Avoiding Disaster: Policies to Reduce the Risk of Banking Crises

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Abstract

This paper reviews the existing evidence on the origins of banking crises, provides new results on the impact of government bank ownership on financial stability, and discusses policy options that can prevent and mitigate the consequences of banking crises. We find that government ownership of banks increases the likelihood and fiscal cost of crises, albeit the latter result is weak. Among the policies recommended to minimize the occurrence of crises, we highlight the importance of sound macroeconomic policies, adequate financial infrastructure, incentive compatible regulations, and limiting government interference in the banking sector.

ملخص

تتناول الورقة الحقائق المتعلقة بجذور أزمات القطاع المصرفى، كما تقدم نتائج جديدة تتعلق بأثر ملكية الحكومة للبنوك على الاستقرار المالى. وبالإضافة الى ذلك تناقش الورقة بدائل السياسات المختلفة التى تؤدى الى منع أو التخفيف من الآثار الناجمة عن أزمات القطاع المصرفى. وقد توصلت نتائج الدراسة الى أن ملكية الدولة للبنوك تؤدى الى زيادة احتمال وقوع الأزمات وكذلك إرتفاع تكلفتها على الموازنة العامة للدولة؛ على الرغم من ضعف هذه الأخيرة. وقد إقترحت الورقة عدة سياسات من شأنها التخفيف من وقوع الأزمات، لعل من أهمها ضرورة وجود سياسات اقتصادية كلية قوية، وبنية أساسية مناسبة للقطاع المالى، وكذا إجراءات تجعل الوحدات المصرفية قادرة على إمتصاص الأزمات بدلاً من جعلها تتفاقم.

I. Introduction

In the last two decades, developing countries from Argentina to Zambia have endured banking crises. Since banks intermediate most of the funds in these economies, banking crises are especially challenging for developing countries. When banks fail, credit is likely to contract and the payment systems may collapse. Consumption, investment, and, consequently, economic growth typically deteriorate. Also, crises might undermine the authorities' ability to conduct fiscal or monetary policies. The use of public money to recapitalize problem banks can seriously handicap efforts to control budget deficits, especially given the immense burden that banking crises can signify to governments. Serious banking problems can also create difficulties for monetary policy. They may not only distort the normal relationships among monetary instruments and targets, but also compromise the overall stance of monetary policy.

By now, an extensive literature exists examining the origins of banking crises and the policy options to prevent them (see Demirgüç-Kunt and Detragiache (1998, 1999, and 2000), Eichengreen and Rose (1998), Goldstein and Turner (1996), Kaminsky and Reinhart (1996, 1998), among others). In particular, the following factors have been identified in the literature as the key determinants of banking crises: (i) macroeconomic shocks, (ii) sharp increases in short-term interest rates, (iii) lending booms (iv) currency mismatches, (v) inappropriate incentive structures (e.g., presence of ill-designed deposit insurance schemes), (vi) financial liberalization, (vii) weak institutions and inadequate legal infrastructure, (viii) external economic conditions, (ix) the exchange rate regime, and (x) poor bank management.

Even though in the 1990s many countries embarked in the privatization of government enterprises including banks, government ownership of banks is still prevalent around the world. According to data collected by La Porta, Lopes de Silanes, and Shleifer (2000), in an average country in 1995, 42 percent of the equity of the 10 largest banks was owned by the government (down from 59 percent in 1970). Despite the fact that government ownership or control of banks is so widespread, little research exists on the impact of this phenomenon on the incidence and cost of crises.[1]

[1] Barth, Caprio, and Levine (2000) and La Porta, Lopes de Silanes, and Shleifer (2000) are exceptions, but in both cases the investigation of the relationship between government ownership and crises was not the primary focus.

This paper has three objectives. First, in Section II, this study surveys the literature and empirical evidence on the determinants of banking crises. The paper then conducts an empirical analysis of the role of public ownership of banks on the likelihood and cost of banking crises in Section III. Finally, in Section IV, the study reviews the policy measures that can help reduce the likelihood of crises, as well as minimizing their costs should they occur.

A key finding of the paper is that greater state ownership tends to increase the likelihood of banking crises and raise their fiscal costs as well. However, the limited number of observations for the costs of crises —and the difficulty in estimating these costs— suggests that the latter result be viewed as tentative. Getting governments out of their ownership role and focusing their efforts on provision of financial sector infrastructure and regulation would seem to be key for lessening the likelihood of banking crises, and should help stimulate development as well.

II. The Determinants of Banking Crises

Research on the causes of banking crises strongly suggests that these episodes can be the result of a confluence of factors.[2] *Macroeconomic shocks* can affect bank solvency in a number of ways. A major recession, a decline in the terms of trade, a sharp drop in asset prices, or other negative shocks to national wealth can reduce the profitability of bank borrowers and lead to a rise in bank non-performing loans and an erosion of bank capital.

Sharp increases in short-term interest rates can affect the health of the banking system via at least two channels.[3] High real interest rates can reduce banks' profits or produce losses, since typically the asset side of bank balance sheets is comprised of longer maturity instruments at fixed interest rates. Moreover, high interest rates make loan repayments harder for debtors and adversely affect banks by increasing non-performing loans. As a consequence, a sharp increase in short-term rates is likely to be a significant contributing factor to systemic banking sector problems.

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[2] See BIS (1996), Demirgüç-Kunt and Detragiache (1998, 1999, and 2000), Eichengreen and Rose (1998), Gavin and Hausmann (1996), Goldstein and Turner (1996), Kaminsky and Reinhart (1996,1998), and Lindgren et al. (1996) for more on this.

[3] A sudden rise in interest rates could be the result of a number of factors such as a rise in the inflation rate, the need to defend from a speculative attack, a change in monetary policy towards a more restrictive stance, the elimination of interest rate controls, etc.

Lending booms can also put pressure on the health of the banking system. In particular, periods of rapid credit growth may weaken the capacity of banks to carefully screen borrowers, thus causing bad loans to increase.

C*urrency mismatches* that take place when banks borrow in foreign currency and lend in domestic currency can increase bank fragility by exposing banks to unanticipated exchange rate movements. Even if banks hedge their foreign currency positions by lending in that currency, they can still be impacted by devaluations to the extent that their borrowers remain unhedged.

