dual the concentration fell from 0.926 to 0.92, in the same period. This occurs because the number of banks fell from 131 to 109 and the HHI does not take this information into consideration.

In several studies, the concentration index is a variable that has been used to test hypotheses as to whether banking concentration is correlated to financial stability. The majority of these studies utilize the HHI or the market participation of the three largest banks. As already discussed, these indicators do not provide sufficient information on the banking structure. Furthermore, the HHI for different countries is not comparable, since the quantity of banks in each country is quite variable.

Table 6 – Hirschman-Herfindahl Index (IHH) for loans

Itemization	2001-I	2001-II	2002-I	2002-II	2003-I	2003-II	2004-I
Hot Money	0.152	0.110	0.114	0.115	0.142	0.153	0.141
Discount of trade bills	0.116	0.119	0.140	0.152	0.178	0.193	0.276
Discount of promissory notes	0.280	0.204	0.386	0.334	0.294	0.207	0.220
Working capital	0.079	0.071	0.076	0.081	0.087	0.083	0.079
Guarantied over draft accounts	0.084	0.089	0.097	0.104	0.112	0.118	0.128
Acquisition of goods – Corporate entities	0.193	0.181	0.221	0.196	0.181	0.190	0.195
Vendor	0.134	0.135	0.156	0.136	0.170	0.178	0.160
Special overdraft checks	0.117	0.121	0.122	0.125	0.129	0.134	0.133
Personal credit	0.115	0.118	0.117	0.102	0.098	0.103	0.105
Acquisition of vehicles	0.126	0.121	0.146	0.145	0.145	0.156	0.149
Acquisition of goods – Individuals	0.112	0.118	0.116	0.136	0.134	0.144	0.159

Table 7 – Dual Index (d) for loans

Itemization	2001-I	2001-II	2002-I	2002-II	2003-I	2003-II	2004-I
Hot Money	0.943	0.919	0.918	0.916	0.932	0.936	0.924
Discount of trade bills	0.925	0.925	0.933	0.937	0.946	0.949	0.961
Discount of promissory notes	0.969	0.956	0.976	0.971	0.967	0.953	0.952
Working capital	0.890	0.874	0.877	0.881	0.889	0.882	0.865
Guarantied over draft accounts	0.897	0.900	0.904	0.908	0.914	0.917	0.917
Acquisition of goods – Corporate entities	0.955	0.951	0.958	0.951	0.947	0.948	0.945
Vendor	0.935	0.934	0.940	0.929	0.943	0.945	0.934
Special overdraft checks	0.926	0.926	0.924	0.923	0.926	0.927	0.920
Personal credit	0.925	0.924	0.920	0.906	0.902	0.905	0.899
Acquisition of vehicles	0.931	0.926	0.936	0.934	0.934	0.937	0.928
Acquisition of goods – Individuals	0.922	0.925	0.919	0.929	0.928	0.932	0.933

Therefore, the ideal measurement for calculating the degree of banking concentration is the d or (I-d).

It is important to observe that measurements of banking concentration do not necessarily bear a biunivocal correlation with competitiveness in the banking sector, Alencar and Nakane (2004) argue that even if the Brazilian banking system exercises any market power this has not necessarily led to the formation of cartels (hindering competition).

In the next section, we will test the hypothesis that interest rates are correlated to the level of concentration measured by the dual (d), controlling the different risk and macroeconomic variables.

5. Testing the price-concentration relationship

Tonooka and Koyama (2003) Evaluate the price-concentration relationship in the Brazilian banking industry and conclude that this relation is not statistically significant, meaning that possible measures aimed at reducing the degree of concentration may not result in reductions in internal bank interest rates[44].

Peria and Mody (2004) Evaluate the case of Latin America (Argentina, Chile, Colombia, Mexico and Peru) and conclude that bank concentration is directly and positively related to larger spreads and banking costs. This result was also partially obtained by Demirguç-Kunt et al. (2004) in their evaluation of 1400 banks in 72 countries, considering the

44/ This study does not consider geographic dimensions which may be important in determining this relationship. In certain regions, it is entirely possible that the market power of certain banks may be quite large and this relation could take on greater significance.

individual characteristics of the banks. However, on introducing controls to regulatory impediments to competition and inflation, the previously mentioned results are not robust. One of the problems in these studies is the fact that the vast majority utilize the HHI or the participation of the three largest banks as concentration measurements. The problem is that these measurements are compatible with various market structures[45]. Consequently, more research is necessary to determine whether banking spreads are related to concentration.

5.1 Data panel models

A data panel model was estimated in order to study the relation between interest rates and the bank concentration index for different loan modalities. The model is similar to that estimated by Berger and Hannan (1989).

Two variables seek to reflect concentration of the banking system for each loan modality. On the one hand, we have the market participation of each bank in each segment. This participation reflects the market power that the banks may have in light of their relative participation. On the other hand, we have bank concentration of that modality of loan calculated through d (Dual- HHI).

The reduced equation below was estimated for each loan modality:

$$Interest_{i,t} = \mu_i + \beta' Fund_{i,t-1} + \gamma_1 Part_{i,t} + \gamma_2 Conc_t + \varphi' Macro_t + \delta_1 Maturity_{i,t} + \delta_2 Volume_{i,t} + \varepsilon_{i,t}$$

where I=1…N e t=1….T. N is the number of banks in each loan modality. The panel is nonbalanced and, therefore, T which corresponds to the number of observations per bank varies from one institution to the other.

The variable $Interest_{i,t}$ represents the interest charged by bank i at instant t. One foundation vector of the banks ($Fund_{i,t-1}$) was added with a lag. The term μ_i reflects the fixed effects of the banks. The variable $Part_{i,t}$ corresponds to the participation of each bank in the loan modality while variable $Conc_t$ is calculated by the concentration index in that modality. Finally, a vector of macroeconomic variables was added in order to control macroeconomic impacts on interest rates (CPI and GDP growth). The variables of term

45/ For example, two distinct economies may have the same HHI= 0.10, one with ten banks with uniform participation in the market and therefore not concentrated, and the other with a thousand banks in which there is strong concentration.

and volume seek to control for the purposes of loan maturity, as well as for the magnitudes of the amounts lent.

The interest of this article is centered on the study of the coefficients γ_1 and γ_2. If market participation does not explain the higher rates of interest found in the Brazilian banking market, one should not reject the null hypothesis that $\gamma_1 = 0$. On the other hand, if banking concentration is greater, the banks should have increased market power to determine interest rates. If this premise is not true, it should be possible to accept the hypothesis that $\gamma_2 = 0$.

The results of the between and within regressions are presented. The between estimators are obtained by estimating the average interest rates of each bank over the average values of the explicative variables. The within estimators (or

Table 8 – Interest rates response to banking concentration and participation – Corporate entities

Variables	Hot money		Discount of trade bills		Disc.of promissory notes		Working capital	
	Between	Within	Between	Within	Between	Within	Between	Within
Constant	-5,143*	-5,494*	0.824	0.850	-0.650	-0.820	-1,681*	-1,595*
	(1.478)	(1.504)	(0.638)	(0.653)	(1.067)	(1.143)	(0.494)	(0.498)
Capital adequability(-1)	0.177	0.155	-0.010	-0.006	-0.001	0.004	1.1E-4	0.002
	(0.195)	(0.226)	(0.029)	(0.030)	(0.014)	(0.014)	(0.008)	(0.008)
Asset quality(-1)	-0.149	3,276***	0.462	3.280	-1,683***	3.459	0.028	1,928*
	(0.415)	(1.788)	(0.479)	(3.971)	(0.602)	(6.892)	(0.172)	(0.632)
Management(-1)	-0.085	-0.103	-0,096*	-0.087	-0,123*	-0.099	0.015	-0.013
	(0.068)	(0.073)	(0.055)	(0.059)	(0.063)	(0.070)	(0.026)	(0.028)
Earnings(-1)	0.852	0.752	0.079	0.066	-0.093	-0.382	-0.034	-0.028
	(0.639)	(0.700)	(0.192)	(0.195)	(0.442)	(0.601)	(0.112)	(0.113)
Liquidity(-1)	0.139	0,382**	-0,171*	-0.130	-0.153	0.125	-0,136*	-0.059
	(0.156)	(0.191)	(0.074)	(0.092)	(0.099)	(0.159)	(0.040)	(0.047)
Concentration	6,096*	6,185*	-0.248	-0.422	1.460	1.290	2,511*	2,295*
	(1.588)	(1.625)	(0.690)	(0.713)	(1.119)	(1.138)	(0.566)	(0.570)
Participation	-1.008	-0.646	-1.343	-1.153	0.069	-0.022	2.292	1.896
	(1.881)	(1.890)	(1.534)	(1.735)	(0.302)	(0.332)	(1.920)	(1.956)
Maturity	-5.0E-4	1.3E-4	-7.9E-4	-2.3E-4	-2.3E-4	-2.1E-4	-3,6E-5**	-2.6E-5
	(0.002)	(0.002)	(5.9E-4)	(7.1E-4)	(4.4E-4)	(5.3E-4)	(1.8E-5)	(1.8E-5)
Volume	2.7E-6	2.8E-6	1.5E-7	1.5E-7	-7.9E-7	-7.9E-7	-2.4E-7	-2.1E-7
	(5.6E-6)	(5.7E-6)	(2.2E-7)	(2.3E-7)	(6.3E-7)	(6.9E-7)	(1.7E-7)	(1.7E-7)
Inflation index	0.837	1,121**	1,167*	1,170*	-0.052	-0.004	0.210	0,275*
	(0.537)	(0.547)	(0.292)	(0.293)	(0.490)	(0.497)	(0.163)	(0.164)
GDP	-1.190	-1,136***	-0,909**	-0,984**	-1,911*	-2,134*	-0,992*	-1,087*
	(0.599)	(0.604)	(0.403)	(0.406)	(0.552)	(0.566)	(0.206)	(0.208)
Adjusted R^2	0.173	0.850	0.162	0.728	0.188	0.665	0.195	0.846
F Test - Fixed effects	-	19,997*	-	11,433*	-	5,170*	-	20,462*
Haussman Test	18,133***	-	4.279	-	15.741	-	38,217*	-
F Test-Fundamentals	1.144	2,089***	1,959***	1.129	3,395*	0.599	2,398**	2,226***
F Test-Participation and concentration	7,374*	7,297*	0.409	0.353	0.852	0.672	9,908*	8,135*
Number of banks	44	-	72	-	33	-	85	-
Number of observations	178	-	328	-	149	-	415	-

The *, ** and *** denote statistically significance at the 1%, 5% and 10% level, respectively and standard errors are given in parenthesis.

fixed effects) focus on the variation in interest rates over time, using the deviations from the average of each bank.

In all of the estimations, the F tests of joint significance of the fundamentals of the banks (CAMEL variables), of the fixed effects (the within regression), of the concentration variables and participation are presented jointly.

5.2 Empirical results

Table 8 presents the response of interest rates to bank participation and concentration (measured by the dual d). Only the dual concentration index is significant for the variables hot money and working capital, with a positive sign. It is not possible to reject the joint significance of these

Table 9 – Interest rates response to banking concentration and participation – Corporate entities

Variables	Guarantied over draft accounts		Acquisition of goods		Vendor	
	Between	Within	Between	Within	Between	Within
Constant	-1.275	-1.140	1.286	1.142	-4,571*	-4,500*
	(0.810)	(0.819)	(1.018)	(1.078)	(0.846)	(0.884)
Capital adequability(-1)	0,216*	0,190*	0,224*	0,439*	-0.054	-0.089
	(0.047)	(0.050)	(0.071)	(0.110)	(0.098)	(0.113)
Asset quality(-1)	0.486	1.361	1,983**	0.951	-0.138	-0.571
	(0.336)	(1.248)	(0.961)	(3.559)	(0.567)	(2.691)
Management(-1)	-0.041	-0.062	-0,084***	-0,091***	-0.009	-0.011
	(0.045)	(0.047)	(0.049)	(0.052)	(0.024)	(0.026)
Earnings(-1)	-0,391**	-0,325*	-0.275	-0.271	0,577***	0.405
	(0.160)	(0.161)	(0.248)	(0.253)	(0.301)	(0.307)
Liquidity(-1)	-0,128**	-0,145*	-0,110***	-0.082	-0.016	-0.026
	(0.064)	(0.069)	(0.066)	(0.083)	(0.049)	(0.068)
Concentration	1,988**	1,821*	-0.975	-0.835	5,193*	5,140*
	(0.892)	(0.907)	(1.063)	(1.098)	(0.894)	(0.924)
Participation	0.954	0.129	0.241	0.144	-0.691	-0.500
	(1.527)	(1.687)	(0.343)	(0.563)	(0.619)	(0.646)
Maturity	0.002	0.002	-1,6E-4**	-1,9E-4*	7.4E-5	7.8E-5
	(0.002)	(0.002)	(6.3E-5)	(6.8E-5)	(6.7E-5)	(7.0E-5)
Volume	-3.2E-8	1.6E-9	-2,3E-7*	-2,6E-7*	5.0E-8	5.7E-8
	(1.3E-7)	(1.3E-7)	(8.6E-8)	(8.8E-8)	(9.8E-8)	(9.9E-8)
Inflation index	-0.184	-0.162	0,966*	1,002*	1,425*	1,364*
	(0.230)	(0.232)	(0.202)	(0.203)	(0.219)	(0.225)
GDP	-1,615*	-1,537*	-0,612**	-0,547**	-0,801*	-0,833*
	(0.315)	(0.317)	(0.253)	(0.258)	(0.223)	(0.228)
Adjusted R^2	0.122	0.907	0.327	0.824	0.516	0.826
F Test – Fixed effects	-	41,299*	-	18,069*	-	12,587*
Haussman Test	17.238	-	14.814	-	14.294	-
F Test – Fundamentals	5,852*	4,714*	3,866*	4,274*	0.875	0.508
F Test – Participation and concentration	2,502***	2.054	0.566	0.317	16,899*	15,484*
Number of banks	73	-	45	-	40	-
Number of observations	374	-	195	-	171	-

The *, ** and *** denote statistically significance at the 1%, 5% and 10% level, respectively and standard errors are given in parenthesis.

concentration measurements. In the case of hot money and working capital, the null hypothesis that the effects are random (between) was rejected and the model of fixed effects (within) was accepted. In both cases, the fixed effects are not redundant as can be perceived through test F of fixed effects and, therefore, this hypothesis is rejected at the significance level of 1%. Moreover, the F test for the fundamentals suggests that such fundamentals have explicative power for interest rate levels. This final point suggests that, aside from concentration, efficiency considerations also impact loan costs, with reflections on interest rates.

Continuing in the framework of table 8, in the invoice discounting and promissory note discounting modality, one observes that there is no relation between concentration

Table 10 – Interest rates response to banking concentration and participation – Individuals

Variables	Special overdraft checks		Personal credit		Acquisition of vehicles		Acquisition of goods	
	Between	Within	Between	Within	Between	Within	Between	Within
Constant	-7.701	-7.578	7,166*	6,370*	-2,926*	-3,056*	-0.219	-0.241
	(6.781)	(6.930)	(2.179)	(2.242)	(1.053)	(1.085)	(1.758)	(1.784)
Capital adequability(-1)	0.090	0.103	0.092	0.293	0,201**	0,353*	0.097	0.190
	(0.112)	(0.117)	(0.263)	(0.320)	(0.100)	(0.122)	(0.167)	(0.208)
Asset quality(-1)	2.182	0.114	-0.402	3.540	2,129**	-0.062	3,486*	1.331
	(1.354)	(7.648)	(0.963)	(3.524)	(1.060)	(3.486)	(1.461)	(4.665)
Management(-1)	0.074	0.106	-0,340*	-0,318*	0.022	0.033	-0.071	-0.054
	(0.108)	(0.110)	(0.070)	(0.072)	(0.050)	(0.051)	(0.087)	(0.090)
Earnings(-1)	-0.317	-0.303	2,392***	2,413***	-0.220	-0.224	-0.086	-0.012
	(0.321)	(0.324)	(1.279)	(1.315)	(0.256)	(0.258)	(0.658)	(0.668)
Liquidity(-1)	-0,308***	-0,420*	-0.295	-0.140	-0,263*	-0,258*	-0.063	-0.003
	(0.179)	(0.199)	(0.222)	(0.253)	(0.071)	(0.076)	(0.123)	(0.141)
Concentration	9.690	9.798	-6,421*	-5,843**	3,714*	3,902*	0.874	0.922
	(7.323)	(7.425)	(2.339)	(2.384)	(1.126)	(1.137)	(1.903)	(1.922)
Participation	0.246	-5.329	-1.025	-5.323	0.023	0.019	-0.748	-0.637
	(3.516)	(4.829)	(3.415)	(4.798)	(0.550)	(0.593)	(1.523)	(1.625)
Maturity	-0.002	-9.5E-04	-8,2E-04*	5,3E-04***	-1.1E-04	-7.7E-05	-9.3E-05	-6.6E-05
	(0.004)	(3.7E-03)	(2.8E-04)	(3.1E-04)	(6.8E-05)	(7.1E-05)	(9.8E-05)	(1.0E-04)
Volume	1.7E-07	2.7E-07	-4.3E-08	-5.9E-08	-2,8E-08***	3,0E-08***	1.2E-07	1.2E-07
	(3.3E-07)	(3.4E-07)	(1.1E-07)	(1.1E-07)	(1.7E-08)	(1.7E-08)	(3.2E-07)	(3.3E-07)
Inflation index	1,364**	1,312**	-0.733	-0.530	1,489*	1,540*	0.365	0.386
	(0.657)	(0.660)	(0.944)	(0.952)	(0.195)	(0.197)	(0.368)	(0.369)
GDP	-1,892***	-1,797***	-2,284**	-2,417**	-1,271*	-1,287*	-1,574*	-1,638*
	(0.967)	(0.972)	(1.136)	(1.139)	(0.271)	(0.272)	(0.479)	(0.483)
Adjusted R^2	0.095	0.881	0.089	0.825	0.468	0.959	0.121	0.898
F Test - Fixed effects	-	33,159*	-	19,920*	-	68,521*	-	31,947*
Haussman Test	15.353	-	14.411	-	17.230	-	15.321	-
F Test-Fundamentals	1.337	1.175	5,637*	5,265*	4,750*	4,551*	1.363	0.267
F Test-Participation and concentration	0.948	1.241	4,157**	3,857**	5,553*	6,014*	0.368	0.312
Number of banks	60	-	80	-	46	-	48	-
Number of observations	304	-	418	-	206	-	213	-

The *, ** and *** denote statistically significance at the 1%, 5% and 10% level, respectively and standard errors are given in parenthesis.

Table 11 – Interest rates response to banking concentration and participation – Corporate entities

Variables	Hot Money		Discount of trade bills		Disc.of promissory notes		Working capital	
	Between	Within	Between	Within	Between	Within	Between	Within
Constant	2,343**	1.803	0.956	0.907	0.608	-0.396	1,373**	1,283**
	(1.122)	(1.153)	(0.738)	(0.753)	(1.877)	(2.022)	(0.604)	(0.605)
Capital adequability(-1)	0.193	0.183	-0.011	-0.006	-0.004	0.001	-0.002	0.000
	(0.203)	(0.236)	(0.029)	(0.030)	(0.014)	(0.014)	(0.008)	(0.008)
Asset quality(-1)	-0.077	4,106**	0.442	2.953	-1,673*	1.481	0.015	1,964*
	(0.435)	(1.831)	(0.478)	(3.916)	(0.592)	(7.025)	(0.178)	(0.647)
Management(-1)	-0,158**	-0,194*	-0,096***	-0.090	-0,127*	-0.094	-0.017	-0,045***
	(0.069)	(0.074)	(0.054)	(0.057)	(0.063)	(0.070)	(0.026)	(0.027)
Earnings(-1)	0.660	0.527	0.074	0.068	-0.066	-0.390	-0.046	-0.034
	(0.667)	(0.729)	(0.191)	(0.195)	(0.440)	(0.594)	(0.114)	(0.116)
Liquidity(-1)	0.110	0.344	-0,170**	-0.129	-0.137	0.152	-0,139*	-0.059
	(0.162)	(0.199)	(0.074)	(0.091)	(0.098)	(0.161)	(0.041)	(0.047)
Concentration(-1)	-1.942	-1.672	-0.416	-0.483	0.122	0.914	-0.974	-0.994
	(1.179)	(1.201)	(0.796)	(0.811)	(1.961)	(2.026)	(0.677)	(0.679)
Participation(-1)	-0.120	-0.050	-0.318	0.053	-0.193	-0.178	-0.214	-0.004
	(0.544)	(0.673)	(0.380)	(0.564)	(0.148)	(0.196)	(0.387)	(0.564)
Inflation index	-0.397	-0.023	1,131*	1,141*	0.116	-0.064	0.283	0,327***
	(0.575)	(0.592)	(0.289)	(0.290)	(0.637)	(0.656)	(0.182)	(0.183)
GDP	-2,004*	-1,871*	-0,928**	-1,001**	-1,776*	-1,931*	-1,475*	-1,556*
	(0.629)	(0.636)	(0.393)	(0.397)	(0.616)	(0.629)	(0.231)	(0.233)
Adjusted R^2	0.127	0.837	0.161	0.730	0.178	0.660	0.159	0.840
F Test – Fixed effects	-	19,256*	-	11,838*	-	5,131*	-	20,675*
Haussman Test	13.723	-	3.663	-	13.870	-	31,844*	-
F Test – Fundamentals	2,493**	3,898*	7,800*	7,374*	4,281*	2,104***	19,370*	19,098*
F Test – Participation and concentration	1.408	0.985	0.527	0.178	0.857	0.511	1.210	1.073
Number of banks	44	-	72	-	33	-	85	-
Number of observations	178	-	328	-	149	-	415	-

The *, ** and *** denote statistically significance at the 1%, 5% and 10% level, respectively and standard errors are given in parenthesis.

and interest rates, though the fundamentals are jointly significant. According to the Hausman test, the correct specification would be that of random effects in these cases.

