

THE EFFICIENCY-STABILITY TRADE-OFF: THE CASE OF HIGH INTEREST RATE SPREADS IN VENEZUELA

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This paper examines the determinants of the high intermediation spread observed in the Venezuelan banking sector during the 1990s (by far the largest in the Latin American region throughout the 1990s). We trace the evolution of the spread and its connection with other bank-specific variables. A reduced-form equation is estimated on the basis of a simple behavioral model for the banking firm previously developed by Shaffer and extended by Barajas, Steiner, and Salazar. Using different types of estimators for aggregate and pooled data of the financial system, we found that high spreads can be attributed to market power, high operating costs, and expected portfolio risk. The empirical results also suggest a trade-off between assuring bank solvency and lowering profitability.

Keywords: Financial system; Interest rate spread; Market power; Latin America; Venezuela

JEL classification: E43, E44, G21

I. INTRODUCTION

OVER the last decade, most economies in Latin America have experienced exceptionally high levels of bank spreads (the difference between the interest rate charge to borrowers and the rate paid to depositors), well above international levels. This disquieting performance has raised many questions on the supposed benefits of the financial reforms initiated in the region in the late 1980s and early 1990s and aimed at redefining the structure and operation of the financial system.¹

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¹ Several Latin American countries (most notably Colombia, Argentina, Mexico, Peru, and Venezuela) undertook a strategic turnaround in the early 1990s with far-reaching implications: from an inward-oriented form of development with heavy State intervention in production, finance, and the system of prices, to an outward-oriented development strategy in the context of a free market, with the private sector playing the leading role. In general, reforms in the financial system were aimed at easing entry restrictions, phasing out directed credit programs, reducing financial taxation (by eliminating mandatory investments and simplifying reserve requirements), and liberalizing interest rates.

To understand the behavior of interest rates and interest rate spreads and to account for its determinants, recent empirical research has largely focused on Latin American countries. While conventional wisdom and policymakers in the region have stressed a theoretical link between substantial reductions in spreads and financial liberalization, most of these studies show high and stable spreads, even after a process of opening domestic financial markets. However, this increasing empirical literature has left the case of Venezuela somehow unexplored. This is quite striking given that among the Latin American countries, the spread of the Venezuelan financial sector has been the largest on average throughout the decade of the 1990s, with an upward trend after the 1994–95 financial crisis. Venezuela provides an interesting case study because the country embarked on an ambitious and far-reaching economic reform program that included liberalization of interest rates and the elimination of the mechanism for direct allocation of credit by the late 1980s. Moreover, intermediaries moved toward a multibanking scheme in the early 1990s and foreign private participation increased significantly after the new Banking Law in 1994. These events sought to increase financial intermediation, facilitate efficiency, and promote slow convergence of interest rates to international levels. However, financial intermediation did not increase and the aforementioned narrowing of the spreads did not occur.

Policymakers care about bank spreads because they reflect, in part, the cost of intermediation. High spreads are usually interpreted as an indicator of low efficiency and lack of competitiveness, which adversely affects domestic real savings and investment, leading to significant amelioration of growth. However, this conventional narrative has been recently challenged and, a priori, it is not clear whether high spreads are good or bad from a social welfare perspective. Rojas-Suarez (2001), for instance, argues that in developing countries, low spreads may signal risky institutions. Arguably, banks attempt to increase market share after financial liberalization, which lead them to expand their loan portfolio through loans to risky borrowers. Funding for these loans is usually obtained by offering high deposit rates, but the resulting increase in funding costs is not translated into proportional increases in loan rates, as banks are aware that this could cause their risky borrowers to default. Moreover, Barajas, Steiner, and Salazar (1999) have pointed out that high spreads can contribute to high bank earnings, which, if channeled into the capital base of the system, may promote safety and stability in the system. Indeed, in the context of underdeveloped equity markets, increases in the regulatory minimum capital requirement or voluntary decisions to hold capital above the regulatory minimum (if banks face increasing credit risk exposure) may push the system toward higher profitability goals and higher spreads. These arguments are particularly relevant in developing countries and the depiction might even be consistent with the Venezuelan case, where the post liberalization era was followed by riskier bank strategies, financial turmoil, and a strong need to capitalize the system after the crisis.

This paper attempts to investigate and discuss the behavior and determinants of interest rate spreads and of interest rates in Venezuela. In this task, we make use of an available and rich database that comes from the consolidated balance sheets and income statements of the commercial and universal banks. We also offer some plausible explanations for the findings, and though these are not exhaustive, we found support for both the inefficiency and the risk exposure hypothesis.

The work has been organized as follows. In Section II, we present some stylized facts concerning the evolution and decomposition of the so-called “net interest margin” in Venezuela and compare it with a sample of countries to identify similarities and differences that would justify attention on specific aspects of the Venezuelan case. This is followed by a brief comparison between the spread and some possible explanatory variables, such as banking concentration and other accounting ratios. In Section III, we present the theoretical and empirical specification to be used in our econometric exercise and analysis. In Section IV, we discuss the data and present the empirical results. An interpretation of the results is presented in Section V. Finally, Section VI presents evidence that sheds light on the probable uses of high spreads in Venezuela.

II. SOME STYLIZED FACTS

Empirical measures of the bank spread attempts to capture the costs of financial intermediation, that is, the difference between what banks charge to borrowers and what they pay to depositors. However, strange as it may seem, the definition itself of the bank spread is a very common difficulty in analyzing the performance of the financial sector and in public discussions. We have chosen in this paper to estimate bank spreads using banks’ balance sheets and income statements in an effort to obtain the implicit loan and deposit rates. Following a number of studies, we calculate first the so-called net interest margin, which is the accounting value of a bank’s interest income over total assets. This allows us a useful decomposition of the ex-post interest spread into its constituent parts. Besides, it will be useful for comparing for a sample of countries.

To understand the notion of the net interest margin, we may use the consolidated income statement of commercial banks and define profits after taxes (P) as interest earnings (IE) plus noninterest income (NII), minus interest expense (IEX), operating cost (OC), provisions for loan losses ($PROV$), and taxes (T). That is:

$$P = IE + NII - IEX - OC - PROV - T. \quad (1)$$

Dividing this expression by total assets we have:

$$\frac{P}{A} = \frac{IE}{A} + \frac{NII}{A} - \frac{IEX}{A} - \frac{OC}{A} - \frac{PROV}{A} - \frac{T}{A}. \quad (2)$$

But we do know that the spread can be the result of the difference between the first and third terms on the right-hand side of equation (2). Consequently, by making the net interest margin of interest (*NIM*) equivalent to the definition of ex-post spread, we have the following simple decomposition:

$$S_1 = NIM = \frac{P}{A} - \frac{NII}{A} + \frac{OC}{A} + \frac{PROV}{A} + \frac{T}{A}. \quad (3)$$

The term P/A commonly represents a measure of bank profitability.² Furthermore, assuming that the net profit over assets ratio is constant, increases in operating costs (OC/A), in provisions ($PROV/A$), and in direct taxes as a proportion of assets (T/A) raise the spread's magnitude.

Of course, the definition of ex-post spread depends on the latitude of the criterion defining the net interest income and the assets and liabilities that generate interest income and expenses. For instance, interest income might include revenues for loans but exclude revenues for securities. Outlays could include not only financial expenses (or interest expenses) but also personnel and administrative costs (the sum of which is usually called operating costs). We have then a wide range of ex-post spreads that can be constructed and compared if due care is taken to select the divisor that is to be applied to the net interest income.