The presence of a *deposit insurance scheme* can also contribute to a banking crisis. In this respect, the theory does not provide a clear causal link between deposit insurance and banking crises. On the one hand, self-fulfilling crises —as described by Diamond and Dybvig (1983)— are less probable when deposits are insured. On the other hand, banking crises owing to adverse shocks can become more likely as managers opt for riskier loan portfolios in the presence of deposit insurance.

The process of *financial liberalization* may present banks with new risk that without the proper precautions can negatively affect the stability of the banking sector. More specifically, financial liberalization allows banks to undertake new lines of business and make new, unaccustomed investments. Unless the supervisory and regulatory frameworks are strengthened before financial markets are liberalized, bank supervisors may have neither the resources nor the training needed to adequately monitor and evaluate the new activities of banks.

The stability of the banking sector may be compromised if the *institutional and legal structure* in which banks operate is weak. For example, inadequate accounting standards or poor information disclosure will prevent investors, depositors, and bank supervisors from being able to discipline or monitor bank performance. Similarly, if the legal system does not facilitate the pledging of collateral by debtors and its seizing by banks when necessary, then the cost of credit losses and the cost of borrowings may be high. Finally, if bank supervisors lack the power to enforce prudential regulations and close insolvent banks, then they will be unable to prevent or punish excessive bank risk-taking behavior.

External economic conditions can also contribute to banking sector problems, particularly in developing countries. For instance, a sharp increase in industrial country interest rates can reduce the inflow of foreign funds, thereby leading to an abrupt decline in the level or growth of banks' funding. Similarly, a sharp economic slowdown in industrial countries or deterioration in the

terms of trade can also contribute to banking problems in developing countries, once again by diminishing the flow of funds to these economies.

The *exchange rate regime* in place can also affect the likelihood of a banking crisis. A popular argument in favor of fixed exchange rates is that a commitment to a currency peg may reduce the probability of banking crises, as it would discipline policy makers (Eichengreen and Rose (1998)). Put differently, the restrictions imposed by the objective of maintaining an exchange rate anchor would discourage the propensity towards erratic policies and, therefore, minimize the occurrence of domestic shocks that lead to banking crises.[4] Furthermore, as argued by Calvo (1999b) random shocks that affect economies may be a function of the exchange rate regime. Thus, the transparency and credibility associated with fixed exchange rates may insulate a country from contagion and rumors.

Proponents of fixed exchange rate regimes also consider the presence of dollar debt as an argument supporting the adoption of pegged exchange rates (Velasco and Cespedes (1999)). They argue that a nominal devaluation will drastically increase the burden faced by debtors and can generate a wave of corporate bankruptcies. This may, in turn, result in a banking crisis, as banks see their stock of non-performing loans rise. Calvo (1999a) also supports this conjecture and claims that, "liability-dollarized economies are highly vulnerable to a devaluation".

The traditional argument for supporting the adoption of flexible exchange rate systems is that they offer the possibility of a more stabilizing monetary policy. Accordingly, the exchange rate could be used to absorb some of the real shocks the economy faces and could reduce the burden on the interest rate. More precisely, confronted with an adverse external shock, floaters can let the exchange rate bear the brunt of the adjustment so interest rates need not be raised. Thus, output is protected through increased competitiveness and more favorable financial conditions.[5]

Defenders of floating exchange rate regimes also contend that pegged exchange rates provide implicit guarantees for those looking to borrow in foreign currency, giving rise to a moral hazard problem. To sustain the peg, authorities will insist that there is absolutely no prospect of it being changed. In this way, the government offers the private sector an insurance against the risk of exchange rate changes. This situation attracts capital inflows, but leaves the economy very

[4] A related argument put forward by Mishkin and Savastano (2000) is that countries lacking political and economic institutions to support an independent central bank may find hard pegs a sensible second best strategy for monetary policy

[5] This argument is, of course, not applicable to those countries with significant liability dollarization.

vulnerable to external shocks.[6] Moreover, under pegged regimes, borrowers have little incentive to hedge their foreign exposures (Eichengreen and Hausmann (1999)). On the other hand, exchange rate risk under flexible regimes promotes hedging and helps to curb inflows.

Advocates of the flexible regime also argue that fixed exchange rates severely constrain lender of last resort operations, since domestic credit growth may undermine the confidence in the currency peg.[7] The lack of a lender of last resort under fixed exchange rates can, in turn, encourage bank runs and financial panics.[8,9]

As interest on the determinants of banking crises resurfaced during the 1990s, the empirical literature on this subject grew. One strand of the literature uses logit or probit models to analyze the determinants of banking crises, while the second strand focuses on identifying leading indicators of such episodes.

Eichengreen and Rose (1998) and Demirgüç-Kunt and Detragiache (1998, 1999, and 2000) are among the most widely quoted studies in the first strand of the literature. Demirgüç-Kunt and Detragiache (1998) estimate a multivariate logit model to examine the determinants of banking crises in a large sample of developed and developing countries over the period of 1980-97. Their findings suggest that a weak macroeconomic environment (characterized by low growth and high inflation), as well as periods of high real interest rates, make banking crises more likely. Moreover, they observe that both deposit insurance and lax legal enforcement increase the probability of banking crises. Demirgüç-Kunt and Detragiache (1999) have also shown that financial liberalization can engender financial fragility to the extent that the supervisory, legal,

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[6] Indeed, many analysts considered this channel as one of the major contributing factors to the Asian crises, and concluded that "the peg did it". However, as was pointed out by Calvo (1998), if the crisis countries had floated their exchange rates prior to the crisis, their currencies would likely have appreciated, not depreciated.

[7] It could be argued that the use of fiscal policy in lieu of monetary policy to help troubled banks might be a reasonable alternative. However, since developing countries are often rationed at times of crises, it is not feasible for the government simply to borrow against the present value of future tax receipts and then hand over the money to the bankers (Velasco, 1999).

[8] It should be noted that there is no unanimity over this argument. Some claim that the lender of last resort function can be rented-contingent credit lines (Dornbusch, 1998). Others contend that the policy of contracting a line of credit has the following shortcomings (Velasco, 1999). First, the risk of bank runs need not be easily diversifiable for lenders in the wake of regional or global contagion. Second, such contracts are difficult to write and enforce, owing to the obvious potential for moral hazard. Third, the issue size of the credit may not be sufficient to cover a reasonable portion of the banking sector liabilities at a reasonable premium.