Table 9 presents the responses of corporate entity interest rates to market concentration and participation. In this case, measurements of concentration are directly related to the interest rates practiced on the market. The variables of fundamentals are not significant only for the vendor modality.

Table 10 presents the response of interest rates for individual persons to market concentration and participation. Only in the modalities of personal credit and vehicle acquisitions does test F show that these variables have joint significance. However, in the case of personal credit it is an inverse relationship. The coefficients of d index are negative and significant. One explanation for this result could be that the large banks have economies of scale.

Table 12 – Interest rates response to banking concentration and participation – Corporate entities

Variables	Guarantied over draft accounts		Acquisition of goods		Vendor	
	Between	Within	Between	Within	Between	Within
Constant	-0.948	-0.861	4,234**	3,955**	0.421	0.427
	(0.739)	(0.745)	(1.917)	(1.991)	(1.030)	(1.061)
Capital adequability(-1)	0,214*	0,189*	0,210*	0,407*	-0.097	-0.185
	(0.047)	(0.049)	(0.072)	(0.112)	(0.105)	(0.128)
Asset quality(-1)	0.479	1.380	1,920**	1.505	-0.229	-2.063
	(0.332)	(1.246)	(0.967)	(3.581)	(0.550)	(2.984)
Management(-1)	-0.046	-0.064	-0.036	-0.046	-0,075*	-0,082**
	(0.044)	(0.046)	(0.054)	(0.058)	(0.024)	(0.026)
Earnings(-1)	-0,403**	-0,337**	-0.311	-0.299	0,767**	0.539
	(0.159)	(0.161)	(0.257)	(0.263)	(0.335)	(0.343)
Liquidity(-1)	-0,124***	-0,144**	-0,125***	-0.108	-0.015	-0.011
	(0.064)	(0.069)	(0.068)	(0.086)	(0.051)	(0.075)
Concentration(-1)	1,677**	1,579***	-4,117**	-3,860***	-0.088	-0.027
	(0.821)	(0.835)	(2.018)	(2.078)	(1.105)	(1.135)
Participation(-1)	0.339	-0.353	-0.330	-0.295	-0,342**	-0.027
	(0.579)	(0.755)	(0.257)	(0.515)	(0.150)	(0.223)
Inflation index	-0.150	-0.137	1,575*	1,591*	0,574*	0,497*
	(0.229)	(0.231)	(0.321)	(0.328)	(0.180)	(0.183)
GDP	-1,634*	-1,547*	-0,909*	-0,855*	-1,166*	-1,209*
	(0.327)	(0.329)	(0.262)	(0.266)	(0.339)	(0.349)
Adjusted R^2	0.120	0.907	0.299	0.810	0.418	0.782
F Test - Fixed effects	-	41,533*	-	16,685*	-	10,006*
Haussman Test	18,683**	-	7,361***	-	17,491**	-
F Test-Fundamentals	7,363*	6,670*	8,498*	7,320*	7,876*	6,511*
F Test-Participation and concentration	2,352***	1.829	2,840***	1.802	2,607***	0.007
Number of banks	73	-	42	-	40	-
Number of observations	374	-	195	-	171	-

The *, ** and *** denote statistically significance at the 1%, 5% and 10% level, respectively and standard errors are given in parenthesis.

One of the problems with the results obtained up to the moment is that it is difficult to establish a priori whether the concentration is in fact exogenous variable, which may enter as an explicative variable for interest rates at instant t.

Evans et al. (1993) argue that the interest rates practiced in certain markets can affect decisions as to entering and leaving such a market and, consequently, the very structure of the market. In this way, it would be necessary to carry out a robusticity test in order to evaluate whether the results remain the same, seeking to control for a possible endogenous nature of the concentration and participation variables. To do this, the participation and concentration variables enter with a lag in one period in the regressions and tables 11, 12 and 13 show the results obtained.

As can be observed in table 11, the relation between concentration and participation and interest rates for legal entities is not maintained under this specification. A similar

Table 13 – Interest rates response to banking concentration and participation – Individuals

Variables	Special overdraft checks		Personal credit		Acquisition of vehicles		Acquisition of goods	
	Between	Within	Between	Within	Between	Within	Between	Within
Constant	48,349*	52,648*	5,224*	4,848*	5,241*	5,352*	-1.867	-1.841
	(16.255)	(16.400)	(1.810)	(1.846)	(1.217)	(1.222)	(2.094)	(2.123)
Capital adequability(-1)	0.096	0.111	0.174	0.336	0,180***	0,285**	0.113	0.205
	(0.109)	(0.115)	(0.271)	(0.322)	(0.102)	(0.121)	(0.167)	(0.205)
Asset quality(-1)	2,232***	0.511	-0.424	3.109	2,063***	-0.148	3,701**	2.680
	(1.335)	(7.466)	(1.048)	(3.529)	(1.166)	(3.476)	(1.508)	(5.100)
Management(-1)	0.157	0,214***	-0,336*	-0,314*	-0.023	-0.015	-0.034	-0.022
	(0.111)	(0.113)	(0.071)	(0.073)	(0.047)	(0.048)	(0.089)	(0.092)
Earnings(-1)	-0.327	-0.352	2,182***	2,189***	-0.295	-0.295	-0.150	-0.092
	(0.312)	(0.316)	(1.285)	(1.313)	(0.257)	(0.259)	(0.658)	(0.669)
Liquidity(-1)	-0,378**	-0,498**	-0.316	-0.170	-0,257*	-0,254*	-0.074	-0.027
	(0.177)	(0.196)	(0.226)	(0.253)	(0.072)	(0.076)	(0.123)	(0.140)
Concentration(-1)	-50,782*	-55,198*	-4,571**	-4,424**	-5,117*	-5,165*	2.624	2.585
	(17.516)	(17.697)	(1.971)	(1.991)	(1.313)	(1.320)	(2.262)	(2.298)
Participation(-1)	2.330	-0.947	-0.649	-0.319	-0,719**	-0,687***	-0.360	-0.310
	(1.502)	(3.209)	(2.156)	(3.971)	(0.328)	(0.365)	(0.367)	(0.442)
Inflation index	-1.092	-1.305	0.805	0.841	2,113*	2,145*	0.709	0,723***
	(0.914)	(0.920)	(0.859)	(0.861)	(0.226)	(0.227)	(0.430)	(0.434)
GDP	-1,502***	-1.318	-1.707	-1,904***	-0,801*	-0,801*	-1,454*	-1,508*
	(0.828)	(0.834)	(1.055)	(1.060)	(0.246)	(0.247)	(0.449)	(0.453)
Adjusted R^2	0.122	0.885	0.076	0.823	0.473	0.959	0.129	0.900
F Test - Fixed effects	-	34,583*	-	23,179*	-	81,612*	-	33,462*
Haussman Test	12.897	-	5.918	-	7.302	-	9.529	-
F Test-Fundamentals	2,828**	2,707**	2,353**	2,168***	34,247*	34,001*	4,945*	3,976*
F Test-Participation and concentration	5,444*	4,892*	2,711***	2,470***	11,514*	10,958*	1.028	0.802
Number of banks	60	-	80	-	46	-	48	-
Number of observations	304	-	418	-	206	-	213	-

The *, ** and *** denote statistically significance at the 1%, 5% and 10% level, respectively and standard errors are given in parenthesis.

result was obtained in table 12. Using the Hausman test, the best specification for the modalities guaranteed overdraft account, acquisitions of goods and vendor operations is the fixed effects model. For this specification, the concentration variable is significant at the level of 10% for special overdraft accounts and vendor operations, with a positive sign for the first and a negative sign for the second.

Table 13 shows that there exists a strong relation between banking concentration and the level of interest practiced in the modality of individual persons. The relation is not only significant, but is also negative for the overdraft, personal credit and vehicle acquisition types, also in line with the hypothesis that economies of scale may be operating in these segments. In other words, higher rates may be compensated by high volumes of credit concession.

6. Final considerations

This article presented a concentration measurement that is more informative than the Hirschman-Herfindahl index. The measurement in question has a direct interpretation and can be used to measure banking concentration, making it possible to draw direct comparisons over time and among countries. This measurement was developed on the basis of the theory of duality.

The most important contribution of this article is that it presents this new measurement of banking concentration and demonstrates its utility. Moreover, it shows that such ordinary measurements as HHI are not comparable, making it difficult to compare countries among themselves and even to evaluate the evolution of the domestic banking sector should there be significant alterations in the number of banks. With this, the article is an original contribution that can aid research in banking literature and can be used in a variety of applications. Studies that draw direct relations between financial stability and banking concentration should use the measurement tool proposed in this article. Furthermore, studies that make comparisons among countries should use the dual of the HHI since this measurement of banking concentration is directly comparable, which is not true for the HHI index (commonly used in literature).

One data panel model was estimated in order to test the price-concentration relationship. The results show that for corporations the loan types secured accounts and acquisition of assets maintain a statistically significant relation with banking concentration.

For individual persons, in the loan modalities of special overdraft checks, personal credit and vehicle acquisitions, there is a statistically significant relationship and negative between banking concentration (measured by the HHI dual) and the interest rates practiced.

In this way, the conclusions of this paper indicate that there is no evidence that banking concentration leads to anticompetitive practices and explains the high banking spreads practiced in Brazil. Other variables may be included in future surveys in order to better understand this relationship.

References

Alencar, L. S. de e Nakane, M.I., (2004), **Bank Competition, Agency Costs and the Performance of the Monetary Policy**, Working Papers Series do Banco Central do Brasil, 81.

Allen, F., e Gale, D., (2001), **Comparing Financial Systems, Cambridge**, MA: MIT press.

Allen, F., e Gale, D., (2004), **Competition and Financial Stability**, Journal of Money, Credit and Banking 36, 453-480.

Amel, D., Barnes, C., Panetta, F., e Salleo, C., 2004, **Consolidation and efficiency in the financial sector: A review of the international evidence**, Journal of Banking and Finance 28, 2493-2519.

Beck, T., Demirguc-Kunt, A., e Levine, R., 2003, **Bank Concentration and crisis**, NBER Working Paper 9921.

Berger, A. N., e Hannan, T.H., 1989, **The priceconcentration relationship in banking**, The Review of Economics and Statistics 71, 2, 291-299.

Carletti, E., e Hartmann, P, (2002), **Competition and stability: what´s special about banking, In Monetary History, exchange Rates and financial markets: Essays in honor of Charles Goodhart**, editado por Paul Mizen, Cheltenham, UK: Edward Elger.

Demirguç-Kunt, Laeven, L., e Levine, R., 2004, **Regulations, market structure, institutions, and the cost of financial intermediation**, Journal of money, Credit, and Banking 36, 593-622.

Evans, W.N., Froeb, L.M., e Werden, G.J., 1993, **Endogeneity in the concentration-price relationship: causes, consequences and cures**, The Journal of Industrial Economics XLI, 4, 431-438.

Grochulski, B. e Kareken, J. (2004) **Allen and Gale on risk-taking and competition in banking**, Finance Research Letters 1, 236-240. Group of Ten. (2001), Consolidation in the Financial Sector. Janeiro, 450 pp.

Internal Models Validation in Brazil: Analysis of VaR Backtesting Methodologies

Alan Cosme Rodrigues da Silva[46]
Claudio Henrique da Silveira Barbedo[47]
Gustavo Silva Araújo[48]
Myrian Beatriz Eiras das Neves[49]

Abstract

The purpose of this article is to analyze backtesting methodologies of VaR, focusing on aspects as suitability to volatile markets and to limited data set. We verify, from regulatory standpoint, tests to complement the Basel traffic light results, using simulated and real data. The results indicate that tests based on failures proportion are not adequate for small samples even for 1,000 observations. The Basel criterion is conservative and has low power, which does not invalidate its application, as the criterion is only one of the procedures adopted in internal models validation process. Thus, it is suggested using tests that capture the shape of returns distribution, as the Kuiper test, in addition to the Basel criterion.

46/ Department of Research, Banco Central do Brasil, alan.cosme@bcb.gov.br.
47/ Department of Research, Banco Central do Brasil, claudio.barbedo@bcb.gov.br.
48/ Department of Research, Banco Central do Brasil, gustavo.araujo@bcb.gov.br.
49/ Department of Research, Banco Central do Brasil, myrian.neves@bcb.gov.br.

1. Introduction

The validation of risk models is a critical issue in the acceptance of internal models for market risk management. The models generally used by financial institutions are based on Value at Risk (VaR) concept, whose theoretical and practical framework is well spread out among risk managers. However, the process of empirically accessing risk models accuracy is still a challenge.

For regulators, the validation of internal models evolves qualitative and quantitative features. Although Lopez (2001) reports the qualitative criteria as potentially of greater importance from a regulatory standpoint, he also remarks the difficulties in using statistical tests to determine the performance of institutions' VaR estimates. Basel Committee[50] proposes a validation model based on the number of exceptions observed during a period, establishing penalties according to the model's performance. The Committee recognizes that this procedure has low power in distinguishing mis-specified from accurate models, besides assuming that the exceptions are independent. However, the possibility of not rejecting mis-specified models is limited by the Committee's recommendation of analyzing qualitative aspects, as regular procedures of external audit, periodical monitoring of the risk systems and evaluation of the performance of risk model's forecasts.

In literature, there are three groups of methodologies for validating risk measurement models:

i. those based on the frequency of tail losses, considering or not the independence among them;
ii. those based on the size of tail losses and;
iii. the ones based on the adherence of the VaR model to the assets returns distribution. All the tests present advantages and limitations in usage: some are reliable but depends on a very large sample; others are feasible but offer partial information about the model.

In this context, this article aims to evaluate the most applied tests available in literature, that are the methods proposed by Kupiec (1995), Christoffersen (1998), Crnkovic-Drachman (1996), Berkowitz (2001), Lopez (1998) and Basel Committee (1996). We focus on aspects as suitability to volatile markets such as Brazilian market and to limited data set, verifying, from regulatory standpoint, desirable tests

50/ See Basle Committee on Banking Supervision (1996).

to be used to validate internal models, in addition to Basel traffic light results.

For this, the evaluation analyzes the tests performance considering type I and type II errors, using simulated data. Besides, the tests are also performed using real asset returns from Brazilian stock market and spot US dollar quoted in Brazilian real.

The results indicate that tests based on the frequency of failures are not adequate to small samples even for 1,000 observations sample; the tests perform weakly for low percentiles of value at risk. Basel criterion is conservative, as a proportion of failures test, what can be adequate under supervisors' position. However, as it does not take into account the returns distribution, it has low power. In this sense, as a complementation of Basel criterion, it could be implemented an additional test of adherence as the Kuiper test in internal models validation process.

The paper is organized as following: section 2 presents the validation tests, showing the main details discussed in literature; section 3 describes the simulation as well as the methodology to construct VaR models and validation tests; section 4 discusses the results, comparing the performance of all tests. Finally, section 5 presents the conclusion, and proposes issues for future works.

2. Tests for Validating Models

We can classify the tests for VaR models validation into three groups: (i) the ones which validate if the number of observed exceptions are consistent to the number of expected exceptions; (ii) the ones which analyze the size of the occurred exceptions and; (iii) the ones which verify the consistency between the risk model and their construction assumptions. The first group is composed by Basel Committee's procedure, the basic frequency of tail losses (or Kupiec) test and the conditional Christoffersen (1996) approach, which is based not only on the frequency of observed exceptions but also on the independence among them. The most reliable test in the second group is the one proposed by Lopez (1998). Finally, remarkable tests in the third group are suggested by Crnkovic-Drachman (1996) and Berkowitz (2001). These tests evaluate the VaR model based on adherence of its underlying distribution to observed distribution of returns. The following section describes the six tests performed in this paper.

2.1 Tests based on frequency of tail losses

2.1.1 Basel Validation

Basel Committee (1996) classifies the backtests results of VaR models into three categories. In the first (green zone), the tests results are consistent with an accurate model and the probability of not reject an inaccurate model is low. In the extreme (red zone), the tests results are very improbable to come from a suitable model and the probability to reject an accurate model is remote. Between the two cases lies a region (yellow zone) where the backtest results may be consistent to accurate or inaccurate models and the supervisor incentives the banks to present additional information about theirs models.

The Committee determines 250 days as the minimum sample size to perform the backtest and 1% VaR. In this case, the green zone is situated between zero and four exceptions, the yellow zone, between five and nine exceptions and, above ten exceptions, the model is in red zone. According to the backtest results, a multiplier factor – varying between three and four – is applied for capital requirements, which gives a safety margin to regulator.

If a VaR model is reliable then the exceptions do not follow any pattern, which means for example that exceptions clustering are not expected. The Basel procedure focus on exceptions frequency, not considering issues like detecting if they follow unexpected patterns or if their size are relevant.

2.1.2 Kupiec Test

The most widely used test is the frequency of tail losses one proposed by Kupiec (1995), which is based on the frequency of losses that exceed VaR.

Let x be the number of "failures" or exceptions (the number of cases in which loss exceeds forecasted VaR) in a sample of size n. If the VaR model is correct, x follows the binomial distribution with parameter (n,x). Under the null hypothesis, the forecasting model is correct and the observed frequency of tail losses is consistent with the frequency of exceptions predicted by the model. The test is based on likelihood ratio (LR) for null hypothesis, which is given by

$$LR = -2Log\left[(1-p^*)^{n-x}(p^*)^x\right] + 2Log\left[(1-[x/n])^{n-x}(x/n)^x\right]$$

where *p** is the probability of exceptions under null hypothesis, *n* is the sample size and *x* is the number of exceptions in the sample. Kupiec calls the LR test the proportion of failures (*PF*) test. Under null hypothesis, the probability of an exception (*p*) is equal to the significance level (*p**) of the VaR and *PF* has a chi-square distribution with one degree of freedom. The region where the null hypotheses cannot be rejected is determined by the intersection between the PF and the chi-square function. For given sample size and significance level, the test determines inferior and superior limits where the null hypothesis cannot be rejected at the significance level of the test.

However, as the author remarks, the test presents low power in small samples: there is a significant probability of not reject the null hypothesis when it is false. Like Basel criterion, this test is based on the frequency of tail losses, not considering information as the size of tail losses and the temporal dependence in exceptions behavior. This is an important issue given the evidences of conditional volatilities in financial series.

2.1.3 Christoffersen Test

An alternative approach developed by Christoffersen (1998) is to estimate a confidence interval to the number of exceptions based on the available sample and verify whether the observed number of exceptions is consistent with the forecasted, including an independence test. He suggests a procedure to evaluate the precision of predictions in confidence intervals, which tries to capture the VaR estimative conditionality.

