BANK RISK FUNDAMENTALS AND REGULATORY DISCIPLINE IN THE MEXICAN BANKING SECTOR

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ABSTRACT

The 1994 Mexican banking crisis led to wholesale changes in the deposit insurance fund in the country's banking system. Poor lending decisions allowed banks to transfer risk to the fund, resulting in their capturing returns on performing loans, while limiting downside exposure when the fund covered losses on non-performing loans. Through a series of programs, the Mexican banking system now uses performance bonds in concert with the insurance fund. The bonds adjust in price based on the level of risk, and purport to measure the level of safety for the fund. We measure the effect of regulator actions by monitoring performance bond price levels over a 104-month period. Key bank ratios in the areas of liquidity, profitability, activity, and leverage were collected on the largest seven national banks, which control 87% of the capital in the banking system. Through a regression analysis, effects of these bank indicators demonstrate that, while not all are useful for predicting risk reduction and safety net viability, overall the banking regulators have incentivized lending institutions to reduce the occurrence of risk-shifting. This has led to a more stable banking system, and a more effective safety net for deposits.

JEL: F34; G15; G18, G28

KEYWORDS: Mexican banking system, Financial safety net, Deposit Insurance Fund, FOBAPROA, FONAPRE, IPAB, BPA

INTRODUCTION

More than a decade has passed since the Mexican Tequila Crisis came to an end. At that time the banking sector experienced a fiscal shock that caused major trouble throughout the financial system. The existing safety net, the Banking Fund for the Protection of Savings (FOBAPROA), was depleted by the crisis. Unemployment and business bankruptcies increased the loan default rate to unsustainable levels. Many high-risk personal and business loans were made leading up to the crisis; some have related this to a weak system of loan qualification procedures. This fact made the banking sector vulnerable in 1995 when the crisis hit hardest. The causes of the banking crisis have been extensively documented by McQuerry (1999) and Calomiris (1999). Mishkin (1996) developed a theory of banking and financial crises based on the asymmetric information framework and used it to analyze the USA and Mexican crises. He stated that an appropriate institutional structure is important in preventing banking and financial crises, and the need was especially critical in developing countries.

In 1982 the banking sector was nationalized due to a major financial crisis caused by many factors, including the collapse of oil prices, high levels of country indebtedness, and the devaluation of the Mexican peso. As a part of the nationalization process under the presidency of Miguel de la Madrid Hurtado (1982–1988), a trust fund was created to support the banks in times of financial stress. The fund was called Fund of Preventive Support for Banking Institutions (FONAPRE). FONAPRE, however, did not have any of the elements that constitute a modern safety net.

In 1991 the Mexican financial system was modernized and updated. As a part of that reconstruction, the banking sector was again privatized and a new deposit insurance fund was created to protect deposits. This deposit insurance fund was called FOBAPROA.

As a part of the modernization of the financial system, the government sold the banks. However, many of the banks were sold to private investors that did not have financial industry expertise. The new owners engaged in a search of high returns to compensate for their investments and for the expenses made in the modernization of the banks. Through this, they increased bank risk prior to the crisis. The owners were able to shift the risk of bank failures from themselves to the national deposit insurance system. In this manner, they could capture higher returns while facing diminished risk.

After the Tequila Crisis, the Mexican government had the opportunity to redesign the safety net to prevent future disorders in the financial and banking sectors. The Institute for the Protection of Bank Deposits (IPAB) was developed to replace the largely ineffective FOBAPROA Fund. Special attention was given to the regulation and supervision of banks. Since 1998, IPAB has represented the Mexican safety net with the primary goal of maintaining financial system stability and avoiding bank-risk shifting.

A principal component of the IPAB´s safety-net design is the incorporation of a surety bond. This bond is intended to introduce a method for real-time evaluation of the performance of regulators in disciplining banks to avoid risk-shifting. The performance bond was proposed by Kane (1995) when the Tequila Crisis was starting in Mexico.

The objective of this research is to test for risk-shifting behavior in the Mexican banking industry since the IPAB became operational. The question this paper intends to answer is whether IPAB has been able to constrain Mexican banks from transferring their risks to the deposit insurance fund. The Tequila Crisis experience, the collapse of FOBAPROA, and the banking sector crash during the decade of the 1990s should be strong reasons to persuade Mexican banks and IPAB regulators to avoid bank risk-shifting.