[9] Indeed, as Hausmann et al. (1999) indicate, this is exactly what happened in Venezuela during the first half of 1994.

and regulatory framework for banks to deal with the new regime are not in place. In their most recent study analyzing the links between deposits insurance and banking system stability, the authors find that explicit deposit insurance schemes tend to increase the likelihood of banking crises, in particular where bank interest rates are deregulated and the institutional environment is weak. Also, certain design features of deposit insurance schemes can exacerbate the adverse effects on bank stability. In particular, the likelihood of crises is higher the more extensive is the coverage of deposits and in countries where the scheme is funded, and where it is run by the government rather than the private sector.

Eichengreen and Rose (1998) examine the determinants of crises in a sample of developing countries only. Their results show that banking crises in emerging markets take place in response to unfavorable developments in domestic and international markets. Their strongest finding, by far, is the association between high industrial country interest rates and banking crises in developing countries. Put differently, an increase in foreign interest rates raises the probability of banking crises in developing countries by undermining the availability of offshore funding for the banks.[10]

Also using a logit methodology, Domaç and Martinez Peria (2000) examine the impact of the exchange rate regime on the likelihood of banking crises in a sample of 88 developing countries over the period 1980-97. Furthermore, the authors evaluate whether the exchange rate regime affects the cost and duration of crises. Overall, the authors find that fixed exchange rate regimes are associated with lower probability of crises, but higher costs (in terms of output losses) if a crisis does unfold.

The most widely known studies on the leading indicators of banking and currency crises include Kaminsky and Reinhart (1996) and Kaminsky, Lizondo, and Reinhart (1998). The main findings from these papers can be summarized as follows: first, these studies find recurring patterns of behavior in the period leading up to banking and currency crises. Second, banking crises seem to be somewhat more difficult to forecast accurately than currency crises. This can be attributed to the fact that banking crises also depend on various micro characteristics of the banking industry and of the official safety net. Third, changes in equity prices, real interest rates, real output, export prices, and money multipliers are among the best leading indicators of banking crises.[11]

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[10] More specifically, they find that a one percent increase in Northern interest rates is associated with an increase in the probability of Southern banking crises of around three percent.

[11] A related study in this strand of the literature by Roja-Suarez (1998), including both macro and bank level data, develops a bank-based early warning system for emerging markets. The application of the proposed bank-based early warning indicators to Latin America suggests that spreads between deposit and lending rates exhibit a high degree of accuracy in predicting banking problems.

III. Banking Crises and the Role of Government Ownership of Banks

Proponents of government ownership of banks argue that governments can better allocate capital to highly productive investments, in particular when institutions are not well developed (Gerschenkron 1962). Also, they argue that government ownership should be encouraged since private ownership may result in excessive concentration and in limited access to credit by many parts of society. Finally, failures such as those of Barings and Long Term Credit Management have led some to believe that private banks are more concerned with gambling than with allocating resources wisely.

On the other hand, those opposed to government ownership of banks contend that, by allowing political motives to distort all aspects of bank operations, government ownership may play an important role in causing banking crises. Frequently, politicians use public banks as a vehicle to extend credit to given sectors or interest groups. In those cases, the creditworthiness of the borrowers does not play an important role in the credit decision. Thus, not surprisingly, loans of state banks all too often become non-performing. Also, those against government ownership argue that public banks tend to have lower incentives to innovate, to identify problem loans at an early stage, and to control cost, since they frequently have their losses covered by the government, they confront limited competition, and they are often shielded from closure on constitutional grounds (Goldstein and Turner (1996)).

Despite increased privatization in the last decade, public ownership of banks remains significant and pervasive around the world. Figures 1 and 2 illustrate this fact. In a sample of 64 countries, the average share of assets of the top 10 banks owned or controlled by the government was 51 percent in 1970, 44 percent in 1985, and 33 percent in 1995. [12] In 1970, the share of bank assets owned by the government was larger than 50 percent in 34 out of a total of 64 countries. This number was 25 in 1985 and 16 in 1995. Both of these statistics are higher if we consider only developing countries. For this group of countries, the government in 1995 controlled 40

[12] The countries included are: Algeria, Argentina, Australia, Austria, Bahrain, Bangladesh, Belgium, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cote d'Ivoire, Cyprus, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Finland, France, Germany, Greece, Guatemala, Honduras, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kenya, Korea, Lebanon, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Nigeria, Norway, Panama, Paraguay, Peru, Philippines, Portugal, Saudi Arabia, Senegal, Singapore, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Tanzania, Thailand, Tunisia, Turkey, United Kingdom, United States, Uruguay, and Venezuela.

percent of bank assets and 13 out of 43 developing countries exhibited shares of government ownership larger than 50 percent.

Figure 1:
Share of the assets of the top 10 banks owned or controlled by the government
(in percentages)