The null hypothesis of the unconditional coverage test is that $I_t \sim i.i.d.Bernoulli(p)$, against the alternative that $I_t \sim i.i.d.Bernoulli(\pi)$, where I_t is the hit sequence of VaR_t violations, *p* is the confidence level and π is equal to the ratio between the number of observations and the size of the sample. The test (uc) is then $H_{0,uc} : \pi = p$

This test implicitly assumes that the hits are independent and because of this, the author tests this hypothesis against an alternative which the hit sequence follows a first order Markov sequence with switching probability matrix $\Pi = \begin{bmatrix} 1-\pi_{01} & \pi_{01} \\ 1-\pi_{11} & \pi_{11} \end{bmatrix}$ where π_{ij} is the probability of an *i* on day *t-1* being followed by a *j* on day *t*. The test of independence (ind) is $H_{0,ind} : \pi_{01} = \pi_{11}$. The two tests are

combined in a test of conditional coverage (cc) defined as $H_{0,cc}: \pi_{01} = \pi_{11} = p$. Under the null hypothesis, this statistic test is distributed like a chi-square with 2 degrees of freedom.

Although Christoffersen (2003) criticizes first order markovian process as a limited alternative compared to others forms of clustering, the present approach is easy to implement and presents the vantage of the advantage of evaluating the dynamic behaviour of exceptions sequence, apart from their frequency estimative. This allows to verify, in case of rejection of a model, if this rejection is due to the incorrect estimative of failures frequency or to the dependence among them.

2.2 Tests to Evaluate Forecast Model

An alternative robust evaluation involves the utilization of tests that measure the deviation between the empirical returns distribution implicit to VaR model and the model theoretical distribution. Dowd (2002) says that, once these tests are based on more information than frequency of tail losses, it is expected they produce more reliable results.

2.2.1 Chrkovic and Drachman Test

Chrkovic and Drachman (1996) present a test for evaluating risk measurement models based on the forecast of the probability density functions (PDF). The aim is to test the agreement between the PDF forecast and the actual PDF of market variables, i.e., given a forecast of the PDF, one must determine into which percentile the actual PDF fell. The insight is that if the actual returns are random, the percentile of them must be uniformly distributed in the PDF forecast. In this way, for a forecasting method to be considered ideal, all these percentiles must look like a sample from a uniform distribution. To evaluate the independence of the measured percentiles, the authors propose the BDS's statistic, presented in Brock et al (1996).

The uniform test of the distribution is based on the Kuiper's statistic that is equally sensitive for all values of the sample and therefore put all percentiles on an equal footing. Consider F(x) a cumulative distribution function of realized percentiles, the Kuiper's statistic for the deviation between F(x) and uniform cumulative distribution G(x) is given by $K(F(x), G(x)) = \max\{f(x) - g(x)\} - \min\{f(x) - g(x)\}$.

The advantage of the statistic is that, since a significant fraction of the change in value of many portfolios comes from non-linear instruments, the test does not consider only the medium values of the sample, like the Kolmogorov-Smirnov test. The critical values of the test are based on Stephens (1970).

The BDS test can be applied to a series of estimated residuals to check whether the residuals are independent and identically distributed (iid). The idea behind the test is to choose a distance between a pair of points (ε). If the observations of the series are iid, then for any pair of points, the probability of the distance between these points being less than or equal to e will be constant and equal to $c_1(\varepsilon)$.

The set of pairs of points is chosen moving through consecutive observations of the sample in order, i.e., given an observation *s*, and an observation *t* of any series, one can construct a set of pairs of the form $\{[x_s, x_t];[x_{s+1}, x_{t+1}];[x_{s+2}, x_{t+2}];...;[x_{s+m-1}, x_{t+m-1}]$ where *m* is the number of consecutive points used in the set, which is called dimension. The joint probability of every pair of points in the set satisfying the *e* condition is $c_m(\varepsilon)$. According to the BDS test proceedings, under the assumption of independence, this probability will simply be the product of the individual probabilities for each pair, i.e., if the observations are independent, $c_m(\varepsilon) = m \times c_1(\varepsilon)$.

However, as well documented in the literature, the BDS statistic presents a size bias. Kanzler (1999) shows that it is very sensitive to sample size and Belaire-Franch and Contreras-Bayarri (2002) recommend that the test be used to sample higher than 2.500 data. To solve this problem, we used the function of Kanzler that evaluates the significance of BDS statistics under the null hypothesis of iidness, both on small and on large samples.[51]

2.2.2 Berkowitz Test

Based on Crnkovic and Drachman (1997), Berkowitz (2001) developed a new way for evaluating models, stating that the information of entire forecast distributions or only the tail forecast distribution combined with ex-post realizations is enough to construct a powerful test even with sample sizes as small as 100.

51/ The function is available in http://www2.gol.com/users/kanzler/index.htm.

Berkowitz advocates an extension of Rosemblatt (1952) transformation which delivers, under the null hypothesis, variables iid which follow N(0,1). This allows for estimation of the Gaussian likelihood and construction of likelihood-based tests, which are convenient, flexible and present good finite sample properties.

The Berkowitz test applied in this work ignores model failures that are limited to the interior of the distribution and the shape of the forecasted tail of the density is compared to the observed tail. Any observations that do not fall in the tail will be intentionally truncated. Let the desired cutoff point be $VaR = \Phi^{-1}(\alpha)$, where $\Phi^{-1}(\cdot)$ is the inverse of cumulative standard normal distribution function, the new variable of interest is $z_t^* = Min(z_t, -VaR)$ to the left tail and $z_t^* = Max(z_t, VaR)$ to the right tail. For example, the log-likelihood function for the left tail is:

$$L(\mu,\sigma / z^*) = \sum_{z_t^* < VaR}\left[-\frac{1}{2}\ln(2\pi\sigma^2) - \frac{1}{2\sigma^2}(z_t^* - \mu)^2\right] + \sum_{z_t^* = VaR}\ln\left[1 - \Phi\left(\frac{VaR - \mu}{\sigma}\right)\right]$$

The first two terms in equation represent the usual Gaussian likelihood of losses. The third term is a normalization factor arising from the truncation. Tests based on this equation should be more powerful than traditional approaches while still allowing users to ignore model failures in the *interior* of the distribution.

To construct an LR test, note that the null hypothesis again requires that $\mu = 0$ e $\sigma^2 = 1$ and therefore a restricted likelihood L(0,1) can be evaluated and compared to an unrestricted likelihood, $L(\hat{\mu}, \hat{\sigma}^2)$. Then the tail likelihood ratio will be: $LR_{cauda} = -2(L(0,1) - L(\hat{\mu}, \hat{\sigma}^2))$. Under the null hypothesis, this statistic test is distributed like a chi-square with 2 degrees of freedom.

2.2.3 Lopez Test

An alternative for methodologies based on statistic criteria is the test proposed by Lopez (1999), which allows to rank models but does not give any formal statistical indication of model adequacy. Because it is not a statistical test, it does not present low power of standard tests such as the Kupiec test.

The loss function, defined by the author to any m model, follows the form: $C_m = \frac{1}{T}\sum_{t=i}^{T} C_{m,t}$, where:

$$C_{m,t} = \begin{cases} 1 + (L_t - VaR_{mt})^2, & se \quad L_t > VaR_{mt} \\ 0, & se \quad L_t \leq VaR_{mt} \end{cases}$$

and VaR_{mt} is the VaR estimated by model m for period *t* and *Lt* is the loss in portfolio market value observed in t.

This function is similar to mean squared error measure used in evaluation of the precision of points forecasts. In this case, the error magnitude only affects the function when the VaR is exceeded; in other words, this function gives a measure of the observed error size when the VaR is exceeded. The best model is the one that joins the exceptions proportion close to expected to low loss function. However, with this loss function, there is no longer a straightforward condition for the benchmark, so it can be estimated by simulation as shown ahead.

In this paper, we implement the loss function method as proposed by Lopez (1998) to real data. For estimating a benchmark for the stocks, we generate 10,000 returns series, with 1,000 observations each, following $N(0,\sigma^2)$ where the volatility is equal to the standard deviation of the Brazilian market index (IBOVESPA) for the first 250 observations of the sample. For US dollar series, the volatility is equal to the standard deviation of ask quotation for the first 250 days of the sample period. For these distributions, the VaR is estimated by the delta-normal methodology, with volatility estimated by the standard deviation of the 250 previous returns.

For each one of the series of returns, it is computed the loss function so we have a distribution of C*m*. Once *f*(C*m*) has been generated, we can determine the empirical quantile of the cumulative distribution function, above which the regulators should take a closer look at the assumptions of VaR model. Lopez suggests a threshold quantile of 80 percent, but remarks that this decision should be based both on the severity of the distributional assumptions used and regulators preferences. In this paper, we also use 80% as a threshold.

3. Methodology

3.1 Application in Simulated Data

For evaluating the internal models developed by the financial institutions, as value at risk (VaR), it is necessary to verify the effectiveness of the statistic tests which have the purpose of testing these models, and select the best ones. For making this verification, asset returns simulations are used. The simulation makes possible to know precisely the process of generation of the asset returns, the DGP (data generating process), and to apply the correct VaR model, because the probability density function used in the DGP is equal to the one used in the model. Thus, the aim of the simulation is to make the test of the test, and for this purpose it is necessary to be sure that the risk model is correct or not, expecting that this fact leads to not reject or reject, respectively, the model.

Usually, the tests are evaluated in two distinct forms: the size of the sample and the power of the test. First one tries to observe which is the minimum size of the sample on which the test can be applied. This is made by counting the occurrences of type I error, which means to reject a null hypothesis when it is true. For defining the minimum size of sample, a sequence of possible sample sizes can be used. For verifying the test performance in a sample with n observations, we generate, several times (for example, 10,000 simulations), returns that follow a pre-specified DGP, and the risk measure is calculated based on this known DGP. In this way, it is known that the risk model is a model that cannot be rejected by the test and the null hypothesis is true. After this, the proportion of the times that the null hypothesis is rejected is compared with the significance level of the tests. If the level used in the test is α%, we expect the null hypothesis not to be rejected more than α% of the time. The minimum size for the application of the test will be the one from which the percentage of rejections is lower than the significance level of the test.

The Basel test indicates a 250 data window for verifying the precision of the VaR-models of financial institutions. Thus, this is the minimum window size evaluated in this paper. Also, we evaluated sample sizes of 500 and 1,000 observations.[52] The aim is, instead of determining the minimum sample size, to evaluate the probability of the type I error for these window sizes.

52/ 1,000 observations is the minimum size recommended by the Kupiec test (1995).

The VaR used is the delta-normal model with volatility equal to one and with four different probabilities (p), 1%, 2.5%, 5% and 10%. The delta-normal VaR, based in returns, is $VaR_{i,t}^{1d} = \left| z_{p\%} \times \sigma_{i,t} \right|$ where $z_{p\%}$ is the quantile of the standard normal distribution that corresponds to the VaR probability and $s_{i,t}$, the returns volatility of the asset i estimated for date t.

The DGP is generated with the software Matlab 6.5 and it consists in 10,000 simulations of 250, 500 and 1,000 standard N(0,1) normal returns. We estimate the 1-day VaR and then apply the tests: Christoffersen, Kupiec, Tail Berkowitz, CD, and Basel, each one with significance level of 5%, and count, for the 10,000 simulations, the number of the null hypothesis rejections.

The second way for analyzing the VaR tests is to verify their power, which is the probability to reject a null hypothesis when it is false. This probability is equal to (1-β) where β is the probability of the occurrence of type II error, which means not to reject a null hypothesis when it is false. If the power of the test is low, then it is probable that it mis-classifies an inaccurate VaR model as well-specified.

For evaluating the power of the test it is necessary that the generation process of the asset returns (DGP) to be different of the probability distribution of the returns assumed by the model that estimates the risk measure. This way, the same simulation procedure is carried through. We generate returns with two different distributions: first, a t-Student, with variance of 6 and 1.5 degrees of freedom, that presents fatter tails than the normal standard distribution. The second distribution is generated with returns that follow a first-order auto-regressive process (AR1). We choose this distribution to compare the tests performance in series of returns with auto-correlation. For both the distributions, the VaR is estimated by the delta-normal methodology, remaining the assumption that the returns are normally distributed, expecting that the tests reject their respective null hypotheses because they are false. The volatility used in the VaR model is estimated by the standard deviation of the 250 previous returns. The statistical tests are applied to each one of the series of returns and we count the number of the null hypothesis rejections. The tests with better performance are the ones that present the higher proportions of rejection of null hypotheses.

3.2 Application in Real Data

The statistical tests also are applied to the Brazilian market. The purpose is to apply the tests in two widely used VaR models, the historical and delta-normal with volatility estimated by the exponentially weighted moving average (EWMA) method, previously knowing, in accordance to the simulations results (section 3.1), how each test performs. We used long and short positions of stocks traded in the São Paulo Stock Exchange (BOVESPA) and US dollar quoted in Brazilian reais, from 02/01/1999 to 02/27/2004. The ten most traded stocks of different economy sectors are selected, as presented in Table 1. The stock quotations used are dividend-adjusted closing prices, and, for the US dollar series, the ask quotation is obtained from Brazilian Central Bank Database.[53]

Table 1 – Selected stocks of main Brazilian economic industries, in the period from 01-Feb-1999 to 27-Feb-2004.

Industry	Enterprise	Ticker
Foods	Sadia	SDIA4
Banks	Bradesco	BBDC4
Drinks	Ambev	AMBV4
Media	Net	PLIM4
Mining	Vale do Rio Doce	VALE5
Petroleum and Gas	Petrobras	PETR4
Steelworks and Metal Works	Cia Sid. Nacional	CSNA3
Telecommunications	Telemar	TNLP4
Transports	Embraer	EMBR4
Retail	Lojas Americanas	LAME4

We obtain 1,250 observations. 250 are used for estimating the model and 1,000 for backtest. We choose this sample size for backtesting VaR models because the tests of Kupiec, Christoffersen and Chrkovic and Drachman have low power for reduced samples. Then, the values of VaR of the percentiles of 1% for left tail (long position) and 99% for right tail (short position) for the holding period of one day are calculated.

The delta-normal VaR model is obtained by the same equation used in the simulations, with the difference that the volatility used here is conditional, estimated by the exponential weighting method. This way, $\sigma_{i,t}$ is substituted in the equation by $h_{i,t}$ which means the daily conditional volatility of the logarithmic returns of the asset i, estimated for date t. The equation for $h_{i,t}$ is $h_{i,t} = \sqrt{\lambda h_{i,t-1}^2 + (1-\lambda) r_{i,t-1}^2}$, where r_t is the logarithmic return of the asset for period t and λ is the decay factor, with the constraint that $0 < \lambda < 1$. The mainly hypothesis of the model is that the asset prices are log-normal. The decay factor is estimated by the root mean squared error (RMSE) criterion, using a 250 working days window.

The historical model consists in a non-parametric model that uses one given quantile of arithmetical returns series as a VaR estimate. It uses a moving window of n days to determine the observations that compose the series of returns. The hypothesis of the model is that the distribution of probability for the studied return is the historical

53/ Brazilian Central Bank Database.

distribution. In this work, a 250 days moving window is used, generating 1,000 observations for backtesting.

3.3 Tests Implementation

The Basel criterion indicates that the maximum number of errors in each region must be calculated with the binomial probability distribution associated to a confidence level. The green zone is characterized by the binomial cumulative distribution of the errors inferior to 95%. For example, for 1,000 observations with the confidence level of 99%, the green zone is limited by fourteen failures. The number of errors in the yellow zone starts at the point that the binomial cumulative probability equals or exceeds 95%. For 1000 observations, for the same confidence level, fifteen failures are obtained with 95.21%, so the yellow zone starts from this number of failures and finishes at the point where the probability is inferior to 99.99% (23 failures). From this point, the red zone is initiated.

For implementing the independence test of Chrkovic and Drachman (1996), Brock, Hsieh and Le Baron (1990) recommend using e between 0.5 and 2 times the unconditional standard deviation of the series, and the dimensional parameter m, between 2 and 10. In this paper, the parameters of 0.433 for e (1.5 times the standard deviation of the uniform distribution) and 2 for m are used, as described in Chrkovic and Drachman (1996). As the statistics of the BDS test has normal asymptotic distribution (0,1), the critical values used are from the two-tailed normal distribution. All the tests had been implemented using the software Matlab 6.5.

4. Results

4.1 Type I Error Analysis – Simulated Data

Table 2 presents the results of all tests applied to 10,000 returns simulated according to a normal (0,1), with a delta normal VaR model constructed on a normal (0,1) hypothesis, considering 1%, 2.5%, 5% and 10% probabilities, for 250, 500 and 1,000 sample sizes. In this case, it is previously known that the VaR model is consistent to the returns distribution and it is expected the tests do not reject the VaR model. However, the tests are expected to produce rejections that represent type I error because of hypothesis tests implicit to them. In each simulation, there can be one of two answers: reject or do not reject by 5% significance

level. For a set of *n* simulations, we have a distribution of results, which can approximate as a binomial distribution. Ins this case, considering *n*=10,000, the 5% percentil is equal to 535 rejections. So, we consider satisfactory all the results below 535 rejections or 5.35% of total simulations.
Kupiec test presents results with high values of type I error for 1% VaR for all sample sizes. For 2.5% VaR, type I error is low only for 1,000 observations sample size. For the others probabilities, the results are not reliable only for 250 observations.

For Christoffersen test, we verify only two situations that the test presents a rejection percentage above 5.35%. For a best test analysis, Table 2 presents the results separated in unconditional Christoffersen, which evaluates proportion of failures, and independence test. In proportion of failures test, the number of rejections is superior to the threshold for all probabilities in 250 sample size, which confirms that the test is not useful for small samples. Besides, in all sample sizes to test 1% VaR, the number of rejections is higher than expected, reflecting how critics is the size problem for extremes values. The results of independence test are similar to joint test, with two cases of superior percentage of failures. In this case, it is important to observe the good results for joint Christoffersen test are much influenced by low type I error of independence test.

Table 2 – Results of Kupiec, Christoffersen, Berkowitz Tail and Crnkovic & Drachman tests applied to delta normal (0,1) VaR to simulated returns Rt ~ N(0,1), where p represents the probability of the VaR model. Sample sizes of 250, 500 and 1,000 observations are evaluated and the results represent percentage of model rejections over 10,000 simulations.

Percentage (%)

p	Number of observations	Kupiec	Christoffersen			Berkowitz	Crnkovic & Drachman		
			Incondicional	Independência	Conjoint	Caudal	BDS	Kuiper	Conjoint
1.0%	1000	5.49	5.49	1.74	2.63	5.35	6.07	4.94	10.06
	500	6.96	6.96	1.52	1.74	5.79	9.18	4.96	13.59
	250	9.70	9.70	1.24	1.21	6.00	14.73	4.99	18.78
2.5%	1000	4.57	4.57	1.94	4.06	5.34	6.07	4.94	10.06
	500	5.66	5.66	1.36	3.51	5.09	9.18	4.96	13.59
	250	7.50	7.50	1.41	3.25	5.60	14.73	4.99	18.78
5.0%	1000	5.12	5.12	8.33	5.62	5.35	6.07	4.94	10.06
	500	5.17	5.17	3.19	3.79	4.88	9.18	4.96	13.59
	250	5.79	5.79	1.86	3.98	5.20	14.73	4.99	18.78
10.0%	1000	4.52	5.07	5.26	5.21	5.01	6.07	4.94	10.06
	500	5.10	5.10	5.33	4.90	4.78	9.18	4.96	13.59
	250	5.58	5.58	7.90	5.50	4.81	14.73	4.99	18.78

The tail Berkowitz test presents three occurrences above the threshold for 1% and 2.5% VaR models, which indicates this test is difficult to be applied in tail extreme values for few observations distributions.

Crnkovic & Drachman (CD) test represents Kuiper and BDS conjoint analysis. The test does not present accurate results as the number of rejections is above the threshold for all sample sizes. To a better analysis, we separate the test results into Kuiper and BDS. The results of the Kuiper test are satisfactory for all the sample sizes and significance levels, with numbers of rejections lower than the threshold. The results of the independence test show that, for small samples, the test presents low power, even using the auxiliary function to evaluate the significance level, and the test tends to produce better results with big samples.

Table 3 presents the simulations classified according to the Basel criterion. This criterion considers a maximum number of failures to which there is a cumulative probability of 95% following a binomial distribution whose success probability is equal to the VaR significance level. In this way, it is expected 95% of simulations to fall into green zone. However, the results show that simulations percentage classified into green zone is lower than expected, exceeding the expected percentage in yellow zone. Nevertheless, a Basel criterion is conservative as, for supervisors, the question is rejecting models with excessive exceptions no matter if reliable models are also rejected.

