Inter-American Development Bank

Why So High?

Understanding Interest Rate Spreads in Latin America

Philip Brock and
Liliana Rojas-Suárez
Editors

LATIN AMERICAN RESEARCH NETWORK

This page intentionally left blank

Why So High?
Understanding Interest Rate Spreads in Latin America

Philip Brock
and Liliana Rojas-Suárez
Editors

INTER-AMERICAN DEVELOPMENT BANK

Washington, D.C.
2000

Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library

Why so high? : understanding interest rate spreads in Latin America / Philip Brock and Liliana Rojas-Suárez, editors.
p. cm.
Includes bibliographical references.
ISBN:1886938741
1. Interest rates--Latin America. 2. Banks and banking--Latin America. I. Brock, Philip. II. Rojas-Suárez, Liliana. III. Inter-American Development Bank.
332.8 W42--dc21

Why So High?
Understanding Interest Rate Spreads in Latin America

1300 New York Avenue, NW
Washington, DC 20577

Table of Contents

Latin American Research Network
Inter-American Development Bank

The Inter-American Development Bank created the Latin American Research Network in 1991 in order to strengthen policy formulation and contribute to the development policy agenda in Latin America. Through a competitive bidding process, the Network provides grant funding to leading Latin American research centers to conduct studies on economic and social issues selected by the Bank in consultation with the region's development community. Most of the studies are comparative, which allows the Bank to build its knowledge base and draw on lessons from experiences in macroeconomic and financial policy, modernization of the state, regulation, poverty and income distribution, social services, and employment. Individual country studies are available as working papers and are also available in PDF format on the internet at http://www.iadb.org.res.41.htm.

Acknowledgments

The studies in this book were financed by the Latin American Research Network of the Inter-American Development Bank and would not have been possible without the collaboration of many friends and colleagues. The authors are extremely grateful to Michael Kumkof for his invaluable work on this project, both in terms of his contribution to the empirical analysis in the introductory chapter as well as his comments and suggestions for improvements. The project also benefited greatly from the participation of Alejandra Anastasi, Andrea Broda, Elena Grubisic, Ximena Coronada, Denisse Martín, Patricia Zelada, and Martha Zubieta. Valuable comments came from Luis Carlos Jemio, Julio Humerez, Fernando Jiménez, and Jairo Escobar. In addition, the authors appreciate the assistance and support of Claudio Chamorro, Mario Chamorro, Rómulo Chumacero, Camilo Morales, Eduardo Antelo, Iván Vravo, Patricia Langoni, Roberto Steiner, Rodrigo Valdés, the participants of the Central Bank of Chile and LACEA-Colombia conference, Martín Ortega, Fernando Montes-Neet, Luca Papi, Martha Misas, Gonzalo Camargo, Javier Kpsoli, Marco Vilchez, Manuel Vásquez, Lizardo Cruchaga and Liliana Martínez. Valuable editorial support was provided by Emily Chalmers and Emaline Mills under the direction of Rita Funaro.

Preface

Financial liberalization has not lived up to expectations, at least as far as interest rate spreads are concerned. Over the past decade, many countries in Latin America and the Caribbean have reformed their financial sectors. Liberalization of financial markets has implied, among other things, eliminating interest rate controls, reducing reserve requirements, and lifting direct credit controls. Greater reliance on market mechanisms has encouraged financial deepening and produced major economic benefits to countries. However, the persistence of high interest rate spreads—the difference between the interest rate charged to borrowers and the rate paid to depositors—has been a disquieting outcome of the reforms.

Why So High? is the first systematic analysis of the micro- and macroeconomic determinants of bank spreads across countries in Latin America. Seven case studies covering Argentina, Bolivia, Chile, Colombia, Mexico, Peru, and Uruguay address three questions: What has been the trend in bank spreads during the 1990s and how has the process of financial liberalization contributed to this trend? How well do competing theories of interest rate spreads in industrial countries perform when applied to Latin America? What can policymakers do to promote the convergence of interest rate spreads to international levels?

The researchers for the country studies gathered panel data on banks' balance sheets and income statements as a basis for their empirical work. Important consideration was given to variations in the behavior of spreads by alternative classifications of banks (e.g., domestic vs. foreign, public vs. private, wholesale vs. retail) and by the nature of the instruments they provide (e.g., domestic vs. dollar-denominated instruments). The empirical analyses are based on data made available by Central Banks and Bank Supervisory Agencies in the countries analyzed. To all those institutions, we wish to extend our sincere gratitude.

The case studies show that high operating costs raise spreads, as do high levels of nonperforming loans. Bank capital, especially when much of it is fictitious, may not be doing enough to encourage prudent lending behavior. Finally, reserve requirements in several

countries still act as a tax on banks, which translates into a higher spread. Beyond bank-specific variables, uncertainty in the macroeconomic environment that banks face appears to have kept interest spreads high. It is the combination of these factors that is cause for concern in Latin America. As spreads widen, the cost of using the financial system becomes prohibitive to more and more potential borrowers. In addition, excessive risk-taking by banks may become a more serious problem when bank spreads are high.

The scope for further research in this area is enormous. It is our hope that this volume motivates analysts to pursue the intriguing micro- and macroeconomic issues associated with high interest rate spreads in Latin America.

Ricardo Hausmann
Chief Economist
Inter-American Development Bank

CHAPTER 1

Interest Rate Spreads in Latin America: Facts, Theories, and Policy Recommendations

Philip Brock and Liliana Rojas-Suárez[1]

Over the last decade, Latin America has initiated a process of financial sector reforms. These reforms included, in almost all countries, liberalization of interest rates and elimination of mechanisms for direct allocation of credit. In some of these countries reforms have gone well beyond the elimination of interest rate controls and have included an overhaul of the regulatory and supervisory systems for financial institutions. In many others, however, deficiencies in regulatory and supervisory standards remain. Notwithstanding the difference in degree of reforms, countries in the region have shown a commitment to continue the process, albeit at different paces.

The commitment to a market-oriented financial system has been tested twice during the 1990s. The first test occurred in 1995 when, following the Mexican financial turmoil, a number of banking crises erupted in the region. In the early 1980s the policy response to banking crises in a number of countries in the region was to reintroduce interest rate and exchange controls and to increase the participation of governments in bank activities through nationalization. In contrast, the policy response to the financial difficulties of the mid-1990s was to intensify reforms and further reduce direct government intervention.

[1] Philip Brock is associate professor of economics at the University of Washington, Seattle. Liliana Rojas-Suárez is Managing Director and Chief Economist for Latin America at Deutsche Bank.

The second test of the region's commitment to free financial markets took place beginning in mid-1997 with the eruption of the severe financial crisis in Asia. Improved economic fundamentals coupled with adequate policy response to the reduced availability of foreign financing allowed the region to weather the crisis during the first year. But as the Russian moratorium of mid-1998 exacerbated the international financial crisis, the sudden stop of short-term capital inflows to emerging markets exposed existing policy inconsistencies in a number of Latin American countries. This led to the eruption of exchange rate and/or banking crises in the region once again (i.e., Brazil, Ecuador, and Colombia).

In spite of the severity of recent events, however, to date there are no countries in the region that have gone back to the policy of interest rate controls. Instead, all indicators point toward a strengthening of the process of opening domestic financial markets. Indeed, there is widespread recognition of the benefits of increased foreign bank participation in the domestic financial landscape.

But, while the process of financial market liberalization and integration is fully supported by policymakers in the region, there is a certain degree of disappointment with some of the results. In particular, policymakers expected that *interest rate spreads*—the difference between the interest rate charged to borrowers and the rate paid to depositors—would converge to international levels. Policymakers care about bank spreads because they reflect the cost of intermediation. In the absence of government intervention on bank activities, high spreads are usually interpreted as an indicator of inefficiency, which adversely affects domestic real savings and investment. By increasing competition, it was expected that market forces would reduce bank spreads and keep them at levels similar to those prevailing in industrialized economies.

It is fair to say that the results from the financial reform process have been mixed. While the opening of domestic systems to foreign banks has allowed an increase in much-needed bank capitalization, the need to keep very tight monetary policies due to adverse external shocks has significantly contained the expansion of real credit. Moreover, the generalized perception in the region is that bank spreads have remained high—well above international levels.

Motivation of the Study: Why Do We Care About Interest Rates and Bank Spreads Now?

The study of interest rates and spreads only makes economic sense in a financially liberalized economy. This type of economy is relatively new in Latin America since the sustained process of financial liberalization only started about a decade ago. Prior to liberalization, government direction of resources centralized economic decision-making, including the scope and profitability of financial institutions. For example, policy steps that might hurt banks, such as imposing controls on loan rates to risky sectors, were offset by tariff policy to raise the profitability and safety of investments in those sectors. Free trade, when combined with a reduction in restrictions to international capital movements, took away sheltered home markets while opening up new, but risky, opportunities in world markets. In a financially liberalized environment, banks take on a key role in the decentralized allocation of new investments. Interest rates and interest rate spreads provide a signal of how banks play this new role.

Interest rate spreads are derived by taking the difference between two interest rates. There are two common types of interest rate spreads. The first type is used as a predictor of economic activity, including the *paper-bill spread* (the difference between the rate on commercial paper and the treasury bill rate) and the *yield spread* (the difference between the return on a ten-year treasury bond and a three-month treasury bill). An increase in the paper-bill spread frequently precedes recessions,[2] as does a decline in the yield spread.[3]

The second type of spreads is the difference between the bank loan rate and the deposit rate. This second type of spreads, commonly referred to as *the cost of financial intermediation* (CFI), is researched in this volume. During the last twenty years, loan-deposit rate spreads have emerged as a central element in analytical models of financial intermediaries. One set of models emphasizes the

[2] See Stock and Watson, 1989; Bernanke, 1990; and Friedman and Kuttner, 1998.
[3] See Harvey, 1988; and Estrella and Mishkin, 1998.

role of banks as providers of liquidity in the form of demandable deposits. These deposits are fixed in value in nominal terms and banks have access to the Central Bank's discount window to insure deposit liquidity. Because liquidity is valuable to holders of demand deposits, the return on demand deposits can fall below the return on other short-term assets, thereby creating an interest rate spread.

Other models have pointed increasingly toward bank loans as an important source of loan-deposit rate spreads. These models emphasize the information-intensive nature of the monitoring process of bank loans. Because of private information known only by borrowers and banks, debt contracts (loans and deposits) become the preferred vehicle for providing appropriate incentives for bank borrowers and bankers to report truthfully. The private information associated with bank lending is the reason bank assets cannot generally be securitized and sold in the secondary market. Banks become delegated monitors that lower the cost of funding for borrowers by holding a diversified portfolio of information-intensive loans.[4] The spread between the loan and deposit rates in these models reflects the bank's cost of capital, the risk premium associated with the probability of bank failure, and the control rents that the banker must receive in order to have the appropriate incentives to monitor loan portfolio performance.[5] One important subset of this literature has focused on credit risk as an important determinant of the cost of financial intermediation.[6]

According to Mercer (1992), income derived from spreads accounts for 80 percent or more of bank operating profits in the United States. Despite the importance of spreads to the financial intermediation process, there are still relatively few empirical studies of the determinants of spreads. Much of the empirical work on the determinants of interest rate spreads builds on the work of Ho and Saunders (1981), McShane and Sharpe (1985), and Allen (1988). In these models the interest rate spreads for a panel of banks are re-

[4] See Diamond, 1984; and Boyd and Prescott, 1986.

[5] See Diamond (1996) for a good discussion and numerical example.

[6] See Bernanke and Gertler, 1990; Chevalier and Scharfstein, 1996; and Boyd and Smith, 1997.

gressed against interest rate risk and a set of bank-specific characteristics. Bank-specific characteristics include the capital-asset ratio, the ratio of nonperforming loans to total loans, noninterest operating expenses, implicit interest payments (i.e., fee income and expenses), and noninterest bearing reserves. In two recent articles, one theoretical[7] and one empirical,[8] support is given to the propositions that spreads are increasing in operating costs, credit risk, interest rate risk, noninterest bearing reserves, and bank capital.

The Historical Context

Concerted attention to interest spreads in Latin America began with the establishment of central banks in the region during the interwar period.[9] The institutional framework for the new central banks varied slightly over the region, but was based on an orthodox commitment to monetary stability under fixed exchange rates. An important part of the operation of the monetary system was the rediscount mechanism. The discount window of the central banks was originally designed to extend short-term credit against paper arising from commercial transactions. Under this regime discount rates tended to fall in the range of 6 to 10 percent. In order for a document to be eligible for discounting, the bank's interest charged on the document could not exceed the rediscount rate by more than a set number of percentage points (typically around 3 to 6 points). The rediscount policies were consciously adopted to lower private

[7] See Wong, 1997.

[8] See Angbazo, 1997.

[9] In the 1920s Professor Edwin Kemmerer of Princeton University gave advice that led to the creation of central banks in Colombia (1923), Chile (1925), Ecuador (1927), Bolivia (1928), and Peru (1931). The Central Bank of Mexico was organized independently in 1925, but showed the influence of Kemmerer's ideas. In 1935 the Central Bank of Argentina was created with the help of advisors from the Bank of England. Costa Rica (1938), Venezuela (1939), and Nicaragua (1941) established central banks with the help of Dr. Hermann Max, a Chilean economist. After World War II, the Federal Reserve helped in the creation or reorganization of central banks in Peru (1944), Guatemala (1945), the Dominican Republic (1945), Ecuador (1948), and Cuba (1949). Brazil began steps to create it own central bank in 1945. See Tamagna (1965) for a more detailed historical account.

loan rates and to establish a pattern of interest rates consistent with the new institutional structure. The rediscount mechanism thereby became the most important tool for controlling interest rate spreads in the financial system.

The beginning of the Great Depression marked the adoption of more aggressive state-directed economic development policies in which the rediscount rate became an increasingly powerful tool of banking policy. Central banks began to rediscount long-term mortgage notes, treasury notes, and special credits to agriculture or mining. By the 1950s, central banks throughout Latin America had established rules that determined the maximum loan rates banks could charge for various types of loans without losing their access to the discount window. Chile in 1955, for example, had established a structure of 30 maximum loan rates on different types of operations.

In addition to loan rate ceilings tied to the rediscount mechanism, some central banks imposed direct controls on deposit interest rates. During the decades following World War II, both loan rates and deposit rates were kept low (and often negative) with spreads that were typically limited to a maximum of 5 to 10 percent. Priority areas of the economy frequently received generous tax advantages and protective trade treatment as well as subsidized credit. Although banks shrank in size relative to GDP, government-directed credit provided a partial substitute for bank-intermediated credit.

Interest rate spreads were not a major policy concern during the period of import substitution that extended well into the 1970s. Spreads only became a policy concern when Latin American governments initiated a return to orthodox economic development programs in the mid-1970s. Financial liberalization, along with trade opening and fiscal reform, became a linchpin of market-oriented policies in Chile, Argentina, and Uruguay. The interest rate spreads of the three Southern Cone economies during the late 1970s prior to the eruption of their financial crises provided the first glimpse of the degree to which spread, in a liberalized financial environment, can appear to approach "normal" levels over time while masking underlying structural problems in banks' balance sheets. In all three

countries, the decline in spreads accompanied an explosive growth of banks' balance sheets.[10] It would later turn out that much of this growth was for loans that had already turned bad (so-called "evergreening") or for loans that would go bad at the start of the 1980s. The central banks and the rest of the public sector in the three countries were eventually called upon to rescue the banking systems at a very high cost, either in terms of fiscal transfers (as in Chile) or in terms of a renewed financial repression that forced losses on depositors (as in Argentina).

An increase in direct government intervention in banking activities also occurred in other Latin American countries following the systemic banking crises of 1982. For example, in Mexico, depositors were obliged to absorb some of the losses through forced conversion of foreign currency-denominated deposits at an unfavorable exchange rate and negative real interest rate on peso-denominated deposits. In addition, banks were nationalized.

In many countries, the renewal of financial repression was the result of governments' lack of understanding of how to manage more liberalized financial systems. As will be discussed in the next subsection, the transitional issues that arose during the (brief) period of financial liberalization were completely missed. Authorities failed to correctly interpret the signals provided by the behavior of spreads in individual banks. Instead, many governments attributed the eruption of crisis to the failure of a market-oriented approach.

As is well known, the period of financial repression that characterized most of the 1980s had disastrous economic consequences for the region. Macroeconomic mismanagement in the context of repressed financial systems resulted in a period of hyperinflation and a drastic loss of real wealth for depositors. Capital flight intensified and many economies became dollarized. Financial intermediation decreased sharply in the region. Peru and Argentina are more

[10] In Chile, for example, the interest rate spread on 30- to 89-day operations rose to 57 percent in 1976 before falling gradually to 8 percent in 1981. In Argentina the spread fell from 49 percent in 1978 following financial liberalization to 23 percent in 1980, while the spread in Uruguay fell from 27 percent in 1978 to 11 percent in 1982. The data on spreads for Chile are from Banco Central de Chile; for Argentina and Uruguay the data are from Végh (1992).

severe examples. Their ratio of deposits to GDP reached only 4 percent of GDP by 1990.

New efforts to liberalize financial systems took place in the late 1980s in some countries, and the early 1990s in others. This time around, the efforts took place in the context of a more comprehensive approach, where major macroeconomic imbalances were corrected and structural reforms in the financial system, such as initiatives to improve the regulatory and supervisory framework, were started.

As in the Southern Cone countries in the late 1970s, spreads that were initially above international levels began to decline in a number of countries. For example, in Mexico, following the privatization of the banking system in the early 1990s, new banks were allowed to enter the system and aggregate spreads declined from 8.5 percent in 1992 to 5.4 percent in 1994. The international community praised Mexico's developments in economic and financial conditions during this period. Once again, however, a new wave of banking crises erupted in the region: Argentina, Mexico, and Venezuela in 1994; Brazil in 1995; and Ecuador in 1996.

Why, in both financial liberalization periods (both in the 1970s and more recently), was the decline in bank spreads not associated with an improvement in efficiency?

Why did increased competition, especially in the later period, not bring stronger and safer banks?

Transitional Issues in the Process of Financial Liberalization

To understand the behavior of interest rates and interest rate spreads in the transition from a repressed to a more liberalized financial environment, it is important to understand what financial liberalization has meant in Latin America.[11] Until recently, in most countries the concept of financial liberalization was restricted to the elimination of targeted credit programs and interest rate controls. In addition, new banks were allowed to enter the system to make the

[11] A comprehensive analysis of these issues is contained in Rojas-Suárez (1997).

industry more competitive. However, rules and regulations allowing new entry were generally not accompanied by strict and promptly enforced exit rules for banks with poor performance.[12] Moreover, financial liberalization did not mean elimination of barriers to the functioning of foreign institutions. Moral hazard problems arising from the existence of implicit or explicit safety nets were not taken into account by governments. As such, incentives for excessive risk-taking by banks were created.

The combination of increased competition among domestic banks, lack of appropriate regulatory and supervisory procedures, extensive government guarantees and, most importantly, a lack of political will to close failing banks, induced poorly managed banks to attempt to increase their market share by rapidly expanding their loan portfolios through loans to risky borrowers.

In a truly liberalized environment with adequate rules and enforcement procedures determining which banks are permitted to operate in the system and which banks need to be either intervened or closed, increased competition reduces the average level of spread during a convergence toward a more safe and sound banking system. Moreover, spread in individual banks will also reflect the true risk of banks' portfolios. It is therefore not surprising that the traditional literature, developed with industrial countries in mind, predicts a positive relationship between spread and a measurement of banks' portfolio risk.[13]

This has not been the case in Latin America.[14] In many countries regulators have demonstrated an overly permissive attitude toward the entry of new banks, a lack of desire to close existing undercapitalized institutions, and an unwillingness to curtail ample government guarantees. With the best-quality borrowers already

[12] In addition, it is important to note that during the long period of financial repression, bank superintendencies lost their human capital and institutional knowledge of prudential regulation. The liberalization process started with a large number of banks having initially weak balance sheets.

[13] The empirical literature includes variables such as the variability of loan rates, provisioning (an ex-ante proxy for bank portfolio risk), or non-performing loans (an ex-post proxy).

[14] A comprehensive analysis of these issues is contained in Rojas-Suárez (1997).

being served by the strongest institutions, weak banks have tended to operate with low interest rate spread for two reasons. First, poorly-capitalized banks often have the incentive to lower loan rates and raise deposit rates in order to capture greater market share. Second, the lack of bank provisioning for loan losses causes reported spread to decline when the loan portfolio (and income) deteriorates. Because of these two reasons, the relationship between interest rate spreads and portfolio risk may differ from industrial countries.

An additional example of the difficulties associated with a straightforward application of the traditional literature to the understanding of bank spreads in Latin America is provided by the predicted relationship between spread and capital-asset ratios. In industrial countries with adequate rules and regulations governing the functioning of the banking system, an increase in capital-asset ratios usually increases the cost of intermediation (due to unfavorable tax treatment of equity capital relative to debt and the dilution in stockholders' control of managers' activities). Banks' usual response is to cover some of the cost increase with an increase in interest rate spread. In sharp contrast with this result, capital ratios mean very little in inadequately regulated and supervisory financial systems. In these systems, inadequate accounting standards and inappropriate classification of loans according to their risk characteristics make the concept of bank capital meaningless. In addition, lack of liquid capital markets prevents an appropriate market valuation of bank equity. In this context, banks can report required "accounting" capital that has little relation with the "true" degree of bank capitalization. The relationship between capital-asset ratios and spread predicted in the literature may therefore not hold for some Latin American countries.

The main conclusion from this section is that an appropriate understanding of the behavior of spread during the transition from a repressed to a more liberalized financial system requires an examination of the institutional framework in which banks operate. At an analytical level, the initial quality of banks' assets, the government's regulatory framework, and the willingness of the authorities to react promptly to individual bank problems affect the growth and consolidation of a liberalized financial system. Never-

theless, there is very little literature on these issues to guide the implementation of financial liberalizations. The study of interest rate spread provides a starting point for addressing and quantifying some of the concerns that frequently accompany the behavior of a liberalized banking system.

The Stylized Facts of Bank Spreads in Latin America

Methodological Issues

Empirical measures of bank spread attempt to capture the cost of financial intermediation—that is, the difference between what banks charge borrowers and what they pay depositors. The theoretical concept of the cost of financial intermediation, however, has no unique empirical counterpart. The reason is that banks do not charge only one loan rate; nor do they pay a single deposit rate. Indeed, on any particular day every bank charges and offers a multitude of rates depending on classes of customers and types of products the bank supplies. Moreover, it is not an uncommon practice for banks to increase their revenues from loans (and payments to depositors) by charging (paying) fees and commissions. These fees and commissions, while not included as interest charged (paid), effectively increase the cost (revenue) faced by bank borrowers (lenders).

To make things even more complicated, not all banks follow the same practice in determining the spectrum of interest rates. These differences in bank behavior may reflect a number of factors including competitive pressures, which in turn may affect a bank's attitude toward risk. The differences, however, also reflect the various kinds of bank activities in which different banks may specialize. For example, banks that orient their services toward retail operations usually face larger operational costs than banks that are more oriented toward wholesale markets. This is because retail operations involve the establishment of a larger number of branches, equipment, and personnel to serve the retail customer. These larger costs are usually translated into higher spreads.

With these issues in mind, the methodology chosen in this introduction to analyze the behavior of bank spreads in Latin America is based on bank-specific data. Since, in most cases, banks do not report the whole array of specific interest rates charged and paid,[15] bank spreads are estimated from data in banks' balance sheets and income statements in an effort to obtain the "implicit" loan and deposit rates offered by each individual bank. The question then is, which is the best method to estimate such an implicit rate? A number of studies approach spreads by calculating the so-called "net interest margins," that is, the difference between a bank's interest earnings and expenses as a percentage of interest-earning assets. This is a common method whose main advantage resides in the simplicity of its calculation—banks in most countries report data necessary for the calculation. The method, however, does not take into account bank charges and income revenue associated with fees and commissions that, as mentioned above, effectively increase the costs paid by bank borrowers and reduce revenues received by depositors. An additional problem is that by including all interest-earning assets and liabilities, net interest margins may deviate significantly from the marginal spread that reflects the bank's marginal costs and revenues. This is particularly true in countries where banks hold noninterest bearing required reserves as well as a significant amount of low-yielding bonds (largely government bonds in Latin American countries). The concept is also subject to important misrepresentations when banks experiencing serious difficulties are allowed to capitalize themselves by issuing bonds to be bought by the government (or the central bank) below market prices.[16]

Because there is no easy way to deal with the measurement problems discussed above, this chapter presents six alternative

[15] Even the *prime rate*—the rate charged to preferred customers—is not always published by banks. On the liability side, banks sometimes report interest rates paid to customers on different kinds of deposits at the retail level, but they do not report rates offered to companies or other kinds of wholesale customers. In some countries, however, banks do not even publish retail deposit rates.

[16] These capitalization schemes have taken place in a number of Latin American countries following the eruption of banking crises. Most notable are the cases of Chile (1984) and Mexico (1995).

proxies for bank spreads. They range from a narrow concept—one that includes loans on the asset side and deposits on the liability side—to a broad concept where all interest-earning assets and liabilities plus associated fees and commissions are included. The alternative definitions used are

$1n$ = (interest received/loans)-(interest paid/deposits);
$1w$ = (interest received/all interest-bearing assets)-(interest paid/all interest-bearing liabilities);
$2n$ = (interest plus commissions received/loans)-(interest paid plus commissions paid/deposits);
$2w$ = (interest plus commissions received/all interest-bearing assets)-(interest plus commissions paid/all interest-bearing liabilities);
$3n$ = (interest received on loans/loans)-(interest paid on deposits/deposits); and
$4w$ = (interest received-interest paid)/total assets

where n is used to reflect the narrow definitions of spread and w represents wide definitions.

The alternative estimates of spreads are calculated for banks in a sample of six Latin American countries: Argentina, Bolivia, Chile, Colombia, Mexico, and Peru.[17] For each country the bank data are quarterly and come from either the Central Bank or the Bank Supervisory Authority. Availability of consistent data does not cover the same period for all countries. However, for each country, the sample data refer to the period in the 1990s after financial liberalization took place.

Alternative definitions of spreads calculated in this introduction are shown in Table 1.1, which presents the estimates for the fourth quarter of 1993, a period in which there are data available for all the countries in the sample. In order to compare across countries, country aggregates are calculated as weighted averages (by

[17] Comparable data for Uruguay, one of the countries in the study, was not available. As a result the cross-country comparison in this introduction includes six of the seven countries in the study.

asset size) across banks for each definition of bank spreads. Figure 1.1, which displays the evolution of the different definitions of spreads over time, shows that methodology matters a lot. Depending on the definition used, one can show extremely high or relatively moderate rates for each country. For example, in Argentina the definition 2*n* shows a spread of 27.5 percent while 4*w* equals only 6.5 percent. These sharp differences are also present in the rest of the sample countries.

With respect to country rankings according to the spread level for a given definition of spreads, Colombia appears to be the country with the highest spreads among sample countries using all but one of the alternative definitions, followed by Peru and Argentina. At the lower end of the spectrum, things are less clear. While Chile appears to be the country with the lowest spreads using one of the definitions, Mexico and Bolivia hold this position under other definitions. The observation that Mexico and Bolivia, two countries recently characterized by severe banking fragilities, display relatively low spreads during the period under consideration is consistent with the hypothesis about the behavior of bank spreads following the liberalization of Latin American financial markets presented earlier.

Table 1.1 Across-Bank Average of Interest Rate Margins (percent, fourth quarter, 1993)

	Narrow Definitions			Wide Definitions		
	1*n*	2*n*	3*n*	1*w*	2*w*	3*w*
Argentina*	-	27.5	-	-	12.9	6.5
Bolivia	3.8	-1.0	10.1	10.3	7.1	3.3
Chile	4.2	6.2	8.9	8.9	11.6	0.8
Colombia	15.8	20.0	-	17.1	21.0	6.6
Mexico*	1.1	2.3	-	6.6	7.7	5.2
Peru	-	22.4	-	-	20.0	6.0

Source: Country bank superintendencies.

*Third quarter, 1994 for Argentina and Mexico.

Figure 1.1 Evolution of Alternative Definitions of Spreads (percent)

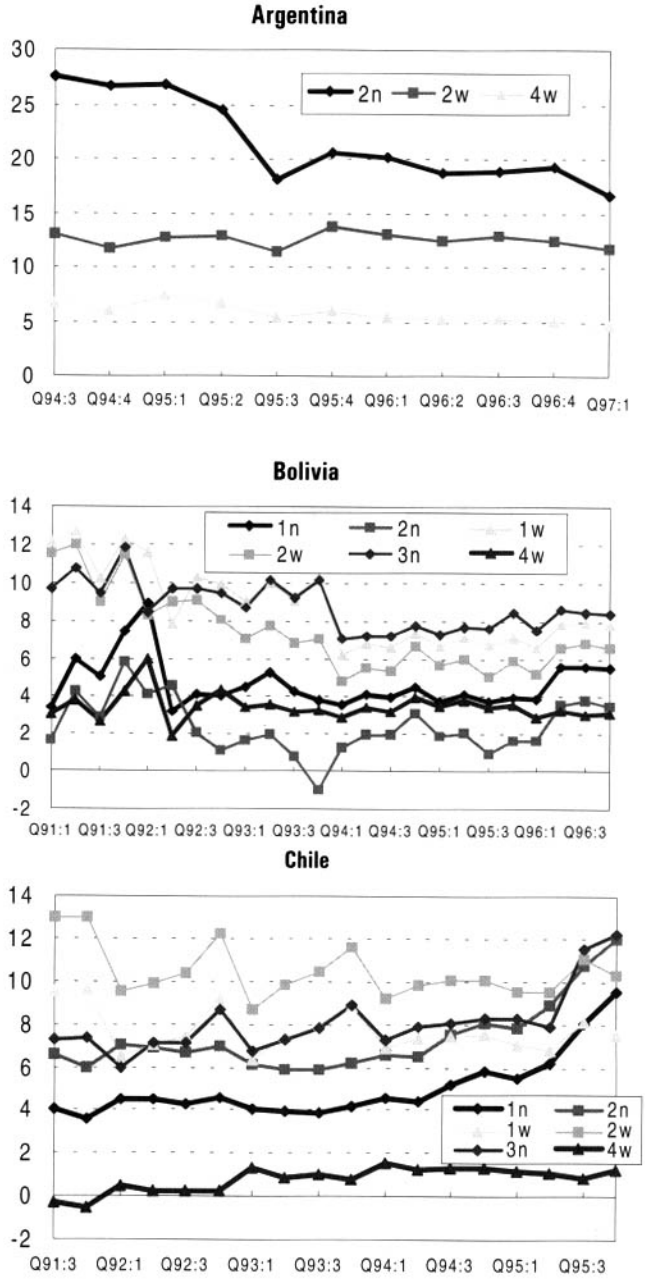
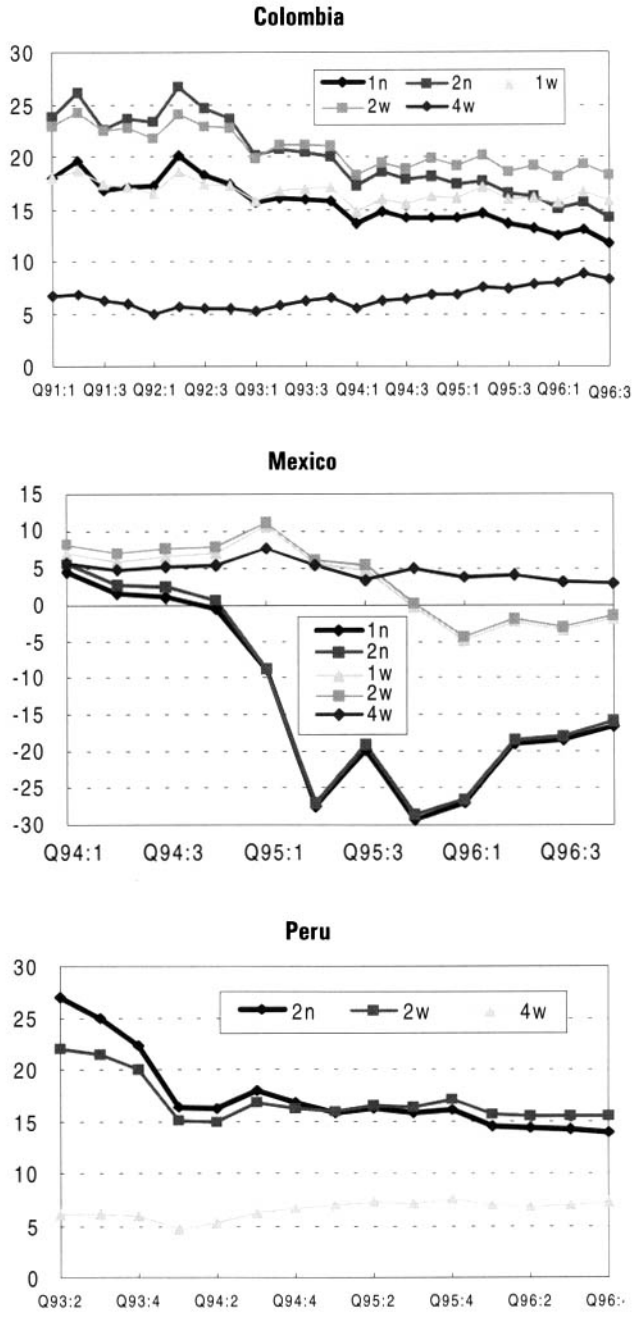


Figure 1.1 (continued)



Source: Country bank superintendencies.

How do Spreads in Latin America Compare with those in Industrial Countries?

Policymakers' concerns about the persistence of high spreads in Latin America can be better assessed by comparing them with those in industrial countries. For this international comparison, we use the 1*w* definition of spreads for all countries except Argentina and Peru.[18]

Figure 1.2 shows that, indeed, in the 1990s aggregate bank spreads in Latin American countries remained much higher than in industrial countries. In particular, countries like Argentina, Colombia, and Peru showed bank spreads about three times higher than most industrialized countries. A noteworthy exception is Chile where bank spreads displayed not only levels, but also a degree of stability comparable to that of industrial countries. However, the fact that Bolivia and Mexico, two countries with much less sound financial systems than Chile, also show relatively low spreads is an additional indication that further analysis beyond country aggregates is required to properly assess spread behavior.

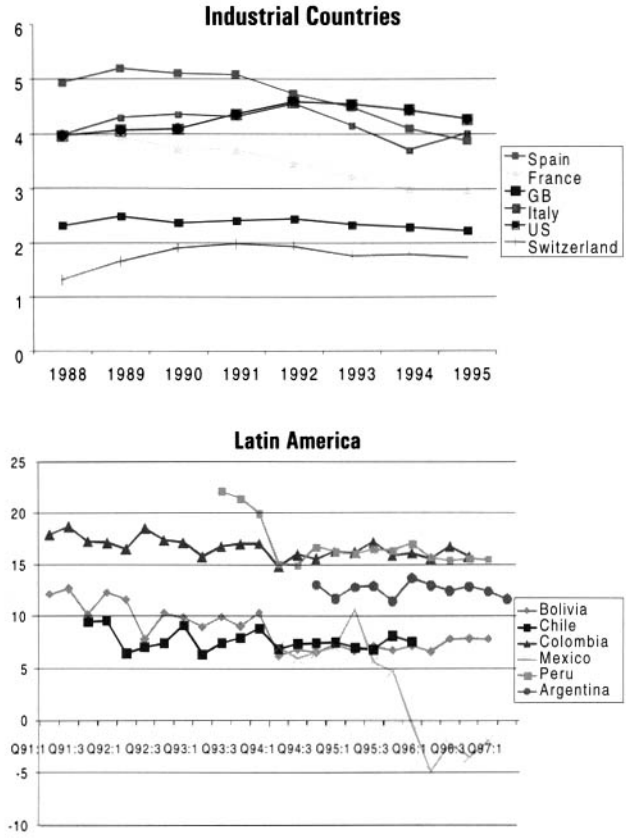
How Do Loan and Deposit Rates Behave Relative to Spreads?

Before leaving country aggregates in favor of bank-specific data, it is useful to ask whether the components of the spread—the deposit rate and the loan rate—move with spreads or whether one of the two rates is more linked to spread changes than the other. Table 1.2 provides a clear answer to this issue. In all countries in the sample, spreads are more correlated with the loan rate than with the deposit rate. This degree of correlation is extremely high in Argentina and Peru, the two countries with the highest spreads in the region.

An important implication of the correlations is that any shock that results in an increased spread will probably raise the lending rate rather than decrease the deposit rate. A plausible explanation to this finding is that financial liberalization has allowed domestic

[18] Information on commission income is not reported for industrial countries, while interest income and commissions are not disaggregated for Peru and Argentina.

Figure 1.2 Aggregate Bank Spreads: Latin America vs. Industrial Countries



Source: Bank superintendencies of countries studied.

Note: The 1*w* definition for spread is used for all countries except Peru and Argentina, for which the 2*w* definition of spread is used.

Table 1.2 Correlation of Spreads with Loan and Deposit Rate

	Loan Rate	Deposit Rate
Argentina	**0.89**	**0.05**
Bolivia	**0.74**	**0.05**
Chile	**0.75**	**0.22**
Colombia	**0.68**	**-0.25**
Mexico	**0.42**	**-0.33**
Peru	**0.99**	**0.74**

Source: Country bank superintendencies.

residents to diversify their portfolios internationally, creating a convergence of domestic deposit rates (adjusted for expectations of exchange rate changes) toward international levels. This convergence of deposit rates does not mean that firms and individuals have gained full access to international capital markets for borrowing. Due to information costs of monitoring domestic borrowers, domestic banks become delegated monitors not only for depositors, but also for international capital markets (so that foreign lending is intermediated by domestic banks rather than lent directly to companies). This argument holds even for countries that have relaxed restrictions to the entry of foreign financial institutions, since those institutions must also invest in private information associated with a portfolio of domestic loans. Only a few large investment-grade Latin American companies have independent access to international capital markets that would create a convergence of domestic and international loan rates that one observes with deposit rates.

Behavior of Spreads over Time and across Banks

Having raised the above caveats about the sensitivity of spreads to alternative definitions, the rest of this introduction will focus on spread $2w$. In addition to the basic reason for choosing this concept, namely that data needed to calculate it are available for all countries in the sample, the concept $2w$ is also chosen because it seems to be the best proxy to represent the "true" opportunity cost for depositors and borrowers since it includes fees and commissions.

Using $2w$, Table 1.3 presents two sets of coefficients of variation (a) over time for a given country, and (b) across banks for a given year and country. A striking result from the table is that, for all countries in the sample, the difference of banks' spreads is much larger than the observed difference over time. Indeed, with the exception of Mexico, where the sample data includes the highly volatile period surrounding the banking crisis of 1994-95, spreads in Latin American countries do not vary much during the 1990s. In contrast, the difference of bank spreads is quite significant in all

sample countries. It may be misleading, consequently, to focus on aggregates to understand the behavior of spreads. Careful consideration needs to be given to bank-specific performance. Even in the crisis period in Mexico, for example, banks did not behave uniformly. The coefficient of spread variation across banks displayed large behavioral differences.

Table 1.3 Coefficients of Spread Variation

		Across Banks:					
	Over Time	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**
Argentina	0.06	-	-	-	0.38	0.42	0.44
Bolivia	0.28	0.56	0.79	0.64	0.64	0.43	0.29
Chile	0.12	0.32	0.38	0.35	0.39	0.38	-
Colombia	0.09	0.25	0.26	0.32	0.33	0.31	0.37
Mexico	1.48	-	-	-	2.84	3.7	-3.6
Peru	0.14	-	-	0.19	0.28	0.74	0.73

Source: Country bank superintendencies.
Note: Spreads measured in 2*w*.

Panel-Data Evidence on Spreads

The aggregate data show significant movement in spreads over time and across banks, but do not indicate the causes of those variations in spreads. In this section we employ panel data on spreads for the six countries that allow us to test for the determinants of time and cross-sectional variation of the spreads. That is, in addition to employing aggregate variables to explain movements in spreads—such as interest-rate spreads, inflation rates, and GDP growth rates—we also examine industry-level determinants of spreads by introducing time-varying industry averages of explanatory variables. We then move to bank-level determinants of spreads by introducing individual bank deviations from the industry-level averages.

As a benchmark for interpreting our results, we note that the stylized panel-data evidence for bank spreads in industrialized countries indicates that spreads are increasing in the ratio of non-performing loans to total loans, in the capital asset ratio, in the ratio of operating costs to total assets, and in the ratio of (non-interest-bearing) short-term assets to deposits. In addition, a number of studies find that measures of market concentration help to explain bank spreads and that macroeconomic variables help to explain spreads.

These results are consistent with a mature and stable industry structure. In industrialized economies, equity holders must receive a risk-adjusted return sufficient to keep them in the industry. Non-performing loans reflect, in equilibrium, the riskiness of a bank's portfolio. The cost of the non-performing loans will be reflected in the spread, and especially in the loan rate. Banks that carve out a niche of riskier loans will have a greater proportion of non-performing loans, on average, and greater spreads.

In a mature industry, greater capital/asset ratios will tend to raise spreads. Raising capital is costly relative to debt. Two reasons for this are the unfavorable tax treatment that capital generally receives and the increase in governance costs (i.e., it becomes harder for stockholders to monitor managers' performance) associated with greater capital. Both reasons imply that banks have more expenses for a given amount of loans, expenses that must in equilibrium show up as higher spreads.

In a stable industry structure any individual greater operating costs reflect the mix of services chosen by a bank. Greater costs are reflected in greater spreads rather than in reduced dividends to equity holders. Finally, greater measured reserve ratios will generally reflect specialization in deposits that are subject to reserve requirements. The cost of reserve requirements will also be reflected in a higher spread.

As has been stressed, banking systems in economies that are in the process of liberalizing and reforming their financial systems are not in long-run equilibrium. There are forces pushing inefficient and poorly managed banks toward exit, but these forces are severely blunted by the existence of deposit guarantees and regulatory forbearance. The interpretation of panel data from liberalizing

countries must be treated with special care, since the regression results are less straightforward to interpret than those of industrialized countries.

In the panel-data regressions, the explanatory variables that were chosen have been widely used in other studies and appeared to be important in the data set. Measures of non-performing loan ratios, capital/asset ratios, cost ratios, and liquidity ratios were taken from bank balance sheets and income statements. In addition, the volatility of short-term interest rates, the inflation rate, and GDP growth rate are used as macro variables. Measures of industry concentration are not included because for these countries it is difficult to distinguish between the effects of cleaning up the banking system (i.e., forcing the exit or consolidation of weak banks) and increasing market power. There are three sets of panel regressions—one for the implicit loan rate collected by the banks (Table 1.4), one for the implicit deposit rate paid by the banks (Table 1.5), and one for the spread (Table 1.6). Although any two sets of regressions are consistent with the third, it is useful to present all three sets of regressions to highlight the important determinants of the results. P-values are given in parentheses next to the estimated coefficients and those coefficients that are significant at the five percent level (p=.05) are in boldface.

The methodology used in this section to study the behavior of spreads in Latin America during the 1990s takes into account the fact that during the transition period of financial liberalization and reform, the banking industry as a whole experienced sharp changes. Indeed, for all six countries there was important time variation in industry averages of the explanatory variables that needed to be explicitly included, unlike the case for most industrialized countries where the industry averages can be incorporated in the constant term. For any given observation these industry averages are the same for all banks in a country, but the averages change over time as the structure of the industry changes. In Tables 1.4, 1.5, and 1.6, the regressions estimate coefficients for industry averages for the non-performing loan ratio, the capital/asset ratio, the cost ratio and the liquidity ratio, as well as individual bank deviations from

these averages. The estimated coefficients on the industry averages capture the time effect of exogenous changes to the industry, while the coefficients on the individual bank deviations from these averages capture the cross-sectional variation in the data.

As discussed earlier, weak banking systems functioning in the context of inadequate regulatory and supervisory frameworks have incentives to take excessive risks. In those systems, the response of the loan rate, the deposit rate, and the spread to increases in non-performing loans and capital/asset ratios would tend to differ from what is expected in better regulated systems. For example, in sharp contrast with results found in industrialized countries, an increase in non-performing loans provides incentives for weak banks to reduce interest-rate spreads. Moreover, capital/asset ratios do not provide an appropriate tool to contain undue risk-taking activities when there are severe deficiencies in accounting procedures. Therefore, in weak banking systems, increases in capital/asset ratios are not expected to yield the traditional result of an increase in bank spreads. Since the non-performing loan ratio and the capital/asset ratio hold the keys for showing the differences between strong and weak banking systems, the discussion that follows will largely focus on these two variables, giving more cursory attention to the cost ratio, the liquidity ratio, and the macro variables.

During the time period covered by the panel data, Colombia and Chile had the most mature and stable banking systems. Neither country was affected strongly by the Tequila crisis, and both countries had dealt with their banking problems by the end of the 1980s.[19] On the other hand, Argentina, Bolivia, Mexico, and Peru all had banking systems that were much more fragile. In 1994-1995 these countries were still in the middle of dealing with the transition to liberalized finance and were still facing severe deficiencies in their regulatory and supervisory frameworks (Rojas-Suárez, 1997). We would, therefore, expect sig-

[19] Beginning in 1998 the Colombian banking system once again exhibited weakness from a deteriorating loan portfolio, but this was after the period covered by the data (1991-1996).

nificant differences in the behavior of spreads between these two groups of countries.

Nonperforming Loan Ratio. To examine the effect of non-performing loans on spreads, it is useful to start with Table 1.4, which has the implicit loan rate as the dependent variable. Table 1.4 shows that in Bolivia, Colombia, Chile, and Mexico a rise in the industry average nonperforming loan ratio produces a statistically significant rise in the implicit loan rate. But at the individual bank level, only Colombia and Chile show a positive response to an increase in non-performing loans. The other four countries all show negative responses. The negative responses indicate underprovisioning for loan losses, while the positive responses in Colombia and Chile may indicate aggressive provisioning, or a combination of neutral provisioning with some market power to raise loan rates in response to greater non-performing loans. In addition to a lack of provisioning, the negative coefficients for Argentina, Bolivia, Mexico, and Peru may also reflect a *reduction* in the loan rate in response to greater non-performing loans. A reduction in the loan rate may reflect an attempt to grow out of the bad loan problems by increasing market share. This result has also been documented for U.S. savings and loans prior to the 1980s crisis (White, 1991).

Table 1.5 indicates that implicit deposit rates rise in response to increases in industry average non-performing loan ratios in Bolivia, Colombia, Chile, and Mexico. These statistically significant responses have two related explanations. First, they may indicate the presence of guarantor risk: increases in non-performing loans at the industry level may compromise the ability of the government to provide credible guarantees to depositors. Deposit rates will rise either in anticipation of direct default by the government or, as is generally more likely, in anticipation of exchange-rate devaluation. That is, increases in non-performing loans at an industry level will produce a "peso" problem because of expectations that devaluation will be used as part of the solution to the bad loan problem.

Table 1.4 Dependent Variable: Interest and Fees Collected (2w)

	95:1-96:4 Argentina	92:2-96:4 Bolivia	91:2-96:3 Colombia	91:4-95:4 Chile	94:2-96:4 Mexico	93:3-96:4 Peru
Non-Performing Loan Ratio: Industry Average[1]	-.546 (.336)	1.548 (.000)	**2.829 (.000)**	**13.695 (.000)**	**4.919 (.002)**	-.282 (.419)
Non-Performing Loan Ratio: Individual Bank Deviation from Industry Average	**-.100 (.006)**	-.028 (.679)	**.153 (.049)**	.146 (.402)	-.200 (.256)	**-.154 (.000)**
Capital/Asset Ratio: Industry Average[2]	-.733 (.569)	**1.196 (.000)**	**-.534 (.054)**	**-.593 (.002)**	-.011 (.498)	.090 (.845)
Capital/Asset Ratio: Individual Bank Deviation from Industry Average	.097 (.078)	.069 (.117)	.021 (.641)	.084 (.070)	-.003 (.217)	.012 (.896)
Cost Ratio: Industry Average[3]	.571 (.116)	.363 (.105)	.049 (.462)	**1.708 (.000)**	3.613 (.093)	**.420 (.001)**
Cost Ratio: Individual Bank Deviation from Industry Average	**.086 (.001)**	**.248 (.000)**	**.026 (.045)**	**.069 (.005)**	**.908 (.000)**	.004 (.906)
Liquidity Ratio: Average[4]	**-.512 (.032)**	**.788 (.000)**	-.131 (.056)	**.452 (.000)**	.314 (.786)	.352 (.184)
Liquidity Ratio: Individual Bank Deviation from Industry Average	-.025 (.472)	.023 (.468)	.043 (.277)	-.002 (.671)	.125 (.307)	**.126 (.000)**
Interest Rate Volatility	033 (.907)	**2.412 (.000)**	.202 (.611)	.838 (.000)	**1.456 (.009)**	-.387 (.294)
Inflation Rate	1.487 (.207)	.044 (.774)	**-.401 (.033)**	-.025 (.772)	.267 (.116)	.055 (.285)
GDP Growth Rate	**-.295 (.007)**	-.312 (.149)	.176 (.183)	**-.849 (.000)**	**-1.040 (.012)**	-.095 (.433)
Constant	— F(11,566) = 7.38	— F(11,305) = 79.62	— F(11,541) = 12.70	— F(11,566) = 88.70	— F(11,221) = 30.53	— F(11,280) = 25.63

Note: p-values in parentheses. Bold face values are significant at the 5 percent level (p = .05).

[1] Non-performing loans/total loans.

[2] Equity/total assets.

[3] Administrative and other operating costs/performing loans.

[4] Short-term assets/total deposits.

Table 1.5 Dependent Variable: Interest Paid (2w)

	95:1-96:4 Argentina	92:2-96:4 Bolivia	91:2-96:3 Colombia	91:4-95:4 Chile	94:2-96:4 Mexico	93:3-96:4 Peru
Non-Performing Loan Ratio:	-.211	**1.215**	**1.982**	**8.780**	**3.528**	.004
Industry Average[1]	(.288)	**(.000)**	**(.000)**	**(.000)**	**(.015)**	(.975)
Non-Performing Loan Ratio: Individual Bank						
Deviation from Industry	.015	.026	-.074	**.283**	.097	.023
Average	(.250)	(.597)	(.135)	**(.022)**	(.537)	(.089)
Capital Ratio: Industry	.570	.501	.073	-.207	.021	.026
Average[2]	(.207)	(.044)	(.681)	(.121)	(.145)	(.884)
Capital Ratio: Individual Bank						
Deviation from Industry	**.086**	**-.160**	**-.135**	.039	-.002	-.014
Average	**(.000)**	**(.000)**	**(.000)**	(.237)	(.324)	(.687)
Cost Ratio: Industry	.173	.027	-.028	**1.193**	.771	**.102**
Average[3]	(.176)	(.868)	(.508)	**(.000)**	(.687)	**(.033)**
Cost Ratio: Individual Bank						
Deviation from Industry	.004	-.035	.009	**.054**	**.298**	.002
Average	(.679)	(.095)	(.283)	**(.002)**	**(.016)**	(.858)
Liquidity Ratio:	-.070	**.707**	**-.363**	**.286**	.753	-.069
Average[4]	(.402)	**(.000)**	**(.000)**	**(.000)**	(.465)	(.502)
Liquidity Ratio: Individual Bank						
Deviation from Industry	**-.027**	-.040	-.039	**-.009**	-.156	-.001
Average	**(.026)**	(.089)	(.123)	**(.024)**	(.155)	(.902)
Interest Rate Volatility	-.052	**1.885**	-.086	**.656**	**1.488**	.026
	(.605)	**(.000)**	-(.736)	**(.000)**	**(.003)**	.855)
Inflation Rate	.323	.042	**-.326**	-.110	**.294**	**.074**
	(.435)	(.709)	**(.007)**	(.068)	**(.052)**	**(.000)**
GDP Growth Rate	**-.079**	**-.348**	**.261**	**-.664**	-.594	**-.102**
	(.039)	**(.028)**	**(.002)**	**(.000)**	(.107)	**(.029)**
Constant	—	—	—	—	—	—
	F(11,566) = 29.12	F(11,305) = 58.70	F(11,541) = 30.99	F(11,566) = 76.47	F(11,221) = 20.50	F(11,280) = 28.85

Note: p-values in parentheses. Bold face values are significant at the 5 percent level (p = .05).

[1] Non-performing loans/total loans.

[2] Equity/total assets.

[3] Administrative and other operating costs/performing loans.

[4] Short-term assets/total deposits.

Table 1.6 Dependent Variable: Spread (2w)

	95:1-96:4 Argentina	92:2-96:4 Bolivia	91:2-96:3 Colombia	91:4-95:4 Chile	94:2-96:4 Mexico	93:3-96:4 Peru
Non-Performing Loan Ratio:						
Industry	-.334	.333	.846	4.915	**1.393**	**-.287**
Average[1]	(.521)	(.151)	.022)	(.000)	**(.406)**	**(.371)**
Non-Performing Loan Ratio: Individual Bank						
Deviation from Industry	**-.114**	-.054	**.227**	-.137	-.298	**-.177**
Average	**(.001)**	**(.303)**	**(.000)**	(.337)	(.107)	**(.000)**
Capital Ratio: Industry	-1.303	**.695**	**-.607**	**-.386**	-.032	.064
Average[2]	(.270)	**(.009)**	**(.005)**	**(.013)**	**(.059)**	**(.880)**
Capital Ratio: Individual Bank						
Deviation from Industry	.011	**.229**	**.156**	.045	-.001	.025
Average	(.825)	**(.000)**	**(.000)**	(.232)	(.735)	(.755)
Cost Ratio: Industry	.398	**.336**	.077	**.515**	2.841	**.318**
Average[3]	(.233)	**(.054)**	(.140)	**(.004)**	(.206)	**(.005)**
Cost Ratio: Individual Bank						
Deviation from Industry	**.083**	**.283**	.017	.015	**.610**	.002
Average	**(.001)**	**(.000)**	(.093)	(.451)	**(.000)**	(.958)
Liquidity Ratio:	**-.442**	.081	**.232**	**.166**	-.439	.421
Average[4]	**(.043)**	(.491)	**(.000)**	**(.000)**	(.716)	(.084)
Liquidity Ratio: Individual Bank						
Deviation from Industry	.002	**.063**	**.082**	.007	**.281**	**.127**
Average	(.946)	**(.012)**	**(.008)**	(.152)	**(.029)**	**(.000)**
Interest Rate Volatility	.085	**.527**	.288	**.182**	-.032	-.413
	(.745)	**(.041)**	(.357)	**(.002)**	(.956)	(.223)
Inflation Rate	1.164	.002	-.075	.085	-.028	-.019
	(.282)	(.985)	(.613)	(.222)	(.875)	(.685)
GDP Growth Rate	**-.215**	.035	-.085	-.185	-.446	.007
	(.032)	(.833)	(.412)	(.087)	(.300)	(.945)
Constant	—	—	—	—	—	—
	F(11,566) = 2.99	F(11,305) = 45.32	F(11,541) = 27.38	F(11,566) = 18.12	F(11,221) = 6.79	F(11,280) = 14.44

Note: p-values in parentheses. Bold face values are significant at the 5 percent level (p = .05).

[1] Non-performing loans/total loans.

[2] Equity/total assets.

[3] Administrative and other operating costs/performing loans.

[4] Short-term assets/total deposits.

Second, in weak banking systems, increases in non-performing loans may give poorly capitalized banks incentives to raise deposit rates in order to attract funds to grow out of their problems or simply to finance the rollover of non-performing loans. This second effect, which is caused by inadequate bank-level capitalization across a large number of banks, is in addition to the first effect of guarantor risk, which is caused by inadequate fiscal resources to back up government deposit guarantees. The combination of the two factors will produce upward pressure on the deposit rate at the industry level.

Increases in non-performing loans at the individual bank level will not generate the same upward movement in deposit rates as system-wide increases in non-performing loans, provided that depositors care more about the deposit guarantee fund than about individual bank solvency. If the deposit guarantee fund is solvent, an individual bank faces an elastic supply of deposits, so small increases in the deposit rate are enough to generate funds to finance loan loss rollover or expansion of risky loans. It is noteworthy that individual bank deviations in non-performing loan ratios only produce a statistically significant rise in the deposit rate in Chile, where there are credible precedents for imposing losses on non-insured lenders to individual banks. The presumption is that in other countries depositors worry less about individual bank riskiness than about the overall capability of the government to handle bank failures.