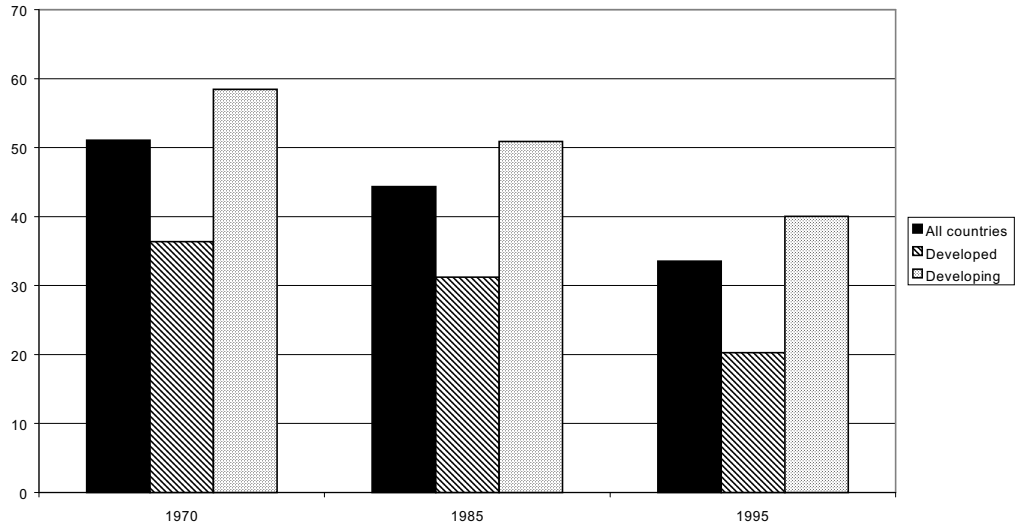
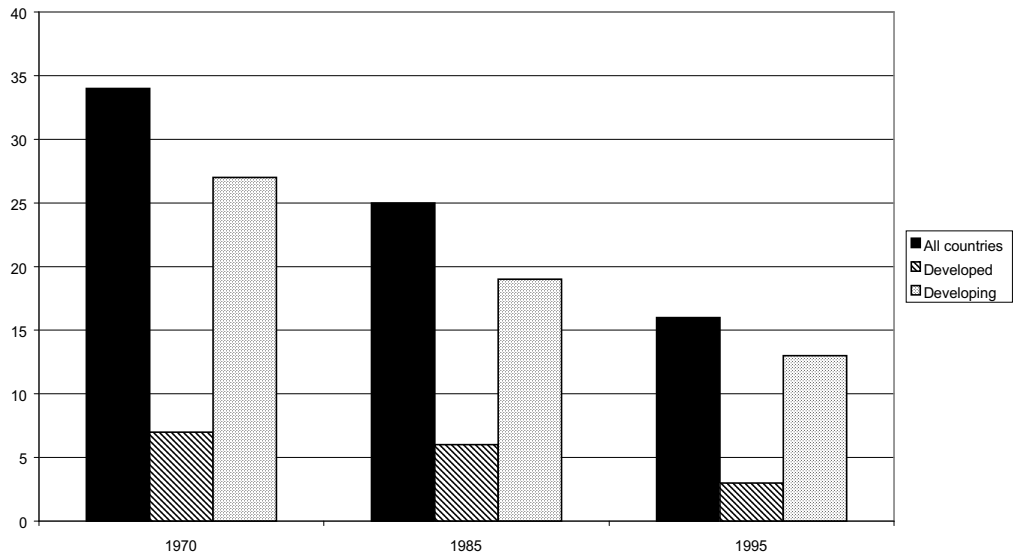


Figure 2:
Number of countries with share of bank assets controlled by the government > than 50%
(sample of 64 countries)



Though public banks remain a fixture of banking systems in developing countries, there is little empirical evidence on their impact on the likelihood and cost of crises. Two exceptions are Barth, Caprio, and Levine (1999) and La Porta, Lopez de Silanes, and Shleifer (2000). Using a data set including more than 60 countries, the first study examines the links between different regulatory/ownership practices and both financial-sector performance and banking system stability. Among other things, the authors find that on average, the greater the share of bank assets controlled by state-owned banks, the lower the level of financial development as well as the development of the non-bank sector and the stock market. Regarding the impact of government ownership of banks on the likelihood of banking crises, the authors did not find any significant effects. However, their estimations should be considered preliminary, since they only consider recent (i.e., 1997) information on government ownership rather than a time series for this variable. Also, the authors only control for a small set of factors that can potentially affect the likelihood of crises.

Using a sample of 92 countries, La Porta, Lopez de Silanes, and Shleifer (2000) find that higher government ownership of banks is associated with slower financial development, lower subsequent growth of per capita income, and longer growth of productivity. Aside from examining the correlation between the extent of government ownership and the likelihood of crises, the authors do not explore this subject in their study.

Using the information on government ownership assembled by La Porta, Lopes de Silanes, and Shleifer (2000), we examine the impact of this variable on the likelihood and severity of banking crises. Our sample includes 64 countries (43 developing) over the period 1980-1997. We distinguish between systemic and non-systemic crises. Following Demirgüç-Kunt and Detragiache (1998), we define as systemic crises episodes that meet one of the following four criteria: (i) the non-performing loans ratio (to total loans) is above 10 percent; (ii) the cost of the banking crisis is at least 2 percent of GDP; (iii) the crisis led to the nationalization of banks; and/or (iv) emergency measures such as deposit freezes or prolonged bank holidays are adopted in response to the crisis.

Table 1 shows the probability of banking crises conditional on the share of public ownership being below or above 50 percent. Also, this table displays tests of whether these proportions or probabilities are the same. For all countries and for developing countries, we find that the probability of a banking crisis is larger in those countries where the share of bank assets owned

by the government is larger than 50 percent. On the other hand, we find no differences in probabilities when we consider only developed countries.

To examine the relationship between the severity of crises and the degree of government ownership of banks, we calculate the mean cost of crises (both in terms of the fiscal cost and the cost in terms of foregone output) for those cases where the share of bank assets in the hands of the government is above and below 50 percent. These descriptive statistics are presented in Table 2. Data on the fiscal cost of crises (relative to GDP) come from Honohan and Klingebiel (2000). The real output cost was calculated as the differences between the average growth rate of real GDP during each crisis episode relative to the average growth during tranquil times. Allowing for a two-year window around banking crises (to accommodate for the possibility that crises may have started earlier and ended later than identified in the literature), we define output growth during tranquil periods as the average growth of output in the two years surrounding the window described above.[13] According to the results in Table 2, we can never reject the null that the average cost of crises is the same regardless of the extent of government ownership.

Because the 50 percent threshold is an arbitrary one, Table 3 examines the relationship between government ownership of banks and the likelihood and cost of banking crises by means of the Spearman rank correlation coefficient. In general, we find a positive and significant relationship between the occurrence of banking crises and the extent of government ownership of banks. There is some evidence that the larger the share of bank assets owned by the government, the smaller the cost of crises in terms of foregone output growth. There is no significant relationship between the fiscal cost of crises and the extent of government ownership of banks.

Since the tests conducted so far are univariate, the results discussed may change once we control for the impact of other variables on the likelihood and cost of crises. To address this issue, we use logit analysis to estimate the probability of a banking crisis and ordinary least squares to analyze the cost of these episodes. We focus on a sample of 43 developing countries over the period 1980-1995.

[13] We tried other definitions of the output losses associated with banking crises, but results did not change significantly.

