

Banks During the Argentine Crisis: Were They All Hurt Equally? Did They All Behave Equally?

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The simple answer to both questions in the title of this paper: No. We concentrate on three key aspects of the banking system's difficulties during the 2001–02 crisis. Two are related to bank behavior (increasing dollarization of the balance sheet and expanding exposure to the government), and the other is related to the degree by which banks were hurt by depositor preferences, specifically, the run on deposits during 2001. We find that there was substantial cross-bank variation, that is, not all banks behaved equally nor were hurt equally by the macroeconomic shocks they faced during the run-up to the crisis. Furthermore, using panel data estimation, we find that depositors were able to distinguish high-risk from low-risk banks, and that individual bank's exposure to currency and government default risk depended on fundamentals and other bank-specific characteristics. Finally, our results have implications for the existence of market discipline in periods of stress, and for banking regulation, which may have led banks to underestimate some of the risks they incurred. [JEL F30, F41, G14, G21]

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The literature to date on the Argentine crisis of 2001 has stressed the macroeconomic disequilibria that arose in the 1990s, continued unchecked for several years, and ultimately led to the abandonment of the currency board and declaration of default by the government in early 2002. Studies have pointed out the fiscal factors, showing that large increases in government spending throughout the 1990s were partly to blame, as deficits persisted and even widened during years of vigorous economic growth,¹ thus leading to a rapid buildup of public debt, from 29 to 41 percent of GDP in the five years ending in 1998 (Perry and Servén, 2002; Mussa, 2002; Independent Evaluation Office, 2004).

Exchange rate issues have also been addressed extensively, with studies highlighting the difficulties of establishing a sustainable hard peg to the dollar in an economy with a relatively small tradables sector and even smaller trade relations with the United States.² Furthermore, the argument has been made that, with somewhat limited domestic price flexibility, the currency board arrangement made the economy particularly vulnerable to serious output contractions in the event of real exchange rate overvaluations. In particular, Argentina would tend to be vulnerable to sudden stops in international capital inflows, requiring much greater adjustments in domestic demand to bring about the current account adjustments necessary to restore external equilibrium (Calvo, Izquierdo, and Talvi, 2003).

Finally, fiscal and exchange rate vulnerabilities were compounded when, because of a history of instability and macroeconomic mismanagement, the government denominated most of its debt in foreign currency. A dollarized debt coupled with an overvalued currency³ implied that the true size of the debt was much greater than it appeared, as was the risk of default.

The banking sector was seen to play a part in the crisis as well. Several studies have shown how the macroeconomic imbalances affected the banking system in the years prior to the crisis, increasing its vulnerability to

¹During 1991–97, Argentina was one of the fastest-growing economies in Latin America, with an average growth rate of 6.7 percent.

²Argentina is less open than most Latin American countries. During 1990–95, total trade represented 16 percent of GDP, whereas it was 37 percent in Mexico and 46 percent in Chile. Moreover, as pointed out by the Independent Evaluation Office of the IMF (2004), the differences in Argentina's degree of openness in relation to other hard peg economies are even more pronounced; for a sample of eight hard peg economies throughout the world, total trade averaged 96 percent of GDP.

³Analysts as well as the government agreed that the exchange rate was overvalued, although there was no consensus on the degree of overvaluation. As the study by the Independent Evaluation Office (2004) reports, by spring of 2000 overvaluation was estimated at 7 percent by Goldman Sachs, 13 percent by JP Morgan, and 17 percent by Deutsche Bank. Ex post, Perry and Servén (2002) estimated the Argentine peso to be overvalued by 55 percent by 2001.

devaluation and its exposure to government default risk.⁴ Eventually, the banking system also suffered a deposit run that led the government to impose measures that severely curtailed the convertibility of bank deposits. To make matters worse, in early 2002 the government introduced asymmetric “pesoization” of dollar-denominated items on banks’ balance sheets, which converted their liabilities at a higher exchange rate than that for assets. The end result was a banking crisis that has extended into subsequent years and left financial intermediation greatly hampered. Because it is widely recognized that recovery in banking is crucial for Argentina’s overall recovery, a better understanding of the factors that led to this situation is key, particularly to help prevent this type of situation from arising in the future.

Our study focuses on three key aspects of the Argentine banking crisis. Two of them are sources of risk arising from bank behavior: the buildup of foreign currency assets and liabilities, and the accumulation of government debt. The third aspect may be characterized as a symptom of the crisis: the drawdown in banking deposits that took place during the latter part of 2000 and throughout most of 2001. We will show that, although the banking system as a whole exhibited all three quite strikingly in the run-up to the crisis, these changes did not affect all banks equally, and substantial cross-bank variation can be observed. Therefore, we set out to determine to what degree bank-specific characteristics can explain why some banks increased their exposures or suffered deposit withdrawals to a larger extent than others. Specifically, we test to what extent both fundamental and nonfundamental bank characteristics add explanatory power above and beyond that of the systemic or macroeconomic variables.

Our results will have implications for the analysis of banking sector health in emerging markets and for regulation as well. Given that traditional bank fundamentals or indicators tended to give an overly optimistic portrait of the Argentine banking system up to 2000, it would be tempting to discard these as irrelevant or misleading once the economy was hit with a large systemic shock. However, it still may be the case that these indicators could contain relevant information at the micro level, helping to predict which types of banks would be more likely to increase their exposure to systemic risk or suffer from sizable deposit withdrawals. Moreover, certain bank fundamentals may be viewed not only as predictors of a bank’s ability to withstand exogenous shocks but also as indicative of the quality of management and the extent of risk taking. For example, bank capitalization serves not only as a buffer against future shocks to profitability but should also provide incentives for prudent behavior toward risk.⁵ Thus, if banks were well regulated and supervised prior to

⁴In particular, de la Torre, Levy-Yeyati, and Schmukler (2003); della Paolera and Taylor (2003); and Levy-Yeyati, Martínez Pería, and Schmukler (2004).

⁵There is an extensive literature linking bank capital to a more prudent behavior toward risk in general.

the crisis, it should be the case that the relatively highly capitalized and well-managed banks would also be the ones less likely to increase their foreign currency operations and holdings of government bonds, precisely at a time when currency and country risks were increasing.

In our analysis of the deposit run, we will draw on the approach used in two recent studies of market discipline in Argentina, introduce different lags in bank fundamentals to explain deposit growth, and test for the relevance of nonfundamental bank characteristics. For the other two aspects of the banking crisis, our study is the first to examine them in a systematic way, testing for their micro and macro determinants.

I. Overview of the Argentine Banks in the Run-Up to the Crisis

As described above, the Argentine banking system was affected by key macroeconomic imbalances: increasing fiscal gaps and public debt, and the related fragility of the exchange rate regime. Regarding the latter, as fears of unsustainability of the currency board grew, depositors reacted by transferring a progressively larger portion of their funds into foreign-currency-denominated accounts, thus contributing to a growing dollarization of the banking system. Banks, for their part, were faced with a dilemma: to allow the mounting dollarization on the liability side to occur, thus increasing the vulnerability of their balance sheets to a devaluation, or to offset this position by increasing loans (to domestic borrowers) in foreign currency. The second alternative, while arresting the direct currency mismatch, implied an increase in credit risk to the extent that borrowers were not perfectly hedged against currency depreciations (de la Torre, Levy-Yeyati, and Schmukler, 2003; Levy-Yeyati, Martínez Pería, and Schmukler, 2004). Eventually, the move toward dollar-denominated deposits evolved into a full-fledged run affecting all types of deposits, which culminated in a three-day period in November 2001 when 6 percent of the banking system's deposits were withdrawn. This led the authorities to impose extreme measures, such as the well-known "corralito," greatly restricting the convertibility of deposits.

Banks were also adversely affected by the deteriorating fiscal situation. As the government's financing needs rose and its ability to tap the international capital markets declined, the government had to rely increasingly on domestic sources of finance, with banks playing a particularly key role. This rise in bank financing of the public sector in turn resulted in greater exposure of the banking system to the risk of government default.

The result was that by the end of 2001, the banking sector was in crisis as well. The deposit outflow had led to the suspension of convertibility of a large portion of bank deposits, and the government default in December 2001 left banks with a significant loss in the value of their assets. In addition, in February 2002, the government introduced an asymmetric pesoization of bank balance sheets, converting dollar-denominated deposits at an exchange rate of 1.4 and dollar-denominated loans at par, while the market exchange

rate hovered around 1.8, all with negative effects on banks' net worth.⁶ This was compounded by an asymmetric indexation scheme whereby banks were allowed to adjust the nominal value of pesoized deposits and loans. The scheme called for using the consumer price index (CPI) to adjust deposits and a salary index to adjust loans. To the extent that the CPI grew faster than the salary index, a further deterioration of banks' net worth ensued.

Although the government subsequently introduced measures to compensate banks for asymmetric pesoization and provided liquidity support equaling 2 percent of GDP (Caprio and Klingebiel, 2003), and some deposits subsequently returned to the system, bank profitability and intermediation activities have since remained weak. Based on the IMF's *International Financial Statistics* (IFS) figures for the Banking Survey (comprising all banking institutions), deposits began to register positive growth in annual terms in September 2002. By the end of 2002, deposits were growing at an annual rate of 19 percent and by 26 percent at the end of 2003. Credit to the private sector, on the other hand, has been much slower to recover, only achieving positive year-on-year growth by July 2004. As for profitability, private banks returned to positive profits in the last quarter of 2003, while public banks continued to show negative profits (IMF, 2004).

This situation contrasts starkly with perceptions of the health of the Argentine financial sector even just a few years before the crisis. Studies such as that of Calomiris and Powell (2000) had lauded the extensive regulatory reform undertaken during the 1990s, starting with the liberalization of the banking sector early in the decade. The reforms included the establishment of a new Central Bank Charter and the abolishment of deposit insurance, adoption of the Basel capital requirements and their subsequent tightening during 1992–95, introduction of a liquidity requirement system, and, finally, the adoption of the BASIC oversight approach,⁷ whereby regulatory and market discipline would function in tandem. Furthermore, when looking at traditional financial performance indicators, even as late as 2000 the Argentine banking system appeared to be sound, well-capitalized, and liquid and to have a relatively high level of provisions.⁸ In fact, as

⁶However, it is worth noting that the conversion of loans at par may have had a positive—and therefore partially offsetting—effect on net worth by reducing the rate of default by imperfectly hedged bank borrowers.

⁷The acronym stands for Bonds, Auditing, Supervision, Information, and Credit Rating. The BASIC approach was introduced following the Tequila crisis of 1994–95 and relied heavily on providing timely and relevant information on individual banks to both private markets and regulators. In turn, regulators and markets would then use this information to punish banks for excess risk taking: regulators, by imposing higher capital requirements, and markets, by pricing down banks' subordinated debt.

⁸For example, the capital-to-asset ratio was 10.5 percent and the capital-to-risk-weighted-assets ratio was 21.2 percent. Provisioning had been well above 100 percent of nonperforming loans during 1997–99, but an increase in nonperforming loans owing to the recession brought the provisioning ratio to 77.1 percent in 2000 (Perry and Servén (2002) based on data from the Central Bank of Argentina).

Perry and Servén (2002) show, in 1998 the World Bank Financial Sector Review ranked Argentina's banking system second (to Singapore) among emerging market economies in terms of its CAMELOT⁹ ratings of bank soundness and the quality of its regulation and operating environment.

Moreover, by most accounts the Argentine banking system had demonstrated its resiliency throughout the 1990s, withstanding the Tequila crisis following the Mexican devaluation of December 1994, and then the subsequent strains caused by the Asian, Russian, and Brazilian crises. In the Tequila crisis in particular, the authorities were able to partially offset a substantial deposit run (18 percent of total deposits were withdrawn between December 1994 and May 1995) by reducing reserve requirements and easing liquidity constraints of the banks. Although 51 institutions failed—they were either closed down or merged—studies have shown that these tended to be the *ex ante* weaker institutions (Dabós and Sosa, 2004). Depositors certainly were concerned with the risk of a possible currency crisis, but market discipline was shown to be operating even during the Tequila crisis, as depositors tended to withdraw more funds from the banks that exhibited weaker fundamentals (and therefore greater risk of default) *ex ante* (Calomiris and Powell, 2000; Schumacher, 2000; and Martínez Pería and Schmukler, 2001).