Table 3 – Results of Basel criterion applied to the VaR delta-normal (0,1) for simulated returns Rt ~ N(0,1), where p represents the probability of the VaR model. Sample sizes of 250, 500 and 1,000 observations are evaluated and the results represent the percentage of model classification in each zone, considering 10,000 simulations.

Percentage (%)

p	Number of observations	Green zone	Yellow zone	Red zone
1.0%	1 000	91.90	8.09	0.01
	500	93.51	6.47	0.02
	250	88.94	11.02	0.04
2.5%	1 000	92.81	7.19	0.00
	500	91.62	8.38	0.00
	250	94.71	5.28	0.01
5.0%	1 000	94.55	5.42	0.03
	500	93.31	6.69	0.00
	250	92.18	7.81	0.01
10.0%	1 000	94.61	5.36	0.03
	500	93.85	6.14	0.01
	250	93.75	6.25	0.00

4.2 Power Test Analysis – Simulated Data

Tables 4 and 5 evaluate the power of the tests for a returns generation process following a t Student distribution and an AR process respectively. The tests present higher power as a higher rejection percentage indicates better capacity to detect a false null hypothesis.

In Table 4, tail Berkowitz and Kuiper tests presents best test power results for all sample sizes and confidence levels, reaching higher than 99% rejection percentage.

We verify that the power of failure proportion test and Christoffersen independence test present low values. This demonstrates that when the returns generation process

Table 4 – Results of Kupiec, Christoffersen, Berkowitz Tail and Crnkovic & Drachman tests applied to delta normal (0,1) VaR for simulated returns Rt ~ t(n=6,s=1.5), where p represents the probability of the VaR model. Sample sizes of 250, 500 and 1,000 observations are evaluated and the results represent percentage of model's rejections over 10,000 simulations.

Percentage (%)

p	Number of observations	Kupiec	Christoffersen			Berkowitz	Crnkovic & Drachman		
			Uncondi-tional	Indepen-dence	Conjoint	Caudal	BDS	Kuiper	Conjoint
1.0%	1 000	35.73	35.73	1.92	21.06	100.00	14.05	100.00	100.00
	500	22.88	22.88	1.28	8.53	100.00	22.57	100.00	100.00
	250	9.71	9.71	1.83	5.57	99.34	31.54	99.12	99.48
2.5%	1 000	5.00	5.00	1.99	4.64	100.00	14.05	100.00	100.00
	500	6.08	6.08	1.67	3.73	100.00	22.57	100.00	100.00
	250	6.62	6.62	1.40	3.36	99.63	31.54	99.12	99.48
5.0%	1 000	6.24	6.24	8.39	5.66	100.00	14.05	100.00	100.00
	500	6.18	6.18	2.60	3.76	100.00	22.57	100.00	100.00
	250	6.34	6.34	1.54	4.21	99.72	31.54	99.12	99.48
10.0%	1 000	32.71	32.71	5.46	26.19	100.00	14.05	100.00	100.00
	500	19.90	19.90	6.44	14.89	100.00	22.57	100.00	100.00
	250	13.81	13.81	6.70	11.36	99.74	31.54	99.12	99.48

Table 5 – Results of Kupiec, Christoffersen, Berkowitz Tail and Crnkovic & Drachman tests applied to delta normal (0,1) VaR for simulated returns $R_t = R_{t-1} + \varepsilon_t$, where p represents the probability of the the VaR model. Sample sizes of 250, 500 and 1,000 observations are evaluated and the results represent percentage of model's rejections over 10,000 simulations.

Percentage (%)

p	Number of observations	Kupiec	Christoffersen			Berkowitz	Crnkovic & Drachman		
			Uncondi-tional	Indepen-dence	Conjoint	Caudal	BDS	Kuiper	Conjoint
1.0%	1 000	96.97	96.97	62.37	99.97	99.42	92.21	100.00	100.00
	500	96.38	96.38	51.60	98.69	98.03	89.59	100.00	100.00
	250	96.03	96.03	40.96	47.41	67.20	86.19	100.00	100.00
2.5%	1 000	96.82	96.82	64.00	100.00	99.96	92.21	100.00	100.00
	500	96.48	96.48	53.02	100.00	99.49	89.59	100.00	100.00
	250	95.97	95.97	42.27	99.41	97.88	86.19	100.00	100.00
5.0%	1 000	96.93	96.93	65.13	100.00	100.00	92.21	100.00	100.00
	500	96.39	96.39	54.33	100.00	99.96	89.59	100.00	100.00
	250	95.69	95.69	43.36	99.99	99.07	86.19	100.00	100.00
10.0%	1 000	97.08	97.16	66.23	100.00	100.00	92.21	100.00	100.00
	500	96.39	96.39	55.48	100.00	100.00	89.59	100.00	100.00
	250	95.70	95.70	44.16	100.00	99.84	86.19	100.00	100.00

comes close to VaR model underlying distribution, these tests are not capable to make a reliable discrimination.[54]

The results for AR1 simulated returns, presented at Table 5, are satisfactory, as most tests present rejection rate higher than 90%. This happens because data generation process is very different from VaR model underlying distribution. For Christoffersen independence test, low power can be justified by the limitation of Markovian process to adequately model returns clustering.

For conjoint Christoffersen test, instead of what happens to type I error, now the results are influenced by unconditional Christoffersen test what delivers high power tests as results.

Table 6 presents the Basel criterion results for the data generated by the t Student distribution. We observe a relevant number of simulations classified at green zone. This data generation process presents fatter tails than the normal distribution underlying to model's VaR as more extreme the percentile is. This explains the reason why, for 1% and 2.5% VaR, there are more simulations at yellow and red zone, while for 5% and 10%, the number of failures is close to the number expected according to Basel criterion, increasing the number at green zone. For results presented at Table 6 related to AR1 returns, there are less simulations at green zone, although the percentage is still high (above 37%), which occurs as the criterion only takes care of the exception's number, apart from the difference between forecasted and observed returns distributions.

Finally, we can verify the importance of tests that compare observed and forecasted distributions to complement Basel criterion in risk models validation.

Table 6 – Results of Basel criterion applied to a VaR delta-normal for simulated returns where $R_t \sim t(\nu=6,\sigma^2=1,5)$ and $R_t=R_{t-1}+\varepsilon_t$, onde $\varepsilon_t \sim N(0,1)$, where p represents the probability of the VaR model. Sample sizes of 250, 500 and 1,000 observations are evaluated and the results represent the percentage of model classification in each zone, considering 10,000 simulations.

Percentage (%)

p	Number of observations	t(6) de Student			AR(1)		
		Green zone	Yellow zone	Red Zone	Green zone	Yellow zone	Red Zone
1.0%	1 000	41.80	57.13	1.07	37.76	1.59	60.66
	500	64.12	35.26	0.63	46.23	1.61	52.16
	250	66.82	32.86	0.32	53.68	2.12	44.20
2.5%	1 000	85.29	14.71	0.01	37.48	1.49	61.04
	500	85.87	14.12	0.01	44.73	1.80	53.47
	250	92.16	7.82	0.02	51.90	1.77	46.34
5.0%	1 000	99.06	0.94	0.00	38.07	1.31	60.63
	500	97.51	2.49	0.00	44.26	1.99	53.76
	250	95.60	4.41	0.00	50.17	2.24	47.60
10.0%	1 000	99.98	0.02	0.00	39.29	1.58	59.13
	500	99.74	0.26	0.00	44.51	2.09	53.40
	250	99.15	0.85	0.00	49.46	2.27	48.27

Table 7 – Descriptive statistic of selected stocks for VaR modelling, from 01-Feb-1999 to 27-Feb-2004.

Stock	Mean	Standard Deviation	Asymmetry	Kurtosis	Jarque-Bera statistic	p-value
AMBV4	0.0013	0.0229	0.0151	5.6131	284.56	0.0000
BBCD4	0.0005	0.0254	-0.0532	4.2252	63.02	0.0000
CSNA3	0.0022	0.0284	0.1194	4.1177	54.43	0.0000
EMBR4	0.0013	0.0297	-0.5467	7.4956	891.90	0.0000
LAME4	0.0015	0.0322	0.4738	6.0023	413.00	0.0000
PETR4	0.0008	0.0223	0.0112	4.6118	108.26	0.0000
PLIM4	-0.0042	0.0527	0.1160	5.9221	358.03	0.0000
SDIA4	0.0014	0.0239	0.2263	4.8314	148.28	0.0000
TNLP4	0.0001	0.0270	0.0515	3.8753	32.36	0.0000
VALE5	0.0013	0.0202	0.1260	4.2180	64.46	0.0000
Dólar	0.0005	0.0106	-0.7300	11.9765	3 446.23	0.0000

4.3 Results – Real Data

First of all, the normality of stocks and dollar returns is tested based on Jarque-Bera statistic. We intend to verify, by kurtosis und asymmetry measures, financial series stylized facts suggested by literature and their importance to the tests. The normality hypothesis is rejected to all studied assets and there is kurtosis excess related to normal distribution.

Table 8 presents results to 1% and 99% VaR. As unconditional Christoffersen test is similar to Kupiec´s test,

54/ In practice, only a t-Student distribution with 30 or more degrees of freedom is considered a reasonably approximation of a Normal distribution. However, it can be noted that a t-Student with 6 degrees of freedom is already a good approximation in this work.

presenting the same results, it is shown only Kupiec and conjoint Christoffersen in table.

Because of asymmetry in distributions, the tests results are different for short and long positions. VaR calculated from historical simulation performs well at Kupiec test, especially for short position, which indicates approval of the model. For the delta-normal model, Kupiec test reject almost all assets, which is expected, as the returns series are not normal. These results must be seen with caution as, for this sample size, the test presents, in simulations, type I error higher than the accepted limit.

When the independence test is added to the proportion of failures test, the historical VaR is rejected for some series; the independence test captures clusters of exceptions that the tests purely based in frequency of failures do not capture. This occurs, for example, to BBDC4 and TNLP4 series. On the other hand, for the delta-normal model, we observe that the conjoint test does not reject models rejected only by the proportion of failures test (CSNA3 and PLIM4).

The Basel criterion classifies more models into the green zone, because it is more conservative than the proportion of failures tests. However, due to the low power of the test, when it classifies the models in the green zone, these results are not reliable, what can be evidenced by the adherence tests. For example, the delta-normal models for the series of LAME4, PLIM4 and PETR4 are classified into the green zone and are rejected by higher power tests as the Berkowitz and Kuiper.

For the Chrkovic and Drachman test, it is observed that there are rejections for most of the assets, what occurs due to the BDS test performance. However, the Kuiper test presents a low type I error and a high power, what can be verified in the simulations. So its results, presented in Table 8, can be used to select the best models.

As Kuiper test is based on the adherence of the model to the distribution of returns, it is verified that this test rejects the delta-normal model for almost all the assets, due to the kurtosis and asymmetry presence in the financial series. For the historical model, the test does not reject the model for almost all the series, what indicates that the underlying hypothesis to the model is well adjusted.

For the Berkowitz test, the results also indicate that the historical model is better adjusted than the delta-normal one. In this case, the results are identical to the Kupiec test, not rejecting the majority of the models. However, considering that this test only

evaluates the tail of the distribution and has a high power, its results are trustworthier than the Kupiec test. For the delta-normal model, the Berkowitz test rejects all series for the short position, except to TNLP4. For long position, the test added more information than Kuiper test. This occurs because these tests are complementaries: while the last one is based on the forecast of all the distribution of returns, the Berkowitz test is based only on the tail of the distribution.

In general, we verify more rejections for the delta-normal model, because the underlying distribution of this model is normal and the returns of the assets do not present any sign of normality as shown in Table 7. This fact does not allow the adherence of the theoretical distribution to the empirical one.

Table 8 – Results of Kupiec, Christoffersen, Berkowitz Tail and Crnkovic & Drachman tests applied to delta normal and historical simulation VaR for the selected assets, from 01-Feb-1999 to 27-02-2004, for 1% and 99% quantiles, where R and NR represents reject and not reject the model respectively.

p	Stock	Historical Simulation							Delta-Normal						
		Kupiec	Chris Conj.	Berkowitz Tail	Kuiper	BDS	CD	Basel	Kupiec	Chris Conj.	Berkowitz Tail	Kuiper	BDS	CD	Basel
1%	AMBV4	NR	NR	NR	NR	R	R	Green	NR	NR	R	R	R	R	Yellow
	BBDC4	NR	R	NR	NR	R	R	Green	R	R	R	NR	NR	NR	Yellow
	CSNA3	NR	NR	NR	NR	R	R	Yellow	NR	NR	NR	NR	R	R	Yellow
	EMBR4	NR	NR	NR	NR	R	R	Green	R	R	R	R	R	R	Yellow
	LAME4	NR	NR	NR	R	R	R	Yellow	NR	NR	NR	R	R	R	Green
	PETR4	NR	NR	NR	NR	NR	R	Green	R	R	R	R	NR	R	Yellow
	PLIM4	R	R	R	R	R	R	Yellow	NR	NR	R	R	NR	R	Green
	SDIA4	NR	NR	NR	R	R	R	Yellow	NR	NR	R	R	R	R	Green
	TNLP4	NR	R	NR	NR	NR	NR	Green	NR	NR	NR	NR	NR	NR	Yellow
	VALE5	NR	NR	NR	NR	R	R	Green	NR	NR	R	NR	R	R	Green
	Dólar	NR	R	NR	NR	R	R	Green	R	R	R	R	R	R	Yellow
99%	AMBV4	NR	NR	NR	NR	R	R	Green	R	R	R	R	R	R	Yellow
	BBDC4	NR	NR	NR	NR	R	R	Green	NR	NR	R	NR	NR	NR	Yellow
	CSNA3	NR	NR	NR	NR	R	R	Yellow	R	NR	R	NR	R	R	Yellow
	EMBR4	NR	NR	NR	NR	R	R	Green	R	R	R	R	R	R	Yellow
	LAME4	NR	R	NR	R	R	R	Green	R	R	R	R	R	R	Red
	PETR4	NR	NR	NR	NR	NR	R	Green	NR	NR	R	R	NR	R	Green
	PLIM4	NR	NR	NR	R	NR	R	Green	R	NR	R	R	NR	R	Yellow
	SDIA4	NR	R	NR	R	R	R	Green	R	R	R	R	R	R	Yellow
	TNLP4	NR	NR	NR	NR	NR	NR	Green	NR	NR	NR	NR	NR	NR	Green
	VALE5	NR	NR	NR	NR	R	R	Green	R	R	R	NR	R	R	Yellow
	Dólar	NR	R	NR	NR	R	R	Yellow	R	R	R	R	R	R	Yellow

We implement the loss function method as proposed by Lopez, estimating a threshold of 1.0003 for the stocks and 1.0001 for the US dollar. This threshold is the maximum value allowed of the observed error when the VaR is exceeded. We observe that the delta-normal model presents a better performance for the 2.5%, 5%, 95% and

Table 9 – Results of Lopez test applied to a delta-normal and Historical VaR for each asset, where quantile represents the probability of the VaR model. The Models are evaluated according to the Benchmark of the Test, estimated by 10,000 simulations.

Stock	VaR Model	Percentile 1%	2.5%	5%	95%	97.5%	99%
AMBV4	Historical	R	R	R	R	R	R
	Delta-Normal	R	R	R	R	R	NR
BBDC4	Historical	R	R	R	R	NR	NR
	Delta-Normal	R	R	R	NR	NR	NR
CSNA3	Historical	NR	R	R	R	R	R
	Delta-Normal	NR	NR	R	R	R	R
EMBR4	Historical	R	R	R	R	R	R
	Delta-Normal	R	R	R	R	R	R
LAME4	Historical	R	R	R	R	R	R
	Delta-Normal	R	R	R	R	R	R
PETR4	Historical	NR	R	R	R	R	R
	Delta-Normal	R	R	R	NR	NR	NR
PLIM4	Historical	R	R	R	R	R	R
	Delta-Normal	R	R	R	R	R	R
SDIA4	Historical	NR	R	R	R	R	R
	Delta-Normal	NR	R	R	R	R	R
TNLP4	Historical	NR	NR	R	R	R	R
	Delta-Normal	NR	NR	NR	NR	NR	R
VALE5	Historical	NR	NR	NR	NR	NR	NR
	Delta-Normal	R	NR	NR	NR	NR	NR
DÓLAR	Historical	R	R	R	R	R	NR
	Delta-Normal	NR	NR	NR	NR	NR	NR

Table 10 – Percentage of classification into Basel green zone of an inaccurate VaR model for each 250 days and the mean of Kuiper statistic, considering 1,000 simulations.

Basel Green zone	First period	0.956
	Second period	0.967
	Third period	0.966
	Fourth period	0.949
Kuiper	Mean of statistcs	0.8903

97.5% percentiles, because this model is more sensitive to volatility changes. However, for the 1% and 99% percentiles, it is not possible to define which model is the best one as the historical model presents good performance for extreme values.

4.4 Is the Basel criterion adequate?

From practical standpoint, the Basel criterion focuses exclusively on the number of failures of the model. Thus, it is possible imagining a model in which the underlying assumptions do not adhere to the empirical return distributions and even though the model is not rejected. For evaluating the performance of Basel criterion, we execute a simulation exercise where the manager, although with an aggressive style, keeps the model's performance into the Basel Capital Ratio.

In this way, we generate 1,000 uniformly distributed random returns ranging from –50% to 50%. The VaR model is constructed based on the assumption that the returns follow a stochastic continuous-time motion with a random jump process, where $dS_t = a_t d_t + \sigma_t dW_t + dJ_t$, for $t \geq 0$, where $\sigma = 0{,}616$, a = 0,000635, dW_t is a standard Wiener process and dJ_t represents the random process that follows a Poisson distribution. The VaR model is applied to the simulated returns series and it is expected no more than four exceptions in each 250 days, so that, the model should be classified into Basel green zone.

In order to evaluate if the Basel criterion is adequate, we use the Kuiper test that is based on the entire distribution. From the cumulative returns distribution and the cumulative distribution of the VaR model, we calculate the Kuiper statistic. The process is repeated 1,000 times and we verify the distance of Kuiper measure for each return distribution versus VaR distribution pair. The mean of this measure is presented on Table 10.

Considering that the critical value of the Kuiper measure for 1,000 observations interval is 0.054971, which means that this is the maximum value for a model to be deemed "accurate", we can verify that the constructed VaR model follows the Basel proposal in terms of number of failures but it is a model in which the underlying distribution does not adhere the simulated returns distribution. So, tests that evaluate the models underlying assumptions could be used in addition to the Basel diagnosis in risk models validation, at least in high volatile markets, whose returns can change dramatically.

5. Conclusion

The aim of this paper is to analyze tests for evaluating the accuracy of risk models. The studied tests are the ones proposed by Kupiec (1995), Christoffersen (1998), Crnkovic-Drachman (1996), Berkowitz (2001), Lopez (1998) and the Basel Committee. We focus on aspects as suitability to volatile markets such as Brazilian market and to limited data, verifying, from regulatory standpoint, desirable tests to be used to validate internal models. We analyze the performance of the tests based on the type I error and type II error. For this purpose, series of returns for three distinct windows are simulated (250, 500 and 1,000 observations) using normal standard, t-student and first-order autoregressive distributions. In addition, the tests also are applied to the historical and delta-normal 1%-VaR on long and short positions of ten stocks traded in the São Paulo Stock Exchange (BOVESPA) and US dollar quoted in Brazilian real, from 02/01/1999 to 02/27/2004.

The results of the simulations indicate that the proportions of failures tests (Kupiec and unconditional Christoffersen) are not appropriate for small samples and, even for sample of 1,000 observations, these tests present weak performance for values at risk with low percentiles. When we include the independence test, we notice that the conditional test of Christoffersen presents better performance both in relation to the size and to the power of the test. The results of the conditional test suggest that the independence test influences the size while the proportion of failures influences the power of the test.

In the case of the Crnkovic and Drachman test, we verify that the test is not adequate for the sample sizes used in this paper because the BDS test is only appropriated to samples with a higher number of observations. However, the Kuiper test is adequate to capture the shape of the distribution of returns, even for small samples.

The tail Berkowitz test presents good performance for both size and power of the test, except for the sample of 250 observations on low percentiles VaR. This happens because of the difficulty for modeling the tail shape of distributions with few observations.