Table 1. The Likelihood of Banking Crises and Government Ownership of Banks (non-parametric tests)

	All countries	Developed	Developing
Prob (Banking crises/share of assets owned by the government > 50%)	8.33	4.44	9.52
Prob (Banking crises/share of assets owned by the government < 50%)	4.95	4.8	5.1
Test of equality of proportions (H0: proportion (x) – proportion (y)=diff=0)	2.1	-0.137	2.146
p-value (95% confidence level)	0.036 **	0.891	0.0318 **
Prob (Systematic Banking crises/share of assets owned by the govt>50%)	6.8	1.11	8.5
Prob (Systematic Banking crises/share of assets owned by the govt>50%)	3.5	1.7	4.8
Test of equality of proportions (H0: proportion (x) – proportion (y)=diff=0)	2.326 **	-0.393	1.876 *
p-value (95% confidence level)	0.02	0.69	0.06

Table 2. The Cost of Banking Crises and Government Ownership of Banks (non-parametric tests)

	All countries	Developing
Cases where the share of bank assets owned by the government > 50%		
Average cost of crises in terms of foregone output	1.86	2.14
Average fiscal cost of crises (% of GDP)	14.22	15.61
Cases where the share of bank assets owned by the government < 50%		
Average cost of crises in terms of foregone output	3.25	3.52
Average fiscal cost of crises (% of GDP)	14.2	18.28
Test of equality of means for the cost of crises in terms of foregone output	1.58	1.18
p-value (95% confidence)	(0.12)	(0.25)
Test of equality of means for the fiscal cost of crises	0.004	0.44
p-value (95% confidence)	(0.99)	(0.67)

Table 3. Spearman's Rank Correlations (pvalue for test of independence in parentheses)

	% of Bank Assets Owned by the Government	
	All countries	**Developing**
Banking crises	0.057 *	0.075 *
	(0.08)	(0.06)
Systematic banking crises	0.078 *	0.071 *
	(0.02)	(0.08)
Cost of crises in terms of foregone output growth	-0.41 **	-0.32 *
	(0.01)	(0.08)
Fiscal cost of crises (% of GDP)	-0.005	-0.064
	(0.97)	(0.75)

Note: * and ** denote significance at the 10 and 5 percent levels, respectively.

The dependent variable in the logit analysis is a dummy that equals zero in years and countries where there are no crises and it equals one during crisis periods. Once again, here we

distinguish between systemic and non-systemic crises. Given the logistic distribution, the probability of a banking crisis in period t can be expressed as follows:

$$\Pr ob(Crisis_t = 1 / X_{t-1}) = \frac{e^{(\beta' X_{t-1})}}{1 + e^{(\beta' X_{t-1})}} \quad (1)$$

Similarly, the probability of no crisis in period t is:

$$\Pr ob(Crisis_t = 0 / X_{t-1}) = \frac{1}{1 + e^{(\beta' X_{t-1})}} \quad (2)$$

X is a matrix of determinants of banking crises. In our estimations, only the first year of a crisis is coded as a one and the crisis observations beyond the first year are excluded. We adopt this strategy to avoid the endogeneity problem that would result from the fact that once the crisis starts, it is likely to affect the evolution of the macro and financial variables on the right hand side. Similarly, to minimize simultaneity problems, all regressors in the logit models are lagged one period.

The variables included in X are dictated by the theory on the determinants of banking crises. We provide a detailed list of variables and sources in the data appendix. Aside from the share of bank assets owned by the government, we include three types of variables in our estimations, namely: *domestic-macroeconomic*, *external*, and *financial*. In this regard, we closely follow the empirical specification on the likelihood of banking crises in Demirgüç-Kunt and Detragiache (1998). Among the domestic macroeconomic variables we include the real growth of GDP, the level of real GDP per capita, the inflation rate, and the real interest rate.[14]

Adverse macroeconomic conditions hurt banks by increasing the share of non-performing loans in the economy. Thus, we expect an increase in the real growth of GDP to reduce the probability of a banking crisis. On the other hand, we expect higher real interest rates to have a positive effect on the likelihood of crises. High inflation is associated with high nominal interest rates and may also be viewed as a proxy for poor macroeconomic management. Therefore, we expect high inflation countries to be more crises prone. Finally, real GDP per capita is included to control for the fact that poor countries typically have inefficient legal systems, as well as weak

[14] We also conducted some estimations including the budget surplus/deficit as a percentage of GDP, but since this variable was never significant and it considerably reduces the number of observations, we report the results excluding this variable. The results including the budget surplus/deficit to GDP are available upon request.

enforcement of loan contracts and deficient prudential regulations. We expect an increase in GDP per capita to lower the probability of a banking crisis.

We allow a number of financial variables to enter into the logit estimations. In particular, we include the ratio of M2 to reserves, the ratio of private domestic credit to GDP, the growth of credit, the ratio of foreign liabilities to foreign assets held by banks, and the ratio of cash held by banks to assets. The ratio of M2 to foreign exchange reserves is supposed to capture the exposure that banks face to runs associated with currency crises. Demirgüç-Kunt and Detragiache (1998) argue that financial liberalization may weaken the condition of the banking sector because this process may result in an increase in risk-taking opportunities, and when not appropriately regulated, in instances of fraud. Pill and Pradhan (1995) argue that the ratio of domestic credit to the private sector to GDP can be utilized to capture the extent of financial liberalization.[15] We include this variable in our estimations to control for this effect. Also, because a number of studies (Gavin and Hausmann (1996), Gourinchas et al. (1999)) have argued that banking crises are associated with lending booms, we include the growth rate of domestic credit in the logit estimations.

The ratio of cash (to total bank assets) held by banks is introduced to capture the ability of banks to deal with potential runs on their deposits. We include the ratio of foreign liabilities to foreign assets held by banks to examine the extent to which banks' currency mismatches affect the likelihood of a banking crisis.[16]

To capture the external conditions that countries face, we include two variables: the change in the terms of trade and the ratio of net capital flows to GDP. A deterioration in the terms of trade is expected to increase the likelihood of a banking crisis, since it would negatively affect the ability of borrowers (in particular those in the tradable sector) to repay loans. Both net outflows

[15] We also conducted some estimations using a dummy for financial liberalization periods (following Demirgüç-Kunt and Detragiache (1998)), but it reduces our sample of countries significantly and does not affect the empirical results.