Table 1.6 shows the impact of non-performing loans on spreads. The impact is very similar to that on the loan rate. For the group of countries with relatively weaker banking systems in the period under study, bank spreads tend to decrease in response to an increase in individual bank deviations in non-performing loan ratios. This reinforces our view that reductions in spreads in weak banking systems are a reflection of deteriorating conditions in banks' portfolios. Rather than taking a more conservative approach in the face of problems, weak banks operating in the context of a generous public safety net tend to further increase their risk-taking positions.

The case of Chile, however, deserves some additional attention. With a strong banking system, the reduction in individual bank spreads does not reflect an increased attitude for risk-taking activities when non-performing loans rise. Rather, this reduction is the

result of the strong upward deposit rate response to individual bank deviations in the non-performing loan ratio. As mentioned above, it is the credible threat to impose losses on uninsured lenders to individual banks that drives this result.

Capital/Asset Ratio. The regression results for the capital/asset ratio confirm the distinction between "good" banking systems and those that are still struggling to establish strong supervision and good banking practices. The loan rate response to higher capital/asset ratios is statistically significant and *negative* for Colombia and Chile; i.e., more capital at the industry level causes a reduction in loan rate. Since increases in capital tend to raise spreads in well-capitalized banks in industrialized countries, some countervailing factor must be at work. It is likely that the countervailing factor is the reduction in the option value of government deposit guarantees that results from greater capital/asset ratios. This factor is most important for countries where bank riskiness can be significantly lowered by raising capital requirements. Higher capital/asset ratios cause banks to behave more prudently since owners have more at stake (i.e., the option value of the guarantees is lower). Greater prudence dictates making lower risk loans and charging lower loan rates.[20] This is different from the industrialized-country result where increases in capital/asset ratios have little impact on reducing the already small option value of government guarantees.

Spreads in Mexico and Peru show a lack of response to increases either in average industry capital or in individual bank deviations. The lack of response suggests that, as expected in countries with inadequate regulatory and supervisory frameworks, capital is fictitious: It has no impact on loan rates, deposit rates, or spreads. In these countries capital is probably mismeasured, with economic groups employing double-gearing to artificially create accounting capital for regulatory purposes. For countries like Mexico and Peru in the mid-

[20] The result that raising industry-level capital/asset ratios reduces loan rates is consistent with a limited, but still substantial, deposit guarantee scheme. Even though Chile's deposit guarantee is limited, it still covers 40 percent of all deposits and is given free of charge. It is likely that the implicit guarantee is somewhat larger in scope, although not extending to all uninsured lending to banks.

1990s with weak regulatory systems, the use of capital/asset ratios is clearly insufficient to control financial risk.

Spreads in Bolivia are positively correlated with capital/asset ratios, as is generally true for industrialized countries. This suggests that raising capital is costly in Bolivia, but perhaps for different reasons from industrialized countries. While the standard explanation for industrialized countries is the increased governance costs associated with increased capital, which assumes that the supply of capital is fairly elastic given well-functioning capital markets, for Bolivia, it seems more reasonable to believe that thin capital markets have caused banks to rely on retained earnings to raise capital. Higher retained earnings require higher spreads.

Cost Ratio. The response of spreads to industry-level increases in costs is greater than the response to individual bank deviations from industry averages, as one would expect. Most of the increases come from higher loan rates, with statistically significant positive coefficients for all countries except Peru. Bolivia and Mexico stand out as the two countries in which individual banks show a strong ability to pass on higher costs by raising spreads (with coefficients of .283 and .610 in Table 1.6).

Liquidity Ratio. Increases in the liquidity ratio raise spreads in Colombia, Chile, and Peru. These three countries have very high reserve requirements and, as in the case of the cost ratios, banks have been able to pass on to customers the increased cost of intermediation produced by higher reserve requirements. Although Argentina also has very high reserve requirements, the observed negative coefficient is a reflection of the sample period analyzed: In response to the Tequila crisis, liquidity ratios were reduced to provide support to banks (which produced a rise in spreads).

Macro Variables. Interest-rate volatility had a strong positive impact on loan rates, deposit rates, and spreads in Bolivia and Chile. For Mexico, the spread was unaffected by interest-rate volatility even though both loan rates and deposit rates increased in response to greater volatility. Inflation tended to raise interest rates in Mexico and Peru and to lower them in Colombia and Chile (see especially Table 1.5), but left spreads unaffected in all six countries. Higher GDP growth rates lowered deposit rates in all countries except Co-

lombia (all six coefficients are statistically significant), and lowered loan rates in all countries except Colombia (where there is an insignificant positive response). But these interest rate effects tended to net out, so that spreads were only lowered in Argentina and Chile (p=.087).

Macro variables in the panel regressions do affect spreads, but not as much as they affect loan rates and deposit rates. Once the effects on loan and deposit rates are netted out, the remaining influence of macro variables on spreads (Table 1.6) is limited.

Concluding Remarks

This chapter has focused on the determinants of interest-rate spreads in Latin American countries in transition—countries in which banking systems have recently been liberalized and are not yet operating in a mature regulatory environment. Because of this focus, the standard results regarding the behavior of interest-rate spreads do not always hold. In order to sharpen the presentation of the results for the conclusion, countries are divided into three groups: Latin American countries with weak banking systems (in the mid-1990s), Latin American countries with strong banking systems, and industrialized countries. Table 1.7 summarizes the effect of increases in the nonperforming loan ratio and the capital/asset ratio on interest-rate spreads in the three groups of countries.

Table 1.7 Spreads Summary Table

	Non-Performing Loan Ratio ↑	**Capital/Asset Ratio ↑**
Weak Latin American Banking Systems	Spreads ↓	Spreads ö
Strong Latin American Banking Systems	Spreads ↑	Spreads ↓
Industrialized Country Banking Systems	Spreads ↑	Spreads ↑

The behavior of bank spreads merits special attention in the first group of Latin American countries—those with weak banking systems that have recently undertaken financial liberalization. In these countries years of financial repression prior to the liberalization necessarily means that banks do not have in place appropriate internal mechanisms to assess credit risk, that banks have had large amounts of loans of dubious quality, that bank supervisors have been too few and inadequately trained, and that implicit government deposit guarantees and regulatory forbearance have provided the glue that holds together the appearance of a modern banking system. The panel-data regressions indicate that in these systems banks underprovision for bad loans, thereby exploiting the government guarantee and transferring risk to the government. In these systems, and in contrast to observed results in industrialized countries, individual banks respond to increases in non-performing loans by *decreasing* loan rates and spreads. Depositors respond to increases in non-performing loans for the banking system as a whole by demanding higher deposit rates, but they do not discriminate between individual banks on the basis of non-performing loans, suggesting that depositors care primarily about the total amount of the government's resources to finance bank bailouts.

Countries in Latin America with strong banking systems in the mid-1990s, on the other hand, behaved differently. In Colombia and Chile there is a strong *positive* association for individual banks between non-performing loans and loan rates, suggesting that banks provision for bad loans and charge higher loan rates to partially cover the cost of provisioning. In Colombia this effect on the loan rate carries over to a positive association between non-performing loans and individual bank spreads. In Chile, with a regulatory system that puts non-insured depositors of individual banks at risk, deposit rates at individual banks are positively correlated with non-performing loans. This effect is strong enough to offset the loan-rate effect on spreads in Chile so that the net effect on spreads is slightly negative.

Another way to think of the results for the non-performing loans is the following: In the weak Latin American countries the cost of non-performing loans is passed on to the governments in the form of higher state-contingent transfers associated with fu-

ture bank bailouts. By contrast, in Colombia and Chile the cost of the nonperforming loans is primarily passed on to borrowers, as is the case in industrialized countries. In this regard we can say that the results for Chile are particularly strong, because depositors react to higher nonperforming loans at individual banks by demanding higher deposit rates (suggesting that non-insured depositors expect, on the margin, not to be bailed out by the government).

The panel-data regressions also indicate that for countries with weak banking systems, capital/asset ratios have *no effect* on loan rates, deposit rates, or spreads, suggesting that bank capital on the margin is largely fictitious and not an appropriate tool for containing risk. In other words, with weak regulation banks can easily create capital for regulatory purposes by various accounting tricks, including double-gearing within an economic group (where the bank lends money to a company in the group so that the company can acquire stock in the bank). Because the capital is fictitious, raising capital requirements is a meaningless exercise as regards prudential supervision.

Countries with strong banking systems (Colombia and Chile) responded to industry-level increases in capital/asset ratios by *lowering* spreads. Although this result is the opposite of what one finds in similar regressions for industrialized countries, these responses are consistent with banks that are becoming increasingly well capitalized, but in which further increases in capital/asset ratios still carry significant benefits in terms of banking system stability. These benefits come primarily from lowering the option value of government deposit guarantees. Greater capital/asset ratios reduce banks' incentive to shift risk to the government. Lower risk ultimately translates into lower loan rates and spreads by more prudent lending decisions and better monitoring of borrowers. Finally, results suggest that macroeconomic variables also affect spreads in Latin America. In particular, interest rate volatility appears to increase spreads in several countries.

This chapter and the country studies make clear that there is no simple explanation for the generally high level of bank spreads in Latin America during the 1990s. The spreads must be seen in the context of a transition from repressed financial systems to liberal-

ized financial environments. High operating costs raise spreads, as do high levels of non-performing loans. Bank capital, especially when much of it is fictitious, may not be doing enough to encourage prudent lending behavior. Finally, reserve requirements in a number of countries still act as a tax on banks that is translated into higher spreads. Beyond bank-specific variables, uncertainty in the macroeconomic environment facing banks appears to be an important cause of high Latin American interest spreads.

The combination of these factors is cause for concern in Latin America. As spreads widen, the cost of using the financial system becomes prohibitive to more and more potential borrowers. In addition, moral hazard may become a more serious concern when bank spreads are high. Since governments almost always come to the aid of depositors when banks become insolvent, high interest rate spreads may be a leading variable that predicts future government bailouts of banks and bank borrowers.[21]

Excessive risk-taking by banks in a liberalized financial environment has undone many economic reforms and plunged economies into financial crisis and recession. This book shows that panel data on banks can usefully be used to study bank spreads. In the context of cross-country comparisons, panel regressions can indicate the extent to which a newly liberalized financial system in one country deviates from a more mature financial system in another country. Such information may help governments correct market distortions and take actions that prevent or mitigate future episodes of bank crisis.

[21] On the other hand, moral hazard in a liberalizing environment may sometimes manifest itself as competition for market share, so that very low spreads may also be reason for concern.

References

Allen, L. 1988. "The Determinants of Bank Interest Margins: A Note." *Journal of Financial and Quantitative Analysis.* 23 (6): 231-35.

Angbazo, L. 1997. "Commercial Bank Net Interest Margins, Default Risk, Interest Rate Risk and Off-balance Sheet Banking." *Journal of Banking and Finance.* 21 (1): 5-87.

Bernanke, B. S. 1990. "On the Predictive Power of Interest Rates and Interest Rate Spreads." *New England Economic Review.* November/December. Boston, MA: Federal Reserve Bank of Boston.

Bernanke, B.S. and Gertler, M. 1990. "Financial Fragility and Economic Performance." *Quarterly Journal of Economics.* 105 (1): 87-114.

Boyd, J. H. and Prescott, E. C. 1986. "Financial Intermediary-Coalitions." *Journal of Economic Theory.* 38 (2): 211-32.

Boyd, J. H. and Smith, B. D. 1997. "Capital Market Imperfections, International Credit Markets, and Nonconvergence." *Journal of Economic Theory.* 73 (2): 335-64.

Chevalier, J. and Scharfstein, D. 1996. "Capital Market Imperfections and Countercyclical Markups: Theory and Evidence." *American Economic Review.* 86 (4): 703-25.

Diamond, D. W. 1984. "Financial Intermediation and Delegated Monitoring." *Review of Economic Studies.* 51 (3): 393-414.

Diamond, D. W. 1996. "Financial Intermediation as Delegate Monitoring: A Simple Example." Federal Reserve Bank of Richmond: Economic Quarterly. 82 (3): 51-66.

Estrella, A. and Mishkin, F. S. 1998. "Predicting U.S. Recessions: Financial Variables as Leading Indicators." *Review of Economics and Statistics.* 80 (1): 45-61.

Friedman, B. M. and Kuttner, K. N. 1998. "Indicator Properties of the Paper-Bill Spread: Lessons from Recent Experience." *Review of Economics and Statistics.* 80 (1): 34-44.

Harvey, C. R. 1988. "The Real Term Structure and Consumption Growth." *Journal of Financial Economics.* 22 (2): 305-53.

Ho, T. S.Y. and Saunders, A. 1981. "The Determinants of Bank Interest Margins: Theory and Empirical Evidence." *Journal of Financial and Quantitative Analysis.* 16 (November): 581-602.

McShane, R.W. and Sharpe, I. G. 1985. "A Time Series/Cross Section Analysis of the Determinants of Australian Trading Bank Loan/Deposit Interest Margins: 1962-1981." *Journal of Banking and Finance.* 9 (1): 115-36.

Mercer, Z.C. 1992. *Valuing Financial Institutions.* Homewood, Illinois: Business One Irwin.

Rojas-Suárez, L., editor. 1997. *Safe and Sound Financial Systems: What Works for Latin America.* Washington DC: Inter-American Development Bank/John Hopkins University Press.

Stock, J. and Watson, M. W. 1989. "New Indexes of Coincident and Leading Economic Indicators." In: O. J. Blanchard and S. Fischer, editors. *NBER Macroeconomics Annual: 1998*. Cambridge, MA: MIT Press.

Tamagna, F. 1965. *Central Banking in Latin America*. Mexico City, Mexico: Centro de Estudios Monetarios Latinoamericanos.

Végh, C. 1992. "Stopping High Inflation: An Analytical Overview." IMF Staff Papers. 39 (3): 626-95.

White, Lawrence. 1991. *The S&L Debacle: Public Policy Lessons for Bank and Thrift Regulation*. New York: Oxford University Press.

Wong, K. P. 1997. "On the Determinants of Bank Interest Margins under Credit and Interest Rate Risks." *Journal of Banking and Finance*. 21 (2): 251-71.

This page intentionally left blank

CHAPTER 2

Spreads in the Argentine Financial System

Hildegard Ahumada, Tamara Burdisso, Juan Pablo Nicolini, and Andrew Powell[1]

Perhaps the most striking characteristic of interest rates in Argentina is the persistence of spread levels that are considerably higher than those in industrial economies. These levels are concentrated primarily in two types of credit—authorized overdrafts and consumer credit—which represent slightly over 30 percent of the country's total credit. Despite these high spreads, variables such as prices, exchange rates, and even the rates at which large firms obtain financing abroad generally exhibit the same behavior in Argentina as they do in industrial countries.

What are the reasons for the persistently high spreads, particularly in light of the price stabilization achieved with the 1991 convertibility plan? This chapter seeks to answer this question by analyzing interest rate trends in Argentina in the 1990s, using a very rich database recently created by the Central Bank of Argentina.[2]

A Look at the Data

A quick look at the evidence shows that borrowing rates in Argentina are basically at international levels. However, the average lend-

[1] Hildegard Ahumada and Juan Pablo Nicolini are from the Universidad Torcuato Di Tella. Tamara Burdisso and Andrew Powell are from the Central Bank of Argentina.

[2] The database includes a large number of variables covering the entire Argentine financial system for 13 quarters (from 1993 to 1996). The period encompasses years of expansion (1993 and 1996), as well as the deep recession of 1995.

ing rate is approximately 12 percentage points higher. This difference suggests that because the deposit market is much more fully integrated internationally than the loan market, a good explanation of spread can be found in the determinants of the lending rate.

Any analysis of these determinants must take into account the context in which the Argentine financial system operates. The system operates with annual earnings approaching 10 percent, which are considered the international norm (Table 2.1). The efficiency of the financial system (operating costs in terms of loans) has also improved, although it remains at about half the level that is considered appropriate internationally.

Table 2.1. Trends for Some Indicators

Period	Earnings in Terms of Net Assets	Operating Costs in Terms of Loans
1991	7.12	17.99
1992	10.02	14.17
1993	11.02	12.19
1994	2.54	11.67
1995	-1.60	11.58
1996	5.58	9.77

Trends in Credit

In Argentina both banks and nonbank institutions provide information to the Central Bank on loans made to the public, financial, and private nonfinancial sectors.[3] Loans to the private nonfinancial sector can be subdivided into five types: authorized overdrafts, secured loans, unsecured loans, mortgage credit, and consumer credit.[4] All types of loans are made in pesos and dollars.

In June 1993 Argentina's stock of bank credit (net of reserves) was approximately 16.6 percent of GDP. In June 1996 this indicator

[3] The words *credit* and *loan* are used interchangeably.

[4] Mortgage credit includes both housing loans and chattel mortgage credit. See Ahumada et al., 1998.

rose to 18.4 percent, reflecting a decrease in lending to the public sector of 0.6 percentage points (in terms of GDP) and an increase in lending to the private sector of 2.4 percentage points. Lending to the private nonfinancial sector rose by approximately US$12,000 million, or 37.4 percent, in the period studied.[5] Unsecured loans and mortgage credit account for 70 percent (35 percent each) of this amount, contributing 26.2 percentage points to the variation in lending (Table 2.2). Consumer credit accounts for 13.4 percent of this growth (that is, it contributes 5 percentage points to the total variation). Secured loans account for 10.6 of the total increase in lending (4.0 percentage points), while authorized overdrafts account only for 5.8 percent of the increase (2.2 percentage points).

Table 2.2. Loans to Private Nonfinancial Sector (millions of pesos)

	Authorized Overdrafts	Unsecured Loans	Secured Loans	Consumer Credit	Mortgage Credit	TOTAL[a]
June 1993	9,458	10,567	2,239	3,681	6,209	32,155
September 1993	9,981	11,558	2,580	4,027	5,991	34,138
December 1993	9,986	12,995	3,073	4,550	6,665	37,268
March 1994	11,001	13,366	3,384	4,985	7,174	39,909
June 1994	10,373	11,930	3,643	5,481	7,794	39,281
September 1994	10,435	12,325	3,852	5,829	8,356	40,797
December 1994	10,530	13,089	4,100	6,011	8,904	42,634
March 1995	9,260	12,985	3,967	5,916	9,204	41,332
June 1995	9,654	13,228	3,744	5,621	9,296	41,452
September 1995	9,427	12,515	3,544	5,205	9,549	40,240
December 1995	9,751	14,377	3,523	4,956	10,049	42,655
March 1996	9,660	14,274	3,486	5,080	10,051	42,551
June 1996	10,156	14,774	3,512	5,295	10,430	44,167
Variation (June 1996/June 1993)	7.4	39.8	56.8	43.9	68.0	37.4
Proportion of Variation (June 1996/June 1993)	5.8	35.0	10.6	13.4	35.1	100.0
Influence of Each Loan[b]	2.2	13.1	4.0	5.0	13.1	37.4

a. Does not include funds paid and other credit instruments.

b. Indicates how many percentage points each type of loan contributes to the variation in total loans to the private sector.

[5] Credit to the private sector does not include funds due.

Throughout the period private nonfinancial sector loans accounted for varying proportions of total lending (Table 2.3). In June 1993 authorized overdrafts represented 29.4 percent of total lending to the private nonfinancial sector, but by June 1996 the proportion of authorized overdrafts had fallen to 23 percent. The proportion of mortgage credit rose by 4.3 percent, and that of unsecured loans increased by 0.5 percent. Secured loans saw a 1 percent increase, and consumer credit participation grew by 0.6 percent.

Table 2.3. Proportion of Each Type of Loan to Total Loans

	Authorized Overdrafts	Unsecure Loans	Secured Loans	Consumer Credit	Mortgage Credit	TOTAL
June 1993	29.4	32.9	11.4	19.3	100.0	100.0
September 1993	29.2	33.9	7.6	11.8	17.5	100.0
December 1993	26.6	34.9	8.2	12.2	17.9	100.0
March 1994	27.6	33.5	8.5	12.5	18.0	100.0
June 1994	26.4	30.5	9.3	14.0	19.8	100.0
September 1994	25.6	30.2	9.4	14.3	20.5	100.0
December 1994	24.7	30.7	9.6	14.1	20.9	100.0
March 1995	22.4	31.4	9.6	14.3	22.3	100.0
June 1995	23.2	31.8	9.0	13.5	22.4	100.0
September 1995	23.4	31.1	8.8	12.9	23.7	100.0
December 1995	22.9	33.7	8.3	11.6	23.6	100.0
March 1996	22.7	33.5	8.2	11.9	23.6	100.0
June 1996	23.0	33.4	8.0	12.0	23.6	100.0

Changes can also be seen in the proportion of currencies in which the various types of loans were made. In June 1993, 51.5 percent of total loans were made in pesos and the remaining 48.5 percent in dollars. In June 1996 only 40.8 percent of loans were made in pesos, and the proportion of dollar-denominated loans had risen to 59.2 percent.

For some types of loans, such as consumer credit, the proportions denominated in pesos and dollars has not varied significantly. Mortgage credit, however, shows significant change. While in June 1993 almost 70 percent of mortgage loans were made in

pesos, by mid-1996 some 67 percent of such loans were being made in dollars.

In June 1996 pesos were the favored currency for authorized overdrafts.[6] However, dollars were more popular for unsecured loans, mortgage credit, and consumer credit. Dollars accounted for approximately 90 percent of secured loans, 70 percent of unsecured loans, and 60 percent of mortgage loans. Only consumer credit is granted in equal proportions of pesos and dollars.

Trends in Lending and Borrowing

Throughout the period studied, lending and borrowing rates fluctuated. They rose in the first four months of 1995 and then fell precipitously, so that the average lending and fixed term deposit rates were soon below 1994 levels. In June 1996 Argentina had an average lending rate of 18 percent and a mean borrowing rate of 6.1 percent, resulting in a spread for the financial system of 11.9 percent.[7] As mentioned, borrowing rates (corrected for country risk) approximate international levels, but lending rates are higher.

Interest rates for various types of loans. Rates for the various types of loans varied throughout the period studied (Table 2.4). In June 1996 rates for authorized overdrafts and consumer credit were higher than those for unsecured loans, secured loans, and mortgage credit. The rate for authorized overdrafts in the financial system as a whole was 31.2 percent, or approximately 13 percentage points higher than the average lending rate for the system. The rate on consumer credit was 33.3 percent, also much higher than the average lending rate for the system. Certain loans showed lower-than-average rates, however, including unsecured loans (11.9 percent), secured loans (15.7 percent), and mortgage credit (12.2 percent).

[6] Two-thirds of all overdrafts were made in pesos.

[7] See Ahumada et al., 1998.

Table 2.4. Lending Rates for Various Types of Loans (nominal annual percent)

	Overdrafts Unsecured Loans		Mortgage Credit		Secured Loans		Consumer Credit		Average Lending Rate	
	Dollars	Pesos	Dollars	Pesos	Dollars	Pesos	Dollars	Pesos	Dollars	Pesos
Jun. 1993	24.8	39.3	14.9	21.7	17.4	16.5	19.3	24.6	22.8	43.2
Sep. 1993	24.0	39.9	14.3	20.9	17.0	16.6	18.2	22.1	22.9	42.6
Dec. 1993	22.9	40.1	14.3	21.5	16.0	16.4	17.3	22.5	22.0	40.0
Mar. 1994	20.7	38.0	14.5	19.4	15.0	16.2	17.6	24.6	22.1	39.3
Jun. 1994	22.7	38.2	13.8	20.0	13.9	16.4	17.3	25.1	21.5	39.3
Sep. 1994	21.8	36.9	14.6	20.7	14.4	16.3	17.2	24.2	21.2	38.8
Dec. 1994	24.8	40.2	15.6	21.9	15.4	15.9	17.6	25.3	22.6	40.1
Mar. 1995	38.3	54.2	27.1	39.0	16.0	18.6	21.0	29.8	27.4	49.2
Jun. 1995	28.4	46.3	17.2	17.9	18.0	16.0	20.0	26.3	27.9	50.2
Sep. 1995	22.7	43.0	14.8	16.2	16.3	14.0	17.1	23.2	25.7	43.6
Dec. 1995	22.7	43.0	14.8	16.2	16.3	14.0	17.1	23.2	25.7	43.6
Mar. 1996	19.3	40.5	13.1	13.9	15.9	13.1	16.5	23.2	25.0	44.3
Jun. 1996	18.0	38.0	12.2	11.2	12.3	12.0	15.5	20.3	22.9	41.9

The rate on peso loans shows a standard deviation of 10.7 percentage points, far above that observed for dollar-denominated credit. Each of the several types of loans follows the same pattern. The scattering of rates is greater for loans showing rates that are higher than average, however. Authorized overdrafts show a standard deviation of 9.3 percentage points and consumer credit a deviation of 8.4 percentage points. The deviation is smaller for unsecured loans (5.1 percentage points), secured loans (3 percentage points), and mortgage credit (3.2 percentage points). This pattern holds true not only for the system as a whole, but also for each group of banks.[8]

The types of loans with the highest rates also show the greatest differential between the rates charged in pesos and dollars. In June 1996 authorized overdrafts show a differential between peso and dollar rates of 20 percentage points. For consumer credit, the

[8] Ibid.

differential is 19 percentage points. The differential between rates in pesos and in dollars is smaller for secured loans (4.8 percentage points), mortgage loans (-0.3 points), and unsecured loans (-1.0).

The differential between peso and dollar lending rates is 9.1 percentage points, much higher than it is for borrowing rates (the differential between peso and dollar borrowing rates is actually less than 1 percentage point) (Table 2.5). The large differential reflects the implicit currency risk and the differing procedures for each type of loan and each currency, including the fact that loans in different currencies are made to different dealers.

Active rates by group of banks. As mentioned above, the average lending rate for the banking sector for June 1996 was 18.0 percent. However, that rate differs among groups of banks as well as

Table 2.5. Differential in Lending Rates in Pesos and Dollars (nominal annual percent)

	Differential
Authorized Overdrafts	**9**
Pesos	10
Dollars	8
Unsecured Loans	**5**
Pesos	8
Dollars	4
Mortgage Credit	**3**
Pesos	3
Dollars	2
Secure Loans	**3**
Pesos	6
Dollars	3
Consumer Credit	**8**
Pesos	14
Dollars	4
Average Lending Rate*	**6**
Pesos	11
Dollars	4

Source: BCRA and authors' calculations.

Note: Active lending rates for the various types of loan are averages weighted for amounts.

* Average weighted for stocks.

among types of loans. For example, the small bank corporations incorporated in the Federal District (*bancos sociedades anonimas de Capital Federal*) charge lending rates that are effectively 5.75 percentage points higher than the banking sector average, while public banks show lending rates 1 percentage point lower than the system average.[9]

Lending rates and spreads: variance among banks and variance over time. Cross-sectional variations and variations over time were calculated in order to compare bank lending rates throughout the period. The cross-sectional variations are the simple averages of the standard deviations in lending rates among banks for the 13 quarters between June 1993 and June 1996. Similarly, variations over time were obtained by calculating the average deviation, using the standard deviations of individual banks weighted according to each bank's proportion of total loans.

The variation in lending rate among banks (8.4 percentage points) is higher than the variation in lending rate over time (approximately 3 percentage points). The finding holds for the various types of loans and for bank spread.[10]

Scattering of lending rate among banks in the period studied. The standard deviation of the lending rate among banks decreases until December 1994. During the months of the "Tequila effect" (March to June 1995), the scattering among banks increased. At the end of 1995, when the financial crisis had been resolved, the scattering once more began to fall.

The scattering in rates among banks during the period studied varies with the type of loan. The scattering in rates for authorized overdrafts, consumer credit, and unsecured loans follows the pattern for the average lending rate for the system, but the scattering in rates for other types of loans does not. The distributions of interest rates for the various types of loans show the increase in standard deviation (in other words, a flattening in the distribution of the rate) in March 1995 for authorized overdrafts, unsecured loans, and con-

[9] Ibid.

[10] Ibid.

sumer credit. Rates for mortgage credit and unsecured loans do not show this type of flattening.[11]

Effect of variations in country risk. When country risk increases, the lending rate rises, boosting the cost to financial institutions of obtaining funds and exacerbating the uncertainty of loan transactions. However, changes in country risk have different effects, depending on the type of loan. A general shock to the economy has a milder effect on rates charged for mortgage loans and secured loans than it does on rates for consumer credit, authorized overdrafts, and unsecured loans. The reason for this difference in effects is that mortgage and unsecured loans have underlying guarantees (in the form of concrete assets) that partially control transaction risk.

Do changes in country risk affect the rates for secured and unsecured loans differently? This econometric analysis examines variations in lending rates using the volatility of a representative government bond (the FRB) as a measure of country risk. Information on rates is analyzed quarterly (between June 1993 and September 1996) for the five types of loans in both pesos and dollars. The results of this analysis are given below, in the random sampling model

$$\sigma_{it} = \beta_0 + \beta_1 \sigma FRB_t * D1 + \beta_2 \sigma FRB_t * D2$$

where

s_{it} = variability in the lending rate for the various types of loans i in the 14 quarters t;

$D1$ = a dummy variable that takes the value of 1 for consumer credit, authorized overdrafts, and unsecured loans and 0 for other types of loans; and

$D2$ = another dummy variable that takes the value of 1 for mortgage loans and secured loans and 0 otherwise.

The results of the regression are summarized in the following table:

[11] Ibid.

Table 2.6. Variations in Lending Rates, Secured and Unsecured Loans

β_0	β_1	β_2
9.24	1.69	0.50
(8.02)	(2.18)	(0.52)

Note: The t-test statistics are shown under the coefficients.

As can be seen from the regression, the coefficient for unsecured loans (mortgage or secured) is greater than it is for secured loans. This result suggests that variations in country risk or macroeconomic conditions affect interest rates for consumer credit, authorized overdrafts, and unsecured loans more than rates for mortgage credit and secured loans.

Lending rates by type of customer. Data on portfolio irregularity by type of borrower—irregularities that might increase lending rates—do not exist. This analysis attempts to provide some data, examining lending by type of customer in an effort to determine whether institutions that focus on small and medium-sized firms have greater levels of portfolio irregularity and thus elevated lending rates.

The analysis considers those borrowing less than $200,000 small or medium-sized customers. An indicator for each institution was constructed showing loans of less than $200,000 as a proportion of the total amount of loans. Rank or Spearman correlations were made between that indicator (called *SME*) and the lending rate and portfolio irregularity. Results are shown in Table 2.7.

Table 2.7. SME, the Lending Rate, and Portfolio Irregularity

Variables	Spearman R	t(n-2)	Probability
SME & LR	0.552	6.383	0.000
SME & PI	0.518	5.847	0.000

The indicators show that institutions making a large number of loans to small and medium-sized customers have higher levels of portfolio delinquency and higher lending rates than other institutions. This result suggests that these banks have relatively risky customers and determine their lending rates accordingly, taking into account the possibility that these customers will default on their loans.

These factors suggest that a theoretical model of the Argentine financial system should include variables describing the heterogeneity among various types of loans, the cost of obtaining funds (which is now at international levels), the risk implicit in various types of customers, and operating costs, which are clearly higher than those of developed economies.

Conceptual Framework

A simple competitive model for the Argentine banking sector assumes the presence of the five different types of products: authorized overdrafts, consumer credit, mortgage credit, unsecured loans, and secured loans. The marked heterogeneity among the interest rates banks charge for the various lines of credit suggests that loans are granted based on variables such as collateral and customer characteristics.

The model also assumes that banks incur a cost to obtain a unit of credit and that this cost is determined by the interest rate paid on deposits.[12] Legal reserves are kept idle.[13] The banks transform this unit of credit into one unit of the five different products they offer, and the production functions assume constant returns to scale. Thus, the marginal cost of product i is constant and equals the average

[12] Borrowing rates as a function of type of deposit vary considerably, and a more exhaustive study would take this variability into account. However, as most spread is explained by variability in lending rates, the analysis here concentrates on this rate.

[13] Legal reserve coefficients in Argentina are very high but are remunerated at close to borrowing rates. Banks maintain cash reserves (about 5 percent of all deposits) on a strictly voluntary basis.

cost.[14] The same technologies do not necessarily apply to each type of product, so that c_i represents the cost per unit of product i. These assumptions imply a very simple industrial structure. In equilibrium, the size of each bank cannot be determined, and each is interpreted as a linear combination of the various products it offers.

Uncertainty and default enter into the model in the simplest manner possible. Each unit of i-type credit lent will not pay interest in a specific period with probability p_i. Assets in default in period t are therefore interpreted as those that do not meet their interest payments in this period, and the probabilities of default are judged to be different for the various types of assets. This interpretation is not the only one consistent with the data on irregularities in portfolios reported by banks in Argentina. The opposite assumption may also be true: an irregular portfolio asset pays neither interest nor capital. The reality certainly lies somewhere between these two extremes, but it cannot be quantified with the available data. This analysis uses the first assumption and provides comments on its interpretation in the calculations if an alternate assumption is made.

Technically speaking this assumption does not allow for defaults on principal. But defaults on interest for long periods of time are equivalent, in present value, to defaults on up to 100 percent of the principal. For this reason this analysis considers these defaults de facto defaults on the principal. As in conditions of competition, profit must be zero. Then

$$i^P D + L_i c_i = i^A L_i (1 - p_i) + R_i i^R$$

where

D_i = amount of deposits required to generate L_i units of credit and R_i units of reserve;

i^R = rates of interest on remunerated reserves;

[14] This assumption does not take into account the possibility of externalities among types of product. If these externalities are not very strong, they will not affect the calculation significantly.

i^P = interest rates on deposits; and
i^A = interest rate on loans.

The relationship among deposits, loans, and reserves is given by

$$D\,(1-r) = L,\ Dr = R$$

where r is the average reserve coefficient for deposits. Together the two equations state

$$i^A{}_i = \frac{i^P - r i^R}{(1-r)(1-p_i)} + \frac{c_i}{(1-p_i)} \qquad [1]$$

When markets are competitive, interest rates for various types of loans differ only if the costs of producing the loan vary (c_i) or are the result of their risk characteristics. Put another way, in the absence of market power, rates on all types of loans differ only if the probabilities of default or the inputs necessary to produce them (such as labor and capital) also differ.

The main problem in evaluating equation [1] is that no cost or risk data are available by type of credit. The database recently constructed by the Central Bank of Argentina contains information on total administrative costs for each bank but does not break the information down by type of bank. The database also includes information on the proportion of total credit for each of the five types of loans in each period. The hypothesis to be evaluated is whether costs differ by type of credit. Using the assumptions made regarding bank technologies, the total administrative costs for each bank are

$$C = \sum_{i=1}^{n} c_i L_i$$

Thus, the costs per unit of credit are

$$C = \sum_{i=1}^{n} c_i \alpha_i$$

where $_i$ is the proportion of line of credit i to the total credit offered by the bank. Using data on the administrative costs for each bank

and the proportions of each type of credit, the regression estimates the costs of each type of loan. In reality the proportions are linearly related, so one of the proportions in the regression (secured loans) is excluded. The estimated parameters are interpreted as the difference between the cost of credit considered and the cost of secured loans.

Quarterly data from June 1993 and March 1996 were used to show the results for the entire financial system. The individual effects were considered for both banks and periods (in both cases significant according to the LM statistic). The random-effect model (REM) is preferred, according to the Hausman statistic. The REM shows very high estimations for variances in the residuals. Using traditional levels, the regressions indicate that the costs only of consumer credit differ significantly. They show that $c_i = 0.066$ for all i except consumer credit and $c_i = 0.11$ for consumer credit. With these estimated values and information on borrowing rates, equation [1] can be reformulated to estimate the levels of risk for the various types of credit, consistent with this simple tentative model

Credit = p_1;
Overdraft = 47 percent;
Mortgage = 0;
Unsecured = 0;
Secured = 16 percent; and
Consumer Credit = 43 percent.

Given the assumption that default refers only to interest, the values for authorized overdrafts and consumer credit are relatively high. If default is assumed to refer to interest and principal, the corresponding values are[15]

Credit = p_1;
Overdraft = 10.2 percent;
Mortgage = 0;
Unsecured = 0;
Secured = 2.6 percent; and
Consumer Credit = 10.8 percent.

[15] The same equation should not be used directly. It must be reformulated.

These numbers provide the benchmarks for the calculations that follow.

Two complementary methods are available to estimate the probabilities of default for each type of loan. The *direct* approach uses data on portfolio irregularities, which are defined as all the assets of a bank that are more than 90 days in arrears. The *indirect* approach utilizes data on the effective rates of interest across banks.

Calculating the Cost of Credit: The Direct Approach

A bank offers only type i credit. There are two probabilities: p is the probability that the loan will fall into the irregular portfolio,[16] and q is the probability that one unit of credit in the irregular portfolio will pay the arrears. Then the equation for irregular portfolio formation is

$$IC_t = IC_{t-1}(1 - q) + L_{t-1}\pi \qquad [2]$$

where IC is the irregular portfolio stock. In a stationary state, where the proportion of irregular loans is constant

$$\frac{IC}{L} = \frac{\pi}{q}$$

Thus irregular portfolio data can be used to estimate the probabilities of default. In fact, if banks specialized in only one type of loan, the proportion of irregular loans would be necessary to estimate the quotient π/q.

Three assumptions hold. First, the banks offer n different lines of credit. Second, the probabilities the loans will become irregular differ for different lines of credit. And finally, the probability that the loans will not remain irregular forever is the same for all types of credit.[17] Using these assumptions, the following law pertains for the irregular portfolio in aggregate:

---

[16] It does not pay interest for the period in question.

[17] This assumption is surely unreasonable and is made here only to keep from complicating the econometrics significantly.

$$IC_t = IC_{t-1}(i-q) + \sum_{i=1}^{N} \alpha_i L_{t-1} p_i$$

This equation helps in estimating the values of p_i. The explanatory variables are linearly combined, so one must be omitted and the estimators interpreted as differences with respect to base values. The preceding equation was estimated in residuals using instrumental variables, as is usual in the literature on dynamic models with panel data. As an instrument, both differences in the irregular portfolio shifted during one period, so the earlier level-two periods were used. Fixed temporal effects were also included, although they did not affect the earlier results in terms of the significance of the other regressors.

Because of the importance of the temporal structure, only those banks for which there were data for the entire period were included in the analysis of the panel. The results are preliminary.[18] However, they show no significant differences in the proportions of the various lines of credit in the irregular portfolio of the banking sector, which exhibits autoregressive behavior and in response to temporal shocks. These results are obviously inconsistent with the proposed model, given the results of the cost equation. Part of the problem may be that the variable being measured does not describe the concept of a portfolio in arrears appropriately, especially because the definitions changed during the period studied. An attempt was made to describe these changes with the temporal dummies, but the results were the same. The results obtained with this variable also did not reasonably describe the risk components of the lending rates.

Calculating the Cost of Credit: The Indirect Approach

An alternate way of measuring p_i is through ex post or effectively charged data on interest. Assuming that the amount of credit each bank offers is great enough to make the law of large numbers a reasonable approach, then the interest truly paid on the line of credit i, R_i must be equal to the interest rate multiplied by the probability.

[18] Further analysis of this estimation is required, particularly of residual behavior.

The problem is that banks do not report the interest they charge for each line of credit, but only the interest on the total. For this reason the proportions of each type of credit offered by each bank must be used to estimate these values.

According to equation [1]

$$i(1 = p_i) = R_i = \frac{i^P ri^R}{(1-r)} + c_i$$

Can all variability observed in the R_i be explained by the costs estimated above? Under the assumptions of the model

$$R = \sum_{i=1}^{n} R_i L_i = \sum_{i=1}^{n} \left(\frac{i^P - ri^R}{(1-r)} + c_i \right) L_i$$

Therefore the total interest effectively charged as a percentage of total loans is equal to

$$\rho = \sum_{i=1}^{n} \left(\frac{i^P - ri^R}{(1-r)} + c_i \right) L_i$$

or

$$\rho = \left(\frac{i^P - ri^R}{(1-r)} + c_i \right) + \alpha_i$$

The model is correct if the estimations of the parameters are consistent with the cost equation.

Market Power

If high interest rates cannot be explained through administrative or risk costs, an alternate explanation is the existence of bank market power. Thus, equation [1] will be

$$i_i = \frac{i_p}{(-r)(1-p_i)} + \frac{c_i}{(1-p)} + markup_i$$

where the markup may depend on the rest of the variables affecting the lending rate, as in traditional oligopoly models. This subsection proposes a simple method of evaluating this hypothesis. Mortgage credit and unsecured loans are the lines with the lowest lending rates. Given the cost estimate, all lending rates can be explained through administrative and financial costs, and therefore both the risk premium and markup should be zero. Even with very conservative estimates, then, none of these types of loans can generate exceptional profits.

The assumption is that the market power of Argentine banks has generated high interest rates on the other three lines of credit. In this case it must be true that banks specializing in these three types of loans have earnings that are higher than the system average. In fact, given the model's assumptions, the profit of each bank should equal

$$\Pi = \sum_{i=1}^{N} L_i \left(i_i^A - \frac{i^P}{(1-r)(1-p_i)} - \frac{c_i}{(1-p_i)} \right)$$

and therefore profit as a percentage of total loan is

$$\pi = \sum_{i=1}^{N} \alpha_i + (markup_i)$$

If the markups are different for each line of credit and justify the high interest rates, the estimators should be significant and positive for authorized overdrafts and consumer credit. The random effect model is not appropriate according to the LM and Hausman statistics.[19] Neither of the models (with and without specific or group effects) show estimators significantly different from zero for this equation.

It has already been argued that monopolistic profits cannot be generated from mortgages and unsecured loans. The results of this regression refute the hypothesis that market power affects authorized overdrafts, secured loans, and consumer credit.

The analysis in this section generates two other results. First, it shows that relatively heavy administrative costs in part explain the

[19] The LM was 2.02 (0.15) and Hausman 6.49 (0.16). The results were similar for the two-way REM.

high interest rates on consumer credit. Second, it indicates that administrative and financial costs explain the lending rates charged on mortgage credit and consumer credit. But the analysis does not identify dissimilar risk characteristics among types of credit that might justify high rates on authorized overdrafts and consumer credit.

Econometric Results from the Panel

The preceding discussion focused on a tentative model that cannot explain the enormous variety of information the panel offers. For example, the model cannot be consistent with all the different rates banks pay or charge on the same types of deposits and loans. Accommodating this situation requires a friction model (e.g., matching models). But developing a model of this type is far beyond the scope of this work. The strategy used here, then, employs panel data as a means of explaining each bank's lending rate. The simple tentative model helps in interpreting the results.

The objective is to identify the main factors that prevent the Argentine financial system from operating with lower lending rates. An attempt has thus been made to determine whether the rates for borrowers are affected by changes in market power and to explain the roles of factors such as administrative costs, costs related to the evaluation and monitoring of debtors, and the anticipated probability of default.

Regressions for the empirical analysis were made with panel data, which are quarterly statistics for individual banks from June 1993-June 1996. While previous works have used only time series and cross-sectional methods, this analysis considers observations for the various banks over several periods. These observations should show improvements in lending rate estimates if heterogeneities specific to the banks or over time exist that could not be observed.

The implicit borrowing rate, or financial outflows on deposits, was selected as a variable representative of the cost of obtaining funds.[20] For purposes of describing the risk of unrecoverability and

[20] The Central Bank of Argentina does not have data on the fixed term rate paid for all entities.

the costs associated with evaluating debtors, the variable utilized was the irregular portfolio divided by total financing.[21] Total administrative costs and costs associated specifically with financing were used as measures of costs.[22]

First, an attempt was made to verify the existence of competition in the Argentine banking system. As no clear evidence of the presence of market power was found, other factors must be influencing the high lending rates in the Argentine banking market.

Additional Testing for Market Power

In the preceding analysis, the test for market power was based on the profit trend of banks with different loan portfolios. The present analysis uses supplementary tests. Seventy-eight percent of the banks in Argentina earn profit on net assets of less than 10 percent, the average for the entire system—a figure considered appropriate normal earnings (not extraordinary) by international standards.[23]

To ascertain statistically whether market power exists in the Argentine banking industry, a cost analysis was used to determine whether banking entities could translate increases in their administrative costs into the rate they charge their customers. For this purpose total financing costs were broken down into two components:

- The average of costs for the banking sector in each period, reflecting the changes in costs affecting all banks equally for each of the 13 periods (*CMED*);

[21] Loans over 90 days in arrears were considered.

[22] The administrative or procedure cost variable includes remuneration, benefits, amortizations, miscellaneous costs, and taxes excluding profit tax. Also included were administrative costs associated specifically with financial intermediation activity and net administrative costs of earnings for services (or earnings for commissions), on the assumption that net income for commissions is used to pay the costs associated with customer service activity and that additional costs correspond to intermediation activity. This simplification was made because information on costs associated with each bank activity or procedure was unavailable and could create problems if banks attribute to commissions part of the costs of intermediation for services (the difference between commissions paid and charged).

[23] See Ahumada et al., 1998.

- The deviation in the costs of each bank at each point with respect to the average value of the banking sector in that period (*CDIF*).

The regression estimated is

$$i_{it} = \beta_0 CMED_t + \beta_1 CDIF_{it}^A$$

with specific effects per bank. The results were

β0	β1
1.14	0.085
0.000	0.005

where the values *p* are described in parentheses. It shows a good fit ($R^2 = 0.77$), and both explanatory variables are significant (not showing atypical residual behavior). Changes in average administrative costs for the system translate directly into the rate charged by the entities. An increase of 1 percentage point in the system's average costs translates into an increase in the lending rate of 1.14 percentage points (a coefficient not significantly different from 1). The coefficient of the other explanatory variable—the difference between the cost of each bank and the mean for the system for each period—was positive but very small. Banks showing specific (own) costs 1 percentage point higher have lending rates 0.08 points higher.

These results imply that there is little market power in the banking industry, as only the changes in average operating costs (that is, changes in the costs affecting all banks in the same way at the same time) can be translated directly into higher rates for borrowers. In addition, only a very small part of the changes specific to an individual bank affect the lending rate. In other words, the differential between the rate of that entity and the rates of other entities is not affected (the coefficient corresponding to specific costs of each bank is very small).

Other Factors Affecting the Lending Rate

This result clearly does not explain the high level of lending rates. The next step was to check the influence of factors such as the cost of

obtaining funds, administrative costs, the quality of the loan portfolio, and the loan structure (that is, the proportions of the various types of loans), including individual effect (bank) dummy variables. This analysis (Table 2.8, Model A) allowed us to identify the presence of very significant individual bank effects, which demonstrated a marked heterogeneity among banks. Temporal dummy variables were then included (Table 2.8, Model B). With individual bank and temporal effects, interpreting the signs of the borrowing rate and irregular portfolio coefficients economically became increasingly difficult.

Table 2.8 Econometric Regressions

	Dependent Variable: LR				
	Model A	**Model B**	**Model C**	**Model D**	**Model E**
Independent variables:					
ILR	0.052	-0.017	–	–	–
	(0.000)	(0.076)			
IRREILR	–	–	0.147	0.0118	0.0148
			(0.000)	(0.000)	(0.000)
IRRE_RES	-0.022	-0.075	0.049	0.0315	0.052
	(0.178)	(0.000)	(0.000)	(0.020)	(0.000)
COSTOT_F	0.081	0.065	0.172	–	–
	(0.000)	(0.000)	(0.000)		
COSTFIN_F	–	–	–	0.316	–
				(0.000)	
ISSIMP_F	–	–	–	0.581	–
				(0.004)	
DIFCOST	–	–	–	–	0.175
					(0.000)
AVCOST	–	–	–	–	0.732
					(0.000)
DAOULR	–	–	0.173	0.155	0.174
			(0.000)	(0.000)	(0.000)
AO	0.126	0.141	0.082	0.089	0.078
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
UL	0.001	0.002	–	–	–
	(0.980)	(0.958)			
CC	0.073	0.058	0.105	0.109	0.103
	(0.117)	(0.171)	(0.000)	(0.000)	(0.000)
MC	-0.011	-0.052	-0.082	-0.099	-0.08
	(0.0812)	(0.225)	(0.000)	(0.000)	(0.000)

Table 2.8 (continued)

	Model A	Model B	Model C	Model D	Model E
Individual effect	Fixed	Fixed	–	–	–
Temporal effect	–	Fixed	Random	Random	–
DSAINT	–	–	5.482	5.473	5.434
			(0.000)	(0.000)	(0.000)
DNAPRO	–	–	0.598	1.284	0.512
			(0.627)	(0.288)	(0.678)
DEXT	–	–	-1.74	-1.99	-1.722
			(0.029)	(0.011)	(0.031)
DMAY	–	–	-5.429	-6.479	-5.507
			(0.000)	(0.000)	(0.000)
DMINC	–	–	1.793	1.089	1.781
			(0.034)	(0.187)	(0.033)
DCOP	–	–	6.213	5.546	6.002
			(0.000)	(0.000)	(0.000)
DPUB	–	–	1.697	1.512	1.6
			(0.024)	(0.041)	(0.031)
CONSTANT	–	21.098	13.801	13.906	5.596
		(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.778	0.814	0.614	0.633	0.618
No. of observations	1822	1822	1492	1492	1492
No. of parameters	174	187	15	16	16

Note: The values in parentheses correspond to the "p-value."

The results described above led to a more prudent model with fewer dummy variables for individual banks. Dummy variables were then constructed by groups of banks, taking into account the fixed coefficients estimated for each bank from the regression. Model C is the result of the successive estimations. The following were included as explanatory variables: the borrowing rate corrected for portfolio irregularity owing to the problems of colinearity that these variables showed; administrative costs; the loan structure; the differential between the rate on authorized overdrafts and the rate on discounted unsecured loans; and dummies by group of banks.[24] In addition, tem-

[24] *Corrected borrowing rate* = (borrowing rate–0.2 irregular portfolio)/financing. A panel regression for the borrowing rate and irregular portfolio/financing produced a coefficient of 0.2. This coefficient of irregularity was used to correct the colinearity existing with the borrowing rate.

poral dummies were also considered. In this analysis, the time effect was random (Hausman test is 0.15), and an estimation with generalized least squares was made.

As Table 2.8 shows, the R^2 of this model is 0.6. Bank costs are significant in explaining the lending rate. Banks with higher costs charge higher lending rates: an administrative cost/financing ratio 1 point higher than the average means that lending rates are 0.17 points higher. The borrowing rate is also significant, with a coefficient of 0.15. This result shows that if banks must pay more for funds, their lending rates are once again higher (0.15 percentage points for every 1 percentage point). Portfolio irregularity is significant, but its coefficient is almost zero (0.02). This rather unsatisfactory result may stem from the difficulty of constructing a homogeneous series in time for irregular bank portfolios.[25]

The regression included proportions of the various types of loans, improving its overall fit. The proportions of authorized overdrafts (with a coefficient of 0.08), consumer credit (with a coefficient of 0.10), and mortgage loans (-0.08) were significant. This result shows that banks with a relatively large proportion of authorized overdrafts and consumer credit in their portfolios have higher lending rates, even after adjusting for portfolio irregularity. One interpretation of this finding is that the coefficients of the proportions of the different types of loans are describing the irregularity (risk) specifically associated with each lending operation that is not reflected in the irregular portfolio/financing variable. The result is in line with earlier calculations.

The variable differential between rates on authorized overdrafts and on unsecured loans was also included in this regression, reflecting the fact that customers tend to differ among banks. Banks with poorer quality debtors and a differential falling between these rates, which is one point above the average, show lending rates of 0.17 points higher.

Costs associated with financial intermediation rather than administrative costs can also be used (that is, administrative costs mi-

[25] The classification system for debtors and the minimum reserve requirements were changing gradually between June and December 1994.

nus net income for commissions). Together with taxes (contributions to bank employee benefits and other taxes), these costs produce an R^2 equal to 0.63. In this case the variables are significant, with coefficients of 0.32 and 0.58 respectively (Table 2.8, Model D).

These models show significant explanatory variables that account for about 60 percent of the lending rate. But the constants in these models are very high. For this reason, administrative costs were broken down into a general component for all banks (*CMED*) and a specific component for each bank (*CDIF*). This technique allows for a lower value of the axis intercept (Table 2.8, Model E). The coefficients and significance of the explanatory variables in Model E are very similar to those obtained in Model C. The most important difference between the two models lies in the costs variable. The variable average administrative costs and financing (*CMED*) shows a coefficient of 0.73. This result shows that an increase of 1 percentage point in average costs translates into a 0.73 percentage point increase in the lending rate. The coefficient of the second explanatory variable (*CDIF*) is 0.18, showing that banks whose specific costs are 1 percentage point higher than average have lending rates 0.18 higher.

This result once again suggests that there is little market power in the banking industry, as only a small proportion of increases in specific bank costs can be translated into increases in the lending rate (0.18). But changes in average operating costs (that is, changes in costs affecting all banks in the same way at the same time) can be transferred to rates charged to borrowers (0.73).

For this model, the Breusch and Pagan test using the Lagrange multiplier was carried out, producing a value of 0.71. This result shows no evidence of the existence of unobservable effects over time. One possible explanation for the finding may lie in the average administrative costs and financing variable (*CMED*), which seems to be describing the unobservable time effect.

Conclusions

This analysis has sought to explain lending rate levels in the Argentine financial system. It finds that the variety of lending rates is a function of the many types of credit. While authorized overdrafts and consumer credit are subject to rates well in excess of international levels (27 percent and 33 percent, respectively, in June 1996), mortgage loan rates, secured loans, and unsecured loans are subject to rates of close to 12 percent. These rates are high in relation to international levels because of the heavy administrative costs of Argentine banks. Administrative costs have been falling in recent years, however, and this factor, combined with the slow modernization of the banking sector, will certainly help rates fall more quickly and converge with international levels.

What, then, explains the high rates on the lines of credit—authorized overdrafts and consumer credit—that even today represent almost 40 percent of all lending? The analysis has explored two alternate explanations. First, two independent tests of market power were conducted that refuted the hypothesis and in fact provided abundant evidence to disprove it. Second, the analysis explored the possibility that potential defaults explain the difference in rates. The first results are not encouraging, as problems with the data hindered efforts to identify the differential effects of risk by type of credit. An alternate test is being developed, which may provide more satisfying results. For now the present findings are the most accurate explanation available.

References

Ahumada, H., Burdisso, T., Nicolini, J., and Powell, A. 1998. "Los spreads de tasas de interés en Argentina." Working Paper No. R-343. Washington, DC, United States: Inter-American Development Bank.

Burdisso, T. 1997. "Estimación de una función de costos para los bancos privados argentinos utilizando datos de panel." Working Paper No. 3. Buenos Aires, Argentina: Banco Central de la República Argentina.

Dick, A. 1996. "Efficiency in the Private Banking Sector of Argentina: Its Importance with Respect to Economies of Scale and Economies of Joint-Production." Working Paper No. 1. Buenos Aires, Argentina: Banco Central de la República Argentina.

Maguillo, R. and de la Peña, N. 1996. "Case Disposition Time for Seizing and Selling Movable Property in Capital Reserve Courts." Working Paper. Center for the Economic Analysis of Law.

Rivas, C. 1984. "Costos bancarios, producción multiple y rendimientos a escala." Technical Paper. Buenos Aires, Argentina: Banco Central de la República Argentina.

Streb, J. and D'Amato, L. 1996. "Economies of Scale and Degree of Capacity Utilization: Evidence from Retail Banks in Argentina." Working Paper No. 108. Buenos Aires, Argentina: CEMA University.

This page intentionally left blank

CHAPTER 3

Determinants of Bank Spreads in Bolivia

Bernardo Requena, Eduardo Antelo, Carmen Crespo, Ernesto Cupe, and Juan Ramón Ramírez[1]

Since 1985 the Bolivian economy has undergone a series of changes that have transformed the financial sector. The government's New Economic Policy, which is based on market economics, has liberalized the financial system and opened markets to foreign trade. Under this policy, the private sector plays a predominant role in growth through its participation in productive investment. The new model also emphasizes the role of the state in constructing infrastructure, investing in social welfare, defining the legal framework, and regulating noncompetitive markets.

The result has been some stability in the persistently high inflation rates, but a decline in bank deposit and lending rates. These declines have not extended to bank spread (defined here as the difference between the lending and deposit rates in foreign currency), which has remained around 6 percent since 1991 (Figure 3.1). This level of spread is high in relation to industrial countries, where spreads average around 3 percent, and interferes with the efficient intermediation of funds. But it is relatively low compared with other South American countries, with the exception of Chile (see chapter 4).[2]

The stability of monetary and fiscal policies in recent years has reduced pressure on spreads. Legislative changes have also

[1] Bernardo Requena, Eduardo Antelo, Carmen Crespo, Ernesto Cupe, and Juan Ramón Ramírez are researchers at the Unidad de Análisis de Políticas Sociales y Económicas in Bolivia.