If, for instance, financial revenues derived from the loan portfolio (*IFP*) are taken from the income statement and divided by the total amount in loans maintained on average during a given financial period (L), the result is an implicit interest rate on loans. This rate could be compared with the implicit interest rate on deposits that results when the cost of deposits (*EFD*) is divided by the average amount in deposits (D). Comparing these implicit rates yields the second measure of spread (S_2) that we employ in this study. In other words,

$$S_2 = \frac{IFP}{L} - \frac{EFD}{D}. \quad (4)$$

This definition is particularly suitable for testing and the analysis of market power that follow.

Using the definition of S_1 , we have calculated the net interest margin and its decomposition for a sample of countries that includes seven semi-industrialized Latin American countries (Argentina, Brazil, Colombia, Ecuador, Mexico, Peru, and Venezuela), nine industrialized countries (the United States, the United Kingdom, Canada, France,

² This measure is not problem-free but is often considered better than the classic measure of return on capital. In developing countries, where there are no sufficiently deep and liquid capital markets, the "true" value of capital may be difficult to know. Moreover, the return on capital may be inflated if banks are able to take risks at the expense of the existing public safety nets. In such cases, return on assets seems a more appropriate measure of profitability.

Germany, Italy, Japan, Sweden, and Spain), and four Asian economies (Thailand, South Korea, Singapore, and Taiwan) representing the group of new industrialized economies (NIEs). The data used come from the BankScope database provided by Fitch IBCA, comprising financial statements of each country's commercial and universal banks for the 1992–99 period. As this data attempts to standardize financial statements across countries, it allows reasonable cross-country comparison.³ This database has also been used recently by the World Bank in a study of spread determinants for 80 countries (see Demircuc-Kunt and Huizinga 1999).

Table 1 shows the level and evolution of the spread for the sample of 20 countries. Some important observations can be made from this table. In the first place, the average ex-post interest spread (measured as the net margin of interest) is substantially larger for Latin American than for industrialized countries and NIEs in the sample. Likewise, throughout the 1990s, the spread in Latin American countries has remained stable at very high levels, compared to the downward trend in industrialized countries and NIEs.⁴ Although this is very much consistent with the findings of Brock and Rojas Suarez (2000), who compare a set of six Latin American economies with a sample of industrialized economies, it is interesting to note that we are using a different source of data. Secondly, among the Latin American countries, the spread of the Venezuelan financial sector has been larger on average throughout the decade, with an upward trend after the 1994–95 financial crises. Again, it should be noted in that respect that during the second half of the 1990s, the Venezuelan economy registered higher inflation rates and higher exposure to macroeconomic risk than its peers in the sample. Moreover, the Venezuelan financial system was poorly capitalized and in need of large sums of capital as a consequence of the crisis and stronger prudential regulation.

As mentioned previously, equation (3) suggests an accounting breakdown of the ex-post interest spread. The breakdown is useful for comparing both the level and evolution of the spread as well as the weight of its components (in order to provide an assessment of differences across countries).⁵ Table 2 provides the average accounting ratios (relative to total assets) of each country. The figures reveal that operating costs are substantially higher in the Latin American sample than in the

³ Indeed, the use of this database presents an advantage over Brock and Rojas Suarez (2000), who make cross-country comparisons for a sample of countries (including six countries in Latin America) using data collected from different sources. However, it is important to point out that since the *NIM* is not including noninterest income, broad differences in what banks do and in how they allocate their operating budgets may question cross-country comparisons that use this measure of the ex-post interest spread.

⁴ Eventually, the countries of the region may be supposed to have undergone a higher systemic risk and little competition owing to scarcely developed capital markets and secondary bond markets.

⁵ There is no doubt that comparing accounting ratios without controlling for differences between the various macroeconomic and regulatory contexts and without taking into account the business climate, the mixture of financial products, etc., may be misleading. However, the breakdown can still reveal very useful preliminary assessment for the differences across countries.

TABLE 1
Annual Interest Rate Spreads in Selected Countries (%)

Country	1992	1993	1994	1995	1996	1997	1998	1999	Average (1992–99)
Argentina	4.24	6.63	6.00	5.44	4.40	3.83	3.67	3.24	4.68
Brazil	3.80	7.25	10.74	8.00	6.01	5.20	5.76	4.23	6.38
Colombia	6.01	6.64	9.25	8.11	9.59	7.65	5.72	4.42	7.17
Ecuador	5.28	9.19	7.67	6.26	5.35	4.64	2.21	0.03	5.08
Mexico	5.72	6.46	4.08	4.65	4.35	5.09	5.38	6.42	5.27
Peru	7.06	6.51	6.60	7.71	7.34	6.77	5.78	4.22	6.50
Venezuela	5.67	6.37	8.57	8.49	10.58	11.64	16.76	13.31	10.17
Average	5.40	7.01	7.56	6.95	6.80	6.40	6.47	5.12	
Canada	2.19	2.28	4.87	2.70	2.66	2.08	1.88	1.87	2.57
France	1.57	1.43	1.47	1.41	1.24	1.13	1.15	0.71	1.26
Germany	1.79	1.87	1.97	1.66	1.47	1.45	0.90	0.79	1.49
Italy	2.48	2.70	2.50	2.60	2.52	2.17	2.01	1.22	2.27
Japan	1.15	1.16	1.22	1.20	1.24	1.17	1.32	0.63	1.13
Spain	3.18	2.66	2.67	2.60	2.33	2.29	2.58	2.08	2.55
Sweden	2.04	3.01	2.64	2.46	2.00	1.67	1.53	1.31	2.08
UK	1.79	1.98	1.84	1.89	2.06	1.84	1.64	1.50	1.82
USA	3.45	6.91	3.55	3.49	3.65	3.67	3.35	3.35	3.93
Average	2.18	2.67	2.52	2.22	2.13	1.94	1.82	1.49	
Thailand	3.44	4.14	4.01	3.74	3.64	2.42	1.06	0.73	2.90
South Korea	2.06	2.02	1.73	1.79	1.78	1.48	1.63	1.80	1.78
Singapore	1.77	1.95	2.09	2.10	2.20	2.02	2.04	1.53	1.96
Taiwan	1.79	2.16	2.20	2.12	2.03	2.04	2.02	1.81	2.02
Average	2.26	2.57	2.51	2.44	2.41	1.99	1.69	1.46	

Source: BankScope Database provided by Fitch IBCA and own calculations.

other two samples, which may be indicating excessive administrative and personnel cost, too many minor transactions and high-cost-per-unit checks, unused scales or an excessive proliferation of agencies and branches. The average indicator of operating costs/assets is also high in the United States, perhaps reflecting the proliferation of banks and bank branches due to (geographic) restrictions on banking activities.⁶ Also remarkable is that the noninterest income to total assets variable is much higher in the region than in the industrialized and Southeast Asian countries. This may reveal the importance of fee-based services in Latin American countries, though in other contexts it may be an indication of poor portfolio quality and low interest income as a proportion of assets. Indeed, anecdotal evidence indicates that the financial system in several Latin American countries rely intensively on supplying services. In the case of Venezuela, operating costs, provisions, and noninterest income are no different from the rest of the region but the profitability indicator is much higher on average

⁶ This fact is also stressed by Demirguc-Kunt and Huizinga (1999).