On the other hand, some analysts criticized aspects of the reform process (see, for example, World Bank, 1998). First, they stressed the lack of stability in the rules of the game. For example, deposit insurance, abolished early on, was reinstated in 1995 and its coverage limit subsequently raised. Liquidity requirements were changed over time, particularly in response to the Tequila crisis, as discussed above. Second, although the obligation of banks to issue subordinated debt was thought to be a key aspect of the BASIC approach, the penalty for noncompliance was relatively low. Third, tight regulations on risk taking may have combined with the traditionally high operating costs to lower bank profitability throughout the decade. Fourth, the regulatory reforms may have still left significant room for government discretion in the banking system. In particular, regulatory incentives as well as a degree of moral suasion by the government may have been responsible for an excessive buildup of government debt on banks' balance sheets. Finally, della Paolera and Taylor (2003) characterized the banking system more as a willing accomplice than a victim of the fiscal imbalances. For all the regulatory changes enacted during the 1990s, it argued, the system is still one of rampant cronyism, more than willing to contribute to the government's soft budget constraint.

⁹The acronym stands for a ratings scheme for banking systems based on a composite index of capital adequacy, asset quality, management (percentage of foreign ownership), liquidity, operating environment, and transparency.

II. A Descriptive Look at Argentine Banks in 1995–2001

Here we concentrate on the three aspects of the banking crisis in Argentina: the expansion of foreign currency operations of the banking system, the accumulation of government debt, and, finally, the run on deposits. All three are closely connected to the macroeconomic shocks; to the extent that the crisis resulted in a large currency devaluation and a default by the government, banks' balance sheets would be severely affected and depositors had good reason to fear that funds deposited in the banking system would be in danger. However, the extent to which individual banks were affected by the macroeconomic shocks would depend crucially on the degree to which their balance sheets were exposed to these risks. We will investigate whether there was any pattern across banks to the accumulation of these exposures.

Foreign Currency Exposures—Increasing Dollarization

A first step is to quantify the Argentine banks' foreign currency operations, on both the asset and the liability side. We note that two different types of risk are increased with each type of exposure. On the one hand, an increase in foreign currency liabilities—to a large extent caused by depositors' preferences as devaluation fears mounted—would lead to a direct currency mismatch on bank balance sheets. On the other hand, an accumulation of foreign currency assets, through increased dollar lending, would lead to an increased default risk to the extent that borrowers were not perfectly hedged against currency risk. Table 1 shows that in the mid-1990s about 60 percent of bank liabilities were denominated in foreign currency, and that this portion increased subsequently, reaching over 70 percent by September 2001 for the banking system as a whole. Similar behavior can be observed on the asset side, where the foreign currency segment increased from 59 to 69 percent during the same period. As Table 1 also shows, many of the movements in currency denomination of assets and liabilities are related to increases in the shares of foreign currency deposits and loans.

We combined data on both foreign currency assets and liabilities to produce a net foreign currency position (assets minus liabilities) measured as a percentage of total assets. There is a slight downward trend in the total position during the 1995–2001 period, going from 8.4 percent of assets in 1995 to 7.6 percent by the end of the study period (Table 1). However, when only loans and deposits are considered, the downward trend is more pronounced; the banking system as a whole went from a positive net position of almost 12 percent of assets to a net negative position of about 3 percent of assets. Thus, when deposits became progressively more dollarized, banks responded by increasing their foreign-currency-denominated assets, although only partially offsetting the impact on their balance sheets. Furthermore, in addition to foreign currency lending, banks increased other assets denominated in foreign currency. Overall, Argentine banks maintained a positive net foreign currency position, but the increase in foreign currency loans would presumably leave them more exposed to default risk arising from imperfectly hedged borrowers.

Table 1. Foreign Currency Positions of Argentine Banks

	January 1995	September 2001	January 1995	September 2001
Liabilities				
	<i>Foreign currency liabilities/ total liabilities</i>		<i>Foreign currency deposits/ total deposits</i>	
Banking system	59.9	70.4	54.2	67.7
Foreign	71.0	72.8	66.3	72.3
Domestic private	65.0	73.6	60.0	66.4
Public	50.4	64.0	41.7	61.4
Assets				
	<i>Foreign currency assets/ total assets</i>		<i>Foreign currency loans/ total loans</i>	
Banking system	58.9	69.3	62.8	72.3
Foreign	67.8	69.6	74.2	73.4
Domestic private	62.1	66.1	68.1	63.1
Public	52.4	70.8	52.4	77.1
Net foreign currency position as a percentage of total assets				
	<i>Foreign currency assets minus liabilities</i>		<i>Foreign currency loans minus deposits</i>	
Banking system	8.4	7.6	11.6	-2.8
Foreign	6.0	4.2	12.6	-5.3
Domestic private	6.4	6.8	10.5	-1.3
Public	11.3	14.3	12.2	0.6

Sources: Central Bank of Argentina banking system database; IMF, *International Financial Statistics*; and authors' calculations.

Note: This table shows different measures of the foreign currency positions of banks in Argentina at two points in time: at the beginning of the sample period (January 1995) and immediately prior to the crisis (September 2001). Based on monthly individual bank balance sheet information from the Central Bank of Argentina's banking system database, indicators of foreign currency position were constructed by the authors for the banking system as a whole, and for subgroups of foreign, domestic private, and public banks.

Banking System Financing of the Government

Next, we turn to our second aspect of the banking crisis, namely, the accumulation of bank claims on the government. Other studies have highlighted the increase in government reliance on voluntary domestic financing, particularly as foreign financing dried up in 2001.¹⁰ Here we focus

¹⁰For example, in Figure 11 in de la Torre, Levy-Yeyati, and Schmukler (2003), voluntary domestic financing of the central government is shown to increase steadily between 1994 and 2001, with banks and pension funds being the major contributors.

on the impact of this borrowing from the banking system's perspective. The share of the government in total assets increased rapidly during the second half of the 1990s (Table 2). By late 2001, government bonds accounted for about 10 percent of assets, versus 3 percent at the beginning of 1995, and total government financing (bonds plus loans) had grown from just under 10 to 21 percent. Looking at IFS data, we see that banks' claims on the public sector increased rapidly both as a percentage of total assets and of GDP, increasing threefold between 1995 and 2001. It is interesting to note that, although public banks had a higher proportion of assets dedicated to financing the government throughout this period, the relative increases were larger for private banks; their corresponding ratio of total government financing increased roughly by a factor of 4, whereas it doubled for public banks.¹¹

Furthermore, Argentine banks used government financing increasingly as a means for dollarization of the asset side of their balance sheets. Table 2 also shows that during the 1995–2001 period, the share of loans to the government within total foreign currency lending almost tripled, from about 11 to 29 percent. Although the initial levels of this share for public banks were higher on average, private domestic banks in particular exhibited sharp increases, from a negligible amount to about a third of their foreign currency loan portfolio devoted to financing the nonfinancial public sector.

One logical consequence of the increased financing of the government was a decline in intermediation activities, as measured by bank financing to the private sector.¹² We see that both the loan-asset and the loan-deposit ratios declined across all three groups of banks, with the former falling from close to 70 percent in the mid-1990s to less than 50 percent by the end of 2001 (Table 3). The same pattern is observed in IFS data for deposit money banks, where both ratios fell considerably. The credit-to-GDP ratio, after increasing throughout the 1990s and peaking at 24 percent in 1999, fell to 20 percent at end-2001, roughly the same value as in 1994.¹³

¹¹It should be noted that this behavior was common to a number of emerging economies since the mid-1990s, as documented by a recent study by Hauner (2006). For a sample of 42 middle-income countries, Hauner shows that the share of the public sector in total bank credit grew from 17 percent in 1995 to more than 27 percent in 2003.

¹²Barajas and Steiner (2002) analyze recent credit slowdowns in eight Latin American countries, including Argentina. Using a breakdown of major changes in banks' balance sheets, the authors rank the relative importance of different factors, such as deposit growth or alternative uses of funds raised. It is interesting to note that, up until 2000, government financing did not appear to be a major factor causing the slowdown in Argentina. However, if the analysis were to be repeated including 2001, this factor would most likely enter the picture significantly.

¹³Because of the severe recession that began in 1999, the credit-GDP ratio understates the magnitude of the credit decline up to 2001.

Table 2. Bank Financing of the Government in Argentina

Central Bank Monthly Data	January 1995	September 2001
Government bonds/total assets		
<i>Banking system</i>	3.3	10.0
Foreign	4.4	11.0
Domestic private	3.2	8.0
Public	2.9	9.6
Government bonds plus lending/total assets		
<i>Banking system</i>	9.7	21.0
Foreign	4.5	16.7
Domestic private	5.0	20.2
Public	16.1	29.5
Foreign currency loans to the government/total foreign currency loans		
<i>Banking system</i>	10.7	29.3
Foreign	0.1	17.0
Domestic private	2.1	33.6
Public	28.5	46.1
IFS Annual Data: Deposit Money Banks	December 1994	December 2001
Claims on nonfinancial public sector		
As a percentage of total assets	15.7	29.8
As a percentage of GDP	4.5	11.1
Claims on central government		
As a percentage of total assets	8.3	20.2
As a percentage of GDP	2.4	7.5

Sources: Central Bank of Argentina banking system database; IMF, *International Financial Statistics*; and authors' calculations.

Note: This table shows different measures of banks' financing of the government in Argentina at two points in time: at the beginning of the sample period, and immediately prior to the crisis. Measures were constructed from two sources: International Financial Statistics (IFS) annual data for deposit money banks, and monthly individual bank balance sheet information from the Central Bank of Argentina's banking system database, from which indicators of financing to the government were constructed by the authors for the banking system as a whole, and for subgroups of foreign, domestic private, and public banks. Regarding the measures derived from IFS data, total assets are defined as the sum of reserves, foreign assets, and claims on the central government, state and local government, official entities, and the private sector. Claims on the nonfinancial public sector are defined as those on the central government, state and local governments, and official entities.

The Deposit Run

Finally, we look at the run on deposits. Aggregate deposits¹⁴ for deposit money banks grew at an average annual rate of 21 percent between 1995 and

¹⁴This includes demand, time, savings, and foreign-currency-denominated deposits held by the private sector.

Table 3. Intermediation Activity in Argentina

Central Bank Monthly Data	January 1995	December 2001
Loans/total assets		
<i>Banking system</i>	65.7	49.0
Foreign	68.8	45.8
Domestic private	68.8	54.3
Public	61.6	51.4
Loans/total deposits		
<i>Banking system</i>	119.9	86.7
Foreign	118.7	85.1
Domestic private	113.3	101.4
Public	127.8	80.9
IFS Annual Data: Deposit Money Banks	December 1994	December 2001
Claims on the private sector		
As a percentage of total assets	69.7	54.4
As a percentage of total deposits	121.6	84.6
As a percentage of GDP	20.0	20.2

Sources: Central Bank of Argentina; IMF, *International Financial Statistics*; and authors' calculations.

Note: This table shows different measures of banks' intermediation activities in Argentina at two points in time: at the beginning of the sample period (December 1994 or January 1995, depending on the source of information), and immediately prior to the crisis (December 2001). Measures were constructed from two sources: International Financial Statistics (IFS) annual data for deposit money banks, and monthly individual bank balance sheet information from the Central Bank of Argentina's banking system database, from which the intermediation indicators were constructed by the authors for the banking system as a whole, and for subgroups of foreign, domestic private, and public banks. Regarding the measures derived from IFS data, total assets are defined as the sum of reserves, foreign assets, and claims on the central government, state and local government, official entities, and the private sector. Total deposits are defined as the sum of demand, time, savings, and foreign currency deposits.

2000, then fell by close to 18 percent in 2001 (Table 4). Furthermore, the disaggregated bank data show that the run appeared to be most severe on the domestic private banks, whose deposits fell by 36 percent; foreign banks suffered a drop of 17 percent and public banks lost close to a quarter of their deposits during 2001.

Thus, it is clear that in the years leading up to the crisis, Argentine banks increased their exposure to currency risk, to credit risk to the extent that a large proportion of their increased foreign currency lending was to unhedged borrowers, and to the risk of a significant capital loss arising from an eventual government default. Furthermore, and partly as a result of these exposures, they also suffered a run on their deposits, particularly during 2001.

Cross-Bank Variation

However, it is possible that the aggregate figures might be concealing considerable variation across banks. This appears to be the case, as we show in Table 5. At end-2001 the degree of exposure to currency risk and to government default, and the size of the deposit withdrawals, all varied noticeably across banks. We will examine each of these in turn.

Table 4. Deposit Growth in Argentina

Central Bank Monthly Data	Average Growth 1995–2000	2001
Annualized growth of deposits		
<i>Banking system</i>	11.3	–23.1
Foreign	30.5	–17.1
Domestic private	–3.4	–36.3
Public	8.6	–24.7
IFS Annual Data: Deposit Money Banks		
Total deposits	21.1	–17.8

Sources: Central Bank of Argentina; IMF, *International Financial Statistics*; and authors' calculations.