The Basel criterion, as a proportion of failures test, is conservative, what can be desirable in supervisor's point of view. However, by not taking into account the shape of the distribution of returns, it has low power in distinguishing mis-specified from accurate models. It is important to remind

that in the internal model validation process, the statistic procedure analyzed here represents one of the issues that have to be considered by banking supervision. The risk of not rejecting mis-specified models using Basel criterion is diminished by recommendation of analyzing qualitative aspects, as regular procedures of external audit, as well the evaluation of any modification in the risk measurement process.

In case of banking supervision desires to evaluate directly the statistics behind internal models, it is suggested, as a complement to Basel criterion, the use of a test of adherence, as the Kuiper test, specially in high volatile markets.

7. Bibliography

BASEL COMMITTEE ON BANKING SUPERVISION. Supervisory Framework for the Use of Backtesting in Conjunction with the Internal Models Approach to Market Risk Capital Requirements. Basel Committee on Banking Supervision**, Basel, (January). 1996**

BELAIRE-FRANCH, J. & BAYARRI-CONTRERAS, D. **The BDS Test: A Practioner's Guide**. In: http://aeser.anaeco.uv.es/pdf/dt/dt02-01.pdf . accessed on: August 2004.

BERKOWITZ, J. Testing density forecasts, with applications to risk management. **Journal of Business & Economic Statistics**, v. 19, nº 4, October 2001.

BROCK, W.; DECHERT, D.; SHEINKMAN, J.; LEBARON, B. A Test for Independence Based on the Correlation Dimension, **Econometric Reviews**, v. 15(3), 197-235. August 1996.

BROCK, W., HSIEH, D. & LEBARON, B. Non-linear dynamics, chaos and instability. **The Massachusetts Institute of Technology Press**, Cambridge, Massachusetts. 1993.

CHRISTOFFERSEN, P.F. Evaluating Interval Forecasts, **International Economic Review**, v. 39, pp. 841-862, 1998.

_____ Backtesting Value-at-Risk: A Duration-Based Approach, In: http://ssrn.com/abstract=418762, 2003 accessed on: August 2004.

CRNKOVIC, C.; DRACHMAN, J. Quality Control, **Risk**, v. 9, n. 9, pp. 139-143, September, 1996.

DOWD, K. **Measuring Market Risk.** John Wyley & Sons. England. 2002.

KANZLER, L. **Very Fast and Correctly Sized Estimation of the BDS Statistic**. Oxford University, Department of Economics, Working Paper, 1999 available on http://www2.gol.com/users/kanzler accessed on: August 2004.

KUPIEC, P. Techniques for verifying the accuracy of risk measurement models. **Journal of Derivatives**, v. 2, p. 73-84, December, 1995.

LOPEZ, J. A. **Methods for Evaluating Value-at-Risk Estimates.** Mimeo, Research and Market Analisys Group, Federal Reserve Bank of New York, 1998.

LOPEZ, J. A. Regulatory Evaluation of Value-at-Risk Models. ***Journal of Risk***, volume 1, pp. 37-64, 1999

LOPEZ, J. A.; SAIDENBERG, M. R.**The Development of Internal Models Approaches to Bank Regulation & Supervision: Lessons from the Market Risk Amendment**. In: http://www.frbsf.org accessed on: August 2004, 2001

RISKMETRICS™, **Technical Document**, 4rd ed. J.P Morgan, 1996.

ROSENBLATT, M. Remarks on a multivariate transformation. **Annals of Mathematical Statistics**, 23, 1952.

STEPHENS, M. Use of Kolmogorov-Smirnov, Cramer-Von Mises and Related Statistics Without Extensive Tables. **Journal of the Royal Statistical Society**, 32, 1970.

Behavior of Intraday Liquidity in the New Brazilian Payments System

Mário Rubem de Coutto Bastos[55]
Júlio César Costa Pinto[56]
Aquiles Rocha de Farias[57]
Mardilson Fernandes Queiroz[58]

Abstract

One of the most important innovation of the new Brazilian Payments System (SPB) was the Reserves Transfer System (STR). The STR is a fund transfer system with Real Time Gross Settlement (RTGS). The system does not allow the Banking Reserve account to register negative balances at any moment during the course of the day, thus providing system participants with enhanced security. This paper analyzes the current Brazilian Payments System under the prism of the system's primary sources of aggregate liquidity and the distribution of this liquidity during the day. Considering that distribution follows a Markov process, this study also analyzes how liquidity is allocated among the SPB participants and how it will be allocated in the future.

55/ Central Bank of Brazil, Department of Banking Operations and Payments System, mario.bastos@bcb.gov.br.
56/ Central Bank of Brazil, Department of Banking Operations and Payments System, julio.cesar@bcb.gov.br.
57/ Central Bank of Brazil, Department of Banking Operations and Payments System, aquiles.farias@bcb.gov.br.
58/ Central Bank of Brazil, Department of Banking Operations and Payments System, mardilson.queiroz@bcb.gov.br.

1. Introduction

Prior to implementation of the new Brazilian Payments System (SPB), institutions were able to register negative balances in their Banking Reserve accounts during the course of the day. This was a result of the design of the system at that time. By way of example, one could cite operations with federal public securities in the Selic framework. The financial result of these operations impacted the Banking Reserve account after 11 PM and only after this time an institution default would be revealed. By accepting negative balances in the Banking Reserve account and guaranteeing settlement of the operations carried out during the day, Central Bank assumed payments system risks and, in this way, implicitly encouraged institutions to increase their positions and risk levels, thus generating a problem of moral hazard.

One of the major innovation of the new SPB was the so-called Reserves Transfer System (STR), implemented on April 22, 2002. The STR is a fund transfer system with Real Time Gross Settlement (RTGS) in which operations are settled continuously one by one[59]. This system performs the settlements carried out on the money, exchange and capital markets, while also effecting settlement of Central Bank and National Treasury operations. The STR is monitored in real time and no longer accepts negative balances in the Banking Reserve account over the course of the day, thus providing system participants with enhanced security. Aside from this, only the party responsible for the accounts can order debits against those accounts. In this way, balances can be maintained under full control. Though these changes are designed to reduce the risks faced by participants in the payments system, they increase the need for liquidity in administering the balance of the Banking Reserve account during the day.

Thus, while banks managed their balances in the past with the aim of minimizing the opportunity costs generated by excess reserves in their efforts to comply with compulsory reserve requirements, the new model gave rise to an additional motive: the need to settle their payments in real time in the RTGS environment.

The objective of this paper is to analyze the stability of the Brazilian Payments System from the viewpoint of total liquidity compared to the payments processed through the system. The study was divided into four sections plus an introduction: the first section analyzes the current Brazilian

59/ For more information on this and other systems, see Summers (1994) and BIS (1997).

Payments System, indicating the primary sources of liquidity and their volumes and showing how this liquidity is distributed during the day. In this way, it is possible to verify how much excess liquidity exists in the system during the period analyzed. Further on, it will be shown how this excess is allocated among SPB participants – financial institutions holding Banking Reserve accounts. The second section describes the methodology to be utilized in analyzing the distribution of liquidity in the system, which is the subject of the third section dealing with the results obtained. The conclusions to this study are presented in section four.

2. Intraday liquidity

By making it impossible to register negative balances in the Banking Reserve account at any time during the day and adopting a system of real time control, Central Bank created a situation in which banks must administer their liquidity in real time. This need has become even more important due to the fact that some operations previously settled by the net value of all multilateral positions among financial system participants are now settled bilaterally at gross value[60].

When sufficient resources are not available, payment messages sent by banks are not immediately executed and remain in a queue (by debtor) until such messages are processed, canceled or rejected. One of the major concerns of the system manager (Central Bank) is the possibility of system gridlock due to a momentary lack of liquidity.

In general, payment system managers provide participants with intraday liquidity instruments in order to avoid or, at least, minimize the problems of queues. In the Brazilian case, there are two major instruments:

Intraday Rediscount Window Operations – this modality provides liquidity based on sales of federal public securities by banks to Central Bank with a commitment to repurchase those papers on the same day with no financial cost (sale price = purchase price)[61].

60/ By way of example, one can cite Selic, based on Real Time Gross Settlement (RTGS).

61/ Some studies, such as those by Angelini (1998) and Bech and Garratt (2003) have demonstrated that this type of operation has an opportunity cost. On effecting a rediscount operation, the asset belonging to the institution involved becomes locked into the operation and, consequently, the institution is unable to use it in another market operation. In Brazil, since institutions normally carry a high volume of public securities in their portfolios, the opportunity cost is considered equivalent to zero. The only charge is the cost of the message R$0.62 (between 6:30 and 8:00, this cost is R$ 0.31).

Table 1 – Sources of liquidity

R$ billion

Month	Banking reserves[1/]	Discountable securities[2/]	Reserve requirements[3/]	Total liquidity
2005 Feb	27.5	206.3	64.8	298.5

1/ Daily average balance of begin of day on banking reserves, including reserve requirements on demand deposits.
2/ Federal public securities, including security requirements on time deposits.
3/ Balance of all reserve requirements, not including reserve requirements on demand deposits.

Reserve Requirements – This instrument is an important source of liquidity, since its volumes are quite high. All reserve requirements, independently of whether they are made in reserve, with or without earnings, or in securities, may be operated freely during the day. For purposes of verifying compliance, only the end-of-day balances are utilized. In the case of reserve requirements on demand deposits, control is facilitated by the fact that compliance is measured according to the average balance of the Banking Reserve account itself.

Table 1 shows the balance of the respective sources of liquidity in February 2005.

3. Methodology

This paper utilizes the concept of effective need for intraday liquidity. This concept is based on the difference between the balance of liquidity (reserves, reserve requirements and tradable federal public securities) at the start of the day and the minimum balance of the participant over the course of the day, or:

$$ELN_{i,t} = B_{i,0} - \min(B_{i,t}) \qquad (1)$$

Effective liquidity need (ELN) represents the maximum need for liquidity of a single participant in order to effect all required payments during the course of one day. The liquidity ratio (LR) was defined as the ratio between ELN and the balance at the begin of a day, and is used as the instrument for comparing ELN with the participant's liquidity balance, or:

$$LR_i = (ELN_{i,t}) / B_{i,0} \qquad (2)$$

With regard to risk, the importance of a participant in the system is directly related to the weight of the participant's positions in the total debts of the entire system of payments. In order to quantify this importance, we have defined the concept of magnitude given by equation (3):

$$M_i = \left(\frac{\sum_{j=1}^{n^{\circ}deb_i} Deb_i^j}{\sum_{i=1}^{n^{\circ}inst.} \sum_{j=1}^{n^{\circ}deb_i} Deb_i^j} \right) \qquad (3)$$

in which i is the participant and j is the registration of the debit.

For purposes of calculating magnitude, only those debt positions stated in messages that represent payments among financial institutions with STR accounts and among these institutions and the various payments system clearing houses were considered.

The concentration of liquidity among market institutions is analyzed according to the Herfindahl-Hirschman index (HHI), calculated through the use of equation (4):

$$HHI = \sum_{j=1}^{n} \left(\frac{L_j}{\sum_{k=1}^{n} L_k} \right)^2 \qquad (4)$$

in which L represents the average liquidity of each participant in the system during the period. Higher values registered under this index reflect greater concentration of resources for intraday payments – system liquidity[62]. The maximum value it can reach is equal to one when only one participant holds all liquidity.

For purposes of calculating the indices as well as evaluating effective liquidity needs, the balances of the Banking Reserve account, of the securities portfolio at Selic and of the reserve requirements utilized during the day were reconstituted minute by minute. All securities were calculated according to the price base system for rediscount window operations[63].

Based on the historic values of the liquidity ratio (LR) of each bank, one can construct a migration matrix utilizing the concept of transition matrix, which is the matrix of the probability of moving from a specific state to another in the following period. The fact that the daily LR series follows a Markov chain is also considered; or, in other words, that the probability of one participant having a specific LR tomorrow depends only on the LR of that participant today.

The building of the transition matrix is done as follows:

$$P_{ij} = \frac{\sum I(LR_i \rightarrow LR_j)}{\sum I(LR_i)} \qquad (5)$$

62/ In this text, liquidity is understood as the total resources available to effect payments in the SPB over the course of the day or, in other words, the sum of the resources available in the Banking Reserve account, total federal public securities subject to rediscount and the volume of compulsory reserve requirements.

63/ This price is defensive or, in other words, it is lower than the market price of the security and represents the value of these papers for intraday rediscount operations

in which P_{IJ} is the element ij of the transition matrix and reveals the probability of one institution having LR=i moving to LR=j. I(.) is an indicator function that, for the numerator, points to 1 should the participant be t with LR=i and moves from t-1 to LR=j, and zero, should the contrary occur. As regards the denominator, it indicates 1 whenever the participant is in t with LR=i, and zero, should the opposite occur.

With the given transition matrix, one can forecast the liquidity ratio of a specific participant on the basis of the LR for today:

$$LR_{t+j} = LR_t.P^j \qquad (6)$$

in which P is the transition matrix; LR is today's liquidity ratio and LR_{ij} is the liquidity ratio j periods forward.

Considering the invariable liquidity matrix, one can find the invariant of LR, with $j \rightarrow \infty$.

4. Study on system behavior

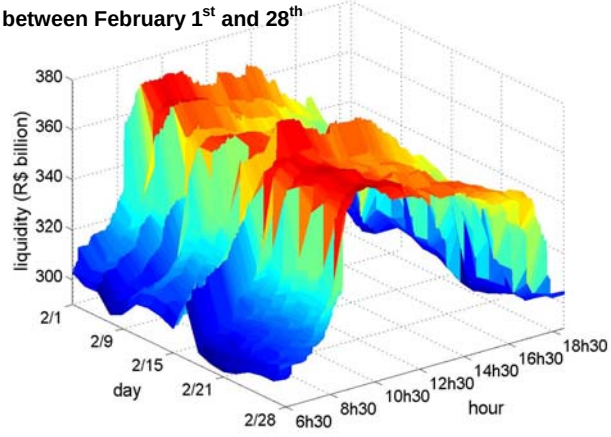
In this section, the liquidity of institutions holding Banking Reserve accounts is analyzed. This liquidity is sensitive to operations in which the counterpart does not belong to the system, as occurs in the case of Central Bank, the National Treasury, investment funds and other institutions that do not have Banking Reserve accounts. It will sensitize the liquidity of the entire system to movements of the resources (securities or reserves) from an institution within the system to another outside the system.

The liquidity of the participants was then added together and consolidated on a minute by minute basis, as shown in Graph 1.

This graph shows that the system was liquid in every moment of February 2005 and that liquidity always increased between 9 am and 4 pm. It was also shown that operations that result in increased system liquidity occur for the most part early in the day while operations that reduce liquidity are postponed to the end of the day. This result is expected in RTGS type systems in which there is a need for resources during the entire day so that institutions can carry out their operations on the Interbank market.

In order to analyze the sources that increase liquidity at the start of the day, the system's flow of intraday liquidity was broken down into its components: reserves and reserve requirements in cash and securities. In order to see this in greater detail, the security flow was also separated into

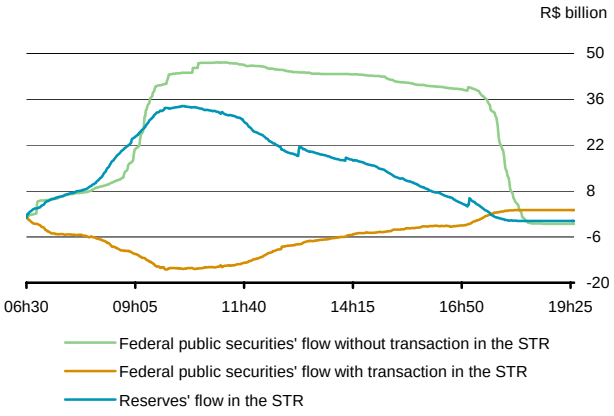
Graph 1 – System Liquidity per day, per minute between February 1st and 28th



operations that were processed through the STR and those that were not. Graph 2 shows the evolution of the accumulated daily average flow of liquidity in February 2005.

For example, a rediscount operation will result in a negative flow on the curve of securities processed through the STR and a positive flow in the balance of the Banking Reserve account, without however affecting system liquidity. On the other hand, definitive operations with Central Bank may affect system liquidity should the value of the security be different from the rediscount value of that paper, since movement in reserves is calculated according to the real value of the transaction. Operations with securities that are not processed through the STR do not have a counterpart with the reserve flow and therefore affect system liquidity at the gross value of the movement.

Graph 2 – Components of liquidity in the system



Graph 2 indicates that the increase in liquidity is primarily a consequence of the entry of securities into the system through operations that are not processed through the STR and the positive flow of reserves in the system. Furthermore, flows registered sharp variations in the morning period up to 9:30 am. As of that moment, the flow of reserves became negative and the accumulated flow of securities dropped sharply after 4:30 pm.

Appendix I presents nine tables with greater details of the flows presented in Graph 2. Tables A1, A2 and A3 present information on the accumulated flow of securities in operations that are not processed through the STR. Table A1 presents this flow at intervals of one hour following opening of the STR (6:30 am) with the volatility in the interval considered in February, while Table A2 shows the origin or destination of the principal flows during the course of the day. Tables A4, A5 and A6 are related to the flow of securities processed through the STR and the other tables show data on the flow of reserves.

The concept of significance was defined in order to analyze only the principal flows. This concept is defined as the ratio between the module of flows and the sum of the modules, as shown in equation (7).

$$\text{Significance} = \frac{|Flow_i|}{\sum_{i=1}^{n^{\circ}inst.} |Flow_i|} \qquad (7)$$

Only flows with significance greater than 5% were considered in this paper.

As already noted, it was seen that investment funds are the items most responsible for the exchange of liquidity in those periods of greater security flows (up to 9:30 am and after 4:30 pm). Universal banks represent the transactions between the different Selic accounts (client account, guarantee and others) and the institution's own account. Other participants with less impact on the system are investment banks, brokerage companies, distribution companies and brokers.

Table A3 shows that this flow is a consequence of repo operations, with the "return" of these operations (operation code 1056) accounting for the positive flow of securities in the system and repo operations (code 1054) accounting for the outflow of the securities.

Table 2 – Reserve net position of distinct financial system institutions

Institution	Total R$ billion
Investment funds	71.3
Others participants[1/]	16.3
Commertial banks (private and public)	-23.8
Central Bank of Brazil	-63.8

1/ It includes extra-market investments, investment banks, securities brokers and others.

This scenario is due to the current position of excess reserves held by investment funds, as shown in Table 2. The table in question shows the daily average of the difference of the position in custody and in portfolio of the volume of federal public securities. Positive values represent excess reserves of institutions, while negative values represent excess securities.

An analysis of the month of February shows that the market held a daily average of R$ 63.8 billion (position contrary position in relation to Central Bank). Investment funds are the institutions with the largest volume of excess reserves and they invest on repo operations, which are recontracted every day. Since those institutions do not have Banking Reserve account, when the operation is undone they have a claim to the clearing banking reserves while the security custody is transferred to the bank. However, as banking reserves might be freely used to perform payments, this operation increases the liquidity of the clearing banks.

The accumulated flow of securities processed through the STR is shown in Table A4. It can be noted that this flow has lesser values when compared to the flow of operations that are not processed in the STR, though the high values of the standard deviations suggest that this curve may have a significantly different format depending on the day considered.

Table A5 indicates that the major entities underlying this flow are Central Bank, investment funds, investment banks and the National Treasury. When one analyzes this table with Table A6, it is possible to infer on the basis of the magnitude of the values involved that Central Bank interferes in system liquidity mainly through rediscount operations (codes 1024, 1025 and 1026), while the other

entities involved exchange liquidity through repo operations (codes 1054, 1056, 1057 and 1059).

Tables A7, A8 and A9 present details on the reserve flow. As already mentioned, the institutions of greatest importance to this flow are Central Bank and the various clearing houses. It should be noted that only flows with significance greater than or equal to 5% were considered and, for this reason, the flows through clearing houses could not be fully reconciled when the results are added together for the different time periods. Furthermore, it was seen that the most important messages referred to exchanges of securities in Selic (code SEL) – in the previous paragraph, it was seen that this deals primarily with rediscount operations and repo operations – payments of clearing houses (LDL) and exchanges with the Treasury (STN).