The IPAB has decided not to implement a system using insurance premiums adjusted for bank-risk; instead it has bet that regulation is enough to discipline banks who practice risk-shifting, and incentivize them to make proper decisions regarding the acceptance of risk. As a component of the new architecture, a performance bond was introduced as part of the regulation and supervision efforts of IPAB (Kane, 1995).

A performance bond measures the effectiveness of regulators in constraining bank risk-shifting. When investors consider the safety net organization´s debt to be risky, the premium on these bonds will increase, causing the bond price to fall. In contrast, if regulators are performing well and banks are not tending to shift risk to the deposit insurance fund, the market will perceive the institution´s debt to be low-risk and hence show a higher bond price. Therefore, the performance bond´s price acts as an immediate indicator of the health of the deposit insurance fund and its ability to prevent a banking crisis.

We should expect a rise in the bond price as the market perceives regulators to be successfully constraining bank risk-shifting. In other words, the price rises with a decrease in bank risk, and falls with an increase in bank risk. Regulators will have the incentive of preventing banks from increasing their risks, consequently driving the deposit insurance fund to a healthier level.

The remainder of this document is organized as follows. First, a discussion of the relevant literature is presented. Next, the methodology used in the study is described, followed by a discussion on the data selection. Results of the analysis are presented, and finally, conclusions and recommendations for further research are presented.

LITERATURE REVIEW

The goal banking safety nets is to prevent banks from shifting their risk to the deposit insurance fund. Bank risk-shifting promotes moral hazard when the deposit insurance fund must bailout banks with

taxpayer money (Kareken & Wallace, 1978; Chari, 1989). Hovakimian and Kane (2000) tested for bank risk-shifting in commercial US banks, finding evidence that banks actually shifted their risk to the deposit insurance fund. Academics have proposed different ways of preventing risk-shifting.

The first attempt to deal with bank risk-shifting was the proposal by Gibson (1976) of a risk-based deposit insurance premium that would constrain banks from transferring risk to the deposit insurance fund. This proposal opened a wide field in deposit insurance research starting with Merton (1977), who used the Black-Scholes formula to compute risk-adjusted premiums for banks in the United States. Other academics have followed Merton´s work (e.g. Acharya & Dreyfus, 1989; Marcus & Shaked, 1984; Pennachi, 1987; and Ronn & Verma, 1986).

Besides risk-adjusted premiums, regulation has been proffered as a means of ensuring discipline in the behavior of banks. Kane´s posture is that efficient regulation must constrain banks from transferring their risks to the insurance fund. To him, regulators are the key ingredient to the proper functioning of a financial safety net. However, regulators can undermine the goals of the safety net and engage in practices that lead to problem situations for the deposit insurance fund (Kane, 1989). Kane (1995) proposed the performance bond as a way of measuring regulator performance. In this manner, regulators will have an ongoing indicator that evaluates their work, which should result in a better capitalized and risk-controlled banking sector. Indeed, Kane claimed there is no need to make major changes in the structure of the US regulatory bureaucracy. Instead, what needs to be repaired is the incentive structure under which financiers and government officials operate (Kane, 2009).

Market discipline was also proposed as an alternative to discourage bank risk taking as a complement to regulation efforts. Following Kareken and Wallace (1978), it was proposed by the Federal Deposit and Insurance Corporation (FDIC) to increase bank capital requirements with bank subordinated notes and debentures (SNDs) permitted to satisfy up to one-third of this requirement.

Later, a study conducted by Avery, Belton, and Goldberg (1988) evaluated the potential for SNDs to impose market discipline. It was thought that subordinated lenders were subject to greater risk than uninsured depositors since uninsured depositors may withdraw their deposits from a risky bank while subordinated lenders could not. Because of that, it was proposed, subordinated lenders would impose the same kind of discipline the FDIC did. Their research found weak evidence for market discipline through SNDs.