[2] See Calvo, Leiderman, and Reinhart, 1993.

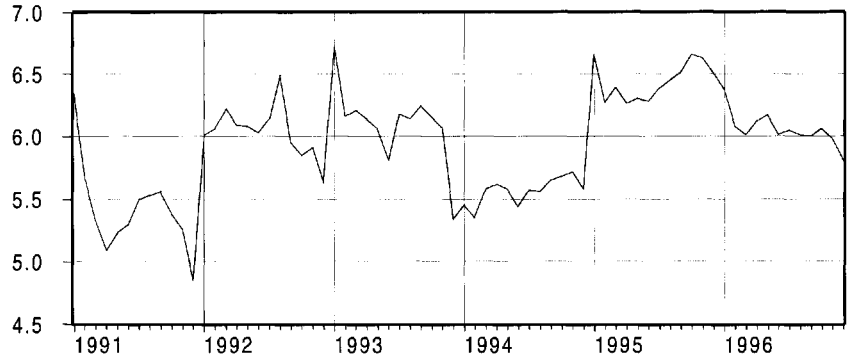
helped, especially the 1993 Law of Banks and Financial Entities, which has allowed the financial sector to begin adapting to modern regulations and the new development model. But some features of the market have not changed sufficiently to affect spreads. The oligopolistic market structure, decisions on the administrative management of capital, the quality of bank portfolios, high administrative expenses, and problems with earnings and liquidity all help explain why spreads in Bolivia are higher than in industrial countries.

Spreads have not remained entirely stable, even at their relatively high levels. The levels vary among groups of banks and can destabilize the banking system when they fall too low. In 1994 and 1995 two banks with lower-than-average spreads collapsed. In part, the collapse was the result of the moral hazard generated by the existence of implicit insurance, which induced the banks not to internalize all their risks.

This chapter identifies the most important determinants of bank spreads in Bolivia in the 1990s. It takes into account macroeconomic factors, financial (microeconomic) developments, changes in the market structure, and institutional (legal) changes. In addition to corroborating the persistence of relatively high levels of spread in Bolivia, it formulates some recommendations for economic policy aimed at gradually reducing these levels.

One important aspect of the analysis is a survey conducted in February 1997 of 14 of Bolivia's 17 banks. The survey, designed for financial managers familiar with their banks' operating procedures, was designed to identify those factors taken into account in determining lending and deposit rates—in other words, what banks consider in setting the rates that in turn determine spread. The results of the survey bolster the results of the analysis, confirming many of the findings.

Figure 3.1 Spreads for the Total Banking System



Bank Spreads and the Bolivian Financial Sector

Between 1980 and the early 1990s, Bolivia's economic climate changed dramatically, moving from a system in which the role of the state predominated to a market economy. Controls on interest rates were in place until August 1985. These controls, combined with hyperinflation, bad bank debts, the *desdolarización* of 1982, and slow economic growth, provoked the collapse of the financial system.[3] An increase in monetary issue speeded up inflation and resulted in negative real interest rates that directly affected financial intermediation. Domestic banks were unable to meet their commitments to foreign banks and soon lost access to that source of finance. Financial regulations, which were not very clear, were not even observed. Increases in nonperforming portfolios, administrative expenses, and unprofitable assets significantly reduced the banking system's operating volumes.

In August 1985, when the New Economic Policy was implemented, a series of changes transformed the financial sector. The initial objective was to halt hyperinflation and stimulate growth. The measures included fiscal restructuring, liberalization of the financial system, and liberalization of the goods and factor markets, which

[3] The term *desdolarización* refers to the 1982 Government order that prohibited the banking system from making operations in dollars.

were opened to foreign trade. These measures stabilized the financial sector somewhat, reducing annual inflation rates to around 10 percent. Both bank deposit and lending rates began to fall in 1990, but high rates have persisted, preventing the expansion of productive activity.

As noted, bank spreads have also remained relatively high. Levels of spread differ according to the type of bank, however. Private Bolivian banks report a higher-than-average spread, but foreign banks have a lower spread. The large private wholesale banks have the lowest average spread in the system (4.4 percent), followed by small wholesale banks (4.6 percent). Large and small retail banks have spreads that are well above average (between 6.5 and 7 percent). However, the banks, in fact, exhibit different characteristics and behaviors that can affect spreads. Large banks, for example, have the advantage of being perceived as "too big to fail," and emit a solvent public image. Thus, the size and market segment of banks (wholesalers, retailers, and microcredit) are factors that affect spreads differently.

Developments in the Banking System

In the second half of the 1980s, the liberalization of the financial system and the possibility of conducting operations in dollars stimulated credit activity. The capital account of the balance of payments was opened, allowing commercial banks to hold deposits in foreign currency and restraining the recurrent use of legal reserves as an instrument of financial repression.[4]

Despite these important changes, regulatory and supervisory mechanisms were not modified during the first two years of the adjustment program, presumably because all efforts were concentrated on guaranteeing macroeconomic stability. In July 1987 changes were made in legal reserve requirements and banking regulations in an effort to develop regulatory and oversight mechanisms more in line with the newly liberalized markets. These initiatives succeeded in

[4] See Afcha, Cuevas, and Larrazabal, 1992.

reducing the cost of credit and improving bank solvency. One of the most important initiatives was the restoration of the Superintendency of Banks and Financial Entities (Superintendencia de Bancos y Entidades Financieras, or SBEF).

In the state banking sector—in accordance with the new role of the state in the economy—the three public commercial and development banks were liquidated after 1990 (Banco Minero, Banco Agrícola, and Banco del Estado). The Central Bank of Bolivia has ceased to grant credits as a wholesale bank, and its assets and liabilities have been transferred to a private entity, the Nacional Financiera Boliviana (NAFIBO).

Between 1988 and 1996, the banking system experienced a phase of growth characterized by very pronounced fluctuations, the result of liquidating seven private commercial banks and creating five new ones.[5] In December 1996, the Bolivian banking system was comprised of 17 private commercial banks, 13 national and 4 foreign (Box 3.1). These banks held deposits totaling approximately US$2.71 billion (about 41 percent of GDP) at the end of 1996.[6] In comparison, in June 1985, in the wake of the crisis, total deposits in the system totaled just $68 million.

The breakdown of the banking system's deposits in 1996 was 20.8 percent demand, 14.9 percent savings, and 64.3 percent time. The composition by currency was 92.3 percent in U.S. dollars or national currency (with maintenance of value), since deposits in bolivianos were mainly in fiscal accounts. The terms of the time deposits lengthened from an average of 81 days at the end of 1990 to 239 days in December 1996.

---

[5] The liquidated banks were: BLADESA, BAFINSA, Potosí, Oruro, Progreso, Cochabamba, and SUR. Banco SUR was the result of the merger of Banco Industrial and Ganadero del Beni with Banco Inversión Boliviano. The new banks are: Banco Internacional de Desarrollo (BIN), Banco Económico (BEC), Solidario (BSO), Banco Ganadero (BGA), and Interbanco, which has merged with Banco Boliviano Americano (BBA).

[6] This value, which is relatively high compared with other Latin American countries, is explained by the lack of substitute uses for deposits and the poor development of nonbank financial markets.

Box 3.1 Bolivian Banks

National Banks	*Foreign Banks*
Banco Santa Cruz (BSC)	Banco Real (BRE)
Banco Nacional de Bolivia (BNB)	Banco de Brasil (BDB)
Banco Mercantil (BME)	Citibank (CIT)
Banco Industrial (BIS)	Banco de la Nación Argentina
BHN-Multibanco (BHN)	
Banco Boliviano Americano (BBA)	
Banco Internacional de Desarrollo (BIN)	
Banco La Paz (BLP)	
Banco Ganadero (BGA)	
Banco Solidario (BSO)	
Banco de la Unión (BUN)	
Banco Económico (BEC)	
Banco de Crédito de Bolivia (BTB)[1]	

[1] Despite being formed with Peruvian capital, the BTB is national under an Andean Pact decision.

The total loan portfolio at the end of 1996 was reported to be $2.97 billion. Some 31.5 percent of loans had been granted to the commerce sector, 19.4 percent to manufacturing industries, and 17.1 percent to community, social, and personal services. The most neglected sectors were agriculture and mining. Some 47 percent of the portfolio was backed by mortgage guarantees because the legal system and SBEF solvency regulations encourage banks to grant credits with easily recoverable guarantees. Both deposits and portfolio were highly concentrated. Some 12.1 percent of deposits were held by 0.03 percent of customers, while 69.2 percent of depositors held only 0.88 percent of the total funds. A very small 0.2 percent of borrowers received credits representing 31 percent of the portfolio.

Stylized Facts

Macroeconomic Variables

From 1981 to 1996, the Bolivian economy recorded relatively stable average annual economic growth of about 4 percent, with an average inflation rate of 11 percent (Table 3.1). This trend is important, as macroeconomic instability can lead to high interest rates and punish institutions that transform short-term deposits into long-term loans. A slowdown in economic activity also has a negative impact on banks because borrowers have difficulty meeting their commitments.

Another indicator of macroeconomic stability is the deficit in the nonfinancial public sector, which in Bolivia has declined over time. In 1996 the deficit was less than half the 1991 figure. The largest deficits of the period were recorded during the elections of 1993. The public sector began to place larger quantities of paper to finance them, possibly intensifying pressure on domestic interest rates.

Monetary policy is reflected in three variables: monetary issue, interest rates, and reserves. The government sought to maintain stability by increasing monetary issue in line with growth and inflation targets, but succeeded only in late 1994, following the liquidation of two private commercial banks, the CBB and BSR. Interest rates on

Table 3.1 Macroeconomic Variables (percent)

Year	Spread	Legal Reserve	Deposit Rate-CDs	CDs-LIBOR	Inflation	Change Issue	Devaluation	Fiscal Deficit (% of GDP)	Growth
1991	4.85	12.29	11.97	4.06	14.52	16.06	10.30	5.80	5.3
1992	5.63	16.62	10.53	3.74	10.46	20.09	9.33	4.60	1.6
1993	5.34	16.18	9.51	3.21	9.31	12.86	9.27	6.50	4.2
1994	5.58	15.37	0.40	-0.05	8.53	36.69	4.90	3.20	4.6
1995	6.51	13.33	-5.70	8.16	12.58	20.78	5.10	2.30	3.8
1996	5.80	15.55	2.21	0.48	7.96	8.48	5.06	2.10	3.9

Source: Banco Central de Bolivia, Instituto Nacional de Estadística, UPF.

short-term public securities fell during the period, except in 1993 (an election year) and 1995 (a year of bank instability).

Despite the fall in the rates of legal reserves for some financial operations during this period, the average reserve level increased. The higher proportion of demand deposits generated by the relative economic stability explains this development, as demand deposits have a higher legal reserve requirement. The nonremuneration of reserves with the Central Bank is a financial cost for the bank. Since deposits require reserves in the same currency, the cost of reserves in bolivianos is higher because of inflation. This situation helps explain the dollarization of deposits and the fact that some banks do not offer all financial products in bolivianos.

Exchange policy was designed to maintain a competitive real exchange rate. For this reason, the nominal devaluation of the boliviano against the dollar was reduced. However, the real dollar exchange rate remained relatively stable during the period. Country risk, measured as the difference between rates of return on CDs and the LIBOR, declined.[7] So did the difference between deposit and CD rates, except in 1995 and 1996—years of instability provoked by the liquidation of the two banks.

The Mexican crisis (the Tequila effect) had no direct impact on the development of the Bolivian banking system, since the dollarization of its operations was already virtually complete.[8] Bolivia has no developed capital market, and the stabilization program is based primarily on restrictive fiscal and monetary measures rather than on a fixed exchange rate. Substantial variations in the exchange rate or important effects from capital flows are therefore unlikely. The principal outcome of the Tequila effect in many countries in the region was an increase in domestic deposit rates to prevent capital flight. In Bolivia, the rates of public securities and, to a lesser extent, the deposit rates offered by the banking system soared. In the same period, however, bank spreads increased because of the financial instability generated by the closure of the two banks.

---

[7] CDs issued by the Central Bank, along with Treasury bills (LTs), are the principal instruments used in open market operations in Bolivia.

[8] However, two banks had losses attributable to this crisis.

Financial Indicators

Spreads for the banking system as a whole increased about 19 percent between 1991 and 1996. The maximum levels (1995) can be related to the instability in the country's banking system from the two bank liquidations and the financial problems of the second-largest bank.

The financial indicators are based on the "early warning" system for the prudential regulation of banks (Table 3.2). This system is known as CAMEL (capital, assets, management, earnings, and liquidity). It takes into account capital adequacy (solvency), asset or portfolio quality, management efficiency, earnings, and liquidity.[9] These indicators are measured by the following ratios, respectively: capital and reserves plus bonds (compulsorily convertible into stock) over total assets,[10] nonperforming portfolio over gross portfolio, administrative expenses over gross portfolio, net results over capital and reserves, and liquid assets over short-term liabilities.

Table 3.2 Spreads and Financial Indicators of the Banking System (percent)

Year	Spread	NPP[a]/ Gross Portfolio	(Capital + Bonds[b])/ Assets	Current Assets/ Short-term Liabilities	Adm. Expenses/ Gross Portfolio	Net Results/ Capital and Reserves	Concentration		Time Difference (days)
							Herfindahl	IC(4)	
1991	4.85	8.25	8.19	29.25	7.12	8.33	0.09	48.41	625
1992	5.63	6.52	8.68	33.43	6.37	15.48	0.08	49.60	722
1993	5.34	6.23	7.64	48.98	5.57	11.95	0.09	50.13	712
1994	5.58	3.61	8.00	43.47	5.00	14.19	0.10	55.02	683
1995	6.51	6.25	7.27	40.90	5.87	10.92	0.11	56.90	758
1996	5.80	4.70	7.27	56.13	5.96	13.00	0.11	55.63	753

Source: SBEF.

a. Nonperforming portfolio.

b. Bonds compulsorily convertible into stock.

[9] See Dewatripont and Tirole, 1993.

[10] The risk weighting of the assets is not considered.

Several conclusions follow from the information in the table:

- The nearly 100-percent increase in the liquidity indicator is evidence of "hot money" in the system. It also reflects the higher inflow of short-term capital in recent years. The stability of the banking system could be affected if investors change their expectations and withdraw their capital.
- Demand for credit is restricted by the requirement that borrowers provide mortgages as security.[11] This restriction, which is an institutional problem, limits the placement of funds.
- The time difference between placements and deposits increased from 625 to 753 days on average, generating a potentially higher liquidity premium and partly explaining the trend in spreads.
- Although the levels of the Herfindahl index are not significant, the concentration ratio implies that if the four largest banks decide to collude, they will affect the market negatively. Both indexes indicate that bank concentration increased between 1991 and 1996. However, the small number of banks may also explain the increase in the concentration indicators.

The Institutional Environment in Bolivia

Institutional factors play an important role in the functioning of the financial system and, therefore, in determining bank spread. The institutional and legal framework helps guarantee the health of the financial sector by promoting the dissemination of information, eliminating implicit deposit insurance, and facilitating the movement of customers among banks. Competition also increases efficiency, allowing for new entrants and contributing to the development of the capital market. While Bolivia's legal and institutional framework has been modernized in recent years, several problems remain.

One such problem is debt recovery, which is an important component in the determination of spreads. Once a customer defaults, neither Bolivia's civil and criminal legislation nor its justice system guarantees that the debt will be recovered rapidly. As a result, transaction costs rise. Although a lender's primary guarantee should

[11] The existing legal framework makes recovering debts such as nonmortgage guarantees extremely difficult.

be the profitability of a project, banks are pressured to require collateral from their borrowers, distorting the concept of credit and ultimately restricting the size of the market.

The Legislative Climate

In 1993 the Law of Banks and Financial Entities was passed, replacing the Banking Law of 1928. The purpose of the new law was to consolidate laws and regulations governing the financial sector, bring legislation in line with the New Economic Policy, improve the quality of supervision, and strengthen banking institutions.

The new law has made important changes in the way the financial sector operates. It reduces leverage by adopting standards similar to those in the Basle Agreement, raising the required ratio of capital and reserves to total assets from 4.8 to 8 percent.[12] It permits commercial banks to provide a full range of services and to form subsidiaries to provide products and services such as insurance, leasing, factoring, mutual funds, and stock brokerage. It aims to increase competition in bank and nonbank markets, take advantage of economies of scale and scope, and diversify risks and earnings. Any disadvantages that might result would involve conflicts of interest, potential increases in risk, and concentration in the system.

The 1995 Bolivian Central Bank Law and the earlier Banking Law define the powers of the Central Bank and the SBEF. The Central Bank determines monetary and banking policy, and the SBEF oversees compliance. The liquidation of the CBB and BSR in November 1994 and the difficult financial situation of the Banco Boliviano Americano (BBA) in December 1995 shook the financial system. (The BBA, the second-largest bank in the system, has since been restructured.) During the early months of 1995, the growth rate of deposits slowed, and banks began a process of restructuring and adapting to the new legislation. The Central Bank and the SBEF were fundamental to this process—the former in regulating minimum capital and forming the Fondo de Desarrollo del Sistema Financiero (FONDESIF),[13] the latter in improving bank supervision.

---

[12] This ratio ignores the weighting of asset risk.

[13] Financed by the Bolivian government and the Inter-American Development Bank (IDB).

Implicit Deposit Insurance

Although the new legislation does not make deposit insurance compulsory, it does leave open the possibility that such insurance will be provided.[14] In the last seven years, the Central Bank has assumed the obligations of liquidated banks, returning the full value of deposits to the public.[15] As a result, the control that depositors should exercise over banks has been lost, since depositors no longer internalize the cost of their mistakes in selecting banks. This lack of control has generated a problem of moral hazard, in that solvency has ceased to be a barometer of competition among banks. Banks also do not assume the entire cost of their bad decisions because they are not afraid of losing money. The possibility of instituting a system of explicit deposit insurance is currently being studied.

There is also the so-called "too big to fail" problem. Some large private banks that run into solvency problems are restructured rather than liquidated in order to forestall the negative impact a bank failure would have on economic activity.[16] This solution can provoke problems of adverse selection if the reorganized bank, knowing that the Central Bank will act as lender of last resort, continues to choose risky customers.[17] In this regard, large banks have an additional advantage over small banks because the public believes large banks carry less risk.

Competition

Bolivian banks offer their customers different types of financial services, plus access to supplementary services such as insurance, leas-

[14] The D.S. 23881 of 1994 states, "the Central Bank may surrogate the rights of depositors or may cover the refund of the deposits of the financial entities in liquidation."

[15] The Central Bank returns to depositors the principal in full without interest (a cost for the depositors).

[16] This solution was imposed when some Bolivian banks were reorganized in 1987–88. These banks continued to be controlled by the same shareholders despite high losses from large nonperforming portfolios. It was also imposed in 1995–9, when FONDESIF capitalized banks with problems.

[17] See Rojas-Suárez and Weisbrod, 1996.

ing, and factoring. Transaction costs (including the costs of gathering information on banks and establishing credit) are high, affecting consumers' willingness to change financial institutions. Banks therefore have a certain amount of power over groups of captive customers.

Further, there are no real substitutes for bank services such as deposits and placements. There are only a few alternatives, and they are not always available. Consumers can deposit their money in credit unions and cooperatives and can borrow money from them or from nongovernmental organizations (NGOs). But these organizations generally do not provide the same range of services as banks and tend to offer lower interest rates. As a result, demand in the banking sector is inelastic for both deposits and placements, with little competitive pressure.

The concentration of portfolio and deposits in a small group of customers illustrates the degree of market power on the demand side. This power can moderate the effect of market concentration on spreads and, in extreme cases, may involve negotiation of a bilateral monopoly.[18]

Despite these drawbacks to competition, the Bolivian capital market is expected to develop as a result of the structural reforms, especially the privatization of public enterprises and reform of the pension system. The privatization process will be bolstered by the government's capitalization scheme.[19] The new pension scheme, a private system with individual accounts, will have a profound effect on competition in the banking system as institutions compete for customers.

Results of the Survey

An important part of the analysis was a survey of 14 of the 17 banks operating in the Bolivian market. Each bank was asked a number of

[18] If the borrower is linked to the bank, the implications of this argument are lost.

[19] In the capitalization process, the state contributes 50 percent of the value of the new enterprise and the investor the other 50 percent. The stock held by the state is transferred to the Bolivian adult population through pension funds.

questions about the factors it considers when determining deposit and lending rates, as well as questions about strategies such as keeping customers (maintaining competitiveness), setting interest rates, and using interbank credits. Banks were also asked to describe their perceptions of the market and their outlook for the future.

Of the 17 banks, 12 (86 percent) take into account the decisions of a group of banks in the domestic market or one in particular. All the large banks take the behavior of other banks into account when setting their deposit rates, but two small banks, one wholesale and one retail, do not consider the behavior of other banks.

The survey found that nine banks (64 percent) take into account domestic interest rates (public securities) or international rates (the LIBOR or prime rate) when setting their deposit rate. The large wholesalers consider international rates and the large retailers, national rates. But ten banks (71 percent) do not consider inflation or devaluation in setting their deposit rates because most of their operations are dollarized. Wholesale and retail banks have different attitudes. Fifty percent of the latter take these indicators into account when setting their deposit rates.

On the lending side, ten banks (71 percent) set their lending rate without considering other banks' rates, relying more on their own financial indicators. In contrast, 75 percent of the small wholesale banks take other banks' rates into account. This result reveals the potential influence banks can have on groups of captive customers by offering a variety of products at different prices and using techniques such as "tied" sales that link, for example, mortgage loans and life insurance.

Additionally, six banks (43 percent), especially the retailers, consider high administrative expenses an important factor. Branches and the credit segment of the market generate these expenses. The large wholesale banks (the corporate segment) consider their administrative expenses low.

Eleven banks (78 percent, mostly small banks) have a predetermined policy for setting spreads. Once they have set the deposit rate in terms of the market, they use a markup to set the lending rate.

All but two small retailers (86 percent) indicate that the growth of short-term funds affects interest rates. These banks use govern-

ment securities as a temporary investment while they classify loan applications. These banks also regard state securities as a way to mitigate the financial cost of surplus liquidity because the securities generate additional net operating income at higher returns than do typical deposit rates.

With respect to strategy, both large and small banks, with the exception of one wholesaler and one retailer, say they grant preferential interest rates to certain customers. The better the guarantee, they say, the lower the risk and thus the interest rate.

Eight banks (57 percent) compete in both price and quality of services. Only one of the large banks competes in price, and only three of the small banks compete in quality. Additionally, 12 banks, or 86 percent, make little use of interbank credit, which is not considered a source of intermediation funds. Only two wholesale banks occasionally use this type of financing.

According to ten of the banks surveyed (71 percent), customers do not react to changes in interest rates because, among other factors, the banks offer additional services. Customers also appear to "identify" with their banks. Ten banks also reported that they were not influenced by the Tequila effect. Only two wholesale banks said they felt the effect through the higher price of Euro-paper, their source of external financing.

Finally, the outlook for interest rates and spreads varies somewhat across banks. Seven banks, or 50 percent, expect stability in the short term. Some 79 percent (11 banks) expect a fall in the medium term in response to competition from the stock exchange and the new pension system. These views confirm the banks' knowledge that as a system they are dealing with inelastic demand, which allows them to obtain higher spreads.

Empirical Evidence

The empirical evidence is based on analyses made for the banking system as a whole. The system is broken down by groups of banks, regressions, and individual banks using panel data. The objective was to verify whether the determinants of the spread vary for different categories of banks. The analysis takes into account previous stud-

ies on Bolivia, which were used to verify the importance of certain factors to interest rates and spreads. The evidence from the literature helped facilitate the definition of the variables that would be included.

Studies on Interest Rates and Spreads in Bolivia

To define the explanatory variables, the authors reviewed the results of different studies of the determinants of interest rates in Bolivia. Ramírez and de la Viña (1992) determined that macroeconomic risk induced by economic policy variables and country risk has caused high deposit rates in Bolivia since 1985. Other studies found that the high deposit rates were the result of problems of credibility owing to fiscal instability[20] and discretionary actions by those designing economic policy.[21]

At the microeconomic level, some studies found evidence that the administrative efficiency of the banking system, portfolios, capital adequacy, and the liquidity of the banks were among the determinants of lending rates.[22] Nina (1993) makes a deeper analysis of the microeconomic determinants of interest rates, showing the effects of nonperforming portfolios, liquidity, capital and reserves, bank provisions, administrative expenses, the LIBOR interest rate, and the CD discount rate. These results show that lending rates are higher in the presence of nonperforming portfolios, high administrative expenses, and low liquid assets and capital.

Apt and Schargrodsky (1995) emphasize that the oligopolistic behavior of commercial banks in Bolivia is an important determinant of high interest rates and spreads, although Crespo (1996) shows that the oligopoly is not collusive in nature. Comboni, de la Barra, and Ramírez (1992) analyze the relationship of high spreads to monetary policy, macroeconomic and country risk, and the efficiency of the banking system (measured as administrative expenses). Monetary policy analyzed through the legal reserve

[20] See Calvo and Guidotti, 1991.

[21] See Antelo, 1994.

[22] See World Bank, 1989; and Della Paolera, 1992.

requirement and open market operations (CDs) reveals a weak relationship with spread, indicating greater efficiency and therefore lower spreads in the banks that hold the largest portfolios in the system.

Antelo, Cupé, and Requena (1996) use macroeconomic variables (for example, the inflation rate as a measure of macroeconomic instability), the LIBOR rate (as a measure of country risk), and microeconomic variables (CAMEL) to evaluate the trend in deposit rates and spread. Their study shows that macroeconomic variables have a greater impact on deposit rates than do microeconomic variables. However, microeconomic variables have a more profound impact on spread.

Defining the Variables [23]

Two types of risk affect banking activity and consequently spread: *market* and *systemic risk. Market risk* has two components: *macroeconomic risk* and *country risk. Macroeconomic risk* is determined by variables such as monetary issues, inflation, and the fiscal deficit (which can indicate instability). *Country risk* is the difference between domestic and international interest rates (the CD rate less the LIBOR). *Systemic risk*, or the risk of the banking system (the deposit rate less the rate of CDs), can be expressed as the difference between the deposit rate and the rate of return on public securities (CDs), legal reserves, and the time differences between the terms of deposits and placements.

Systemic risk is attributable to each individual financial institution or to groups of banks with similar characteristics (size or market niche). The level of risk can be expressed with the CAMEL indicators: the weight of a portfolio (nonperforming portfolio/gross portfolio), capital adequacy (capital/total assets), efficiency (administrative expenses/gross portfolio), earnings (net operating income/capital), and liquidity (liquid assets/short-term liabilities).

[23] See Requena et al., 1998.

We also include as a possible determinant of spread the degree of competition in the system, as measured by the concentration index (C4). According to the structure-conduct-performance paradigm of industrial organization, the more a market is concentrated, the more susceptible it is to collusive behavior or the use of market power. But the paradigm of differential efficiency suggests that concentration can be inversely related to improvements in bank efficiency.[24]

Finally, effects of institutional (legal) changes are included using dummy variables for the Law of Banks and Financial Entities and the Central Bank Law.

Table 3.3 Unit Root Tests

	ADF
Total Banking System	-4.255328
Private National	-5.225861
CIT	-4.787863
CBB	-3.726443
BSC	-4.091825
BSO	-4.059906
BRE	-4.072977
BLP	-3.66386
BEC	-3.332961
BBA	-3.543543
BIN	-4.063234
BHN	-2.920864
BIS	-4.086054
BNA	-4.04886
BNB	-3.276451
BTB	-2.977711
BUN	-3.425524
BME	-3.324565
BDB	-9.657959
Critical Value (72 observations)	
1%	-3.5226
5%	-2.9017
10%	-2.5879

[24] See Demsetz, 1973.

The Econometric Estimates [25]

During the sampling period (January 1991 to December 1996), 72 observations were made for each variable.

Temporary or permanent shocks? To analyze whether the impact of a variable on spreads is temporary or permanent, unit root tests were used on the spreads of all the banks (Table 3.3). In all cases the variables are stationary, so the effects of shocks on spreads are temporary.

Analysis of the total banking system by breakdown of variance. In this section, the analysis is carried out in two stages. First, common factors are constructed to reduce the variables to four underlying factors, using the multivariate technique of factorial analysis.[26] Second, in order to project the variance of the error of the spread, the variance is broken down using ARV methodology to determine the statistical significance of each factor.

The factorial analysis summarized in Table 3.4 determined the existence of four factors that explain 90 percent of the variability of the series because they adequately represent the comovement. The four factors are grouped as follows:

- Factor 1: Time difference, reserve requirement, administrative expenses, and liquidity. These are interpreted as the different costs banks in the system encounter.
- Factor 2: Concentration index C4 and deposit rates minus CDs. This factor shows the structure and the trend of the aggregate banking system.
- Factor 3: Capital adequacy, portfolio quality, and earnings. This factor encompasses the financial variables of bank decisions.
- Factor 4: Monetary issue, the deficit, CDs minus the LIBOR. This factor represents the effects of monetary and fiscal policies.[27]

---

[25] The estimates in this work were made in the Eviews programs (version 2.0) and RATS (version 4.0).

[26] See Johnson and Wichwern, 1982.

[27] The deficit variable has a small factorial loading and was included in this factor for reasons of interpretation.

Table 3.4 Rotation Method: Varimax, Rotated Factor Pattern

	Factor 1	Factor 2	Factor 3	Factor 4
Issue	-0.26649	0.06282	-0.11402	0.50127
Fiscal Deficit	-0.06045	-0.10934	0.17656	0.06275
Reserve Requirement	0.88748	0.01103	-0.14595	-0.06595
CDs - LIBOR	0.05058	-0.07725	0.18199	0.82144
LIAB - CDs	-0.22435	0.89396	0.16946	-0.08889
Time Difference	0.78651	-0.21828	-0.24920	-0.09855
C4	0.13151	-0.89899	-0.02000	-0.07547
Capital Adequacy	-0.36671	0.39380	0.61770	0.43049
Assets	-0.29116	0.46662	0.75451	0.28842
Management	-0.66370	0.34978	0.42093	0.06969
Earnings	0.07080	-0.07134	-0.76741	0.25071
Liquidity	0.59849	-0.45573	0.08960	-0.42570

In the next step, the ARV model is estimated with four lags to guarantee sufficient degrees of freedom. In the general case, the arrangement of the endogenous variables in the system assumes a triangular form. This methodology is known as the *Cholesky factorization*. In the exercise, restrictions are imposed on the factors so that they depend solely on their lagged variables because they are orthogonal by construction. A prearrangement is also assumed: factor 4, factor 2, factor 3, factor 1, and spread, taking into account an ar- rangement of factors in which the macroeconomic variables are considered first, followed by the microfinancial variables, to explain the spread through all the factors.[28]

The results of the breakdown of variance of the spread (Table 3.5) show that about 24 percent can be explained by the spread itself, and 30 percent by fiscal and monetary policies (factor 4). Costs (factor 1) explain 18 percent, the structure of the banks and behavior (factor 2) another 17 percent, and financial variables (factor 3) another 11 percent.

[28] This methodology is adapted from the work of Calvo, Leiderman, and Reinhart (1993). The order of the factors would not affect the result, given their orthogonality.

Table 3.5 Breakdown of the Variance of the Spread Variable

Step	STD Error	Factor 4	Factor 2	Factor 3	Factor 1	Spread
1	0.174955	1.426290	2.734780	3.156350	2.429190	90.253390
6	0.326450	29.611360	12.677500	13.099870	15.011750	29.599530
12	0.358822	31.215720	14.848670	11.329360	17.565900	25.040350
18	0.365908	30.038900	16.537980	10.927850	18.398910	24.096360
24	0.367880	29.735150	17.282040	10.812080	18.330660	23.840070

Spread by Groups of Banks

The total banking system can be divided into private national and foreign banks. Because of their characteristics, private national banks can be further divided into large and small wholesale and retail banks (Table 3.6). Using the characteristics described in Table 3.6, banks can be classified by size (large or small), function (wholesale or retail), and country of origin (foreign or domestic).

Large and small banks. Large banks have a market share of over 6 percent (assets plus contingents). The following banks fall into this category: the BSC, BIS, BME, BNB, BHN, and BBA. The other national banks (BTB, BUN, BLP, BGA, BIN, BEC, and BSO) are small banks (see Box 3.1 for full names of banks).

Wholesale and retail banks. Bolivia's banks can be classified as wholesale or retail, based on variables such as the number of loans and branch offices. The BHN, BIS, BEC, BGA, and BUN are wholesale banks. The BSC, BBA, BNB, BME, BLP, BTB, BIN, and BSO are retail banks (see Box 3.1 for full names of banks).

Foreign banks. The four foreign banks played a very small role in the overall operations of the Bolivian banking system during the period under analysis, as they have a much lower volume of operations and far fewer branches than the national banks. In December 1991 the foreign banks' share of the total portfolio of the aggregate banking system was only 2.37 percent, accounting for a mere 1.53 percent of total deposits. In December 1996 the figures were about the same: 1.98 percent of deposits and 2.5 percent of the total portfolio. Each of the four foreign banks maintains only one office in the

country (in La Paz), with the exception of the BNA, which also has a presence in Santa Cruz. The national banks service an average of 5 provinces with 21 offices. The foreign banks also operate with far fewer employees—an average of 27, compared with 400 in the national banks. Foreign banks can be classified as wholesale banks, since they grant 58 percent more credit on average than the national banks.

Table 3.6 Basic Data on Private Commercial Banks

	Share (% Assets+ Conting.)		Average Credits (In thousands of bolivianos		Branches				Personnel (No. employees)	
					Number		Provinces			
	1991	1995	1991	1995	1991	1995	1991	1995	1991	1995
BSC	18.68	20.70	130.04	87.10	28	38	5	5	409	832
BBA	14.16	6.74	64.53	92.30	18	32	4	5	315	354
BNB	7.74	12.90	59.88	198.00	16	27	8	7	308	578
BUN	6.79	5.48	94.53	141.00	8	14	3	3	186	310
BME	8.26	10.12	73.65	113.60	15	22	5	6	326	410
BHN	8.50	9.46	402.36	918.80	4	5	3	3	170	283
CBB	3.65		59.09		11		5		174	
BIG	7.02		110.21		16		6		273	
BIS	5.95	11.06	364.55	1,454.00	4	12	3	3	134	269
BLP	4.85	4.65	37.11	83.20	10	16	6	7	240	415
BTB	4.90	5.81	25.88	83.80	13	16	7	7	230	374
BIB	3.79		100.38		3		2		83	
BIN	2.35	3.80	171.24	74.60	4	44	1	6	99	670
BEC	0.99	3.66	51.47	101.90	1	7	1	2	36	198
BSO		1.02		11.30		36		4		451
BGA		0.67		239.10		3		1		46
BRE	0.33	0.33	295.96	386.90	1	1	1	1	18	19
BNA	1.02	0.67	319.83	405.40	2	2	2	2	33	41
CIT	0.97	2.45	1,258.23	851.60	1	1	1	1	23	31
BDB	0.05	0.48	191.80	104.10	1	1	1	1	7	16
Total	100.00	100.00			156	280			3,064	5,341

Source: SBEF.

Total banking system. From 1991–96, the banking system as a whole reported an average spread of 5.9 percent, with a variability represented by a standard deviation of 0.4 percent (Table 3.7). The private national banks reported a spread slightly above this average, and the foreign banks had a spread about one percentage point lower. The large wholesale private national banks had the lowest spread in the system, followed by the small wholesale banks. The retail banks, both large and small, reported above average spreads.

The spread reported by small wholesale banks declined until 1994, although the spread for small retail banks has been stable since 1992. The behavior of the spreads of these two groups of banks is inversely related: when one group's spread increases, the other group's tends to fall (e.g., December 1993 and 1994 in Figures 3.2 and 3.3).

A similar relationship is reported between the spreads of the two groups of large banks (Figures 3.4 and 3.5). The spread for large wholesale banks fell sharply in 1993, stabilizing around the average level, while the spread for large retail banks increased in 1993.

Table 3.7 Bank Spreads (average 1991–96, percent)

	Total Banking System	Private National	Private Foreign	Large Wholesalers	Large Retailer	Small Wholesalers	Small Retailers
Spread	5.93	6.03	4.97	4.42	6.65	4.63	6.98
Standard Deviation	0.41	0.40	1.74	0.58	0.42	0.70	0.75
Maximum	6.72	4.97	12.50	5.68	8.02	6.42	8.38
Minimum	4.85	0.40	0.70	2.34	5.79	3.06	4.89

Source: Authors (based on SBEF information).

Figure 3.2 Spreads for Small Wholesale Banks

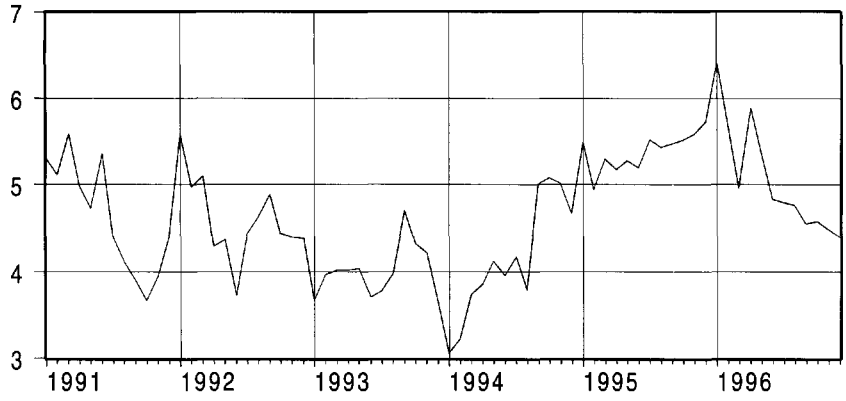


Figure 3.3 Spreads for Small Retail Banks

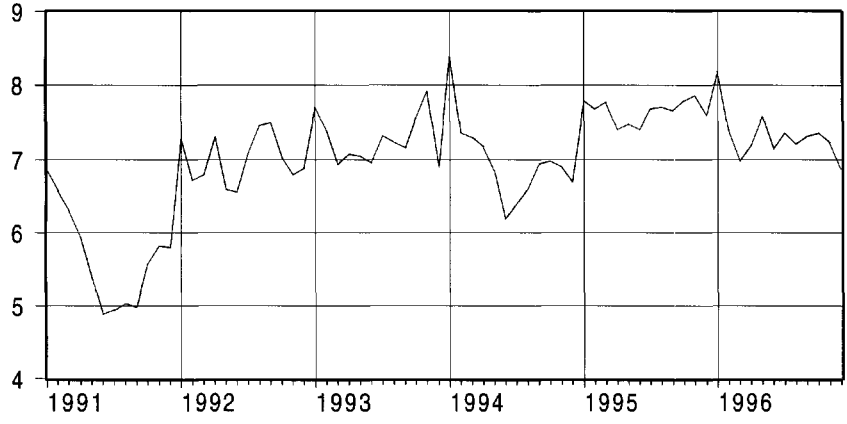


Figure 3.4 Spreads for Large Wholesale Banks

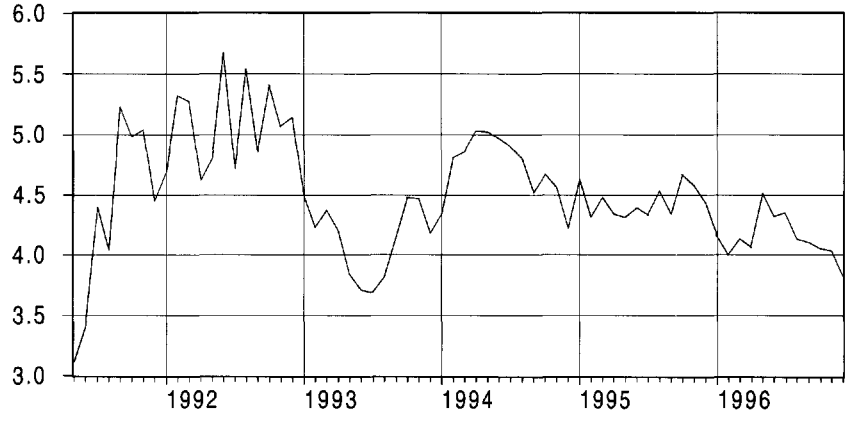
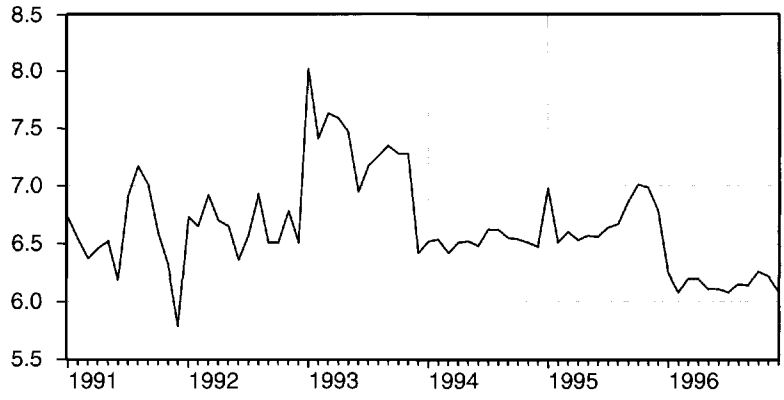


Figure 3.5 Spreads for Large Retail Banks



Results of the Econometric Models (by Type of Bank) [29]

The analysis covers 11 private banks for the period January 1991 to December 1996.[30] The panel data technique was used in two situations. In the first, the assumption is that only the term of intercept differs from bank to bank. In the second, in order to verify the differences with respect to the financial indicators, it is assumed that macroeconomic risks, bank concentration, and legislation affect all banks equally.

The panel data model has constant slopes over time and among banks, and its intercepts vary across banks in the system.[31] The number of monthly observations (T) considered in the work is relatively high and tends to increase between January 1991 and December 1996. The number of banks (N = 11) comprises almost all of Bolivia's banking universe. The sample is so large that it coincides with a census. Unlike the usual panel data models, where T is considered fixed and N tends to infinity, in this model the statistical properties of asymptotic character must be considered, so that N is fixed and T tends to infinity.

---

[29] The analysis is made with a level of significance of 10 percent.

[30] The BGA and BSO were excluded.

[31] The panel data model is of fixed effects. The alternative model of random effects was rejected because it involves a census of banks and not a sample (Judge et al., 1985). In this case the number of banks (N) is fixed.

Additionally, the model has serial correlation (lag in the endogenous variable). As the number of banks is fixed and the number of observations tends to infinity, the estimators of the coefficients that intervene in the model are consistent. This scenario is also unlike the one in which T is fixed and N tends to infinity.[32]

Table 3.8 Determinants of Spread: Panel Estimation, Fixed Effects Model With Variable Intercepts

Variable	Coefficient	Standard Error	t-Statistic	Probability
Issue	0.0076	0.0031	2.4450	0.0147
Deficit	0.0006	0.0002	2.9218	0.0036
AB Spread (-1)[a]	0.7920	0.0214	37.0322	0.0000
AB Portfolio	0.0202	0.0071	2.8266	0.0048
AB Capital Adequacy	0.0317	0.0125	2.5277	0.0117
AB Earnings	0.0110	0.0024	4.5142	0.0000
Fixed Effects				
BBA—C	-0.0727			
BEC—C	-0.3942			
BHN—C	-0.4716			
BIN—C	0.1710			
BIS—C	-0.5073			
BLP—C	-0.1333			
BME—C	-0.0521			
BNB—C	0.2724			
BSC—C	-0.0966			
BTB—C	-0.0175			
BUN—C	-0.4485			
R^2			0.8532	
Durbin-Watson			2.0555	
F-Statistic			338.0461	
Probability (F-Statistic)			0.0000	
F-Statistic: Equal Intercepts		54.007		

Note: Restrictions on all variables except intercept. Total panel observations 781.
a. AB = All banks.

[32] See Anderson and Hsiao, 1982.

In the first situation (Table 3.8), the macroeconomic risk (monetary issue and deficit) is significant, as is the lag of the spread, which has a coefficient of 0.79. Among the microeconomic variables, the weight of portfolio, capital adequacy, and earnings increase spread. The intercept is different for all banks, because each bank takes into account its own considerations in determining spread. If the intercept were the same for all banks, they would be setting their rates at approximately the same predetermined level.

In all cases, the lag shows that banks use past information on spreads to determine the new levels. The survey found that 79 percent of the banks set their lending rate only after adding a "margin" (based on their own characteristics) to the market deposit rate.

In the second case (Table 3.9), the macroeconomic risks (deficit and issue) and the time differences have a positive impact on spread, and legislation has an inverse effect. The lagged spread is significant for all banks considered—an important factor, given that the minimum coefficient is 0.43 and the maximum is 0.77.

The weight of the portfolio is statistically significant for only two banks and increases the spread. Capital adequacy is significant only in one bank and has a negative relationship with spread. Liquidity, which is significant for three banks, has a negative impact on two of them. The efficiency indicator is significant in five banks and positive in four. Earnings are significant in five banks, all with a positive sign.

Table 3.9 Determinants of Spread: Panel Estimation, Fixed Effects Model

Variable	Coefficient	Standard Error	F-Statistic	Probability
Issue	0.0076	0.0032	2.3727	0.0179
Deficit	0.0004	0.0002	1.8601	0.0633
Time Difference	0.0022	0.0010	2.1943	0.0285
Dummy Bank Law	-0.2084	0.1032	-2.0198	0.0438
BBA-Spread (-1)	0.5995	0.0900	6.6636	0.0000
BEC-Spread (-1)	0.7750	0.0414	18.7387	0.0000
BHN-Spread (-1)	0.7005	0.1036	6.7645	0.0000
BIN-Spread (-1)	0.4353	0.0585	7.4344	0.0000
BIS-Spread (-1)	0.6835	0.1374	4.9745	0.0000
BLP-Spread (-1)	0.5104	0.1200	4.2519	0.0000

Table 3.9 (continued)

Variable	Coefficient	Standard Error	F-Statistic	Probability
BME-Spread (-1)	0.7269	0.0846	8.5936	0.0000
BNB-Spread (-1)	0.4584	0.1794	2.5560	0.0108
BSC-Spread (-1)	0.5971	0.1576	3.7878	0.0002
BTB-Spread (-1)	0.5415	0.1285	4.2147	0.0000
BUN-Spread (-1)	0.6346	0.1298	4.8876	0.0000
BIN—Portfolio	0.0830	0.0198	4.1918	0.0000
BTB—Portfolio	0.0913	0.0390	2.3384	0.0196
BIN—Capital Adequacy	-0.1517	0.0311	-4.8826	0.0000
BBA-Liquidity	-0.0100	0.0058	-1.7069	0.0883
BEC—Liquidity	-0.0335	0.0100	-3.3421	0.0009
BLP—Liquidity	0.0485	0.0200	2.4286	0.0154
BBA-Admin. Expense	-0.4077	0.1672	-2.4389	0.0150
BEC—Admin. Expense	0.0494	0.0300	1.6479	0.0998
BIN—Admin. Expense	0.5121	0.0695	7.3739	0.0000
BNB—Admin. Expense	1.0452	0.4618	2.2632	0.0239
BUN—Admin. Expense	0.2082	0.1247	1.6696	0.0954
BHN—Earnings	0.0200	0.0098	2.0365	0.0421
BIN—Earnings	0.0516	0.0063	8.1953	0.0000
BLP—Earnings	0.0472	0.0151	3.1186	0.0019
BME—Earnings	0.0344	0.0161	2.1511	0.0318
BTB—Earnings	0.1077	0.0421	2.5574	0.0108
Fixed Effects				
BBA—C	4.4836			
BEC—C	1.2246			
BHN—C	-0.9764			
BIN—C	-0.7475			
BIS—C	0.4461			
BLP—C	-0.7291			
BME—C	-0.1732			
BNB—C	-2.5127			
BSC—C	1.3253			
BTB—C	2.8883			
BUN—C	-1.1773			
R^2			0.8801	
Durbin-Watson			1.9475	
F-Statistic			70.001	
Probability (F-Statistic)			0.0000	

Note: Restrictions on macroeconomic variables. Total panel observations 781.

Large and Small Wholesale and Retail Banks

The econometric estimates and the results of the survey of bank executives reveal that the behavior of banks differs according to market, not according to size. Thus, the spread levels of both small and large wholesale banks are similar and considerably lower (around 33 percent) than those of retail banks. The administrative expenses of wholesale banks are also lower than those of the retail banks, reflecting the absence of economies of scale in Bolivia's banking sector.

As Table 3.10 shows, large, wholesale bank spreads are negatively affected by concentration, capital adequacy, and systemic risk. The lagged spreads are highly significant, with a coefficient of 0.7 as the intercept.

For large retail banks, microeconomic risks such as monetary issue and the fiscal deficit are also significant and increase the spread. These risks are in addition to the intercept, lagged spread, and concentration, which have the same impact on large retail banks as on large wholesale banks. Time differences and liquidity (both of which have a positive effect), portfolio weight (which has a negative effect), and the new legislation result in lower spreads.

The effect of concentration on spread is negative for large banks (both wholesale and retail) and positive for small wholesale banks. For small banks, this apparently contradictory result can be explained by the traditional theory of industrial organization. More concentration implies that there is a greater possibility of using market power—and thus of higher spreads. For large banks, the increase in concentration is the result of improved efficiency, in line with the Demsetz hypothesis of "differential efficiency."[33] For small wholesale banks, increases in country risk, concentration, and earnings raise the spread, and the new legislation tends to reduce it. The lag of the spread is important in making decisions.

Country risk has a significant effect on only the spreads of small wholesale banks. Although previous studies show that this variable is important in explaining deposit rates, it does not affect spreads.

[33] See Tirole, 1989; and Scherer and Ross, 1990.

The fact that it does not suggests that lending rates are adjusted in line with changes in deposit rates and LIBOR. In the case of small retail banks, increases in reserve requirements and the public deficit raise spreads, while the weight of the portfolio reduces them. All the banks make their decisions on current spreads based on the levels of lagged spreads. For small banks, spreads and earnings are positively related.

Table 3.10 Spread Estimators (t-statistics in brackets)

Variable	Large Wholesalers	Large Retailers	Small Wholesalers	Small Retailers
C	6.2126	4.1851		
	(5.0094)	(2.4611)		
Issue		0.0137		
		(3.1976)		
Deficit		0.0005		0.0007
		(2.2584)		(2.0595)
Legal Reserve				0.0604
				(1.6889)
Deposit Rate–CDs	-0.0234			
	(-1.6797)			
CDs – LIBOR			0.0965	
			(3.7013)	
Time Differences		0,0030		
		(2.4881)		
C4	-0.0567	-0.0461	0.1313	
	(-3.6560)	(-2.2398)	(3.0765)	
Liquidity		0.0165		
		(1.9009)		
Earnings			0.0232	0.0221
			(2.8697)	(1.8740)
Portfolio Quality		-0.0646		-0.0784
		(-2.1886)		(-3.0402)
Capital Adequacy	-0.1267			
	(-2.5182)			
Spread (-1)	0.6686	0.3257	0.3032	0.5459
	(5.2433)	(3.0480)	(2.6314)	(6.5292)
Dummy Bank Law		-0,3965	-0,4855	
		(-2.2833)	(-1.8120)	

Table 3.10 (continued)

Variable	Large Wholesalers	Large Retailers	Small Wholesalers	Small Retailers
EQUATION OF VARIANCE				
B	0.0030			
	(2.2552)			
e^2 (1)	-0.0121			
	(-1.9339)			
R^2	0.6206	0.7525	0.7632	0.8095
F-Statistic	5.8896	13.3339	15.5776	22.7918
Probability (F-Statistic)	0.0000	0.0000	0.0000	0.0000
Ljung Box Q (12)	16.7700	10.4300	10.6770	10.2010
Probability	0.1150	0.5780	0.5570	0.5980
ARCH Test F (12)		0.9215	1.1457	0.8508
Probability		0.5338	0.3491	0.5999
Reset F		0.8594	0.1379	2.0011
Probability		0.4290	0.9369	0.1243
Jarque Bera	2.6466	1.6122	7.9877	5.093
Probability	0.2663	0.4466	0.0200	0.0783

Note: All the regressions have the same specification, although coefficients of variables that are not statistically significant are not reported. In some cases, GARCH specifications were used to eliminate heteroskedasticity.

Increases in required reserve levels raise the spreads of small retail banks. In the period under study, legal reserve requirements did not rise. A possible explanation for this fact is that greater economic stability provoked an increase in the proportion of demand deposits, which are subject to higher reserve requirements than time deposits.

The results of the weight of the portfolio are also conclusive. They appear significant, with a positive sign for two retail banks (using panel data) and a negative sign for large and small retail banks. This result could be caused by two contrary effects. When nonperforming portfolios worsen, interest income falls, and earnings and spreads decline. Banks then increase their spreads to maintain a certain level of earnings. This indicator—theoretically the most significant of specific bank risks—does not generate conclusive results because of the problems of moral hazard associated with the

existence of implicit deposit insurance. Ultimately, bank customers do not adequately assess the financial situation of the banks they patronize, and banks do not have to fully internalize the costs of their poor portfolio decisions.

Liquidated Private Banks

Bank spread that is higher than the system average is not necessarily bad and does not always need to be reduced. On the contrary, experience from bank crises shows that the banks with the lowest spreads present the most risk because they are often relying on a lender of last resort. As a result, they take excessive risks in difficult periods, paying high rates to attract depositors. However, this risk is not fully reflected in lending rates because periods of crisis are generally associated with a slowdown in economic activity. During these slowdowns, high-interest loans are more difficult to place. The risk is thus transferred to the monetary authority, and high-risk banks have low spreads.

During the period under analysis, the BIB and BIG merged to create the BSR, which was liquidated in October 1994 (together with the CBB). The banks shared three characteristics at the time of the mergers and liquidations: lower-than-average spreads, above-average variability, and relatively large nonperforming portfolios (Table 3.11). The situation suggests that in Bolivia low spreads do not necessarily reflect a healthy financial position. For this reason, efforts to reduce spreads may not always be warranted. Low levels of spread can mean high levels of competition, but they can also mean high risk.

A statistical analysis was made of the CBB, as it was the only bank on which detailed information was available. Among the macroeconomic variables, the only statistically significant variable was monetary issue. There was a direct correlation between increases in monetary issue and increases in bank spreads.[34]

[34] The CBB used lagged spread as an indicator of its current levels. The new legislation apparently prompted the bank to reduce its spread.

Table 3.11 Financial Indicators

	SBT (1993)	BIB	BIG	SBT (1994)	CBB	BSR
Average Spread	6.10	6.06	4.72	5.56	5.49	0.81
Standard Deviation of Spread	0.32	1.71	0.50	1.24	2.86	0.69
Indicators						
NP Portfolio / Gross Portfolio	9.11	16.64	11.95	7.73	32.21	18.10
Administrative Expenses / Gross Portfolio	5.43	4.42	4.36	5.19	6.74	4.76

Source: SBEF.

Among the microeconomic variables, four variables (with the exception of administrative expenses) are statistically significant. Increases in spreads are related to increases in liquidity (opportunity costs), nonperforming portfolio and earnings, and reductions in capital and reserves that result in low levels of leverage.

New Banks

No clear trend in spreads emerges in the early months of the new banks. The BIN and BSO reported higher-than-average spreads, while those for the BGA, BIR, and BEC were much lower. A common characteristic is that the variability of the spreads is higher than the system average.

The BGA, BSO, and BIR are not included in the statistical analyses because of limitations on information. Even so, analyzing the BSO is useful because this bank services the microenterprise segment of the market with a system of joint guarantees rather than the mortgages common in the rest of the system. The results for this bank suggest that the macroeconomic variables are not statistically significant (Table 3.12). The time difference affects systemic risk (a direct relationship with spread), and microeconomic variables predominate in the explanation of the spread. Higher spreads are related to higher liquidity, earnings, and administrative costs and to larger nonperforming portfolios.