Graph 3 also corroborates the existence of excess system liquidity to meet daily payment needs. In this graph, the sum of the effective liquidity needs (ELN) of each participant is compared with system liquidity at the start of the day. As can be observed, the total balances of the Banking Reserve accounts at the start of the day would be sufficient to meet the system's ELN[64]. One also observes several peaks in the reserve balance at the start of the day caused by the maturity of papers in fund portfolios, client accounts and those of other institutions not considered in the system. On such days, there is an increase in the balance of reserves corresponding to the value of these maturities.

Though the level of system liquidity may be comfortable for the current level of payments, it is important to analyze the distribution of this liquidity among the participants. As demonstrated in Table 3, utilization of the Herfindahl-Hirshman index (HHI) shows that the level remains practically constant during the period.

Interpretation of the HHI data shows that the concentration of liquidity comes close to a symmetric oligopoly with eight participants[65] or, in other words, it is possible to characterize liquidity in this market as distributed into eight equivalent groupings. This index shows that some institutions have liquidity leeway vis-à-vis their payment needs, while nothing can be said with regard to the majority of the institutions that have lesser liquidity. Consequently, it is the task of Central Bank to analyze whether current liquidity distribution could compromise the flow of payments within the system.

Graph 3 – Liquidity effective need vis a vis distinct sources of liquidity

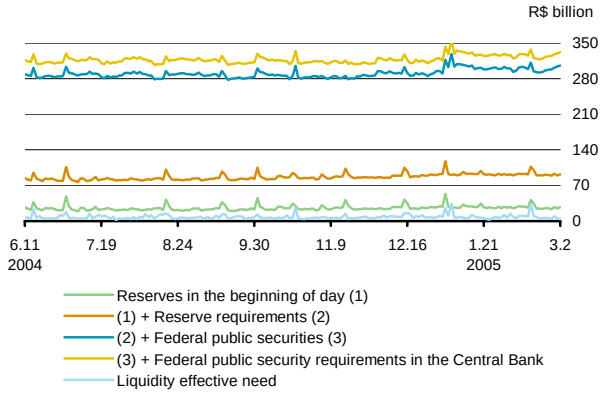


Table 3 – Herfindahl-Hirshman Index (HHI) between December/04 and February/05

Month	% HHI
2004 Nov	12.3
Dec	12.5
2005 Jan	12.3
Feb	12.5

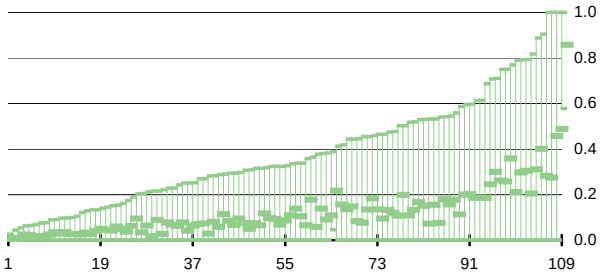
64/ The system ELN is understood as the sum total of the ELN of each participant.

65/ The number of equivalent groupings is obtained by the inverse of the Herfindahl-Hirschman index.

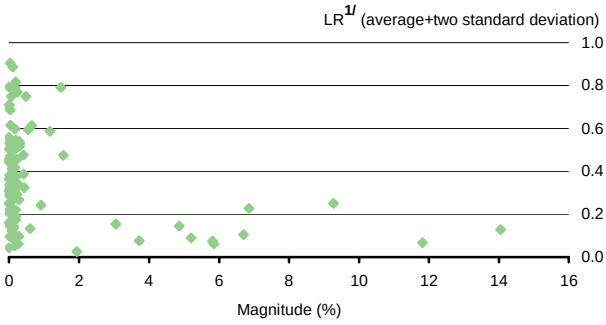
Table 4 – Distribution of liquidity ratio between 6/7/2004 and 2/28/2005

Range	Number of participants	Magnitude
0.0 |-- 0.1	69	86.0
0.1 |-- 0.2	24	7.5
0.2 |-- 0.3	6	1.2
0.3 |-- 0.4	4	0.7
0.4 |-- 0.5	2	0.5
0.5 |-- 0.6	0	0,0
0.6 |-- 0.7	2	4.1
0.7 |-- 0.8	0	0.0
0.8 |-- 0.9	1	0.0

Graph 4 – Average Liquidity ratio distribution with two standard deviation interval between June/04 and February/05



Graph 5 – Scatter plot of average liquidity ratio + two standard deviation on payment magnitude of banks



1/ Liquidity Ratio

In this way, the liquidity ratio of each participant was calculated, dividing average effective liquidity needs by the average balance at the start of the day. After that, the ratio was grouped into classes, as shown in Table 3. Analyzing the same table, it is possible to observe the accumulated magnitude of the grouped institutions. Since magnitude is a measurement of the importance of the participant within the payments system, the greater the magnitude of the class, the greater will be its relevance.

One perceives therefore that institutions with higher liquidity ratios have magnitude of little significance when compared to the magnitude of the other system participants. Thus, it is shown that institutions that utilize more than 50% of their initial daily liquidity in moments of greatest stress have intraday debts of less than 4.1% of total STR debts.

However, Table 4 presents average values for the liquidity ratio, making it possible to hide a scenario quite different from that shown above in the space of a few days. Consequently, it becomes necessary to analyze data distribution of the liquidity ratio in the period studied. Graph 4 shows distribution of the average (μ) with intervals of two standard deviations (σ) for all of the system's participants.

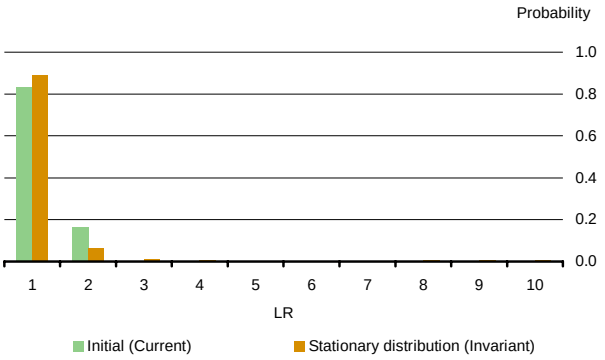
Note that of the 109 participants, only 33 registered the upper level of the interval above 0.5 for the liquidity ratio.

Graph 5 presents the dispersion of $\mu+2\sigma$ according to the magnitude of the participants, showing that the institutions that registered values above 0.5 in the graph above have low magnitude.

It should be stressed that Graph 5 points to a scenario in which the probability of the ratio being below the points found on the graph is more than 97%. Thus, during the period analyzed, it is shown that the Brazilian system of payments is robust when seen against the liquidity needed for a RTGS type system to operate, and that though 30.3% of the institutions (33) have registered stressed values above 0.5, these institutions represent only 11.6% of the magnitude of the payments system.

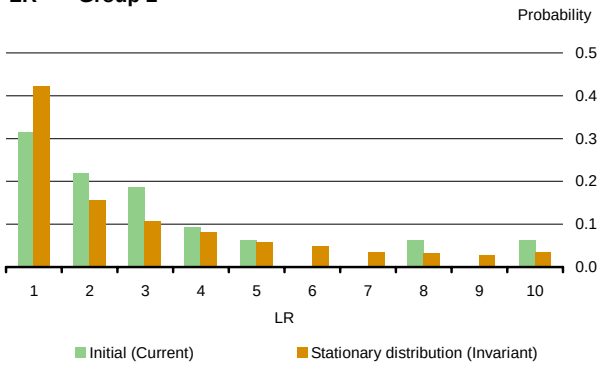
Up to this point, it has been shown that there is excess liquidity both in aggregate terms and in individual terms for the SPB to operate efficiently, safely and reliably. It is important for the payments system supervisor to know how system liquidity will be distributed in the future given the current distribution and the probability of migration among classes. To do this, the Markov chain concept was utilized

Graph 6 – Initial and stationary distribution of LR [1/] – Group 1



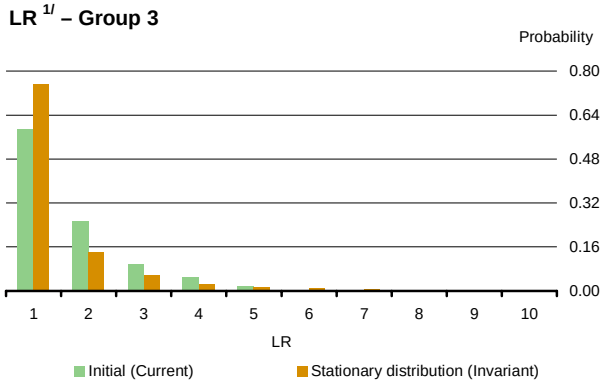
1/ Liquidity Ratio

Graph 7 – Initial and stationary distribution of LR [1/] – Group 2



1/ Liquidity Ratio

Graph 8 – Initial and stationary distribution of LR [1/] – Group 3



1/ Liquidity Ratio

in order to build a migration matrix. Considering the invariable migration matrix, it is possible to find the invariant distribution of LR. Graphs 6, 7 and 8 presented these distributions for three groups of participants: group 1 with participants that have magnitude of more than 2% of the system; group 2 has the participants that possess μ-2σ larger than 0.5; and group 3 concentrates the other participants.

One sees that the invariant distribution presents higher probabilities in the lesser liquidity ratios. This result shows that there will be sufficient liquidity in the SPB so that payments processed through it will be made safely and reliably, given the current distribution of liquidity and the probability of migration between classes.

One can verify the migration matrices of the three groups in Appendix 2, noting that the probability of a participant migrating to classes of greater value is very small, thus further reinforcing the stability of the current system.

5. Conclusion

The new Brazilian payments system requires that the financial system participants administer their intraday liquidity effectively since it is no longer possible to register negative balances in the Banking Reserve account. This has increased liquidity demand among institutions so that they can comply with their obligations in real time.

This paper demonstrated that the financial system has sufficient liquidity to meet its current payment needs over the course of the day. Given the higher concentration of this liquidity, the analysis was extended to each participant, demonstrating that not only did the institutions have a sufficient liquidity cushion to meet their payment needs, those with lesser volumes of liquidity vis-à-vis their payment needs are institutions with little relevance in terms of total system payments.

This study was based on data from the period extending from June 7, 2004 to February 28, 2005. Despite the fact that the results obtained demonstrated considerable system leeway with regard to the intraday liquidity needs of the institutions analyzed, constant supervision is a must since, when certain macroeconomic questions are considered, both liquidity distribution (reduction of the federal public debt or of reserve requirement rates) and increased liquidity demand generated by more intense economic activity could alter this scenario.

References

ANGELINI, P. An analysis of competitive externalities in gross settlement systems. **Journal of Banking and Finance** 22(1), 1-18. 1998.

CENTRAL BANK OF BRAZIL. Sistema de Pagamentos Brasileiro (Brazilian Payments System). **Technical text** prepared by the Department of Banking Operations and Payments System - DEBAN. Available at: www.bcb.gov.br.

BECH, M., GARRATT, R. The intraday liquidity management game. **Journal of Economic Theory** 109, 198-219. 2003.

BIS - BANK FOR INTERNATIONAL SETTLEMENTS. Real-time gross systems. **Committee on Payment and Settlement Systems of the central banks of the group of ten countries.** Basle: BIS, 1997.

HAMILTON, J.D. Time Series Analysis. **Princeton University Press**. 1994.

SUMMERS, B. J. (org.). The payment system:design, management, and supervision. **IMF.** Washington, DC. 1994.

Appendix I

• Flow of Securities not processed through the STR:

Table A1 – Cumulative flow distribution of federal public securities without transaction in the STR in February/2005

R$ million

Timetable	Average cumulative flow	Standard deviation
06h30 |-- 07h30	6 924.67	1 281.36
07h30 |-- 08h30	3 370.27	1 044.89
08h30 |-- 09h30	26 582.85	13 907.37
09h30 |-- 10h30	8 707.10	11 268.21
10h30 |-- 11h30	1 356.17	6 061.78
11h30 |-- 12h30	-1 868.00	1 580.88
12h30 |-- 13h30	-1 290.34	1 112.58
13h30 |-- 14h30	- 299.28	514.52
14h30 |-- 15h30	-2 315.17	1 229.25
15h30 |-- 16h30	-1 677.12	1 494.85
16h30 |-- 17h30	-5 037.82	5 148.84
17h30 |-- 18h30	-36 323.40	5 980.33

Table A2 – Federal public securities flow – Sources and application without transaction in the STR in February 2005

R$ million

Timetable	Institution	Average acumulated flow	Significance %
06h30 |-- 07h30	Clients – Universal banks	599.28	8.7
06h30 |-- 07h30	Investment funds	6 034.48	87.1
07h30 |-- 08h30	Clients – Universal banks	462.38	13.2
07h30 |-- 08h30	Investment banks	462.54	13.2
07h30 |-- 08h30	Investment funds	2 438.78	69.8
08h30 |-- 09h30	Clients – Universal banks	1 332.45	29.7
08h30 |-- 09h30	Investment funds	23 871.36	89.8
09h30 |-- 10h30	Investment funds	8 174.86	92.6
10h30 |-- 11h30	Investment funds	1 170.80	86.3
11h30 |-- 12h30	Investment funds	-1 088.59	58.3
12h30 |-- 13h30	Investment funds	-1 188.42	90
12h30 |-- 13h30	Others institutions	1.36	0.1
12h30 |-- 13h30	Leasing and mortgage companies	0,07	0
13h30 |-- 14h30	Universal Banks	13.96	3.8
13h30 |-- 14h30	Investment banks	- 153.60	41.4
13h30 |-- 14h30	Investment funds	- 181.52	48.9
13h30 |-- 14h30	Municipal and State Funds	20.82	5.6
14h30 |-- 15h30	Investment banks	- 191.73	7.7
14h30 |-- 15h30	Clearinghouses	-1 048.84	42.1
14h30 |-- 15h30	Investment funds	-1 157.90	46.4
15h30 |-- 16h30	Investment banks	- 100.53	5.3
15h30 |-- 16h30	Investment funds	-1 618.86	85.9
15h30 |-- 16h30	Fundos estadual e municipal	99.40	5.3
16h30 |-- 17h30	Clients – Universal banks	- 393.55	5.4
16h30 |-- 17h30	Investment banks	- 509.03	7
16h30 |-- 17h30	Clearinghouses	1 094.19	15.1
16h30 |-- 17h30	Investment funds	-5 086.75	70.4
17h30 |-- 18h30	Clients – Universal banks	-2 281.38	6.3
17h30 |-- 18h30	Investment funds	-33 010.25	90.9

• Flow of Securities processed through the STR:

Table A3 – Relevant messages in the Brazilian Payment System of securities without transition in the STR

R$ million

Timetable	Messages[1/]	Average acumulated flow	Significance %
06h30 |-- 07h30	1 056	7 781.25	87.6
06h30 |-- 07h30	1 054	- 949.56	10.7
07h30 |-- 08h30	1 056	3 928.42	86.5
07h30 |-- 08h30	1 054	- 586.11	12.9
08h30 |-- 09h30	1 056	25 895.86	97
09h30 |-- 10h30	1 056	10 415.97	85.3
09h30 |-- 10h30	1 054	-1 719.56	14.1
10h30 |-- 11h30	1 056	6 378.85	54.6
10h30 |-- 11h30	1 054	-5 116.09	43.8
11h30 |-- 12h30	1 054	-1 897.24	88.1
11h30 |-- 12h30	1 056	139.09	6.5
12h30 |-- 13h30	1 054	-2 537.81	62.4
12h30 |-- 13h30	1 056	1 384.55	34.1
13h30 |-- 14h30	1 054	-3 788.01	50.9
13h30 |-- 14h30	1 056	3 539.21	47.6
14h30 |-- 15h30	1 054	-7 971.72	50.7
14h30 |-- 15h30	1 056	6 695.80	42.6
14h30 |-- 15h30	1 023	-1 041.02	6.6
15h30 |-- 16h30	1 054	-7 438.64	55.2
15h30 |-- 16h30	1 056	5 893.88	43.7
16h30 |-- 17h30	1 054	-10 657.28	64.8

1/ Message 1023: custody transference between FI and Clearinghouses;
message 1054: repo;
message 1056: repo (return of operation).

Table A4 – Cumulative flow distribution of federal public securities with transition in the STR in February of 2005

R$ million

Tabletime	Average cumulative flow	Standard deviation
06h30 |-- 07h30	-5 248.65	872.54
07h30 |-- 08h30	-3 064.58	1 601.52
08h30 |-- 09h30	-5 602.26	2 191.82
09h30 |-- 10h30	-1 851.51	3 112.68
10h30 |-- 11h30	1 347.81	3 342.93
11h30 |-- 12h30	4 553.66	2 880.74
12h30 |-- 13h30	2 946.03	3 139.51
13h30 |-- 14h30	2 070.23	1 379.96
14h30 |-- 15h30	1 233.05	1 305.76
15h30 |-- 16h30	993.67	1 159.58
16h30 |-- 17h30	3 372.07	1 261.50
17h30 |-- 18h30	1 452.76	845.10

Table A5 – Federal public securities flow – Sources and application with transaction in the STR in February of 2005

R$ million

Timetable	Institution	Average acumulated flow	Significance %
06h30 |-- 07h30	Central Bank of Brazil	-6 988.06	79.9
06h30 |-- 07h30	Investment funds	1 732.06	19.8
07h30 |-- 08h30	Central Bank of Brazil	-9 183.28	59.9
07h30 |-- 08h30	Investment funds	5 940.36	38.8
08h30 |-- 09h30	Central Bank of Brazil	-14 394.21	61.7
08h30 |-- 09h30	Investment funds	8 219.02	35.3
09h30 |-- 10h30	Central Bank of Brazil	-4 692.13	58.4
09h30 |-- 10h30	Investment funds	2 285.20	28.4
09h30 |-- 10h30	National Treasury	503.58	6.3
10h30 |-- 11h30	Central Bank of Brazil	1 827.36	62.9
10h30 |-- 11h30	Investment banks	- 381.71	13.1
10h30 |-- 11h30	Investment funds	- 189.41	6.5
10h30 |-- 11h30	National Treasury	298.56	10.3
11h30 |-- 12h30	Central Bank of Brazil	6 127.51	73.3
11h30 |-- 12h30	Investment funds	-1 670.38	20
12h30 |-- 13h30	Central Bank of Brazil	5 507.82	65.5
12h30 |-- 13h30	Investment funds	-2 329.74	27.7
13h30 |-- 14h30	Central Bank of Brazil	3 190.36	71.9
13h30 |-- 14h30	Investment funds	-1 093.29	24.6
14h30 |-- 15h30	Central Bank of Brazil	4 084.84	58.8
14h30 |-- 15h30	Investment funds	-2 669.48	38.4
15h30 |-- 16h30	Central Bank of Brazil	4 942.34	53.3
15h30 |-- 16h30	Investment funds	-4 065.79	43.9
16h30 |-- 17h30	Central Bank of Brazil	7 510.83	63.9
16h30 |-- 17h30	Investment funds	-3 936.23	33.5
17h30 |-- 18h30	Central Bank of Brazil	2 398.65	71.4
17h30 |-- 18h30	Investment funds	- 849.28	25.3

Table A6 – Relevant messages in the Brazilian Payment System of securities with transaction in the STR

R$ million

Timetable	Messages[1/]	Average acumulated flow	Significance %
06h30 |-- 07h30	1 024	-7 018.82	79.9
06h30 |-- 07h30	1 056	1 734.29	19.7
07h30 |-- 08h30	1 024	-9 303.72	59.8
07h30 |-- 08h30	1 056	5 797.34	37.2
08h30 |-- 09h30	1 024	-17 111.91	58.6
08h30 |-- 09h30	1 056	10 283.59	35.2
09h30 |-- 10h30	1 024	-6 913.80	56.5
09h30 |-- 10h30	1 056	2 422.67	19.8
09h30 |-- 10h30	1 026	1 544.81	12.6
10h30 |-- 11h30	1 026	3 561.93	43.7
10h30 |-- 11h30	1 024	-2 069.98	25.4
10h30 |-- 11h30	1 025	802.86	9.8
10h30 |-- 11h30	1 054	- 746.22	9.1
10h30 |-- 11h30	1 059	- 530.31	6.5
11h30 |-- 12h30	1 026	6 549.21	52.7
11h30 |-- 12h30	1 054	-2 215.85	17.8
11h30 |-- 12h30	1 024	-1 572.72	12.7
11h30 |-- 12h30	1 025	1 563.73	12.6
12h30 |-- 13h30	1 026	4 856.05	43.1
12h30 |-- 13h30	1 054	-3 150.45	27.9
12h30 |-- 13h30	1 025	1 054.65	9.4
12h30 |-- 13h30	1 024	- 941.08	8.3
12h30 |-- 13h30	1 057	788.66	7.0
13h30 |-- 14h30	1 026	3 101.70	50.7
13h30 |-- 14h30	1 054	-1 715.91	28.1
13h30 |-- 14h30	1 025	880.86	14.4
14h30 |-- 15h30	1 026	3 356.50	40.3
14h30 |-- 15h30	1 054	-3 063.90	36.8
14h30 |-- 15h30	1 025	1 374.43	16.5
14h30 |-- 15h30	1 024	- 453.11	5.4
15h30 |-- 16h30	1 054	-4 002.53	42.0
15h30 |-- 16h30	1 026	3 631.33	38.1
15h30 |-- 16h30	1 025	1 608.68	16.9
16h30 |-- 17h30	1 026	5 820.15	49.4
16h30 |-- 17h30	1 054	-4 007.42	34.0
16h30 |-- 17h30	1 025	1 752.42	14.9
17h30 |-- 18h30	1 026	1 966.69	59.2
17h30 |-- 18h30	1 054	- 847.81	25.5