Gorton and Santomero (1990) used a model based on option pricing theory to test for market discipline through SNDs. They found no meaningful evidence of market discipline, which confirmed previous research. Sironi (2003) however, focusing on SND spreads for European banks found evidence that investors in SNDs are sensitive to bank risk and even recommended that bank supervisors should rely on this kind of discipline to complement regulatory efforts. For public sector banks, though, Sironi's study shows no effective market discipline through SNDs. Blum (2002), on the other hand, demonstrated the ambiguous impact of subordinated debt in the risk-taking incentives of banks and even saw SNDs as being part of the increase in risk taking.

Market discipline can also be incentivized when uninsured depositors withdraw deposits or require a higher interest rate when banks engage excessively in risky activities. Martinez and Schmukler (2001) found this kind of discipline in México, Argentina and Chile. Their results show that depositors in these countries did punish banks for risky behavior, particularly after experiencing an economic crisis. Thiratanapong (2007) conducted a similar analysis in Thailand and found the same results, showing that depositors´ responses to increases in bank risk taking in the aftermath of a crisis was effective. He also demonstrated that an explicit guarantee weakened the extent of an increase in market discipline.

Consequently, it seems that market discipline becomes less effective when an explicit deposit insurance system is implemented. Explicit insurance undermines the effect that market discipline has over bank behavior since there are no longer uninsured depositors with incentive to watch over their deposits. Demirgüç-Kunt and Kane (2002) identified this phenomenon to exist in almost every country that has deposit insurance at work, and proposed that the loss of market discipline may be more than offset in countries with a strong regulatory and supervisory environment.

Hovakimian, Kane, and Laeven (2003) used a worldwide study to estimate bank risk-shifting to the deposit insurance fund and determined that explicit insurance often reduced market discipline, while at the same time promoting the transfer of bank risks to the insurance fund. Likewise, they found that coinsurance, risk sensitive premiums, and coverage limits temper bank risk-shifting. Demirgüç-Kunt and Huizinga (2004) confirmed the notion that deposit insurance reduces market discipline, and proposed the same set of design features to construct an optimal safety net as Hovakimian et al. These improvements on the deposit insurance safety net should augment market discipline and reinforce government regulation.

In this regard, Imai (2006) conducted an empirical study in Japan after the government limited the coverage of time deposits. He found evidence that the deposit insurance reform enhanced market discipline. However, the "too-big-to-fail bank effect" became a more important determinant in interest rates and deposit allocation after the reform, partially offsetting the positive effects on overall market discipline. In this sense, Gosh (2009) later found that charter value, bank risk, and depositor discipline are interlinked.

Landskroner and Paroush (2008) used a theoretical model to examine the possibility of substituting market discipline for bank regulation, finding that there was indeed a substitution relationship between the two. They concluded that even when market discipline is eliminated with full coverage insurance, it can be recovered when special features are added to the safety net design. In this manner regulatory effort may be reinforced by market discipline.

METHODOLOGY

We propose a regression-based analysis of the relationship between bond prices and the indicators of banking system performance. The dependent variable is the bond price. The Institute for the Protection of Bank Deposits (IPAB) issues a performance bond called the Bond for the Protection of Savings (BPA). This bond captures the welfare of the deposit insurance fund managed by IPAB. $BPA_{i,t}$ is the price for which the bond i is offered at time t. In relation to the independent variables, we use bank risk depicted in the CAMEL rating (Martinez and Schmukler, 2001; Thiratanapong, 2007).

The root parts of the CAMEL rating are measures of capital adequacy, asset quality, management, earnings, and liquidity. These measures are commonly derivable from bank financial statements. Because not every Mexican bank is listed in the Mexican stock exchange, balance sheet data (available on all banks) is preferred over market data. Additionally, balance sheet information is updated on a monthly basis rather than quarterly, making data more reliable and a better current reflection of the actual bank situation. When taking positions in the stock market, investors consider not only future outcomes but also past bank financial history through the study of published financial statements.

We measure the reaction of BPA prices to bank risk-taking with the following reduced-form equation:

$$BPA_{i,t} = \mu_i + \beta' \, Bank\ Fundamentals_{i,t-1} + \omega_{i,t} \qquad (1)$$

To take into account bank fixed effects we use μ as the constant in the model, Bank Fundamentals is a vector of risk ratios in bank balance sheets, and $\omega_{i,t}$ is the stochastic error term for bank i in month t. For Bank Fundamentals, a series of financial ratios are considered. The first element is liquidity, as the lack of liquidity increases bank risk. To account for liquidity we use the ratio of availabilities to total assets (ATA), and the ratio of investment in portfolio assets to total assets (IPATA).