Table 3.12 Spread Estimators (t-statistics in brackets)

Variable	CBB	BSO
C	15.0189	-40.9676
	(3.5050)	(-5.9783)
Issue	0.0661	
	(2.2351)	
Time Differences		0.0614
		(6.2743)
Liquidity	0.1031	0.0323
	(2.6595)	(3.0768)
Earnings	0.0271	0.2429
	(2.2487)	(4.3329)
Portfolio Quality	0.1016	0.7741
	(2.0109)	(4.1081)
Capital Adequacy	-1.2944	
	(-2.9729)	
Administrative Expenses	0.1398	
		(2.0927)
Spread (-1)	0.3309	
	(2.1398)	
Dummy Bank Law	-3.3407	1.7516
	(-2.9276)	(2.4484)
GARCH		2.6833
		(3.7802)
VARIANCE EQUATIONS		
B		0.4117
		(1.4373)
e^2 (1)		0.2773
		(2.8738)
Conditional Variance (1)		0.4092
		(1.6374)
R^2	0.7332	0.8457
F-Statistic	7.9698	13.6972
Probability (F-Statistic)	0.0000	0.0000
Ljung Box Q (12)	11.6400	16.238
Probability	0.4750	0.1810
ARCH Test F (12)	1.2213	
Probability	0.3520	
Reset F	1.2088	
Probability	0.3229	
Jarque Bera	2.7812	2.7698
Probability	0.2489	0.2504

Note: All the regressions have the same specification, although they do not report the coefficients of the variables that were not statistically significant. For the BSO, a GARCH-M model was used because of the heteroskedasticity.

The new legislation, which includes strict requirements by the SBEF, seems to have affected this bank by increasing spreads. Some risk not captured by the macroeconomic variables or country risk is significant in explaining the higher levels of spreads.[35]

State Banks

Bolivia no longer has either a state commercial or development banking sector. The banks in this sector proved unable to operate efficiently, had higher-than-average administrative expenses, and held large nonperforming portfolios. The state banks in operation until 1992 were Banco del Estado (BDE), Banco Minero de Bolivia (BMB), and Banco Agrícola de Bolivia (BAB).[36] Only the BDE took deposits from the public (in 1990 its share was 4 percent of total banking deposits). The state share of the portfolio was more significant—13.6 percent of the banking system in 1990.

Table 3.13 shows that the BDE has an extremely unstable spread, as measured by the typical deviation of the variable (which is slightly higher than for the total banking system). With respect to the financial indicators, these banks had large nonperforming portfolios and high administrative expenses at the time of liquidation. The principal reasons for their liquidation were the change in the Bolivian eco-

Table 3.13 Indicators of the Liquidated Public Banks (percent)

	SBT (1991)	BAB	BMB	SBT (91-93)	BDE
Average Spread	5.42			5.80	6.45
Standard Deviation of Spread	0.37			0.34	1.15
Indicators					
NP Portfolio / Gross Portfolio	15.77	67.66	72.90	9.31	49.90
Administrative Expenses / Gross Portfolio	7.14	4.55	8.00	5.88	10.05

Source: Prepared with information from the SBEF.

[35] As the original model estimated for the BSO presented problems of heteroskedasticity in the residuals, it was reestimated using a GARCH-M model to adjust the heteroskedasticity and incorporate it as a determinant of spread.

[36] BAB and BMB were liquidated in 1991 and BDE in 1993.

nomic model, the policy of international organizations toward development banks, and losses on portfolios. Because little information is available on the period under analysis, these banks are not included in the econometric analysis.

Total Banking System: National and Foreign Private Banks

The analysis of the total banking system presented in Table 3.14 reveals that high macroeconomic risks (increases in monetary issue and the fiscal deficit) lead to high spreads. In contrast, an increase in the difference between system deposit rates and CD rates reduces spreads. Time differences between lending and deposit operations explain this outcome, as these differences can introduce lags when lending rates are adjusted in response to changes in deposit rates.[37] Maintaining balanced fiscal accounts reduces pressure on the rates of public securities and helps keep spreads low. The lower rates of return on public securities have the additional effect of increasing the opportunity cost of surplus liquidity with respect to portfolio placements. This effect puts pressure on the banks to place a larger volume of funds, often by reducing the lending rate and with it, the spread. The incentives for short-term capital inflows also become weaker, improving the stability of the banking system.

Liquidity appears significant and positively related to spread. Although liquidity complements capital adequacy, and banks are obliged to maintain a minimum level of technical reserves, surplus liquidity has financial costs. To compensate for these costs, spreads may rise. According to the survey, 11 of the 14 bank managers questioned said that returns on public securities moderate the negative effects of surplus liquidity. In this respect, the "hot money" that appeared in the Bolivian banking system with the inflow of short-term capital seems to have increased spread.

The time difference between lending and deposit operations in the system appears significant in the analysis of the aggregate banking system, as well as in some specific groups. The positive effect on

[37] This fact explains why the cost of deposits rises.

Table 3.14 Spread Estimators (t-statistics in brackets)

Variable	Total System	Private National	Foreign
C	1.7897	2.8659	-14.8181
	(1.5689)	(2.6922)	(-3.8524)
Issue	0.0114	0.0105	
	(3.4279)	(3.2920)	
Deficit	0.0006	0.0007	
	(3.2103)	(3.6757)	
Legal Reserve			0.3271
			(4.2447)
Deposit Rate-CDs	-0.0359	-0.0412	-0.0684
	(-2.9197)	(-3.1491)	(-2.2901)
Time Difference	0.0040	0.0045	
	(3.8100)	(4.1733)	
C4			0.1947
			(3.4176)
Liquidity	0.0127		
	(1.8030)		
Earnings	0.0139	0.0038	0.0198
	(1.8452)	(2.6609)	(4.5274)
Portfolio Quality	-0.0500		
	(-2.7418)		
Capital Adequacy	0.1363	0.2568	
	(3.6175)	(2.7950)	
Administrative Expenses			0,0820
			(2.7909)
Spread (-1)	0.2274	0.1692	0.5217
	(2.7252)	(1.8074)	(5.9945)
Dummy Bank Law	-0.3702	-0.3194	
	(-2.8945)	(-2.4419)	
R^2	0.8236	0.8043	0.8020
F-Statistic	20.468	18.022	15.9081
Probability (F-Statistic)	0.0000	0.0000	0.0000
Ljung Box Q (12)	11.3830	13.5980	13.3740
Probability	0.4120	0.3270	0.2700
ARCH Test F (12)	0.5778	0.2849	0.4933
Probability	0.8485	0.9890	0.9079
Reset F	2.3155	1.5588	1.5501
Probability	0.1082	0.2195	0.2018
Jarque Bera	3.2400	4.1156	2.6254
Probability	0.1979	0.1277	0.2691

Note: All the regressions have the same specification, although the coefficients of the statistically insignificant variables were not reported.
Ljung Box: Tests the serial correlation up to i-th order in the residuals.
ARCH: Verifies the existence of conditional heteroskedasticity in the residuals.
RESET: This is the Ramsey test to verify the specification of the functional form.
Jarque-Bera: Proof of the normality of the distribution of the residuals.

spreads is explained by the fact that long time differences carry with them high risks that can be compensated for only with high levels of earnings and spreads. The time differences are expected to fall in the next few years, reducing the liquidity premium (which can be implicit in the explanation of the spread) and making a decisive contribution to economic stability.

The results for the financial indicators are as follows:

- The capital adequacy indicator has a positive relationship with spreads for the aggregate banking system. This result is explained by the opportunity cost to banks of maintaining a low level of leverage.
- Administrative expenses are not generally a variable that helps to explain the behavior of the spreads. This outcome is confirmed by the survey, which shows that fewer than half the banks consider their administrative expenses high. However, banks relate their administrative costs to the market they serve: wholesale banks believe their administrative expenses are low, but retailers believe the opposite.
- Earnings are also significant. One explanation for this result lies in the way banks set their interest rates, as the survey shows. In this case, promoting competition in the banking system contributes to lower spreads.
- The dummy variable, which measures the impact of the new legislation, is also significant in reducing spreads.
- Lastly, banks take into account the previous spreads when setting the current level.

Repeating the exercise for private national banks generates similar results, except that liquidity and portfolio weight are not statistically significant. For foreign banks, however, increases in reserve levels, market concentration, and administrative expenses raise spreads. The new banking legislation does not have any significant effect. As in the previous cases, a drop in the difference of deposit rates less CDs increases spreads, as do increases in earnings. These banks also take past spread levels into account in setting future levels.

In most of the cases studied, the new legislation tends to lower spreads. This result is not surprising. The legislation creates an environment that favors a modern banking system adapted to the new economic model and modernizes the financial market by authorizing innovations such as full-service banks.

Strengthening the institutional and regulatory framework for supervising the banking system also helps reduce spread. The new framework helps define property rights, improve the administration of justice, decrease transaction costs, and reduce the risks implicit in granting credit. These measures have improved the evaluation of lending risks so banks need not always require collateral and expanded the universe of potential borrowers.

In addition to strengthening existing institutions (the SBEF and Central Bank), the government is making progress in its efforts to construct an integrated system of financial regulation known as SIREFI. SIREFI encompasses the bank regulatory agencies (including institutions such as credit unions and cooperatives), as well as organizations that handle insurance, pensions, and securities, with the aim of generating greater competition and decreasing spreads over time.

Linkage and the Relationship between Spread and Economic Activity

In bank-based financial systems such as Japan's and those of several European countries, very close relations generally exist between banks and nonfinancial firms. In fact, banks often hold part of the capital of these firms. Although Bolivia's Law of Banks and Financial Entities prohibits banks from holding shares in nonfinancial companies, companies of this type do participate in the share composition of banks, so that the Bolivian banking system resembles a bank-based system.

The Advantages of Linkage

This type of institutional linkage offers many advantages compared with a stock exchange–based system.[38] Linkage reduces the problem of asymmetric information by reducing the transaction costs of searching for information on lenders.[39]

[38] A system of companies whose shares are traded on the stock exchange. Generally, the relationship between banks and nonfinancial firms tends to be more distant.

[39] In Bolivia, the practice of using mortgages to back credits weakens the advantage linkage should offer in lowering the costs of gathering information.

The risk of bankruptcy is also lower with linkage because banks, in their role as shareholders, can address temporary shortages of liquid assets in nonfinancial firms. The problem of agency also becomes less important, as banks become principals and shareholders if nonfinancial firms act as agents. If linkage did not exist, the agent's objective would be to appropriate the greatest possible share of the lenders' funds in order to make suboptimum investments, at least from the lender's point of view. With linkage, the interests of both converge, because the problem of agency is eliminated.

The Disadvantages of Linkage

The problem of agency continues even with integration between banks and firms, however. If borrowers gain more from firms than from banks, perhaps going so far as not repaying loans, then banks run into difficulties. One of the concerns of banking regulators in systems in which banks form conglomerates with nonbank or nonfinancial firms is that a healthy bank can suffer from the bankruptcies of nonbank affiliates (and even nonaffiliates). A conglomerate can transfer its financial or administrative funds, in biased form, from one affiliate or subsidiary to another, or it can promote crossed subsidies through, among other things, tied sales. Such arguments do not apply only to nonbank affiliates. A conglomerate can assign risks to the banking part of a business if the price of its debt (deposits) is not sensitive to risk.

This subject is important in discussing Bolivia because linkage has been pinpointed as the cause of most bank liquidations since 1987 (Rocaboado, 1996). The assumption is that linked credits are made on more favorable conditions than the rest of the portfolio, even assuming major risks of nonperformance. The justification is that loans are made to borrowers related to the institution in line with the prevailing economic group's objective, which is to maximize the profits of the group rather than those of the bank.

According to the Law of Banks and Financial Entities, linked credit operations are defined as those granted to borrowers or borrower groups that control or hold 10 percent or more of the capital of the bank; those in which receivers or directors of the bank hold over 50 percent of the ownership, control, or management of the

borrowing group, in which one-third of its directors are shareholders, receivers, or employees of the bank; or the granting of credits to borrowers without prior credit check.

Additionally, banks cannot make credit operations with their administrators or with borrowers or borrower groups linked to the administrators. The Central Bank Law restricts the granting of linked credit even further by including in the definition of linked borrower groups all entities that are in any way interrelated with respect to ownership, administration, guarantees, activity, or use of credit if the relationship determines that such loans have the same risk. Lastly, the SBEF may presume that borrowers are linked *juris tantum*.

The Linkage Test

In a monetary contraction, banks face higher interest rates and smaller portfolios, a scenario that causes firms to issue paper on the stock exchange. Spreads capture cyclical changes related to problems of asymmetric information and the possibilities of bankruptcy. The premium on the asymmetric information captured in the lending rate is procyclical, so that the spread can be used as a key indicator of economic activity. Increases in spread can be associated with subsequent falls in product.

If bank linkage reduces the problems of asymmetric information and the potential risk of bankruptcies, then spreads will be a less powerful key indicator. To prove this assumption, Tease and Browne (1992) formulated a test that verifies whether the lagged variables of the spread have a significant effect on product, using autoregressive vector models (ARV).[40] The growth rate of the product of the manufacturing industry was used to apply the model to Bolivia, representing the trend in economic activity[41] and the spreads of the total banking system.[42]

---

[40] See SIMS, 1972 and SIMS, 1980.

[41] This indicator was preferred to the general indicator of economic activity (the monthly index of economic activity) to avoid problems related to seasonal variations in the agricultural sector.

[42] These two variables are stationary, having been used without transformation. The results presented take into account the test for the set of lagged spread variables. Taken individually, none of them is statistically significant.

The results of Table 3.15 show that, in the case of Bolivia, spreads do not have a statistically significant effect on product and are thus not a key indicator of economic activity. This result is similar to the results found for France, Germany, and Japan—countries with bank-based systems.[43] In these countries, the problem of asymmetric information and the risk of bankruptcy are potentially lower than in countries with stock exchange–based systems.

Policy Recommendations

The analysis shows that spreads in Bolivia can be explained by the macroeconomic risks associated with fiscal and monetary policies, the financial characteristics of each bank, the lack of competition inside the banking system (and in other markets), and the institutional and legal framework. External factors such as country risk do not have a significant influence on spreads. The Mexican crisis did not affect Bolivia as much as it did other countries in the region (e.g., Brazil and Argentina) for three reasons: the high degree of dollarization of deposits, the underdeveloped securities market, and an economic stabilization policy based on monetary and fiscal instruments rather than on the exchange rate as a support for domestic prices.

The results of the survey confirm the low statistical significance of variables such as inflation and devaluation. The survey revealed that 71 percent of banks do not consider these indicators when setting their interest rates. This attitude is explained by the extremely high degree of dollarization of Bolivian banking operations.

Table 3.15 Product-Spread Ratio: Wald Test
(Verification of the statistical significance of the spread lags in the product equation)

	F-Statistic	Probability
4 Lags	1.00	0.41
8 Lags	0.88	0.54
12 Lags	0.87	0.59

[43] See Browne and Tease, 1992.

What are typically relatively high levels of spread reveal the inefficiency of Bolivian banks in performing the principal functions of banking systems: financial intermediation and the transformation of risks and terms. However, the evidence presented shows that spreads are low in times of crisis or bank liquidations. Low spreads are directly related to risk-taking by banks, as the existence of implicit deposit insurance provokes problems of moral hazard and adverse selection.

A space exists for increased competition in the banking system so that other financial agents can enter the system. To promote competition, measures aimed at eliminating moral hazard and adverse selection can be put in place. The institutional and legal framework can also eliminate implicit deposit insurance and guarantee that information is more widely disseminated, facilitating the movement of customers among banks. The structural reforms—especially pension reform—will contribute to the development of the capital market.

Monetary and fiscal policies aimed at maintaining economic stability result in lower levels of spread, since such policies reduce risks for banks. In contrast, increases in the rates of public securities increase spreads. For this reason, stable rules are preferable to discretionary policies. Balanced fiscal and monetary policies designed to achieve a sustained reduction in levels of spread will help preserve macroeconomic stability.

In short, policy measures can reduce the spread of interest rates, as long as they take into account the need to guarantee the financial health of the banking system. These measures, which can be extended to other Latin American countries with similar economic characteristics, are:

- Macroeconomic policies that guarantee monetary and fiscal stability;
- Measures to stimulate competition inside the banking system and with other financial agents, including encouraging the development of the stock market and financial services as substitutes for banks, eliminating implicit full deposit insurance, and disseminating information on the financial position of banks; and
- Improvements in the regulatory and legal framework, including strengthening regulatory agencies, improving the definition of property rights, and guaranteeing that debts can be recovered through the country's judicial system—a measure that will also expand the pool of potential borrowers.

References

Afcha, G., Cuevas, J. and Larrazabal, E. 1992. "Desintermediación y liberalización financiera en Bolivia." Análisis económico. 3 (April): 102. La Paz, Bolivia: Unidad de Análisis de Políticas Sociales y Económicas.

Anderson,T.W. and Hsiao, C. 1982. "Formulation and Estimation of Dynamic Models Using Panel Data." *Journal of Econometrics.* 18: 47–82.

Antelo, E. 1994. "Reglas, discreción y reputación: una explicación para las elevadas tasas de interés en Bolivia." Análisis económico. 9 (November): 7–21. La Paz, Bolivia: Unidad de Análisis de Políticas Sociales y Económicas.

Antelo, E., Cupe, E., and Requena, B. 1996. "Determinantes microeconómicos y macroeconómicos del spread en Bolivia." Análisis económico. 15 (June): 91–111. La Paz, Bolivia: Unidad de Análisis de Políticas Sociales y Económicas.

Antelo, E., Cupe, E., Escobar, J., and Martinez, A. 1995. "Análisis de la evolución del sistema bancario nacional." Análisis económico. 12 (May): 31–63. La Paz, Bolivia: Unidad de Análisis de Políticas Sociales y Económicas.

Apt, J., Schargrodsky, E. 1995. "Market Structure of the Bolivian Banking System." Harvard University. Cambridge, MA, United States. Mimeographed document.

Bollerslev, T. 1986. "Generalized Autoregressive Conditional Heteroscedasticity." *Journal of Econometrics.* 31:307–27.

Browne, F. and Tease, W. 1992. *The Information Content of Interest Rate Spreads across Financial Systems.* Paris, France: Organization for Economic Cooperation and Development.

Calvo, G. and Guidotti, P. 1991. "Interest Rates, Financial Structure and Growth: Bolivia in a Comparative Perspective." Paper presented at the Conference on Stabilization and Growth in Bolivia. La Paz, Bolivia.

Calvo, G., Leiderman, L. and Reinhart, C. 1993. "Capital Inflows and Real Exchange Rate Appreciation in Latin America." Working Paper WP/92/62. Washington, DC, United States: International Monetary Fund.

Comboni, J., De La Barra, V. H., and Ramirez, J.R. 1992. "El problema de los altos 'spreads' en el sistema bancario." La Paz, Bolivia. Mimeographed document.

_____. 1993. "Alternativas en la Política Monetaria de Tasas de Interés." Análisis económico. 7(July):97–113. La Paz, Bolivia: Unidad de Análisis de Políticas Sociales y Económicas.

Crespo, C. 1996. "Inexistencia de un cártel en la banca comercial privada boliviana." Master's Thesis. Santiago, Chile: Catholic Pontificial University of Chile.

Della Paolera, G. 1992. "Los spreads financieros en el sistema financiero boliviano." La Paz, Bolivia. Mimeographed document.

Demsetz, H. 1973. "Industry Structure, Market Rivalry and Public Policy." *Journal of Law and Economics.* 16 (April): 1–10.

Dewatripont, M. and Tirole, J. 1993. *The Prudential Regulation of Banks.* Cambridge, MA, United States: MIT Press.

Dickey, D. and Fuller, W. 1979. "Distribution of the Estimators for Autoregressive Time Series with a Unit Root." *Journal of the American Statistical Association.* 74: 427–31.

Engle, R. 1982. "Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation." *Econométrica.* 50: 987–1007.

Engle, R. and Bollerslev, T. 1986. "Modelling the Persistence of Conditional Variances." *Econometric Review.* 5: 1–50.

Engle, R. and Granger, W. 1987. "Cointegration and Error Correction Representation, Estimation and Testing." *Econométrica.* 37: 424–438.

Ferrufino, R. 1993. "Mercado bancario boliviano." Análisis económico. 7 (July): 53–97. La Paz, Bolivia: Unidad de Análisis de Políticas Sociales y Económicas.

Friedman, B. and Kuttner, K. 1991. "Why Does the Paper-Bill Spread Predict Real Economic Activity?" NBER Working Paper 3879. Cambridge, MA, United States: National Bureau of Economic Research.

Gaceta Oficial de Bolivia. 1993 "Ley de Bancos y Entidades Financieras." Bolivia.

_____. 1995. "Ley del Banco Central de Bolivia." Bolivia.

Hanson, J. and Rezende Rocha, R. 1986. "High Interest Rates, Spreads, And The Costs Of Intermediation." Industry and Finance. Series 18. Washington, DC, United States: World Bank.

Hausman, J. 1978. "Specification Tests In Econometrics." *Econométrica.* 46: 1251–1271.

Hsiao, C. 1986. *Analysis of Panel Data.* New York City, NY, United States: Cambridge University Press.

Johnson, R. and Wichwern, D. 1982. *Applied Multivariate Statistical Analysis.* Englewood Cliffs, NJ, United States: Prentice Hall.

Judge, G. 1985. *The Theory and Practice of Econometrics.* New York, NY, United States: John Wiley and Sons, Inc.

Konishi, T., Ramsey, V. and Granger, C. 1993. "Stochastic Trends and Short-Run Relationships between Financial Variables and Real Activity." NBER Working Paper 4275. Cambridge, MA, United States: National Bureau of Economic Research.

Mollinedo-Trujillo, C. and Guelacar, A. 1995. "Determinación de las tasas de interés en el sistema financiero de Bolivia (1992–1995)." Working Paper Gerencia de Estudios Económicos. La Paz, Bolivia: Banco Central de Bolivia.

Nina, O. 1993. "Determinantes microeconómicos de la tasa de interés." Instituto de Investigaciones Socioeconómicas. La Paz, Bolivia.

Ramirez, J.R. 1992. "Los certificados de depósitos y la política económica." Análisis económico, 4 (June): 267–338. La Paz, Bolivia: Unidad de Análisis de Políticas Sociales y Económicas.

Ramirez, J. and De La Viña, J. 1992. "Tasas de interés en la post-estabilización." La Paz, Bolivia: ILDIS.

Requena, B., Antelo, E., Crespo, C., Cupe, E. and Ramirez, R. 1998. "Determinantes del Spread en las tasas de interés bancarias en Bolivia." Working Paper R-336. Washington, DC, United States: Inter-American Development Bank.

Rocabado, C. 1996. "Vinculación, eficiencia, riesgos y los procesos regulatorios en el sistema bancario Bolivianos." Tesis de grado para la obtención del título de Licenciatura. La Paz, Bolivia: Bolivian Catholic University.

Rojas-Suárez, L. and Weisbrod, S.R. "Managing Banking Crises in Latin America: The Do's and Don'ts of Successful Bank Restructuring Programs." IDB Working Paper 319. Washington, DC, United States: Inter-American Development Bank.

Scherer, F. and Ross, D. 1990. *Industrial Market Structure and Economic Performance*. Third edition. Boston, MA, United States: Houghton Mifflin.

Sims, C. 1972. "Money, Income and Causality." *American Economic Review.* 62 (4): 540–52.

_____. 1980. "Macroeconomics and Reality." *Econometrica.* 48: 1–48.

_____. Cartas Informativas Semanales, various issues.

_____. Memorias Anuales, various issues.

Tirole, J. 1989. *The Theory of Industrial Organization.* Cambridge, MA, United States: MIT Press.

World Bank. 1989. *Informe sobre el desarrollo mundial 1989.* Washington, DC, United States: World Bank.

_____. 1991. *Bolivia: From Stabilization to Sustained Growth.* Washington, DC, United States: World Bank.

This page intentionally left blank

CHAPTER 4

Macroeconomic Influences on Bank Spreads in Chile, 1990–95

Rodrigo Fuentes and Miguel Basch[1]

The financial sector is key to a healthy economy. It plays an essential role in economic activities by providing intermediation for savings and investment, which determine the long-term growth of an economy and ultimately the welfare of future generations. *Bank spread*, or the difference between lending and deposit rates (in foreign currency), is one of the most important variables in the financial sector. High spreads reflect market inefficiencies that discourage savings and investment, while low spreads indicate that banks are financing too many risky projects.[2] An understanding of the determinants of bank spreads can help policymakers design measures that target possible sources of inefficiency in financial markets.

This chapter seeks to identify the economic determinants of bank spreads in Chile. Hypothetically, three kinds of factors can influence spreads: microeconomic (the management of commercial banks, risk management, and market functioning), macroeconomic (monetary policy and inflation, exchange policy, and the exchange rate), and institutional (bank legislation and supervision). The empirical analysis presented here aims to determine which of these fac-

[1] Rodrigo Fuentes and Miguel Basch are members of the Department of Economics, University of Chile.

[2] Some authors have argued that during a financial crisis low spreads lead to the liquidation of, or at least to the authorities' intervention in, some banks (Rojas-Suárez and Weisbrod, 1996). Banks with high spreads have greater capacity to survive the crisis. Moreover, debtors are willing to pay higher interest since they wish to build up a long-term relationship with their bank, which protects them from insolvency in times of crisis.

tors is most important in influencing the distribution of spreads in Chile.

The Chilean economy is ripe for such a study because of several recent and significant economic developments. First, unlike other Latin American economies in the 1990s, Chile's economy has been undergoing changes that have helped lower the relatively high spreads of the late 1980s.[3] During the crisis of 1982–83, the government dealt with management problems at several banks by intervening in some institutions and liquidating others. Once the immediate crisis passed, a different kind of financial system began to develop. Between 1984 and 1988, Chile experienced a "drought" of external capital; voluntary loans to the country were nonexistent.[4] The government modified legislation imposing restrictions on the concentration of banks' asset portfolios, and the Superintendency of Banks and Financial Institutions (SBIF) tightened controls on bank management.

Second, the Chilean banking system has experienced profound structural changes in recent years. It has seen the merger of two important national banks and the purchase of another by a foreign bank already operating in the country. The new banks are now the largest and second largest, respectively, in the national market. Finally, the Chilean Congress has been supporting this restructuring by considering a bill that would allow banks to enter new areas (such as securities). This diversification of the banking industry should help combat interindustry competition and a growing lack of intermediation in the economy.

Macroeconomic Developments and the Cost of Intermediation

Chile's financial sector has undergone dramatic changes in recent years. Understanding these macroeconomic developments is important to interpreting the trends in intermediation costs and the results of the statistical analysis.

[3] See Basch, 1995; Fuentes and Vargas, 1995.

[4] See Agosin, Fuentes, and Letelier, 1993.

Macroeconomic Developments in Chile, 1974–96

The macrofinancial characteristics of the Chilean economy set it apart from the other economies in the region. Bank spreads are among these notable characteristics. Most Southern Cone countries have reported relatively high bank spreads since 1990. Spreads in Chile, however, have been much lower than those in neighboring countries and have even followed a downward trend. This spread structure is the result of the gradual modernization of Chile's capital market.

The economic and financial crisis of 1981 found the country heavily dependent on the external sector. Between 1979 and 1982, Chile's exchange regime was based on a fixed peso-dollar parity, generating a large trade deficit that was financed by foreign borrowing. The presence of an implicit state guarantee on deposits, combined with the moral hazard linked to the granting of credits without adequate preventative supervision, allowed the transfer of significant financial resources to the most powerful economic groups. This situation undoubtedly strengthened the effects of the sudden reduction in external funds in the wake of the international recession.[5]

The result of this scenario was that the economic model underpinning the structural changes responsible for the present system was based on relatively mediocre results. For example, despite the significant monetization and growth of credit that took place in Chile between 1973 and 1982, real interest rates remained high, and the level of saving as a proportion of GDP declined (from 16.3 percent in the 1960s to 12.4 percent in 1975–81). Public and private investment followed a similar trend.

In June 1982, the economic authorities devalued the peso against the dollar. As a result, debtors with dollar-denominated loans faced large losses, and some payments had to be suspended. Only the intervention of the economic authorities in 1982–83 prevented the collapse of the financial system. The government adopted measures to improve the capital situation of banks and to facilitate the recovery of profitable firms with large, high-interest debts. Politically, these measures

[5] See Arellano, 1983; De la Cuadra and Valdés, 1989; Ramírez, 1989; Le-Fort, 1993; and Basch and Maquieira, 1993.

provoked criticisms, as some of the entities they saved (which otherwise would have disappeared) created serious distortions.

These distortions persisted until recently.[6] Only in 1997 were contracts drawn up that defined payment schedules for the banks' subordinated debts, which still had not been paid. An agreement with the Central Bank allowed debtors to defer payment until conditions became more favorable (largely because of unclear clauses describing when the debts would be settled). As it was difficult to evaluate the degree of solvency of each bank, conditions for repurchasing bad portfolios were excessively soft, and most of the affected banks expected a general debt pardon.

One consequence of the intervention was the transfer of considerable resources on a discretionary basis from the state to a handful of debtors. Another consequence—the continued financing of companies with a negative net worth—resulted in flagrant distortions in the allocation of financial resources. The rescue operations also created a serious cash problem for the Central Bank, for two reasons: the purchase of nonperforming bank portfolios and the ensuing subsidies; and the refinancing of dollar-denominated corporate and consumer debts (including mortgages) in domestic currency. The resulting losses created a quasi-fiscal deficit that was financed primarily by domestic debt instruments and the inflation tax. The Central Bank's annual losses equaled 0.5 percent of GDP,[7] and estimates put the total accumulated cost of the rescue programs at US$8 billion.[8]

As mentioned earlier, the fundamental factor behind the financial crisis was the absence of adequate regulation and supervision of the financial system. In 1986 the General Banking Law was modified to establish a set of regulations that would deal with the problems associated with the financial crisis. Financial supervision was consolidated and bank credits were classified according to the "quality" of the debtors in order to generate early warning indicators. An important set of regulations would protect bank managers' autonomy (in relation to their parent groups) by strictly controlling what are known as related credits. The modifications were also extended to

[6] See Basch and Maquieira, 1993.

[7] See Eyzaguirre, 1992.

[8] See Eyzaguirre and Larrañaga, 1990.

more sophisticated economic concepts such as debtor limits and economic indebtedness. The change in the Superintendency of Banks Organic Law gave the agency the mandate it required to effectively control these normative developments.[9]

One of the most important aspects of the legal changes of 1986 was the incorporation of new services into the traditional banking system. These services, provided by bank subsidiaries and bank service companies, have allowed the Chilean banking system to expand into the kinds of activities that make an industry competitive. These activities include investment banking and, through the service companies, the introduction of modern technology such as automated teller machine (ATM) networks, credit card management companies, and data transmission networks.

The modifications to the General Banking Law of 1986 opened up possibilities for the financial system to develop new bank-related activities. In part, this change was a response to signs that the capital market was about to undergo a major transformation for two reasons: the privatization of public enterprises, and the success of the new pension fund system, which now relied on the capitalization of individual retirement accounts. These developments spurred growth in stock exchange capitalization, resulting in a more sophisticated capital market. The short- and long-term bond markets also expanded, causing the volume of intermediation handled by the banks to drop sharply after 1991.

Participation in the industry by mutual funds, investment funds, dealers, stockbrokers, leasing companies, and consulting firms has generated further growth in the capital market and has set in motion an ongoing process of modernization. The developments discussed in the next section help illustrate how this process is working.

Intensifying and Deepening the Banking System

Monetary aggregates, specifically M1A, M2, and M7, are one measure of a country's financial development. Since M7 is less liquid than the other two, it offers a better reflection of the degree of finan-

[9] See Fuentes and Basch, 1998.

cial intensification.[10] Table 4.1 shows that M2 in Chile grew from 20 percent of GDP in 1986 to 32 percent in 1995, while the M7 aggregate grew from 48 percent of GDP in 1986 to 71 percent in 1995. Similarly, another useful indicator—M1A subtracted from M7—grew 22 percentage points with respect to GDP between 1986 and 1995, confirming that Chile's financial system has developed significantly.

As noted, bank intermediation fell in Chile after 1991. Did it expand as the financial system deepened in the 1980s? One way to answer this question is to examine how bank placements and investments developed, including the purchase of public and private fixed-income instruments, or bonds, which are also a source of credit. Tables 4.2 and 4.3 show the trends in placements and investments for the different components of the financial system: Banco del Estado, national and foreign banks, and other financial institutions. If the ratio of placements and investments with respect to GDP is taken as a measure of depth, then bank intermediation has fallen since 1986.

Table 4.1 Monetary Aggregates
(percent)

Year	GDP[a]	M7/GDP[b]	M1A/GDP[c]	M2/GDP[b]	(M7-M1A)/GDP
1986	16.113	48	8	20	40
1987	17.773	52	7	23	45
1988	21.670	52	8	25	44
1989	23.965	60	9	25	51
1990	26.186	63	7	24	56
1991	32.074	66	8	29	58
1992	405.40	66	8	30	58
1993	428.12	71	9	31	62
1994	542.40	71	9	31	62
1995	655.86	71	9	32	62

Source: Monthly Bulletin, Banco Central de Chile.

Note: M7 includes M2A + private sector time deposits + time savings (including housing) + Central Bank paper held by the public + treasury notes held by the public + letters of credit held by the public + private sector deposits in foreign currency.

a. GDP = millions of 1995 dollars.

b. M2, M7 = balance at December each year.

c. M1A = annual average.

[10] See Gelb, 1989.

Table 4.2 Placements in National and Foreign Currency (percent of GDP)

Year	National Banks	Banco del Estado	Foreign Banks	Financial Institutions	Total
1986	32	12	8	1	53
1987	33	9	7	1	49
1988	31	8	6	1	46
1989	32	9	8	1	50
1990	27	8	7	1	42
1991	25	6	7	1	39
1992	27	5	7	2	41
1993	30	6	7	2	45
1994	29	5	6	2	42
1995	30	4	6	2	43

Source: SBIF, *Información Financiera*.
Note: National banks do not include Banco del Estado.

Table 4.3 Placements and Investments (percent of GDP)

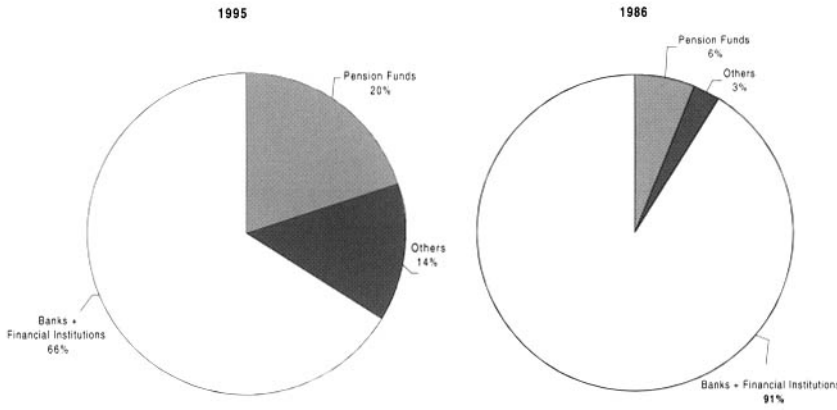
Year	National Banks	Banco del Estado	Foreign Banks	Financial Institutions	Total
1986	61	25	14	1	102
1987	58	20	14	1	93
1988	48	16	13	1	78
1989	45	14	13	1	74
1990	40	13	13	1	67
1991	36	11	14	1	62
1992	36	10	12	2	59
1993	38	10	11	2	62
1994	36	9	10	2	58
1995	37	9	9	2	57

Source: SBIF, *Información Financiera*.
Note: Financial investments include transactions in both national and foreign currency.

There are several reasons for this decline. First, a process of disintermediation started in the financial system. This phenomenon was the result of the boom in pension funds, which have become the

principal institutional investors.[11] Second, other agents, such as insurance and leasing companies and mutual funds, made a strong entrance into the business of fund intermediation (Figure 4.1). In addition, as noted earlier, short- and long-term bond markets expanded rapidly after 1991.

Figure 4.1 Institutions Involved in Financial Intermediation (percent)



Clearly, Chilean banks are experiencing a growing process of disintermediation. What is more, the figures presented here underestimate the phenomenon, as they do not include one particularly important group of institutions: large retail chains such as Almacenes París, Falabella, Ripley, and Hites. Although these institutions do not belong to the formal financial system, they act as placement agents for consumer credit. Quantifying the amounts involved is difficult because the information is not made public, but the sums are undoubtedly appreciable. The entrance of these chains has further pressured banks to operate with a reduced spread structure.

[11] Pension funds increased from 14 to 45 percent of GDP between 1986 and 1995.

The Costs of Intermediation

To understand the determinants of bank spreads, it is vital to know what the costs of intermediation have been for Chilean banks. In part, the spreads are determined by the legal reserve requirements for deposits in local currency and by the interest rates on deposits.[12] The size of the spreads is crucial to understanding the efficiency of the intermediation process.

Determining whether the increases and decreases in the spreads were the result of a price effect or a quantity effect requires calculating the return on capital and the banking intermediation reserves in order to show both the ex post spread and the leverage effect.[13] Tables 4.4 and 4.5 show that the returns from the financial system were unstable during the period under consideration. The volume of placements and investments rose after 1990, stabilizing in 1993 at around 11 percent. However, in relation to bank capital and reserves, the leverage effect fluctuated slightly around a mean of 10.5 times. In general banks manage to keep approximately 11 times their capital and reserves in the market as placements and investments. Hence, the quantity effect has no important effects on fluctuations in spreads, so that these fluctuations must be the result of the price effect. The price effect corresponds in turn to fluctuations in the ex post spread (the quotient between after-tax surpluses and ex post placement and investment). Additionally, leverage increased despite these fluctuations from 9.9 to 11.3, while profitability declined. This development supports the earlier conclusion that spreads began to decline in Chile after 1990.

---

[12] If a bank receives a unit of deposits, and if the reserve is e and the lending rate is r, then the bank's income from intermediation is $r(1\text{-}e)$. A nil spread would occur if the lending rate were equal to this income

[13] The return on capital and reserves is defined as the ratio between the surpluses after tax obtained by the bank (prior to payment of the subordinated debt with the Central Bank) and its capital and reserves. The ex post spread corresponds to the quotient between these surpluses and the placements and investments. Lastly, leverage measures the volume of bank intermediation given by the ratio between a bank's placements and investments and its capital and reserves.

Table 4.4 Breakdown of the Profitability of the Banking Industry (in millions of 1995 dollars)

Year	Capital and Reserves[a] (c)	Net Earnings[b] (d)	Payments to Central Bank[b] (e)	Percent Total Profitability
1990	3,129	302	320	19.0
1991	3,211	250	242	15.3
1992	3,293	303	255	17.0
1993	3,382	421	275	20.6
1994	3,656	446	251	19.1
1995	3,967	511	203	18.0

Source: SBIF, *Información Financiera*.

Note: Return = $(d+e)/c$, where c = capital and reserves (not including subordinated bonds), and $(d+e)$ = surplus after tax (not including payment of subordinated debt to the Central Bank).

a. Balances to December.

b. Accumulated to December.

Table 4.5 Return on Capital (in millions of 1995 dollars[c])

Year	Capital and Reserves	Surplus After Tax	Ex Post Placements + Investments	Leverage Effect[a] (no. of times)	Profitability[b] (percent)
1990	3,129	621	30,833	9.9	19.85
1991	3,211	491	31,900	9.9	15.30
1992	3,293	558	33,933	10.3	16.96
1993	3,382	696	37,201	11.0	20.58
1994	3,656	697	39,321	10.8	19.07
1995	3,967	714	44,808	11.3	17.99

Source: SBIF, *Información Financiera*.

Note: Price effect = surplus after tax (placements + investments).

a. Leverage = (placements + investments)/(capital and reserves).

b. Profitability = (surplus after tax)/(capital and reserve).

c. Balances to December.

The banking system is becoming increasingly competitive with other sources of financial intermediation. This fact will be discussed more fully during the examination of the econometric results. But additional support is available for the argument that the interme-

Table 4.6 Concentration of Current Assets

Year	No. of Companies	Herfindahl[a]	C4[b]
1990	40	0.114	0.45
1991	40	0.104	0.45
1992	40	0.098	0.43
1993	39	0.098	0.44
1994	38	0.095	0.43
1995	34	0.093	0.43

Source: SBIF, *Información Financiera*.

a. The Herfindahl-Hirschman index is defined as the sum of holdings to the square of the companies.

b. C4 = the sum of the four principal relative holdings.

diation market has tightened and that the market for placements and investments is gradually deconcentrating. During the period under consideration, more competitors could have entered the market, provoking a fall in earnings. Table 4.6 shows that these events did not take place. The Herfindahl-Hirschman index and the C4 indicator (both measures of concentration for placements and investments) have remained more or less constant over time. However, the system has become more competitive following the entry of players that are not part of the formal financial system. Previous indexes did not reflect this development.

The facts presented so far are reflected in the diversification of financial services, changes in the composition of corporate liability portfolios, and the efficiency of the banking system. These three subjects are analyzed next.

Diversifying Financial Services

Just as the depth of the banking system has increased, the number of financial institutions (including branches) has grown (Table 4.7). These institutions now offer an array of services. The institutions that showed most dynamism were the financial societies, which saw their branches almost triple in number between 1990 and 1995. This development seems to indicate that banks may be exploring new mar-

Table 4.7 Financial Institutions[a,b]

Year	Banco del Estado	National Banks		Foreign Banks		Financial Institutions		Total	
	Branches	Institutions	Branches	Banks	Branches	Institutions	Branches	Entities	Branches
1990	194	13	639	22	161	4	86	40	1,080
1991	201	13	677	22	169	4	100	40	1,147
1992	208	13	674	22	179	4	113	40	1,174
1993	213	13	825	21	241	4	105	39	1,316
1994	214	13	834	20	224	4	142	38	1,414
1995	219	13	886	17	203	3	171	34	1,479

Source: SBIF, *Información Financiera*.

a. Including head office, branches, auxiliary and exchange offices, agencies and payment locations.

b. The data are for years from October to October.

kets, most likely among small and medium-sized enterprises (SMEs). Additionally, the increase in the number of branches indicates strong expansion into retail banking, where margins are higher.

Monetary liabilities and disintermediation. One feature of the financial sector in recent years has been the dramatic change in corporate liability portfolios. Table 4.8 shows the magnitude of this shift. Pension funds alone increased their investment portfolios by 10 percentage points between 1990 and 1995. The total amount of funds held by institutional investors increased almost 20 percentage points, rising from 26.9 percent of GDP in 1990 to 44.6 percent in 1995.

A more detailed examination of recent changes in the financial structure of firms shows a shift in the proportion of long-term liabilities that finance corporate assets (Table 4.9).[14] Bank participation in the financing of firms (measured as the ratio between corporate indebtedness with banks and financial institutions and corporate short- and long-term liabilities) fell from 44.5 percent in 1990 to 31.8 percent in 1995. In the market for public offerings, a growing pre-

[14] The most recent changes cannot be explained by an increase in financing through short-term liabilities, since these liabilities rose only from 15.4 percent in 1985 to 18.3 percent in 1995.

Table 4.8. Assets of Institutional Investors (percent of GDP)

Year	Pension Funds	Foreign Capital Funds	Mutual Funds	Total	Stock Exchange Capitalization
1990	23.7	1.6	1.7	26.9	49.6
1991	30.6	2.6	3.0	36.3	87.3
1992	29.8	2.3	2.7	34.8	73.1
1993	36.1	2.9	3.6	42.6	104.2
1994	40.0	3.9	3.9	47.7	124.8
1995	37.8	3.9	3.0	44.6	111.1

Sources: SBIF, *Información Financiera;* and Monthly Bulletin, Banco Central de Chile.

Table 4.9 Indicators of the Indebtedness of Firms

Year	Firms	LTL/TA (percent)	BFI/(LTL + CL) (percent)
1990	273	19.5	44.5
1991	287	18.8	42.6
1992	304	17.7	40.6
1993	336	17.2	34.9
1994	351	15.8	34.7
1995	398	15.3	31.8

Source: Superintendency of Securities and Insurance.
Note: LTL = long-term liabilities, TA = total assets, CL = current liabilities, and BFI = indebtedness with banks and financial institutions.

ponderance of issues of commercial paper was notable, rising from just 1.4 percent of the loans in the financial system in 1986 to 12.5 percent in 1995.

Efficiency in the Banking System

Efficiency and competitiveness are closely related. Theoretically, a market functions most efficiently when producing at a cost equal to the mean minimum cost (the point at which an industry is operating

in conditions of perfect competition and stable, long-term equilibrium). In other words, a measure of the efficiency of the banking industry is whether it is producing at the mean minimum cost over the long term. In practice, however, measuring the efficiency and competitiveness of the banking system is much more complex. For instance, for a banking system to perform efficiently, measures must be in place to ensure compliance with all the factors necessary to a competitive market structure. And the market has characteristics that prevent the direct application of the classic microeconomic scheme for analyzing competitiveness, simply because there are barriers to free entry by new competitors.

Efficiency is also a relative economic concept that must be measured with a specific purpose in mind. In the case of banking, several perspectives for analyzing efficiency are available.[15] One has as its focus *social efficiency*, or the banking industry's ability to satisfy the objectives the community has assigned to it. Another concentrates on *private efficiency*, which is a measure of banks' compliance with the specific objectives imposed by their owners.

Banking system efficiency: the social viewpoint. The social efficiency of the banking industry must be measured in relation to how well banks perform the functions set out in the prevailing laws and regulations. Banks will have many or few of these functions, depending on the role the community (as it is reflected in the laws and regulations) assigns them. When banks are highly regulated, offering only state credit lines for restricted uses, the

[15] According to Fama (1980), the function of banks is to transfer wealth among economic agents and to manage asset portfolios on behalf of depositors and owners. In the former function, efficiency is compatible with traditional measures that evaluate administrative expenses. The real problem emerged only recently, when it became necessary to measure the second function. Three types of agents that interact in the credit process are immediately recognizable in the analysis of this function: *shareholders*, who are satisfied if their risk-adjusted shares produce income that is at least close to returns on other investments; *depositors*, who are satisfied if their risk-adjusted returns are at least equal to returns on similar financial instruments; and finally *receivers of credits*, who are satisfied if their cost of borrowing is the same as it is for other credit sources. The objectives of the different participating agents are mutually exclusive, not only among themselves but in terms of the system's social efficiency.

banks' function is merely administrative—that is, they only oversee and record transfers of funds. In such a situation, banks are efficient to the extent that funds are transferred at the lowest possible cost.

The social efficiency of the banking system can also be analyzed as the dynamism the system contributes to the savings and investment processes. In this case, certain indicators exist: a low lending rate that does not put negative pressure on debtors and thus create a process of disintermediation; high volumes of deposits and levels of intermediation, which depositors perceive as a fair return (in line with the assumed risk); low risk, which is a sign of the quality of banks' decisions on borrowers; and low operating expenses, which show that banks are managing their lending processes well.[16] High social efficiency in the banking system, then, is associated with relatively low administrative expenses, a low lending rate, high levels of intermediation, and low levels of risk. The results for the period of measurement (1990–95) appear in Table 4.10.

The table shows several disparate trends. The lending rate fell from 40.40 percent in 1990 to 20.29 percent in 1995. However, the relevant indicator for investment is the real lending rate, which has fluctuated between 15.3 and 9 percent, a reasonable figure considering the country's level of development. Administrative expenses related to commercial management increased slowly from 1990 to 1994 but fell in 1995, largely because of the changing composition of the banking system's assets and liabilities. Bank portfolios have gradually shifted toward the retail segment, which, although more profitable, has higher operating expenses.[17]

The shift into the retail segment usually leads to an increase in levels of default that is also reflected in levels of risk (Table 4.10).[18]

---

[16] This view is in line with the analysis of the banking system as a suboptimum situation, since it is equivalent to a decline in the transaction costs inherent in the existence of the banking system.

[17] See Chamorro, 1987.

[18] The provisions posted in this row correspond to the stock of provisions accumulated in the balance sheet and not to the real flow of nonperforming loans.

Table 4.10 Social Efficiency Indicators (percent)

Year	1990	1991	1992	1993	1994	1995
Lending Rate[a]	40.40	25.96	22.90	23.04	19.05	20.29
Real Lending Rate[b]	15.29	9.15	9.02	10.45	10.03	12.04
Administrative Expenses[c]	4.32	4.54	4.81	4.91	5.20	4.57
Risk[c,d]	4.98	4.46	3.76	3.27	2.44	1.94
Level of Intermediation[e]	-3.21	2.37	4.74	12.37	8.50	15.44

Source: SBIF, *Información Financiera.*

a. Lending rate = (Interest received and accrued + adjustments received and accrued + commissions received and accrued for placements in letters of credit, contingent placements, and letters of credit)/average earning assets.

b. Real lending rate = (1 + lending rate)/(1 + inflation rate).

c. Administrative expenses and risk are divided by the average earning assets.

d. Risk = provisions maintained to December each year/average earning assets.

e. Level of intermediation = real annual percentage change of asset.

Finally, levels of intermediation have increased, but in a proportion lower than for other intermediaries—a positive development from the point of view of social efficiency.

Banking system efficiency: the private viewpoint. The banking system is efficient from the private viewpoint only to the extent that it maximizes the return on bank owners' investments. Achieving maximum returns requires the efficient management of four areas of bank administration, which provide the basis for four indicators of private bank efficiency.

An ex post evaluation of a bank allows any surplus to be broken down into at least four parts. These divisions reflect the areas of administration in which banks must excel if they are to reach optimum efficiency and thus maximize their earnings as follows:

- The *operational return*, which measures the efficiency of the institution in maximizing the difference between the rate at which it places funds in the market and the rate at which it takes them;
- *Administrative expenses*, which measure the bank's efficiency with respect to the administration of expenses associated with the credit and deposit processes;
- *Provisions and write-offs*, which reflect the bank's efficiency in investment of funds and thus measure allocation efficiency; and

- *Other net income,* which groups a series of income and expenses relating to the nonoperational aspects of bank administration with income and expenses from prior fiscal years.

The fact that several variables can affect bank profitability means that efficiency in the determination of each is a necessary—but not sufficient—requirement for earning an optimum profit for the owners. Only when a bank reaches maximum efficiency in all the criteria will it succeed in this goal. A bank with the objective to maximize its earnings, then, will be more efficient than one that seeks only to raise returns on capital.

Table 4.11 shows these measures for the Chilean banking system for 1990–95. The results were calculated by breaking down the income statement for the industry into the efficiency factors explained above. The results show that efficiency has varied in line with the performance of the economy during the period under review.

Table 4.11 Results
(percent of average assets)

	1990	1991	1992	1993	1994	1995
Operational Efficiency[a]	6.95	5.36	5.24	5.60	5.53	4.96
Administrative Efficiency[b]	3.27	3.48	3.44	3.64	3.92	3.49
Net operating Margin	3.68	1.88	1.79	1.97	1.61	1.48
Allocation Efficiency[c]	1.62	1.22	0.81	0.71	0.80	0.63
Margin After Provisions	2.06	0.66	0.99	0.25	0.80	0.85
Other Net Income	0.15	1.00	0.52	0.59	0.93	0.74
Efficiency Before Tax[d]	2.21	1.66	1.51	1.85	1.73	1.58
Income Tax	0.30	0.22	0.05	0.13	0.09	0.15
Total Efficiency[e]	1.91	1.44	1.46	1.71	1.64	1.43
Assets/Capital	21.80	22.08	21.33	24.17	31.38	32.63
Surplus/Capital	19.00	19.00	19.00	25.00	23.00	22.00

Source: SBIF, *Información Financiera.*

a. Operational efficiency = [(interest earned and accrued + adjustments earned and accrued + commissions earned and accrued on placements in letters of credit, contingent placements, and letters of credit) - (interest paid and accrued + adjustments paid and accrued)]/(earning assets).

b. Administrative efficiency = administrative expenses/earning assets.

c. Allocation efficiency = provisions and write-offs/earning assets.

d. Efficiency before tax = surplus before tax/earning assets.

e. Total efficiency corresponds to using the surplus for repurchasing portfolios, absorbing deferred debts, distributing preferential dividends, and speeding up the implementation of regulatory provisions.

The economic context is especially important in explaining the trend in operational and allocation efficiency. As mentioned earlier, operational efficiency is the difference between operating income and expenses. Since 1980 the operating margin in Chile's banking industry has persistently declined—possibly, in the first few years, because of increased competitiveness. Later, the margin declined because of problems with the debtors themselves. The margin increased after the economic reform measures, when Central Bank securities replaced many low-quality assets, allowing some debtors to recover.

Allocation efficiency, which is associated with provisions and write-offs, reflects the quality of the assets in which the banks have invested their funds and fluctuates with the level of economic activity. Since 1990, provisions and write-offs have fallen to levels that are reasonable for a normally functioning economic system. This development reflects the greater stability of the economy and reforms of the financial system in the early 1990s.

Measuring Bank Spread and Its Trend

Measures of spread are sensitive to the definition of the term itself as well as to the variables used. In macroeconomic terms, spread is associated with the differential between the lending and deposit rates. A possible definition of this differential would be

$$s = \frac{IG}{AG} - \frac{IP}{P} \qquad [1]$$

where

s = measure of spread;
IG = interest earned;
IP = interest paid;
AG = interest-bearing assets; and
P = interest-bearing liabilities.

But this measure, which seems conceptually adequate, has two problems. First, it does not take into account the fact that interest-bearing assets are financed in part through liabilities with third par-

ties and in part through capital and reserves. Second, it does not measure a bank's efficiency in earning a return to a given level of assets. An alternative definition would be closer to what can be termed *gross margin over earning assets*, or

$$m = \frac{IG}{AG} - \frac{IP}{AG}$$

The difference between both measures is given by

$$m - s = \frac{IP}{P}\left(1 - \frac{P}{AG}\right)$$

which shows that if $P < AG$, as it will be if part of the earning assets are financed with capital and reserves, the measure m will be greater than s. This result is seen in Figure 4.2, which shows the trends for both measures for 1990–95.

First, as was expected, m is higher than s during the whole period. Second, the spreads do not diminish or grow appreciably. Examining only the permanent and transitory components of the series gives a better idea of how these measures have behaved. A seasonal

Figure 4.2 Measures of Spread (1990-95)

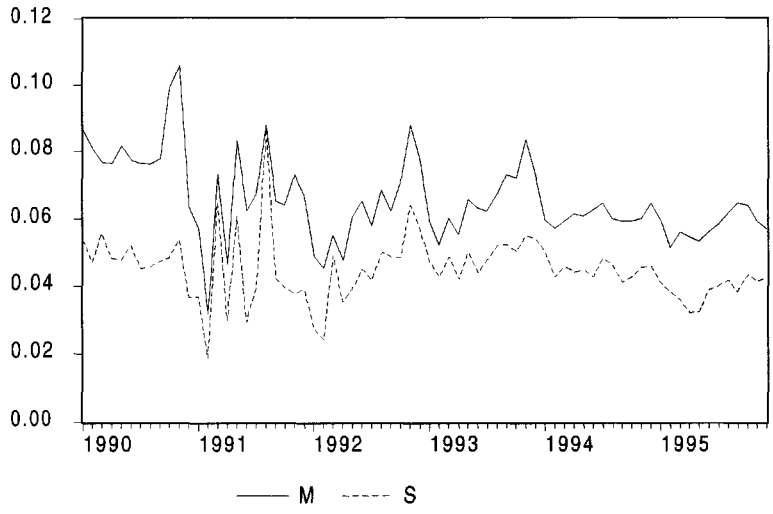
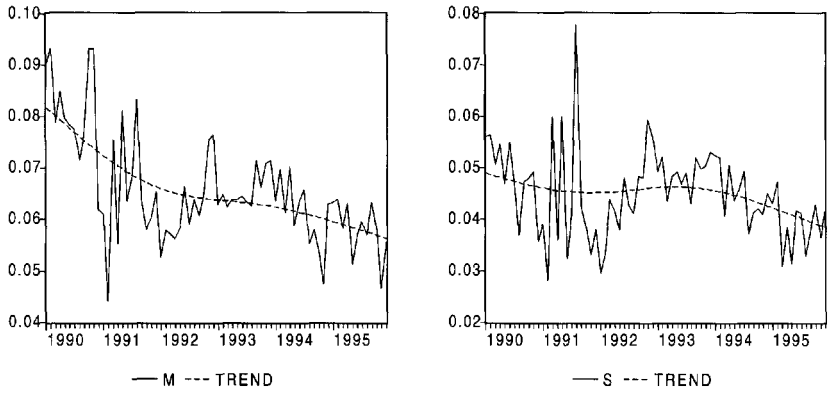


Figure 4.3 Variance in Spread Levels Using Hodrick-Prescott Filter



adjustment restricts the new series to permanent and cyclical components only. The Hodrick and Prescott filter is then applied to distinguish between the components (Figure 4.3).

With the measure *m*, the margin records a downward trend during the 1990s. The *s* measure, however, gives a slightly less pronounced downward trend before 1993.[19] This analysis illustrates the sensitivity of the results in relation to the definition of spread, since the differences shown here are reflected in both level and trend over time. For the purposes of measuring the efficiency and soundness of Chilean banks, the concept of margin is the most useful.