TABLE 2
Decomposition of the Interest Spread, 1992–99

Country	Profits after Taxes	Taxes	Operating Costs	Provisions	(Noninterest Income)	Net Interest Margin
Argentina	0.72	0.24	6.38	1.74	4.84	4.68
Brazil	0.60	0.39	8.66	1.54	4.82	6.38
Colombia	1.23	0.48	8.26	1.30	4.11	7.17
Ecuador	1.30	0.07	7.42	1.58	5.30	5.08
Mexico	0.63	0.10	4.68	1.84	1.97	5.27
Peru	1.22	0.62	7.70	1.61	4.65	6.50
Venezuela	3.25	0.24	7.84	1.47	2.62	10.17
Canada	0.53	0.37	2.72	0.57	1.62	2.57
France	0.11	0.09	1.68	0.46	1.07	1.26
Germany	0.27	0.21	1.50	0.09	0.57	1.49
Italy	0.22	0.30	3.35	0.50	1.10	2.27
Japan	(0.20)	0.02	0.94	1.03	0.66	1.13
Spain	0.57	0.22	2.45	0.47	1.16	2.55
Sweden	0.49	0.12	1.78	0.93	1.23	2.08
UK	0.78	0.26	1.77	0.30	1.29	1.82
USA	1.27	0.64	4.26	0.59	2.83	3.93
Thailand	(0.59)	0.50	2.14	1.96	1.12	2.90
South Korea	(0.36)	0.12	2.32	0.95	1.25	1.78
Singapore	1.01	0.36	1.02	0.43	0.85	1.96
Taiwan	0.69	0.15	1.34	0.30	0.46	2.02

Source: BankScope database provided by Fitch IBCA and own calculations.

Notes: 1. All definitions are divided by the nominal value of the total assets.

2. The interest rate spread corresponds to the sum of all its components as shown in equation (3).

3. Noninterest income and the values in brackets are negative.

than in the other countries, including Latin America. Whether or not these particularly high levels of profitability are due to systematic use of market power is a question that is not possible to assess with a descriptive analysis.

A better picture of the evolution of the two measures of the interest spread that we use here is provided in Figure 1. We have used semiannual aggregate data that come from income statements and balance sheets of the entire system of commercial and universal banks. The data covers the period between 1986 and the first semester of 2000.⁷ In both figures, it is clear that spreads stayed at low levels before the process of financial liberalization took place; however, spreads began to increase in the first quarter of 1989 after the announcement of financial liberalization. The S_2 measure shows that just before the 1994–95 financial crises, the spread increased, while the S_1 measure shows a similar increase as the crisis evolved. In both measures, the spread increases substantially and reaches a maximum in the first semester of

⁷ For the period 1986–2000, only the balance sheet figures are available on a monthly basis.

Fig. 1. Interest Spread, 1986:1–2000:1

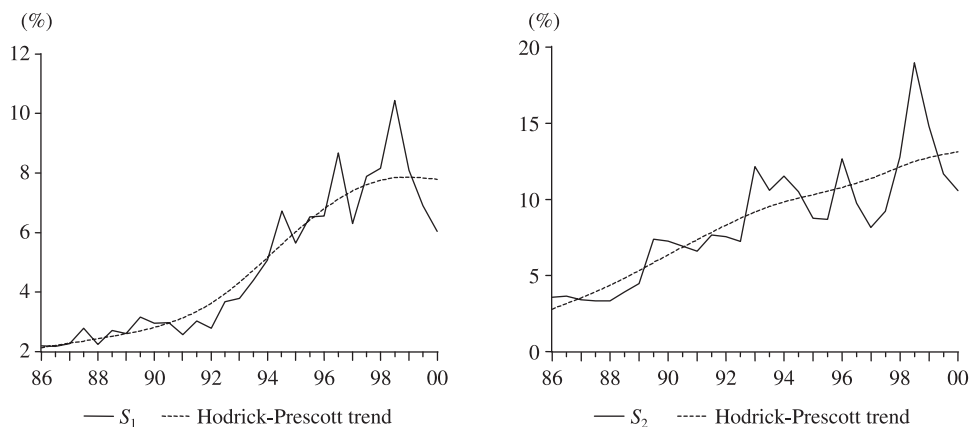


TABLE 3
Correlation Matrix between Spreads, and Spreads and Interest Rates

Spread	S_1	S_2	i_{L2}	i_{B2}
S_1	1.000	0.837	—	—
S_2	0.837	1.000	0.832	0.351

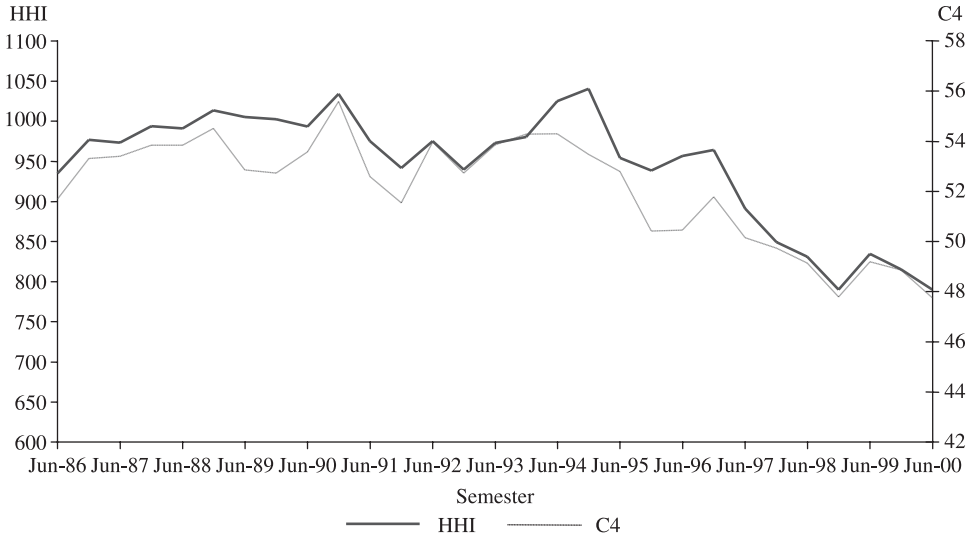
1998. When the Hodrick-Prescott filter is applied to the series, we can see that the evolution and trend of these various measures of the spread do not seem to differ.

Both spread measures equally reflect high correlation, as shown by the correlation matrix in Table 3. Even from the accounting viewpoint, the calculation differences between both measures are minimal. It is also interesting to see that the loan rates correlate much more with the spread than the rates on deposits within each definition of the spread. One important implication of this correlation is that any change that causes an increase in spread, for instance, will be much more the result of higher interest rates on loans than of lower interest rates on deposits. In fact, and as shown in Table 3, while the loan rate (i_{L2}) correlates positively with its associated spread, the interest rate on deposits (i_{B2}), associated with spread S_2 , does not show the expected negative correlation.⁸

Obviously, the progressive increase of the interest rate spread and its subsequent resistance to decline pose large questions. Has this upward trend been the result of the exercise of market power, little competition, and serious costs inefficiencies or is it simply the result of hedging against the increasing risk assumed by the banks?

⁸ Brock and Rojas Suarez (2000) suggest that the absence of high and negative correlation between spreads and interest rates on deposits may be related to the fact that financial liberalization has allowed the domestic residents of many Latin American countries to diversify their portfolios internationally. In contrast, businesses and families have not gained full access to international capital markets.

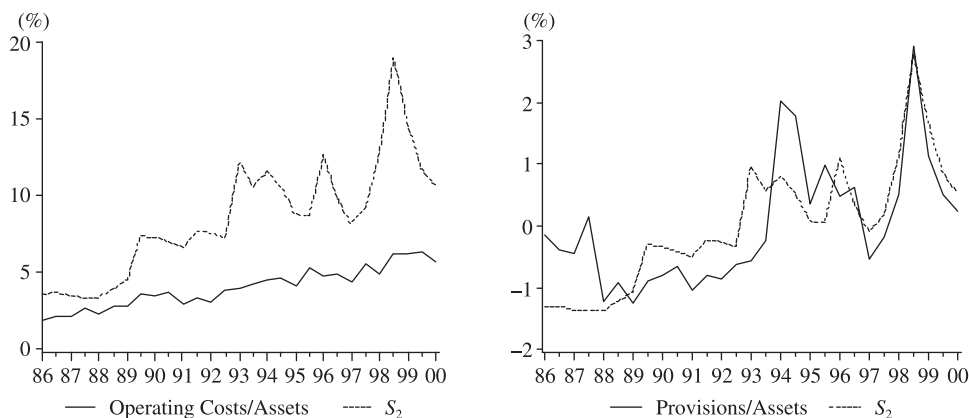
Fig. 2. Hirschman-Herfindahl (HHI) and C4 Concentration Indexes of Commercial and Universal Banks, 1986:1–2000:1



As shown further on, the high number of variables affecting the spread may come down to elements having to do with profitability and market power in the industry, with costs, and with the risks that the banks must face. A glance at the behavior of certain financial variables may help to evaluate some postulates.