[16] The ratio of foreign liabilities to foreign assets used here (see appendix for definition and sources) is only a proxy for the true currency mismatch, since it only considers the liabilities held by banks with foreigners (i.e., non-residents) and the banks' claims on foreigners, irrespective of the currency of denomination. There are a number of obvious deficiencies with this measure. First, for some developed countries bank assets and liabilities with foreigners may in fact be denominated in the domestic currency, in which case, this ratio does not really capture the currency mismatch of banks. However, because our sample is primarily comprised of developing countries, we do not expect this to be a significant bias. Another potential problem with this ratio is that it excludes the foreign assets and liabilities held by banks with domestic residents. In many developing countries, banks take dollar deposits and make dollar loans. In those cases, our measure will underestimate the currency mismatch since it only includes obligations towards and claims on non-residents. We made attempts to collect data on foreign currency deposits and loans held by residents, but we were only able to collect a very limited data set.

and inflows could play an important role in precipitating banking crises. A rise in capital flows intermediated by the domestic banking system is likely to increase the supply of loanable funds at banks' disposal, thereby allowing banks to engineer a lending boom. As is widely acknowledged, lending booms lead to financial vulnerability by contributing to an endogenous decline in the quality of banks' assets.[17] Outflows, on the other hand, can bring about crises by depriving banks of foreign financing and also by heightening the expectation of a meltdown, leading to bank runs. Calvo and Reinhart (1999) argue that "sudden stops" or episodes of inflow reversals can trigger output collapses and severely damage financial sectors.

We investigate the link between the exchange rate regime and banking crises, by introducing a dummy that equals one if a country is under a fixed exchange rate regime and zero otherwise.

To capture the impact of government ownership on the likelihood of crises, we use the data collected by La Porta, Lopez de Silanes, and Shleifer (2000) on the share of assets of the top ten banks in a given country owned by government of that country. Data on this variable is only available for 1970, 1985, and 1995.[18]

Table 4 examines the impact of government ownership on the likelihood of banking crises (including systemic and non-systemic crises), while Table 5 focuses exclusively on systemic crises. All estimates are corrected for heteroscedasticity and for within-country autocorrelation.[19]

Both the estimations that focus on all crises and those for systemic crises, indicate that capital flows and high ratios of M2 to reserves have a positive and significant impact on the likelihood of crises. On the other, countries with higher GDP per capita and, therefore, more developed institutions face a lower probability of enduring a banking crisis. Finally, exchange rate stability appears to reduce the likelihood of a banking crisis.

The first model in Table 4 and Table 5 (model (4.1) and (5.1)) shows that the share of bank assets owned by the government has a positive and significant effect on the likelihood of banking crises. This is true whether we focus on all episodes of bank unsoundness or only on systemic crises.

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[17] There are several reasons why this holds true. First, banks have limited capacity to evaluate projects. Second, regulatory agencies have limited monitoring capacity and resources. Finally, the supply of "good" projects with high expected returns relative to their variance is limited (see Gavin and Hausmann (1996)).

[18] Therefore, we use the 1970 value for the period 1980-1984, the 1985 value for the period 1985-1994, and the 1995 value for the period 1995-97.

[19] See Huber (1967) and White (1980, 1982) and Rogers (1993).

Table 4. The Impact of Government Ownership of Banks on the Likelihood of Banking Crises in Developing Countries (Systemic and non-systemic crises are included)

Variables	**Model (4.1)**	**Model (4.2)**	**Model (4.3)**	**Model (4.4)**	**Model (4.5)**	**Model (4.6)**
	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)
Inflation t-1	-0.0068	-0.0069	-0.0060	-0.0069	-0.0058	-0.0051
	-(1.33)	-(1.36)	-(1.16)	-(1.34)	-(1.14)	-(0.75)
Terms of trade t-1	0.0127	0.0118	0.0129	0.0128	0.0121	0.0339
	(0.69)	(0.61)	(0.69)	(0.70)	(0.66)	(1.76) *
Real interest rate t-1	-0.0073	-0.0074	-0.0065	-0.0074	-0.0063	-0.0050
	-(1.41)	-(1.44)	-(1.24)	-(1.42)	-(1.23)	-(0.69)
M2 over reserves t-1	0.0019	0.0017	0.0022	0.0018	0.0018	0.0309
	(2.05) **	(1.91) *	(2.47) **	(2.07) **	(2.02) **	(1.55)
GDP per capita t-1	-0.0001	-0.0001		-0.0001	-0.0001	-0.0002
	-(1.94) *	-(2.07) **		-(1.93) *	-(1.92) *	-(1.87) *
Real GDP growth t-1	0.0871	0.0845	0.0820	0.0887	0.0911	-0.0170
	(1.47)	(1.39)	(1.39)	(1.43)	(1.49)	-(0.26)
Growth of real credit t-1	0.0018	0.0003	0.0027	0.0018	0.0015	0.0035
	(0.16)	(0.02)	(0.25)	(0.16)	(0.13)	(0.28)
Credit to GDP t-1	0.0023	0.0024	0.0019	0.0023	0.0023	0.0205
	(0.84)	(0.90)	(0.71)	(0.84)	(0.84)	(0.71)
Cash to bank assets t-1	-0.0058	-0.0061	-0.0061	-0.0060	-0.0087	0.0292
	-(0.55)	-(0.56)	-(0.58)	-(0.56)	-(0.80)	(1.57)
Ratio of unhedged liabilities t-1	-0.0002	-0.0001	-0.0005	-0.0002	-0.0003	-0.0041
	-(0.18)	-(0.06)	-(0.56)	-(0.18)	-(0.35)	-(0.22)
Capital flows to GDP t-1	0.0334	0.0298	0.0352	0.0338	0.0294	0.0002
	(1.34)	(1.22)	(1.43)	(1.34)	(1.09)	(0.19)
Government ownership of banks t-1	0.0140	0.0179	0.0184	0.0138	0.0178	0.0161
	(2.36) **	(2.29) **	(3.02) **	(2.36) **	(2.30) **	(1.79) *
(Gov. ownership of banks*1980s dummy) t-1		-0.0051				
		-(0.81)				
(Gov. ownership of banks* GDP per capita) t-1			0.0000			
			-(1.38)			
(Gov.ownshp. of banks*dummy for<20%gov.ownshp) t-1				-0.0094		
				-(0.33)		
Gov.ownshp ofbanks*shareofloans to thepublic sector) t-1					-0.0002	
					-(1.38)	
(Dummy for countries under an exchange rate peg) t-1	-0.8972	-0.7917	-0.8692	-0.8888	-0.8357	-1.3818
	-(2.17) **	-(1.98) **	-(2.11) **	-(2.12) **	-(1.98) **	-(2.01) **
(Dummy for explicit deposit insurance) t-1						0.1173
						(0.16)
(Dummy for financial liberalization) t-1						0.3025
						(0.48)
(Dummy for capital account liberalization) t-1						0.2158
						(0.38)
Constant	-2.9197	-2.9596	-3.2399	-2.9072	-2.9292	-3.8505
	-(4.35) **	-(4.33) **	-(4.96) **	-(4.42) **	-(4.38) **	-(3.81) **
Number of observations	434	434	434	434	434	279
Pseudo R-squared	0.098	0.1	0.091	0.098	0.1	0.096

The dependent variable is a dummy that equals 1 during periods of systemic or non -systemic banking crises and zero otherwise. All observations following the first year of crises are dropped.