In the case of the Chilean economy, however, the problem of definition is compounded by the existence of a third unit of account (in addition to the Chilean peso and the U.S. dollar). This unit is known as the *unidad de fomento* (UF), or development unit. Its value fluctuates in line with the variations in the consumer price index (CPI) of the preceding month, so that it reflects changes in the CPI one month before. Banks can receive deposits and make

[19] A regression of *m* seasonally adjusted in time generates a coefficient of -0.0003 with a t = -5.9. For *s*, a seasonal adjustment results in a coefficient of -8E-05 and a t of -1-39. For practical effects this latter variable does not show a downward trend, something the first measure does show.

loans denominated in all three currencies, but all long-term operations in national currency (more than 89 days) and a large part of the Central Bank notes (PRBC and PRC) are denominated in UFs.

This third currency poses an additional problem in estimates of spreads, since loans denominated in UFs are earning an interest rate similar to the real ex post rate.[20] Making the calculation with the formula in discrete time (relevant in this case) gives

$$(1+i^a)-(1+i^p)=[(1+r^a)-(1+r^p)](1+\pi) \qquad [2]$$

where

i^a = the nominal lending rate;
i^p = the nominal lending deposit rate;
r^a = the real lending rate;
r^p = the real deposit rate; and
p = the relevant inflation rate.

In other words, the spread of nominal rates equals the spread of real rates corrected for inflation, or

$$(i^a - i^p)=(r^a - r^p)(1+\pi)^{21} \qquad [3]$$

An Empirical Model

In a review of the literature, Baltensperger (1980) divides the types of bank models into three groups: models concerned only with the optimum selection of assets, models of the handling of liabilities, and more complete models that consider the size of the firm as a whole. In the third model, as opposed to the first two, the actual size of a bank's assets is endogenous. There are also models that focus on

[20] The rate in question is not equal to the real ex post rate because of the time lag in calculating the unit.

[21] Estimating a spread that combines different types of denominations requires making the corresponding correction for inflation. In this work the differentials of the loans in UFs are corrected for inflation.

industry competitiveness, risk aversion, and the use of real resources as well as on the size of the firm and the structure of assets and liabilities.

The most traditional view sees banks as mere financial intermediaries between lenders and borrowers. From this point of view, banks are managers of third-party assets (lenders) that deliver a certain return. These intermediaries save the costs of searching for, monitoring, and approving contracts and reduce the problems of asymmetry of information between lenders and borrowers. In other words, the handling of the information generates a series of economies of scale.[22] As a result, banks assume two types of risk: nonpayment and liquidity, which is related to the time structure of the assets and liabilities.

In this analysis, bank spread covers the intermediation costs associated with the use of funds for handling information and making transactions, as well as the risks banks take in performing their intermediation function.

The data. For the purposes of the empirical analysis, a data panel of 22 banks with monthly data was constructed for the period August 1991 to December 1995 (Box 4.1). The sample includes 1,166 observations.

The model used the spread measure m, the most relevant measure for the empirical analysis of bank efficiency. This measure is similar to that used by Ho and Saunders (1981). But calculating m for each bank on a monthly basis requires identifying all assets, income, and expenses by type of currency (peso, dollar, and UF) in order to make the corresponding corrections for inflation. This division was made using information available after August 1991.

[22] See Heffernan, 1996.

Box 4.1 Chilean Banks

Foreign Banks
Banco Sudameris
Bank of America
Citibank
National Bank of New York
Chase Manhattan Bank
Banco de Boston
Banco del Exterior
American Express
Banco de la Nación Argentina
State Banks
Banco del Estado
Large national banks
Banco O'Higgins
Banco Osorno
Banco de Santiago
Banco de A. Edwards
Banco de Crédito e Inversiones
Banco de Chile
Small National Banks
Banco Internacional
Banco SudAmericano
Banco del Desarrollo
Banco Bice
Banco Bhif
Banco de Concepción

The model. The model to be estimated is

$$M = f(TII, CORES, PROV, SUC, LEV, VTI, INFANT, TCN, DEIN) \quad [4]$$

where

M = Measure of spread;
TII = Interest rate implicit in other activities, defined as (non-interest expense - noninterest income)/earning assets;
$CORES$ = Opportunity cost of reserves, defined as (noninterest earning reserves * the rate of Central Bank notes, PDBC)/earning assets;

PROV = (Provisions and write-offs)/earning assets;
SUC = Number of branches;
LEV = Leverage, defined as the ratio of debts to total assets;
VTI = Variance of the real interest rate/over deposits;
INFANT = Estimated anticipated inflation through time series (see Table 4.12);
TCN = Nominal exchange rate; and
DEIN = Degree of bank disintermediation, defined as one - the assets managed by the banks/ the total assets of the financial system.

The variables are supported by the fact that risk aversion is perhaps the most relevant of the determinants of the spread. This is the argument followed in the works of Ho and Saunders (1981), Zarruk (1989), and Paroush (1994). The empirical model presented is similar to that of Ho and Saunders (1981) in assuming that banks are risk averse, so that the margin must cover a risk premium in addition to all costs of intermediation and other costs originating from regulation. But as the next section shows, the estimate is formulated differently.

Table 4.12 Time-Series Model for Estimating Inflation, on a Monthly Basis

Variable	Coefficient	p Values
Inf(-1)	0.450	0.000
Inf(-5)	0.205	0.004
Inf(-9)	0.246	0.000
Inf(-17)	-0.164	0.010
Inf(-22)	0.109	0.014
Dmfeb	-0.007	0.002
Dmmar	0.007	0.008
Dmsep	0.007	0.001
Dmoct	0.008	0.000
R^2	0.4343	
σ	0.0064	

Note: Dummy variables were used to capture seasonal changes. The work began with 30 lags. After tests for the exclusion of variables, this model is the most parsimonious. An ARCH test was made to the final model, which could not reject the nonexistence of ARCH at traditional levels of significance.

Among the regulations that impose additional costs, Ho and Saunders include a measure of the implicit interest rate that covers the services banks are obliged to provide under existing regulations (*TII*). A second source of costs has to do with the opportunity cost of the reserves (*ORES*) the regulations require banks to maintain. If this variable were not significant, the banks would not transfer the cost to their customers. Finally, it is necessary to include, as an explanation of the margin, the risk premium for nonpayment by the banks' debtors. The remainder must be explained by the instantaneous variance of the interest rate (*VTI*). Another proxy of the measure of risk used in the study is the set of provisions and write-offs (*PROV*) reported by the banks in their income statement. This proxy has the advantage of being specific to each bank.

In addition to the variables from the Ho and Saunders model, other micro- and macroeconomic variables important to determining the spread need to be explored—for example, the leverage the banks can take. When a particular bank increases its capital, its borrowing capacity also increases and its margin is reduced, raising the degree of competition in the industry. A potentially significant variable is related to the requirement that banks maintain a certain percentage of deposits as reserves and therefore cannot earn a return on these funds. The measure of bank disintermediation (*DEIN*), which is related to competition, should also be considered.

Expected inflation (*INFANT*) also plays an important role in the setting of margins. The intermediation model of Cukierman and Hercowitz (1990) shows a positive relationship between margin and expected inflation in situations where the market is dominated by large banks. This relationship would not exist if the industry were under conditions of perfect competition. The authors argue that higher inflation increases demand for intermediation services because investors shift their portfolios from liquid to less liquid assets that pay higher interest, offsetting the effects of inflation. This increase in demand for intermediation services occurs independently of market structure. If a market has an oligopolistic structure, then the increase in inflation increases the monopolistic power of the banks and the margins of the intermediaries.

There are other reasons why inflation affects margins, most of them related to the fact that banks do not pay interest on current accounts. When inflation rises these deposits generate higher returns, since a large part of banks' investments and placements are in UFs. Thus, the effect of high inflation should be positive on the margin. Similarly, the nominal exchange rate (*TCN*) affects bank margins, although its impact varies depending on the structure of banks' assets and liabilities in foreign currencies.

Because this information corresponds to panel data that shows large and small private banks coexisting alongside state and international banks, a sample by subpanels was made using dummy variables. Dummy variables were defined with a value of 1 for foreign banks (*DEXT*) and variables for the Banco del Estado (*DEST*), large national banks (*DGRA*), and small national banks (*DCHI*). Each of these variables was introduced in multiplication form. Proofs of hypothesis were then made using the likelihood ratio to verify whether the effects of the different exogenous variables were similar among the subpanels or not significant. For example, the effect of the opportunity cost of the reserves on bank margins was positive and statistically equal for all banks except the Banco del Estado, for which the estimates produced a coefficient equal to zero. Further, the effects of the provisions were statistically significant in the case of the large banks.

Results of the analysis. Table 4.13 shows the results of the most parsimonious models. The panel, estimated using an effects model fixed by weighted least squares, was corrected by autocorrelation under the assumption that the coefficient of autocorrelation is different for each bank. The data confirmed this assumption by means of a likelihood ratio. The corresponding bank subpanel follows the name of each variable: foreign bank (*Ext*), Banco del Estado (*Est*), large national bank (*gr*), and small national bank (*ch*).

The variable of the interest rate implicit in other activities has a positive sign and is statistically significant only for the small national banks. This finding shows that a part of the margin covers the difference between noninterest income and expenses (thus the name *implicit* interest rate).

Table 4.13 Results of the Estimate (p values in brackets)

Dependent Variable	*M*	*m*
Implicit Rate (Ch)	0.015	0.017
	(0.015)	(0.004)
Cost of Reserves (Ext, Gr, Ch)	1.152	1.195
	(0.000)	(0.000)
Provisions (Gr)	0.016	0.170
	(0.000)	(0.000)
Branches (Ch)	-3.20E-04	-3.20E-04
	(0.000)	(0.001)
Leverage	-0.032	-0.030
	(0.000)	(0.000)
Interest Variance (Ext)	0.052	0.059
	(0.042)	(0.021)
Expected Inflation	0.013	0.013
	(0.000)	(0.001)
Nominal Exchange Rate	8.63E-05	8.44E-05
	(0.000)	(0.000)
Disintermediation		-0.167
		(0.000)
Disintermediation (Ext)	-0.307	
	(0.000)	
Disintermediation (Est)	-0.229	
	(0.007)	
Disintermediation (Gr)	-0.187	
	(0.000)	
Disintermediation (Ch)	-0.121	
	(0.000)	
R^2 (not weighted)	0.3961	0.3871
log L	4297.857	4295.779

The effect of the variable representing the opportunity cost of the reserves shows no difference by type of bank and was statistically significant (except for the Banco del Estado). This result was expected because the margin has to cover this implicit cost and should affect all banks equally.

The risk measured through provisions and write-offs was positive in its effect on the spread. Provisions and write-offs correspond to a proxy of the specific risk associated with each bank's portfolio.

However, this variable was statistically significant only in the case of the large national banks. The variance of the interest rate should affect all the banks in the same way, since it is a proxy of what is happening in the macroeconomy. This variable was relevant only in the foreign bank subgroup.

The leverage variable is specific to each bank and had a coefficient common to all. The variable had a negative sign and was statistically insignificant. The idea is that higher leverage generates more funds for placement, increasing the volume of placements and allowing banks to reduce the margin and increase their earnings.

Consistent with the Cukierman and Hercowitz hypothesis (1990) expected inflation had a positive effect on spreads. In this case the Chilean banking system would be dominated by a small group of large banks. An alternative explanation is that the increase in inflation causes both rates—lending and deposit—to rise, but by different proportions. Since the banks do not pay interest on current accounts, the rate on these deposits is nominally zero, reducing the effective positive rate. This explanation is more credible in view of the strong competition banks face, which is reflected in the trend in the margins and in bank disintermediation.

The effect of the nominal exchange rate was also positive and similar for all groups of banks except the small banks, whose coefficient was zero. No a priori sign was expected because, as has already been noted, the effect of a higher exchange rate on spreads depends on the structure of bank assets and liabilities in different currencies.

A variable that has often been used to explain the fall in bank margins in recent years is the process of financial disintermediation. This variable was statistically significant in explaining the behavior of the margins (after controlling for all the variables mentioned). The coefficient was statistically equal for all groups of banks (Table 4.13 shows the coefficient for each group individually). The smaller national banks were the least affected by disintermediation, while the foreign banks were the most affected. Given the nature of the business of these groups (except for Citibank, the foreign banks offer corporate services), the effects of disintermediation could be different. The disintermediation variable does not include the access to international financial markets that large companies enjoy, or the

credit offered by the retail chains, so the effect is probably underestimated.

Using the second model that appears in Table 4.13, an analysis of variance was made to determine which of the individual variables explained a higher percentage of the total variation. Table 4.14 shows the results.

As Table 4.14 shows, the changes in leverage, disintermediation, and opportunity cost of reserves (in that order) explain the higher percentages of the total variation. Expected inflation is the macroeconomic factor whose variation explains the highest percentage of total variation, a result that was to be expected, given the preceding discussion.

Table 4.14 Analysis of Variance

Source of Variation	Sum of Squares	Degrees of Freedom	Average of Squares	Percent Variation Explained
Implicit Rate (Ch)	0.0022	1	0.0022	0.54
Rest	0.4066	8	0.0508	99.49
Cost of Reserves (Ex, Gr, Ch)	0.0255	1	0.0255	6.24
Rest	0.3833	8	0.0479	93.79
Provisions (Gr)	0.0094	1	0.0094	2.30
Rest	0.3993	8	0.0499	97.70
Branches (Ch)	0.0003	1	0.0003	0.07
Rest	0.4085	8	0.0511	99.95
Leverage	0.0391	1	0.0391	9.57
Rest	0.3697	8	0.0462	90.46
Interest Variance (Ex)	0.0157	1	0.0157	3.84
Rest	0.3931	8	0.0491	96.18
Expected Inflation	0.0177	1	0.0177	4.33
Rest	0.3910	8	0.0489	95.67
Nominal Exchange Rate	0.0006	1	0.0006	0.15
Rest	0.4081	8	0.0510	99.85
Disintermediation	0.0334	1	0.0334	8.17
Rest	0.3754	8	0.0469	91.85
Explicative Variables	0.4087	9	0.0454	
Remainder	0.6465	1113	0.0006	
Total	1.0552	1122	0.0009	

Exchange differences. A crucial element of the analysis of bank spreads in Chile is the management of assets and liabilities in different currencies by banks and financial institutions. The financial system operates primarily in pesos, UFs and U.S. dollars. Exchange differences among assets and liabilities denominated in these three monetary units can generate large gains for banks whose positions will be positively effected by movements in the parities of the three units. But commercial banks can also incur large losses if their expectations do not materialize. In other words, spread increases with exposure to the risks associated with changes in the parities of these currencies.

The way in which the exchange differences operate can be expressed as follows. The equation assumes that a bank's only cost is intermediation, although the example can be extended, without changing the basis of the analysis, by assuming the existence of other costs. Thus operating profit (*UO*) over the firm's earning assets (*A*) can be written

$$\frac{UO}{A} = i^a_{\$}\frac{A_{\$}}{A} + i^a_{UF}\frac{A_{UF}}{A} + i^a_{US\$}\frac{A_{US\$}}{A} - i^p_{\$}\frac{P_{\$}}{A} - i^p_{UF}\frac{P_{UF}}{A} - i^p_{US\$}\frac{P_{US\$}}{A} \quad [5]$$

where

i^a_j = lending rate denominated in the currency j = \$, UF, US\$;
i^p_j = deposit rate denominated in the currency j = \$, UF, US\$;
A_j = amount of assets expressed in the currency j = \$, UF, US\$; and
P_j = amount of liabilities expressed in the currency j = \$, UF, US\$.

The lending rate can be written as the deposit rate plus a determined spread (d). Assuming this is the same for all currencies (an assumption that is not limiting), the following is obtained:

$$i^a_j = i^p_j + \delta \quad [6]$$

Replacing the ratio 6 in equation [5], recalling that ($A_{\$}$+$A_{UF}$+$A_{US\$}$ = A), and arranging to terms results in the following:

$$\frac{UO}{A} = i_{\$}^{p}\frac{A_{\$} - P_{\$}}{A} + i_{UF}^{p}\frac{A_{UF} - P_{UF}}{A} + i_{US\$}^{p}\frac{A_{US\$} - P_{US\$}}{A} + \delta \qquad [7]$$

Equation [7] clearly shows that a bank's operating profit has a pure spread component plus (minus) the effect of the profit (loss) generated by the exchange differences. If a bank's assets and liabilities are perfectly matched, the first three right-hand terms will be null and the profits will come exclusively from the spread. Table 4.15 shows the calculation of the exchange difference (defined as the sum of the first three right-hand terms), both in absolute terms and as a percentage of the margin.

Table 4.15 shows that income from exchange differences explains a significant part of the total operating margin. In the fourth column, income from exchange differences fluctuates between 6.6 and 13.3 percent, with a simple mean of 8.7 percent. This calculation is net—that is, profits and losses occur because of a determined position of assets and liabilities at any given time, with large fluctuations from one year to another. Specifically, in December 1994 the Chilean peso was revalued, producing substantial gains for banks that had speculated on the measure.

Table 4.15 Exchange Difference (percent)

Year	Exchange Difference	Margin	Exchange Difference (percent of margin)
1990	0.587	8.96	6.6
1991	0.588	6.96	8.4
1992	0.594	7.17	8.3
1993	0.566	7.18	7.9
1994	0.853	6.42	13.3
1995	0.464	6.19	7.5

A Final Word

This study found that all macroeconomic variables are empirical determinants of spread. In the period from 1990 to 1995, the spreads fell slightly when analyzed using a definition of margin in which the denominator is earning assets. An important factor that emerges from an analysis of the monthly data, however, is the high volatility of this measure.

The analysis also shows that the decline in return on bank assets in recent years is explained by the fall in operating margins, as the quantity of intermediation, or leverage (measured as placements plus investments over capital and reserves) has remained relatively constant. The reduction in margins is apparently not the result of traditional measures of concentration but of reduced bank disintermediation. This development is reflected in a decline in the volume of bank intermediation in relation to the total assets handled by the agents in the financial system. Bank participation declined from 91 percent in 1986 to 77 percent in 1990 and to 66 percent in 1995. To compensate, banks have explored new business areas, substantially increasing the number of branches—a move that suggests a shift toward retail banking.

References

Agosin, M., Fuentes, R. and Letelier, L. 1993. *Los capitales extranjeros en las economías latinoamericanas: el caso de Chile.* Santiago, Chile: Universidad de Chile, Departamento de Economía.

Arellano, J.P. 1983. "De la liberalización a la intervención: el mercado de capitales en Chile, 1974–83." Colección Estudios. 11. Santiago, Chile: CIEPLAN.

Baltensperger, E. 1980. "Alternative Approaches to the Theory of the Banking Firm." *Journal of Monetary Economics.* 6:1–37.

Barandiarán, E. 1983. "Nuestra crisis financiera." Estudios públicos. 12. Santiago, Chile.

Basch, M. 1995. "La desconcentración del acceso a los servicios financieros. El caso chileno." Washington, DC, United States: Inter-American Development Bank.

———— . and Maquieira, C. 1993. "Evolución del mercado de capitales." *Comentarios sobre la situación económica.* Santiago, Chile: Universidad de Chile, Departamento de Economía.

Chamorro, M. 1987. "Eficiencia bancaria: concepto y medición. Tecnificación y eficiencia del sistema bancario." Colección economía y finanzas. IV. Santiago, Chile: Institute of Banking Studies Guillermo Subercaseaux.

Cukierman, A. and Hercowitz, Z. 1990. "Oligopolistic Financial Intermediation, Inflation and the Interest Rate Spread." Paper No. 2/90. Tel Aviv, Israel: The David Horowitz Institute for the Research of Developing Countries.

De la Cuadra, S. and Valdés, S. 1989. "Myths and Facts About Instability in Financial Liberalization in Chile: 1974–83." Santiago, Chile. Mimeographed document.

Eyzaguirre, N. 1992. "Financial Crisis, Reform and Stabilization: The Chilean Experience." Paper presented at the Seminar on Financial Sector Reforms in Asian and Latin American Countries, World Bank, Santiago: Chile.

Eyzaguirre, N. and Larrañaga, O. 1990. "Macroeconomía de las operaciones cuasifiscales en Chile." Research Series No. 31. Washington, DC, United States: ILADES-Georgetown University.

Fama, E. 1980. "Banking in the Theory of Finance." *Journal of Monetary Economics*, 6:39–57.

Fuentes, R. and Basch, M. "Determinants of Bank Spread: The Case of Chile." Working Paper R-329. Washington, DC, United States: Inter-American Development Bank.

Fuentes, R. and C. Vargas. 1995. "Análisis del sistema financiero chileno." Report prepared for Leasing Andino S.A. Mimeographed document.

Gelb, A. 1989. "Financial Policies, Growth, and Efficiency." Working Paper 202. Washington, DC, United States: World Bank.

Goldsmith, R. 1963. *La estructura financiera y el crecimiento económico.* México: Centro de Estudios Monetarios Latinoamericanos.

Heffernan, S. 1996. *Modern Banking in Theory and Practice.* Chichester, England: John Wiley and Sons, Inc.

Held, G. 1989. "Regulación y supervisión de la banca en la experiencia de liberalización financiera en Chile (1974–88)." Serie Financiamiento del Desarrollo No. 1, Document No. LC/L 522. Santiago, Chile: Economic Commission for Latin America and the Caribbean.

Ho, T. and Saunders, A. 1981. "The Determinants of Bank Interest Margins Theory and Empirical Evidence." *Journal of Financial and Quantitative Analysis*, XVI(4): 581–600.

Le-Fort, G. 1993. "The Financial System and Macroeconomic Stability: The Chilean Experience." Paper presented at the Seminar on Reforms of the Financial Sector and Liberalization, Bali, Indonesia.

Paroush, J. 1994. "The Effect of Uncertainty, Market Structure, and Collateral Policy on the Interest-Rate Spread." *Bank of Israel Banking Review*. 4: 79–94.

Ramírez, G. 1989. "Política bancaria y legislación financiera: la experiencia chilena de los años 1980." *Revista Información Financiera*. Santiago, Chile: Superintendency of Banks and Financial Institutions.

Rojas-Suarez, L. and Weisbrod, S. 1996. "Central Bank Provision of Liquidity: Its Impact on Bank Asset Quality." Washington, DC, United States: Inter-American Development Bank. Mimeographed document.

Zarruk, E. 1989. "Bank Spread with Uncertain Deposit Level and Risk Aversion." *Journal of Banking and Finance*. 13: 797–810.

This page intentionally left blank

CHAPTER 5

Structural Reform and Bank Spreads in the Colombian Banking System

Robert Steiner, Adolfo Barajas, and Natalia Salazar[1]

In 1989 Colombia began an ambitious reform program, first cutting tariffs unilaterally and then adopting measures aimed at restructuring and improving the operations of the financial sector. These measures have made entry easier for new intermediaries, moved the sector closer to full-service banking, introduced stricter prudential standards, simplified legal reserve requirements, dismantled forced investments, and advanced the privatization process. The reforms were induced by the government's desire to create a strong, efficient, competitive financial sector that encourages the participation of foreign and domestic private capital.[2]

As with Colombia's other attempts at financial reform, the recent liberalization efforts have been affected by macroeconomic considerations. Between 1989 and 1995, in the context of the government's highly inflexible fiscal policy, international reserves increased steadily. These increases were countered with an arsenal of measures aimed at structural reform and stabilization, including an increase in ordinary reserve requirements, the imposition of mar-

[1] Roberto Steiner and Natalia Salazar are researchers at the Fundación para la Educación Superior y el Desarrollo (FEDESARROLLO). Adolfo Barajas works at the International Monetary Fund.

[2] Several trends have emerged as a result of the reforms. The number of large financial conglomerates has increased (along with the number of banks), state participation in the sector has declined, and the tendency of intermediaries to specialize has been partly reversed.

ginal reserves, controls on the expansion of credit, and taxes on foreign borrowing. While several of the structural changes did make the financial system more efficient and competitive, some of the stabilization measures had exactly the opposite effect. For example, while relaxed conditions for foreign direct investment fostered the introduction of new technology and stimulated competition, reserve requirements were placed on foreign borrowing. Clearly, there has been a trade-off between some elements of the structural reform program and macroeconomic stabilization policies.

An implicit objective of Colombia's financial reform process has been to reduce bank spread, which has traditionally been high compared with other developing countries and with industrial economies. This chapter examines the trends and determinants of bank spreads in Colombia during the 1990s, a period that has seen not only important structural reforms but also a rapid increase in banking activity. With the exception of 1996, bank loans grew more rapidly throughout the decade than the economy as a whole. At the same time, the financial sector deepened considerably.[3]

This chapter touches on another important point. The size of the spread depends on several factors, including cost, risk, and market structure. For this reason, a precise identification of the relative importance of spread is a prerequisite for evaluating the measures that have already been adopted, and for making new policy recommendations. But an additional trade-off must be taken into consideration. High spreads may indicate noncompetitive practices by financial intermediaries, high nonfinancial operating costs, deteriorating loan quality, or declining bank profitability. However, financial intermediaries generate earnings only insofar as they appropriate the spread between the lending and deposit interest rates. It is feasible that high spreads, although undesirable for many reasons, contribute to the adequate capitalization of the financial system—a positive result.

This point is particularly relevant here, given that financial systems operate in conditions of moral hazard and that intermediaries can generally count on implicit guarantees from a government or cen-

[3] See Steiner et al., 1998.

tral bank. Society has essentially accepted the cost of protecting the payment system by rescuing financial intermediaries that, for different reasons, have lost or are about to lose their capital. In principle, then, it is not entirely evident that the social cost of operating with high spreads, which banks tend to capitalize, is higher than that of operating with low spreads and an explicit guarantee of rescue.

For this reason, it is also important to understand the appropriate use of bank earnings. This chapter looks not only at the determinants of bank spread in Colombia, but at the recent trend in earnings and capitalization that has strengthened the banking system.

Bank Spreads in Colombia, 1991–96

Because there is more than one definition of bank spread, any analysis of spreads or their determinants needs to define its terms and give the sources of information. This analysis, which classifies banks by ownership, can be applied to subgroups of private and official banks, as well as to the total banking system.

Definitions, Sources of Information, and Classification of Banks

Definitions and sources. [4] There are several ways to define bank spread. Four are considered in this section, but the emphasis is on their differences. The definitions use the following variables:

i^b_l = gross interest rate on loans;
c_l = commissions on loans;
i_l = total interest rate on loans = $i^b_l + c_l$;
i_d = total interest rate on deposits;[5]

[4] This section does not include all the alternative definitions. Omitted, for example, are interest or commissions from noncredit operations and interest implicitly paid for providing (and not charging for) services to current account holders. This chapter does not get involved in the sterile debate on the "optimum definition of the spread." The definitions presented here are commonly used in the literature and have been chosen as the only definitions for this analysis.

[5] On deposits, current, and other liabilities. The latter are loans from the Banco de la República, foreign banks, and multilateral organizations.

L = outstanding loans;
D = deposits (plus other liabilities); and
e = legal reserves/deposits.

A first definition of bank spread (m_1) corresponds to the difference between income received per peso loaned and expenses paid per peso deposited. Thus,

$$m_1 = i_l - i_d / \frac{i_l L}{L} - \frac{i_d D}{D} \qquad [1]$$

The preceding definition incorporates an identity at the extreme right because the interest *rates* (that is, i_l in m_1) cannot be observed directly in the banks' financial statements. Interest rate *flows* are extracted from these—that is, the interest rate is multiplied by the balance of loans or deposits (that is, iL).

The preceding definition has been calculated for the (weighted) average of all the banks (I=1 . . . 30) during each month (t=1991:02-1996:08).[6] The information is taken from the financial statements reported each month to the Banking Association. The monthly flows are multiplied by 12 to obtain the annualized value. For deposits and the outstanding loans, the average balances for the month are used. Only the outstanding loans are included in the calculations in equation [1]. Since, under the regulations, interest can be accrued on the loans only until a very short time after the due date; the income item is a satisfactory reflection of the real situation of each intermediary, even though it is calculated on an accrual and not a cash basis.[7]

---

[6] The econometric estimates consider only 22 banks, since of the 30 presently operating, 8 began operating only very recently.

[7] According to the Banking Association, at present approximately 35 percent of the nonperforming loans are less than three months past due and thus continue to accrue interest. This means that the definitions used here overestimate the spread. The denominator therefore includes interest charged but not the corresponding loans. Given the availability of information, the alternative would be to include all nonperforming loans in the denominator, generating a severe underestimate of the spread. The nonperforming loans represent between 5 and 7 percent of the total loans, so this overestimate should not be very large and, in any case, probably does not affect the trend of the series.

The difference between the lending and deposit rates provides a second definition (m_2), both rates coming from Superintendency surveys. The definition m_2 is a compulsory reference point that forms the basis for discussions of economic policy on spreads in Colombia. In this case, the rates correspond to the average interest that banks charge on their loans (i_l) and pay on their time deposits (CDs) (T) during the preceding week (i_t).[8]

$$m_2 = i_l - i_t \Big/ \frac{i_l L}{L} - \frac{i_t T}{T} \qquad [2]$$

The relationship between m_2 and m_1 is important here. The assumption is that the banks take two types of deposits: current accounts (C), on which interest is not paid; and time deposits (T), on which interest (i_t) is paid.[9] L represents the credits and E the reserve amount. The credits are placed at a rate of i_l. It is also assumed that the reserve applies only to C, so that $E = eC$, where e is the reserve ratio. The balance equilibrium implies that $C + T = L + E$. Simplifying, it is assumed that there are no commissions and that all loans are outstanding. Thus, the spread (M) can be defined in pesos, unlike equations [1] and [2], where the spread is expressed as a percentage, or the difference between total interest received and total interest paid,

$$M = i_l L - i_t T = i_l(1-e)C + T(i_l - i_t) \qquad [3]$$

The term $(i_l - i_t)$ that appears on the right of equation [3] approximates the spread (m_2) that is produced weekly in Colombia and that represents the difference between the interest rate on placements and the interest rate on time deposits. The difference between M and m_2 is the expression $i_l(1-e)C$, a term that will equal zero only if the banks do not take current accounts or if the reserve on these accounts is 100 percent.

Different definitions are useful for different purposes. Without invalidating a definition like m_2, this work uses specifications such

[8] In a strict sense the loan rate is not the same as in the preceding definitions. It is assumed to be so here in order to concentrate on the differences in deposit rates.

[9] i_a in equation [1] results from having deposits (T) on which i_t is paid and deposits in current accounts (C) on which no interest is paid.

as those in *M*, taking into account the fact that in Colombia the reserve is fractional and interest is not paid on current accounts. These factors combine to determine higher bank earnings.[10]

In a system like Colombia's, where current accounts are not remunerated and the reserve is less than 100 percent, the spread increases with the inflation rate.[11] It should be recognized that the higher spread is used partly to assume the high nonfinancial costs inherent in current accounts. However, for a given level of current accounts, *ceteris paribus*, banks benefit from a higher inflation rate.

Classification of banks. For the descriptions made in this section and for the econometric analysis presented later, banks are best classified by type of ownership.[12] This classification system distinguishes between private and official banks.[13] Banks are classified as official when the principal shareholder is the state or the National Guarantee Fund.

Spreads and Some Relevant Indicators

The descriptions of trends and indicators presented here also apply to the entire banking system and to the subsets of private and official banks.

---

[10] Some remunerated deposit instruments are very similar to current accounts. Some account holders also benefit from automatic transfers from remunerated saving accounts to current accounts.

In a more complex analytical framework, it is possible to introduce the concept that banks make a partial implicit remuneration on current accounts through services that have no explicit charges.

[11] This is only a partial equilibrium. Increases in inflation may have real effects on bank performance. Apart from the direct positive effect of inflation on the spread, connotations of general equilibrium (positive or negative) are not evident.

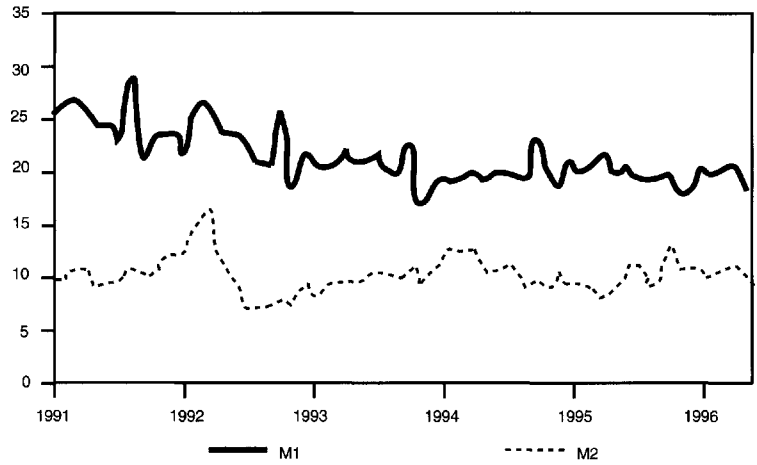
[12] The Caja Agraria was not considered in the analysis because the legislation has granted this institution some functions that fall outside the traditional functions of commercial banks. Similarly, the Caja Social de Ahorros was not included since it did not originally offer current accounts, although it now operates as a commercial bank. Lastly, the Banco de Boston was not included because the information available was for a very short period. Because they were small, excluding the last two banks, they do not affect the analysis.

[13] Banks privatized at any time between 1991 and 1996 are considered to be private during the entire period of analysis.

Total banking system. Figure 5.1 shows two measures of the spread that follow definitions [1] and [2]. The upper panel shows that the spread (m_1) fell about 6 percentage points from 1991–96, with virtually all the decline occurring from 1991–94. The second measurement of the spread (m_2) remained relatively constant throughout the period.

In order to analyze the differences between these indicators in more detail, the two definitions (and the interest rate scheme implicit in each one) were broken down into trend and stationary components according to Hodrick and Prescott's method, using the recommended value of the parameter for the monthly series.[14] Panels A and B of Figure 5.2 show that while the permanent component

Figure 5.1 Alternative Measures of Bank Spreads: M1 and M2

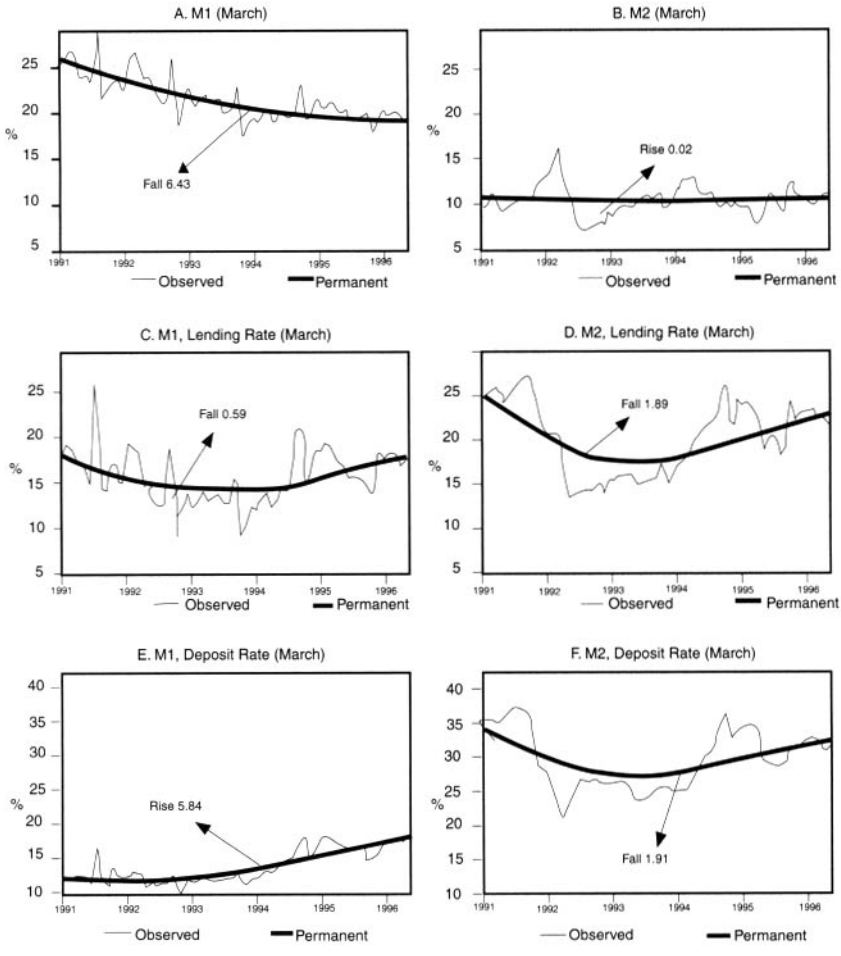


Source: Author's calculations based on information from Asobancaria and Banco de la República.

[14] This procedure allows for finding one trend (μ) and one stationary component (y_t-μ_t) for a series y_t in order to minimize the following sum of squares: $(1T)'_T (y_t - \mu_t)^2 + (\beta/T)'_T [(\mu_{t+1} - \mu_t) - (\mu_t - \mu_{t-1})]^2$, where β is an arbitrarily chosen constant that represents the cost of introducing fluctuations into the trend component. If β tends to zero, the sum of squares is minimized when y_t is equal to μ_t. If β tends to 4, the sum of squares is minimized when the change in the trend component is minimized—that is, when the latter is lineal. For more detail see Enders, 1995.

m_1 tends to fall over time, m_2 has no clearly defined trend. Panels C and F show that the interest rates implicit in m_2 have similar but not stable trends. The downward trend of m_1 is fundamentally explained by the fact that the deposit rate has increased significantly, particularly from 1992 onward. As will be shown in the model developed in the third section, the deposit rate is a key determinant of the lending

Figure 5.2 Total Banking System: Alternative Measures of Bank Spread and Interest Rates



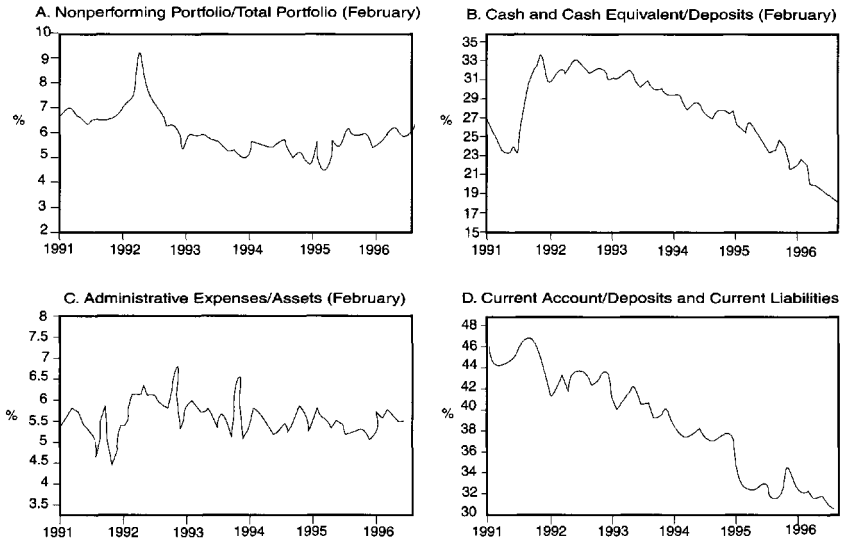
Source: Author's calculations based on information from Asobancaria and Banco de la República.

rate.[15] In fact, the last section of this chapter empirically shows that the ratio of elasticity of changes in the lending rate to changes in the deposit rate is greater than one. For this reason, the ex post observation that the spread is declining (that is, that the deposit rate is rising faster than the lending rate) should not be interpreted as meaning that the banks are not transferring all the changes in the deposit rate to the lending rate. Other determinants of the lending rate help explain the fact that, ex post, the lending rate does not rise as much as does the deposit rate.

Figure 5.3 shows some indicators that affect the trend of m_1. Although the nonperforming loans as a percentage of total gross loans increased in early 1992, they have remained steady at 5–7 percent since mid-1992. Employee expenses as a proportion of assets recorded a very slight downward trend that reversed itself toward the end of the period. However, the proportion of current accounts to deposits and legal reserves (e.g., cash and the cash equivalents/deposit ratio) has fallen continuously since early 1992. Undoubtedly, this restructuring of banks' financial liabilities to favor interest-bearing deposits is an important factor (at least in this analysis) in the increase in the deposit rates. Exactly why the loans were realigned this way is not entirely clear, although the reasons probably involve financial developments that allow one group of economic agents to retain the privilege of current account services while maintaining low balances for these deposits. In other words, the ground lost by current accounts could be linked to changes in the demand for money spurred by financial innovations in the banking system.

[15] This chapter does not analyze the determinants of the deposit rate. However, to put the figures in perspective, during the period of analysis the average level of the annual deposit interest rate implicit in m_1 was 13.5 percent; of the lending rate implicit in m_1, 35.2 percent; and of the deposit rate implicit in m_2, 29.8 percent. During the same period, the average annual inflation rate was 23 percent and the average annual devaluation of the Colombian peso against the dollar, 13 percent. These figures imply that interest rates in Colombia are relatively high in real terms compared with the United States (after correcting for devaluation).

Figure 5.3 Total Banking System Indicators



Source: Author's calculations based on information from Asobancaria and Banco de la República.

Banks Classified by Ownership. The spread (m_1) of official banks is usually higher than the spread of private banks.[16] If m_1 is broken down into its components, as a general rule the official banks lend at a slightly higher interest rate and, more importantly, accept deposits at a lower rate.

The financial expenses of official banks are lower than those of private banks because official banks handle more current accounts. One reason for this disparity is that the official banks handle most of the demand deposits used to execute government spending. Although there has been a shift to remunerated deposits in both groups of banks, it has been slower in the official banks. And as a result of the restructuring of deposits and changes in the reserve regulations, official bank legal reserves have declined significantly, especially since 1995.

[16] See Steiner et al., 1998.

Other indicators confirm that official banks and private banks behave differently. The ratio of nonperforming loans to total loans is consistently higher for official banks, despite the recovery that started in late 1992. The employee expense/assets indicator shows a similar pattern. Panels E and F show two measures related to the productivity of the sector that, to some extent, complement the employee expense indicator. The real value of loans by employee and by office has also been calculated. Both measures show a slight upward trend over time and, even more importantly, record systematically lower levels for the official banks. The econometric analysis presented later in the paper supports the notion of the inefficiency of official banks relative to private banks.

Three conclusions emerge from this discussion. First, for the total set of banks, the most important development during the period analyzed has been the restructuring of deposits into financial liabilities with low reserve requirements and high financial costs. However, this shift has not significantly decreased the spread. Because the banks exercise considerable market power, they can transfer the increases in their financial costs on deposits to the lending rate.

Second, the very slight fall in spreads can be linked to insignificant reductions in both the nonfinancial costs of intermediation and the nonperforming loans as a percentage of total loans. Finally, the behavior of private banks clearly differs from that of official banks. Because of the structure of their deposits, official banks take deposits at lower interest rates and report higher spreads. They also have higher employee expenses and lower-quality loans than do private banks, and tend to use more human and physical resources for each loan granted.

Some Working Hypotheses

Two statistical exercises complement the stylized facts described earlier. These exercises show the diversity of the banking sector, fully justifying the use of panel data in the econometric analysis. The exercises also show a positive association between the deterioration of loans and the spread and suggest that the causality relationship may

go in both directions. This finding in turn suggests that caution must be exercised in interpreting the econometric estimates, in which it is assumed that the loan quality is exogenous. The statistical regularity, along with the descriptive evidence, supports the derivation and estimate of a simple model of bank conduct. According to this model, the spread is a function of nonfinancial expenses, noncompetitive practices by intermediaries, and risk.

Dispersion Among Banks and Over Time

Table 5.1 shows the *coefficient of variation* (the ratio between the standard deviation and the mean) of the lending and deposit rates implicit in m_1, and of the ratios of nonperforming loans/gross loans and nonfinancial expenses/assets. The coefficient is estimated among banks and over time. Each bank indicator has an average observation for the entire period under consideration (May 1992–August 1996), and has an average measurement for all of the banks for each time period.

For all the variables considered, the dispersion is greater among banks than over time. For deposit and lending rates, it is relatively low and very similar over time and among banks. At the other extreme, dispersion is very high in the case of the ratio of nonperforming loans/gross loans—four times higher among banks than over time. The high dispersion among banks in the ratio of nonfinancial expenses/assets indicator is also significant.

Table 5.1 Dispersion Among Banks and Over Time (coefficient variations)

	Over Time	Among Banks
Deposit Rate	0.16	0.23
Lending Rate	0.08	0.11
Nonperforming Loans/ Gross Loans	0.16	0.57
Administrative Expenses / Assets	0.07	0.23

Source: Asobancaria and authors' calculations.

Surprisingly, the dispersion among banks in the indicators of loan quality and labor expenses is significantly higher than it is for interest rates. This finding seems to indicate that despite important differences in performance indicators, relatively few differences exist in the prices banks set for their products (placements and deposits). This observation is consistent with a market in which the banks exercise market power and do not behave competitively.

The fact that dispersion is greater among banks than it is over time for all of the variables leads to an important conclusion. At least during the period under consideration, bank differences mean that an analysis of the spreads based on time-series information for the aggregate of all the banks, results in a loss of valuable information.

Spread and Loan Quality

A simple correlation exists between the indicator of loan quality and spread. A positive correlation exists between spread (m_1) and loan quality, suggesting that the banks transfer part of the loan deterioration costs to depositors and borrowers.[17] To corroborate the association between the quality of the loan (*cvct*) and the spread (m_1), a Granger Causality Test was made between these variables. The hypothesis that a unit root exists at 5 percent significance cannot be rejected for any of the variables (in logarithms) (Table 5.2, Panel A).[18] For this reason, the causality test must be made on the first differences of the variables.

The results of the test are shown in Table 5.2, Panel B. The optimum number of lags has been determined using the Akaike and Schwartz criteria. With any of the criteria, causality moves in only one direction (from loan quality to spread). Only Schwartz's crite-

[17] Ibid.

[18] Unreported cointegration tests suggest that the lending rate may be cointegrated with the deposit rate for the total set of banks, the set of official banks, and the set of private banks. This result indicates that although these series are integrated (order 1), regressions can be made at intermediate levels without fear of finding spurious correlations.

Table 5.2 Granger Causality Test

A. Augmented Dickey-Fuller Test: 1991:01–1996:08

Variable	Definition	DF Test	Critical Value at 5% of Significance	Number Lags
lcvct	Nonperforming Loans (Log)	-0.24	-1.94	3
lm1	Spread (Log)	-1.29	-1.94	3

B. Granger Causality Test: 1992:05–1996:08

Null Hypothesis	Number Observations	Number Lags	F-Test	Probability
a. d(lml) does not cause d(lcvct)	52	4	0.11	0.98
d(lcvct) does not cause d(lml)	52	4	3.4	0.02
b. d(lml) does not cause d(lcvct)	52	1	5.61	0.022
d(lcvct) does not cause d(lml)	52	1	16.02	0.0002

Note: The Akaike criterion suggests introducing 4 lags and the Schwartz criterion 1.

rion gives causality in both directions. These results indicate that the loan quality is an important determinant of the spread and invite consideration of an analytical framework that explicitly incorporates the effects of loan quality.[19] The results also suggest a call for caution in interpreting econometric results derived from a model that makes loan quality a strictly exogenous variable.

The Model

The simple model of the determinants of bank spreads that is developed here is not a precise reflection of the Colombian banking system. Its usefulness lies in the fact that it provides a consistent analytical framework for a joint analysis of the determinants of the spread. The validity of the model, like that of many others, is determined not by the

[19] The model's estimate should be based on the panel data technique in order to demonstrate the high degree of variability among the banks.

realism of its assumptions but by the reasonableness of the predictions that follow from it.

The model used here, in which banks maximize profits in terms of a restriction of the balance, is similar to that used by Barajas (1996). In that work, the estimate was based on aggregate information for the banking system. Montes and Carrasquilla (1986) used individual bank information, but in the framework of an accounting model with no explicit maximization.[20]

The condition of balance for each bank must be met, so that loans (L) plus reserves (R) equals deposits (D) plus other net liabilities (ONL). The reserve is equal to the reserve rate (e) multiplied by the deposits. In other words,

$$L_i + R_i = D_i + ONL_i, \text{ and}$$
$$L_i - D_i (1- e) - ONL_i = 0. \qquad [4]$$

The banks maximize earnings (U), which are defined as the difference between financial income and financial and nonfinancial expenses, or

$$U = i_l L_i - i_d D_i - C(L_i, D_i, w, V) \qquad [5]$$

where

i_l and i_d	=	rates of loans and deposits;
L	=	loans;
D	=	deposits;
w	=	nonfinancial expenses; and
V	=	a vector of additional variables that affect the costs.

In the initial formulation it is assumed there is no uncertainty. Assuming the banks compete in terms of amounts, the first-order conditions are:

---

[20] See Carvajal and Zárate (1996) for a recent application of an accounting model.

$$\delta P/\delta L_i = i_l + L_i\,(\delta i_l/\delta L_i) - C_l - \lambda = 0$$

$$\delta P/\delta D_i = -i_d - D_i\,(\delta i_d/\delta D_i) - C_d + \lambda(1 - e) = 0$$

$$\delta P/\delta \lambda = -L_i + D_i\,(1 - e) + ONL_i = 0$$

where C_l and C_d are the marginal costs of the placement and deposits. The first-order conditions determine that

$$i_l + L_i\,(\delta i_l/\delta L_i) = C_l + [i_d + D_i\,(\delta i_d/\delta D_i) + C_d]/(1 - e)$$

from which it follows that

$$i_l\,(1 + \theta_l/Y_l) = C_l + i_d\,(1 + \theta_d/Y_d)/(1 - e) + C_d/(1 - e) \qquad [6]$$

where Y_x is the elasticity of demand to the interest rate (positive for deposits, negative for loans) and $\theta_x = (\delta X/\delta X_i)(X_i/X)$. Note that θ_x will be equal to zero if the production of i is insignificant with respect to the market (X_i/X 0), or if changes in the production of i generate changes of the opposite sign for other producers ($\delta X/\delta X_i$ 0). It follows that there is no market power if θ_x is equal to 0.

The next step is to define $\phi_x = 1 + \phi_x/Y_x$. Thus,

$$i_l = C_l/\phi_l + i_d\,(\phi_d/\phi_l)/(1 - e) + C_d/\phi_l\,(1 - e) \qquad [7]$$

If both markets are competitive, then $q_l = q_d = 0$. This relationship implies that $f_d = f_l = 1$, which determines that the price charged for loans (i_l) is equal to marginal cost. More precisely,

$$i_l = C_l + C_d + i_d/(1 - e).$$

Assuming that marginal cost functions are linear in the volumes of loans, deposits, wages, and loan quality, then

$$C_l = \delta_{01} + \delta_{11}L + \delta_{21}D + \delta_{31}w + \delta_{41}V$$

$$C_d = \delta_{02} + \delta_{12}L + \delta_{22}D + \delta_{32}w + \delta_{42}V \qquad [8]$$

The parameters of the marginal cost function are contained in equation [7]. In this cost function, V is a measure of nonperforming loans.[21] It is equivalent to postulating that the quality of loans not only represents an explicit financial expense (the larger the nonperforming loans, the lower the interest income) but also involves other costs that must be considered in the analysis, including nonperforming debts. Different alternative specifications are given below.

General Case, Deterministic Specification

The derivation is similar to Suominen's model (1996) of two bank products, but it also includes the relationship between the loan and deposit rates that follows from the restriction of balance in equation [4], and is summarized in equation [6]. Given the cost functions that appear in equation [8], and taking into account that e is the reserve rate (not a parameter),[22] the reduced form of the equation for each bank's lending rate is the following:

$$i_l = a_0 + a_1 F + a_2 i_d F + a_3 D + a_4 D_f + a_5 L + a_6 L_f + a_7 w + a_8 w_f + a_9 V + a_{10} V_f \quad [9]$$

where

$$a_0 = Y_{01}/\phi_l \qquad a_1 = Y_{02}/\phi_l \qquad a_2 = \phi_d/\phi_l \qquad a_3 = Y_{11}/\phi_l$$
$$a_4 = Y_{12}/\phi_l \qquad a_5 = Y_{21}/\phi_l \qquad a_6 = Y_{22}/\phi_l \qquad a_7 = Y_{31}/\phi_l$$
$$a_8 = Y_{32}/\phi_l \qquad a_9 = Y_{41}/\phi_l \qquad a_{10} = Y_{42}/\phi_l \qquad F = 1/(1-e)$$
$$L_f = L.F \qquad D_f = D.F \qquad w_f = w.F \qquad V_f = V.F$$

[21] Specifically, V is the relationship between the nonperforming loans and total loans.
[22] Although in equation [4] e is formally a parameter, its practical counterpart is a variable. The percentage of reserve effectively maintained, which varies from bank to bank and from month to month, in terms of changes in the composition of deposits, among other things.

In equation [9] there will be market power if a_2 is greater than one, a situation that can exist if there is market power in placements and/or deposits.[23]

Marginal Costs

Marginal costs are not dependent on the scale of production. If it is assumed that in equation [8]

$Y_{11} = Y_{12} = Y_{21} = Y_{22} = 0$, the corresponding reduced form will be:[24]

$$i_l = a_0 + a_1 F + a_2 i_d F + a_3 w + a_4 w_f + a_5 V + a_6 V_f \qquad [10]$$

Exogenous Credit Risk

It can also be assumed that bank credits (*i*) have an exogenous probability of repayment (r_i). In this case the bank will maximize, as follows:

$$U = \rho_i i_l L_i - i_d D_i - C(L_i, D_i, w, V) \qquad [11]$$

The conditions of first order give the following equilibrium condition for the placement rate in terms of (among other things) the deposit rate and the probability of repayment of the credits:

$$i_l = C_l/\rho\phi_l + i_d(\phi_d/\phi_l)/(1-e)\rho + C_d/(1-e)\rho\phi_l \qquad [12]$$

If the (exogenous) probability of repayment (*r*) is incorporated, all the explanatory variables in the estimate must be divided by that

---

[23] Obviously, if, a priori, it is assumed that one of the two markets is competitive, obtaining a coefficient a_2 that is significantly greater than one necessarily implies that the other market is not competitive. For example, Hannan and Liang (1993) assumed that the placement market was competitive and proved the existence of market power in the deposit market.

[24] If it is also supposed that the parameters of the functions of marginal cost are equal for deposits and loans, then the equation is reduced even further to an expression that depends on all the explanatory variables (corrected for the reserve), which lack a constant term.

factor. If that probability is not incorporated (and it is not equal to 1), the estimated parameters will partially capture the risk effect in the deterministic model, and the costs and the market power will appear to be greater than they are.

In the estimates presented below, the probability of repayment is defined as the complement of the variable V (nonperforming loans/total loans). Thus, the probability of charging interest is one if a bank has no nonperforming loans. This approximation is a first approach to the problem for several reasons. One reason is that the approximation implies that risk is exogenous. The probability of charging interest arguably depends in part on the interest rate that is actually charged, as shown by the Granger causality test. In the event that the estimate includes the correction by r, it must not include V as a component of the marginal cost function.

Panel Data Results

Monthly information is available for 22 commercial banks from May 1992 until August 1996.[25] For the panel of 22 banks, a variant of equation [10] was estimated, permitting an exact breakdown of the spread into its principal determinants.[26] An index of nonfinancial expenses (obtained from the banks' income statements) was used as the wages

[25] Information for 21 of the banks exists after February 1991. This analysis works with a sample of 22, since the bank that makes the difference is a very large official bank. To exclude it from the analysis would mean severely reducing the importance of the official banks as a whole.

[26] This specification was used because the results of preliminary regressions showed the zero significance of marginal cost parameters in relation to the scale of production of deposits and loans. This finding differs from the results of studies of economies of scale in the Colombian banking industry, which relate to a more remote period and do not use information from banks but from the entire system. The principal studies are Bernal and Herrera (1983), Suescún (1987), Acosta and Villegas (1989), and Ferrufino (1991). A critical review of some of them appears in Suescún and Misas (1996). Additionally, preliminary estimates produce similar results for the deterministic model specified in equation [10] and the exogenous risk model described by equation [12], excluding the quality of the loans explanatory variable. It was decided to use the deterministic specification because it facilitated the breakdown of the spread.

variable. The results are reported in Table 5.3.[27] Regressions were run for the total set of banks and for the subsets of private and official banks. In the three cases, a test was made to determine whether the estimated parameters differed among banks. After rejecting the null hypothesis of the equality of parameters, a test was made to establish whether the differences were the result of fixed or random effects (for the total set of banks and for private banks). The null hypothesis of fixed effects was not rejected, and the estimate was made using Generalized Least Squares, the most appropriate method in this case.[28]

The estimate for the banking system as a whole is reported in the first column of Table 5.3. All coefficients are significant to 1 percent and have the expected sign. The coefficient that accompanies the deposit rate is statistically different from one, implying that the banks exercise substantial market power in at least one of the two markets in which they operate. The estimate suggests that banks operate with a markup on the deposit rate of 25.5 percent.[29] The coefficients of wages, legal reserves, and loan quality have the expected sign and are statistically significant.