Typically, market power issues and pessimism about competition lead many analysts to suggest that high correlation between measures of concentration and profitability can be taken as the simplest approximation to how the structure of the market influences performance. Nevertheless, it is fair to say that in banking markets this relationship has been called into question on theoretical and empirical grounds (see Berger and Humphrey 1992). The concentration levels of commercial banks in Venezuela, measured by the C4 index and the Herfindahl-Hirschman index for the period from 1986 to June 2000, reflects a lot of stability (and very slight changes) and a permanent downward trend since the financial crisis broke out in 1994 (see Figure 2).⁹

⁹ The C4 index is calculated simply as the sum of the assets market share of the four major banks. The Herfindahl-Hirschman index is a convex function of each bank's market share, calculated as $HHI = \sum_{i=1}^n (m_i)^2$, where m_i represents the participation of each bank's assets over the system's total assets. From the US regulatory standpoint, the industry is considered to be non-concentrated when the index is below 1,000, moderately concentrated in a range of 1,000–1,800, and highly concentrated over 1,800. The sample includes not only all the banks in existence since the 1994–95 crisis but also at least five banks that disappeared after the financial crisis (they are Banco Latino, Occidente, Popular, Fivenez, and Orinoco).

Fig. 3. Operating Costs, Behavior of Provisions, and Spread S_2 , 1986:1–2000:1

Indeed, the Herfindahl index falls from 1,040 in the second semester of 1994 to 800 in 2000. Conversely, as we have reported above, different measures of the interest rate spread show unambiguously an increasing trend after 1994. It is very clear then, that if there were any relationship between market power and the spread, the industry's concentration would be a very poor indicator. Moreover, it should be noted the ease of entry restrictions that allowed the presence of foreign banks (since the new Bank Law was passed in 1994) and events, such as the transition from a system of financial repression to one of liberalization (since the late 1980s) and the restructuring that took place after the financial crisis, have helped new actors to enter the banking business, providing expectations of more intense competition.¹⁰

Focusing on the period of 1986–2000, Figure 3 shows at least two important indicators that we have found to be statistically related to interest rate spreads: the ratio of operating costs to total assets and the ratio of expenditures for loan loss provisions to total assets (here the series are normalized). This latter statistic would measure the perceived changes in loan quality and risk.¹¹ While these associations do not imply

¹⁰ Indeed, the share of foreign bank assets to total bank assets in Venezuela increased from 1% before 1995 to 38.7% in 2000. Whether this increasing foreign bank presence is associated with rising competition and greater efficiency in domestic banking markets is an issue that goes beyond the extent of this work.

¹¹ Indeed, the financial system's portfolio quality can be measured in different ways. An approximate and very common form is by constructing some index of the proportion of nonperforming loans. Unfortunately, a measure of nonperforming loans for the Venezuelan financial system is only available since 1992. In such cases, the proportion of expenditures for loan loss provisions divided by total assets is commonly used as a measure of portfolio quality. We should be aware, however, that this latter indicator may also reflect changes in provisioning regulations.

a systematic or causal relation between the variables, in theory this is plausible. With reference to costs, Figure 3 indeed shows a close correlation between the ex-post measures of the spread and the operating costs as a proportion of the average level of total assets, but we should note that since 1992 and 1993, the spread begins to distance itself from the operating costs ratio, which seems to make room for other explanatory factors. With reference to loan loss provisions, the correlation could support the notion that the spread is a sign of high portfolio risk and that an increasing spread might simply indicate increasing risk and a strategy of hedging against it.

III. THE MODEL

The accounting identities and the decomposition of ex-post interest spreads into its constituent parts may be useful; however, to explain mechanisms and to find out the main determinants at work, we require modeling techniques that make it possible to contrast the basic theoretical propositions empirically and to settle paramount aspects of policies.

Three fundamental frameworks have been used to study the determinants of interest rate spreads. One relies very much on ad hoc determinants or variables that are expected a priori to have an effect on the spread but with not much behavioral content. Under this approach, the determinants may include a wide set of bank characteristics (such as size, leverage, costs, loan quality, ownership), macro indicators, taxation, and regulatory variables, and legal and institutional indicators. This approach is followed, for instance, by Fuentes and Basch's (1998) panel study of the Chilean economy covering the period from August 1991 to December 1995, by the study of Requena *et al.* (1998) for the financial sector in Bolivia, and by Demirguc-Kunt and Huizinga's (1999) panel study of 80 countries during the 1988–95 period. The empirical results under this heading are difficult to summarize and the theoretical links are sometimes not well-established. A second framework is the one based on the so-called dealership model (originally advanced and tested by Ho and Saunders 1981). It assumes that the role of banks is to provide liquidity to the market, provision that by its own nature implies holding a position (either long if it grants too many loans or short if it takes too many deposits). Banks will demand a positive interest spread as the price of providing immediacy of service in the face of the (transactions) uncertainty generated by asynchronous deposit supplies and loan demands. This dealership model has been further developed by Allen (1988) and estimated for the United States by Angbazo (1996), for Australia by McShane and Sharpe (1985), for six selected European countries and the United States by Saunders and Schumacher (2000), and for a group of five Latin American countries by Brock and Rojas Suarez (2000). Usually, spreads are empirically explained by a two-step procedure: a first step where a regression of bank spreads is run for a cross section of banks on bank-specific variables, and a second step, where the constant term of

these regressions is regressed against macro variables, mainly an index of interest rate volatility. Unfortunately, this framework does not adequately incorporate the role of competitiveness since it considers banking to be only a trading activity.¹² An alternative theoretical framework relies on the industrial organization literature and utilizes models that treat banks as microeconomic decision intermediation agents that use inputs to acquire deposits, and then, use inputs and deposits to generate assets. The assumption of profit-maximizing behavior leads to empirical estimations in which market power may be tested explicitly. Even though this framework is not rich enough in terms of how macroeconomic variables affect the spread, the link is not entirely missed since the consequences of macroeconomic conditions are sometimes contained in bank-specific variables. Moreover, the approach also provides a method for assessing the impact of marginal changes of cost efficiency, portfolio risk, and a government's regulatory action. This approach was initially followed by Shaffer (1989, 1993) for the US and Canadian banking industries and Hannan and Liang (1993) for the US deposit market, but recent applications and fertile grounds have been found in the less industrialized economies of Latin America.¹³ The industrial organization approach allows us to discuss aspects related to efficiency, market power, risk analysis, and a government's regulatory action on the banking business.

We use Bresnahan's approach (1982), as developed for banking by Shaffer (1989, 1993), with some variations introduced by Barajas, Steiner, and Salazar (1999). The starting point is a representative bank, j , whose output, namely, loans (L_j), is obtained from two kinds of inputs: deposits or financial inputs (D_j), and nonfinancial inputs. In addition to loans on the asset side, the bank is also required to hold a certain amount of reserves (R_j) with the monetary authority. Banks' assets are then loans and reserves and their liabilities are the deposits and other nonfinancial obligations (ONF_j).