Note: This table shows the average annual growth rate of bank deposits in Argentina during two periods: an early high-growth period running from the mid-1990s until the peak of deposits in 2000, and a second period of negative growth up until the end of 2001. Growth rates were constructed from two sources: International Financial Statistics (IFS) annual data for deposit money banks, and monthly individual bank balance sheet information from the Central Bank of Argentina's banking system database, from which the growth rates were obtained for the banking system as a whole, and for subgroups of foreign, domestic private, and public banks. Average annual growth rates were computed for the period between January 1995 and January 2001, and between December 2000 and December 2001. Regarding the measures derived from IFS data, total deposits are defined as the sum of demand, time, savings, and foreign currency deposits.

Table 5. Cross-Bank Variation in Key Indicators in 2001

	Ranges				
	0 to 20%	20 to 40%	40 to 60%	60 to 80%	80 to 100%
1. Dollarization					
(a) Foreign currency deposits/total deposits					
<i>Number of banks</i>	6	10	20	24	22
Domestic private	4	5	11	6	6
Foreign private	1	2	7	13	14
Public	1	3	2	5	2
(b) Foreign currency loans/total loans					
<i>Number of banks</i>	7	11	20	24	24
Domestic private	4	5	11	6	8
Foreign private	2	3	7	13	14
Public	1	3	2	5	2

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Table 5 (concluded)

	< -10%	-10 to 10%	10 to 30%	30 to 50%	> 50%
(c) Foreign exchange position/total assets					
<i>Number of banks</i>	24	42	10	1	2
Domestic private	16	14	3	0	0
Foreign private	5	19	7	1	2
Public	3	9	0	0	0
	0-20%	20-40%	40-60%	60-80%	> 80%
(d) Foreign currency loans to the private sector/total assets					
<i>Number of banks</i>	8	20	28	16	14
Domestic private	5	9	13	4	3
Foreign private	1	4	14	10	10
Public	2	7	1	2	1
2. Claims on the government	0 to 10%	10 to 20%	20 to 30%	30 to 40%	> 40%
Government bonds/total assets					
<i>Number of banks</i>	57	22	3	1	3
Domestic private	19	13	2	0	0
Foreign private	27	8	1	0	3
Public	11	1	0	1	0
3. Run on Deposits	< -20%	-20 to -10%	-10 to 0%	0 to 10%	> 10%
Deposit growth December 2000 to December 2001					
<i>Number of banks</i>	22	17	21	14	7
Domestic private	7	9	10	6	1
Foreign private	11	5	8	6	6
Public	4	3	3	2	0

Source: Authors' calculations based on bank balance sheets provided by the Central Bank of Argentina.

Note: This table shows the variability in key banking indicators across banks in Argentina in 2001. Based on monthly individual bank balance sheet information from the Central Bank of Argentina's banking system database, ranges were constructed for each indicator, and the table reports the number of banks falling within each range for a given indicator. The table also shows the number of banks falling within a given range in each subgroup of foreign, domestic private, and public banks. Three main types of indicators are shown: dollarization, expressed as the ratios of foreign currency loans to total loans, foreign currency deposits to total deposits, and foreign currency position (foreign currency loans minus foreign currency deposits) to total assets; claims on the government, expressed as the ratio of government bond holdings by banks to total assets; and run on deposits, defined as the growth rate of total deposits from December 2000 to December 2001.

Regarding currency risk, although many banks exhibited noticeably high dollarization levels, there were still a sizable number of banks (about 44 percent of them) with less than 60 percent of their loans or deposits denominated in foreign currency, and some banks even had levels below 20

percent. Furthermore, the distribution of dollarization was not the same for deposits and loans; for example, there appeared to be more banks with extremely high (more than 80 percent) dollarization of loans than of deposits. Therefore, as one would expect, the net foreign currency positions varied considerably across banks as well. Most banks exhibited a negative foreign currency position at the end of 2001; that is, foreign currency deposits were generally greater than foreign currency loans. On the other hand, roughly one-fourth of banks had a positive position at end-2001. There was also considerable cross-bank variation in the extent to which foreign currency loans were directed to the private sector, although a good number of the banks were clustered around the 40–60 percent range.

Government debt financing also exhibited variability across banks. Whereas most banks held less than 10 percent of their assets in government bonds, there were many that had more than 10 or even 20 percent of their assets in these securities.

Finally, the deposit run, although it affected a very large segment of the banking system, was far from being equal across all banks. In fact, a fourth of all banks actually enjoyed positive deposit growth during 2001, and some banks even experienced deposit growth in excess of 10 percent.

To summarize the descriptive results of this section, we observed behavior by the banking system that led to increased exposure to currency and government default risk, and we documented the run on overall deposits that occurred during 2001. However, we also found there to be considerable cross-bank variability both in the risky behavior and in the extent to which banks were hurt by depositors. This points to the need to use a panel data approach to separate the possible bank-specific factors from the macroeconomic variables that may have led to the precarious situation in which Argentine banks found themselves by the end of 2001. We describe the estimation procedure and results in the next section.

III. Econometric Analysis

Our approach was to test for the effect of bank-specific and macroeconomic factors on banks' risk exposure and deposit growth, using a panel containing about 90 banks and monthly observations for the four-year period between January 1998 and December 2001. Therefore, it comprises virtually the entire Argentine banking system for the key period during which risk exposure increased and deposits fell. Furthermore, as discussed in the Introduction, in 1998 many analysts considered the Argentine banking system to be solid and well managed and also to be one of the the best regulated and supervised among emerging economies. Their analysis, based on CAMEL-type¹⁵ bank fundamentals, did not at the aggregate level

¹⁵The acronym refers to the evaluation of the financial condition of individual banks based on the following criteria: capital adequacy, asset quality, management, earnings, and liquidity.

reveal the kinds of vulnerabilities that would later plague the Argentine banking system. However, it is possible that there is still relevant information contained in these fundamentals, namely their variation across banks, that may help explain the extent to which the increase in different risk exposures also varied across banks. We also were interested in testing whether other bank characteristics, for instance their ownership, were significant in explaining the risk exposure. Finally, we controlled for the macroeconomic risk factors affecting all banks simultaneously. Our regression equation may be summarized as follows:

$$E_{it} = \alpha_0 + \alpha_1 FUND_{it-l} + \alpha_2 BANK_i + \alpha_3 MACRO_t + \varepsilon_{it}. \quad (1)$$

The dependent variables (E) relating to risk exposure and deposit growth are regressed on vectors of bank fundamentals ($FUND$), other bank-specific characteristics ($BANK$), and macroeconomic factors ($MACRO$). Note that the $BANK$ variables are generally not expected to change much over time; therefore, they act much in the same way as an intercept shift in ordinary-least-squares (OLS) regressions. As an alternative, we also ran fixed effects estimations, in which all bank-specific but time-invariant factors are summarized in the fixed effects themselves. The $FUND$ variables were lagged by l periods depending on the regression. Lagging the bank fundamentals had two main advantages. It allowed us to capture the time required for either bank managers or depositors to react to previous information on the state of the banks, and it also helped to ameliorate endogeneity problems arising from the possible effect of the risk exposures on the bank fundamentals themselves.

The dependent variables were (1) the percentage of foreign currency deposits (FDD); (2) the percentage of foreign currency loans to the private sector (FPL);¹⁶ (3) the net foreign exchange position (foreign currency loans minus deposits) as a percentage of total assets (FP); (4) government financing by banks as a percentage of total assets ($NGOV$); and (5) the deposit growth rate in 12-month ($AGDEP$) and monthly ($GDEP$) terms.

Our three basic groups of explanatory variables are defined as follows. The components of bank fundamentals ($FUND$) were (1) capitalization, as measured by the capital-asset ratio ($CAPR$); (2) liquidity, measured by the ratio of liquid assets to total assets (LIQ); (3) credit risk, measured by the ratio of nonperforming loans to total loans ($NPLL$); and (4) profitability ($PROFIT$), as measured by the ratio of before-tax profits to assets. The components of $BANK$ were (1) bank size, measured by each bank's market share of assets in each period ($SIZE$); and (2) dummy variables for bank ownership, $PRIVATE$ and $FOREIGN$. The $MACRO$ variables were (1) currency risk ($CURISK$), as measured

¹⁶In order to avoid double counting, we excluded from FPL foreign currency loans to the government, because these are already included in our measure of financing to the government, $NGOV$.

by the spread between dollar- and peso-denominated interbank rates;¹⁷ (2) the monthly central government balance as a percentage of GDP (*FISCAL*), to capture the growing financing requirement of the public sector; and (3) the stock market index (*MERVALNB*), to reflect market expectations on the state of the economy.¹⁸ In addition, we also included some of the exposure variables to test whether the three types of exposures were correlated with each other. After removing outliers among the fundamental and exposure variables,¹⁹ we ran OLS and fixed-effects (FE) regressions for the Argentine banking system in the 1998–2001 period. We report the results in Tables 6–9.

Foreign Currency Operations

Our results for the foreign currency operations of banks—deposits, loans, and the net position—are shown in Table 6, where each column corresponds to *FDD*, *FPL*, and *FP*, respectively. In general, lagged bank fundamentals appear to be jointly significant, as shown by the results of the corresponding *F*-test for all three dependent variables, and macro variables are also highly significant in explaining time variation in foreign currency operations. We ran an OLS version of the equation in which we included the time-invariant bank ownership variables as well as size. The latter, because it exhibits some time variation as well, was also included in the fixed effects estimations. From the OLS regressions we also obtained a measure of the bank fundamentals' contribution to explanatory power,²⁰ and found

¹⁷In earlier drafts we used a country risk indicator, *CRISK*, measured as the JP Morgan Emerging Market Bond Index (EMBI) spread for Argentina. Following comments received, and in order to isolate the currency risk component not directly captured by the other two macroeconomic controls, we opted to use *CURISK* instead. The results were similar in all regressions except in those for government financing, where *CURISK* had a more intuitively reasonable effect than *CRISK*. We now report only the regressions with *CURISK*.

¹⁸We also used the headline *MERVAL* Argentine stock market index in earlier drafts of the paper. However, in order to rule out the possibility that overall banking sector performance—through the stock price—was driving the relationship between *MERVAL* and individual bank behavior, we constructed our own nonbanking stock market index, *MERVALNB*, by excluding banking institutions. We found that the degree of correlation between the two indices, although high throughout the sample period, declined appreciably from the third quarter of 1999 onward. Furthermore, both *MERVAL* and *MERVALNB* performed well in our regressions, with consistently significant coefficients in virtually all of the equations. We now report only the regressions using the nonbanking index.

¹⁹In all regressions, we eliminated outliers; observations containing unrealistically high liquidity; loan-asset, government financing, nonperforming loan, or dollarization ratios; or growth rates of loans or deposits. We also excluded cases in which the capitalization ratios were negative. These outliers were generally the result either of data reporting errors or of relatively new institutions growing at high rates from a small base.

²⁰Defined as $1 - R_{nf}^2 / R_f^2$, where the subscript *nf* refers to a regression excluding all fundamentals, and *f* refers to the reported regression including the fundamentals.

that fundamentals account for about half of the explanatory power in the case of foreign currency deposits, and for much more in the other two regressions, in particular, 85 percent in the case of foreign currency lending to the private sector.

Looking at depositor behavior (*FDD*) in the first column, it appears that banks with higher capital and liquidity ratios tended to have a lower portion of foreign currency deposits; thus, depositors may have perceived that these banks were safer and therefore depositors would be slower to increase their

Table 6. Foreign Currency Operations by Argentine Banks

Fixed Effects Estimation	<i>FDD</i>	<i>FPL</i>	<i>FP</i>
Explanatory variables			
<i>Individual bank fundamentals</i>			
<i>CAPR</i> (−1), capital ratio	−0.084 (2.18)**	0.093 (4.65)***	0.208 (6.39)***
<i>LIQ</i> (−1), liquid asset ratio	−0.289 (5.68)***	−0.019 (0.54)	−0.155 (3.58)***
<i>PROFIT</i> (−1), before-tax profits to assets	0.400 (1.87)*	0.708 (4.81)***	0.639 (3.52)***
<i>NPLL</i> (−1), nonperforming loan ratio	−0.031 (2.26)**	−0.021 (2.23)**	−0.025 (2.18)**
<i>NGOV</i> (−1), government financing ratio	0.035 (1.17)	−0.039 (1.95)*	−0.160 (6.40)***
<i>Other bank characteristics</i>			
<i>SIZE</i> , market share of assets	−0.601 (1.09)	−3.953 (10.44)***	−0.508 (1.09)
<i>Macroeconomic variables</i>			
<i>CURISK</i> , currency risk premium	1.62E-05 (2.94)***	2.46E-05 (6.48)***	2.47E-05 (5.27)***
<i>FISCAL</i> , fiscal balance to GDP	−2,412.2 (9.54)***	1,972.2 (11.45)***	3,720.6 (17.35)***
<i>MERVALNB</i> , stock market index	−3.45E-04 (4.97)***	2.28E-05 (0.48)	2.08E-04 (3.54)***
Number of observations	3,066	3,219	3,072
<i>R</i> ² (within)	0.091	0.102	0.149
<i>F</i> -test for joint significance of fundamental variables, <i>p</i> -values in parentheses	10.64 (0.00)	8.71 (0.00)	18.43 (0.00)
<i>F</i> -test for individual effects, <i>p</i> -values in parentheses	219.28 (0.00)	138.46 (0.00)	94.00 (0.00)
OLS estimation, coefficients of bank-specific nonfundamental variables			
<i>SIZE</i>	1.676 (9.05)***	1.171 (11.19)***	0.496 (4.63)***
<i>FOREIGN</i>	0.065 (7.38)***	0.080 (16.22)***	0.096 (18.64)***

Table 6 (concluded)

<i>PRIVATE</i>	0.105 (7.75)***	-0.052 (7.25)***	-0.074 (9.40)***
Contribution of fundamentals to explanatory power (percent)	46.5	85.0	61.6
Adjusted R^2	0.138	0.374	0.327

Sources: Central Bank of Argentina; IMF, *International Financial Statistics*; and authors' calculations.