The second element is profitability. An unprofitable bank may engage in risk-taking practices to increase return. The two ratios considered are return on assets (ROA) and return on equity (ROE). The third term is activity to account for the fact that a bank must charge to have income. The less it charges, the riskier the bank becomes. To account for activity the ratio non-performing loans to total loans (NOLT) and income to total assets (ITA) are considered. Finally we test the total debt to equity ratio (TODE), which accounts for a bank's leverage. The more debt to equity a bank has, the riskier it becomes.

When overall bank risk decreases, the deposit insurance fund becomes safer. This is shown by the performance bond becoming safer, resulting in an increase in its price. This will then cause a reduction in cost for the insurance corporation. Hence, a reduction in overall bank risk should translate into an increase in the bond price, which would imply a negative sign on the regression coefficient.

If a bank lacks liquid assets in relation to its debts, it becomes riskier. For this case, an increase in liquidity will reduce risk, producing a positive sign on the regression coefficient, giving an increase in the bond´s price. An increase in ATA and IPATA would also signify a reduction in risk, and their coefficients would show a positive sign. Moreover, we expect that an increase in profitability will generate a positive sign on the coefficients of the related variables. An increase in profitability would relax the pressure from the bank to assume higher levels of risk.

Therefore, an increase in ROE and ROA would mean a reduction in risk, and therefore a safer deposit insurance fund. We expect a positive sign in these two coefficients. When testing activity levels we would expect that an improvement in activity would reduce the ratio of non-performing loans to total loans (NOLT) and increase the ratio of income to total assets (ITA). As NOLT decreases and ITA increases, we expect a reduction in risk, which would then generate an increase in the price of the bond. Hence, NOLT should have a negative sign and ITA a positive sign on the regression coefficients. Finally, an increase in total debt to equity (TODE) would result in higher risk, demonstrating greater moral hazard to the deposit insurance fund. We therefore expect a reduction in this ratio to be correlated with higher bond prices, and a subsequent negative sign in the coefficient.

THE DATA

Mexico restructured its financial system in 1991 and a new law was enacted. From that year through the present, 40 banks make up the Mexican banking system. Bank data was obtained from an Institute for the Protection of Bank Deposits (IPAB) internal database that covers financial data for the 40 banks. Table 1 shows selected descriptive data for banks in the system relating to each bank's size and share of the Mexican market. Although the overall system comprises 40 banks, the seven largest banks control 87% of the total capital in the Mexican banking system, and none of the other 33 banks have more than 1.9% of the nation's deposits. Therefore, this research limits data to those entities. The monthly data cover the period from December 2000 to August 2009, for a total of 104 months.