Given a required reserves coefficient (r_j), such that:

$$r_j = \frac{R_j}{D_j},$$

the balance condition should be fulfilled for each bank. That is:

$$L_j - D_j(1 - r_j) - ONF_j = 0. \quad (5)$$

¹² As Lerner (1981) has pointed out, there is a production function in banking that concerns itself with purchasing power and transforming it into a loan. By considering banking to be only a trading activity, the insights that arrive after recognizing that a production function exists may be lost.

¹³ See, for instance, the studies for places such as Uruguay (Spiller and Favaro 1984), Argentina (Catao 1998), Colombia (Barajas, Steiner, and Salazar 1999), Brazil (Nakane 2001), and Mexico (Gruben and McComb 2003). Randall (1998) uses the same approach to investigate the impact of financial reforms on interest rate spreads in six countries in the Eastern Caribbean region and Moore and Craigwell (2002) uses it in a sample of ten Caribbean countries.

Again, each bank receives income from the granted loans ($i_L L_j$) and pays interest on the received deposits ($i_B D_j$).

Likewise, each bank runs up costs (C_j) of the real inputs required for their intermediation and operations. These costs vary according to the scale of operations or the output level (L_j), the operating costs (OC), and a vector of other variables that affect the marginal nonfinancial cost (x). Consequently, the profits of a bank, $j(P_j)$, can be represented by:

$$P_j = i_L L_j - i_B D_j - C_j(L_j, OC, x). \quad (6)$$

Assuming no uncertainty and that the banks have to choose only the stock of loans they grant in order to maximize their profits, the behavior of the representative bank is determined by solving the problem of maximizing P_j :

$$\text{Max}_{L_j} P_j = i_L L_j - i_B D_j - C_j(L_j, OC, x).$$

The first order condition for this maximization problem is:

$$\frac{\partial P_j}{\partial L_j} = i_L + L_j \frac{\partial i_L}{\partial L_j} - i_B \frac{\partial D_j}{\partial L_j} - D_j \frac{\partial i_B}{\partial L_j} - C_{L_j} = 0. \quad (7)$$

Note that according to the balance equation (5), the partial derivative $\partial D_j / \partial L_j$ is determined by the required reserves coefficient. That is, the growth of credit is restricted by the amount of the reserves the banks must maintain: $\partial L_j = (1 - r_j) \partial D_j$. Therefore,

$$\frac{\partial D_j}{\partial L_j} = \frac{1}{1 - r_j}. \quad (8)$$

In addition, the value of $\partial i_L / \partial L_j$ and of $\partial i_B / \partial L_j$ will be determined by the degree of market power, as, in perfect competition, individual bank output will have no effect on prices.

Equation (7) can be transformed into a regression equation explaining either the interest rate charge on loans or the spread between the lending and deposit rate. The precise specification of such an equation will depend on the set of assumptions regarding costs function and the markets for deposits and loans.

Transforming equation (7) so that the elasticities with respect to the interest rates of the demand for loans ($\eta_L = (\partial L / \partial i_L)(i_L / L) < 0$) and of the demand for deposits ($\eta_B = (\partial D / \partial i_B)(i_B / D) > 0$) can be introduced, and substituting equation (8) into equation (7), we obtain the following expression:

$$i_L + i_L \left(\frac{L_j}{L} \frac{\partial L}{\partial L_j} \frac{1}{\eta_L} \right) = \frac{i_B}{1 - r} + i_B \left(\frac{D_j}{D} \frac{\partial D}{\partial D_j} \frac{1}{\eta_B} \right) + C_{L_j}. \quad (9)$$

Now, we can define $SL_j (= L_j/L)$ and $SD_j (= D_j/D)$ as the share of bank j in the market of loans and of deposits respectively, and we may consider that $GR_L (= \partial L/\partial L_j)$ and $GR_B (= \partial D/\partial D_j)$ represent the degree to which the supply of loans and the stock of deposits respond to changes in the loans and deposits of bank j . Consequently, equation (9) may be expressed as:

$$i_L \left(1 + \frac{SL_j GR_L}{\eta_L} \right) = \frac{i_B}{1 - r_j} \left(1 + \frac{SD_j GR_B}{\eta_B} \right) + C_L. \quad (10)$$

By naming the terms $(1 + SL_j GR_L/\eta_L)$ and $(1 + SD_j GR_B/\eta_B)$ as H_L and H_B , eliminating subindex j for simplification purposes, and isolating the lending rate on the left-hand side, equation (10) may be rearranged as:

$$i_L = i_B \left(\frac{1}{1 - r} \right) \left(\frac{H_B}{H_L} \right) + C_L \frac{1}{H_L}. \quad (11)$$

Here, H_L and H_B are indicators of market power in each of the two markets (for loans and deposits, respectively). Given the restrictions of sign associated to the interest rate on loans and interest rate on deposits elasticities, the ranges of acceptable values for market power indicators would be:

$$\begin{aligned} H_B &\geq 1, \\ H_L &\leq 1. \end{aligned}$$

It can be proved that if perfect competition prevails in both markets, the coefficient (H_B/H_L) will be equal to unity.¹⁴ In this case, the optimal interest rate on loans should equal the nonfinancial marginal costs plus the financial costs, that is:

$$i_L = C_L + i_B \left(\frac{1}{1 - r} \right). \quad (12)$$

If there is evidence of simultaneous market power, this coefficient will tend to be higher than 1 (Barajas, Steiner, and Salazar 1999).

Equation (11) therefore shows the interest rate on loans that maximize the profits of a representative bank j in terms of the interest rate on deposits adjusted for the rate of financial taxation, the degree of market power, and the nonfinancial marginal costs of producing loans. For the purpose of deriving a single equation that can be econometrically estimated, it may be assumed that the marginal cost (C_L) is a linear

¹⁴ In the case of perfect competition, the second components of terms H_L and H_B will be null. It is assumed that in a competitive market, each bank's participation in both the loans and the deposits markets is sufficiently small so that these markets are not affected by the changes the individual banks induce.

function of the production scale (L), the operating costs (OC), and other factors that may affect the level of risk (x).¹⁵ That is:

$$C_L = a_0 + a_1L + a_2OC + a_3x.$$

Consequently, equation (11) can be written as:

$$i_L = \left(\frac{H_B}{H_L} \right) \left(\frac{i_B}{1-r} \right) + \frac{(a_0 + a_1L + a_2OC + a_3x)}{H_L}. \quad (13)$$

If we define

$$b_0 = \frac{a_0}{H_L}; b_1 = \frac{a_1}{H_L}; b_2 = \frac{a_2}{H_L}; b_3 = \frac{a_3}{H_L}; b_4 = \frac{H_B}{H_L},$$

equation (13) becomes capable of being estimated as:

$$i_L = b_0 + b_1L + b_2OC + b_3x + b_4 \left(\frac{i_B}{1-r} \right). \quad (14)$$

Again, if there is perfect competition in both markets, the estimated value for b_4 would be equal to 1. In the case of there being market power in both or at least in one market, the value of b_4 would be larger than 1. Now, from a strictly algebraic viewpoint, b_4 could be a negative value if the elasticity related to the interest rate of loans was extremely low and the representative bank's participation in the market was extremely small. This could generate a situation that prevents the exercise of market power. For this reason, an additional restriction is established whereby the market power indicator, coefficient b_4 , must also yield a strictly positive value. In summary, the acceptable range of values for b_4 would be $b_4 \geq 1$.

A common resort in estimating this type of model is to assume that perfect competition predominates in one of the markets, generally the deposits market.¹⁶ Consequently, the estimate of equation (14) validates the hypothesis of imperfection in the remaining market ($b_4 = 1/H_L$).