1/ Message 1024: secured loan with Central Bank (discount window) with payment in the same day
message 1026: payment of discount window
message 1054 repo
message 1056: repo (return of operation)

• Flow of Reserves and Compulsory Reserve:

Table A7 – Cumulative flow distribution of reserves in February of 2005

R$ million

Timetable	Average acumulated flow	Standard deviation
06h30 |-- 07h30	7 212.57	1 586.36
07h30 |-- 08h30	8 853.84	2 623.07
08h30 |-- 09h30	14 222.26	3 108.66
09h30 |-- 10h30	3 290.15	3 025.77
10h30 |-- 11h30	-3 003.15	3 647.17
11h30 |-- 12h30	-8 842.78	3 451.65
12h30 |-- 13h30	-2 579.66	3 194.56
13h30 |-- 14h30	-2 420.26	1 776.20
14h30 |-- 15h30	-5 323.34	2 389.04
15h30 |-- 16h30	-5 037.16	1 547.58
16h30 |-- 17h30	-4 847.71	1 936.25
17h30 |-- 18h30	-2 682.12	1 525.08

Table A8 – Main sources and aplications of the reserve flows (including reserve requirements) in February 2005

R$ million

Timetable	Institution	Average acumulated flow	Significance %
06h30 |-- 07h30	Central Bank	7 536.11	95.9
07h30 |-- 08h30	Central Bank	8 978.00	95,5
08h30 |-- 09h30	Central Bank	14 543.73	97,8
09h30 |-- 10h30	Central Bank	4 013.25	84,4
09h30 |-- 10h30	BMF Câmbio	- 541.52	11,4
10h30 |-- 11h30	Central Bank	-2 065.01	68,8
10h30 |-- 11h30	BMF Câmbio	- 259.87	8,7
10h30 |-- 11h30	Cetip	- 376.45	12,5
11h30 |-- 12h30	Central Bank	-6 252.26	70,6
11h30 |-- 12h30	Cetip	-2 456.33	27,7
12h30 |-- 13h30	Central Bank	-5 327.19	62,2
12h30 |-- 13h30	Cetip	2 900.40	33,8
13h30 |-- 14h30	Central Bank	-3 160.42	67,1
13h30 |-- 14h30	BMF Câmbio	1 145.76	24,3
14h30 |-- 15h30	Central Bank	-4 363.28	73,7
14h30 |-- 15h30	BMF Ativos	- 728.88	12,3
14h30 |-- 15h30	CIP - SITRAF	- 311.72	5,3
15h30 |-- 16h30	Central Bank	-4 766.39	85
15h30 |-- 16h30	CBLC	283.32	5
15h30 |-- 16h30	CIP - SITRAF	- 534.02	9,5
16h30 |-- 17h30	Central Bank	-7 601.39	73,4
16h30 |-- 17h30	BMF Ativos	829.25	8
16h30 |-- 17h30	CIP - SITRAF	1 879.85	18,2
17h30 |-- 18h30	Central Bank	-2 693.70	99,6

Table A9 – Message responsable for the main flow of reserves and reserve requirements

R$ million

Timetable	Message[1/]	Average cumulated flow	Significance
06h30 |-- 07h30	SEL	6 983.94	80.1
06h30 |-- 07h30	STN	983.18	11.3
07h30 |-- 08h30	SEL	9 314.63	95.3
08h30 |-- 09h30	SEL	14 286.08	95.4
09h30 |-- 10h30	SEL	4 123.59	83.1
09h30 |-- 10h30	LDL	- 717.26	14.5
10h30 |-- 11h30	SEL	-2 173.36	67.2
10h30 |-- 11h30	LDL	- 897.38	27.7
11h30 |-- 12h30	SEL	-6 179.75	68.8
11h30 |-- 12h30	LDL	-2 613.66	29.1
12h30 |-- 13h30	SEL	-5 524.38	63.9
12h30 |-- 13h30	LDL	2 761.34	31.9
13h30 |-- 14h30	SEL	-3 316.76	76.6
13h30 |-- 14h30	LDL	747.75	17.3
14h30 |-- 15h30	SEL	-4 250.76	76.4
14h30 |-- 15h30	LDL	- 965.83	17.4
15h30 |-- 16h30	SEL	-4 771.99	88.0
15h30 |-- 16h30	LDL	- 265.77	4.9
16h30 |-- 17h30	SEL	-7 520.61	69.0
16h30 |-- 17h30	LDL	2 712.07	24.9
17h30 |-- 18h30	SEL	-2 349.42	72.6
17h30 |-- 18h30	STN	- 609.41	18.8
17h30 |-- 18h30	CIR	166.07	5.1

1/ SEL – Transactions with Selic
STN – Transactions with National Treasury
LDL – Transactions with Clearinghouses
CIR – Transactions related to exchange of currency

Appendix II

The tables below show the transition matrix for three different groups of participants: table A10 for the group of participants with magnitude above 2%; table A11 for the group of participants that registers the median plus two standard deviations of LR above 0.5; and table A12 for the other participants.

Table A10 – Transition Matrix – Participants that have magnitude above 2%

Distribution	t									
	0 - 1	1 - 2	2 – 3	3 – 4	4 – 5	5 – 6	6 – 7	7 – 8	8 – 9	9 – 10
0 – 1	0.91	0.85	0.84	0.58	0.80	0.50	0.16	0.47	0.47	0.54
1 – 2	0.06	0.09	0.13	0.18	0.20	0.50	0.00	0.00	0.00	0.15
2 – 3	0.01	0.04	0.00	0.06	0.00	0.00	0.17	0.00	0.00	0.00
3 – 4	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.15	0.00	0.00
t+1 4 – 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
5 – 6	0.00	0.01	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
6 – 7	0.00	0.00	0.00	0.06	0.00	0.00	0.17	0.00	0.05	0.00
7 – 8	0.00	0.01	0.00	0.00	0.00	0.00	0.33	0.23	0.11	0.00
8 – 9	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.32	0.00
9 – 10	0.00	0.00	0.00	0.06	0.00	0.00	0.17	0.00	0.05	0.23

Table A11 – Transition Matrix – Participants that have average plus two standard deviation of the liquidity ratio bigger than 0.5

Distribution	t									
	0 - 1	1 - 2	2 – 3	3 – 4	4 – 5	5 – 6	6 – 7	7 – 8	8 – 9	9 – 10
0 – 1	0.61	0.37	0.32	0.25	0.2	0.22	0.19	0.23	0.13	0.25
1 – 2	0.16	0.24	0.18	0.17	0.12	0.08	0.06	0.08	0.06	0.04
2 – 3	0.07	0.14	0.2	0.13	0.14	0.11	0.07	0.08	0.07	0.04
3 – 4	0.05	0.08	0.11	0.15	0.14	0.14	0.12	0.08	0.08	0.05
t+1 4 – 5	0.03	0.05	0.07	0.12	0.13	0.12	0.1	0.06	0.02	0.05
5 – 6	0.02	0.04	0.04	0.08	0.09	0.16	0.12	0.07	0.09	0.02
6 – 7	0.01	0.02	0.02	0.04	0.07	0.08	0.17	0.08	0.07	0.06
7 – 8	0.02	0.02	0.02	0.03	0.05	0.04	0.07	0.19	0.06	0.06
8 – 9	0.01	0.02	0.02	0.02	0.04	0.03	0.06	0.05	0.36	0.04
9 – 10	0.02	0.02	0.02	0.01	0.02	0.02	0.04	0.08	0.06	0.39

Table A12 – Transition matrix – Other participants

Distribution	t									
	0 - 1	1 - 2	2 – 3	3 – 4	4 – 5	5 – 6	6 – 7	7 – 8	8 – 9	9 – 10
0 – 1	0.82	0.58	0.45	0.48	0.49	0.63	0.58	0.67	0.54	0.45
1 – 2	0.11	0.25	0.27	0.20	0.16	0.13	0.12	0.00	0.08	0.00
2 – 3	0.04	0.10	0.17	0.13	0.07	0.08	0.05	0.05	0.15	0.00
3 – 4	0.01	0.04	0.06	0.11	0.12	0.05	0.03	0.05	0.15	0.22
t+1 4 – 5	0.01	0.02	0.03	0.06	0.08	0.06	0.00	0.09	0.00	0.11
5 – 6	0.01	0.01	0.01	0.02	0.07	0.04	0.03	0.09	0.08	0.00
6 – 7	0.00	0.00	0.01	0.00	0.01	0.00	0.12	0.00	0.00	0.00
7 – 8	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
8 – 9	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.22
9 – 10	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.05	0.00	0.00

Bankruptcy Law and Optimal Contract Design

Marcelo Yoshio Takami[66]

Abstract

This study analyzes three articles under the prism of the new Bankruptcy Law and, using a theoretical model, illustrates the importance of the SCR (Credit Information System). With regard to the new bankruptcy legislation, the reader's attention is called to three aspects: i) exemption of property, ii) creditor protection and iii) incentive mechanisms in credit contracts. The study concludes that the new law represents a significant advance, particularly as regards creditor protection, and that consolidation of the SCR could reduce information problems between creditors and debtors.

66/ Department of Research, Banco Central do Brazil, marcelo.takami@bcb.gov.br.

1. Introduction

The new Bankruptcy and Business Recovery Law (law 11,101/05), sanctioned by the President of the Republic on 2/9/2005, will go into effect in June of this year. Academic circles, market agents and specialists have shown themselves to be highly receptive to the new legislation, because it tends to revitalize the role of creditors in the bankruptcy process, following in the wake of recent reformulations of European legislation in which an effort was made to preserve the businesses involved instead of liquidating them. The purpose of the new legislation is precisely to provide the conditions required for feasible companies to recover and, if this is not possible, to offer a bankruptcy mechanism that is both rapid and efficient.

In this survey, several articles have been chosen and are analyzed under the prism of the new bankruptcy legislation. More specifically, discussions center on the following questions: i) exemption of property, ii) creditor protection; and iii) incentive mechanisms in credit contracts. Insofar as creditor protection is concerned, the study concludes that the design of the legal framework is in line with contemporary thought regarding adequate treatment of credit rights. However, there is still room for improvements as regards the question of legal respectability.

Aside from this, Banco Central created the Credit Risk Center (CRC), later altered to the Credit Information System (SCR), with the objective of strengthening control over systemic risk and guaranteeing financial stability. In this context, a model is presented for the purpose of illustrating the importance of the SCR in reducing information problems among creditors and debtors.

This study is divided into four sections, aside from this introduction. In the second section, three articles are discussed in light of the new legislation. The first two articles, one of which is based on data concerning Brazil, present empirical results. The third article presents a model of contract theory in the North American context. A credit contract model is discussed in the third section, concluding that the problems of adverse selection and credit rationing can be minimized through the SCR. The final section contains the conclusions of the study.

2. Reviewing literature

National and international literature discusses varied macro and microeconomic aspects of credit. In the specific case of Brazil, many articles have been written dealing with credit as an important instrument of monetary policy transmission and a significant catalyst of GDP growth, generating expectations regarding entry of the new legislation into force.

Araújo and Funchal (2004) analyze the influence of bankruptcy law and the judiciary on the credit market in different regions of the world (120 countries) in 2003. The multiple regression and quantile regression methods were applied to the following model (complete): $cp_i = \beta_0 + \beta_1 prot_i + \beta_2 prot_i^2 + \beta_3 prot_i^3 + \beta_4 prot_i^4 + \beta_5 pib_i + \beta_6 y_i + \beta_7 I_i + \beta_8 contr_i + \beta_9 corte_i + \varepsilon_i$, in which: $\varepsilon_i \sim N(0,\sigma^2)$, cp_i= volume of private credit/GDP, $prot_i$=effective creditor protection[67], y_i= per capita income, I_i=efficiency of the insolvency system, $contr_i$=complexity of judicial intervention in civil cases before the courts, $corte_i$=degree of court interference in the insolvency process.

The authors found a non-linear and concave relation between cp and prot. The variables of a legal nature (I_i, $contr_i$ and $corte_i$) were significant[68], when it was the case at all, at the minimum of 10%. The intuition seems to be in line with the empirical results and general equilibrium models with incomplete markets and default[69]: the greater (lower) the creditor protection, the larger (smaller) the credit available to the market. This occurs up to an optimal level of penalization. From that point forward, the debtor is discouraged from contracting loans because of a supposedly excessive level of penalization. This result leads to additional conjecture in current literature, suggesting that the greater the protection accorded to creditors, the better it will be for the credit market.

After substituting the optimal level of penalization in the model, it was concluded that the impact on private credit is more positive for the developing countries. Despite the fact that variables of a legal nature have little significance from the statistical point of view, they are an important concern

67/ Multiplication of the variable legal respectability by the variable creditor rights. This is the most important explanatory variable in the model, since it represents penalization of the debtor. Legal respectability represents the tradition of the law and order of a country.

68/ The results of the quantile regression suggest that the legal variables have less importance for the developing countries than for the developed countries.

69/ Particularly with the theoretical work of Dubey, Geanakoplos and Shubik, Default and Punishment in a General Equilibrium, Econometrica, forthcoming, 2003.

in the Brazilian context. For example, the sluggishness of the process of judicial execution is frequently cited (Araújo, 2004, Abrão Costa, 2004 and Pinheiro, 2001) as one of the factors that hampers improvements in the credit flow, because debtors tend to take advantage of procedural inefficiencies to put off payment of their debts. With respect to the possibility of streamlining judicial proceedings, a constitutional amendment has already been promulgated by the Congress, while another bill is now before that body. Constitutional Amendment 45/2004 allows the Federal Supreme Court to issue decisions not subject to appeal, requiring that these decisions be followed by all lower courts. At the same time, another bill deals with reform of the civil process code (PL 4728/04), proposing that the need for opening a new judicial process for purposes of settlement and execution of a judicial sentence be eliminated.

White and Berkowitz (2004) have investigated how access to credit on the part of small businesses is affected by bankruptcy law. The authors found a direct relation between the level of property exemption and the incentive to declare bankruptcy. Tests indicate that small businesses with unlimited property exemptions have a greater propensity to have their credit requests denied and, in those cases in which the loan is approved, the amount is smaller and interest rates are higher.

The sample is from 1993 and is composed of nonfinancial, nonfarm private United States companies with less than 500 employees (1750 noncorporations firms and 2800 corporations). Three models were tested for both types of business:

1. A multiple logit regression in which the dependent variable is the probability of credit rationing;
2. A multiple Tobit regression in which the dependent variable is the interest rate on the loan;
3. A multiple Tobit regression in which the dependent variable is the amount of the loan.

The authors utilized 24 explanatory variables for the three models. The main explanatory variables of interest are: homestead exemption, personal property exemption (sum of the state's exemptions for cash and for equity in vehicles, plus the value of the wildcard exemption), a dummy for previous bankruptcy filing, a dummy for personal financial delinquency and a dummy for business delinquency. The latter three dummies are measurements of prior financial difficulties (on the part of the owner and/or the company). Previous bankruptcy filing has an ambiguous impact on credit

rationing in the United States context. Since debtors who have already requested bankruptcy under Chapter 7 cannot file again for six years, they would stand a better chance of having their credit approved. However, debtors may request bankruptcy under Chapter 13 or default on repaying their loans without filing for bankruptcy. If debtors choose the latter alternative, creditors have the right to initiate judicial proceedings, though it might not be financially worth for the creditors. Parallel to this, past bankruptcy filing is evidence of poor entrepreneurial ability. In the regression, the negative effect prevailed or, in other words, previous bankruptcy filing may lead to increased rationing of credits, higher interest rates and less amount of loans. On the other hand, there is a consensus that past personal or business delinquency represents negative evidence regarding creditworthiness, pointing to weak entrepreneurial ability and signaling that the debtors are familiar with the default procedures and have a tendency to use them. The estimators for the main explanatory variables were significant and with the expected sign, but the personal property exemption, which was not significant in any of the models. This is probably due to the fact that this variable has a low magnitude value and less variation in relation to the homestead exemption. Moreover, the latter variable may be absorbing part of the impact of the personal property exemption.

The empirical results also suggest that corporations are more likely to be credit rationed than noncorporate firms since, in the latter case, owner's assets always guarantee the debt but do not always guarantee the debt of corporate firms. The results of model 2 corroborate the same intuition, i.e., the responsiveness of the interest rate to changes in the exemption level is higher for noncorporate firms than corporations. Besides, the effect of changes in exemption levels on the probability of credit rationing is much larger for firms with low net assets than for firms with high net assets, since creditors with large volumes of net assets are less likely to declare bankruptcy. In the case of model 3, it is expected that the estimators reflect a combination of supply and demand considerations, i.e., an increase in the level of property exemption implies relief in penalization for failings in conducting the affairs of the undertaking and, consequently, would lead debtors to demand more loans. At the same time, creditors tend to reduce the loan flow as a result of moral hazard. The empirical results indicate that the effects on the supply side prevail or, more clearly, the volume of loans decreases with the level of property exemption.

On the other hand, in the case of Brazilian legislation, there is no specific rule with regard to commercial responsibility

or, in other words, regardless of whether they are corporate or noncorporate, personal and asset responsibility of the partners may be limited, unlimited or mixed, depending on the nature of the business (limited partnership, corporate name, capital and industry, unincorporated partnership, limited partnership by shares or private limited liability company). In the case of limited responsibility, all of the partners are accountable with their own private property up to the limit of the capital stock while, in the case of unlimited responsibility, the capital stock does not limit the accountability of the property of the partners. With regard to mixed responsibility, some partners have limited responsibility and others, unlimited responsibility. In any case, the responsibility of the partners is always subsidiary or, in other words, the properties of the company are seized in the first place and, only afterwards, the properties of the partners. As regards the property exemption, the new bankruptcy law (11,101/05) states only that those assets that can not in any way be attached are excluded when the bankrupt estate is distributed (art. 108 §4th).

The article by Bisin and Rampini (2004) focuses on the role that bankruptcy law plays in limiting the effect of externalities over the course of unsecured loan contracts. This externality occurs when default in one contract reduces the value expected to be received by other creditors. The authors propose and solve a maximization model with restriction for the situation of a debtor who contracts unsecured financing with a principal creditor (designated "bank") and who has the possibility of raising additional funds with secondary creditors. It is thought that, after having contracted a loan to finance a project, the debtor may behave in an opportunistic manner and, therefore, requires an incentive in order to make the effort required for the project to be successful and, consequently, to pay back creditors. Three cases are analyzed:

i) Contract exclusivity without bankruptcy;
ii) Nonexclusivity without bankruptcy;
iii) Nonexclusivity with bankruptcy.

Introducing the bankruptcy institution, the bank chooses a repayment schedule which induces the debtor to declare bankruptcy if, and only if, the project fails. The crucial point is the possibility of enforcing its claim to any assets that the debtor possesses above a fixed bankruptcy protection level (this is not foreseen in the Brazilian legislation). More specifically, the bank would have the right to seize payoffs of secondary contracts (up to the value of the debt) which the debtor would be due to receive, presuming that the

payments which the debtor makes or receives are observable in bankruptcy. Thus, the debtor has no ex-ante incentive to grant a loan on the secondary market, but may have some incentive to take an additional loan. However, secondary creditors have no incentive whatsoever to provide loans since they have less priority than banks in cases of debt execution. It is important to stress that this should not be confused with the possibility of companies in the process of recovery receiving new credits. This is foreseen in both American and Brazilian legislation (articles 67 and 84 of law 11,101/05) and has the purpose of preserving the continuity of the company's operations. Should the company's efforts to recover fail, payment of the new credit will take preference over all other creditors.