The next two columns show the estimate for private and offi-

---

[27] The econometric estimates attempt to explain the determination of nominal prices based on nominal costs and market structure. The fact that the interest rates and costs are presented as a percentage of the loans, deposits, and assets does not affect the fact that these rates and costs are nominal and consequently increase with inflation. This reservation is made because inflation is not explicitly included in the theoretical model and econometric estimates. However, in relation to nominal variables, inflation is implicitly included. For example, since the banks exercise market power (that is, if the coefficient a_1 in equation [9] is 1.20), an increase in the inflation rate of 5 percentage points increases the deposit rate by 5 points and the spread by one point (0.2*5). Although the inflation rate does not appear explicitly, it has a positive effect on the spread in all the estimates presented in the remainder of this work.

[28] This test could not be made for the official banks because the number of banks (3) is not greater than the number of regressors. In this case it is assumed that, like the private banks, the differences arise from random effects. The model was estimated using Generalized Least Squares. See Judge et al., 1985.

[29] In unreported estimates, all the banks were aggregated so that at any one time there was a single observation. An estimate of Ordinary Least Squares with recursive coefficients showed that the coefficient that measures market power was very stable during the reference period. The hypothesis suggesting that it has decreased as the financial liberalization process has advanced during the 1990s is rejected.

cial banks, respectively. All the coefficients have the expected sign and a significance of at least 5 percent, with the exception of the constant term for private banks and the coefficient of official bank reserves. The results from the effects of market power are maintained, and the estimated value of the markup is slightly higher for the official banks.

The data also indicate that the spread depends positively on deterioration in the quality of the loan, as well as on reserves and nonfinancial expenses.

Table 5.3. Determinants of the Lending Rate: May 1992–August 1998

	(1) Total Banks	(2) Private Banks	(3) Official Banks
Constant	5.362	4.762	8.647
	(1.746)**	(1.348)	(3.593)***
Nonperforming Loans	0.396	0.362	0.553
	(2.558)***	(2.039)**	(2.195)**
Legal Reserve	0.172	0.185	0.095
	(3.613)***	(3.482)***	(0.907)
Nonfinancial Expenses	1.083	1.169	0.616
	(3.714)***	(3.493)***	(3.129)***
Deposit Rate	1.256	1.252	1.305
	(8.23)***	(7.12)***	(8.771)***
Ho: ßs Equal Between Banks			
X^2	3770.1	2897.6	148.3
X^2 Critical Value	129.9	113.1	18.3
Ho: Random Effects (GLS)			
X^2	18.46	19.59	NA
X^2 Critical	37.65	37.65	NA
Observationes (N x T)	1144	988	156

Note: NA = not available.

** significant to 95%.

*** significant to 99%.

Conclusions

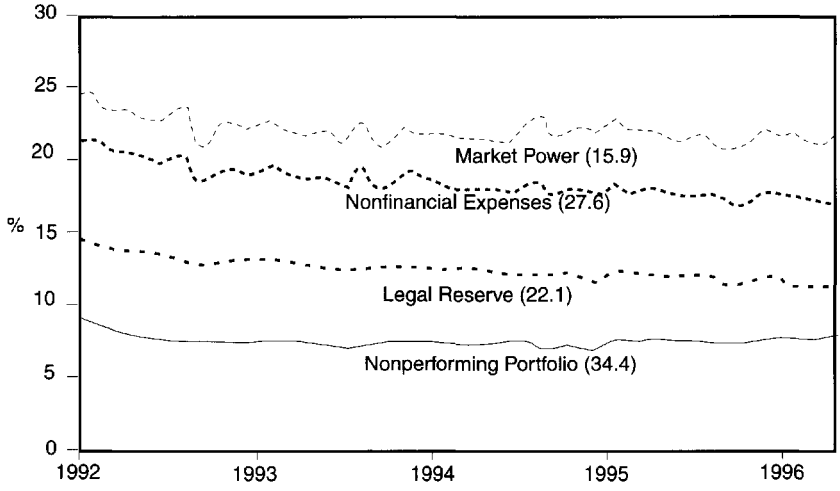
The reforms adopted in Colombia since 1989 have created a more efficient and competitive financial system, in line with the needs of an economy that is becoming increasingly international. Financial institutions are being privatized, and capital inflows have increased. In the banking sector (at least until 1995) these developments took place in the context of a rapid expansion of intermediation activities, high-quality loans, and high spreads. This combination of factors generated a high return on capital and strengthened the capitalization of the sector.

In identifying the determinants of the spread, this chapter has produced several findings. First, since 1991 bank spread and nonfinancial expenses have declined slightly, legal reserves have fallen significantly, and the level of the nonperforming loans has been stable as a percentage of total loans. Second, for different variables of the banking sector, dispersion is greater among banks than over time. Third, spread is positively correlated with deterioration in loan quality, and that causality can go in both directions.

This analysis developed a simple model of bank behavior that corroborates the preceding statistical relationships in a consistent analytical framework. The estimates suggest that both official and private Colombian banks operate in a noncompetitive market, with a placement rate that is about 26 percent higher than the deposit rate. As expected, spread is positively dependent on labor expenses and risk. In particular, when the latter approaches (the complement of) loan quality, statistically significant positive coefficients result.

A simple final exercise shows the principal conclusions of the work in an explicit, analytical framework. Using the estimated values for the coefficients in the first column of Table 5.3, the estimated spread ($m_1 = i_l - i_d$) is broken down into its components of market power, nonfinancial expenses, reserves, and nonperforming loans for each period. As Figure 5.4 shows, the principle determinant of the spread (on average for the period) is the nonperforming loans, explaining some 34 percent. The importance of this determinant has remained relatively constant over the period. The influence of the reserve requirements has been markedly declining, so that it now

Figure 5.4 Components of the Spread*



* The average participation of each component for the period is shown in brackets.

explains only 22 percent. Nonfinancial expenses are significant as an explanatory factor (an average of 20 percent). The importance of market power has also increased slightly, explaining 16 percent of the spread on average during the period studied.

The preceding exercise clearly shows that although reserves are important, their relevance has markedly diminished, so that the high spreads in Colombia are now linked to the effects of loan risk and nonfinancial expenses. Although the crisis situation of the mid-1980s has been resolved somewhat and the rate of nonperforming loans has fallen notably, the banking sector seems to be charging a significant premium to users of credit and depositors to cover the risk of default. Additionally, various initiatives adopted since 1989 have not been very successful in increasing competition within the banking system, despite the growing number of intermediaries, increased foreign investment, and the privatization of several institutions. The banking system continues to operate with prices (placement rates) that greatly exceed the marginal cost of attracting deposits.

A similar commentary can be made for nonfinancial expenses, which have hardly reacted to the measures adopted since 1989. As a

percentage of assets, this item has remained high, explaining about 28 percent of the spread. Obviously, the less competitive the conditions in the Colombian banking system, the fewer the incentives for intermediaries to reduce costs.

For this reason, creating a more competitive banking system needs to be deemed more important. At the same time, efforts to reduce the parafiscal burden on banks need to continue.[30] At least so far, privatization and the influx of foreign capital have not been sufficient to achieve this objective. As noted early in the chapter, monetary and exchange policies have partially negated the effects of several structural measures. In particular, while foreign direct investment has been encouraged, foreign external private borrowing has been severely penalized, most recently in May 1997.[31] The effects of this type of policy are not only questionable from a macroeconomic viewpoint, but also work against the goal of achieving a more efficient and competitive financial system that operates with more moderate spreads.[32]

High spread indicates that the productive sector of the economy faces high costs of financial intermediation, which are certain to impair its capacity to compete efficiently in the globalized economy. But it also allows banks to generate earnings and protect themselves against credit risk, a minimum requirement for a solid, stable financial system. Spread does not fulfill this function, however, if banks use the resulting profits to cover rampant inefficiencies in intermediation (as some official banks do), or if bank owners appropriate the earnings rather than reinvesting them in the business.

Until late 1996 (and despite the strong economic slowdown in that year) the banking system's nonperforming loans did not increase significantly.[33] Rapid credit growth in a situation where assets

[30] Although the effectively maintained reserve fell 32 percent on average in 1991–92 to 22 percent in 1995–96, it continues to be high in absolute terms and also in comparison with the level in 1989 (17 percent).

[31] This type of measure, which naturally increases the market power of local banks, is usually adopted with bankers' approval. Recently, in relation to the last increase in the reserves on the foreign debt, the president of the Banking Association said that, in general terms, the decisions of the Central Bank coincide with the policy recommendations bankers have been making for some time.

[32] See Cárdenas and Steiner, 1996.

deteriorated very little and spreads remained high has generated a high level of earnings in the system. According to figures issued by the Banking Superintendence, while return on equity has been declining, in 1996 the weighted average exceeded 20 percent.[34] In industrial countries this indicator does not usually reach 10 percent.

With very few exceptions, banks have maintained capitalization levels significantly higher than required.[35] Although these levels of capitalization do not mean that the banking sector is protected against all risks, they do allow for the following interpretation. Colombian banks operate with high spreads, which, because the productive loans grow rapidly, have generated very high levels of profitability. These earnings have largely been capitalized. Any adverse statement about high spread must be contrasted against this reality. The cost to the economy of operating with high spreads may be offset by the benefits of a sound banking system, the strength of which depends partly on the capitalization of profits produced by high spreads.

Obviously, this line of reasoning can lead to a very undesirable and, worse still, unsustainable complacency. High spread reduces incentives for intermediaries to maintain the quality of their loans and increase the possibility of loan deterioration. And in an increasingly globalized economy, bank earnings will depend more and more on the efficient intermediation of financial savings (including low nonfinancial expenses and highly productive loans) than on the extraction of oligopolistic profits from credit users and depositors.

---

[33] Between 1992 and 1995 GDP grew at an average annual rate of 5.2 percent, falling to 2.1 percent in 1996.

[34] For various reasons, this indicator is questioned in some countries, although not in Colombia, perhaps in part because defaulting on any part of a credit makes the entire loan past due.

[35] At the end of 1996, the ratio between technical equity and risk-weighted assets was 13.7 for the system as a whole. The regulations require a ratio of 9. For three of the five largest banks, the ratio was over 15.

References

Acosta, C., and Villegas, L. 1989. "Eficiencia y economías a escala en la banca." *Revista de la Superintendencia Bancaria.* 1(2). Bogota, Colombia.

Alviar, O. 1971. "Bancos comerciales y cajas de ahorro en los mercados de dinero de corto, mediano y largo plazo." In: Banco de la República, editor. *El mercado de capitales en Colombia.* Bogota, Colombia: Banco de la República.

Barajas, A. 1996. "Interest Rates, Market Power, and Financial Taxation: An Application to Colombian Banks 1974–88." Washington, DC, United States: International Monetary Fund. Mimeographed document.

Beltz, H. and Lora, E. 1991. *Apertura y modernización: las reformas de los noventa.* Bogota, Colombia: Fedesarrollo/Tercer Mundo.

Bernal, O. and Herrera, S. 1983. "Producción, costos y economías de escala en el sistema bancario colombiano." *Ensayos sobre política económica.* 3. Bogota, Colombia: Banco de la República.

Cárdenas, M. and Steiner, R. 1996. "Private Capital Flows in Colombia." Bogota, Colombia: Fedesarrollo. Mimeographed document.

Carvajal, A. and Zárate, J. 1996. "Márgenes de intermediación: efectos de regulación y costos (una nota contable)." Bogota, Colombia: Banco de la República. Mimeographed document.

Enders, W. 1995. *Applied Econometric Time Series.* Wiley Series in Probability and Mathematical Statistics. New York, NY, United States: John Wiley and Sons.

Ferrufino, A. 1991. "Reestimación y ampliación de la evidencia sobre las economías de escala en el sistema financiero colombiano." *Ensayos sobre política económica.* 19. Bogota, Colombia: Banco de la República.

Hannan, T. and Liang, J. 1993. "Inferring Market Power from Time-Series Data: The Case of the Banking Firm." *International Journal of Industrial Organization.* 11 (2): 205-218.

Inter-American Development Bank. 1995. *Progreso económico y social en América Latina 1995: hacia una economía menos volátil.* Washington, DC, United States: Inter-American Development Bank, and Johns Hopkins University Press.

Jaramillo, J. 1982. "El proceso de liberación del mercado financiero colombiano." *Ensayos sobre política económica.* 1. Bogota, Colombia: Banco de la República.

Judge, G., Griffiths,W., Hill, C., Lutkepohl, H., and Lee, T. 1985. *The Theory and Practice of Econometrics. Second edition.* New York, NY, United States: John Wiley and Sons.

Misas, M. Suescún, R. 1996. "Cambio tecnológico, ineficiencia de escala e ineficiencia X en la la banca colombiana." Weekly Working Paper Series No. 59. Bogota, Colombia: Banco de la República.

Montenegro, A. 1983. "La crisis del sector financiero colombiano." *Ensayos sobre política económica.* 4. Bogota, Colombia: Banco de la República.

Montes, F. and Carrasquilla, A. 1986. "Sensibilidad de la tasa de interés activa de los bancos a cambios en los parámetros de política económica." *Ensayos sobre política económica.* 10. Bogota, Colombia: Banco de la República.

Ortega, F. 1979. "Política monetaria y sector financiero." In: C. Caballero, editor. *El sector financiero en los años 80.* Bogota, Colombia: Asociación Bancaria de Colombia Press.

Steiner, R., Barajas, A., and Salazar, N. 1998. "El margen de intermediación bancaria en Colombia." Working Paper No. R-325. Washington, DC, United States: Inter-American Development Bank.

Steiner, R., and Giedion, U. 1996. "Características, determinantes y algunos efectos de la inversión extranjera directa en Colombia". In: M. Agosin, editor. *Inversión extranjera directa en América Latina: su contribucion al desarrollo.* Santiago, Chile: Inter-American Development Bank/Fondo de Cultura Económica.

Suescún, R. 1987. "Nueva evidencia sobre economías de escala en la banca colombiana." *Ensayos sobre política económica.* 12. Bogota, Colombia: Banco de la República.

Suominen, M. 1996. "Measuring Competition in Banking: A Two-Product Model." *Scandinavian Journal of Economics.* 67 (1): 95-110.

CHAPTER 6

The Determinants of Bank Interest Rate Margins in Mexico's Postprivatization Period (1992-95)

Anthony Saunders and Liliana Schumacher[1]

Interest rate margins, the spread between a bank's interest earnings and expenses as a percent of interest-earning assets, have been high in Mexico since the 1991-92 privatization. Table 6.1 shows the margin for an aggregate of 13 banks representing around 90 percent of Mexican bank assets. The spread was particularly high in the quarters immediately following privatization, reaching 7.16 percent at the end of 1992. If the fees charged on loans and paid on liabilities, the *implicit interest margin*, are also taken into consideration, the total margin for most of the period stood at around 7 percent.

The question of whether high margins are good or bad from a social welfare perspective has no definitive answer. On the one hand, narrow margins may be indicative of a relatively competitive banking system with a low level of regulatory "taxation" (such as reserve and capital requirements). On the other, relatively large margins may provide a banking system with some degree of stability, adding to the profitability and capital of banks, and thus providing additional insulation from macroeconomic and other shocks. Bank failures themselves carry significant externalities and social costs. In the absence of well-functioning equity markets, margins

[1] Anthony Saunders is John M. Schiff Professor of Finance at the Stern School of Business, New York University. Liliana Schumacher is assistant professor of international finance at George Washington University.

Table 6.1 Mexican Bank Interest Margins

Date	NIM[a]	INIM[b]	Margin[c]
1992			
Quarter 1	5.64	1.21	6.84
Quarter 2	5.78	1.28	7.06
Quarter 3	5.35	1.39	6.74
Quarter 4	7.16	1.23	8.39
1993			
Quarter 1	6.61	1.05	7.66
Quarter 2	6.26	1.11	7.37
Quarter 3	6.16	1.10	7.26
Quarter 4	5.71	1.13	6.84
1994			
Quarter 1	5.75	0.85	6.60
Quarter 2	4.61	0.79	5.41
Quarter 3	4.95	0.82	5.77
Quarter 4	5.50	0.69	6.20
1995			
Quarter 1	8.27	0.18	8.45
Quarter 2	5.98	0.36	6.34
Quarter 3	4.17	0.38	4.55
Quarter 4	5.38	0.39	5.77

Source: Comisión Nacional Bancaria y de Valores de México.

a. NIM = (Interest Income-Interest Expenses)/Average Interest Earning Assets.

b. INIM = (Fees Related to Loans - Fees Related to Liabilities)/Average Interest Earning Assets.

c. MARGIN = NIM + INIM.

and internal profits may be the only means banks have of adding to their capital bases.

This chapter investigates the determinants of interest rate margins in Mexico's postprivatization period, using quarterly data for individual banks that are derived from public information reported by the Mexican supervisory agency (Comisión Nacional Bancaria y de Valores de México) between 1992 and 1995. The analysis looks at three traditional determinants of bank interest margins: a tax or regulatory component, a market structure component (reflecting the degree of monopoly power in the banking market), and a risk premium component. It also seeks to establish whether Mexican bank mar-

gins have a cost component that reflects the initial inefficiency of a recently liberalized banking sector. The model used to examine the four components is based on one originally proposed by Ho and Saunders (1981) and later extended by a number of other researchers, including Allen (1988) and Angbazo (1997).

The analysis aims to do more than simply increase the general understanding of the determinants of spreads in Mexico, however. It also produces some results that offer potentially valuable guidelines for determining public policy. Macroeconomic policies can usefully be shifted in response to the behavior of the determinants of spread. If interest rate volatility is responsible for a significant proportion of bank margins, for instance, the most appropriate focus of public policy may be reducing the cost of intermediation services.

Recent Developments in the Mexican Banking Sector

As part of the Mexican government's response to the 1982 external crisis, all Mexican banks (with the exception of Citicorp's Mexican subsidiary) were nationalized.[2] The government imposed heavy reserve requirements banks could fulfill only by purchasing government debt, set interest rate ceilings for both assets and liabilities, and dictated lending quotas to what it deemed "high priority" economic sectors.

During the 1980s the government was increasingly pressured to undertake economic and financial reforms. In 1984 it sold brokerage houses, insurance companies, and other bank operations that did not take deposits and make loans. Because the Mexican securities markets were expanding rapidly, the government began to issue *Cetes*, short-term government debt comparable to U.S. Treasury bills, creating a market that insulated banks from the government's financial needs. In 1988 and 1989 the government freed interest rates on bank assets, removed priority lending quotas, and reduced reserve requirements, which were eliminated altogether in 1991.[3]

[2] The nationalization was even incorporated into the constitution.

[3] See Gruben and McComb, 1997

In 1990 the Mexican congress passed the Financial Groups Law, which amended the constitution to permit the sale of nationalized banks and created a legal framework for a universal banking structure. The banks were then sold in public auctions. In taking these steps, the government had several objectives:

- To obtain the best price;
- To ensure that buyers were financially sound;
- To guarantee that the banks would remain in the hands of Mexican nationals; and
- To facilitate the sale of regional banks to investors from the same locale.

Buyers were preselected, and while foreigners could participate in the auctions, they could buy only "C" stocks that did not allow majority ownership.[4]

The government sold its 18 banks in the 14 months between June 1991 and July 1992 at the extraordinarily high price-to-book value ratio of 3.49, 14 times their profit margin. The rapid sales and high prices raised suspicions that the financial groups and brokerage houses doing the buying were willing to pay well because the purchasers expected only limited competition.[5]

The signing of the North American Free Trade Agreement (NAFTA) in November 1993 was a seminal event for Mexican banks. NAFTA's financial services section permitted foreign banks to enter the Mexican financial system. The intent of the rules was clearly to allow foreign banks, which had been restricted to buying existing banks, to establish subsidiaries in Mexico.[6] Three significant barriers to foreign entry remained, however. First, NAFTA established a six-year transition period beginning January 1994. During this time a U.S. or Canadian financial institution could acquire an existing Mexican bank only if that bank did not account for more than 1.5 percent of total Mexican bank capital. Because of this stipulation, only two banks were eligible for direct acquisition when NAFTA

[4] See Bazdresch and Elizondo, 1993.

[5] See Lopez de Silanes and Zamarripa, 1995.

[6] See Gruben, Welch, and Gunther, 1993.

was signed. Second, the agreement limited the total amount of Mexican bank capital that the group of foreign-controlled banks could hold.[7] Finally, U.S. banks, particularly small U.S. "border banks," were affected by the initial minimum capital requirement, which was equivalent to 0.5 percent of total paid-up capital, reserves, and current gross profits.

By the time NAFTA had been signed, the successful stabilization program, begun in Mexico in 1988, was in place. Inflation had fallen, both because the government deficit had been reduced and because the exchange rate had been pegged to the U.S. dollar. The initial range of the peg was narrow, but the range grew gradually (on a daily basis). Mexican interest rates were high but stable, given low (and falling) U.S. rates. In addition, the prospects of NAFTA's passage had increased private capital flows and foreign direct investment. But 1994 saw the reversal of many of the conditions on which these capital inflows had been based. A number of events were blamed for the capital outflows, including nascent political instability in Mexico and the U.S. Federal Reserve Board's decision in February 1994 to raise interest rates.

On December 20, 1994 the peso was devalued from 3.47 to 3.99 per U.S. dollar. While the devaluation did not signal a significant change in the prevailing exchange rate regime, investors precipitated a run on the peso. Two days later the government allowed the peso to float, and interest rates and inflation soared. The high interest rates and rampant inflation had important consequences for the health of Mexico's financial institutions, although the cause-effect relationship has been questioned. Calvo and Mendoza (1996) found that the clearest proximate cause for the reserve losses that ultimately contributed to the devaluation was an expansion of net credit to the commercial banks. The expansion itself had been undertaken to prevent interest rates from rising in response to attacks on reserves. In 1994 Calvo and Mendoza also identified the fragility of the banking sector as the primary factor preventing the monetary tightening that would have maintained the peso.

[7] The 1994 ceiling of 8 percent was set to rise to 15 percent in 2000.

The government adopted a rescue package for the banks to help them deal with the fallout from the devaluation crisis. The measures include a recapitalization program, "repackaging" for problem loans, and additional flexibility in the rules governing the acquisition of Mexican banks by foreign investors. The recapitalization program, Programa de Capitalización Temporaria (PROCAPTE), enables troubled banks to raise capital by creating and selling subordinated convertible debentures with a five-year maturity to the nation's deposit insurance authority, Fondo Bancario de Protección al Ahorro (FOBAPROA). The government has established criteria for converting the debentures to equity if a bank turns out to be poorly managed or is likely to become insolvent. Although this condition could technically make FOBAPROA, which is administered by the Bank of Mexico, a shareholder in commercial banks, the government has committed to selling the instruments as soon as they become shares.[8]

Banks are allowed to repackage and restructure certain types of past-due loans into bonds that are then bought by the government. To buy these bonds, the government issues another type of bond that is bought by the banks. This program spreads the impact of current losses over time and permits problem banks to hold on to loans that are likely to be repaid.

The law relaxing the restrictions on foreign banks' purchases of Mexican banks took effect in February 1995. It raised the ceiling on the total Mexican bank capital that foreign banks can hold from 1.5 to 6 percent, making all but the three biggest banks eligible for purchase. Although some domestic banks had minor foreign capital participation prior to 1994, the number of foreign bank subsidiaries in Mexico has risen dramatically since then.[9]

One of the hypotheses about the behavior of Mexican banks in the postprivatization period was that domestic banks enjoyed monopoly power and could keep interest rates high through underloaning. This hypothesis is based on the temporary restrictions the government imposed on foreign bank entry and the high degree

[8] See Gruben and McComb, 1997.

[9] See Saunders and Schumacher, 1998.

of concentration in the banking sector. In December 1994 the three largest banks—Banamex, Bancomer, and Serfin—held 61 percent of all bank assets in Mexico.[10] This feature of the Mexican system is one reason the spread between banks' interest rates on loans and the cost of funds can be expected to remain high for years.[11]

Looking at the balance sheet items, however, the monopoly theory seems a less plausible explanation of bank behavior than the "bubble" investor theory (Tables 6.2. and 6.3).[12] In particular, after 1991 banks simultaneously increased the proportion of loans as a percentage of total assets and reduced their holdings of cash and government securities (Table 6.2). The increase in the proportion of total loans was accompanied by an increase in past-due loans, which rose from an average of 1.76 percent of total assets in 1991, to 5.50 percent of total assets in 1994. The growth in past-due loans reflected either Mexican banks' inability to properly monitor risk, or their propensity to take risks, or both.[13] Loss reserves also increased as a percent of total assets, signaling deterioration in the quality of Mexican bank portfolios.

The ratio of capital to nominal assets, or those not adjusted for risk, also rose in 1992 and 1993, most probably as a consequence of the adoption of the Basel guidelines for minimum risk-adjusted capital (Table 6.2). However, capital ratios deteriorated in 1994. Ultimately the Finance Ministry extended the date by which banks had to meet the new requirement to October 1993.

Mexican banks made large profits before 1994 (Table 6.3). The return on assets (ROAs) for 1991, 1992, and 1993 were 1.11, 1.34, and 1.50, respectively, for Mexican banks, compared with only 0.51, 0.91, and 1.20 for U.S. banks. These ROAs were partly the result of high net interest income. Total net interest income—explicit and implicit—for 1992 and 1993 equaled 5.61 percent of total assets, much higher than in 1991 (4.7 percent), when the state still owned most of the

[10] Ibid.

[11] See McComb, Gruben, and Welch, 1994.

[12] See Gruben and McComb, 1997.

[13] Past-due loans were still higher in 1995, owing to defaults induced by high interest rates and the economic downturn that followed the peso devaluation.

banks. Overhead costs were high, totaling 4.32 percent in 1992 for Mexican banks, as opposed to 2.15 percent for U.S. banks. However, these costs decreased to a low of 3.7 percent in 1995, possibly reflecting the impact of increased competition from foreign banks or lower labor costs in the wake of the devaluation.

Table 6.2 Balance Sheet Items of Mexican Banks, 1991-1995 (percent of total average assets)

	1991	1992	1993	1994	1995
Assets	100.00	100.00	100.00	100.00	100.00
Interest Earning Assets	90.10	91.12	90.30	89.10	87.68
Loans	52.94	63.21	62.25	61.31	62.09
- Regular Loans	51.18	59.73	57.17	55.80	56.29
- Past Due Loans	1.76	3.48	5.08	5.50	5.80
Repos	11.23	7.75	9.15	5.97	3.89
Securities	25.57	19.63	18.29	21.02	20.90
Other Interest Earning Assets	0.36	0.53	0.61	0.80	0.80
Non Interest Earning Assets	4.56	4.25	3.51	3.61	4.56
Cash	3.60	3.09	2.26	2.38	3.30
Fixed Assets	0.97	1.16	1.25	1.23	1.26
Other*	5.34	4.64	6.19	7.29	7.76
Liabilities	94.51	94.81	93.70	94.17	93.52
Interest Earning Liabilities	88.74	90.51	87.24	86.38	84.41
Deposits	59.00	61.79	58.33	53.83	52.34
Repos	15.97	14.90	16.19	15.35	9.48
Interbank Loans	8.78	8.53	8.03	12.37	16.24
Loans from Government	0.88	1.06	1.05	1.00	1.40
Other Interest Earning Liabilities	4.11	4.23	3.64	3.83	4.96
Other*	5.30	1.77	4.34	5.38	5.37
Loss Reserves	0.47	1.53	2.12	2.41	3.81
Capital Account	5.49	6.19	6.30	5.83	6.41
Assets (millions of pesos)	351,993	431,757	543,952	657,091	890,848
Assets (millions of dollars)	116,554	139,276	174,344	194,406	138,978
Average Dollar Price (ISF)	3.0	3.1	3.1	3.4	6.4

Source: Comisión Nacional Bancaria y de Valores de México.

* Basically, these are off-balance sheet transactions reported on balance.

Table 6.3 Profits of Mexican Banks, 1991-1995
(percent of total average assets)

	1991	1992	1993	1994	1995
Interest Income	17.17	16.95	17.75	15.11	34.33
Interest Expense	13.43	12.32	12.99	10.97	29.63
Net Interest Income	3.74	4.63	4.76	4.15	4.70
Fees Charged	0.98	1.02	0.88	0.73	0.36
Fees Paid	0.04	0.03	0.03	0.11	0.11
Net Implicit Interest Income	0.94	0.98	0.85	0.62	0.25
Total Interest Income	4.67	5.61	5.61	4.77	4.95
Provisions	0.40	0.85	1.25	1.46	2.75
Recoveries	0.25	0.43	0.23	0.33	0.23
Noninterest Income	1.48	1.18	1.52	1.43	1.94
Income on Services	1.38	1.35	1.46	0.81	1.28
Other Operating Income	0.13	0.00	-0.03	0.51	0.83
Non Operating Income	-0.03	-0.18	0.09	0.11	-0.17
Noninterest Expense	4.47	4.56	4.62	4.90	4.86
Overhead Cost	4.22	4.32	4.21	3.90	3.67
Salaries	1.77	2.04	2.08	1.87	1.49
Expenses of Premises and Fixed Assets	2.45	2.28	2.13	2.03	2.17
Expenses on Services	0.11	0.13	0.14	0.14	0.21
Other Expenses	0.14	0.10	0.28	0.87	0.98
Net Noninterest Expense	2.99	3.38	3.10	3.47	2.91
Gains on Securities	0.12	0.34	0.55	0.56	0.83
Returns before Taxes	1.65	2.16	2.05	0.71	0.35
Taxes	0.54	0.82	0.55	0.20	0.11
Returns before UDIS	1.11	1.34	1.50	0.52	0.24
Fideicomisos Udis	0.00	0.00	0.00	0.00	0.04
ROA	1.11	1.34	1.50	0.52	0.27
Total Average Assets (millions of pesos)	351993	431757	543952	6570901	890848
Total Average Assets (millions of dollars)	116553.80	139277	174344	194406	138761
Average Dollar Price in Pesos (ISF)	3.02	3.1	3.12	3.38	6.42

The Model

The basic model used in this chapter assumes that the representative bank is a risk-averse agent acting as a dealer in a market for intermediation for deposits and loans, with the major portfolio risk emanating from interest rate fluctuations. Thus, the analysis focuses on banks' risk exposure as providers of intermediation to the rest of the economy. Ho and Saunders (1981) developed and estimated the framework for the model for the United States, although the importance of the relationship between interest rate volatility and bank margins had been recognized nearly four decades earlier.[14]

The planning horizon is a single period during which bank rates are held constant and a single transaction in loans or deposits occurs. Bank rates are posted before the demand for intermediation has been observed. Risk-averse banks facing asymmetric arrival times for the demand for loans and the supply of deposits select optimal loan and deposit rates, minimizing the risks of excessive demand (for loans) or insufficient supply (of deposits). The optimal rates are

$$R_L = (r + b)$$
$$R_D = (a + b)$$

and the margin is

$$R_L - R_D = (a + b)$$

where

R_L = the rate set on loans;
R_D = the rate set on deposits;
r = the expected risk-free interest rate; and
a and b = fees charged by the bank for intermediation and interest rate risk.

[14] See Samuelson, 1945.

For example, if a deposit arrives at a different moment in time than a new loan demand, the bank will temporarily invest the funds in the money market at the short-term risk-free rate *r*. Because the short-term rate could fall, the bank faces reinvestment risk at a later date. Similarly, meeting the demand for a new loan without a sufficient inflow of deposits forces a bank to resort to short-term borrowing in the money market at rate *r* to fund the loan. In this case, the bank faces refinancing risk if the short-term interest rate goes up. Banks must charge fees that are high enough to compensate for these risks.

The bank is assumed to maximize the following expected utility function:

$$Max_{ab}\, EU(W_T) = \lambda_a EU(W_T/deposit) + \lambda_b EU(WT/\text{loan}) \qquad [1]$$

where

$$\lambda_a = (\alpha - \beta a);$$

$\lambda_b = (\alpha - \beta b)$ = the probabilities of deposit and loan transactions given by the symmetric and linear supply of deposit and demand for loan functions;

$EU(W_T/deposit)$ = the expected utility of net worth after deposit intermediation; and

$EU(W_T/loan)$ = the expected utility of net worth after loan intermediation.

Solving the model for the optimal fees *a* and *b* and thus for spread $s = (a + b)$ provides

$$s = (a + b) = \alpha/\beta + (1/2)R\sigma^2_1 Q \qquad [2]$$

The first term, α/β, measures the bank's risk-neutral spread and is the ratio of the intercept α and the slope β of the bank's symmetric deposit and loan arrival functions. A large a and a small b will result in a large α/β and thus high spread. That is, if a bank faces relatively inelastic demand and supply functions in the markets in which it operates, it may be able to exercise

monopoly power (and earn a producer's rent) by demanding a greater spread than it could get if banking markets were competitive (had a low α/β ratio).

Consequently, the ratio α/β provides some measure of the producer's surplus or monopoly rent element in bank spread. The second term is a first-order risk adjustment term and depends on three factors: R, the bank management's coefficient of absolute risk aversion; Q, the size of bank transactions; and σ^2, the instantaneous variance of the interest rate on deposits and loans. The second term implies that, all other things being equal, a high degree of risk aversion, large transactions, and considerable variance in interest rates will result in larger bank margins. This spread equation has an important implication for the microfoundations of financial intermediation. It suggests that even in highly competitive banking markets, as long as a bank's management is risk averse and faces transaction uncertainty, positive bank margins are the price of providing deposit-loan intermediation.

The empirical specification derived here identifies the sensitivity of bank margins to bank market structure (α/β) and intermediation risk (α/β). It controls for regulatory tax effects, specific credit risk, and efficiency arguments that potentially distort the "pure" margin or spread. Actual margins may differ from the optimal margin in equation [2]. Banks must cover regulatory costs out of the net interest margin (NIM), either because of cross-sectional differences in portfolio risk or because of inefficiency arguments.

Although banks' cash holdings are also included in the specification of the first-stage regression, the regulatory costs analyzed here are basically risk-based capital ratios because Mexico eliminated reserve requirements in 1991. Since Mexican banks are free to hold as much in liquid resources as they want, the cash-to-asset ratio should not be significant in determining bank margins. Compensation for interest rate volatility should be considered net loan portfolio credit risk. In order to isolate the pure margin, then, it is necessary to control the counterparty risk impact.

In addition to these typical components of bank margins, the analysis also tests the efficiency argument suggested by the literature on financial liberalization. For example in his analysis of Chile's

financial liberalization, Brock (1992) argues that when a repressed financial system is first liberalized, intermediation costs will be high. The author maintains that, in this situation, banks lack the expertise, personnel, and technology needed to supply intermediation services efficiently. High intermediation costs result in a large spread between interest rates charged to borrowers and paid to depositors. At this stage banks also lack the resources to evaluate loan risk, so the quality of the portfolio tends to deteriorate.

In short, the analysis tests the hypothesis that in Mexico the NIM will comprise a pure spread that remains constant across banks in a given period. This NIM reflects bank market structure, intermediation risk, and markups for capital requirements (k/a), credit risk (σ_L), and the initial high cost of providing financial services, or the cost-to-asset ratio (c/a) in the wake of financial liberalization. All other effects are reflected in the residual variable u.

In general form

$$NIM = f\{s(\alpha/\beta, R, Q, \sigma_I),\ k/a,\ \sigma_L,\ c/a, u\} \qquad [3]$$

Empirical Specifications

Given equation [3], the analysis of the determinants of the NIM follows a two-step process. The first step controls for the effects on the NIM of regulatory imperfections, credit risk, and inefficiencies in order to insulate estimates of the pure spread(s) in each quarter. The second step analyzes the time series of the pure spread for the Mexican system between 1992 and 1995 (quarterly) to identify possible market structure components and the effect of volatility on the spreads. Specifically

Step 1. A panel data of individual bank net interest margins, with fixed time effects for each quarter, is run for a sample of Mexican banks over 16 quarters. The specification is

$$\text{MARGIN}_{it} = \gamma_t = \delta_1 cash + \delta_2 (k/a)_{it} + \delta_3 \sigma_{L_{it}} + \delta_4 (c/a)_{it} + u_i \qquad [4]$$

where

$MARGIN_{it}$ = *total margin* (interest margin + implicit interest margin) of each of i banks in quarter t;

δ_{jit} = the estimated coefficients on the cash-to-assets ratio, the capital-to-assets ratio k/a), credit risk (σ_L) and the cost-to-assets ratio (c/a);

u_{it} = the residual; and

g_t = the estimated time effect for each quarter t, or the estimate of the pure spread(s) component of the NIM for all i banks at time t, for a total of 16 parameters.

Step 2. From equation [2], the pure spread estimates from the cross-sectional regression in Step 1 should vary over time in line with variations in market structure (α/β), volatility (σ^2_I), risk aversion (R), and transaction size (Q). Because of problems in estimating risk aversion parameters and transaction size, the regression in this step concentrates on the effects on the pure spread of market structure and volatility. The regression analyzes a panel (cross section-time series) regression of the form

$$\gamma_t = \theta_o + \theta_1 \sigma_t \qquad [5]$$

where

γ_t = a time series of pure spreads ($t = 1 \ldots 6$) for all Mexican banks that are also the estimates of the time effects of the regression in Step 1;

θ_o = a constant that reflects the effect of market structure on the pure spread;

σ_t = the interest rate volatility measured as the quarterly standard deviation of daily interbank rates; and

θ_1 = the sensitivity of the pure spread to changes in intermediation risk (interest rate volatility over time).

This methodology can be used to separate the effects on the NIM of market structure and macroeconomic policies (such as

interest rate volatility) from microeconomic components of the NIM for which banks are responsible (such as credit risk and efficiency).

Data Sample

The major sources of data for this study were quarterly balance sheets and income statements published by the Comisión Nacional Bancaria y de Valores de México. Data had to be available for all 16 quarters, leaving 13 banks available for the study: Banamex, Bancomer, Serfin, Bital, Mexicano, Atlántico, Probursa, Confia, Bancrecer, Del Norte, Citibank, Promex, y Banoro. The interest rate volatility figures were calculated as the quarterly standard deviations of daily interbank rates, based on data provided by the Banco de Mexico.

The dependent variable in this study is the *total margin* (*MARGIN*), defined as the sum of the explicit and implicit net interest margins (*NIM* and *INIM*, respectively). The *implicit interest margin* is the difference between interest income and interest expense to average earning assets, and the *explicit interest margin* is the difference between fees related to loans and fees related to liabilities to average earning assets. This analysis uses the total margin because Mexican banks report the relevant fees separately from other types of fees, making it easy to identify the fee component that is part of the broad definition of margins. This broad definition coincides with the definition used by the Comisión Nacional Bancaria y de Valores de México.

The capital to asset ratio (k/a) is the ratio of the capital account to total average assets. Traditionally Mexican banks measure the quality of their portfolios by the ratio of past-due loans to total loans. This variable is used as a proxy for credit risk in this analysis. The dependent and independent variables for the aggregate of the 13 banks follow much the same pattern as the variables for the aggregate of all banks.[15] In particular, capital-to-asset ratios increased until the first quarter of 1994 (when they began to fall), while past-due

[15] See Samuelson and Schumacher, 1998.

loan ratios increased and cost-to-asset ratios decreased for the whole period.

Empirical Results

Tables 6.4 and 6.5 show the results of the first step regression. Table 6.4 includes the traditional determinants of bank margins as regressors: capital-to-asset ratios, cash-to-asset ratios, and the quality of loans. Table 6.5 shows the effect of the traditional determinants of bank margins and the cost-to-asset ratios that proxy for the inefficiencies of a recently liberalized financial sector. As expected, the cash-to-assets ratios had no impact on the determination of bank margins. When reserve requirements were eliminated in 1991, banks were free to choose the (optimum) ratios themselves.

The capital-to-assets ratio had a strong impact on bank margins. In both models the coefficient is positive and significant at a 1 percent confidence level. This result seems to be evidence that the banks were trying to fund the new risk-adjusted capital requirements with higher spreads. Because Mexico's stock markets are not well developed, high profits are one of the few ways banks have to increase capital. However, given aggressive lending policies and the struggle for market share, most banks may have failed in their attempt to generate the extra margins they needed to increase their capital base. As noted earlier, aggregate capital-to-asset ratios decreased in 1994, a trend that is also true for the sample of 13 banks.

The relationship between past-due loans and margins is negative in both models. There are several possible explanations for the relationship. First, Mexican banks may not have been able to identify and properly estimate their portfolio risk. Another explanation may lie in the appropriateness of Mexico's accounting system, and, in particular, the wisdom of using the ratio of past-due loans as a measure of credit quality. In order to determine if other measures of loan quality were better proxies of the credit risk of bank portfolios, this analysis also classified loans as minimum, low, medium, or high risk as reported by the Comisión Nacional Bancaria y de Valores de México for each quarter. But the correlation be-

tween margins and loan ratios calculated according to risk was also negative. Thus, a final reason for the negative relationship may be that banks with risky portfolios were more apt to operate with low margins in order to gain market share and grow out of their problems.

The cost-to-asset ratio is highly significant, which can be expected in a banking system in the wake of financial liberalization. The introduction of this variable doubles the explanatory power of the regression. Two types of bank activities could explain this result. First, it may have been caused by the innovations that banks introduced to lower the cost of funding. For example, banks that improved their customer service with automatic teller machines or that devoted resources to advertising their products may have been able to reduce the cost of funding. However, from the perspective of risk, all bank deposits should be priced equally, given the complete safety net the government has provided. Second, it may be the result of the high interest rates banks charged their clients to fund the cost of financial innovation or of bank managers' learning process. Although banks may have engaged in both these activities, the second would most probably have been more difficult to impose in the context of a struggle for market share. In any event, cost-to-asset ratios decreased over the period studied for both the aggregate of all banks and the aggregate of the 13 banks, providing additional evidence of competition.

Tables 6.4 and 6.5 also report the time effects for all 16 quarters. As discussed earlier, these time effects (in the margin model) can be viewed as the pure spread(s) common to all banks in a single country in the same year. For example, for the 13 Mexican banks the pure spread in the third quarter of 1993 is estimated at 1.8 percent, compared with a gross margin of 7.26 percent. That is, in 1993 the pure spread is estimated to explain about 17 percent of the Mexican margin. The remaining 83 percent is explained by regulatory variables, credit risk effects, and the cost ratio.

Table 6.4 Panel Data for Mexican Bank Margins (with fixed time effects)
Dependent Variable = Total Margin*
Model 1

	1992	1993	1994	1995	
K/A	0.473 Quarter 1	2.183 Quarter 1	3.274 Quarter 1	0.907 Quarter 1	3.298
	(3.813)	(1.542)	(2.177)	(0.572)	(1.969)
Cash/Assets	0.016 Quarter 2	1.447 Quarter 2	3.766 Quarter 2	1.500 Quarter 2	2.785
	(0.193)	(1.011)	(2.518)	(0.927)	(1.582)
Past Due Loans Ratio	-0.278 Quarter 3	1.768 Quarter 3	3.839 Quarter 3	1.866 Quarter 3	-0.129
	(-3.243)	(1.277)	(2.556)	(1.244)	(-0.073)
Cost/Assets	Quarter 4	3.536 Quarter 4	3.195 Quarter 4	2.787 Quarter 4	-0.289
		(2.496)	(2.145)	(1.949)	(-0.174)

Notes:
1. R2: 38.8.
2. F(18,189) = 8.30.
3. White Estimator of the Covariance Matrix.
4. (t-tests between brackets).
* Total Margin = (Interest Income - Interest Expense + Fees Related to Loans - Fees Related to Liabilities)/Average Earning Assets.

Table 6.5 Panel Data for Mexican Bank Margins (with fixed time effects)
Dependent Variable = Total Margin*
Model 2

	1992	1993	1994	1995	
K/A	0.473 Quarter 1	0.008 Quarter 1	1.614 Quarter 1	1.034 Quarter 1	3.776
	(3.813)	(0.008)	(1.593)	(0.746)	(3.304)
Cash/Assets	0.016 Quarter 2	-0.561 Quarter 2	1.968 Quarter 2	1.083 Quarter 2	4.092
	(0.193)	(-0.563)	(1.966)	(1.059)	(3.360)
Past Due Loans Ratio	-0.278 Quarter 3	-0.211 Quarter 3	1.832 Quarter 3	1.312 Quarter 3	0.077
	(-3.243)	(-0.220)	(1.829)	(1.300)	(0.065)
Cost /Assets	1.049 Quarter 4	1.205 Quarter 4	0.745 Quarter 4	1.384 Quarter 4	-0.805
	(9.030)	(1.238)	(0.746)	(1.432)	(-0.729)

Notes:
1. R2: 64.3.
2. F(19,189) = 20.65.
3. White Estimator of the Covariance Matrix.
4. (t-tests between brackets).
* Total Margin = (Interest Income - Interest Expense + Fees Related to Loans - Fees Related to Liabilities)/Average Earning Assets.

Using these estimated time effects as dependent variables measuring the pure spread, the analysis then runs the time series regression outlined in Step 2 (equation [5]). The key parameters of interest are the intercepts of that regression, which show the general average effect of market structure on pure bank spreads and the sensitivity of pure spreads with respect to the market volatility of interbank rates.

Table 6.6 shows the result of the time series regression of the pure spread on the volatility of interbank rates for both models, with and without the cost ratio. The estimation of the covariance matrix was adjusted for the presence of a positive autocorrelation among the residuals (as evidenced by a DW test that rejected the null of no serial correlation). In both cases, the evidence is incompatible with the idea of market power, as signaled by an insignificant intercept. With respect to *macroeconomic risk*, or the volatility of interest rates, spreads increase as volatility increases, as the model implies.

Table 6.6.1 Time Series Regression of Pure Margin on Interbank Rate Volatility Dependent Variable: Fixed Time Effects in Model 1, 1992-1995 (quarterly)

Constant	1.204
	(1.170)
Volatility	0.132
	(2.142)
Rho	0.797
	(5.112)

Note: t-statistics in brackets.

Table 6.6.2 Time Series Regression of Pure Margin on Interbank Rate Volatility Dependent Variable: Fixed Time Effects in Model 2, 1992-1995 (quarterly)

Constant	-0.019
	(-0.029)
Volatility	0.196
	(3.225)
Rho	0.649
	(3.305)

Note: t-statistics in brackets.

International Comparisons

The analysis indicates that the pure spread in Mexico has varied over time and that a significant determinant of the spread has been interest rate volatility (as measured by the daily variance of the interbank market). This result is a new finding for Mexico, and it confirms the analytical model's prediction (equation [2]).

Does the connection between interest rate volatility and spreads found in Mexico hold for countries in which the transition to more efficient banking has already taken place? To answer this question, this section looks at a sample of banks from seven major countries of the Organization for Economic Cooperation and Development (OECD) between 1988 and 1995. Table 6.7 indicates that interest margins varied widely. For example, the mean NIM for the United States (4.264 percent) is more than twice as large as the NIM for Switzerland (1.731 percent). In addition, the relative cross-country margins appear to have changed over time. For example, Spain had the highest NIMs throughout the entire period, but the United States had higher NIMs between 1993 and 1995.

Table 6.7 Net Interest Margins, U.S. and European Banks

		1988	1989	1990	1991	1992	1993	1994	1995
Germany	Mean	2.434	2.372	2.347	2.477	2.588	2.630	2.676	2.531
	St. Deviation	1.035	1.070	1.064	1.144	1.287	1.271	1.240	1.207
Spain	Mean	5.087	5.410	5.265	5.094	4.851	4.717	4.438	4.131
	St. Deviation	0.940	1.158	1.033	1.098	1.125	1.094	1.156	1.045
France	Mean	3.318	2.980	2.889	2.642	2.486	2.547	2.569	2.496
	St. Deviation	2.289	2.004	1.711	1.519	1.556	1.766	1.786	1.670
Great Britain	Mean	2.103	2.356	2.213	2.176	2.240	2.113	2.088	2.038
	St. Deviation	0.380	0.369	0.334	0.364	0.309	0.308	0.255	0.399
Italy	Mean	4.059	4.387	4.465	4.389	4.617	4.201	3.731	4.022
	St. Deviation	1.192	1.353	1.357	1.341	1.465	1.405	1.248	1.383
United States	Mean	3.827	3.738	3.932	4.643	4.897	4.558	4.923	4.197
	St. Deviation	1.514	1.585	2.193	3.645	3.423	3.185	3.192	2.797
Switzerland	Mean	1.293	1.646	1.948	2.042	1.969	1.752	1.814	1.732
	St. Deviation	0.838	1.195	1.352	1.369	1.202	0.884	0.838	0.738

Source: Worldscope, 1996.

As before, the empirical specification is designed to identify the sensitivity of bank margins to bank market structure (α/β) and interest rate risk (σ) after controlling for effects that potentially distort the pure spread. Despite the lifting of reserve requirements, two of the three effects, the capital-to-assets ratio and the opportunity cost of holding required reserves, were considered for Mexico.

The third effect considered in this section is bank payments of implicit interest (instead of, or as well as, explicit interest) on deposits.[16] These payments include service charge remissions and other types of depositor subsidies that result from regulatory restrictions on explicit interest payments. They are calculated as noninterest expense minus other operating income divided by total average assets.[17] A country with relatively low NIM, such as Switzerland, also pays the lowest implicit interest rates (Table 6.7). Spain, which along with the United States has the highest NIM, has relatively high implicit interest payments.

The estimation follows a two-step procedure similar to that used for Mexico. In the first step cross-sectional regressions of net interest rate margins of individual banks are run in each country for each period. This procedure gives $C \times T$ sets of parameters, where C is the number of countries and T is the number of time periods. The specification is

$$NIM_{ic} = \gamma_c + \sum_j \delta_j X_{jic} + u_1$$

where

NIM_{ic} = the published NIM of bank i in country c in period t;
X_{jic} = a vector of regulatory variables (Feepr, Neata and K/A) for each bank i in country c in time period t;

[16] Ibid.

[17] The fee proxy for the seven OECD countries' database is not the same as it is for Mexico. In Mexico the Comisión Nacional Bancaria y de Valores de México provides information on fees that substitute for interest payments, so that fee income can be combined directly with the NIMs to calculate the total margin. The OECD data set contains no such direct measure of fee income. The fee proxy must be used as a regressor to take into account payments that are positively correlated with the NIMs.

u_{ic} = the residual; and

g_c = the regression constant, or the estimate of the pure spread(s) component of the NIM for all *i* banks in country *c* at time *t*.

Repeating this cross-sectional regression for years 1 through 8 (1988-95) gives eight estimates of the pure spread for each country. That is, the results will be an eight-period time series of the pure spread for seven countries.

The second step measures the effect of interest rate volatility on spreads and is equivalent to the procedure used for Mexico, except that the data for the seven countries are pooled. Consequently the second step analyzes a panel regression (cross-section time series) of the form

$$\gamma_{tc} = \theta_o + \sum_{c-1} \eta_c + \theta_1 \sigma_c$$

where

γ_{tc} = a time series of pure spreads (t=1 . . . 8) for seven countries (*c*=1 . . . 7), which are also the intercepts of the regressions in Step 1;

θ_o = a constant that reflects the average effect on the pure spread of market structure across seven countries;

η_c = a set of *c*-1 dummy variables reflecting the differential effects of market structure on the pure spread across countries;[18] and

θ_1 = the sensitivity of the pure spread to changes in *intermediation risk*, or interest rate volatility, over time.

As with Mexico, this methodology separates the effects on the NIM for which macroeconomic policies are responsible (such as interest rate volatility) and components of the margin for which market structure (monopoly power) is responsible.

[18] Germany is the excluded base country.

The major source of data for this study is balance sheet and income statement information derived from the Worldscope database. This database standardizes financial statements across countries in order to facilitate cross-country comparisons of bank performance. The annualized database covers 1988 through 1995. The seven countries chosen include five major banking "powerhouses:" France, Germany, Switzerland, the United Kingdom (UK), and the United States. Two other countries, Italy and Spain, have had relatively controlled banking systems, somewhat like Latin American systems. All the countries have relatively universal structures. Germany has the largest number of banks in the sample (151), followed by Italy (135), Spain (114), France and the United States (110), Switzerland (94), and the UK (32). The sample includes only those banks for which all the required data was available for all eight years. Because the United States has a more segmented, or nonuniversal, banking system compared with the other countries in the sample, some tests were rerun using the U.S. institutions that are designated as purely commercial (103 out of the 110).

The interest rate volatility figures were collected from Worldscope databases. Short-term volatility was calculated as the annual standard deviation of weekly interest rates on three-month securities in each country. Long-term volatility was calculated as the annual standard deviation of weekly interest rates on one-year securities.[19] There was considerable time variation in volatility within countries, and the degree of correlation in volatility shocks across countries is quite low. For example, the annual short-term volatility for the United States varied from a low of 0.083 percent in 1993 to a high of 0.85 percent in 1988. That for Spain varied from 0.23 percent in 1990 to a high of 2.18 percent in 1993.[20]

---

[19] The specific rates used for the short-term were: the 3-month money market rate in France and Germany, the 3-month interbank rate in the UK and Spain, the 3-month Treasury Bill rate in the United States, the discount rate in Italy, and the fixed 3-5 month deposit rate in Switzerland. The long-term rates used were: the 1-year money market rate in France, the 1-year treasury bond rate in Germany, the 1-year treasury bill rate in the United States, the 1-year interbank rate in the UK and Spain, the ABI Prime rate in Italy, and the 12-month fixed deposit rate in Switzerland.

[20] See Samuelson and Schumacher, 1998.

The sample period (1988-95) was chosen for three reasons. First, it includes the worldwide recession of the late 1980s and early 1990s, when many banks saw their exposure to credit risk, rates of loan losses and charge-offs increase. The analysis is therefore able to identify the determinants of the NIM during both expansions and contractions in economic activity. Second, the sample period encompasses the phasing in of the new requirements for risk-based capital that forced a number of banks to increase their capital ratios. As noted earlier, these capital ratios can be viewed as a form of taxation on bank profitability that is likely to be reflected in NIMs. Including a variable for bank capital captures the effects of the new capital guidelines on bank spreads.

Finally, 1988-95 was a period that saw dramatic consolidation in the banking industry through mergers and acquisitions. The number of U.S. banks fell by nearly 25 percent during the period as barriers to cross-state acquisitions fell. Europe also saw consolidation in the banking industry (both within and across countries) as the countries of the European Union (EU) moved toward a single banking and capital market. The model used here specifies a variable that picks up the effects of a changing market structure, or consolidation, on bank margins in the United States and Europe.

The results of the regressions indicated in the first step show that of the three market imperfections, the implicit interest rate, or *fee proxy*, has the strongest impact.[21] For virtually all countries this variable has a highly significant and positive impact on NIMs—that is, restrictions on paying explicit interest on deposits result in positive implicit interest payments or subsidies to depositors. To finance these payments, however, banks have had to increase their loan rates and thus their actual NIM.[22]

[21] Ibid.

[22] In Mexico these implicit interest payments are calculated by the Comisión Nacional Bancaria y de Valores de México. The specific-short rates used were: the 3-month money market rate in France and Germany, the 3-month interbank rate in the UK and Spain, the 3-month Treasury Bill rate in the U.S., the discount rate in Italy, and the fixed 3-5 month deposit rate in Switzerland. The long rates used were: the 1-year money market rate in France, the 1-year treasury bond rate in Germany, the 1-year interbank rate in the UK and Spain, the 1-year treasury bill rate in the U.S., the ABI Prime rate in Italy, and the 12-month fixed deposit rate in Switzerland.

The opportunity cost of reserves variable (*neata*) has the expected positive sign in most countries and years. The coefficients are also significant in most countries and years. In Mexico, however, the absence of reserve requirements meant that the cash-to-assets ratio was an insignificant determinant of the margin.

Bank capital-to-assets ratios are generally significant and have the expected positive signs. In this case, high regulatory and endogenously determined capital ratios tend to erode bank profitability. Banks seek to lower the cost of holding relatively high capital-debt ratios by demanding higher NIMs.

As they could for Mexico, the intercepts of these regressions (in the context of the margin model) can be viewed as the common pure spread(s) across all banks in a single country in the same year. For example, the pure spread for all U.S. banks in 1995 is an estimated 2.65 percent, compared with a gross NIM of 4.264 percent. In 1995, then, the pure spread is estimated to explain about 62 percent of the NIM in the United States. The remaining 38 percent is explained by "regulatory tax" variables and other effects (excluding residual effects). These pure spreads are generally statistically significant and vary across time and across countries.