From an econometric viewpoint, the price of the deposits is an exogenous variable for the banks under two possible circumstances: when the interest rate on deposits is regulated by the monetary authority and when banks must compete for depositor funds. It should be noted that to assume that banks behave as price takers in the deposits market does not disqualify the eventual results of the estimate. It can be

¹⁵ We insist that this assumption of linearity does not propose that the returns to scale are constant. Constant returns to scale would require in addition that $a_1 = \partial C_L / \partial L$ assumes a null value.

¹⁶ This assumption neither contradicts the evidence presented by Brock and Rojas Suarez (2000) for six Latin American countries, nor the sign and magnitude of the correlations in Table 3.

proved that, if the banks have market power with respect to the deposits, the b_4 specification underestimates its value; therefore, finding a competitive behavior turns out to require a much more demanding test (Shaffer 1993). In this sense, inferring the market power of banks by means of the b_4 coefficient provides a strong test, whether the market is regulated or not.

IV. DATA AND ESTIMATIONS

The stochastic representation of equation (14) is the basis of the econometric estimation for both the aggregate of all banks of the Venezuelan financial system and for pool regressions in a subset of 24 individual banks. All of the data used in the estimations come from the consolidated balance sheets and income statements of the commercial banks reported to SUDEBAN. The database is semiannual and covers the period from 1986 to the first half of 2000. This implies a total of 29 observations for the aggregate model and 618 observations for the panel data regressions.

For the case of the interest rates on loans and deposits appearing in the operationalization of equation (14), the definition of spread S_2 has been used. The implicit rate on deposits has been adjusted for the observed coefficient of reserves maintained by the banks in the Central Bank. The scale variable (RL) in real terms was calculated as the average semiannual stock of loans (L) deflated by the Wholesale Price Index with 1984 as the base year. This is the only variable used in the levels and measured in trillions of bolivares. We include the nonfinancial costs variable (OC) as the ratio of operating costs (including the wage bill) to the total average value of assets. Finally, to incorporate the possible effects of changes in loan quality and risk, the variable ($PROV$) was calculated as the ratio of expenditures for loan loss provisions to total assets. All variables expressed as a proportion of total assets, as well as the implicit interest rates on loans and deposits, were annualized.

The possibility of finding spurious regressions led us to look at the stationarity of the series for the aggregate financial system and individual banks. Applying the augmented Dickey-Fuller (ADF) and the Phillips-Perron unit root tests, we find that all variables are integrated of the order of one. However, a cointegrating relationship was verified following Engle and Granger's (1987) two-step procedure.¹⁷ This indicates that inference about the parameters, separately or jointly, can proceed in standard fashion.

The single equation estimation for the aggregate banking system faces a typical problem of endogeneity. Indeed, the direct relationship between the interest rate on loans and the real loans (RL) may indicate that in order to overcome the correlation

¹⁷ Estimates were made with RATS (version 5) and for the group of individual banks with Eviews (version 5.1).

TABLE 4
Aggregate Estimation

$$i_{L,t} = b_0 + B_1L_t + B_2OC_{1t} + B_3PROV_t + b_4[i_{B,t}/(1 - r_t)] + u_t$$

Variable	Instrumental Variable (1987:1–2000:1)	Generalized Method of Moments (1987:1–2000:1)
Constant term	–0.189700 (–2.99)**	–0.210600 (–4.30)**
Real loans	0.000815 (1.82)*	0.000938 (2.71)**
Operating cost	2.859000 (7.14)**	2.928600 (9.85)**
Provisions	1.962900 (2.23)*	2.179900 (2.00)*
Deposit rate $[i_B/(1 - r)]$	1.185400 (19.81)**	1.200800 (24.79)**
R^2	0.960000	0.960000

- Notes: 1. Instrumental variable estimation. Autocorrelation tests: Durbin-Watson = 1.53; Ljung-Box Q-statistics: Q(1) = 1.2919, significance level = 0.26; Q(2) = 2.2578, significance level = 0.32; LM Test: Order 1 = 2.925, significance level = 0.09; Order 2 = 3.547, significance level = 0.17; Engle heteroscedasticity test: $\chi^2(1) = 1.08$, significance level = 0.55; Bera-Jarque normality test: $\chi^2(2) = 1.212$, significance level = 0.55; F test for $b_4 = 1$: $F(1,22) = 9.61$, significance level = 0.005; Hansen test for optimal W : $u'ZwZ'u = 3.89$, significance level = 0.57; Wald test for $b_4 = 1$: $\chi^2(1) = 17.19$, significance level = 0.000.
2. Generalized method of moments estimation. The ADF-type unit root test on the residuals shows variables tied to a stationary process.
3. The t -statistics are shown in parentheses.

** and * represent statistical significance at the 1% and 5% level, respectively.

problem between an independent variable and the error term, it might be more appropriate to use an instrumental-variables estimation instead of using OLS.¹⁸

Table 4 shows both the results of the instrumental-variables estimation and Generalized Method of Moments (GMM) estimation.¹⁹ The fit of both regressions is relatively close. Diagnostic testing is reported for the GMM estimation. All the coefficients have the expected sign, serial correlation of the error term up to two lags is ruled out, there is no evidence of autoregressive conditional heteroscedasticity, and the residuals seem to be normally distributed as indicated by the Jarque-Bera test.

¹⁸ We have used as instruments the deterministic variables of the estimation along with the total level of deposits and real GDP with different lags.

¹⁹ The GMM estimator is a nonlinear instrumental-variables estimator developed by Hansen (1982) that ensures consistent parameter estimates under a wide variety of conditions and that does not require the assumption of normality.

TABLE 5
Pooled Regression Using Generalized Instrumental Variable Estimation

Variable	$i_{Lit} = b_0 + b_1RL_{it} + b_2OC_{it} + b_3PROV_{it} + b_4\left(\frac{i_{Bit}}{1-r_{it}}\right) + u_{it}$			
	Coefficient	Standard Error	<i>t</i> -statistic	Probability
<i>C</i>	0.041492	0.007183	5.776136	0.0000
<i>RL_{it}</i>	-0.010405	0.000735	-14.156660	0.0000
<i>OC_{it}</i>	1.917607	0.046732	41.034350	0.0000
<i>PROV_{it}</i>	0.390331	0.062105	6.285008	0.0000
<i>i_{Bit}/(1 - r_{it})</i>	1.154495	0.015635	73.841200	0.0000
<i>R</i> ²	0.960000			
S.E. of regression	0.920000			

- Notes: 1. Total pooled (unbalanced) observations: 620.
 2. The Durbin-Watson (1.7190) statistic shows that there is no autocorrelation of order greater than 1.
 3. The *F*-test for $b_4 = 1$: $F(1,615) = 88.15188$, which rejects the null hypothesis at the 1% significance level.

The stochastic version of equation (14) was also used in the form of a simple pooled regression for 24 banks and 29 observations per bank for the time period that goes from the first semester of 1986 to the first semester of 2000. The data used for the estimation come from the consolidated income statements and balance sheets of 49 banks, from which only banks with at least 15 observations were selected, that is, 24 banks.²⁰ In this type of estimation, the approach is always on centralizing the observations to their average, that is, the individual information was used to estimate the parameters on average without distinguishing between banks. Formally,

$$i_{Lit} = b_0 + b_1L_{it} + b_2OC_{it} + b_3PROV_{it} + b_4\left(\frac{i_{Bit}}{1-r_{it}}\right) + u_{it}. \quad (15)$$

Equation (15) was estimated with the same operationalization of the variables used in the models with aggregate data for the system as a whole. For the panel of individual banks, panel-based unit root tests were also applied. Both the Levin, Lin, and Chu test and the Im, Pesaran, and Shin test reject the null of a unit root. To deal with the problem of variables that can be correlated with the residuals, we estimate the equation using instrumental variables as well. Additionally, we correct for both cross-section heteroscedasticity and contemporaneous correlation. As shown in Table 5, using a Generalized Instrumental Variable Estimation, the results of this

²⁰ This was not the case of the Banco Industrial de Venezuela, the largest public bank in Venezuela, which, in spite of having 15 or more observations, was not considered to be due to its excessively atypical performance.