Table 1: Market Participation of Banks in the Mexican Banking System

	Bank	Beginning year	Equity[a]	Market Participation[b]
1	Banamex Citigroup	1991	$ 123,374.54	25.77%
2	BBVA Bancomer	1991	$ 90,969.09	19.00%
3	Santander	2002	$ 71,244.10	14.88%
4	Inbursa	1992	$ 40,082.41	8.37%
5	Banorte	1993	$ 37,130.98	7.76%
6	HSBC	2002	$ 29,911.48	6.25%
7	Scotiabank Inverlat	2001	$ 24,242.39	5.06%
8	Bajío	1994	$ 8,962.92	1.87%
9	ING	1994	$ 7,341.86	1.53%
10	JP Morgan	1994	$ 4,332.12	0.90%
11	Azteca	2002	$ 4,187.67	0.87%
12	IXE	1995	$ 4,119.32	0.86%
13	Compartamos	2006	$ 3,440.10	0.72%
14	Bank of America	1954	$ 3,162.78	0.66%
15	Interacciones	1993	$ 2,879.22	0.60%
16	American Express	--	$ 2,333.36	0.49%
17	Afirme	1995	$ 2,231.69	0.47%
18	Banregio	1994	$ 2,049.61	0.43%
19	Deutsche Bank Mexico	2000	$ 2,044.40	0.43%
20	Invex	1994	$ 1,884.92	0.39%
21	FAMSA	2007	$ 1,167.79	0.24%
22	Multiva	2007	$ 1,036.80	0.22%
23	MIFEL	1994	$ 1,009.38	0.21%
24	Barclays	2006	$ 957.50	0.20%
25	Ve Por Mas	2004	$ 870.69	0.18%
26	The RBS	--	$ 822.69	0.17%
27	Monex	2003	$ 811.50	0.17%
28	Credit Suisse	2002	$ 789.58	0.16%
29	Tokio-Mitsubishi	--	$ 723.48	0.15%
30	Consultoria Internacional	2008	$ 691.08	0.14%
31	Bancoppel	2007	$ 657.47	0.14%
32	Wal Mart	2007	$ 645.51	0.13%
33	Regional	2007	$ 483.12	0.10%
34	Prudential	2007	$ 425.85	0.09%
35	Autofin	2006	$ 385.73	0.08%
36	Volkswagen Bank	2008	$ 355.27	0.07%
37	Amigo	2007	$ 346.83	0.07%
38	UBS	2007	$ 335.90	0.07%
39	Fácil	2007	$ 212.94	0.04%
40	Bansi	1995	$ 87.91	0.02%

[a] *Millions of Mexican pesos in August 2009 From the total capitalization in the banking sector as of August 2009. This table lists the 40 banks in the Mexican banking sector as of August 2009, in order from highest to lowest by market capitalization, including the year in which each began operations in Mexico. Market capitalization is a measure of the size of the bank, and the percentages listed show the relative market share of the banking industry that each bank commands. Note that the seven largest banks (17.5%) control 87% of the deposits in the country. The horizontal line divides the banks into the 7 used for study purposes, and the remaining 33.*

RESULTS

Given a robust model to test for bank risk-shifting, we find strong results that account for a reduction of risk-shifting from Mexican banks to the Institute for the Protection of Bank Deposits (IPAB) deposit insurance fund. As shown in Table 2, Mexican banks have reduced the transfer of risk to the deposit insurance fund. The independent variables are discussed below.

Availabilities to total assets (ATA) show a positive sign in accordance with the hypothesis that an increase in liquidity increases the safety of the insurance fund, driving risk down. Even though there is no evidence that this ratio is statistically significant from zero. The other liquidity measure is investment in portfolio assets to total assets (IPATA), but this variable shows a different sign that what it was expected. A negative sign in IPATA means that a reduction in liquidity, in the form of investment in portfolio assets leads to an increase in the safety of the deposit insurance fund. The best explanation with this difference in expectations is that portfolio investments are risky in their own. Hence, the more the portfolio positions increase, the riskier the bank turns and this affects the safety of the deposit insurance fund. Neither ATA nor IPATA are statistically significant, reducing their explanation power.

Concerning profitability measures, both ROA and ROE are statistically significant. However, ROA shows the expected sign in the coefficient, while ROE does not. We have said that an increase in profitability will stop banks from taking greater risks, reducing the pressure on the insurance fund. ROA has the expected sign, showing that if the profitability over assets increases, risk lessens and hence, the safety of the insurance fund is not diminished. While ROA expresses the profitability of the entire bank (all sources of funding), ROE only shows the profitability of bank equity. This is the explanation of the negative sign in the coefficient of regression for ROE. In a time when regulators are appointing for an increase in equity and a reduction of bank debt to improve capital adequacy, return on equity will drop. ROE increases when equity is low, debt is high and return divides a lower equity. Hence, lower equity will produce high ROE ratios, but increased equity will produce low ROE measures.

These results confirm the view of a retrench in risk-shifting from banks to the deposit insurance fund. They also suggest that there is a systematic intention in stepping back from highly leveraged banks to a better capitalized banking system. Mexico is pushing to create a strong banking system through regulation, and this regulation has leverage reduction as its primary goal.