Note: This table reports fixed effects (FE) and ordinary-least-squares (OLS) regression results of three measures of banks' foreign currency operations (*FDD*, *FPL*, and *FP*) on a set of one-month-lagged bank fundamentals, other bank characteristics, and macro risk variables. In the upper portion of the table, the full set of coefficients for the FE estimations are shown, and in the bottom portion only the OLS coefficients of the nonfundamental bank characteristics (*SIZE*, *FOREIGN*, and *PRIVATE*) are reported, although the bank fundamental and macro variables are also included in these regressions. The banking variables are derived from monthly individual bank balance sheet data obtained from the Central Bank of Argentina's bank database, and are defined as the following ratios: *FDD* (foreign currency deposits to total deposits), *FPL* (foreign currency private sector loans to total assets), *FP* (foreign currency loans minus deposits to total assets), *CAPR* (capital to total assets), *LIQ* (liquid assets to total assets), *PROFIT* (before-tax profits to total assets), *NPLL* (nonperforming loans to total loans), *NGOV* (government securities and other government borrowing to total assets), and *SIZE* (total assets of a given bank to total banking sector assets). Other, time-invariant, bank dummy variables are defined as *FOREIGN* (1 if the bank is foreign-owned, 0 otherwise) and *PRIVATE* (1 if privately and domestically owned, 0 otherwise). The macro variables are: *CURISK* (the spread between dollar and peso-denominated interbank interest rates), *FISCAL* (the ratio of the monthly fiscal balance to GDP), and *MERVALNB* (the Argentine stock market index, recalculated by the authors to exclude banks). In addition to adjusted R^2 and t -statistics, with 10% (*), 5% (**), and 1% (***) significance levels indicated, the table also reports the result of F-tests on joint significance of bank fundamentals and of the individual bank effects, with p -values in parentheses. Finally, the table reports the relative contribution of bank fundamentals to overall explanatory power. This is measured as $1 - R_{nf}^2 / R_f^2$, where R_{nf}^2 is the R^2 from the OLS regression that excludes all bank fundamentals, and R_f^2 is the R^2 from the reported OLS regression (including bank fundamentals).

preference for foreign currency deposits.²¹ However, depositors concentrated fewer of their funds in foreign currency when the bank had a higher exposure to credit risk, as shown by a higher nonperforming loan ratio, although this effect is not very strong.²² Government financing was also positively related to the percentage of foreign currency deposits, although not with high significance. As for the macroeconomic variables, when economy-wide conditions deteriorated, either through an increase in country risk or through

²¹A clarification is warranted. We showed in the descriptive section that over the entire study period the share of foreign currency deposits increased and overall deposits contracted. However, a distinction should be made between an earlier stage, in which there was a pure composition switch toward foreign currency deposits, and a later stage—the deposit run—during which all deposits declined, but the domestic currency component did so more rapidly.

²²In fact, when we estimated this equation using an alternative measure for nonperforming loans, the “broad nonperforming loan ratio,” this effect disappeared.

reductions in the fiscal balance or the stock market index, the share of foreign currency deposits became larger. This reflects the initial reaction of depositors to the increased systemic risk, which would later be followed by a withdrawal of deposits—in both domestic and foreign currency—from the system. As for nonfundamental bank characteristics, the OLS results in the lower panel of Table 6²³ show that, for given fundamentals, all private banks (domestic and foreign) had a larger percentage of foreign currency deposits, which could reflect a perception by depositors that public banks were safer, possibly because of an implicit guarantee. This perception did not appear to extend to large banks, which also tended to have greater foreign currency deposits.

In the descriptive section, we saw that banks made efforts to offset their increasingly dollarized deposits by lending in foreign currency, presumably to a substantial degree to an unhedged private sector. The second column of Table 6 (*FPL*) shows that it was generally the lower-risk banks—those more highly capitalized, more profitable, and with lower credit risk—that tended to lend more actively in foreign currency. Interestingly on the macro side, country risk increased banks' foreign currency lending, but fiscal deteriorations and stock market declines tended to reduce it. Thus, it appears that banks attempted to offset the increase in macroeconomic currency risk by lending in foreign currency, whereas stock market declines would signal a weakening of the private sector's repayment capacity, thus causing banks to cut back on foreign currency lending. At this point, however, it is unclear why a fiscal deterioration would lead banks to cut back on their foreign currency lending to the private sector.

The third column of Table 6 shows the effect of bank-specific and macro variables in explaining changes in banks' net currency positions. We see again that relatively profitable, well-capitalized banks with low credit risk tended to increase their foreign currency position by more, whereas liquid banks or those holding more government bonds tended to lower their net position. Regarding the macroeconomic variables, the progressively increasing country risk tended to induce banks to increase their foreign currency position, while the deteriorating fiscal situation and slumping stock market tended to have the opposite effect. The increase in country risk led depositors to increase their preference for foreign currency deposits, but banks reacted by expanding foreign currency loans even more. On the other hand, because the stock market decline and fiscal deterioration tended to increase the public's preference for foreign currency deposits and simultaneously reduce banks' willingness to lend in foreign currency,²⁴ these effects reinforced each other to reduce banks' net foreign currency position toward the end of the sample period.

²³In Table 6—as well as in Tables 7 and 9—we report the OLS coefficients for only the three nonfundamental bank characteristics, although all fundamental and macro variables were also included. The OLS results on these variables did not differ substantially from those obtained in the FE estimations shown in the upper panel.

²⁴Similarly, as imperfectly hedged borrowers perceived an increase in the risk of a devaluation, their *demand* for foreign currency loans may have declined as well.

Looking at the OLS coefficients in the lower panel of Table 6 allows us to examine whether the net position differed significantly across banks according to type of ownership. We find that large banks tended to increase their net position more, given the same fundamentals. Domestic private banks did so less than public banks, owing to a lesser willingness to lend in foreign currency. Finally, foreign banks were the ones who most offset foreign currency deposits by expanding their foreign currency loans.

To summarize, both macroeconomic and bank-specific variables measuring different types of risk had a measurable impact on bank foreign

Table 7. Government Financing by Argentine Banks

Fixed Effects Estimation				
Dependent Variable: Government Financing As a Percentage of Total Assets (<i>NGOVB</i>)				
Explanatory variables				
<i>Individual bank fundamentals</i>				
<i>CAPR</i> (−1), capital ratio	0.236 (13.25)***	0.056 (2.31)**	0.243 (13.38)***	0.056 (2.36)**
<i>LIQ</i> (−1), liquid asset ratio	0.022 (0.66)	0.054 (1.67)*	0.019 (0.58)	0.021 (0.67)
<i>PROFIT</i> (−1), before-tax profits to assets	0.231 (1.63)	0.064 (0.46)	0.248 (1.77)*	0.101 (0.73)
<i>NPLL</i> (−1), nonperforming loan ratio	−0.032 (3.67)***	−0.020 (2.34)**	−0.034 (3.85)***	−0.023 (2.64)***
<i>FDD</i> (−1), foreign currency deposit ratio		0.026 (2.19)**		
<i>FPL</i> (−1), private foreign currency loan ratio			−0.058 (3.43)***	
<i>FP</i> (−1), foreign currency position				−0.096 (6.91)***
<i>Other bank characteristics</i>				
<i>SIZE</i> , Market share of assets	−0.776 (2.20)**	−0.497 (1.42)	−0.931 (2.63)***	−0.553 (1.61)
<i>Macroeconomic variables</i>				
<i>CURISK</i> , Currency risk premium	8.98E-06 (2.56)**	8.62E-06 (2.47)**	1.09E-05 (3.09)***	1.16E-05 (3.37)***
<i>FISCAL</i> , Fiscal balance to GDP	−800.9 (4.99)***	−817.8 (5.04)***	−654.9 (3.99)***	−490.0 (2.94)***
<i>MERVALNB</i> , Stock market index	−1.34E-04 (3.02)***	−1.53E-04 (3.48)***	−1.22E-04 (2.75)***	−1.37E-04 (3.17)***
Number of observations	3,220	3,065	3,208	3,068
R^2 (within)	0.104	0.055	0.106	0.068
<i>F</i> -test for joint significance of fundamental variables, <i>p</i> -values in parentheses	45.91 (0.00)	3.46 (0.01)	37.99 (0.00)	11.48 (0.00)
<i>F</i> -test for individual effects, <i>p</i> -values in parentheses	86.61 (0.00)	85.87 (0.00)	76.33 (0.00)	88.21 (0.00)

Table 7 (concluded)

OLS Estimation, Effect of Bank-Specific Nonfundamental Variables				
<i>SIZE</i>	0.208 (2.47)***	0.134 (1.59)	0.489 (6.14)***	0.279 (3.50)***
<i>FOREIGN</i>	0.030 (7.69)***	0.030 (7.72)***	0.049 (12.92)***	0.048 (12.37)***
<i>PRIVATE</i>	0.002 (0.40)	0.000 (0.06)	-0.012 (2.23)**	-0.011 (1.93)*
Contribution of fundamentals to explanatory power (percent)	34.1	36.7	71.3	60.9
Adjusted R^2	0.079	0.085	0.185	0.135

Sources: Central Bank of Argentina; IMF, *International Financial Statistics*; and authors' calculations.

Note: This table reports fixed effects (FE) and ordinary least squares (OLS) regression results of banks' government financing operations on a set of one-month lagged bank fundamentals, other bank characteristics, and macro risk variables. In the upper portion of the table, the full set of coefficients for the FE estimations are shown, and in the bottom portion only the OLS coefficients of the nonfundamental bank characteristics (*SIZE*, *FOREIGN*, and *PRIVATE*) are reported, although the bank fundamental and macro variables are also included in these regressions. The banking variables are derived from monthly individual bank balance sheet data obtained from the Central Bank of Argentina's bank database, and are defined as the following ratios: *FDD* (foreign currency deposits to total deposits), *FPL* (foreign currency private sector loans to total assets), *FP* (foreign currency loans minus deposits to total assets), *CAPR* (capital to total assets), *LIQ* (liquid assets to total assets), *PROFIT* (before-tax profits to total assets), *NPLL* (nonperforming loans to total loans), *NGOV* (government securities and other government borrowing to total assets), and *SIZE* (total assets of a given bank to total banking sector assets). Other bank characteristics included are dummy variables for type of ownership: *FOREIGN* (1 if the bank is foreign-owned, 0 otherwise) and *PRIVATE* (1 if privately and domestically owned, 0 otherwise). The macro variables are: *CURISK* (the spread between dollar and peso-denominated interbank interest rates), *FISCAL* (the ratio of the monthly fiscal balance to GDP), and *MERVALNB* (the Argentine stock market index, recalculated by the authors to exclude banks). In addition to adjusted R^2 and t-statistics, with 10% (*), 5% (**), and 1% (***) significance levels indicated, the table also reports the result of F-tests on joint significance of bank fundamentals and of the individual bank effects in the fixed effects regressions, with p -values in parentheses. Finally, the table reports the relative contribution of bank fundamentals to overall explanatory power. This is measured as $1 - R_{if}^2 / R_f^2$, where R_{if}^2 is the R^2 from the OLS regression that excludes all bank fundamentals, and R_f^2 is the R^2 from the reported OLS regression (including bank fundamentals).

currency operations. Depositors increased their preference for foreign currency denomination, as macroeconomic risk—country risk, rising fiscal deficits, falling stock market—increased. Furthermore, this preference was more pronounced for riskier banks, as measured by capital and liquidity ratios. As these types of deposits grew, banks in turn responded by increasing their foreign currency loans in an attempt to offset a growing exposure of their balance sheets to devaluation risk. However, not all banks did this to the same degree. Highly capitalized banks, as well as those with higher profitability, lower credit risk, and higher liquidity, increased their net position even more.