*, ** denote significance at the 10 and 5 percent level, respectively

Table 5. The Impact of Government Ownership on Banks Likelihood of Systematic Banking Crises in Developing Countries

Variables	Model (5.1)	Model (5.2)	Model (5.3)	Model (5.4)	Model (5.5)	Model (5.6)
	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)
Inflation t-1	-0.0072	-0.0072	-0.0064	-0.0072	-0.0052	-0.0079
	-(1.34)	-(1.34)	-(1.20)	-(1.35)	-(1.00)	-(0.76)
Terms of trade t-1	0.0115	0.0115	0.0114	0.0115	0.0111	0.0315
	(0.56)	(0.56)	(0.55)	(0.56)	(0.54)	(1.55)
Real interest rate t-1	-0.0077	-0.0077	-0.0069	-0.0077	-0.0058	-0.0048
	-(1.42)	-(1.42)	-(1.28)	-(1.43)	-(1.08)	-(0.49)
M2 over reserves t-1	0.0018	0.0018	0.0021	0.0017	0.0017	0.0291
	(1.96) *	(1.96) *	(2.36) **	(1.96) **	(1.87) *	(1.46)
GDP per capita t-1	-0.0001	-0.0001		-0.0001	-0.0001	-0.0001
	-(1.77) *	-(1.75) *.		-(1.76) *	-(1.71) *	-(1.55)
Real GDP growth t-1	0.0741	0.0716	0.0662	0.0739	0.0782	-0.0470
	(1.17)	(1.18)	(1.09)	(1.16)	(1.24)	-(0.78)
Growth of real credit t-1	0.0009	0.0009	0.0018	0.0009	0.0003	0.0050
	(0.07)	(0.08)	(0.15)	(0.08)	(0.02)	(0.34)
Credit to GDP t-1	0.0016	0.0016	0.0013	0.0017	0.0016	0.0336
	(0.61)	(0.61)	(0.48)	(0.61)	(0.59)	(1.39)
Cash to bank assets t-1	-0.0144	-0.0144	-0.0149	-0.0147	-0.0198	0.0291
	-(1.17)	-(1.17)	-(1.21)	-(1.17)	-(1.45)	(1.76) *
Ratio of unhedged liabilities t-1	-0.0003	-0.0003	-0.0006	-0.0003	-0.0006	-0.0010
	-(0.35)	-(0.36)	-(0.71)	-(0.34)	-(0.62)	-(0.05)
Capital flows to GDP t-1	0.0467	0.0469	0.0483	0.0473	0.0420	0.0003
	(2.14) **	(2.15) **	(2.25) **	(2.13) *	(1.84) *	(0.32)
Government ownership of banks t-1	0.0127	0.0125	0.0169	0.0124	0.0190	0.0160
	(2.07) **	(1.54)	(2.66) **	(2.04) **	(2.42) **	(1.71) *
(Gov. ownership of banks*1980s dummy) t-1		0.0003				
		(0.04)				
(Gov. ownership of banks* GDP per capita) t-1			0.0000			
			-(1.20)			
(Gov.ownshp. of banks*dummy for<20%gov.ownshp) t-1				-0.0132		
				-(0.46)		
Gov.ownshp ofbanks*shareofloans to thepublic sector) t-1					-0.0003	
					-(1.93) *	
(Dummy for countries under an exchange rate peg) t-1	-0.8447	-0.8504	-0.8142	-0.8331	-0.7483	-1.3160
	-(2.04) **	-(2.05) **	-(1.97) **	-(1.99) **	-(1.73) *	-(1.85) *
(Dummy for explicit deposit insurance) t-1						0.1075
						(0.14)
(Dummy for financial liberalization) t-1						0.3519
						(0.50)
(Dummy for capital account liberalization) t-1						0.3558
Constant	-2.7417	-2.7394	-3.0460	-2.7233	-2.7422	-3.9771
	-(3.96)	-(3.96) **	-(4.51) **	-(4.01)	-(4.00) **	-(3.76) **
Number of observations	434	434	434	434	434	279
Pseudo R-squared	0.092	0.092	0.086	0.092	0.1	0.096

The dependent variable is a dummy that equals 1 during periods of systemic or non -systemic banking crises and zero otherwise. All observations following the first year of crises are dropped.

*, ** denote significance at the 10 and 5 percent level, respect ively

The second model in both Table 4 and Table 5 (model (4.2) and (5.2)) investigates whether the responsiveness of the probability of a banking crisis to increases in the share of bank assets owned by the government changes between the 1980s and 1990s. We examine this issue by interacting a dummy that equals one during the 1980s with the share of bank assets owned by the government. Since this interaction term is insignificant, we conclude that there is no evidence of the relationship between ownership and the likelihood of crises changing over the last two decades.

In the third model of Table 4 and Table 5, we investigate whether the impact of government ownership changes at different levels of income, where this variable is measured by GDP per capita. In principle it is possible that countries with higher GDP per capita, and most likely better institutions and enforcement of contracts, are less likely to suffer from the negative aspects of government ownership of banks. In particular, in countries with solid institutions and therefore lower levels of corruption, it is less probable that government owned banks become a conduit through which certain sectors (not necessarily the most efficient ones) are favored. While the empirical results indicate that at higher levels of GDP per capita government ownership of banks has a smaller impact on the likelihood of crises, this effect is not significant at the conventional levels of significance.

It is possible that the impact of government ownership on the likelihood of banking crises depends on whether this variable is above or below a certain threshold. In most developed countries the median share of bank assets owned by the government is approximately 12 percent. In models (4.4) and (5.4), we examine the impact of the interaction of the ownership variable with a dummy for whether the country is below the 20 percent threshold. Though we find that being below the developed country threshold reduces the impact of government ownership on the likelihood of crises, this effect is not statistically significant.

In the second to last model of Table 4 and Table 5, we examine whether the percentage of bank loans that are directed to the public sector affects the impact of government ownership. If loans to the public sector are diverted to unprofitable, poorly performing projects, then a high concentration of lending to the public sector might increase the likelihood of banking crises. On the other hand, it is possible that lending to the public sector might postpone crises if these funds are recycled as liquidity for ailing banks.[20]

[20] Note that the banks may be no less insolvent, but the realization of a crisis could be postponed.