Table 2: OLS Regression Results Relating Bank Risk Ratios to the IPAB Performance Bond Price

Variable		**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Variable		Coefficient	Std. Error	t-Statistic	Prob.
Constant		100.14	0.89	112.9	.000
Availabilities to total assets	ATA	1.0316	3.57	0.289	.773
Investment in portfolio assets to total assets	IPATA	-0.1671	2.04	-0.082	.934
Income to total assets	ITA	11.694	17.7	0.662	.509
Total debt to equity	TODE	-0.0741	0.01	-6.301	.000*
Return on assets	ROA	24.497	5.52	4.437	.000*
Return on equity	ROE	-1.6280	0.33	-4.863	.000*
Non-performing loans to total loans	NOLT	-13.132	3.09	-4.248	.000*
R-squared 0.827	Observations	104			
Adjusted R-squared 0.815	Prob (F-statistic)	0.000			

This table shows the results of the ordinary least squares regression of bank risk data on the price of BPA bonds issues by the Institute for the Protection of Bank Deposits (IPAB). Data spans 104 months from December 2000 to August 2009. Bank risk data variables were selected from the CAMEL rating categories: capital adequacy, asset quality, management, earnings, and liquidity.

Total debt to equity (TODE) shows a negative sign, in accordance with the hypothesis. If leverage decreases, then risk also decreases, leading to a safer deposit insurance fund. TODE is statistically significant at the 1% level. This reduction in leverage goes in parallel with the increase in ROE. Together these two variables show the systematic effort of regulators in reducing leverage from the Mexican banking industry, driving the nation's financial system to a stronger and safer level. From this result one can conclude that Mexico is taking a serious stance on the Basel II Accord on Bank Supervision.

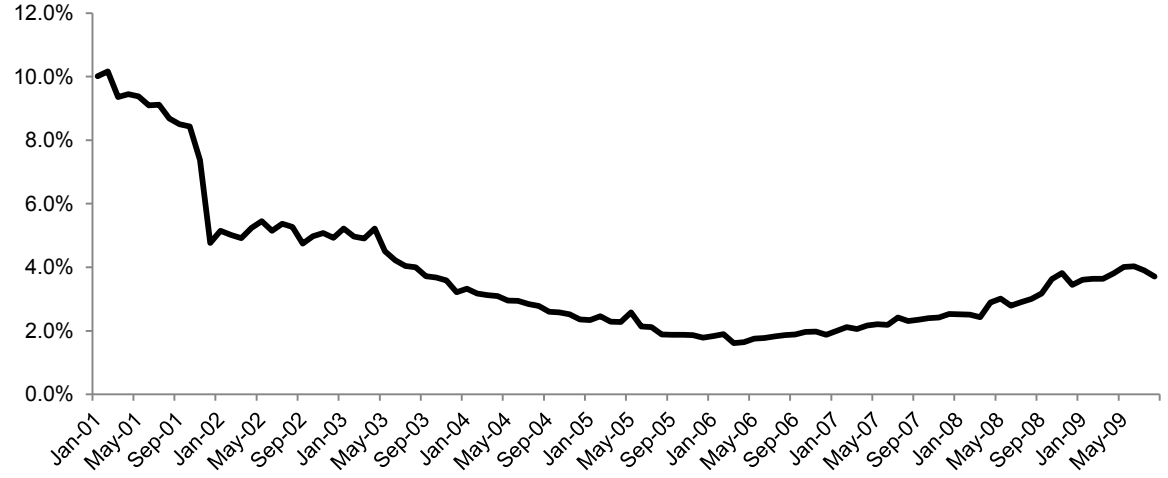
Is also important to note that this positive result has been achieved through regulation and supervision (Kane, 1989; Kane, 2009) and not with risk adjusted premiums, as has been proposed in the past (Acharya & Drayfus, 1989; Gibson, 1972; Marcus & Shaked, 1984; Merton, 1977; Pennacchi, 1987; Ronn & Verma, 1986). Mexico charges the same fixed percentage monthly premium to every bank in the system, based on the level of their deposits for the specified month.

Bank activity is measured by non-performing loans to total loans (NOLT), and income to total assets (ITA). The argument for the use of these two ratios is that if a bank improves activity, it will have less probability of default and its risk will be lower. The regression coefficient for NOLT has the hypothesized negative sign and is statistically significant at the 1% level. The variable ITA is not significant in this regression, so we can conclude that its coefficient does not statistically differ from zero. As such, the sign on the coefficient is irrelevant.