Table 8. Deposit Growth in Argentina: Bank Fundamentals at Different Lags

Fixed Effects EstimationDependent variable: 12-month real growth rate of deposits (*AGDEP*)

	Lags (<i>l</i>)			
	3 months	6 months	9 months	12 months
Explanatory variables				
<i>Individual bank fundamentals</i>				
<i>CAPR</i> (<i>-l</i>), capital ratio	-0.425 (3.33)***	0.012 (0.09)	0.433 (3.52)***	1.104 (8.90)***
<i>LIQ</i> (<i>-l</i>), liquid asset ratio	0.484 (3.61)***	0.328 (2.15)***	0.018 (0.12)	-0.158 (1.13)
<i>PROFIT</i> (<i>-l</i>), before-tax profits to assets	1.276 (1.88)*	-0.008 (0.01)	-0.604 (0.99)	0.446 (0.65)
<i>NPLL</i> (<i>-l</i>), nonperforming loan ratio	-0.147 (3.89)***	-0.045 (1.30)	0.021 (0.64)	0.049 (1.45)
<i>NGOV B</i> (<i>-l</i>), government financing ratio	-0.197 (2.33)**	-0.027 (0.32)	-0.235 (2.99)***	-0.289 (3.63)***
Number of observations	1,959	1,948	2,003	2,008
<i>F</i> -test for joint significance of fundamental variables, <i>p</i> -values in parentheses	11.65 (0.00)	1.34 (24.63)	4.63 (0.00)	18.47 (0.00)
<i>F</i> -test for individual effects, <i>p</i> -values in parentheses	10.80 (0.00)	12.02 (0.00)	13.13 (0.00)	12.93 (0.00)
<i>R</i> ² (within)	0.202	0.188	0.192	0.208

Sources: Central Bank of Argentina; IMF, *International Financial Statistics*; and authors' calculations.

Note: This table reports fixed effects regression results of Argentine banks' annual real deposit growth on a set of lagged bank fundamentals, other bank characteristics, and macro risk variables. Although the table only reports the coefficients for the bank fundamentals, all regressions also include *SIZE* (the ratio of individual bank assets to total banking system assets), and three macro risk variables: *CURISK* (the spread between dollar and peso-denominated interbank interest rates), *FISCAL* (the ratio of the monthly fiscal balance to GDP), and *MERVALNB* (the Argentine stock market index, recalculated by the authors to exclude banks). The banking variables are derived from monthly individual bank balance sheet data obtained from the Central Bank of Argentina's bank database. The dependent variable (*AGDEP*) is defined as the 12-month growth rate of deposits deflated by the consumer price index, and the bank fundamentals are defined as the following ratios: *CAPR* (capital to total assets), *LIQ* (liquid assets to total assets), *PROFIT* (before-tax profits to total assets), *NPLL* (nonperforming loans to total loans), and *NGOV B* (government securities and other government borrowing to total assets). Other bank characteristics included are dummy variables for type of ownership: *FOREIGN* (1 if the bank is foreign-owned, 0 otherwise) and *PRIVATE* (1 if privately and domestically owned, 0 otherwise). Each column contains the results for bank fundamentals at lags of 3, 6, 9, and 12 months, respectively. In addition to adjusted *R*² and t-statistics, with 10% (*), 5% (**), and 1% (***) significance levels indicated, the table also reports the result of F-tests on joint significance of bank fundamentals and of the individual bank effects, with *p*-values in parentheses.

Furthermore, there appeared to be a trade-off between exposure to currency risk, represented by a lower net position, and exposure to government default, as the coefficient on lagged government financing was negative and significant. Finally, it must also be noted that reduction in currency risk through lending came at the cost of an increase in exposure to credit risk, as many private sector borrowers were themselves vulnerable to a devaluation.

Table 9. Annual Deposit Growth in Argentina

Fixed Effects Estimation				
Dependent variable: 12-month real growth rate of deposits (<i>AGDEP</i>)				
Explanatory variables				
<i>Individual bank fundamentals</i>				
<i>CAPR</i> (−3), capital ratio	−0.423 (3.31)***	−0.429 (3.37)***	−0.382 (2.94)***	−0.358 (2.79)***
<i>LIQ</i> (−3), liquid asset ratio	0.495 (3.72)***	0.495 (3.72)***	0.492 (3.69)***	0.420 (3.12)***
<i>PROFIT</i> (−3), before-tax profits to assets	1.262 (1.86)*	1.218 (1.80)*	1.269 (1.88)*	1.396 (2.07)**
<i>NPLL</i> (−3), nonperforming loan ratio	−0.150 (3.97)***	−0.148 (3.92)***	−0.150 (3.98)***	−0.152 (4.03)***
<i>NGOV</i> (−3), government financing ratio	−0.197 (2.34)**	−0.184 (2.18)**	−0.208 (2.46)***	−0.256 (2.98)***
<i>FDD</i> (−3), Foreign currency deposit ratio		−0.086 (1.25)		
<i>FPL</i> (−3), private foreign currency loan ratio			−0.142 (1.61)	
<i>FP</i> (−3), foreign currency position				−0.237 (3.52)***
<i>Other bank characteristics</i>				
<i>SIZE</i> , market share of assets	11.477 (6.24)***	11.601 (6.31)***	11.163 (6.04)***	11.444 (6.25)***
<i>Macroeconomic variables</i>				
<i>CURISK</i> , currency risk premium	−3.92E-05 (2.87)***	−3.91E-05 (2.88)***	−3.79E-05 (2.79)***	−3.71E-05 (2.74)***
<i>FISCAL</i> , fiscal balance to GDP	6,140.58 (8.67)***	5,957.47 (8.33)***	6,438.90 (8.79)***	6,833.98 (9.34)***
<i>MERVALNB</i> , stock market index	1.80E-03 (8.25)***	1.78E-03 (8.18)***	1.81E-03 (8.32)***	1.83E-03 (8.46)***
Number of observations	1,963	1,961	1,963	1,961
R^2 (within)	0.203	0.204	0.204	0.209
<i>F</i> -test for joint significance of fundamental variables, <i>p</i> -values in parentheses	11.91 (0.00)	10.19 (0.00)	10.37 (0.00)	12.05 (0.00)
<i>F</i> -test for individual effects, <i>p</i> -values in parentheses	10.81 (0.00)	10.78 (0.00)	10.79 (0.00)	11.06 (0.00)

Table 9 (concluded)

OLS Estimation, Effect of Bank-Specific Nonfundamental Variables				
<i>SIZE</i>	1.363 (7.46)***	1.267 (6.82)***	1.216 (6.37)***	1.352 (7.34)***
<i>FOREIGN</i>	-0.033 (3.44)***	-0.035 (3.68)***	-0.040 (4.06)***	-0.032 (3.30)***
<i>PRIVATE</i>	0.056 (4.02)***	0.051 (3.65)***	0.056 (4.03)***	0.056 (3.96)***
Contribution of fundamentals to explanatory power (percent)	32.9	33.6	33.9	32.8
Adjusted R^2	0.185	0.187	0.188	0.843

Sources: Central Bank of Argentina; IMF, *International Financial Statistics*; and authors' calculations.

Note: This table reports fixed effects (FE) and ordinary least squares (OLS) regression results of Argentine banks' annual real deposit growth on a set of three-month lagged bank fundamentals, and contemporaneous values of other bank characteristics and macro risk variables. In the upper portion of the table, the full set of coefficients for the fixed effects estimations are shown, and in the bottom portion only the OLS coefficients of the nonfundamental bank characteristics (*SIZE*, *FOREIGN*, and *PRIVATE*) are reported, although the bank fundamental and macro variables are also included in these regressions. The banking variables are derived from monthly individual bank balance sheet data obtained from the Central Bank of Argentina's bank database. The dependent variable (*AGDEP*) is defined as the 12-month growth rate of deposits deflated by the consumer price index, and the bank fundamentals are defined as the following ratios: *CAPR* (capital to total assets), *LIQ* (liquid assets to total assets), *PROFIT* (before-tax profits to total assets), *NPLL* (nonperforming loans to total loans), *NGOV* (government securities and other government borrowing to total assets), *FDD* (ratio of foreign currency deposits to total deposits), *FPL* (ratio of foreign currency private sector loans to total loans), *FP* (ratio of foreign currency loans minus foreign currency deposits to total assets), and *SIZE* (total assets of a given bank to total banking sector assets). Other bank characteristics included are dummy variables for type of ownership: *FOREIGN* (1 if the bank is foreign-owned, 0 otherwise) and *PRIVATE* (1 if privately and domestically owned, 0 otherwise). The three macro risk variables included are: *CURISK* (the spread between dollar and peso-denominated interbank interest rates), *FISCAL* (the ratio of the monthly fiscal balance to GDP), and *MERVALNB* (the Argentine stock market index, recalculated by the authors to exclude banks). In addition to adjusted R^2 and t -statistics, with 10% (*), 5% (**), and 1% (***) significance levels indicated, the table also reports the result of F-tests on joint significance of bank fundamentals and of the individual bank effects in the FE regressions, with p -values in parentheses. Finally, the table reports the relative contribution of bank fundamentals to overall explanatory power. This is measured as $1 - R_{nf}^2/R_f^2$, where R_{nf}^2 is the R^2 from the OLS regression that excludes all bank fundamentals, and R_f^2 is the R^2 from the reported OLS regression (including bank fundamentals).

Government Financing

In Table 7 we present our estimation findings for the proportion of government financing in total assets (*NGOV*),²⁵ similarly to Table 6, with

²⁵The dependent variable *NGOV* is defined as the broad measure of financing to the government, as in Table 2. It includes government bonds plus lending to the government.

fixed effects results in the upper portion and OLS results for groupwise (size and ownership) tests in the lower portion. The results show that the extent to which certain banks engaged in government financing was related to their past fundamentals; the *F*-test again shows these variables to be jointly significant across all specifications, and their contribution to explanatory power is between 34 and 71 percent, depending on the specification. Banks with higher capitalization and liquidity and lower nonperforming loan ratios tended to have a higher percentage of financing to the government. Thus, somewhat paradoxically, banks associated with lower risk were more likely to increase their exposure to a government default.

The degree of involvement in foreign currency operations on either the loan or deposit side also mattered. First, banks with highly dollarized deposits tended to finance the government to a larger degree. Also, the portion of such financing denominated in foreign currency was large and increasing. Thus, government financing would serve to help banks to balance their foreign currency position. Second, just as in the foreign currency regressions, foreign currency lending to the private sector was negatively related to government bond holdings, reflecting a trade-off between these two avenues for countering the dollarization of liabilities. Finally, banks that had preferred to maintain a greater currency mismatch on their balance sheet—but lower exposure to credit risk arising from lending in foreign currency to the private sector—would also engage in greater government financing. Banks could reduce their currency mismatch without having to expand credit to unhedged private borrowers. Of course, as the public debt expanded and its sustainability became more suspect, banks incurred an ever greater exposure to the risk of government default, exacerbated by an increasing dollarization of this financing.

Macroeconomic conditions affected the exposure of all banks to the government. As we expected, the fiscal deterioration tended to increase banks' financing of the government significantly. Second, as conditions in the stock market worsened, and presumably the creditworthiness of private companies was also weakened, banks increased their government financing. This is consistent with our previous result that banks reduced their foreign currency lending to the private sector in response to a fall in the stock market index. Finally, upward movements in currency risk—the spread between peso- and dollar-denominated interest rates—also led to an increase in government financing, which, as we found, was increasingly denominated in foreign currency.

Looking at the OLS results in the lower panel of Table 7, we find that, given the same fundamentals, large banks would engage more in lending to the government. Interestingly, foreign banks tended to lend more to government—given the same fundamentals—than public banks. Finally, domestic private banks were the least likely to expand credit to the government.

To summarize, government financing was associated with both changes in the macro environment and differences across banks. First, although these

operations were spurred to a significant degree by the fiscal deterioration and worsening conditions in the domestic private sector, they tended to be favored by traditionally lower-risk or prudent banks. Second, for similar levels of fundamentals, public and foreign banks were significantly more active in accumulating claims on the government. Third, lending to the government tended to crowd out foreign currency lending to the private sector. This helps to explain why fiscal difficulties, which directly increased the government's demand for bank financing, also led banks to reduce private sector lending in foreign currency. Finally, one result stands out: the banks with strongest fundamentals—those that one might associate with a more prudent stance toward risk taking—tended to be those more active in lending to the government, thus implying that banks perceived the government to be the safer debtor at the time.