The authors begin the article by characterizing the effects of nonexclusivity of contracts due to the inability of writing contracts contingent on the total assets and liabilities of a debtor without the institution of bankruptcy. They demonstrate that the impossibility of introducing exclusivity clauses has two effects:

1. Reduction of the insurance provided by the repayment schedule of the bank's loan against the possibility of project failure. By reducing the insurance, the bank leaves the debtor with more resources in the states in which the project is successful. Aside from this, should the debtor opt for lower effort, these resources will have lower expected value. Thus, it becomes disadvantageous for the debtor to make less effort and negotiate on the secondary market.

2. Reduction in the amount that the debtor can contract. In this model, the bank is guaranteed preference in payment of the debt, in such a way that secondary creditors are paid only when the bank has been fully paid. In effect, this means that the secondary market debt will be partially honored (if it is honored at all) when the project fails. Thus, the debtor in the state of bankruptcy is unable to obtain loans from secondary creditors and the bank manages to obtain contractual exclusivity.

In this sense, in a context in which the declaration of bankruptcy is possible, the appropriate choice of the fixed level of protection (endogenous in the model) alleviates the problem of incentive resulting from the nonexclusivity of contracts, thus characterizing welfare improvement. Furthermore, the optimal contract offered by the bank provides the debtor with more insurance and a larger amount than is provided under an optimal contract in the absence of bankruptcy. In other words, being generous to the debtor is

optimal in this model, since debtors must be induced to declare bankruptcy for the bank to enforce its claim.

Then, the authors show that the institution of bankruptcy is not a perfect substitute for the enforceability of exclusive contracts. On the one hand, the institution of bankruptcy considerably restricts the contracts offered to the debtor on the secondary market. This reduces the problem of ex-ante nonexclusivity, which is a positive point. On the other hand, this is not the same as being able to enforce a specific consumption allocation for the debtor in all states. The repayment schedule offered by the bank should be such that the debtor has no incentive whatsoever to take loans on the secondary market in the state in which the project is successful.

As the authors themselves admit, the proposed model is simplified in several dimensions. In this sense, it would be interesting, for example, to carry out studies of an environment with multiple creditors in a state of equilibrium in which the institution of bankruptcy would, at once and the same time, alleviate problems of exclusivity and coordination among these multiple creditors. Another would be to consider the heterogeneity from the debtors or their projects and analyze the optimal contract independently from the institution of bankruptcy. One hypothesis to be tested is the question if this is not appropriately considered in bankruptcy law, could the institution of bankruptcy end up reducing the welfare of some debtors.

3. A model for the design of credit contracts

In this section, a model of contract theory applied to the credit market is presented with the objective of drawing attention to the informational aspects and incentives indicated by the Bisin and Rampini article (2004).

An adequate credit contract design must specify the correct incentives, in such a way that higher risk debtors are not tempted to enter into contracts with fewer demands (low interest, less security requirements and/or high volumes of credit granted). Aside from this, once the contract has been formalized, the contractual mechanisms must inhibit the borrower company from developing inefficient business practices or, in other words, bankruptcy proceedings must be the final resort to which the company will turn.

According to contract theory, information is one of the most important factors for achieving market efficiency since it is only through information that agents are able to adjust their output and price levels in such a way as to maximize welfare. When information is incomplete, failings occur that result in benefits for one party to the detriment of other parties. This is the case of asymmetric information. Examples would include cases in which sales personnel have more information about their product than buyers, workers more than their employers, company managers more than company owners and debtors more than creditors.

Asymmetric information gives rise to two problems: adverse selection and moral hazard. Adverse selection is characterized by the fact that, in a loan contract, the choice of the loan conditions (interest rate, guarantee requirements and volume of financing) may be determined by factors related to preference that, in turn, may be positively correlated to the risk of default. It is natural that debtors know their own preferences better than creditors. In this sense, debtors indirectly have better information with regard to the risk of nonpayment than their creditors. Thus, the creditor may suffer losses, should the contracts not have an adequate combination of price and quantity. For example, if a bank trades a contract in which the volume of resources to be granted is that desired by debtors with high default risk, the interest rates to be demanded from these debtors must be higher than would be demanded from low risk debtors. Consequently, in order to minimize this problem, those providing the financing must design their contracts in such a way that only lower risk debtors will be encouraged to contract loans with fewer demands (interest rates, guarantee requirements and volume of financing), while higher risk debtors would have to submit to more rigorous conditions. In the case of moral hazard, borrower companies may be less inclined to reduce the probability of failure in their undertakings and begin developing inefficient practices. Once again, the probability of nonpayment may be reduced provided that the contract define adequate incentives, as was discussed in the previous section when dealing with the Bisin and Rampini model.

A theoretical model will be presented in order to illustrate a case of adverse selection. Laffont (1990) described and presented the solution of a simplified theoretical model through which the problem of adverse selection can be resolved. This model can be adapted to the case of credit operations. In the first place, according to the model, debtors are not allowed to choose loan volume z_i: they can only accept or reject the contract offered to them. Secondly,

competition among those providing financing defines the contracts in a state of equilibrium. Below, the results are shown only for the case in which separation equilibrium exists[70]. The problem is that of maximizing the utility function of two types of debtors (one type A, with a high risk of nonpayment, and the other, type B, with low risk of nonpayment). It is presumed that, at the moment of loan contracting, the amount involved is granted net of interest or, in other words, z_i-$q_i.z_i$:

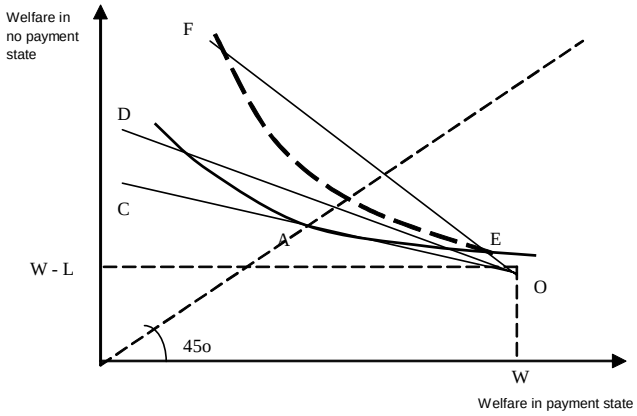
$$Max_z\ [\pi_i u\ (w-L-q_i.z_i + z_i) + (1 -\pi_i)\ u\ (w-q_i.z_i)],\ i = A,B$$

In which: u(.) is a Von-Neumann-Morgenstein utility function (u'(.)>0 and u''(.)<0) π_i, is the probability of debtor type i not paying the debt. L is the value of the loan guarantee. q_i is the interest rate of a loan unit contracted by the type i debtor. z_i is the number of loan units contracted by the type i debtor and W is the wealth of the debtor.

The marginal rate of type i debtor substitution is given by: $TMS_i = \frac{(1-\pi_i)\ u'\ (w-q_i.Z_i)}{\pi_i u'(w-L-q_i.Z_i+Z_i)}$. Thus, along the 45º straight line, in which u'(W - L - qi.zi + zi) = u'(W - qi.zi), the utility curve of the type B debtor is more inclined than that of type A, since $\frac{1-\pi_A}{\pi_A} < \frac{1-\pi_B}{\pi_B}$ (based on the hypothesis that $\pi_A > \pi_B$). The utility curves and separation equilibrium are shown in Graph 1 below:

The traced curve corresponds to the utility curve of Type B debtors, while the full curve refers to the utility curve of type A debtors. The following aspects deserve mention:

- the segment OF is the "budget restriction", corresponding to a fair interest rate (zero profit for the party providing the financing) for type B debtors;
- the OD segment has a slope coefficient of $\frac{1-\pi}{\pi}$, in which $\pi=\lambda_{\pi B} + (1-\lambda)\pi_A$ e λ is the proportion of type B debtors;
- the OC segment is the "budget restriction" corresponding to a fair interest rate (zero profit for the party providing the financing) for type A debtors;
- The E point is the intersection between the OF segment and the utility curves.



70/ Equilibrium in which two or more types of contract (combination of interest rates q_i and volume z_i of the loan) constitute a Pareto optimum for each of the types of debtors.

For the situation corresponding to Graph 1, points A and E are equilibrium contracts[71], in which the party providing the financing obtains zero profit with type A debtors and a positive profit with type B debtors. In other words, higher volume loan contracts are accepted by debtors with a greater probability of not paying even though these contracts are more expensive, while debtors with less risk of not paying pay less than type A debtors for contracts with lower loan volumes. However, the interest rate paid by type B debtors is unfair, since the volume of the loan is more than proportionately less than the contracts for type A debtors. Aside from this, according to this simplified model, in this equilibrium no other competing provider of financing is in a position to attract debtors without incurring losses.

Comparing separation equilibrium with the equilibrium being provided by symmetric information, it is seen that nothing changes for type A debtors; type B debtors suffer the consequences of the impossibility of being identified as low risk debtors: despite having paid less than the type A debtors ($q_B<q_A$), the volume of loans is significantly below what it would be in a situation of fair interest rates. Thus, it is in the interest of the latter debtors to be identified as having low risk through some type of information mechanism. Analogously, it is in the interest of those providing the financing to find criteria that make it possible to segment the target market into subgroups so as to better calibrate loan conditions.

4. Conclusion

The empirical results of the articles by Araújo and Funchal (2004) and White and Berkowitz (2004) reinforce the primary motivation that led to reformulation of the text of the new bankruptcy law (law 11,101/05). The previous legislation that clearly favored debtors (DL 7661/45) is to be replaced by a legal framework more in line with internationally recognized practices. The major reformulation proposed regarding creditor protection is the increased priority given to credits with real guarantees compared to tax credits in bankruptcy proceedings (art. 83). Labor credits continue to have priority standing, though this priority is limited to 150 times the minimum monthly wage (art. 83,I). This limit is aimed at preserving the bankrupt estate against frauds based on labor law suits. In many cases, these suits have involved enormous sums of money and were structured by those responsible for the bankrupt company.

71/ Observe that should the OD segment intercept the utility curve of type B debtors, separation equilibrium would not exist.

With elimination of the previous system of debt composition, companies are able to resort to extrajudicial or judicial recovery. Both have the same spirit, though they differ in form. In the case of extrajudicial recovery, less complex situations can be resolved through informal agreements between creditors and debtors, including the possibility of legal recognition of these agreements. As regards judicial recovery (art.47), companies undergoing difficulties submit a recovery plan to be analyzed by creditors and, once approved and recognized by the court, they then have the opportunity to preserve their productive resources and resolve their debt problems.

The following additional advances can also be cited with respect to creditor protection:

i) Creation of committees to oversee and formally represent creditors in bankruptcy proceedings or in cases of judicial recovery (articles 27 and 35).
ii) Sale in block form of the assets by the bankrupt company without the burden of tax authority precedence. The idea is to create conditions that would make this transfer rapid, thus avoiding deterioration in the value of the company and its assets and equipment (art. 140).
iii) Inclusion of new loans to the company in the process of recovery in the form of exceptional credits entitled to preferential payment in relation to other creditors (articles 67 and 84)

The model set out in the Bisin and Rampini article (2004) shows that in bankruptcy proceedings with a determined level of protection (not foreseen in Brazilian legislation), the institution of bankruptcy implies better conditions for creditors in the case of nonexclusive contracts. However, nonexclusive contracts with bankruptcy cannot yet be considered perfect substitutes for contracts with exclusivity.

While Bisin and Rampini dealt with the problem of moral hazard or opportunism, section 3 suggests that an adequate design for credit contracts may reduce the problem of adverse selection. According to this model, a problem of credit rationing for low risk debtors still remains. This problem, coupled with adverse selection, may be attenuated as financial institutions gain greater access to consolidated information about their clients (and provided that clients grant express authorization for this access). The preference and the risk of nonpayment on the part of a client may be inferred through a process of client risk rating coupled with analysis of the client's past debt history (level of indebtedness, maturity periods, payment punctuality and exposure in foreign currency,

for example). Furthermore, public access to this information by itself also tends to reduce the probability of moral hazard, since a lack of commitment from the part of the debtor may be considered negative by the creditor and more rigorous conditions may be imposed on them in the next loan operation. Banco Central do Brasil is now responding correctly to this question by consolidating the SCR.

References

ABRÃO COSTA, A.C. **Sistemas legais de insolvência, incentivos e mercado de crédito: uma abordagem institucional (Legal systems of insolvency, incentives and credit markets: an institutional approach)**. ANPEC, 2004.

ARAÚJO, A. **As leis de falência: uma abordagem econômica (Bankruptcy legislation: and economic approach).** Banco Central do Brasil discussion papers. Brasília, 2002.

ARAÚJO, A., FUNCHAL, B. **Análise da influência da lei de falências e da eficiência do judiciário no desenvolvimento do mercado de crédito (Analysis of the influence of bankruptcy legislation on the development of the credit market)**. ANPEC, 2004.

ARAÚJO, A., LUNDBERG, E. **A nova lei de falências: uma avaliação. (The new bankruptcy law: an assessment).** Economia e Crédito – Four year evaluation of the Interest and Banking Spread project. Banco Central do Brasil, p. 44-57, 12/2003.

BERKOWITZ, J., WHITE, M.J. **Bankruptcy and small firms' access to credit.** Rand Journal of Economics, vol.35 no.1, Spring 2004 pp. 69-84.

BISIN, A., RAMPINI, A.A. **Exclusive contracts and the institution of bankruptcy**, November 2004, Economic Theory forthcoming.

CARVALHO, A. G. **A Nova Lei de Falências (The new bankruptcy law)**. Mercado de Capitais, São Paulo, v. 95, p. 21- 23, 02 jan.2004.

LAFFONT, J.J. **The Economics of Information and uncertainty**, 1990.

LUNDBERG, E. **Reforma da lei de falências (Reform of bankruptcy legislation)**. Economia bancária e crédito – Three year evaluation of the interest and banking spread project. Banco Central do Brasil, p.49-58, 2002.

PINHEIRO, A.C. e CABRAL, C. **Credit markets in Brazil: the role of the judiciary and other institutions**, in Defusing Default: Incentives and Institutions, Ed. M. Pagano, IDB, 2001.

Appendix

Banco Central do Brasil Management

Central units of the Banco Central do Brasil

Acronyms

Banco Central do Brasil Management

Board

Henrique de Campos Meirelles
Governor

Afonso Sant'Anna Bevilaqua
Deputy Governor

Alexandre Schwartsman
Deputy Governor

Antonio Gustavo Matos do Vale
Deputy Governor

Eduardo Henrique de Mello Motta Loyo
Deputy Governor

João Antônio Fleury Teixeira
Deputy Governor

Paulo Sérgio Cavalheiro
Deputy Governor

Rodrigo Telles da Rocha Azevedo
Deputy Governor

Sérgio Darcy da Silva Alves
Deputy Governor

Executive Secretariat

Hélio José Ferreira
Executive Secretary

Sérgio de Albuquerque de Abreu e Lima
Secretary to the Board os Directors and National Monetary Concil Affairs

Gerson Bonani
Secretary for Institutional Relations

Advisors to the Board

Alexandre Pundek Rocha

Alvir Alberto Hoffmann

Anthero de Moraes Meirelles

Clarence Joseph Hillerman Júnior

Cláudio Jaloretto

Dalmir Sergio Louzada

Flávio Pinheiro de Melo

Gustavo Alberto Bussinger

Katherine Hennings

Luiz do Couto Neto

Marco Antonio Belém da Silva

Central units of the Banco Central do Brasil

Financial Administration Department (Deafi)
Head: *Jefferson Moreira*

Department of Human Resources Administration and Organization (Depes)
Head: *Miriam de Oliveira*

Department of Material Resources Administration (Demap)
Head: *Dimas Luis Rodrigues da Costa*

Internal Auditing Department (Deaud)
Head: *Eduardo de Lima Rocha*

Financial System Information Management Department (Defin)
Head: *Sérgio Almeida de Souza Lima*

Foreign Capital and Exchange Department (Decec)
Head: *Sidinei Correa Marques*

Department of Bank Liquidation (Deliq)
Head: *José Irenaldo Leite de Ataíde*

Department of Economics (Depec)
Head: *Altamir Lopes*

Off-site Supervision Department (Desin)
Head: *Cornélio Farias Pimentel*

On-site Supervision Department (Desup)
Head: *Osvaldo Watanabe*

Department of Information Systems Management (Deinf)
Head: *Fernando de Abreu Faria*

Legal Department (Dejur)
General Attorney: *Francisco José de Siqueira*

Currency Management Department (Mecir)
Head: *José dos Santos Barbosa*

Department of Financial System Regulation (Denor)
Head: *Amaro Luiz de Oliveira Gomes*

Department of Banking Operations and Payments System (Deban)
Head: *José Antonio Marciano*

Department of Open Market Operations (Demab)
Head: *Sérgio Goldenstein*

Department of International Reserves Operations (Depin)
Head: *Daso Maranhão Coimbra*

Department of External Debt and International Relations (Derin)
Head: *Marcio Barreira de Ayrosa Moreira*

Department of Financial System Organization (Deorf)
Head: *Luiz Edson Feltrim*

Department of Planning and Organization (Depla)
Head: *José Clóvis Batista Dattoli*

Research Department (Depep)
Head: *Marcelo Kfoury Muinhos*

Enforcement Against Illegal Foreign Exchange and Financial Activities Department (Decif)
Head: *Ricardo Liáo*

Acronyms

BM&F-Securities	BM&F Securities Clearing House
BM&F-Foreign Exchange	BM&F Foreign Exchange Clearinghouse
BM&F-Derivatives	BM&F Derivatives Clearing House
BNDES	National Bank of Economic and Social Development
BoC	Bank of China
BoJ	Bank of Japan
CAC-40	Cotation Assistée en Continue
CCB	China Construction Bank
CIP	Interbank Payments Clearing House
CMN	National Monetary Council
Compe	Central Clearing and Settlement System for Checks and Other Papers
Copom	Monetary Policy Committee
Cosif	Accounting Plan of National Financial System Institutions
CPMF	Provisional Contribution on Movement or Transmission of Values and Credits and Rights of a Financial Nature
DAX	Deutscher Aktienindex
DIM	Interbank Deposits Tied to Microcredit Operations
DOC	Credit Document
Dow Jones	Dow Jones Industrial Average
DPMFi	Federal Internal Public Securities Debt
Embi+	Emerging Markets Bond Index Plus
FDIC	Federal Deposit Insurance Corporation
FED	Federal Reserve
FGC	Credit Guaranty Fund
FGTS	Employment Compensation Fund
FSA	Financial Services Agency
FTSE	100 Financial Times Securities Exchange Index 100
Iasb	International Accounting Standards Board
Ibovespa	São Paulo Stock Exchange Index
IIF	Institute of Internacional Finance
IMF	International Monetary Fund
INSS	National Institute of Social Security
IPCA	Amplified Consumer Price Index
LBC	Banco Central do Brasil Bills
LFT	Financial Treasury Bill
LTN	National Treasury Bill
Nasdaq	National Association of Securities Dealers Automated Quotations
NGO	Non-Governmental Organizations
NPL	Non Performance Loans
NTN-F	National Treasury Notes – Series F

Oscip	Civil Society Organizations of Public Interest
PIB	Gross Domestic Product
PL	Net Worth
PLA	Adjusted Net Worth
PLE	Required Net Worth
PNMPO	National Targeted Productive Microcredit Program
PRA	Adjusted Base Capital
PR	Base Capital
SCM	Microentrepreneur Credit Companies
SCR	Central Credit Risk System
Selic	Special System of Settlement and Custody
Sebrae	Brazilian Service of Support to Micro and Small Businesses
SFN	National Financial System
SPB	Brazilian Payments System
Sitraf	Fund Transfer System
Siloc	Deferred Settlement System of Interbank Credit Order transfers
STR	Reserve Transfer System
TED	Available Electronic Transfers
TR	Reference Rate
TVM	Stocks and Securities
VaR	Value-at-Risk
VLB-Check	Gross Settlement Reference Value for Checks
VLB-Cobrança	Gross Settlement Reference Value for Charging Documents