The regression for the second step is run using the estimated intercepts from the country-specific cross-sectional regressions as dependent variables to measure the pure spread (equation [5]). The key parameters of interest are the intercepts of that regression. These intercepts show the general average effect of market structure on pure bank spreads across the seven countries, the individual country market structure dummies, and the sensitivity of pure spreads with respect to the market volatility of long- and short-term interest rates. For two types of regression tests, those with the country-specific market structure dummies constrained to zero and those that introduce country-specific dummy variables, the individual coefficient p-values reflect adjustments for heteroskedasticity and for cross-sectional correlation across residuals.

The results suggest that banking markets are on average quite efficient. The intercept variable suggests that market structure, or rents generated by monopoly power, accounts for only around 0.20 percent of margins, on average. But when individual country dum-

mies are included, the results change.[23] Perhaps because of restrictions on interstate and universal banking, the pure spreads for U.S. banks are by far the largest. The dummy coefficient suggests that the noncompetitive structure in the United States adds 1.5 percent to the spread compared with Germany. France and the UK (with negative dummies) have the most competitive banking markets.

As with Mexico, pure spreads increase with the volatility of interest rates. The results also suggest that spreads are equally sensitive to both short- and long-term interest rate volatility. On average, a 1 percent increase in the volatility of interest rates increases bank margins by about 0.2 percent (Table 6.3). The coefficients are similar to those found for Mexico

Overall, as for Mexico, the results suggest that margins (or pure spreads) are sensitive to both market structure effects and volatility effects. But the effects of market structure on spread appear to differ markedly across countries.

Conclusions and Policy Implications

The evidence suggests that bank margins in Mexico's postprivatization period were determined primarily by capital-to-asset ratios, the high cost of providing financial intermediation services, and macroeconomic volatility. Market power does not seem to have driven banks' pricing decisions. In fact, the findings of this analysis consistently point to a struggle among Mexican banks for market share, as evidenced by the increase in bank loans coupled with the drop in cash-to-asset ratios and investment in securities.

An anomaly during this period is the negative relationship found in Mexico between past-due loans and margins. This topic deserves additional attention. However, as the appropriateness of the Mexican accounting framework may be in question, this negative relationship can be seen as evidence of euphoric investor behavior in a rising economy, behavior that may have hindered banks in their efforts to evaluate the riskiness of their borrowers.

[23] Germany is the intercept or the excluded variable.

This analysis has four major policy implications. First, because of the relative cost of bank equity, high capital ratios impose an extra burden on banks and are reflected in higher margins. This finding suggests an important policy trade-off. While high capital ratios improve the solvency position of the banking system, margins are costly for depositors and borrowers.

Second, allowing banks to optimize their cash holdings has no effect on the size of the margins. This result differs from the results found for the seven OECD countries because reserve requirements and related opportunity cost effects impact these countries' NIMs. Thus countries can lower their NIMs by imposing lower reserve requirements or paying interest on required reserves.

Third, interest rate volatility has a significant impact on bank net interest margins. For Mexico and the seven OECD countries, a 1 percent increase in volatility increased bank NIMs by approximately 0.2 percent. This finding suggests that macroeconomic policies consistent with reduced interest rate volatility, such as policies aimed at keeping inflation low, could have a positive effect in terms of reducing bank NIMs.

Fourth, the effect of market structure on bank spread varies across countries. It was not a significant factor in the determination of spreads in Mexico, but it was an important factor in the determination of spreads in the United States and Europe. The more segmented or restricted the banking system (in terms of geographic restrictions and the universality of banking services), the larger the monopoly power of existing banks, and the higher their spreads.

References

Allen, L. 1988, "The Determinants of Bank Interest Margins: A Note." *Journal of Financial and Quantitative Analysis.* 23 (2): 231-35.

Angbazo, L. 1997. "Commercial Bank Net Interest Margins, Default Risk, Interest Rate Risk and Off-balance Sheet Banking." *Journal of Banking and Finance.* 21 (1): 55.

Bazdresch, C. and Elizondo, C. 1993. "Privatization: The Mexican Case." *Quarterly Review of Economics and Finance.* 33: 45-66.

Brock, P. 1992. *If Texas were Chile.* San Francisco, CA, United States: ICS Press.

Calvo, G. and Mendoza, E. 1996. "Mexico's Balance-of-Payments Crisis: A Chronicle of a Death Foretold." International Finance Discussion Papers. 545:1-37. Washington, DC, United States: Federal Reserve Board.

Comisión Nacional Bancaria y de Valores de México. 1991, 1992, 1993, 1994, 1995. Boletín Estadistico de Banca Multiple. Distrito Federal, Mexico.

Gruben, W. and McComb, R. 1997. "Liberalization, Privatization and Crash: Mexico's Banking System in the 1990s." Economic Review, Federal Reserve Bank of Dallas. (First Quarter): 21-30. Dallas, Texas, United States.

Gruben, W., Welch, J., and Gunther, J. 1993. "US Banks, Competition and the Mexican Banking System: How Much Will NAFTA Matter?" Financial Industry, Federal Reserve Bank of Dallas. (October): 11-25. Dallas, Texas, United States.

Ho, T.S.Y. and Saunders, A. 1981. "The Determinants of Bank Interest Margins: Theory and Empirical Evidence." *Journal of Financial and Quantitative Analyses.* 16 (4): 581-600.

Lopez de Silanes, F. and Zamarripa, G. 1995. "Desregulación y privatización de la banca comercial." *Revista de análisis económico.* 10 (November): 113-64.

McComb, P., Gruben, W., and Welch, J. 1994. "Privatization and Performance in the Mexican Financial Services Industry." *The Quarterly Review of Economics and Finance.* 34 (Summer): 217-35.

Samuelson, P. 1945. The Effects of Interest Rate Increases on the Banking System." *American Economic Review.* 35 (March): 16-25.

Saunders, A. and Schumacher, L. 1998. "The Determinants of Bank Interest Rate Margins in Mexico's Post-Privatization Period (1992-1995)." Working Paper No. R-333. Washington, DC, United States: Inter-American Development Bank.

Worldscope. 1996. Bridgeport, CT, United States.

This page intentionally left blank

CHAPTER 7

Trends in Peruvian Bank Spreads, 1991-96

Jorge Rojas[1]

Bank spreads are important to the Peruvian economy for several reasons. First, the study of spreads is a tool for analyzing the reform of the Peruvian banking system. In August 1990 Peru undertook substantial financial reforms that have resulted in tremendous growth in the Peruvian financial sector, especially the private banking sector. The results and scope of these reforms, which began with the lifting of controls on interest rates and the exchange rate, are integral to the story of interest rate spreads in the first half of the 1990s.

Second, the study of bank spreads helps explain the effect that economic fluctuations in other economies of the region have on Peru's economy. These fluctuations tend more and more to be financial in origin and associated with changes in international interest rates and sudden shifts in the direction of capital flows. They are less and less caused by foreign deficits associated with changes in the terms of trade or fiscal deficits.[2]

Third, since the Peruvian financial system is strongly dollarized, an examination of bank spreads in both currencies allows for a comparison between spreads in soles and in dollars. This comparison opens the way for a discussion of the relationship that may exist

[1] Jorge Rojas is an economist from the Pontificia Universidad Católica del Perú.
[2] See Kaminsky and Reinhart, 1996.

between the two spreads and the persistence of the dollarization phenomenon in Peru.[3]

Finally, bank spread can also be used as an indicator of the efficiency of the banking system. In Peru, the productive sector (including industries and exporters, among others) has made lower interest rates one of its principal demands, suggesting that the Peruvian banking system is not the most efficient.[4] However, bank interest rates and spreads are not solely the result of the maximizing activities of banks. They are also affected by state intervention in the financial market, primarily through the reserve requirement and taxes on interest. Under these conditions, bank spread cannot be considered a pure measure of efficiency, and we are impelled to introduce the concept of net bank spread.

Recent Developments in the Peruvian Economy

Four aspects of the recent reforms are particularly relevant to this analysis:

- The state's changed role and the subsequent elimination of subsidies and price controls, especially privatization of state enterprises and the opening of the economy to foreign investment;
- The restructuring of foreign debt with both creditor banks and the Club of Paris;
- Trade liberalization, which has eliminated quantitative restrictions on foreign trade, pushing for a uniform tariff structure; and
- Labor legislation reform.

These reforms have generated a recovery in the level of economic activity, although the pace of the recovery has fluctuated. Real

[3] The intense inflation that affected the Peruvian economy from 1988 to 1990 provoked significant changes in interest rates and spreads. Thus, it is possible to examine the relationship between spread and hyperinflation. Cukierman and Hercowitz (1990) examined this relationship, assuming that the only alternative asset to money was bonds. But this assumption does not apply to Peru because of the strong dollarization. This analysis, however, has information only as of 1991.

[4] The other two matters that seem to concern the productive sector most are taxes and the exchange rate.

GDP grew 12.9 percent in 1994 after falling 3.8 percent in 1990 (Table 7.1). Inflation has dropped dramatically, falling from 7,650 percent in 1990 to 10 percent in 1995. The fiscal deficit has also been reduced, largely because of an increase in the tax burden (which rose from 5 percent to 14 percent of GDP between 1990 and 1996) and the appreciation of the real exchange rate. Lastly, the persistent deficit on the current account, which had been at disturbing levels of 32-76 percent of annual exports, has been offset by substantial capital inflows since 1991. These inflows are linked in part to the privatization of state enterprises and have permitted a sizeable increase in the net international reserves of the Central Bank (Table 7.2).

Table 7.1 Peru: Growth, Inflation, and Current Account Deficit, 1990-96

Year	Real GDP (% change)	Annual Inflation (%)	Current Account Deficit (% of exports)
1990	-3.8	7,649.6	-32
1991	2.6	139.2	-39
1992	-1.8	56.7	-52
1993	6.5	39.5	-61
1994	12.9	15.4	-56
1995	6.9	10.2	-76
1996	2.8	11.8	-57

Source: Banco Central de Reserva del Perú.

Table 7.2 Net International Reserves and Price of Foreign Debt, 1991-96 (period average)

Year	NIR (US$ billions)	Imports/NIR	Price of Debt (US$ millions)
1991	0.8	4.43	8.69
1992	1.6	2.48	15.01
1993	2.4	1.69	36.31
1994	4.6	1.22	57.85
1995	6.0	1.29	61.25
1996	7.6	1.02	95.97

Sources: Banco Central de Reserva del Perú, Salomon Brothers, and Reuters.

Note: NIR = net international reserves.

The apparent contradiction between the trends of the current account and net international reserves (NIR) arises partly because official export figures do not take into account income from drug trafficking. But whatever the reason, the increase in NIR reflects an improvement in the country's solvency. This improvement is also reflected in two other indicators. The imports/NIR series fell from 4.43 to 1.02 in 1991-96 (Table 7.2). And the price of Peruvian foreign debt on the international market rose from under 10 percent in 1991 to close to par value in 1996.

It is hard to imagine the Peruvian financial system recovering without the US$1-2 billion that has entered the country annually since 1991. The capital inflows come largely from three sources: foreign direct investment associated with the privatization of public enterprises, the repatriation of capital that left the country in the 1970s and 1980s, and the laundering of drug money. Capital inflows have been stimulated since June 1988 by a series of decrees that permit individuals and legal entities to bring foreign currency into the country without specifying its origin or paying taxes of any kind.[5] However, capital is also free to leave the country in such a way that, for example, domestic savers can participate in foreign mutual funds through local banks.

Since 1991, then, economic reforms have sparked the remonetization of the economy, the growth of the financial system, a spectacular increase in stock exchange activity, and the emergence of a market for bonds and other fixed-interest securities. After falling to a record low in 1990, the ratio of total monetization rose year after year until 1995 (Table 7.3). (It has never regained the level of 20 years before, however.) Between 1990 and 1995 the ratio in national currency only doubled, while in foreign currency the figure more than quadrupled, in such a way that in 1995 over 60 percent of the liquidity in the Peruvian financial system was denominated in foreign currency.

---

[5] In fact, this type of incentive began in December 1977, with the creation of the banking certificates in foreign currency (DL 22038 and Exchange Res. 015-77-EF/90). The most recent legislation was introduced by DS 094-88-EF of June 28, 1988, and its effectiveness was extended by several decrees until at least 1994.

Table 7.3 Ratio of Monetization of the Financial System, 1975-95 (annual average, percent of GDP)

Year	National Currency	Foreign Currency	Total
1975	20.9	0.0	20.9
1980	12.3	4.2	16.5
1985	8.1	7.6	15.7
1990	3.0	2.3	5.3
1991	3.3	4.3	7.6
1992	4.3	6.3	10.6
1993	3.8	8.5	12.3
1994	4.8	9.1	13.9
1995	6.0	9.7	15.7

Source: Banco Central de Reserva del Perú.

The Lima Stock Exchange experienced tremendous growth in the first half of the 1990s, with stock exchange capitalization rising from a little over US$1 billion to almost US$14 billion, an annual growth rate of 165 percent (Table 7.4). At the same time the participation of foreign investors increased from 1 percent at the end of 1992 to 25 percent in 1996. The growth in the stock exchange is the result of both higher share prices and new issues.

Stock issues have not been the only alternative to bank financing that Peruvian companies have used in recent years. As Table 7.5 shows, the bond market, which did not even exist at the beginning of the decade, also expanded strongly. Because banks are the primary issuers of bonds, the financing obtained by nonfinancial com-

Table 7.4 Capitalization of the Lima Stock Exchange, 1991-1996 (US$ billions, end of period)

Year	1991	1992	1993	1994	1995	1996
Total	1.1	2.6	5.1	8.2	11.7	13.8
Foreign Investors	NA	0.0	0.7	1.5	1.6	3.4

Source: Lima Stock Exchange.
Note: NA = not available.

Table 7.5 Private Sector Bonds, 1991-96
(US$ millions)

Year	Financial Lease Bonds			Simple Corporate Bonds			Convertible Corporate Bonds		
	B	P	R	B	P	R	B	P	R
1991	39	36	0	0	0	0	0	0	0
1992	105	66	0	0	1	1	0	0	0
1993	142	39	2	12	12	0	0	0	0
1994	203	83	22	49	49	12	40	40	0
1995	291	137	50	168	122	4	40	0	0
1996	367	108	35	431	308	41	40	0	0

Sources: Banco Central de Reserva del Perú, Conasev, and Lima Stock Exchange.
Note: B = balance; P = placement; and R = redemption.

panies in this market is reflected in corporate bonds. These bonds grew to a value of almost US$500 million in five years.

The scope of the recent changes should not be exaggerated, however. In 1995 the degree of monetization in the Peruvian economy had still not returned to its precrisis level, placements by commercial banks (in real terms) had returned only to their 1982 levels, and the four or five largest banks were the same as they had been six years ago. (Although bank concentration increased only slightly, the change in the weight of the banking system within the financial sector means that the power of these large banks increased.) An increase in consumer loans seems to be the only new feature of bank portfolios. The new market for fixed-income instruments consists primarily of bonds issued by banks. The mutual funds created to take advantage of the stock exchange boom have not been popular with the public.[6]

[6] Despite their lack of popularity with the public, mutual funds increased sharply in value between December 1995 and December 1996. The number of funds rose from three to nine, and the amount invested climbed from US$5 million to US$140 million.

The New Peruvian Financial System

Volatility has accompanied the development of the Peruvian financial system in the last 10-15 years. In 1985 the process of creating financial flexibility that had been under way for several years was dealt a severe blow when the incoming administration of President García suspended the convertibility of bank certificates in foreign currency and reinforced exchange controls.

In July 1987, apparently following Mexico's example, the García administration tried to take over the private banks.[7] The attempt was thwarted, but these events and the contentious attitude of President García toward international banks converted Peruvian financial markets in the late 1980s into what McKinnon (1986) terms "financial repression." The situation was compounded the next year by intense inflation, which buffeted the country from 1988 until 1990 and left in its wake a badly demonetized economy and a severe reduction in aggregate financial intermediation. In this period the global financial intermediation ratio fell from 16 percent (1985) to 5 percent (1990) (see Table 7.3).

But the most important development for the Peruvian financial sector during this period was unquestionably the series of financial reforms initiated by the Fujimori administration in 1990. These reforms are probably some of (if not the) most radical of the financial reforms undertaken in Latin America in recent years. Along with the elimination of exchange controls, they radically changed the ground rules for the banking business in Peru.[8]

The relative weight of commercial banks in the financial system can be estimated by measuring the percentage of total deposits they hold in the financial system (Table 7.6). Commercial banks accounted for about 90 percent of the financial system in 1995-96,

[7] Mexican banks were nationalized during the 1982 crisis and reprivatized in 1991. The García administration's attempt at nationalization was made after two years of close collaboration between the government and the private sector. As Lago (1991) states, "Before (July) 1987, the confidence and support of the private sector for the economic policy of the administration (of President García) could only be described as unanimous," (p. 281).

[8] See Rojas, 1994.

Table 7.6 Deposits in the Financial System by Type of Institution, 1970-96 (percent, end of period)

Year	Commercial Banks	Banco de la Nación	Development Banks	Municipal Savings Banks	Finance Companies	Cofide[a]	Building Societies	Total
1970	52	34	6	NA	2	--	6	100
1975	38	42	13	NA	1	NA	5	100
1980	48	33	11	*	4	1	3	100
1985	54	27	10	*	5	2	3	100
1986	50	23	16	*	6	1	4	100
1987	57	29	4	*	7	*	4	100
1988	54	33	7	*	4	*	2	100
1989	57	23	6	*	11	*	3	100
1990	55	31	4	*	8	*	1	100
1991	70	19	4	1	5	*	1	100
1992	76	21	--	NA	3	*	--	100
1993	86	12	--	1	1	--	--	100
1994	86	12	--	1	1	*	--	100
1995	92	6	--	NA	1	*	--	100
1996	87	12	--	NA	1	*	--	100

Source: Superintendencia de Banca y Seguros (SBS), Reports and Monthly Financial Information, December 1996.

Note: NA = not available.

* Less than 0.5 percent.

a. Corporación Financiera de Desarrollo.

up from 55 percent in 1990 and 38 percent in 1995. This trend was the result not only of the closure or downsizing of the state banks (Banco de la Nación and the development banking sector), but also of the disappearance of financial companies and building societies.

Banks have played an increasingly important role in the financial system since 1990. Large banks in particular have grown in importance (Table 7.7). This phenomenon has been especially evident for the three largest banks: Crédito, Continental, and Wiese. The share of these banks in total deposits rose from 52.4 percent to 65.9 percent, more than for placements and total assets. These results are

Table 7.7 Bank Concentration in Peru, 1990-1996
(participation of *k* largest banks, end of period)

Year	Deposits			Placements			Total Assets		
	3 Banks	4 Banks	5 Banks	3 Banks	4 Banks	5 Banks	3 Banks	4 Banks	5 Banks
1990	52.4	62.2	69.2	52.2	63.7	71.8	56.8	66.7	73.0
1991	59.1	67.1	72.4	52.3	62.9	71.6	58.2	67.6	74.2
1992	63.6	72.3	76.9	56.9	67.8	74.5	62.3	70.8	75.9
1993	65.4	72.9	77.2	59.2	68.1	74.1	62.5	69.8	74.7
1994	66.1	73.5	77.2	61.3	69.3	74.4	62.8	70.3	74.8
1995	66.3	73.2	76.5	61.0	69.4	74.7	62.6	70.0	74.8
1996	65.9	72.9	78.0	60.9	68.7	73.5	61.7	69.4	73.9

Source: SBS.

Table 7.8 Herfindahl Indexes of Peruvian Banking System, 1990-96
(end of period)

Year	Deposits	Placements	Total Assets
1990	0.135	0.128	0.147
1991	0.161	0.121	0.157
1992	0.166	0.133	0.162
1993	0.165	0.138	0.153
1994	0.169	0.147	0.154
1995	0.166	0.148	0.152
1996	0.165	0.151	0.148

Source: SBS.

confirmed by the calculation of the Herfindahl concentration indexes for deposits, placements, and total assets (Table 7.8).[9]

The growing relative weight and concentration of commercial banks since 1990 ought to result in higher earnings for these institutions. Table 7.9 shows the gross income of commercial banks (col-

[9] The Herfindahl index must fluctuate between $1/n$ (if each bank has the same weight, where n is the total number of banks) and 1 in the case of a single bank that concentrates all the operations. Thus, the value of the index is affected not only by the relative concentration but also by the total number of banks operating.

umn 1) and total average assets estimated for each year (columns 3 and 4). Column 4 provides the better measure because column 3 estimates average stock as the geometric mean of the year-end stocks for two successive years (only annual observations are available). This method assumes that real stock grows at a constant rate during the year because of inflation or as a result of real investment (given a certain price level). This situation does not occur under conditions of high inflation, such as those that existed from 1988-91, particularly if the inflation rate has an asymmetric trend (e.g., grows or declines monthly).

The geometric mean for the years 1988-91 was adjusted to take this problem into account. The factor used resulted from a comparison of the geometric mean of the monthly price index and the arithmetic mean of the monthly price index of the year in question. Both were derived from the December index square root value, using 100 as the base at the start of the year.[10] The results of these calculations are shown in column 4 of Table 7.9, which produces a higher value for the total assets series in 1988-91. Thus, for example, the rate of earnings of commercial banks in 1990 is no longer an exaggerated 81.7 percent, but a more reasonable 28.4 percent.

The possibility that the rise in bank earnings from 1988 to 1990—and the later fall after 1991—is a form of "statistical illusion" caused by the problem of comparing flows and stocks in an environment of very high inflation should be considered. The fall in earnings after 1991 is not the result of a drop in real gross income, which increased by 106 percent between 1990 and 1996. Rather, it is the result of higher growth in total real assets (about 436 percent in the same period). This last development supports the statistical illusion hypothesis, so that in reality earnings may not have fallen at all after 1990.

[10] Proceeding in this way assumes that the real stock remains more or less constant and that the nominal stock increases only as a result of inflation. The advantage of this procedure is its implicit use of additional information from the arithmetic average of the monthly index.

Table 7.9 Gross Income, Total Assets, and Earnings of Commercial Banks, 1976-96 (thousands of new soles)

Year	Gross Income (1)	Total Assets: End of Period (2)	Total Assets: Geometric Average (3)	Total Assets: Corrected Average (4)	Earnings (%) (1)/(3)	Earnings (%) (1)/(4)	Assets (US$ mill.) (5)
1985	5	40	28	28	18.3	18.3	2.318
1986	8	64	51	51	15.0	15.0	3.191
1987	15	136	93	93	16.1	16.1	1.477
1988	176	1,461	446	529	39.4	33.2	859
1989	3,347	31,700	6,805	12,260	49.2	27.3	2.450
1990	172,889	1,412,284	211,588	609,764	81.7	28.4	2.580
1991	530,464	4,092,451	2,404,101	2,701,237	22.1	19.6	4.206
1992	1,095,164	8,681,360	5,960,540	5,960,540	18.4	18.4	5.313
1993	1,725,752	20,017,161	13,182,419	13,182,419	13.1	13.1	9.289
1994	3,138,185	26,542,522	23,050,075	23,050,075	13.6	13.6	12.175
1995	4,471,471	35,898,053	30,867,861	30,867,861	14.5	14.5	15.954
1996	4,743,118	52,737,181	43,510,483	43,510,483	10.9	10.9	21.525

Source: SBS.

Notes:

1. Series (4) is equal to series (3) corrected for the subperiod 1988-91, as explained in the text. For that subperiod, series (4) results from dividing series (3) by 0.842, 0.555, 0.347 and 0.89, respectively. Series (5) is equal to series (2) multiplied by the free market exchange rate, end of period, average buying/selling price.
2. The data in the Table include Banco de la Nación.
3. Gross income = net interest income + other income.

Table 7.10 shows the productivity and capital adequacy indicators of the Peruvian banking system. Productivity, measured as the ratio of total deposits to number of workers, recovered every year after 1991, although in 1996 the relative gains were already slipping. The capital adequacy of the system, measured as the ratio of nonperforming portfolio/total placements, also tended to improve. However, its performance was rather erratic during the first three years of the period.

Table 7.11 shows the dollarization of the banking system. It records no significant reduction in the degree of dollarization of deposits and placements in the banking system in the first half of the

Table 7.10 Productivity and Solvency of the Banking System, 1990-96 (end of period)

Year	Deposits/Number of Workers (US$ thousands)	Nonperforming Portfolio/Total Placements (percent)
1990	57.32	12.79
1991	166.45	8.67
1992	203.24	13.73
1993	296.35	10.01
1994	436.32	7.30
1995	523.57	5.04
1996	568.98	5.46

Source: SBS.

Table 7.11 Dollarization of the Banking System: Stocks in Foreign Currency to Total Stocks, 1991-96 (percent, end of period)

Year	Deposits	Placements
1991	76.6	81.8
1992	78.2	90.9
1993	81.1	78.3
1994	75.5	80.2
1995	73.6	75.6
1996	74.0	78.9

Source: SBS.

1990s. The level seems to have stabilized at 75-80 percent, except for December 1992. The banks' policy of matching deposits and placements by type of currency to avoid exchange risk may be contributing to the latter phenomenon.

Sources of Information on Interest Rates

Two alternative sources of information on interest rates and spreads are available for Peru. The first is the Superintendencia de Banca y Seguros (Superintendency of Banking and Insurance or SBS), which, since July 1991, has published the average monthly interest rates of

the banking system. The second source is the financial statements filed by Peruvian banks at the end of each quarter. The benefit of the second source is that it measures interest rates for individual banks as well as for the consolidated system, rather than just average interest rates.

Information on interest rates and spreads is thus available at two levels of aggregation: aggregated (monthly data from July 1991 to December 1996) and disaggregated (quarterly data from the first quarter of 1991 to the second quarter of 1996). This chapter uses both types of information, although more emphasis is given to the disaggregated quarterly information.

The average interest rates published by the SBS are weighted geometric averages of the different rates banks charge and pay. The weightings are based on the banks' placements and deposits. The SBS does not directly measure the interest rates, relying instead on daily information from the banks. It then calculates four average interest rates:

- TAMN: lending rate in national currency (soles)
- TIPMN: deposit rate in national currency
- TAMEX: lending rate in foreign currency (dollars)
- TIPMEX: deposit rate in foreign currency

The disaggregated calculations for each bank were worked with a database containing the quarterly balance sheets and income statements published by the banks, as compiled by the SBS. The information is affected by three problems. First, it was collected during a period when bank accounting formats changed.[11] Second, some inconsistencies exist in the first year's data. These could reflect the volatile situation and high inflation that existed at that time. The third problem is the changing banking sector during this period, including the disappearance of some banks, the creation of others, and a number of mergers, not to mention name changes. The sample considers the 24 banks listed in Table 7.12, although complete information for the period is available only for the first 15.

[11] See SBS, 1992, and 1994.

Table 7.12 Active Banks, 1991-96

	Bank	Period	Note
1.	Citibank	1991.I-1996.IV	
2.	Comercio	1991.I-1996.IV	
3.	Continental	1991.I-1996.IV	
4.	Crédito	1991.I-1996.IV	
5.	Extebandes	1991.I-1996.IV	
6.	Financiero	1991.I-1996.IV	
7.	Interbank	1991.I-1996.IV	Formerly Interbanc.
8.	Latino	1991.I-1996.IV	
9.	Lima	1991.I-1996.IV	
10.	Norbank	1991.I-1996.IV	Formerly Regional del Norte.
11.	Probank	1991.I-1996.IV	Formerly Banco del Progreso.
12.	República	1991.I-1996.IV	Bandesco until 1995.
13.	Santander	1991.I-1996.IV	Interandino until 1995.
14.	Sur	1991.I-1996.IV	Merged with Banco Libertador in 1996.
15.	Wiese	1991.I-1996.IV	
16.	Mercantil	1991.I-1995.IV	Absorbed by Banco Santander in 1996.
17.	Interamericano	1991.II-1996.IV	Formerly Interamericano (BIF).
18.	Nuevo Mundo	1993.I-1996.IV	
19.	Sudamericano	1993.I-1996.IV	
20.	Banex	1993.I-1996.IV	
21.	Libertador	1994.II-1996.I	
22.	Trabajo	1994.IV-1996.IV	
23.	Solventa	1995.I-1996.IV	
24.	Serbanco	1996.II-1996.IV	

Source: SBS.

Calculating from the Sources

The first type of calculation derived from the banks' financial statements relates to interest rates. The lending rate (*ra*) of a given bank in quarter t is calculated as

$$ra_t = \left(\frac{Interest\ Income_t}{\sqrt{(Placements_t)(Placements_{t-1})}} + 1 \right)^4 - 1$$

where *interest income* excludes the item *exchange difference* (gains on exchange operations). Only the outstanding portfolio is con-

sidered in placements.[12] Similarly, the deposit rate is calculated as

$$rp_t = \left(\frac{Interest\ Expense_t}{\sqrt{(Deposits_t)(Deposits_{t-1})}} + 1 \right)^4 - 1$$

where *interest expense* excludes the item *exchange difference*. Deposits include deposits in their different modalities (savings and time) that are held by the public, other financial institutions, and international organizations. These calculations can be used for transactions in both national and foreign currencies and for total transactions. The resulting interest rates can then be used to calculate spreads.

Net Spread and Net Real Spread

Instruments of monetary policy (such as the legal reserve rate) affect the interest rate and spread. For this reason it is useful to develop a method for measuring the spread and its composition that discriminates among its three components: the part that is explained by the reserve requirement, the part that is explained by taxes that affect bank intermediation, and the part that constitutes the margin or net spread earned by banks.[13]

Using net spread as the variable of interest makes introducing the reserve rate as one of the explanatory variables unnecessary.

The markedly different behavior of spreads in soles and dollars leads to two considerations: the role of price inflation and the need to measure interest rates and spreads in soles in real terms. In this case, discrete time must be used to differentiate between nominal and real spread. Then the real deposit rate, i_p, is given by the following expression:

---

[12] Note that in the income statement, the banks report the accumulated flows for the year. Thus the flow of the second quarter, for example, is found by subtracting the figure of the first quarter from the figure of the second quarter. The square root in the denominator of the principal expression seeks to obtain the geometric average of the placements during the quarter in question, while the fourth power that affects the expression between brackets annualizes a quarterly rate.

[13] See Rojas, 1998.

$$i_p = \frac{1+r_p}{1+\pi} - 1$$

where r_p is the nominal rate and π is the inflation rate. Defining a similar relationship for the real lending rate, i_a, we find that the real spread, i_a - i_p, takes the following form:

$$i_a - i_p = \frac{r_a - r_p}{1+\pi}$$

The previous expression calculates the real spread (in constant soles) of operations in national currency. The corresponding expression for operations in foreign currency is

$$i_a - i_p = \frac{(r_a - r_p)(1+d)}{1+\pi}$$

where the variable d in the numerator measures the rate of devaluation of the national currency. However, in the rest of this chapter, the spread in dollars will be measured in nominal terms.

The Medium-term Trend of the Spread

A starting point when considering the behavior of the spread in the medium term is the downward trend of both net real spread in soles and net spread in dollars, with an emphasis on the former. Two trends were calculated for each spread, using the Hodrick-Prescott nonlinear filter (Figures 7.1 and 7.2).[14] The charts present the trend of the net real spread in soles, using the monthly data on interest rates from the SBS (Figure 7.1) and quarterly data on implicit interest rates for

[14] Given a series of $y_t = g_t + c_t$, where g_t is the growth component, and c_t the cyclical component, the Hodrick-Prescott filtration method minimizes the following loss function:

$$\Theta(g_t) = \Sigma(y_t - g_s)^2 + \lambda(\Delta^2 g_t)^2$$

where λ is the weighting of the relative variations between the trend and cyclical components. In our case λ was assigned the values 14,400 and 1,600, which are usually recommended for monthly and quarterly data respectively (see EViews 2.0. Quantitative Micro Software, 1996).

the banking system (calculated by the author) (Figure 7.2). Both calculations show a marked downward trend, but in the first case the series tends to stabilize from 1995, while in the second case the fall is steeper.

Figure 7.1 Trend of Net Real Spread in National Currency, July 1991–December 1996

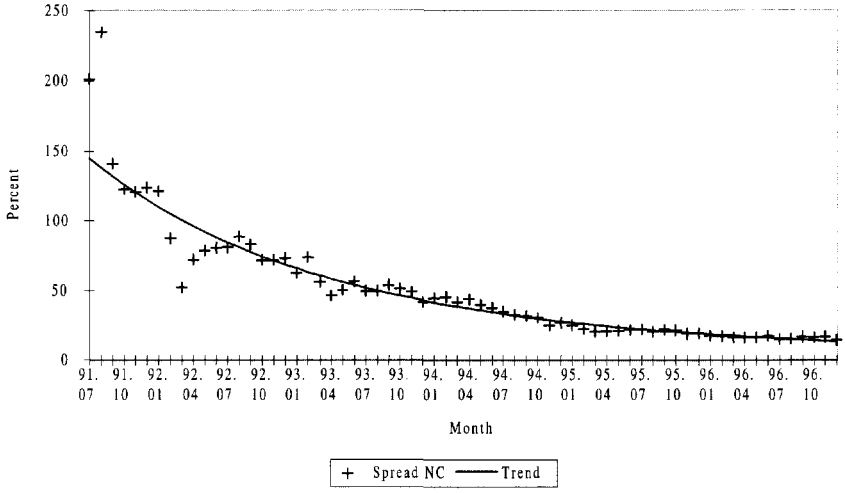
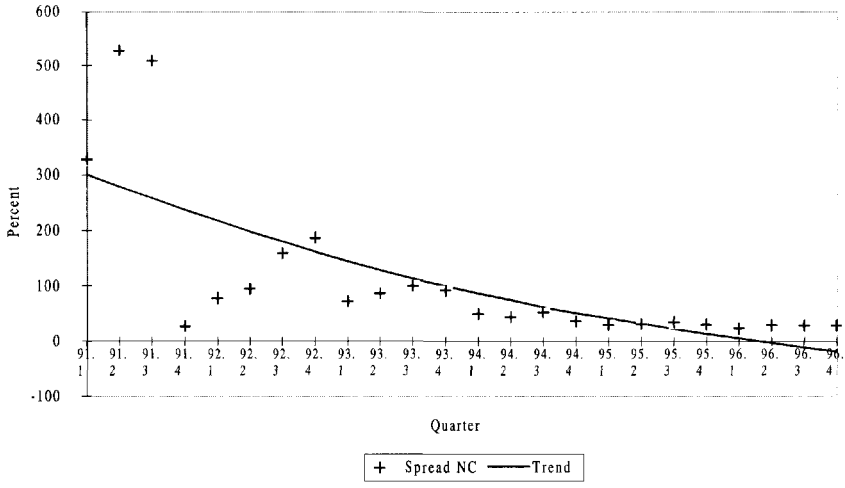


Figure 7.2 Trend of Net Real Spread in National Currency, 1991.I-1996.IV



Figures 7.3 and 7.4 show the trend of the net spread in dollars for the monthly and quarterly data, respectively. Once again the fall is less marked in the first case, with the series stabilizing in 1993. In the second case the fall is steeper and continues until the end of the period. In both cases the instability of the series at the start of the period is important. However, it is especially so for the quarterly observations and could in fact be responsible for the more persistent decline.

Figure 7.3 Trend of Net Spread in Foreign Currency, July 1991-December 1996

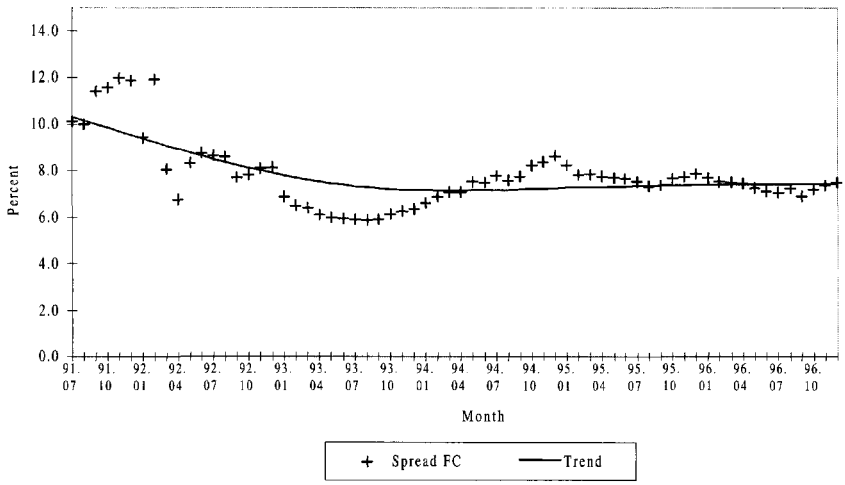


Figure 7.4 Trend of the Net Spread in Foreign Currency, 1991.I-1996.IV

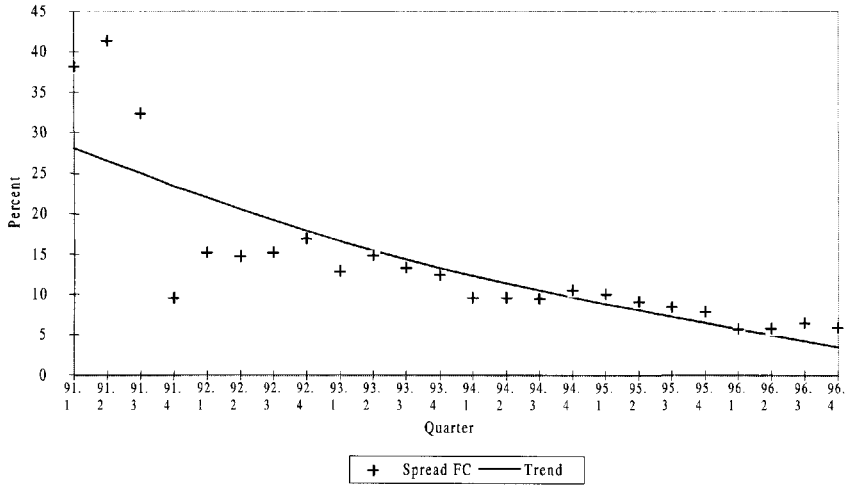
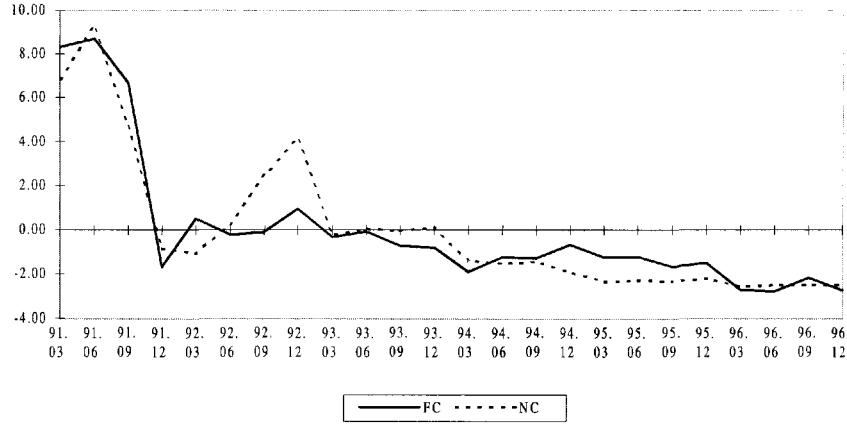


Figure 7.5 Behavior of Spreads in National and Foreign Currency, 1991.I–1996.IV (using first component)



Another alternative for estimating the behavior of spreads uses the first principal components of the spreads for each bank. Figure 7.5 shows the results of this method using the first component of the spread in both national currency and foreign currency. In this case the levels of the variables cannot be compared because they are normalized, but the following three features still need to be highlighted: the downward trend of both series; the joint fluctuations of both series (the behavior of the spread in national currency is slightly more unstable, especially during the first half of the period); and the abrupt fall of both series in the second half of 1991.

Explaining the Behavior of the Spread

This analysis will consider two types of estimates, one for the aggregate data, using the monthly series of average interest rates for the banking system, in soles and dollars, applying cointegration; and another for the disaggregated data, using the series of interest rates for each bank, also in soles and dollars, obtained from banks' quarterly balance sheets and income statements, employing panel data techniques.[15]

[15] The fact that the spread is measured for two currencies (soles and dollars), two frequencies (monthly and quarterly), two levels of aggregation (system average and bank by bank), as well as in real and net terms, complicates the problem to some extent. But it also has the advantage of permitting some comparisons.

In neither case is the selection of the variables associated with the spread (the explanatory variables) based on an economic model. The selection has been made intuitively and is justified only by the literature that discusses the roles of these variables in relation to spread.[16] The factors that are considered to affect the behavior of the spread are:

- The economic stability of the country, or country risk;
- The quality of the bank portfolio, or bank risk;
- The risk of making operations in different currencies, or exchange risk;
- Banks' power to negotiate and the degree of bank concentration;
- The quality of bank management, or banks' operating efficiency; and
- The costs of bank regulation (such as reserves and taxes).[17]

Other more specific variables are also taken into account. One such variable is advertising expenses, which banks in Peru use to avoid price competition based on lower lending or higher deposit rates and which, therefore, should have an implicit effect on spread. Another is the interest rate (or spread) in the United States in relation to the spread in Peru in dollars. If the lack of exchange controls and the free movement of capital in Peru are taken into account, it can be assumed that some level of arbitrage exists between the two rates. Finally, alternate sources of financing may be considered outside the banking sector, including corporate bonds, as a measure of the competition the banking system faces in placing funds.

Estimates Using Monthly Aggregate Data

The inflation rate can be an explanatory variable for the spread in soles. But this analysis measures the spread in real terms, omitting inflation in order to keep the power of this explanatory variable from reducing the importance of the other variables. For the spread in

[16] See Cukierman and Hercowitz, 1990; and Camacho and Mesales, 1994.

[17] Taxes and reserve requirements would not be taken into account in the case of net spread because the costs of reserve and taxes have already been discounted.

foreign currency, the analysis works with net spread rather than real spread, because exchange rate fluctuations during the first stage of the period under consideration generated strong distortions that were difficult to model in an econometric relationship.

As a result, the explanatory variables relate to factors such as country risk, concentration of the banking system, and international interest rates for the spread in dollars, as follows:[18]

- PAIS_RISK is the first principal component of a vector of country-risk indicators. These indicators are: inflation, the price of foreign debt, stock exchange returns, monthly imports/net international reserves, and the primary fiscal deficit. The functions of the series of prices of debt paper and stock exchange returns were used inversely, since these indicators measure the solvency of the country rather than the risk itself. This explanatory variable is known as *country risk*. Although it primarily reflects the confidence of foreign investors, it also reflects the attitude of domestic agents toward the country's economic situation. This attitude in turn affects interest rates and the spread.
- CONCENTRACION3 and CONCENTRACION5 reflect the degree of concentration in the banking system. These measures use the assets of the three or five largest banks to represent the system's total assets. The two variables, in essence, measure the banks' negotiating capacity with their debtors and creditors, a power that should be reflected in the behavior of the spread. But these variables also pose two problems. First, they relate only to the banking system, which is not the totality of the financial system.[19] Second, unlike a Herfindahl or Gini concentration index, they do not include all the banks, but only the weight of the largest banks.
- INTERES_USA (U.S. Bank Prime Loan Rate, as a representative lending rate) and SPREAD_USA (measured as the difference between the prime rate and the U.S. Treasury bill rate, as a representative deposit rate) are used in explaining the dollar spread.

[18] The explanatory variables for portfolio quality and bank management could not be included in this case due to the lack of monthly observations.

[19] This problem would not exist if the banks maintained a fixed participation in the financial system, but they did not.

These explanatory variables grasp the signals from the international financial markets on the domestic markets. The justification for this option is the significant integration of the Peruvian financial system into international markets.

Moving on to the statistical analysis of the variables involved in the model, Table 7.13 shows the principal descriptive statistics of the series to be studied. The statistics presented here indicate that the great majority of the series present large fluctuations.

Table 7.13 Statistical Properties of the Series

Series	Mean	STD	Asymmetry	Ex-Kurtosis	Normality
SPREAD_MN	52.2223	42.8743	2.0592	5.0572	59.7670
SPREAD_ME	7.7897	1.4509	1.4197	1.9168	32.2765
PAIS_RISK	0.0000	1.9043	1.3998	1.5018	27.7588
CONCENTRACION3	0.6148	0.0157	-1.7103	3.1507	44.3840
CONCENTRACION5	0.7384	0.0141	1.6140	1.6140	11.3230
SPREAD_USA	3.0353	0.2438	0.0269	-0.5546	0.3569
INTERES_USA	7.3617	1.1436	-0.0292	-1.6739	23.6100

Analysis of Unit Roots

The descriptive analysis now gives way to the analysis of the stochastic properties of the series. A prerequisite for working with time series is that they be stationary. If they are not, the series could integrate, creating a special class of nonstationary variables with important statistical and economic properties.[20] The best-known test for verifying the presence of an integrated series is the Augmented Dickey-Fuller (ADF) test. The general equation of the ADF test is

$$\Delta Y_t = \delta + \beta t + \varphi Y_{t-1} + \Sigma \gamma_j \Delta Y_{t-j} + \mu t$$

Table 7.14 shows the results for the series studied.

[20] See Dolado, 1989.

Table 7.14 Results of the Augmented Dickey-Fuller Test

	ADF for Levels	Lag	Critical Value	ADF for Differences	Lag	Critical Value
SPREAD_MN	-1.4971	2	-2.919	-6.7623	1	-2.920
SPREAD_ME	-2.0710	1	-2.919	-10.6811	0	-2.920
PAIS_RISK	-2.2950	1	-2.919	-8.5056	0	-2.920
CONCENTRACION3	-2.7537	9	-2.919	-4.4732	4	-2.920
CONCENTRACION5	-2.0437	11	-2.919	-4.3420	4	-2.920
SPREAD_USA	-1.6863	10	-2.919	-6.9095	1	-2.920
INTERES_USA	-1.0950	1	-2.919	-4.0598	0	-2.920

Note: The tests include an intercept and seasonal dummies, except for the country-risk indicator, which possesses only dummies. The critical values correspond to a level of 5 percent significance.

In addition to deterministic components, the analysis uses another criterion of maximum importance to refine the residuals: the optimum selection of the lag. As De Jong and others (1992) show, an incorrect specification of the order of lag can lead to inaccurate results. To avoid this problem the criterion of the *t*-test is used to select the correct order of the lag. Starting from an equation with s lags, k ($k \leq s$) is selected as the last lag for which the test t is statistically different from zero.

All the series present nonstationary components associated with unit roots in the levels. But these components are not present in the first differences of each series. Therefore, the series will be integrated by first order, $I(1)$, or "random walks." Given this series, econometric relationships that are not spurious cannot be evaluated unless there is cointegration between the spread and its determinants.[21]

Cointegration Analysis

The econometric results confirm some of our hypotheses. The series that presents the best behavior is SPREAD_MN (net real spread in

[21] The term *spurious* is taken from Granger and Newbold, 1974. Cointegration is the property of a set of integrated series that allows for a long-term relationship of equilibrium. See Engle and Granger, 1987.

national currency). The regression for this variable obtained the results shown in Tables 7.15 and 7.16.[22] The series SPREAD_ME (net spread in foreign currency) not only presents outliers, but also reveals a marked tendency to stagnate after 1993, so that some of the statistical results are inconsistent with the hypotheses mentioned.

Table 7.15 Explaining the Net Real Spread in National Currency

LS // Dependent Variable:	SPREAD_MN			
Sample:	1991:07 1996:12	**Included observations:** 66		
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Probability**
C	3.679784	1.357555	2.710595	0.0086
PAIS_RISK	0.220490	0.017018	12.95620	0.0000
CONCENTRACION5	4.278735	1.837710	2.328297	0.0231
R-squared	0.900025			
Adjusted R-squared	0.896851			
Log likelihood	38.20778			
F-statistic	283.5779			
Durbin-Watson statistic	1.566919			
Probability(F-statistic)	0.000000			

Table 7.16 Granger & Engle Cointegration Test for the Spread in National Currency

Augmented Dickey-Fuller Unit Root Test on:		**RESID_MN**		
ADF Test Statistic:	-6.470667	**5% Critical Value:***	-1.9454	
Augmented Dickey-Fuller Test Equation:				
LS // Dependent Variable:	D(RESID_MN)			
Sample (adjusted):	1991:08 1996:12	**Included observations:** 65		
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Probability**
RESID_MN(-1)	-0. 791306	0.122291	-6.470667	0.0000
R-squared	0.395482			
Adjusted R-squared	0.395482			
S.E. of regression	0.134164			
Sum squared residual	1.152006			
Log likelihood	38.83769			
Durbin-Watson statistic	1.610813			

Note: ADF applied to the residuals of the long-term equation.

*MacKinnon critical value for rejection of hypothesis of a unit root.

[22] EViews 2.0. Quantitative Micro Software, 1996.

The two signs are as expected. There is also evidence of a long-term cointegration relation. However, the statistical association between spread and country risk seems to be much greater than the relationship between spread and concentration. Both variables are significant, providing evidence of a strong association between spread in national currency and the economic conditions of the country, as well as the general concentration of the financial system.

Estimating the function of spread in foreign currency (SPREAD_ME) requires using not only explanatory variables but also dummy variables to isolate the effects of outliers.[23] The results are shown in Tables 7.17 and 7.18.

In this case, the coefficient of the variable Concentracion5 may not be statistically different from zero, but it has the expected sign. There is also solid evidence of cointegration, leading to the conclusion that the spreads in both national and foreign currency are well explained using country risk and concentration of the financial system as explanatory variables. The relationship found is not short term, but long term, as reported by the Granger and Engle cointegration tests.

Table 7.17 Explaining the Net Spread in Foreign Currency

LS // Dependent Variable:	SPREAD_ME			
Sample:	1991:07 1996:12	**Included observations:** 66		
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Probability**
C	0.136784	0.051093	2.677176	0.0095
CONCENTRACION5	0.076768	0.069210	1.109213	0.2717
PAIS_RISK	0.003841	0.000557	6.889818	0.0000
DUMMY1	0.021958	0.005004	4.388227	0.0000
DUMMY2	-0.017709	0.002394	-7.396813	0.0000
R-squared	0.758487			
Adjusted R-squared	0.742651			
Log likelihood	233.1180			
F-statistic	47.89372			
Durbin-Watson statistic	1.241199			
Probability(F-statistic)	0.000000			

[23] The endogenous variable in this case is net spread and not net real spread.

Table 7.18 Granger & Engle Cointegration Test for the Spread in Foreign Currency

Augmented Dickey-Fuller Unit Root Test on: RESID_ME
ADF Test Statistic: -4.543140 **5% Critical Value:*** -1.9456
Augmented Dickey-Fuller Test Equation:
LS // Dependent Variable: D(RESID_ME)
Sample(adjusted): 1991:10 1996:12 **Included observations:** 63

Variable	Coefficient	Std. Error	t-Statistic	Probability
RESID_ME(-1)	-0.719220	0.158309	4.543140	0.0000
D(RESID_ME(-1))	0.081503	0.149437	0.545398	0.5875
D(RESID_ME(-2))	0.218474	0.125288	1.743776	0.0863
R-squared	0.351440			
Adjusted R-squared	0.329821			
Log likelihood	228.0365			
F-statistic	16.25633			
Durbin-Watson statistic	2.059300			
Probability(F-statistic)	0.000002			

Note: ADF applied to the residuals of the long-term equation.
*MacKinnon critical value for rejection of hypothesis of a unit root.

Estimation with Disaggregated Quarterly Data

A panel of data was generated from 24 banks, each with 24 observations. The data was taken from quarterly balance sheets that the banks filed with the SBS. The sample covers the period between the first quarter of 1991 and the last quarter of 1996. The total number of observations is $T \times N = 576$. However, because new banks were created and others merged during the sample period, some discontinuities exist. These discontinuities imply a loss of observations, limiting the consistency of the econometric results. For this reason, work has been done with a subsample containing the banks for which complete information is available (the first 16 banks listed in Table 7.12).

The values of the dependent variables SPREAD_MN and SPREAD_ME are obtained from the figures for the interest rates in national and foreign currency collected from banks' quarterly balance sheets and income statements. In this case, the explanatory model of the spread, whether in national or foreign currency, considers the following explanatory variables, some of which have already been introduced:

- PAIS_RISK is an indicator of country risk. This variable is the first principal component of the six measure set of country risk: inflation, the inverse of the price of debt, the inverse of stock exchange returns, the ratio of imports to international reserves, and real public deficit without capital inflows. It is expected to maintain a direct relationship with spread.
- CRED_RISK is an indicator of each bank's credit risk. It is measured as the ratio of nonperforming portfolio to outstanding portfolio separately for transactions in national currency (CRED_RISK_MN), and transactions in foreign currency (CRED_RISK_ME). It is expected to maintain a direct relationship with spread.
- CAMB_RISK is an indicator of exchange risk, measured as the difference between the proportion of deposits in foreign currency and the proportion of placements in foreign currency for each bank. It is expected to maintain a direct relationship with spread.
- TAMAÑO is an indicator of the market power of individual banks, measured by each bank's participation in the total assets of the system. It is expected to have a direct relationship with spread.
- GESTION is an indicator of each bank's operating efficiency, measured as the ratio of total deposits (in 1994 soles) to personnel. It is expected to have an inverse relationship with spread.
- NOFIN_TOT can be considered both an indicator of bank operating efficiency and an indicator of banks' target market. It is measured as the ratio of noninterest expense to total expenses. It is expected to have a direct relationship with spread.

According to the terminology used by Hsiao (1986), the country risk indicator PAIS_RISK is "individual-invariant"—that is, in a given quarter the value of the variable is the same for all banks. The other variables are specific for each individual (or bank).

Panel Data Models

A panel data model is formed by a set of individuals (in this case, banks), each of which has a certain number of observations in time. The model combines the time series and cross-section models, since the former do not consider individual agents and the latter have no time dimension.[24] In their most general form, panel data models can be expressed by the following equation:

$$y_{it} = \alpha_{it} + \Sigma\beta_{kit} x_{kit} + u_{it}$$

where the subindex t corresponds to T observations in time, and the subindex i corresponds to N individuals. Thus, the total sample is composed of N x T observations.

This model can be restricted in order to generate all possible classes of data panel models. In general, these restrictions will be of equality of parameters, either among the coefficients corresponding to the individuals, or among those relative to time. The class of models used most frequently considers that the heterogeneity of the individuals is measured through an intercept that is constant in time but variable among individuals.[25] In this case, the previous model is converted into

$$y_{it} = \alpha_i + \Sigma\beta_k x_{kit} + u_{it}$$

In this model diversity among individuals is measured by the different constant term among individuals. Two models can be used to estimate such a structure: the fixed effects or dummy variable model and the random effects model. The fixed effects model is the simplest, since it considers only that each individual will have a different constant term. The set of N intercepts in this model is understood as an additional block of parameters that must be estimated. Thus, the intercepts will be associated with the specific dummy vari-

[24] The cross-section models by definition represent a specific instant in time.

[25] The two most used models in empirical works of panel data—the fixed effects and variable effects models—correspond to this class.

able for each individual. The relationship for the *i*-th individual is as follows:

$$y_i = i\alpha_i + X_i\beta + u_i$$

where i is a column vector of ones.[26]

The random effects model considers that the individual effects are not independent of each other, as in the fixed effects model, but that they are randomly distributed around a given value. In this case, the model can be written

$$y_{it} = (\alpha + e_i) + \beta' x_{it} + u_{it}$$

where e_i represents the random disturbance that distinguishes the effect of each individual in the panel. This model requires compliance with a series of assumptions, and for the estimation the stochastic components are grouped to obtain the following relationship:

$$y_{it} = \alpha + \beta' x_{it} + w_{it}$$

where $w_{it} = e_t + u_{it}$ becomes a new error term.[27]

---

[26] Grouping the N individuals and expressing the model more compactly, we have: $y = D\alpha + X\beta + U$, where the matrix D (of order NT x N) contains the individual effects captured by the dummies. Given a sufficiently large sample size, this relationship can be estimated by least squares. The problem of estimating n individual intercepts is usually solved by simply eliminating them. The technique of elimination in this case consists of centralizing all the panel variables. The justification for this technique is that the *MCO* estimator resulting from applying partitioned regression to the previous relationship is $b = [X'MX]^{-1}X'My$, where $M = I - D'(D'D)^{-1}D$ (Theil, 1971).