One alternative interpretation is that bank behavior was affected by a pro-government bias in prudential regulation. Particularly in times of mounting macroeconomic distress, lending to the government provided banks with a low-cost alternative for complying with capital adequacy requirements and gaining access to liquidity assistance.²⁶ For example, the Basel I risk-based capital regulations adopted by Argentina in the mid-1990s assigned much lower requirements for loans to the government in comparison to loans to the private sector. Norms designed to promote asset diversification, limiting the maximum exposure to a single debtor, did not apply to a broad class of government financing instruments. Finally, capital requirements related to market risk exempted those government bonds that appeared in the “investment accounts” of commercial banks' balance sheets.

Deposit Growth

Two recent studies have examined the issue of market discipline in the context of the Argentine crisis. De la Torre, Levy-Yeyati, and Schmukler (2003) contrasted depositor behavior in the 1997–99 pre-crisis, or tranquil, period with that in the 2000–01 crisis period. They found that the pre-crisis period was characterized by a measurable degree of market discipline, as certain individual bank fundamentals proved to be significant predictors of subsequent deposit growth. However, market discipline appeared to break down considerably in the crisis period, where systemic risk, rather than bank-specific factors, tended to explain deposit growth. In other words, the bank run appeared to be indiscriminate, affecting risky and safe banks equally. Levy-Yeyati, Martínez Pería, and Schmukler (2004) revisited this issue for

²⁶Also it is possible that safer banks had higher costs of compliance with prudential regulations; thus, lending to the government would have helped those banks to level the playing field vis-à-vis the banks with weaker fundamentals and therefore lower costs of compliance.

both Argentina and Uruguay and refined the analysis. They argued that the very concept of market discipline should be reformulated in the context of emerging economies facing large systemic shocks. The statistical link between depositor behavior and traditional bank fundamentals disappears during a period of large systemic shocks, and this may be due to the fact that the systemic variables tend to swamp the effect of fundamentals, and the informational content of traditional fundamentals decreases tremendously. Furthermore, their study showed how, once the deposit growth regressions included measures of banks' exposure to systemic risk along with the systemic variables, depositor behavior in the crisis period turned out to be quite consistent with market discipline.

Our objective in this section is to draw on the framework developed above and examine several additional hypotheses. We examine whether other bank-specific (nonfundamental) characteristics were relevant to depositors and whether the lags on fundamental variables matter, because it is possible that, as the macro situation became more uncertain and volatile, depositors' assessment of financial information released by banks would change. Finally, we focus our analysis on the deposit run period itself, to see if support for the above hypotheses is strengthened or weakened during this subperiod.

Regarding the relevance of lag length, we ran regressions for the 12-month growth rate of real deposits (*AGDEP*), and compared the results obtained with lags in the fundamental variables of 3, 6, 9, and 12 months.²⁷ Several results become apparent, as shown in Table 8. We see that bank fundamentals were generally jointly significant, with the exception of the estimation with a six-month lag. Second, at least one bank fundamental was significant at every lag. Third, we can see that with a three-month lag a greater number of bank fundamentals were significant, although the capital ratio has a counterintuitive negative sign, suggesting that depositors preferred less capitalized banks. Fourth, we find that once the lag reached nine months, depositors ceased to care about the signals on credit risk, profitability, or liquidity, whereas they began to prefer banks with a history of higher capitalization. Thus, during this pre-crisis period, shorter-term signals on bank credit quality, liquidity, and profitability tended to drive depositors' preferences, while short-term signals on capitalization proved to be less informative, and depositors tended to rely on past history instead.

Another interesting result was that financing to the government was negatively related to the growth rate of deposits. On the one hand, this could simply reflect the macro pressures that caused all banks to increase their financing to the government and aggregate deposits to decelerate. However,

²⁷For this comparison we used the simplest specification, which includes the fundamentals not related to currency exposure (*CAPR*, *LIQ*, *PROFIT*, *NPLL*, and *NGOV*) and the three macroeconomic controls (*CURISK*, *FISCAL*, and *MERVALNB*).

because we also controlled for the fiscal balance—which was negatively related to deposit growth—the effect of *NGOV* more likely reflected depositors’ preference for banks with lower exposures to the public sector. Thus, although results of our previous estimations implied that banks used government financing as a safer alternative when conditions in the corporate sector worsened, the fiscal outcome weakened, and currency risk became greater, the deposit growth estimations implied that depositors were conscious of the risks inherent in accumulating government debt.

In Table 9 we chose a lag length of three months, in which a greater number of fundamentals are statistically significant, and report the full results for the deposit growth regressions. As in previous tables, the fixed effects estimations are shown in the upper portion, and OLS estimations for groupwise comparisons in the lower one. In the first column, we excluded all foreign currency variables, and in each of the following three columns we included one foreign currency variable at a time. Bank fundamentals were jointly significant throughout all specifications and contributed about a third of the explanatory power. More specifically, depositors valued traditional fundamentals: liquidity, profitability, and loan quality. In addition, depositors tended to prefer banks with a lower exposure to the government. As for foreign currency operations, there was no inherent preference for banks having greater foreign currency operations on the deposit or lending side, but depositors preferred banks that had lower net positions. Thus, depositors also appeared to recognize the additional risk incurred by expanding foreign currency loans to offset the currency mismatch. The OLS results indicate that depositors preferred larger banks, perhaps reflecting their perception of these institutions as being “too big to fail.” On the other hand, they also preferred domestic banks in general over foreign banks, and private over public banks. Finally, macroeconomic variables also proved to be significant in explaining deposit growth. Bank deposits in general decelerated as currency risk grew, the fiscal balance deteriorated, or the stock market index fell.

Robustness Checks

We conducted several robustness checks on the regressions for government finance, foreign currency operations, and, particularly, deposit growth.²⁸ We describe these below.

Alternative lags in government finance and foreign currency regressions

As in the deposit growth estimations, we estimated the equations for government finance and foreign currency operations using longer (three- and

²⁸Some of the results of robustness checks are not fully reported in this paper. However, they are available upon request from the authors.

six-month) lags of the fundamental variables. We found that most of the results continued to hold, with two main exceptions. First, the significance of the capital and nonperforming loan ratios declined somewhat as the lag length was increased; in some cases they became nonsignificant at a 10 percent level. Second, the trade-off between government financing and foreign currency lending to the private sector became less apparent; in fact, foreign currency lending became positively and significantly related to the level of government financing lagged six months.

Monthly growth rate of deposits

We also ran regressions in which the dependent variable was the real *monthly* percentage change in deposits (*GDEP*), rather than the annualized change. These results were qualitatively similar to those using 12-month growth rates. Deposit growth was positively correlated with bank profitability and liquidity, negatively correlated with high percentages of government financing and nonperforming loans, and negatively related to adverse conditions in the macroeconomy. However, owing to the higher volatility of monthly deposit growth, the statistical significance and explanatory power of all regressors were noticeably lower than in the smoothed year-on-year growth rates; in fact, the fundamentals ceased to be jointly significant. Furthermore, the OLS regressions continued to reflect a preference for larger and domestic banks, but the preference for private over public banks became less clear. Thus, the volatility of month-to-month changes in deposits was therefore smoothed considerably by annualizing, by eliminating an important seasonal component.

Focusing on time deposits

We also estimated the deposit growth regressions for time deposits (*AGTIME*), rather than deposits as a whole, to test whether the former would be more sensitive to bank-specific risk as well as macroeconomic risk. This does not appear to be the case. Compared to total deposits, time deposits were slightly more sensitive to foreign currency lending to the private sector, but not as sensitive to bank liquidity, government financing, or overall currency risk. All other results were broadly similar to those for total deposits.

Exploring possible market segmentation

As we showed earlier, dollarization on the deposit and lending side, as well as the net foreign currency position, exhibited a fair amount of variation across banks. However, it could be argued that such variation was simply a reflection of the existence of a large number of small transaction-oriented or retail banks that, by definition, had very little involvement in foreign exchange operations, while a group of larger and more sophisticated banks would tend to concentrate the bulk of the system's foreign currency

operations. Thus, a negative coefficient of a dollarization variable in the deposit growth equation could be showing that only larger banks relying on time deposits would suffer withdrawals during the crisis. More generally, it could also have been possible that the results were being driven by the presence of these retail banks in the sample.

We addressed these issues in various ways: (1) by reestimating the equations for *AGDEP* over a sample that excluded the 20 percent of banks that were smallest; (2) by reestimating over a sample that excluded the 20 percent of banks with the lowest ratio of time deposits to total deposits; (3) by including interaction terms between bank size and the macro variables; and (4) by including interaction terms between the time deposit ratio and the macro variables. We found that restricting the sample by size (1), or by the time deposit ratio (2), made very little difference in the results; dollarization of deposits or private sector loans continued to be nonsignificant, while the foreign exchange position was still negatively and significantly related to deposit growth. However, when using interaction terms in exercises (3) and (4), we found evidence that depositors' sensitivity to changes in the macroeconomic environment—as measured by the fiscal balance and the stock market index—was indeed greater for larger banks and/or those with higher shares of time deposits. Paradoxically, these banks exhibited less sensitivity of deposits to currency risk.²⁹

Changes in depositor sensitivity to fundamentals over time

Another issue we wished to explore was whether depositors' sensitivity to bank fundamentals changed over time and, more specifically, as a result of the worsening macroeconomic outlook. For this purpose, we ran a series of fixed effects estimations including the bank fundamentals, the macro risk variables, and interactions between each of the fundamentals with all three of the macro variables. The coefficients for the interaction terms are shown in Table 10, with each row corresponding to a different regression. Overall, we see that many of the interaction terms were statistically significant, and that bank fundamentals in conjunction with interactions with the macro variables together accounted for more than 80 percent of the explanatory power.

Looking at the effect of specific macro variables, as currency risk increased, depositors' positive reaction to liquidity and profitability rose, as did their negative reaction to nonperforming loans and, not surprisingly, to foreign currency lending to the private sector and to the net foreign position.

²⁹As Table 9 shows, we found the effect of currency risk (*CURISK*) on deposit growth to be negative. Thus, a positive coefficient on the interaction terms *SIZE*CURISK* and *TIMEDep*CURISK* implies that larger and more time deposit-oriented banks were less likely to suffer deposit withdrawals from an increase in currency risk. Perhaps depositors perceived that these banks were managing their currency risk more effectively; at the same time, depositors may have felt that there was little these banks could do in the face of other deteriorating macroeconomic conditions.

Table 10. Annual Deposit Growth in Argentina: Interaction of Bank Fundamentals with Macroeconomic Variables

Fixed Effects Estimation Coefficients		Interaction with Macro Risk Variables		R^2 (within)	Number of observations	Contribution of Fundamentals to Explanatory Power in OLS Regression (Percent)
Dependent variable: 12-month real growth rate of deposits (<i>AGDEP</i>)		Interaction with Macro Risk Variables				
Bank Fundamentals		Interaction with Macro Risk Variables		R^2 (within)	Number of observations	Contribution of Fundamentals to Explanatory Power in OLS Regression (Percent)
		<i>CURISK</i>	<i>FISCAL</i>			
		<i>CURISK</i>	<i>FISCAL</i>	<i>MERVALNB</i>		
<i>CAPR</i> (-3), capital ratio	-5.28E-04 (5.63)***	-41,087.59 (7.26)***	-0.007 (4.40)***	0.23	1,963	84.2
<i>LIQ</i> (-3), liquid asset ratio	4.23E-04 (1.72)*	-48,201.03 (2.93)***	0.006 (1.40)	0.21	1,963	82.4
<i>PROFIT</i> (-3), before-tax profits to assets	0.006 (2.49)**	161,393.6 (1.24)	0.084 (1.97)**	0.21	1,961	82.3
<i>NPLL</i> (-3), nonperforming loan ratio	-2.04E-04 (2.18)**	-26,165.92 (5.80)***	-0.003 (2.23)**	0.22	1,961	82.6
<i>NGOVB</i> (-3), government financing ratio	-8.01E-05 (0.68)	2,230.4 (0.27)	-1.54E-04 (0.07)	0.20	1,961	82.0
<i>FDD</i> (-3), foreign currency deposit ratio	-1.79E-05 (0.39)	15,251.0 (4.60)***	-3.54E-04 (0.36)	0.22	1,961	82.0
<i>FPL</i> (-3), private foreign currency loan ratio	-2.61E-04 (2.21)**	5,081.5 (0.84)	-0.006 (3.14)***	0.21	1,963	81.9
<i>FP</i> (-3), foreign currency position	-2.20E-04 (2.28)**	-4,923.177 (0.89)	-0.003 (3.44)***	0.21	1,961	80.7

Sources: Central Bank of Argentina; IMF, *International Financial Statistics*; and authors' calculations.