TABLE 6
Descriptive Statistics of the Parameters in the Estimations for Each Individual Bank

Variable	$i_{iL} = b_{i0} + b_{i1}L_{it} + b_{i2}GT_{it} + b_{i3}x_{it} + b_{i4}\left(\frac{i_{Bit}}{1 - r_{it}}\right) + u_{it}$		
	Operating Cost	Provisions	Deposit Rate ($i_B/[1 - r]$)
Mean	2.54	1.99	1.68
Median	2.43	2.05	1.47
Standard deviation	1.42	0.68	1.13
Variation coefficient	0.56	0.34	0.68
Range	6.19	2.12	6.05
Number of individuals	19	11	24

estimation show no large differences compared to the results of the total aggregate financial system.

An estimation for each individual bank can equally be made with the same group of data, considering the correlation between the banks in the form of a weighting of the estimated variance-covariance matrix. For that purpose, we use the Seemingly Unrelated Regression (SUR) of Zellner (1962). In that case, the equation to be estimated would be as follows:²¹

$$i_{iL} = b_{i0} + b_{i1}L_{it} + b_{i2}OC_{it} + b_{i3}PROV_{it} + b_{i4}\left(\frac{i_{Bit}}{1 - r_{it}}\right) + u_{it}. \quad (16)$$

In our case, for analytical purposes we are more interested in a description of the distribution of the parameters, than in the results of individual banks.²² It is interesting to note that a Wald test verifies that the coefficients b_{ij} ($i = 1, \dots, 4; j = 1, \dots, 24$) for each individual bank are, in fact, different. The distribution of parameters described in Table 6 only takes into account those values that are significantly different from zero and have the correct sign.²³ The parameters of the variable RL are not reported since they must exhibit a lot of variability given the fact that real loans are measured in levels. From Table 6, it is clear that for all variables the parameters show little variability across individual banks.

The fact that we have estimated the same model specification using different estimators calls for a comparison of the value of the parameters that result from these

²¹ An estimation using instrumental variables in the panel approach causes a deterioration of the obtained results and indicates that adequate instruments have to be found for each bank if the problem of the endogeneity of loans is to be avoided. For reasons of comparing the estimates with the global approach, we have not made this special selection.

²² The results of the regressions for each bank are available upon request to the authors.

²³ See details in the following section.

TABLE 7
Calculation of the Structural Parameters (*a*)

$$b_0 = \frac{a_0}{H_L}; b_1 = \frac{a_1}{H_L}; b_2 = \frac{a_2}{H_L}; b_3 = \frac{a_3}{H_L}; b_4 = \frac{H_B}{H_L}$$

Variable	Instrumental Variable	Generalized Method of Moments	Pooled Regression
H_L	0.843600	0.832770	0.71900
a_0	-0.160000	-0.175300	0.01906
a_1	0.000687	0.000781	-0.00442
a_2	2.411700	2.438870	1.30398
a_3	1.655800	1.815370	0.24919

different estimation techniques. To give this comparison an economic sense, the term H_L should be identified and the value of the a parameters should be determined on the basis of the estimated values for the b parameters. Table 7 shows the value of H_L and of the a parameters for the four estimation techniques used here. In terms of parameter values and signs, the results are remarkably similar.

V. INTERPRETATION OF RESULTS

As shown in Tables 6 and 7, both the aggregate system estimation and the pooled regression yield unambiguous evidence of imperfection in the market for loans. The value of the parameter measuring the degree of market power obtained in the pooled regression (1.39) is similar to that of the aggregate model (1.20). Calculations of a Wald test for the hypothesis of perfect competition indicate that the market power parameter b_4 is significantly greater than unity. Indeed, assuming pure competition in the deposits market, the estimated indicator H_L (market power in the loans market) has the expected sign and yields a value significantly smaller than one independently of the estimation method (see Table 7). It should be further mentioned that the value obtained for this parameter varies very little within a narrow range (between 0.72 and 0.84). Such values, while indicating that the banks exercised market power and therefore obtained higher revenues than would be expected in a perfectly competitive market, are however far from being considered as indicators of monopoly or of collusive behavior.²⁴ They may allude rather to situations of oligopolistic rivalry or

²⁴ In the case of monopoly or collusive solution, the value of parameter H_L would be close to zero, which implies that the value of parameter b_4 would tend to infinite. Indeed, the value obtained for H_L in the estimations is significantly different from zero.

monopolistic competition in which close substitutes, rivalry, and non-price competition prevail.

The coefficient of the index of economies of scales b_1 is statistically significant at the 1% level in the GMM estimation and at the 10% level in the instrumental variables estimation. Its value is positive, suggesting the inexistence of economies of scale in production.²⁵ Again, the parameter has a considerably low value (approaching a situation of constant returns to scale). This result should not be surprising in a system whose market has squeezed steadily in the past decade after having expanded substantially in the 1970s and most of the 1980s. Consequently, the result may rather reflect a (probably lagging) adjustment of the installed capacity to a smaller market. Alternatively, Randall (1998) suggests that empirical findings of diseconomies of scale in behavioral models can be reconciled with the idea that policies and events that constrain the market size of efficient banks prevent these banks from expanding their operations and for tracing out their long-run average cost curve. Therefore, even remaining in the region of the long-run average cost curve where they can benefit from economies of scale, banks could be operating in the inefficient region of their short-run average cost curve.

Loan loss provisions as a portion of total assets, an ex ante proxy for bank portfolio risk, is a significant factor contributing to the widening of interest spreads, indicating that banks may have had to commit additional resources to deal with changes in loan quality which, in turn, are associated with the perception of portfolio risk. The significance of loan loss provisions could also signal a heightened awareness on the part of bank managers regarding insufficiencies of deposit insurance, especially after the 1994–95 financial crises. Finally, the value and significance of this variable could also reflect the effects of changed regulations that have forced the banks to increase provisions.

The results also show that administrative and operating costs, besides having the expected positive sign, are important reasons for high interest rate spreads in Venezuela. It has been shown that in high inflation countries banks tend to develop an extensive network of local branches aimed at reducing the high transaction costs in these economies (see Revell 1981; Hanson and Rocha 1986). Much of this happened in Venezuela during the late 1980s and early 1990s. With a drop in inflation following the exchange rate–based stabilization of the mid-1990s, and still experiencing a high contraction in the market for loans, part of this network may have become redundant. High operating costs, however, do not necessarily mean growing inefficiencies. They could be the result of non-price competition (generating new products and services and improving quality), intense competition for market share or particular

²⁵ In the pooled regression estimation, the scale coefficient yielded a negative value, although relatively small. The difference with the results for the aggregate system is explained by the different composition of the sample used in the pooled data.

accounting practises, where investments in intangible technological innovations are added to expenditures. A more exact interpretation of what happens with operating costs certainly requires careful analysis beyond the scope and aims of this study.