In the Mexican case, as shown in Figure 1, NOLT has declined significantly in the period of study. That way we can confirm that the reduction in NOLT has lowered bank risk and hence, led the deposit insurance fund to a safer level. The confidence level is high for this independent variable, so we can say that a reduction in NOLT is a good predictor of lower deposit insurance risk. It should be pointed out, that in the 2008–2009 world financial crisis, NOLT increased, but not to a hazardous level. Even with this marginal increase in NOLT, bonds for the protection of savings (BPAs) have shown strong pricing, which indicates that the Mexican safety net is in a very safe position.

Finally, income to total assets is not statistically significant even though it shows the expected positive sign. Increased bank income reduces bank risk, which leads to an increase in the safety of the insurance fund. However, the lack of significance indicates that bank income is not a driving variable for the state of the deposit insurance fund.

Figure 1: Ratio of Non-Performing Loans to Totals Loans (NOLT)



Data for the 104 month period from January 2001 through August 2009. Higher levels indicate increased banking system risk. The ratio of non-performing loans to total loans decreased significantly during the study period. Data were extracted from published bank monthly financial documents, rather than the quarterly Mexican Federal Government reports.

CONCLUSIONS

Deposit insurance was created to avoid banking sector panics and massive runs on deposits. It was posited that as a result of the increased safety of funds deposited in banks, depositors would then become

confident in the system and reduce destabilizing behavior. However, this confidence has reduced depositors' supervision, leaving the enforcement of discipline to government regulators. Although some market discipline can be obtained through coinsurance or coverage limits, bank discipline often relies on the policies and systems put in place by the government. Then the government regulators themselves must be supervised in some way to provide feedback and confirm that they are achieving the goal. In this sense, Kane (1995) proposed the performance bond as a method of indicating how well the regulators are doing. Superior bond performance would mean that regulators were doing an excellent job of incentivizing banks to reduce behavior that shifts their risk to the deposit insurance fund.

The goal of this research is to test for risk-shifting behavior in Mexican banks and to determine if the Institute for the Protection of Bank Deposits (IPAB) has been able to constrain banks from transferring their risks to the deposit insurance fund. We used the bond for the protection of savings (BPA) performance bond as a proxy of the insurance fund's health and a vector of financial ratios that account for bank risk as the explanatory variables. A regression model was applied for a group of the seven largest banks that control 87% of the total capital in the Mexican banking system. Bank factor data from December 2001 through August 2009 was used, making a total of 104 months.

The Mexican case is a good scenario in regards to bank risk shifting. We find that there is a systemic indication of moving away from highly leveraged banks to a better capitalized banking system and that appropriate regulation has been a significant reason. The level of bank risk is trending in the direction of lower risk, and the insurance fund shows a high degree of healthiness. Even in the middle of a world financial crisis, Mexican banks have had a decreasing trend in the risk they pose to the deposit insurance fund of IPAB. Of particular concern, however, is to determine whether this downtrend in risk is the product of managerial prudence on the part of bankers, or is driven by the discipline imposed by regulators. Further research may make this distinction. The Tequila Crisis provides both managers and regulators a common background, and each could be, in their own ways, preventing the banks from falling into the same trap as in 1995. It is therefore difficult to determine whether the actions of regulators alone are causing the observed discipline in banks, thus stopping them from engaging in risky activities. To define the degree in which regulators and bank managers affect banks in restraining to undertake risky activities must be subject of further research.

It has also been shown in this paper that the performance bond can be used as a predictor of the health of the deposit insurance fund. The BPAs issued by IPAB are a suitable gauge to identify risk-shifting from banks to the deposit insurance fund. A decrease in the price of the BPA is a signal that regulators must reinforce discipline. However, the price of BPAs could be influenced by macroeconomic factors over and above regulation. Future research could show if BPAs are an isolated thermometer of regulator's performance or whether they also capture macroeconomic activity. Additionally, research could test whether other common forms of bank regulation and supervision such as capital requirements, chartering, or bank asset holdings, have contributed to discipline in the Mexican banking sector.

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