Note: This table reports fixed effects (FE) regression results of Argentine banks' annual real deposit growth on a set of three-month lagged bank fundamentals, contemporaneous values of other bank characteristics and macro risk variables, and interactions terms between the macro risk variables (*CURISK*, *FISCAL*, and *MERVALNB*) and the bank fundamentals (*CAPR*, *LIQ*, *PROFIT*, *NPLL*, *FDD*, *FPL*, and *FP*). The table displays the coefficients for only the interaction terms. All banking variables are derived from monthly individual bank balance sheet data obtained from the Central Bank of Argentina's bank database. The dependent variable (*AGDEP*) is defined as the 12-month growth rate of deposits deflated by the consumer price index, and the other bank variables are defined as the following ratios: *CAPR* (capital to total assets), *LIQ* (liquid assets to total assets), *PROFIT* (before-tax profits to total assets), *NPLL* (nonperforming loans to total loans), *NGOVB* (government securities and other government borrowing to total assets), and *SIZE* (total assets of a given bank to total banking sector assets). The three macro risk variables included are: *CURISK* (the spread between dollar and peso-denominated interbank interest rates), *FISCAL* (the ratio of the monthly fiscal balance to GDP), and *MERVALNB* (the Argentine stock market index, recalculated by the authors to exclude banks). Adjusted R^2 and t-statistics are displayed with 10% (*), 5% (**), and 1% (***) significance levels indicated. The table also reports the result of F-tests on joint significance of bank fundamentals and of the individual bank effects in the FE regressions, with p -values in parentheses. Finally, the table reports the relative contribution of bank fundamentals to overall explanatory power. This is measured as $1 - R_{ref}^2/R^2$, where R_{ref}^2 is the R^2 from the ordinary least squares (OLS) regression that excludes all bank fundamentals, and R^2 is the R^2 from the reported OLS regression (including bank fundamentals and their interactions with macro risk variables).

The fiscal deterioration also led depositors to increase their positive view of bank liquidity and tended to make foreign currency deposits more attractive, but it also had the paradoxical effect of making depositors *less* responsive to nonperforming loans.³⁰ The stock market index had the expected effect on depositor response to credit risk; as the index collapsed, depositors became even more likely to withdraw from banks with high nonperforming loan ratios. At the same time, however, depositors became *less* likely to withdraw from banks with low profitability or positive foreign currency positions. Another interesting result is that depositors' sensitivity to government financing did not seem to be affected by changes in the macro environment; none of the interaction terms were statistically significant. Finally, recalling that the three-month lag specification yielded a counterintuitive negative coefficient for bank capitalization, the inclusion of interaction terms may shed some light on this issue. It appears that two macro factors—the fiscal weakening and stock market decline—made depositors view capitalization more favorably, but it was the third factor—rising currency risk—that contributed to a negative response to capitalization.

Focusing on the deposit run

So far, all the above regressions encompassed both an initial period of overall deposit growth and a subsequent deposit run period. However, depositor behavior may have changed between periods, becoming more or less sensitive to bank-specific characteristics. Therefore, we were also interested in focusing on the deposit run period to determine whether individual banks' deposit loss during the crisis was related to *ex ante* bank variables. We defined the deposit run period as beginning in September 2000—the peak of total deposits in the banking system in real terms—and ending in November 2001.³¹ We ran cross-section regressions of each bank's real deposit growth rate during this period as a function of bank-specific characteristics and fundamentals evaluated at their average value during July–September 2000.

The cross-section results, as shown in Table 11, support the existence of market discipline, because the amount of deposits withdrawn from a given bank was related to some of the bank fundamentals prior to the run. Banks with lower capitalization and higher nonperforming loan rates and those with greater financing to the government tended to suffer greater deposit

³⁰One possible interpretation is that, as fiscal performance faltered, the exposure of banks to the private sector became less relevant to depositors. Of course, this argument would be stronger if one observed simultaneously that depositors became more responsive to banks' levels of government financing. Unfortunately, this is not the case, as Table 10 shows.

³¹We preferred this ending date over December 2001 because the latter contained the effect of a regulation in November 2001 requiring private pension funds to increase their holdings of government bonds. Because this caused an additional and somewhat indiscriminate deposit run in December, the significance of bank-specific variables was higher when using November 2001 as the ending date.

Table 11. The Argentine Deposit Run

OLS Estimation

Dependent variable: Real growth rate of deposits from banking sector peak (September 2000) to end of period (November 2001).

Explanatory variables

Individual bank fundamentals, average values for July–September 2000

<i>CAPR</i> , capital ratio	1.068 (3.81)***	1.172 (4.12)***	0.875 (2.30)**	0.634 (1.84)*
<i>LIQ</i> , liquid asset ratio	1.470 (1.27)	1.655 (1.44)	0.845 (0.69)	2.062 (1.77)*
<i>PROFIT</i> , before-tax profits to assets	11.918 (0.71)	13.701 (0.83)	15.938 (0.90)	7.503 (0.46)
<i>NPLL</i> , nonperforming loan ratio	-0.396 (1.82)*	-0.411 (1.91)*	-0.365 (1.60)	-0.340 (1.59)
<i>NGOV B</i> , government financing ratio	-0.966 (2.15)**	-0.791 (1.73)*	-0.776 (1.47)	-0.629 (1.35)
<i>DEPR</i> , implicit real interest rate	-70.848 (2.46)**	-55.503 (1.85)*		-49.535 (1.66)
<i>FDD</i> , foreign currency deposit ratio		-0.386 (1.60)		
<i>FPL</i> , private foreign currency loan ratio			0.340 (0.64)	
<i>FP</i> , foreign currency position				0.783 (2.07)**
Bank-specific nonfundamental variables				
<i>TIMEDEP</i> , share of time deposits	0.276 (0.90)	0.425 (1.34)	-0.114 (0.38)	0.353 (1.17)
<i>SIZE</i> , market share of assets	1.073 (0.57)	1.551 (0.83)	0.784 (0.37)	0.394 (0.21)
<i>FOREIGN</i>	0.012 (0.11)	0.052 (0.47)	0.089 (0.79)	-0.029 (0.27)
<i>PRIVATE</i>	-0.150 (0.99)	-0.150 (1.01)	-0.166 (1.03)	-0.085 (0.56)
Number of observations	73	73	71	73
R^2	0.291	0.320	0.227	0.338

Sources: Central Bank of Argentina; IMF, International Financial Statistics; and authors' calculations.

Note: This table reports cross-section ordinary least squares (OLS) results of Argentine banks' real growth rate of deposits from the sector-wide peak to the end of the study period, regressed on a set of bank fundamentals and other characteristics evaluated at their average values just before the peak. The banking variables are derived from monthly individual bank balance sheet data obtained from the Central Bank of Argentina's bank database. The dependent variable ($AGDEP_{2000-2001}$) is defined as the growth rate of total deposits deflated by the consumer price index from September 2000 to November 2001, and the bank fundamentals are defined as the following ratios evaluated at their average values during July–September 2000: *CAPR* (capital to total assets), *LIQ* (liquid assets to total assets), *PROFIT* (before-tax profits to total assets), *NPLL* (nonperforming loans to total loans), *NGOV B* (government securities and other government borrowing to total assets), *FDD* (ratio of foreign currency deposits to total deposits), *FPL* (ratio of foreign currency private sector loans to total loans), *FP* (ratio of foreign currency loans minus foreign currency deposits to total assets), and *SIZE* (total assets of a given bank to total banking sector assets). Other bank characteristics included are dummy variables for type of ownership: *FOREIGN* (1 if the bank is foreign-owned, 0 otherwise) and *PRIVATE* (1 if privately and domestically owned, 0 otherwise). In addition to adjusted R^2 , the table shows t-statistics with 10% (*), 5% (**), and 1% (***) significance levels indicated.

withdrawals. In particular, the effect of capitalization is now positive, more consistent with market discipline than the puzzling negative effect obtained in the panel data estimations using smaller lag lengths. The effect of the foreign exchange position is also contrary to the panel data results; here depositors appeared to prefer banks with a higher net lending position in foreign currency. Turning to other bank variables, we also included in these regressions the share of time deposits. Presumably, in a period of distress depositors would more readily withdraw time deposits than transaction-driven sight deposits, so we were interested in testing whether a bank's reliance on time deposits would make it more susceptible to a run. Our results show that neither the share of time deposits nor the other nonfundamental variables, relating to size and ownership, were relevant in explaining the deposit loss. Finally, in some of the specifications we found a significant negative effect of the real deposit interest rate (*DEPR*) at the beginning of the period,³² which suggests that the interest rate may have also contained information about bank riskiness.

Testing for market discipline on the deposit interest rate

As a result of this last finding, and as an additional test for market discipline, we ran similar regressions with the *DEPR* as the dependent variable (Table 12). We can observe that the macro risk variables behaved in the expected manner; currency risk, fiscal deterioration, and stock market declines all tended to push up real deposit interest rates. However, bank fundamentals did not behave according to market discipline, whereby depositors would demand higher interest rates from riskier banks. Quite the opposite occurred; it was the stronger banks—those with higher liquidity, profitability, and lower nonperforming loans—that were in a position to offer a higher return to depositors. Furthermore, foreign currency operations on either the asset or liability side had no effect on interest rates. Reviewing the OLS results, given bank fundamentals, larger banks tended to offer lower rates, as did foreign banks. Within domestic banks, private banks offered higher interest rates than their public counterparts.

Government finance: testing for the effect of a regulation in 2001

On the issue of government financing by banks, we were interested in testing whether specific policy actions had had a measurable impact. In particular, in 2001 several measures were enacted to encourage banks to increase their financing of the government, precisely when international markets for Argentine sovereign debt had dried up. Although many of these policies took place at the end of our sample period—thus making it impossible to test their significance—we were able to focus on one that was implemented in April 2001, permitting banks to comply with reserve requirements by acquiring

³²*DEPR* was defined as the ratio between monthly interest paid on deposits to the average monthly stock of deposits, then deflated by the percentage change in the CPI.

“Patriot Bonds” issued by the government. Thus, we reran the government finance regressions including a dummy variable for April 2001 (*D0401*). While the dummy variable itself proved to be highly significant, the significance of the other macroeconomic variables declined noticeably. This is not surprising, given that this policy coincided with a general worsening of macroeconomic conditions, which makes it difficult to disentangle the individual effects of each factor.

Table 12. Real Deposit Interest Rates in Argentina

Fixed Effects Estimation				
Dependent variable: Real deposit interest rate (<i>DEPR</i>)				
Explanatory variables				
<i>Individual bank fundamentals</i>				
<i>CAPR</i> (−3), capital ratio	0.001 (0.24)	0.001 (0.23)	0.001 (0.31)	0.001 (0.26)
<i>LIQ</i> (−3), liquid asset ratio	0.012 (3.52)***	0.012 (3.51)***	0.012 (3.52)***	0.012 (3.46)***
<i>PROFIT</i> (−3), before-tax profits to assets	0.085 (4.84)***	0.090 (4.79)***	0.085 (4.83)***	0.085 (4.83)***
<i>NPLL</i> (−3), nonperforming loan ratio	−0.002 (2.52)**	−0.002 (2.50)**	−0.002 (2.52)**	−0.002 (2.52)***
<i>NGOV</i> (−3), government financing ratio	0.002 (1.09)	0.003 (1.17)	0.002 (1.06)	0.002 (1.04)
<i>FDD</i> (−3), foreign currency deposit ratio		−0.001 (0.85)		
<i>FPL</i> (−3), private foreign currency loan ratio			−0.001 (0.34)	
<i>FP</i> (−3), Foreign currency position				0.000 (0.11)
<i>Other bank characteristics</i>				
<i>SIZE</i> , market share of assets	−0.045 (0.98)	−0.043 (0.93)	−0.047 (1.01)	−0.045 (0.98)
<i>Macroeconomic variables</i>				
<i>CURISK</i> , currency risk premium	6.21E-07 (1.78)*	6.25E-07 (1.79)*	6.28E-07 (1.79)*	6.23E-07 (1.78)*
<i>FISCAL</i> , fiscal balance to GDP	−58.93 (3.25)***	−61.56 (3.35)***	−57.16 (3.03)***	−58.35 (3.09)***
<i>MERVALNB</i> , stock market index	−1.37E-05 (2.45)**	−1.41E-05 (2.52)**	−1.37E-05 (2.44)**	−1.37E-05 (2.44)**
Number of observations	1,963	1,827	1,827	1,827
<i>R</i> ² (within)	0.069	0.070	0.069	0.069
<i>F</i> -test for joint significance of fundamental variables, <i>p</i> -values in parentheses	9.62 (0.00)	8.14 (0.00)	8.03 (0.00)	8.01 (0.00)
<i>F</i> -test for individual effects, <i>p</i> -values in parentheses	5.32 (0.00)	4.87 (0.00)	5.06 (0.00)	4.97 (0.00)

Table 12 (concluded)

OLS Estimation, Effect of Bank-Specific Nonfundamental Variables				
<i>SIZE</i>	-0.001 (0.35)	-0.007 (1.61)	-0.009 (2.07)**	0.001 (0.23)
<i>FOREIGN</i>	-0.001 (4.65)***	-0.001 (5.26)***	-0.001 (2.26)***	-0.001 (3.39)***
<i>PRIVATE</i>	0.001 (2.26)**	0.000 (1.15)	0.001 (2.26)**	0.000 (1.46)
Contribution of fundamentals to explanatory power (percent)	53.9	61.3	60.4	57.1
Adjusted R^2	0.097	0.116	0.114	0.104

Sources: Central Bank of Argentina; IMF, *International Financial Statistics*; and authors' calculations.