As D is an echelon matrix by blocks whose elements are the column vectors i, the effect of M is to apply to each individual the transformation $M_i = I - T^{-1}ii'$. The effect of this operation is to centralize the variables, or measure them in deviations with respect to their means (Johnston, 1984). The individual effects after the estimation can be recovered utilizing the following relationship: $a_i = \bar{y}_i - b'\bar{X}_i$

Empirical Results

The best results for the spread in national currency (after rejecting the regressions that were judged unsatisfactory) are presented in Tables 7.19 (fixed effects) and 7.20 (variable effects).[28] The results for the fixed effects model show the expected signs for all the explanatory variables, although not all the estimated coefficients are statistically significant. The variables that show the most statistical significance are country risk (PAIS_RISK), credit risk (CRED_RISK), and bank concentration (TAMAÑO), in that order.

Table 7.19 Estimation of Fixed Effects: Net Real Spread in National Currency

Dependent Variable: SPREAD_MNW - Estimation by Least Squares
Panel(24) of Quarterly Data From: 1//1991:01 **To:** 16//1996:04
Usable Observations: 375 **Degrees of Freedom:** 329
Centered R2:** 0.646910 **R Bar **2:** 0.636985
Durbin-Watson Statistic: 1.660138

Variable	Coefficient	Std. Error	t-Statistic	Significance
1. CRED_RISK_MNW	3.3106837	1.8278374	1.81126	0.07010105
2. GESTIONW	-0.0000960	0.0010458	-0.09179	0.92686156
3. TAMANOW	10.5098576	7.6027511	1.38238	0.16685641
4. PAIS_RISKW	3.9291189	1.2226422	3.21363	0.00131069
5. NOFIN_TOTW	10.4518019	14.3499213	0.72835	0.46639779
6. CAMB_RISKW	4.1467926	3.8931540	1.06515	0.28680811

[27] Given the usual assumptions, w_{it} will not be homoskedastic, since:

$$E(w^2it) = \sigma^2_u + \sigma^2_e$$

$$E(w_{it}w_{is}) = \sigma^2_u$$

This relationship implies that the MCO method is not applicable because it does not comply with the usual hypotheses that permit the consistency of the estimator. The method of estimating the generalized least squares consists of finding a transformation matrix T, so that if both sides of the equation are premultiplied, a homoskedastic matrix of variances-covariances is obtained. It is easy to show that this transformation matrix is composed of entries $(\sigma^2_u/(\sigma^2_u+\sigma^2_e))^{1/2}$. What should be done, then, is to filter each observation through the transformation found and apply MCO to the modified model.

[28] Modified output of RATS. Quantitative Micro Software, 1996.

Table 7.20 Estimation by Variable Effects: Net Real Spread in National Currency

Dependent Variable: SPREAD_MNW - Estimation by Least Squares
Panel(24) of Quarterly Data From: 1//1991:01 **To:** 16//1996:04
Usable Observations: 375 **Degrees of Freedom:** 368
Centered R2:** 0.636388 **R Bar **2: 0.625568**
Durbin-Watson Statistic: 1.627141

Variable	Coefficient	Std. Error	t-Statistic	Significance
1. CONSTWID	8.5863171	6.3839749	1.34497	0.17503991
2. CRED_RISK_MNW	1.9314944	1.3262561	1.45635	0.14529561
3. GESTIONW	-0.0013783	0.0010276	-1.34131	0.17981839
4. TAMANOW	11.8760776	8.1173275	1.46305	0.14345297
5. PAIS_RISKW	3.7640510	1.1475842	3.27998	0.00103815
6. NOFIN_TOTW	2.5117335	8.7181012	0.28811	0.77326593
7. CAMB_RISKW	8.6789372	4.2434455	2.04526	0.04082951

The results for the variable (or random) effects model are similar. All the coefficients again have the expected sign, and their values do not change significantly. The most relevant explanatory variables are country risk (PAIS_RISK), exchange risk (CAMB_RISK), bank concentration (TAMAÑO), and credit risk (CRED_RISK). The total adjustment of both models is similar and relatively high.

For the spread in foreign currency, the results are less satisfactory, particularly with respect to the global adjustment (lower R^2) (Tables 7.21 and 7.22). All the variables still have the expected or "correct" sign, as they did with the spread in national currency. The variables that present the best adjustment are country risk (PAIS_RISK), noninterest expenses/total expenses (NOFIN_TOT, which can be considered both an indicator of each bank's operating efficiency or its target market), and exchange risk (CAMB_RISK). The concentration variable (TAMAÑO) loses much of the importance it exhibits in the spread in national currency.[29]

[29] Since variable effects models, almost by construction, present non-homoskedastic variances, the matrix of variances and covariances has been corrected using the White matrix (White, 1990).

Table 7.21 Estimation by Fixed Effects: Net Spread in Foreign Currency

Dependent Variable: SPREAD_MEW - Estimation by Least Squares
Panel(24) of Quarterly Data From: 1//1991:01 **To:** 16//1996:04
Usable Observations: 375 **Degrees of Freedom:** 329
Centered R2:** 0.263604 **R Bar **2:** 0.252412
Durbin-Watson Statistic: 1.622300

Variable	Coefficient	Std. Error	t-Statastic	Significance
1. CRED_RISK_MEW	0.007141876	0.171960201	0.04153	0.96687167
2. GESTIONW	-0.000152835	0.000117169	-1.30440	0.19209635
3. TAMANOW	2.583713811	4.453208832	0.58019	0.56178550
4. PAIS_RISKW	0.214436895	0.078844878	2.71973	0.00653349
5. NOFIN_TOTW	2.297193152	1.079378308	2.12826	0.03331588
6. CAMB_RISKW	1.727669263	0.893556292	1.93348	0.05317764

Table 7.22 Estimation by Variable Effects: Net Spread in Foreign Currency

Dependent Variable: SPREAD_MEW - Estimation by Least Squares
Panel(24) of Quarterly Data From: 1//1991:01 **To:** 16//1996:04
Usable Observations: 375 **Degrees of Freedom:** 368
Centered R2:** 0.299473 **R Bar **2:** 0.288052
Durbin-Watson Statistic: 1.685649

Variable	Coefficient	Std. Error	t-Statistic	Significance
1. CONSTWID	0.529014248	2.775783505	0.19058	0.84885313
2. CRED_RISK_MEW	0.259076054	0.257483495	1.00619	0.31432654
3. GESTIONW	-0.000059973	0.000056106	-1.06892	0.28510560
4. TAMANOW	1.650401301	3.970692866	0.41565	0.67766930
5. PAIS_RISKW	0.213463980	0.080159860	2.66298	0.00774524
6. NOFIN_TOTW	2.083519744	0.995632657	2.09266	0.03637960
7. CAMB_RISKW	1.594632813	0.773023817	2.06285	0.03912680

A variable PUBLICITY (advertising expense/total placements) was omitted from all the estimations because no observations were available from the beginning of the period, resulting in a loss of degrees of freedom. However, the regressions presented in Tables 7.19 through 7.22 were also estimated taking PUBLICITY into account, and the results were as expected: the estimated coefficient of this variable is greater than zero, and the other explanatory variables maintain the correct sign of their coefficients, but with a lower explanatory power.

What the Calculations Show about Spreads

Several issues affect the interpretation of the results of our calculations. A discussion of the situation of interest rates at the end of the period is a useful place to begin. Table 7.23 presents the lending and deposit rates for aggregate and disaggregated information.[30] First, the table shows the difference in the rates produced by the two methods of measuring interest, especially in the lending rate in national currency—a difference of more than 20 percentage points. The extent of this disparity raises some misgivings about the quality of the aggregate information (the average rate as calculated by the SBS). However, the differences between the rates in dollars are much lower. This fact is reassuring, since dollar transactions account for 75 percent of total transactions.

The table also shows the persistently high level of interest rates—and consequently of spreads—in Peru. This point merits a comment on the costs and benefits of high spreads. The costs are associated primarily with the functional efficiency of the banking system.[31] As the cost of intermediation increases, converting a mon-

Table 7.23 Interest Rates with Aggregated (Dec. 1996) and Disaggregated (1996.IV) Information
(percentages)

Data	National Currency		Foreign Currency	
	Deposit Rate	Lending Rate	Deposit Rate	Lending Rate
Aggregated	10.5	30.6	5.7	16.8
Disaggregated	16.0	51.0	9.0	21.0
Difference	5.5	20.4	3.3	4.2

[30] For the disaggregated information, the rates obtained correspond to the consolidated banking system.

[31] Tobin (1984) suggests four ways of understanding economic efficiency: information-arbitrage, fundamental-valuation, full-insurance, and functional. This last meaning of efficiency is related to the three basic functions of a financial system: diluting risk, providing payment mechanisms, and providing intermediation (that is, converting savings into investment).

etary unit of savings into a monetary unit of investment becomes more expensive for the economy. But high spreads also have their benefits. Arguably, banks are willing to assume a higher risk (and lend more) in the market segments that offer high spreads. These high spreads must therefore be compensating banks for riskier portfolios.[32] But whether high average spread benefits the economy depends in the end on the type of risk banks are assuming. The riskiest portion of the portfolio of Peruvian banks (that is, the type of credit that carries the highest interest rates) is consumer credit, not loans to new productive sectors. For this reason, there is some doubt whether high interest rates benefit the overall economy. It is important to note that they also create a greater problem of adverse selection.

Three other issues affect the results of the econometric estimations. First, the estimates have the "correct" signs for all of the explanatory variables used. These results favor the selection of explanatory variables and the method of measuring the spread, even though the global adjustment of the estimated relationships is not necessarily satisfactory, especially for the spread in dollars. The factors that explain the deficiency of the global adjustment include the quality of the available statistical information, the radical economic and financial reforms made during the period, and the possible omission of some explanatory variables. To address the last issue would require, for example, finding a way of taking into account the formation of economic groups by banks and other types of firms. Such groups are a relatively important phenomenon in Peru and, because they use banks to attract funds, would affect the trend of the spread.[33] Second, the quality of the results for spreads in dollars is generally lower than the quality of the results for spreads in soles. A possible explanation could be that spreads in dollars are less variable than spreads in soles. Alternately, the explanation may lie in the fact that dollar interest rates in Peru are relatively closely linked to international dollar rates, and rates in soles are not.[34] Part of the problem

[32] In the words of Rojas-Suárez and Weisbrod (1996): ". . . in many cases, banks attempt to maintain high spreads . . . by increasing the risk of their loan portfolios" (p. 9).

[33] See Rojas-Suárez and Weisbrod, 1995.

may also be the quality of the information, especially the average rates published by the SBS. There are also inconsistencies in the disaggregated information (the banks' financial statements), particularly for the last quarter of 1991.

Third, another difference between the results in soles and dollars relates to the different performance of two of the explanatory variables. Although the variable noninterest expenses/total expenses plays no role in the spread in soles, it does affect the spread in dollars. The opposite occurs with the variable that measures each bank's market power (TAMAÑO), although the difference is less marked.

The most successful explanatory variables were found to be country risk, credit risk, exchange risk and, to a lesser extent, bank concentration and noninterest expenses/total expenses. Based on these results, it is possible to discuss the conditions required to generate lower, sustainable spreads in Peru. Considering the importance of the country risk variable, one conclusion is that policies need to be designed to reduce risks, particularly those associated with the country's economic and financial instability.[35] Again, the importance of bank concentration adjustment leads to the conclusion that part of the problem posed by high spreads is a lack of competition inside the banking system. It is important for economic agents to have access to all pertinent information in order to make the system more transparent.

Even so, the results would have improved if the explanatory variables and their functional relation with the spread had been previously derived from a model of optimization and behavior of the banks. However, such a model would not include all the necessary explanatory variables. As a result, ad hoc modifications would have

---

[34] And during the period under analysis dollar interest rates in the international markets remained basically constant. Without becoming equal or nearly equal—that is, the rates in dollars must be more affected by the international rates than the rates in soles. Marston (1995) found that the interest rates and spreads in the Eurocurrency markets of five developed countries (France, Germany, Great Britain, Japan, and the United States) are much more alike than the corresponding rates and spreads in national currencies. He suggests several reasons for this disparity, arguing that the Eurocurrency markets have fewer controls and are more integrated than the national currency markets (pp. 10-16).

[35] See Rojas-Suárez and Weisbrod, 1996.

had to be made to introduce these variables into the relationships to be estimated, affecting the formality required with the use of the model.

Interest rates and spreads are still relatively high in Peru, having stopped falling during the last two or three years. This suggests that the financial liberalization program has not yet had its full effect and that more time may be required.[36] It is absolutely essential to raise the level of competition and efficiency and increase the transparency, size, productivity, and sophistication of Peru's financial systems. Finally, all these developments must take place in an environment of political and macroeconomic stability.

[36] Cottarelli, Ferri, and Generale (1995) discuss the time needed for financial liberalization to affect interest rates in Italy.

References

Akyüz, Y., and Held, G. 1993. *Finance and the Real Economy. Issues and Case Studies in Developing Countries.* Santiago, Chile: United Nations, World Institute for Development Economics Research/Economic Commission for Latin America and the Caribbean/United Nations Conference on Trade and Development.

Banco Central de Reserva del Perú. 1990, 1991, 1992, 1993, 1994, 1995, and 1996. Memoria. Lima, Peru.

_____. 1996. *Perú. Compendio de estadísticas monetarias 1959-95.* Lima, Perú.

Camacho, E., and Mesalles, L. 1994. "Márgen de intermediación y eficiencia de la banca." In: C. Gonzáles and E. Camacho, editors. *Regulación, competencia y eficiencia en la banca costarricense.* San Jose, Costa Rica: Ohio State University and Academia de Centroamérica.

Campodónico, H., Castillo, M., and Quispe, A. 1993. *De poder a poder. Grupos de poder, gremios empresariales y política macroeconómica.* Lima, Perú: Desco-Consorcio de Investigación Económica.

Carvajal, A., and Zárate, J. 1995. *Márgenes de intermediación: efectos de regulación y costos (una nota contable).* Bogota: Colombia. Banco de la República.

Cottarelli, C., Ferri, G., and Generale, A. 1995. *Bank Lending Rates and Financial Structure in Italy: A Case Study.* Washington, DC, United States: International Monetary Fund.

Cukierman, A., and Hercowitz, Z. 1990. "Oligopolistic Financial Intermediation, Inflation and the Interest Rate Spread." Working paper No. 2/90. Tel Aviv, Israel: The David Horowitz Institute for the Research of Developing Countries/Tel Aviv University.

De Jong, D., Nankervis, J., Savin, N., and Whiteman, C. 1992. "The Power Problems of Unit Roots Tests in Time Series with Autoregressive Errors." *Journal of Econometrics*. 53 (1-3): 323-44.

Dolado, J. 1989. *Cointegracion: Una panorámica*. Madrid, Spain: Banco de España.

EViews, Version 2.0. Quantitative Micro Software. 1996. Irvine, CA, United States.

Engle, R., and Granger, C. 1987. "Co-Integration and Error Correction: Representation, Estimation and Testing." *Econometrica*. 55 (2): 251-76.

Gonzales, G. 1992. "Regulación y supervisión de la solvencia del sistema financiero en el Perú." In: G. Held and R. Szalachman, editors. *Regulación y supervisión de la banca. Experiencia de América Latina y el Caribe. Vol. 2. Proyecto Regional Políticas, Financieras para el Desarrollo*. Santiago, Chile: Economic Commission for Latin America and the Caribbean/United Nations Development Programme.

Granger, C., and Newbold, P. 1974. "Spurious Regressions in Econometrics." *Journal of Econometrics*: 2 (2): 111-120.

Greene, W. 1990. *Econometric Analysis*. New York, NY, United States: MacMillan Press.

Hsiao, C. 1986. *Analysis of Panel Data.* Cambridge, United Kingdom: Cambridge University Press.

Johnston, J. 1984. *Econometric Methods. Third Edition.* NY, United States: McGraw Hill Press.

Kaminsky, G., and Reinhart, C. 1996. *The Twin Crises: The Causes of Banking and Balance-of-Payments Problems.* Washington, DC, United States: Board of Governors of the Federal Reserve System.

Klingenberger, J. 1987. *Supervisión Bancaria en el Perú.* Lima, Perú: Superintendencia de Banca y Seguros (SBS).

Lago, R. 1991. "The Illusion of Pursuing Redistribution through Macropolicy: Peru's Heterodox Experience, 1985-90." In: R. Dornbusch and S. Edwards, editors. *The Macroeconomics of Populism in Latin America.* Chicago, IL, United States: University of Chicago Press.

McKinnon, R. I. 1986. *Financial Liberalization in Retrospect: Interest Rate Policies in LDCs.* Palo Alto, CA, United States: Stanford University, Center for Economic Policy Research Publications.

Marston, R. 1995. *International Financial Integration. A Study of Interest Differentials between the Major Industrial Countries.* Cambridge, United Kingdom: Cambridge University Press.

Noejovich, H. 1991. "La nueva ley de instituciones bancarias, financieras y de seguros: Algunos comentarios." Working paper No. 97. Lima, Perú: Publicaciones Centro de Investigaciones Sociológicas, Económicas, Políticas y Antropológicas/Pontificia Universidad Católica del Peru.

Ramírez, E., and Ricalde, J. 1995. "El Acuerdo de Basilea: Implicancias de la Adecuación de Capital en los Sistemas Financieros." *Moneda.* (86-87): 47-53

RATS, Version Windows 4.0. Quantitative Micro Systems. 1996. Irvine, CA, United States.

Rojas, J. 1994. "La Reforma del Sistema Financiero Peruano, 1990-95." *Economía.* 17 (33-34): 149-98.

_____. 1998. "Determinantes del Spread en las Tasas de Interés Bancarias en el Perú: 1995-1996." Working paper. Washington, DC, United States: Inter-American Development Bank.

Rojas, J., and Vilcapoma, L. 1996. "Algunas características importantes de la nueva banca peruana. Un estudio preliminar." Working paper No. 124. Lima, Peru: Publicaciones Centro de Investigaciones Sociológicas, Económicas, Políticas y Antropológicas/Pontificia Universidad Católica del Perú.

Rojas-Suárez, L., and Weisbrod, S.R. 1995. *Achieving Financial Stability*. Washington, DC, United States: Inter-American Development Bank.

_____. 1996. "Central Bank Provision of Liquidity: Its Impact on Bank Asset Quality." Paper presented at the Strengthening Latin American Banking in a Global Environment conference, Buenos Aires, Argentina.

Superintendencia de Banca y Seguros (SBS). 1990, 1991, 1992, 1993, 1994, 1995, and 1996. Memoria. Lima, Peru.

_____. 1988. Plan de Cuentas para Instituciones Financieras. Lima, Peru.

_____. 1992. Plan de Cuentas para Instituciones Financieras. Lima, Peru.

_____. 1994. Plan de Cuentas para Instituciones Financieras. Lima, Peru.

Theil, H. 1971. *Principles of Econometrics*. NY, United States: Wiley & Sons Press.

Tobin, J. 1984. "On the Efficiency of the Financial System." *Lloyds Bank Review*. 153 (July): 1-15.

White, H. 1980. "A Heteroskedasticity Consistent Covariance Matrix Estimator and Direct Test for Heteroskedasticity." *Econometrica*. 48 (4): 817-38.

This page intentionally left blank

CHAPTER 8

Uruguay's Spreads Explained

Adolfo Díaz Solsona and Carlo Graziani[1]

Like most Latin American countries, Uruguay experiences high economic and financial volatility. This volatility derives, in part, from the peculiar macroeconomic instability that has characterized the country's two large neighbors, Argentina and Brazil, in recent years.[2] But it is also the result of a lack of adequate control of the financial system.

Uruguay's Financial System

Financial liberalization began in the early 1970s and was consolidated by the middle of the decade. Since that time no restrictions have been imposed on foreign currency transfers. The U.S. dollar has almost completely replaced local currency, both as a store of value and as a medium of exchange.[3] The dollar first came into widespread use during a period of financial repression in the 1970s, and its use intensified after the 1982 exchange crisis.

This peculiar means of obtaining a relatively stable unit of account (at least more stable than the local currency) has had a number of significant consequences.[4] First, dollarization has reduced the

[1] Adolfo Díaz Solsona and Carlo Graziani are researchers at the Centro de Estudios de la Realidad Económica y Social (CERES).

[2] See Inter-American Development Bank, 1995.

[3] See Solsona and Graziani, 1999.

[4] For some economic sectors, such as housing, a relatively more stable unit of account has been developed. The Adjustable Unit (AU), which varies with the trend in the average salary index, applies to both deposits and state bank housing credits.

influence of certain factors conducive to high real rates of deposit. It also has given a unique form to the risk of foreign currency placements, for both companies and individuals. Because the price of tradable and nontradable goods is expressed in dollars, debt in dollars does not translate into currency risk for firms.[5]

Next, dollarization allows greater flexibility for several forms of risk that affect financial (and some nonfinancial) institutions, including interest rate, currency, and liquidity risk. Liquidity risk in local currency, for instance, substantially facilitates the implementation of a swap mechanism based on the foreign currency price. In the absence of controls on either liquidity risk in local currency or on foreign currency positions, liquidity risks can easily be transformed into foreign currency position risks. This conversion occurs not only when exchange rate uncertainty causes the currency to fall, but also in more routine activities. Further, because balance of payments and banking crises usually occur together, the likelihood that liquidity risk will become currency position risk is even greater.

Finally, dollarization impacts banks, though its exact nature depends on the perspective from which the effect is viewed. In terms of asset or liability real values, dollarization has a limited impact on banking institutions' foreign currency positions. Dollarization limits the impact of the exchange system chosen. As for generating risk control instruments, it does not matter which exchange system is chosen. The need to develop risk control instruments has been one of the arguments utilized by partisans of flexible rather than fixed exchange rates.

Foreign currency deposits greatly exceed foreign currency loans to the nonfinancial sector. Deposits made by nonresidents represent 41 percent of the system's total deposits, and their average value is several times greater than that of resident deposits.[6] The same is true of the average value of loans to nonresidents. This imbalance has several ramifications. It is an activity or additional line of business that, given the production technology of banks, could permit

[5] See Díaz, 1994.

[6] See Solsona and Graziani, 1999.

economies of scope or scale. It also decreases liquidity risk through the "contagion effect" on Uruguay's banking system.

Since 1987 deposits by residents have increasingly exceeded loans to residents.[7] Nonresidents have always deposited more than they have borrowed, and, since 1988, nonresident deposits have increased dramatically.[8] Lending to nonresidents, which had been relatively low, has also risen sharply. In contrast, interest rates in dollars in Uruguay have been lower than international rates. This difference, however, has been diminishing over time. Most of the operations are low margin. If they were to expand, however, their effect on bank efficiency could be considerable.

Risk Factors

Because Uruguay's banks are liquid (in both local and foreign currency) in only the very short term, they generate liquidity risk in the form of interest. They also may generate currency risk. Liquidity and interest rate risks in foreign currency (primarily U.S. dollars) are relatively easy to control. Furthermore, total deposits exceed loans to nonbank institutions and international market risk control instruments are available, lessening the aforementioned risks.

Liquidity, interest rate, and foreign currency position risks in local currency are more difficult to control. First of all, there are more short-term liabilities (almost two-thirds of deposits are demand deposits). There are also not any instruments for controlling any of these three risks. Even when bank liquidity can be extended beyond the short term, the liability structure continues to generate these three interrelated risks.

In Uruguay and other Latin American countries, risk control instruments are poorly developed and underutilized. It seems reasonable to expect that the more volatile an economy, the greater the incentives to implement such mechanisms. This expectation has not

[7] Ibid.
[8] Ibid.

held, however, despite the fact that implementing these instruments is considerably simpler than implementing other regulatory devices, such as a guarantee mechanism. In many instances, such as with tradable goods, the challenge is to find mechanisms in, say, the tax and legal realms appropriate to the markets.

The relationship between bank spread and risk (defined broadly to include financial and credit risk) and instruments to mitigate risk (including a system of guarantees) is one of the central topics of this chapter. From the viewpoint of economic policy, this approach is promising. It facilitates efforts to determine the risk factors that cause spreads to increase, and ways to mitigate them.

Microstructure of the Financial Markets

Uruguay has a low level of financial deepening and a low average number of bank operations, both borrowing and lending. The level of financial deepening is important because banks' production function is characterized by economies of scale and scope.

Information on average volumes of operations and levels of financial deepening is indispensable to making international comparisons of efficiency and spreads. Table 8.1 shows calculations of financial deepening. It confirms Uruguay's extremely depressed levels of financial deepening, which are several times lower than those of industrial countries.

Activity in national currency (deposits in national currency divided by the economically active population) is the most accurate reflection of what this analysis is attempting to measure. This measurement is also the most suitable for international comparison, although in the case of a dual-currency economy, it has obvious limitations.

Uruguay's foreign exchange and fund markets are characterized by two serious microstructural problems: a lack of liquidity in the exchange market (and thus potential volatility), and the absence of an intramonthly control system in national currency. These problems are two of the major obstacles to developing risk control instruments that could affect spreads.

Table 8.1 Index of Financial Deepening

	1988	1989	1990	1991	1992	1993	1994	1995
Interior (in percent)	8.1	6.7	7.5	6.5	4.9	3.5	3.2	2.9
Montevideo (in percent)	9.8	8.6	7.8	7.9	8.0	6.8	6.2	6.8
National Total (in percent)	9.0	7.7	7.6	7.2	6.5	5.2	4.8	4.9
EAP Interior	556	569.9	572.6	590	604.1	602.8	633.1	646.4
EAP Montevideo	623.2	634.4	640	645.3	652	658.5	674.9	697.1
EAP National Total	1179.2	1204.3	1212.6	1235.3	1256.1	1261.3	1308	1343.5

Source: Banco Central de Uruguay and authors' calculations.

State banks distort foreign exchange markets in several ways. First, the nonfinancial public sector (including the state petroleum enterprise) buys foreign currency through a noncompetitive demand system. However, the large, state-owned Banco de la República (BROU) not only sells foreign currency to state entities but also buys foreign currency from exporters. In this way, and because of its size, it reduces the private market and decreases its liquidity. All taxes are collected in pesos, while a significant number of state expenditures must be made in dollars. Furthermore, in setting a floor for interest rates on overnight funds, the Central Bank of Uruguay (BCU) creates an incentive for banks to hold national currency. For this reason, banks do not channel liquid assets in excess of reserve requirements to the foreign exchange markets. Finally, the Central Bank does not make intramarginal interventions in the exchange "band" system.[9] Thus, the exchange system more closely resembles a fixed system with an active crawling peg than it does a band system.

Current market operations, then, have two effects. First, they tend to distort the value of the exchange rate within the band, eliminating any incentives for risk control instruments to arise naturally. They also decrease liquidity both directly (because of the lack of competition in the sector and consolidation in BROU) and indirectly (because of the minimum overnight rate, and because of the way state banks operate, alienating the rest of the participants), creating the possibility of more erratic behavior. Correcting the distortions cur-

[9] See Krugman, 1992; Garber and Svensson, 1995.

rently prevalent in exchange market operations would not be very complicated and would improve operations considerably.

The lack of a control system increases the system's vulnerability to fluctuations from variations in intramonthly liquidity, particularly with national currency. More than 66 percent of funds in national currency are demand deposits. Transaction demand is highly seasonal. In the absence of a liquidity control system to soften these cycles, an effective exchange market is absolutely mandatory.

Competition

Many studies of the degree of competitiveness in Uruguay's banking activity and its influence on spreads disregard two facts. First, the banks are not the only institutions providing financing, nor do they provide the majority of it. Credit and some banking-type services are available at nonbank institutions (nonbank financial intermediaries and nonfinancial intermediaries) both within and outside the financial industry. There are few nonbank financial intermediaries, however, so the number of financial competitors outside the banking industry is relatively small. Many types of money-market activities do not exist or are poorly developed, including mutual funds, leasing and factoring companies, and mechanisms for sales of repurchasing agreements. The capital market is also poorly developed and, until recently, has been limited to minor activity in bonds.[10]

Although the role of financial intermediaries is very limited, the role of nonfinancial intermediaries is not. Financing by these institutions is extraordinarily important. Nonfinancial intermediaries became significant market players during the period of financial repression and intensified when banks stopped offering credit to con-

[10] Two types of financial products can be distinguished: traditional and nontraditional. Traditional products are stocks and government and private company bonds. The stock market is practically nonexistent. The bond market is basically concentrated in public securities (a recent development) and low-volume activity in private company bonds. Nontraditional products include securities (there is no legislation in this area); warehouse receipts and risk capital funds, which do not exist; and derivative risk control instruments. Neither financial nor agriculture commodity price activity exists.

sumers and small firms after the 1982 banking crisis. Consumer credit loans were the only loans that the Refinance Acts of 1985–89 did not restructure. Banks did return aggressively to this sector of the market in the early 1990s.

Preliminary estimates of the stock of nonbank financing made to date are around 90 percent of total private bank credit.[11] Competition between financial and nonfinancial intermediaries is desirable, but the current situation may partly be the result of the regulatory and institutional restrictions imposed on banks and on nonbank financial intermediaries. However, because of the nature of banking, technology mandates collaboration. Limiting the development of activities affects the costs of various bank products and of doing business globally. In addition, diverting financing to the nonfinancial market means that these types of distortions and institutional restrictions increase the "domino effect" among banks, especially during a crisis.

State Participation in Banking Activity and the Role of Foreign Banks

Banking activity in both the deposit and loan markets is heavily concentrated in state institutions.

State banks have an advantage over private banks because they receive an important tax and the following regulatory benefits:

- A monopoly on public entity deposits (in both national and foreign currencies) and very low interest rates for these funds;
- Differential reserve requirements that allowed them to offer substantial reductions in the cost of funds (until 1992);
- Significant lending tax advantages over private banks; and
- Greater legal ability to enforce the debts (e.g., housing finance debt).

These institutions' interest rate pricing policy has been based on their receipt of preferential tax and regulatory treatment. For both borrowing and lending, their policies have had a significant impact

[11] See Furest, 1994.

on financial activity, especially in niches of the loan market such as agricultural and consumer credit activity. These privileges create unfair competition with private banks and risk.

A comparison of interest rates on BROU and private bank loans shows that after the last reserve requirement reforms, the BROU's relative position in terms of interest rates changed significantly.[12] Unfortunately, information on loans by different types of banks is not available, making a comparison of the effects of this change on private banks' and the BROU's credit activity impossible to calculate.

Only a small number of securities are channeled through state banks. The central government regularly issues securities (the only ones available), but other public sector entities make almost no use of the capital market. State enterprises, almost without exception, do not use capital markets. Their status as monopolies and the tax advantages they receive are implicit in their service charges. As a result, state enterprises have an unusual financing structure, using fixed assets to fund their investments.

In Uruguay 21 of the 22 private banks are foreign. Several are branches of major international banks. Experiences with banking crises in the region have shown that internationalizing the banking sector mitigates the effects of solvency and liquidity crises and the contagion effect. Mitigating several types of risk should lead to smaller spreads.

Institutional Aspects

The heterogeneous group of institutions operating in the financial market includes banks, *casas bancarias*, and cooperatives, as well as external financial institutions.[13] The various groups of institutions are best defined by the types of activities that they are permitted to

[12] See Solsona and Graziani, 1999.

[13] Under Uruguayan law, *casas bancarias* perform more limited banking operations than do full banks (for example, receiving term deposits from nonresidents and making loans to residents and nonresidents) and are subject to lower capital requirements.

carry out.[14] The high degree of heterogeneity is primarily the result of these groups' ability to adjust their strategies to serve niche markets. This point is significant in terms of some of the measures utilized in the analysis.

Since 1982, banking law has allowed the number of banks to expand at the rate of 10 percent annually. However, the actual increase has been much smaller, largely because of qualitative restrictions. The various governments and the Central Bank have made entry into the banking market difficult. They have followed an unwritten rule requiring that the majority of a new bank's stock belong to a solid international financial entity.

The licensing system has generated inefficiencies because of the differences in capital requirements among the groups of institutions. Levels of activity and efficiency also vary among groups.[15]

Box 8.1 Bank Groups

1. State banks
2. More sophisticated and aggressive banks
3. Large private banks with a traditional business profile
4. *Casas bancarias*
5. Cooperatives
6. External financial institutions

Operating costs also differ among groups. Cooperatives are concentrated in the retail sector and therefore have the highest operating costs and financial margins, the most assets (in national currency), and the highest ratio of salaries to total nonfinancial costs. Among the first three groups, banks with traditional business profiles have the lowest costs. The *casas bancarias* are the only ones with operating costs similar to those of banks in fully developed markets (3 percent).

Virtually all types of institutions pay low interest rates on national currency demand deposits, contributing to dollarization. State

[14] See Solsona and Graziani, 1999.

[15] Ibid.

banks pay the lowest rates of interest on demand deposits, reflecting the advantages of having a monopoly on public entity deposits.

In addition to the restrictions mentioned, the Uruguay banking system is subject to high levels of institutional risk. This risk can be divided into four components:

- Risk that bank debt contracted for any purpose except as consumer credit will be restructured (in term and price) through legislation. The consequences of the refinancing laws were rationing and inefficiency in the allocation of credit, reductions in amounts and terms, and the substitution of nonbank for bank financing. These results have created disincentives to the development of modern legal instruments and have fostered a profit-seeking culture rather than one that values (and rewards) productivity.
- Risks arising from the lack of an adequately functioning judicial system and financial instruments that allow collateral. With the exception of mortgages, legal instruments designed to guarantee debt (e.g., collateral, factoring, leasing, and certificates representing merchandise) are poorly implemented and do not constitute any guarantee of payment. Obsolete codes and laws, slow bureaucratic procedures, a weak infrastructure, and quantitative and qualitative legal deficiencies characterize the system.
- Risk arising from the differing regulatory and tax treatment accorded private and state banks. Differences in the tax and regulatory treatment of various participants in the credit market persist. The risk that regulations will result in income being "given" to state banks is ever present.
- Risk arising from state banks' credit- and fund-attraction policy. In many cases these policies have resulted in explicit subsidies to the sectors financed. In others, state banks—despite significant excess liquidity that allows them to take positions in international money markets—pay far more than the international interest rates on their deposits. Their ability to do so is based on the income generated by favorable reserve regulations, state entity deposits, and other forms of preferential treatment. With the reserve requirement reforms at the beginning of the 1990s, state banks lost some of their privileges, leading to the adoption of

interest rate policies much more in line with those of the private banks.

These components form part of the uncertainty to which banking activity is subject.[16] They add to the systemic elements of risk in the banking business (such as the volatility of the inflation rate, the true exchange rate, and the type of product). As long as these sources of risk exist, they contribute to greater spreads.

Indexing in the Housing Market

Uruguay's attempts to create a generally accepted unit of account with a constant real value (much like the Chilean Unidad de Fomento, or Development Unit) have failed. In light of these failures, the dollar has taken on the role that an accounting unit would have played. The only similar unit of account in Uruguay is the Adjustable Unit (AU), which is indexed to the average salary index.[17] The Banco Hipotecario (BHU), the state bank that finances housing, uses the AU for deposits and long-term loans. The BHU is the only bank that receives deposits and places funds in this currency.[18] The amount of AU deposits the BHU receives is significantly less than the amount of AU placements, reflecting the fact that the unit is not widely accepted.[19]

The two indexation systems' coexistence has some undesirable consequences that a single, generally accepted system would not. Because the value of real property has been dollarized, the price of the collateral (the real property in question) is expressed in a different unit of account than the AU-indexed loan. Because the AU is not widely accepted, two problems emerge. First, no instrument exists that might mitigate the effects of variations in relative prices (especially of the real rate of exchange, since the AU is adjusted with the salary index)

---

[16] Ibid.

[17] Linking the AU to the salary index probably reduces spread to the extent that it reduces credit risk.

[18] See Solsona and Graziani, 1999.

[19] The AU is primarily used by individuals who make savings deposits in apprehension of a loan.

on debts contracted and assets purchased in this unit of account. Second, there is no unit of account able to mitigate fluctuations in the true value of rates on loans (the "tilt" problem).

Some Basic Facts about Spreads

Spread can be defined in several ways. The most widely used measure is the difference between the lending and borrowing rates. When an economy has more than one currency, the number of spreads equals the number of currencies. The relevant interest rates (both lending and borrowing) can be measured in two ways: by using bank slates or statistical information produced by the central bank, or by deducing the average rate from bank balance sheets. The two approaches are complementary. The interest paid and charged (consolidated) makes it impossible to distinguish between lending and borrowing rates, a fact that can be important if spreads vary greatly by type of borrower or by borrowing rate. This work uses both criteria.

Spread as the Difference between Lending and Borrowing Rates[20]

- In both currencies, the differences between the first-, second-, and third-line rates are considerable.[21] These differences are much greater in pesos (15 percent) than in dollars (2–3 percent).

---

[20] When the interest rate levels vary substantially, the spread is often calculated on the basis of the following corrected formula:

$$1 + spread = \frac{1 + lending\ rate}{1 + deposit\ rate} \text{ -> } spread = \frac{lending\ rate - deposit\ rate}{1 + deposit\ rate}.$$

Although calculating spreads in this manner produces interesting data, it also has significant limitations. First, term deposits (the basis for comparison) are not representative for both national and foreign currencies. Second, operating costs (including labor and taxes) are not considered, nor are the consequences of joint production of deposits and loans on the generation of services. Third, liquidity, interest, and exchange rate risks are not taken into account. See Solsona and Graziani, 1999.

[21] These rates apply according to the borrower's rating. First-line rates are for firms with the highest rating, second-line rates for firms with an intermediate rating, and third-line rates for firms with low ratings.

- The differences between private bank rates and BROU rates, both for consumer credit (the third line in the definition of the private banks, and social credit in the BROU) and loans to companies (the second line for private banks, and basic credit in the BROU) reached their maximum prior to the reserve requirement reform. Since then, they have not returned to their previous levels.[22] The partial elimination of reserve privileges that state banks enjoyed meant that they had to make significant reforms and justify the pricing of their loans in national currency. As for credits in national currency to first-line companies, interest rates lost competitiveness after the reform.
- The difference between first- and second-line rates in pesos has been growing since the end of the 1980s.[23] A significant fall in the real rate of exchange or a rise in dollar salaries can raise banks' operating costs considerably. The same can be said with respect to the difference between second- and third-line rates. This result should not be surprising, since the interest rate rises with the operating costs. This result holds true only for pesos, however. Differences among types of dollar-denominated credit are more stable over time.
- The spread in interest rates for consumer credit can reach 4,000 basis points.
- First-line clients receive dollar-denominated loans at rates that are slightly higher than those in industrial countries. The spread for these operations fluctuates between 1 and 2 percent.
- Private banks have responded more rapidly to the fall in interest rates in the international market.
- AU-indexed loans made by the BHU account for nearly one-third of all loans in the system. Although no public information on them is available, the spread of operations is estimated to be between 4 and 5 percent. However, this spread is deceptive for two reasons. First, the BHU runs a considerable risk making placements in AU. The total amount of liabilities in AU is substantially less than assets in

[22] See Solsona and Graziani, 1999.

[23] Ibid.

this unit of account. Second, this type of loan's role is to facilitate the purchase of housing by middle- and lower middle-class families unable to obtain mortgages with private banks. The loans are generally small, long-term credits to physical persons. Nevertheless, a substantial difference in spreads exists between loans denominated in AU and loans in national and foreign currency.

Average Spreads Calculated on the Basis of Bank Balance Sheets

Spreads calculated on the basis of bank balance sheets are computed by dividing net financial income by total loans. For this analysis, they have been converted in national and foreign currency for the most important banking institutions.[24] The figures treat the various groups of banks (Box 8.1). For spreads in national currency, only groups 1, 2, and 3 are taken in account. Groups 5 and 6 have shorter series, and group 4 has almost no national currency operations.[25] For spreads in foreign currency, groups 1–4 are taken into account.

Two conclusions may be drawn from the figures. First, spreads in both national and foreign currency vary substantially among groups of institutions and over time. Group 2, which contains the most sophisticated and aggressive banks, has the largest spreads in national currency. Group 1 (state banks) and group 3 (traditional private banks) show similar trends. Groups 2 and 3 have the largest foreign currency spreads. State banks generally have the smallest spread, although it has shown signs of increasing since the banks' reserve privileges were reduced in 1991. Finally, group 4 (the *casas bancarias*) shows intermediate foreign currency spreads. However, since 1993 the differences in these spreads have tended to decline.

Empirical Evidence

The econometric results for the Uruguay financial system presented in this section are based on data available for groups of banking

[24] Ibid.

[25] In addition, the spreads of this group of banks vary to a surprising degree and merit more detailed study.

institutions and other indicators (Box 8.1). The empirical evidence shows the extent to which bank spreads can be explained statistically by microeconomic characteristics, variables of the macroeconomic environment, and institutional factors of the type presented earlier in this chapter. The sample of available data is small, containing 12 half-yearly observations that cover only the period from the second half of 1988 to the first half of 1994, inclusive. The estimates are for spreads in both national and foreign currency. The estimation method used, in all cases, is pooled least squares.

In studies of this subject, the microeconomic characteristics of banks usually include variables such as indicators of the structure or composition of products, the quality (or size) of the portfolio, the implied rate of interest on demand deposits, the opportunity cost of reserves, net income for services, labor and other costs, and amortization. Among macroeconomic environmental variables are the (anticipated) rate of inflation or devaluation, the variance (or standard deviation) of interest rates as a measure of interest rate risk, and indicators of liquidity and exchange risks. Finally, institutional factors cover aspects such as the degree of concentration of the banking system and changes in banking legislation.[26]

Generally speaking, spread is thought to be positively affected by variations in the composition of products (e.g., the move toward more labor-intensive products), the size of the portfolio (or proportion of debt payable), the implicit interest rate on demand deposits, the opportunity cost of reserves, labor costs, and other costs. Net income for services has a negative effect. Similarly, the presence of variables describing macroeconomic uncertainty should lead to an increase in spread. It is assumed that inflation or deflation can increase spread to the extent that the interest rate on deposits is noncompetitive or is not completely adjusted to inflation. In the same way, it is thought that spread tends to be greater when the degree of competition in the banking system is limited. The anticipated effect of institutional factors will depend on the nature of the change in question.

[26] These are sometimes obtained using appropriately defined dummy variables.

National Currency Spread

Estimates of national currency spread include only the first three groups of institutions (Box 8.1). The empirical analysis attempts to examine the contribution of certain variables to these spreads where

IFPTN = net financial income in national currency/total loans in national currency;
INF = rate of inflation (in decimals);
DEUVEN = proportion of debt payable relative to total debt in private banks (indicator of portfolio size);
SDIMN = lending rate standard deviation in national currency/its average level in each period (measure of interest rate risk);
M1M2 = M1/M2 (a measure of liquidity risk, since a large quotient between M1 and M2 implies that banks face a heavy liquidity requirement that will allow them to withstand massive withdrawals of deposits);
SSPT = wages and salaries/total loans (reflecting banking institutions' labor costs);[27]
OGAPT = other expenses and amortizations/total loans;
CCMN = consumer credit to the resident private sector (in national currency) as a proportion of total credit of the private banks (in national currency) (reflecting the change in the composition of products toward more labor-intensive products); and
DUMINST = dummy variable to determine the institutional change in the reserve requirement at the beginning of the 1990s.

The dummy variable has the value of one until the first half of 1990. It then decreases linearly and assumes the value of zero after the first half of 1992. This variable is used to obtain the effect of the reduction in privileges the BROU enjoyed in terms of reserve requirements.

[27] This variable seems more appropriate than an index of true salaries in the financial system, because it also includes the effect of the reduction in bank personnel that occurred during the period studied.

A large number of estimates were made, but because there were only a few observations and a relatively high degree of correlation among some variables, obtaining coefficients of some degree of significance was difficult.[28] This difficulty persisted even when regressions had a high coefficient of determination (R^2) and there were no indications of autocorrelation in the residuals.

As anticipated, inflation (*INF*) tended to positively affect the national currency spread, even when it did not reach the usual level of significance. This finding suggests that the interest rate on deposits was not completely adjusted to inflation during the period studied. Similarly, the proportion of debt payable (*DEUVEN*) and the measure of interest rate risk (*SDIMN*) positively affected spread, even when interest rate risk did not reach the usual level of significance. This tendency coincides with the idea that institutions take measures to increase the spread between lending and borrowing interest rates when faced with an increase in these variables that could affect net profits negatively. The measure of liquidity risk used (M1M2) appears with the opposite sign to the one that was expected, a difficult development to explain.

Cost variables (*SSPT* and *OGAPT*) did not affect national currency spread. For its part, the proportion of consumer credit (*CCMN*) tended to increase spread, as expected, even when the coefficient did not reach its usual level of significance.[29] Finally, the change in reserve requirements (represented by the dummy variable *DUMINST*) did not turn out to be significant, another finding that is particularly difficult to understand given the makeup of group 1, which includes state banks.

Foreign Currency Spread

Estimates relating to the foreign currency spread regard the first four bank groups.[30] The variables used are

[28] See Solsona and Graziani, 1999.

[29] This variable could in part describe the labor cost effect represented by *SSPT*.

[30] See Solsona and Graziani, 1999.

IFPTE = net financial income in foreign currency/total loans in foreign currency (a measure of foreign currency spread);

DEV = rate of devaluation (in decimals);

SDIME = standard deviation of the lending interest rate in foreign currency (a measure of interest rate risk);

DEMENR = nonresident deposits in foreign currency as a proportion of total foreign currency deposits in the private banks (an indicator of lending capacity not subject to obligatory reserve requirements);

SSPT = wages and salaries/total loans;

OGAPT = other expenses and amortization/total loans;

CCME = consumer credit to the resident private sector in foreign currency as a fraction of total private bank loans in foreign currency (reflecting the change in the composition of products); and

DUMINST = dummy variable to determine the effect of the institutional change in the reserve requirements at the beginning of the 1990s.

In this case estimates also reach a level of significance, as there are no indications of first-order autocorrelation in the residuals.[31]

The devaluation rate (*DEV*) tends to have a positive effect on spread, although it does not reach a level of significance. Arguably, remuneration on foreign currency deposits was considerably closer to competitive levels.[32] The measure used for interest rate risk (*SDIME*) obtains a positive coefficient, as expected, although not a significant one.[33] The proportion of nonresident foreign currency deposits (*DEMENR*) appears with a significant positive sign. This positive relation corresponds to the suspicion that having a large

[31] The high coefficienct of determination (R^2) values are caused, in part, by the limited degrees of tolerance, which, in turn, are the result of the small sample size. See Solsona and Graziani, 1999.

[32] In preliminary estimates, the rate of inflation (*INF*) was insignificant and had a negative coefficient.

[33] In some preliminary estimates, an attempt was also made to determine the possible effect of exchange rate risk using an indicator of foreign currency position of the most sophisticated group of banks (group 2), but in no case did this variable approach the usual level of significance.

proportion of such deposits encourages high foreign currency spreads, so that nonresident foreign currency deposits are subject to lower reserve requirements.

Wages and salaries (*SSPT*) positively affected foreign currency spreads, while the effect of other expenses and amortization (*OGAPT*) was not significant. The proportion of consumer credit (*CCME*) appears with a significant negative coefficient, a result that is difficult to understand.[34]

Finally, the change in reserve requirements (represented by the *DUMINST* variable) affected different institutions in different ways, leading to increased spread. This result is especially true for group 1, which includes state banks. This outcome indicates that state banks were obliged to increase the spread between borrowing and lending rates when their reserve requirement privileges were reduced.

Conclusions

The econometric analysis provides limited evidence of the effects of certain factors on bank spread. Spread in national currency is positively affected by inflation, the proportion of debt payable, the proportion of consumer credit, and the degree of interest rate risk. However, only the effect of interest rate risk approaches the usual level of statistical significance. These results suggest that interest on deposits was not adjusted for inflation and that portfolio size, the change in the composition of products toward more labor-intensive output and uncertainty about interest rates tend to affect spread positively.

Estimates indicate that three variables influence foreign currency spread. First, devaluation triggers a small, though positive, effect. Appropriate proportions of nonresident foreign currency deposits and reasonable salary costs also generate positive effects. Finally, the official banking sector foreign currency spread increases with changes in reserve requirements.

---

[34] The effect of the change in the composition of products towards consumer credit (*CCME*), a more labor-intensive product, can be expressed in part by the variable *SSPT*, given the high correlation between the two variables.

These findings suggest that three interrelated points help explain bank spreads: operating efficiency, the market power of banks, and risk. Relative operating inefficiency, a lack of competition, and risks that cannot be fully controlled, owing to a lack of effective instruments, all negatively impact the banking system. In Uruguay they have helped create a system that does not perform all the functions of a fully developed banking sector. Instead, it carries out those functions it does conduct at a high cost, and it does not take advantage of economies of scale and scope.

These points raise several questions. With respect to the level of spreads and regulation of the financial system, the key question is whether or not large spreads are desirable. Do they reflect the earnings of monopolistic banks and a transfer of funds from other sectors of the economy, negatively impacting credit allocation efficiency? Are spreads an efficient instrument for solving the incentive problems generated by deposit insurance, both explicit and implicit?

From a theoretical point of view, regulation is a response to the incentive problem. Deposit insurance, which is equivalent to an option to sell bank obligations, protects investors, avoids the risk of runs on deposits (its consequence being an impact on the level of credit and activity), and protects the economy's system of payments. High spread is one of several possible mechanisms for reducing incentives for banks to take risks. Compared with deposit insurance (the capital requirements that directly affect distortion), high spread has the disadvantage of acting indirectly and of incurring significant additional costs. These costs can include direct subsidies; indirect subsidies, such as restrictions on the entry of new banks and limitations on competition by nonfinancial intermediaries; and resource allocation costs, such as the danger of inadequate selection of projects to be financed when the spreads are caused by high lending rates.

As for policy, the problems become more complex with the presence of international banking institutions. This situation is particularly pertinent to Uruguay, where 21 of the 22 private banks are foreign (and, in many cases, branches of large international institutions). Legally, a branch operates as an extension of its parent bank. The extension of responsibility serves as a guarantee or endorsement.

The quality of endorsement, however, depends on the parent bank's financial situation.

What are the consequences of such guarantees, both implicit and explicit? First, they make it necessary to reconsider, at both the theoretical and policymaking levels, subjects such as solvency and liquidity crisis risk, which heavily depends on the parent bank's behavior regarding the branch. Second, the internationalization of the banking system poses a new risk: company capital risk. A bank may undergo a crisis not because of its activity in the country where the branch is located, but because of the parent bank's problems in another country. Many North American banks faced this problem at the end of the 1980s, as did several Spanish banks at the beginning of the 1990s. These types of risks must be redefined, as must banks' responses to them.

References

Banco Central de Uruguay. 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995. Boletín Informativo. Montevideo, Uruguay.

Banda, A. 1990. "Regulación bancaria, crisis financiera y políticas consecuentes: el caso uruguayo." In: G. Held and R. Szallachman, editors. *Ahorro y asignación de recursos financieros*. Buenos Aires, Argentina: Grupo Editor Latinoamericano.

Bhattacharya, S., and Thakor, A. 1993. "Contemporary Bank Theory." *Journal of Financial Intermediation*. 3 (1): 2–50.

Brock, P. 1984. "Inflationary Finance in an Open Economy." *Journal of Monetary Economics*. 14 (1): 37–53.

_____. 1989. "Reserve Requirements and the Inflation Tax." *Journal of Money, Credit, and Banking*. 21 (1): 106–21.

_____. 1992. "External Shocks and Financial Collapse: Foreign Loan Guarantees and Intertemporal Substitution of Investment in Texas and Chile." *American Economic Review*. 82 (2): 168–73.

Browne, F., and Tease, W. 1992. "The Information Content of Interest Rate Spreads across Financial Systems." *Economic Letters*. 39 (4): 437–42.

Calvo, G. and Végh, C. 1993. "Exchange Rate Based Stabilization under Imperfect Credibility." In: H. Frisch and A. Worgotter, editors. *Open Economy Macroeconomics*. New York, NY, United States: St. Martin's Press.

Diamond, D. 1991. "Monitoring and Reputation: the Choice between Bank Loans and Directly Placed Debt." *Journal of Political Economy*. 99 (4): 689–721.

Díaz, A. 1994. "The Uruguayan Banking System: Challenges for the Nineties." Washington, DC, United States: World Bank. Mimeographed document.

Dominioni, D., and Noya, N. 1994. "El fortalecimiento del sector financiero en el proceso de ajuste: liberalización y regulación. El caso uruguayo." Washington, DC, United States: Inter-American Development Bank. Mimeographed Document.

Frankel, J. and Chudozie, O. 1995. "Liberalized Portfolio Capital Inflow in Emerging Markets: Sterilization, Expectations, and the Incompleteness of Interest Rate Conversions." Working Paper No. 5156. Cambridge, Massachusetts, United States: National Bureau of Economic Research.

Furest, R. 1994. "Una estimación del crédito no bancario." Draft paper. Montevideo, Uruguay: Central Bank of Uruguay.

Gagliardi, E. 1992. "El margen de intermediación bancario en el Uruguay." Montevideo, Uruguay: Asociación de Bancos del Uruguay. Mimeographed Document.

Garber, P., and Svensson, L. 1995. "The Operation and Collapse of Fixed Exchange Rate Regimes." In: G. Grossman and K. Rogoff, editors. *Handbook of International Economics, Vol. 3*. Amsterdam, Holland: Elsevier, North Holland.

Garber, P. and Taylor, M. 1995. "Sand in the Wheels of Foreign Exchange Markets: A Skeptical Note." *Economic Journal*. 105 (428): 173-180.

Gertler, M. 1988. "Financial Structure and Aggregate Economic Activity: An Overview." *Journal of Money, Credit, and Banking*. 20 (2): 559-588.

Hanson, J. and Rezende Rocha, R. 1986. "High Interest Rates, Spreads, and the Costs of Intermediation, Two Studies." Industry and Finance Working Paper Series No. 18. Washington, DC, United States: World Bank.

Inter-American Development Bank. 1995. *Progreso económico y social en América Latina: hacia una economía menos volátil.* Washington, DC, United States: Inter-American Development Bank.

Koehn, M. and Santomero, A. 1980. "Regulation of Bank Capital and Portfolio Risk." *Journal of Finance*. 35 (5): 1235-1250.

Krugman, P. 1979. "A Model of Balance-of-Payments Crises." *Journal of Money, Credit, and Banking*. 11 (3): 311–25.

_____. 1992. "Exchange Rate Targets and Currency Bands." In: P. Krugman and M. Miller, editors. *Exchange Rate Targets and Currency Bands*. Cambridge, United Kingdom: Cambridge University Press.

López, R., Mújica, L., and Nalbandian, H. 1988. "El indicador del producto del sector financiero en una economía con doble moneda y alta inflación: el caso uruguayo." Working Paper No. 16. Montevideo, Uruguay: Central Bank of Uruguay.

Noya, N. 1988. "Ahorro, inversión y activos financieros: los efectos de la liberalización." *Suma*. 3 (5): 115–45.

Rodríguez, C. 1994. "Interest rates in Latin America." Working Paper No. 98. Buenos Aires, Argentina: CEMA University.

Roldós, J. 1991. "La crisis bancaria de los ochenta." Socio-Economic Working Paper Series No. 4. Montevideo, Uruguay: Centro de Estudios de la Realidad Económica y Social.

Sachs, J., Tornell, A., and Velasco, A. 1996. "Financial Crises in Emerging Markets: The Lessons from 1995." Working Paper No. 5576. Cambridge, MA, United States: National Bureau of Economic Research.

Triunfo, P. 1995. "Sistema bancario privado uruguayo: un estudio de sus costos." Document No. 9/95. Montevideo, Uruguay: Universidad de la República, Departamento de Economía.

Vaz, D. 1993. "Sobre el concepto de restricción presupuestaria 'blanda'." Working Paper No. 12. Montevideo, Uruguay: Centro de Estudios de la Realidad Económica y Social.

Financial liberalization has not lived up to expectations, at least as far as interest rate spreads are concerned. Over the past decade, many countries in Latin America and the Caribbean have reformed their financial sectors and reaped major economic benefits as a result. However, the persistence of high interest rate spreads—the difference between the interest charged to borrowers and the rate paid to depositors—has been a disquieting outcome of the reforms.

Why So High? presents the first systematic analysis of the micro- and macroeconomic determinants of bank spreads across countries in Latin America. What has been the trend in bank spreads during the 1990s and how has financial liberalization contributed to this trend? How well do competing theories of interest rate spreads in industrial countries perform when applied to Latin America? What can policymakers do to promote the convergence of interest rate spreads to international levels? This book addresses these important questions.

Inter-American Development Bank
1300 New York Ave., N.W.
Washington, D.C. 20577

www.iadb.org

ISBN: 1-886938-74-1

B0129201