The results of the SUR estimation for individual banks show some important regularities and do not differ significantly for the ones obtained with the previous estimators. The parameter b_4 exhibits the correct sign in all the 24 banks contained in the sample and its average value of 1.68 (> 1) confirms the hypothesis of market power in the market for loans. The parameter that measures the sensitivity of spreads to operating costs (b_2) is significant and has the correct sign in 19 of the sample's 24 banks. In four banks, it was not significant and in one bank it was significant but its sign was unexpected. In fact, the b_2 average value was 2.54 (with a standard deviation of 1.42), quite close to the estimated value in the model for the aggregate system (2.93). The parameter measuring the response to changes in the perceived portfolio risk (b_3) was significant and with the expected sign in 11 out of the 24 banks. Its average value, considered only where it was significantly different from zero, was estimated at 2.12 with a standard deviation of only 0.68. This also is similar to the result obtained in the aggregate model (2.18).

VI. PROFITABILITY AND CAPITALIZATION

As we discussed in the introduction, high intermediation spreads may constitute a key mechanism through which the banking system generates profits and thereby protects itself against portfolio risk. To cushion themselves against expected and unexpected risk, banks often hold more capital. But for developing countries where equity markets are usually underdeveloped, profits become the only means that aids in strengthening the capital base. Consequently, it is very possible that efficiency losses derived from the deviation of price from cost and higher profits in the banking industry can meet solvency and stability considerations from a social welfare perspective.

Using the same source of data for the same period, we measure the ratio of profit (after taxes) over average total assets and the capital/asset ratio. Figure 4 shows the above-mentioned ratios (after the series were normalized to a mean of 0 and a standard deviation of 1). S_1 is the measure of spread used, being the spread definition with the highest correlation with the profit/asset and the capital/asset ratios. We may observe a similar evolution and strong association between the spread and the system's capitalization index (with correlation coefficients above 0.7 in both cases). The rising capital/asset ratio shown since 1994 in Figure 4 should not come as a surprise if we consider that until then, the 1988 Banking Law established regulatory capital amounts in nominal terms (and not as a proportion of assets). But with the new 1994 Banking Law, the proportion adjusted for risk stood at 8%, in accordance with the Basel agreements, and this, in an already low capitalized system leaving financial turmoil, demanded an increasing effort to build up capital.

Fig. 4. Profit/Asset Ratio, Capital/Asset Ratio, and Spread S_1 , 1986:1–2000:1

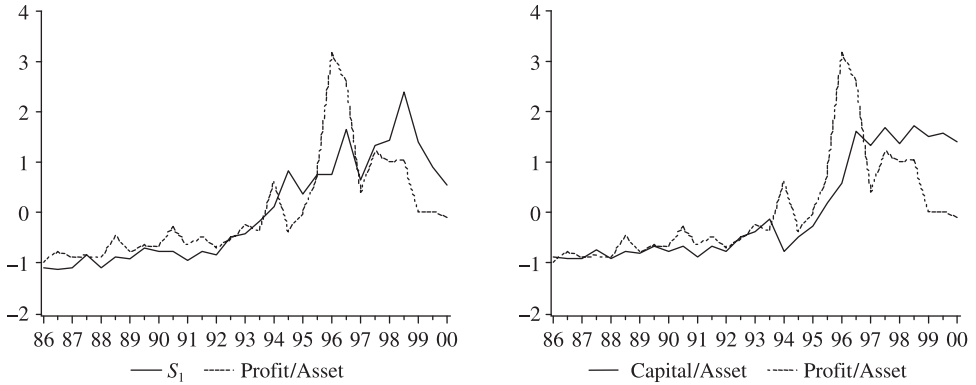


TABLE 8

Granger Causality Test: Spread, Profitability, and Capitalization (1986:1–2000:1)

Null Hypothesis	Observations	Lags	F-statistic	Probability
Capital/asset ratio does not cause profitability	28	1	0.1351	0.7162
Capital/asset ratio does not cause profitability	27	2	0.1296	0.8079
Capital/asset ratio does not cause profitability	26	3	0.7010	0.4103
Profitability does not cause capital/asset ratio	28	1	7.9064	0.0094
Profitability does not cause capital/asset ratio	27	2	7.4676	0.0033
Profitability does not cause capital/asset ratio	26	3	2.8464	0.0649
Spread S_1 does not cause capital/asset ratio	28	1	1.7118	0.2026
Spread S_1 does not cause capital/asset ratio	27	2	4.2539	0.0274
Spread S_1 does not cause capital/asset ratio	26	3	2.6408	0.0789
Capital/asset ratio does not cause spread S_1	28	1	0.0300	0.8637
Capital/asset ratio does not cause spread S_1	27	2	2.3408	0.1197
Capital/asset ratio does not cause spread S_1	26	3	4.7701	0.0121

Some possible evidence that a large part of the spread and profit has been directed toward the financial system’s capital base may be inferred by looking at the result of Granger causality tests for pairs of the series. Table 8 shows the result of causality tests for the semiannual series of spread S_1 and the capital/asset ratio, and of the latter with the profit/asset ratio. Profitability causes the capital/asset ratio in the Granger sense, even after two lags. The null hypothesis that the capital/asset ratio does not cause profit cannot be rejected in this case. Moreover, the spread precedes the capitalization index but this does not cause the spread, even with two lags.²⁶

²⁶ The test with three lags for these two latter variables shows bidirectional causality.

VII. CONCLUSIONS

We have endeavored here to discuss and evaluate the evolution and determinants of interest rate spreads in Venezuela. While the spread may be the result of market inefficiencies inherent to the financial system, specialists would not be surprised that under certain circumstances, high spreads could help to strengthen or maintain the solvency of banking institutions; such is the case when spreads are used to capitalize the system and mitigate the risk. This is a puzzle that has important implications for the interpretation of our empirical results.

Our preliminary presentation of the stylized facts indicates that bank-specific variables, such as operating costs and provisions for loan losses, are strongly associated with high spreads, indicating that elements related to the degree of competition must be complemented with others connected to costs behavior and risk. We also show that it is not easy to infer the influence of market power on spread behavior based on structural measures, such as concentration and entry barriers. Instead, we have used a simple behavioral model for the banking firm that fits very well with these simple facts. The model is inspired by the industrial organization literature and is estimated using semiannual aggregate data for the period 1986–2000 and panel data on 24 banks for the same period. Somehow, the results indicate that the financial spread in Venezuela is the result of a complex array of variables, combining sources of costs, of risk, and market power. These results stand up not only when using aggregate data for the system as a whole but also using individual data for each bank.

The evidence of market power in the financial system is not an unexpected result. There are entry barriers (beyond economies of scale) associated with capital requirements, technology, and regulatory provisions that distance the financial markets from the ideal conditions of pure competition. But this evidence of market imperfections requires better characterization of the market's specific structure and an exploration of the way prices form in this sector. Furthermore, high and rising operating costs may be explained by nominal frictions and adjustment lags after the dramatic fall of credit activity and redundant network after a relatively successful inflation stabilization effort since the mid-1990s. The impact of loan loss provisions on the spread is not striking in an economy subject to high macroeconomic volatility and excessive risk. This suggests that the spread has been used as an instrument to solve banks' deep aversion to risk, insufficiencies of deposits insurance or to accomplish regulations directed toward maintaining certain levels of solvency.

To some extent, our empirical findings for the case of Venezuela supports the notion that market power and the high levels of profitability that derived from it perhaps have been used to increase the capital/asset ratio of the system. Interestingly, the capital/asset ratio correlates very well with profitability and the spread. Granger causality tests also show causality running from the spread and profitability toward

the degree of capitalization. Indeed, it may be the case of a country with a low level of development in capital markets and a high risk in financial markets, where high spreads (and market power) may serve as the mechanisms through which high bank earnings are channeled into the capital base of the system (to aid in strengthening solvency).

Without doubt, the evidence derived from our empirical analysis is limited in scope. Indeed, the empirical model is restricted to the specifications imposed by the theoretical model. A model that includes other, especially macroeconomic, variables would be richer, but at the expense of theoretical rigor. However, it is a needed extension to this paper.

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