Note: This table reports fixed effects (FE) and ordinary least squares (OLS) regression results of Argentine banks' monthly real deposit interest rates on a set of three-month lagged bank fundamentals, and contemporaneous values of other bank characteristics and macro risk variables. In the upper portion of the table, the full set of coefficients for the FE estimations are shown, and in the bottom portion only the OLS coefficients of the nonfundamental bank characteristics (*SIZE*, *FOREIGN*, and *PRIVATE*) are reported, although the bank fundamental and macro variables are also included in these regressions. The banking variables are derived from monthly individual bank balance sheet data obtained from the Central Bank of Argentina's bank database. The dependent variable (*DEPR*) is defined as the ratio of monthly interest paid to average deposits, then deflated by the monthly inflation rate. The bank fundamentals are defined as the following ratios: *CAPR* (capital to total assets), *LIQ* (liquid assets to total assets), *PROFIT* (before-tax profits to total assets), *NPLL* (nonperforming loans to total loans), *NGOV* (government securities and other government borrowing to total assets), *FDD* (ratio of foreign currency deposits to total deposits), *FPL* (ratio of foreign currency private sector loans to total loans), *FP* (ratio of foreign currency loans minus foreign currency deposits to total assets), and *SIZE* (total assets of a given bank to total banking sector assets). Other, time-invariant, bank dummy variables are: *FOREIGN* (1 if the bank is foreign-owned, 0 otherwise) and *PRIVATE* (1 if privately and domestically owned, 0 otherwise). The three macro risk variables included are: *CURISK* (the spread between dollar and peso-denominated interbank interest rates), *FISCAL* (the ratio of the monthly fiscal balance to GDP), and *MERVALNB* (the Argentine stock market index, recalculated by the authors to exclude banks). In addition to adjusted R^2 and t-statistics, with 10% (*), 5% (**), and 1% (***) significance levels indicated, the table also reports the result of F-tests on joint significance of bank fundamentals and of the individual bank effects in the fixed effects regressions, with p -values in parentheses. Finally, the table reports the relative contribution of bank fundamentals to overall explanatory power. This is measured as $1 - R_{nf}^2 / R_f^2$, where R_{nf}^2 is the R^2 from the OLS regression that excludes all bank fundamentals, and R_f^2 is the R^2 from the reported OLS regression (including bank fundamentals).

IV. Conclusions

Although most of the literature on the 2001 Argentine crisis has focused on the macroeconomic imbalances that appeared and worsened in the years leading up to the crisis, the banking sector also merits careful examination. Banks were certainly affected by the macro situation in several ways. As fiscal performance faltered and public debt mounted, the banking system faced increasing pressure to provide financing to the public sector, incurring greater default risk in the process. As the sustainability of the currency board came

under question and depositors shifted their preferences toward foreign-currency-denominated deposits, banks were exposed to an initial currency risk on the liability side of their balance sheets, to which they responded by—at least partially—dollarizing their asset side as well. Furthermore, the downturn in economic activity, which began in the late 1990s, weakened banks' balance sheets by increasing their ratio of nonperforming loans. Finally, by end-2001 the banks were subjected to a sizable deposit outflow, which ultimately led the authorities to impose tight convertibility restrictions.

Banking activity stalled in the aftermath of the crisis, with negative consequences for Argentina's recovery. As discussed in the Introduction, it took almost a full year for deposits to begin to recover, more than two years for private sector credit to register positive annual growth in real terms, and almost two years for private banks to post positive quarterly profits. To the extent that bank credit contributes to economic activity, this situation has severely constrained the strength of Argentina's postcrisis recovery, and therefore smooth functioning of bank intermediation should be a key issue toward the future.

Our study was motivated in part by the observation that many of the banking system's weaknesses were not apparent beforehand. The assessment of the Argentine banking system in the late 1990s was positive overall, as indicated by the lofty position it obtained in a 1998 World Bank ranking of emerging market banks and regulatory structures. Because this analysis was based on traditional bank fundamental indicators, it would be tempting to discard this type of information and deem it unsuitable for analyzing bank vulnerability. Indeed, traditional bank performance indicators did not detect the growing currency risk or the risk of government default, both of which were key components of the banks' fragility in the Argentine case. However, we were interested in examining whether bank fundamentals still contained relevant cross-section information that might explain differences in vulnerability across banks. We were also interested in exploring whether certain nonfundamental characteristics of banks might help to explain these differences.

We concentrated on three aspects of banks' balance sheets from 1995 to 2001: the foreign currency exposure, the financing to the government, and the deposit run; the first two related to bank behavior, and the third related to the degree by which they were hurt by depositor preferences. In the descriptive section, we showed the magnitude of each change, and illustrated how the magnitude varied by type of banking institution. Deposits and loans became increasingly dollarized, and banks increased their financing to the government, both through acquisition of bonds and through direct loans. This financing in turn led to a progressive decline in intermediation activity and crowding out of credit to the private sector. We also showed the magnitude of the fall in deposits during 2001.

Our descriptive analysis also showed that there was considerable cross-bank variation in each of the aspects analyzed; not all banks increased the foreign currency and government default exposures in the same proportion, nor were they all subject to the same deposit withdrawal. In fact, a good number of banks actually experienced an increase in deposits in 2001. Thus, we chose a panel data

approach, which could capture bank-specific characteristics as well as time-varying macroeconomic indicators and allow us to understand how the banking sector vulnerabilities evolved over time and across different institutions.

Our econometric analysis revealed that bank fundamental variables were relevant, although not all fundamentals operated in the same direction or with the same level of significance. Across all regressions, bank fundamentals were overwhelmingly jointly significant and contributed a sizable portion of explanatory power.

Table 13 shows the signs of the estimated impact of macroeconomic and bank-specific factors for each of the aspects considered. In general, we found that riskier banks—those with the weakest fundamentals—tended to have lower net foreign exchange positions as a result of depositors showing greater preference for dollarization when the fundamentals were weak and of these banks being less likely to extend dollarized loans. Riskier banks also tended not to engage as actively in financing to the government, in particular, those with lower capitalization rates and higher nonperforming loans. Depositors, on their part, tended to prefer banks with higher liquidity and profitability, and lower nonperforming loan ratios.³³ Somewhat paradoxically, however, at short lags they tended to prefer banks with lower capitalization. However, comparing across different lags for the fundamental variables, we found that with a lag of three quarters or more depositors did prefer more capitalized banks. Moreover, when we focused our attention on the deposit run period *per se*, we found supporting evidence that banks with higher initial capitalization rates suffered smaller deposit losses; thus, during the deposit run highly capitalized banks were preferred.

Table 13 also shows that macroeconomic shocks affected banks in several ways. The progressive dollarization and eventual outflow of deposits were significantly related to an increase in currency risk, a deterioration in fiscal performance, and a weakening in the domestic stock market. Banks in turn reacted to the stock market decline and the fiscal deterioration by increasing financing to the government and cutting back on foreign currency lending to the private sector, thus lowering their net position. On the other hand, banks responded to rising currency risk by increasing foreign currency loans to the private sector and increasing government financing, both of which tended to increase their foreign currency net position.

Nonfundamental characteristics helped to explain cross-bank differences in performance. All else being equal, depositors tended to prefer larger banks and preferred domestic (particularly private) over foreign banks. Foreign banks tended to concentrate more lending in foreign currency and, thus, had a higher net position. Interestingly, given similar fundamentals, foreign

³³Note that these results continued to hold when considering time deposits instead of total deposits.

Table 13. Summary of the Econometric Results

	Macroeconomic Factors			Bank-Specific Factors			
	Increases in Currency Risk	Deterioration of the Fiscal Balance	Fall in the Stock Market Index	Weak Fundamentals	Foreign Banks	Domestic Private Banks	Large Banks
	↑ <i>CURISK</i>	↓ <i>FISCAL</i>	↓ <i>MERVALNB</i>		<i>FOREIGN</i>	<i>PRIVATE</i>	↑ <i>SIZE</i>
Deposit dollarization	(+)	(+)	(+)	(+)	(+)	(+)	(+)
Overall deposit growth	(-)	(-)	(-)	(-)	(-)	(+)	(+)
Private loan dollarization	(+)	(-)	(-)	(-)	(+)	(-)	(+)
Financing to the government	(+)	(+)	(+)	(-)	(+)	(-)	(+)

Source: Regression results from Tables 6, 7, and 9.

banks engaged more in government financing than their domestic counterparts. Finally, larger banks also were more active in government financing.

We also found that the exposures to currency and government default risk themselves were significant in many regressions. There appeared to be a trade-off between private loan dollarization and government financing; banks that had been more active in government financing in the past tended to have lower foreign currency loans and, hence, a lower net foreign currency position. Likewise, banks that had maintained a higher net position in the immediate past³⁴ would be less active in government financing. As for depositors, the coefficients in the deposit growth equations suggested that they recognized the inherent risk in accumulating government debt and in increasing the foreign currency position. Thus, depositors appeared to weigh more heavily the potential risk of expanding foreign currency loans to an unhedged private sector than the direct currency risk arising from increasing dollarized liabilities.

The significance of bank fundamentals was further supported by cross-section regressions that focused on the deposit run period from September 2000 to November 2001. We found the decline in deposits to be smaller for banks with higher initial capitalization rates and lower nonperforming loans, exposure to the government, and foreign exchange position.

Furthermore, we examined interactions between the macro variables and bank fundamentals to see whether depositors became more sensitive to bank fundamentals as the macroeconomic environment became riskier. For the most part, the regressions supported this suspicion, but a few puzzling results remain. Currency risk had the expected effect, increasing depositors' sensitivity to a wide range of bank fundamentals, as did fiscal performance and the stock market index in the case of many of the fundamental variables. However, the fiscal deterioration tended to diminish depositor sensitivity to nonperforming loans, and the stock market decline reduced sensitivity to bank profitability and foreign currency lending.

As in the two previous studies on depositor behavior surveyed in this paper, we were able to address the issue of market discipline in a situation of large adverse macroeconomic shocks. Based on our analysis of deposit growth, it does appear that appropriate signals were being sent to banks regarding their riskiness. Overall, depositors tended to punish banks with weaker fundamentals,³⁵ as well as those with a higher foreign currency position as a result of greater indirect currency risk arising from lending to unhedged domestic borrowers. Depositors also appeared to recognize the inherent risk in accumulating claims on the government, and they did not show a particular preference for foreign banks. On the other hand, market

³⁴Note that when we used longer lag lengths, this trade-off became weaker.

³⁵Although we do recognize the counterintuitive negative coefficient on capitalization in the panel data regressions at relatively short lags.

discipline did not appear to be operating through deposit interest rates, because our estimations showed that the presumably safer banks were the ones able to offer higher interest rates to depositors.

However, it is unclear whether the signals given through deposit growth were effective in curbing risky behavior by banks. We found that it was banks with more sound fundamentals that tended to incur more of the indirect currency risk as well as the government default risk. We argued that regulatory and other incentives may have skewed bank behavior in this direction. Indeed, the Basel I risk-weighted capital requirements gave a low-risk weight to government financing, thus providing a low-cost avenue for banks to comply with the regulation during a period in which raising additional capital would have been extremely costly.³⁶ We also found that a specific measure, the April 2001 policy allowing banks to use Patriot Bonds to comply with reserve requirements, had a measurable positive effect on government financing, although such effect was difficult to disentangle from other macroeconomic changes occurring at the same time. In addition, the regulatory biases may have been reinforced by other incentives such as moral suasion and the increasing return offered by government bonds as the public sector's financing needs expanded.

Regarding the treatment of foreign currency operations, at first glance the regulations were unbiased in the sense that there was no differentiation between operations in one or another currency. However, the greater indirect credit risk inherent in foreign currency lending—to the extent that borrowers were subject to currency risk—would justify imposing higher capital requirements on these operations. Furthermore, capital adequacy requirements did apply differential risk weights to loans according to their interest rate. Because foreign currency loans tended to have lower interest rates, this provided an additional incentive for banks to lend in foreign currency, particularly as the country spread and domestic peso interest rates increased.

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³⁶de la Torre, Levy-Yeyati, and Schmukler (2003) also make this point, and argue that, although the authorities introduced a positive risk weight on government loans in 2000, this may have come too late.

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