Both in the estimations including all banking crises and in those for the systemic episodes only, we find that the share of loans to the public sector tends to reduce the adverse effect of government ownership of banks on the likelihood of crises. However, this effect is not statistically significant. Finally, the last column in Table 4 and Table 5 shows that the impact of government ownership of banks on the likelihood of crises is robust to controlling for other institutional factors, like whether the financial sector and the capital account have been liberalized, and whether the country adopted an explicit deposit insurance scheme.

An issue of concern when analyzing the impact of government ownership of banks on the likelihood of banking crises, is the potential for reverse causality. In other words, it is possible that rather than precipitating banking crises, increases in the share of bank assets owned by the government are purely a response to these episodes. In the estimations conducted so far we have tried to minimize this possibility by lagging the share of bank assets owned by the government one period. In Table 6, we conduct two other sets of estimations in order to test the robustness of our results to alternative ways of dealing with the potential endogeneity problem. The first two columns of Table 6 (models (6.1) and (6.2)) present estimations for the likelihood of banking crises in general and for systemic crises excluding those countries where bank nationalizations occurred following banking crises[21]. Finally, in models (6.3) and (6.4), we replace the first with the third lag of the government ownership variable. In all cases, we find that the share of bank assets owned by the government continues to have a positive and significant effect on the likelihood of a banking crisis.

To study whether the share of bank assets controlled by the government affects the cost of banking crises, we estimate the following equation using ordinary least squares:

$$Cost_{i,t} = \alpha + \mu' Z_{i,t-1} + \delta * Government\ Ownership_{i,t-1} + \eta' \mathrm{Re}s_{i,t-1} + \varepsilon_i \qquad (3)$$

where i denotes a banking crisis episode.

Cost refers, alternatively, to the fiscal or real output cost (i.e., the cost in terms of foregone output growth) of a crisis. Z is a matrix of macro and financial variables measured the year before crises. In particular, the following variables are included in the specifications: inflation, real interest rates, lending growth, and bank credit to the private sector to GDP.[22] This matrix also

[21] According to Caprio and Klingebiel (1999), these countries include Indonesia, Korea, Jamaica, Mexico, and Paraguay.

[22] Other specifications with a larger number of macro variables were run, but given the limited number of observations and because the remaining variables were not significant, we only report those described above.

includes the lag of the peg dummy. Finally, *Res* is a matrix containing dummies for the different resolution mechanisms implemented by governments to overcome crises. In particular, using data collected by Honohan and Klingebiel (2000), we identify episodes when the government provided liquidity support to banks, when forbearance was extended to multiple institutions, and, finally, crises episodes where the government extended blanket guarantees to depositors.

Table 6. The Impact of Government Ownership on Banks Likelihood of Banking Crises in Developing Countries– Robustness Test (Systemic and non-systemic crises are included)

Variables	**Model (6.1)**	**Model (6.2)**	**Model (6.3)**	**Model (6.4)**
	All Crises Coefficient (t-stat)	Systematic Crises Coefficient (t-stat)	All Crises Coefficient (t-stat)	Systematic Crises Coefficient (t-stat)
Inflation t-1	-0.0055	-0.0053	-0.00764	-0.0080
	-(1.18)	-(1.10)	-(1.45)	-(1.37)
Terms of trade t-1	0.0101	0.0069	0.0065	0.0015
	(0.47)	(0.29)	(0.27)	(0.05)
Real interest rate t-1	-0.0060	-0.0058	-0.0082	-0.0086
	-(1.26)	-(1.19)	-(1.54)	-(1.46)
M2 over reserves t-1	0.0014	0.0013	0.0016	0.0014
	(1.50)	(1.41)	(1.61)	(1.45)
GDP per capita t-1	-0.0001	-0.0001	-0.0001	-0.0001
	-(2.19) **	-(1.96) *	-(1.81) *	-(1.63)
Real GDP growth t-1	0.0762	0.0553	0.0806	0.0592
	(1.20)	(0.86)	(1.15)	(0.82)
Growth of real credit t-1	0.0087	0.0074	-0.0058	-0.0088
	(0.69)	(0.55)	-(0.46)	-(0.66)
Credit to GDP t-1	0.0027	0.0020	0.0017	0.0009
	(1.02)	(0.74)	(0.62)	(0.33)
Cash to bank assets t-1	-0.0081	-0.221	-0.0205	-0.0411
	-(0.55)	-(1.40)	-(0.95)	-(1.87) *
Ratio of unhedged liabilities t-1	-0.0006	-0.0002	-0.0008	-0.0012
	(0.59)	(0.21)	-(0.84)	-(1.11)
Capital flows to GDP t-1	0.0109	0.0291	0.0279	0.0449
	(0.37)	(1.20)	(1.07)	(2.03) **
Government ownership of banks t-1	0.0156	0.0141		
	(2.40) **	(2.09) **		
(Government ownership of banks) t-3			0.0108	0.0096
			(1.87) *	(1.66) *
(Dummy for countries under an exchange rate per) t-1	-0.8090	-0.7389	-0.7413	-0.6907
	-(1.87) *	-(1.74) *	-(1.91) *	-(1.74) *
Constant	-3.0574	-2.7783	-2.3241	-1.9473
	-(4.13) **	-(3.76) **	-(2.95) **	-(2.65) **
Number of observations	396	396	382	382
Pseudo R-squared	0.1	0.094	0.088	0.09

*, ** denote significance at the 10 and 5 percent level, respectively

Table 7. The Impact of Government Ownership of Banks on the Cost of Banking Crises

Variables	Model (7.1)	Model (7.2)	Model (7.3)	Model (7.4)	Model (7.5)	Model (7.6)
	Foregone output cost of crises			Fiscal cost of crises		
	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)
Inflation t-1	-0.0101	-0.0095	0.0903	-0.0660	-0.0644	-0.0087
	(1.81) *	(1.67) *	(2.23) *	-(0.77)	-(0.68)	-(0.10)
Real interest rate t-1	-0.0638	-0.0633	-0.0515	0.0768	0.0738	-0.0145
	-(1.04)	-(1.05)	-(0.87)	(0.56)	(0.48)	-(0.10)
Growth of real credit t-1	0.0105	0.0105	0.0126	0.5037	0.5031	0.4500
	(0.25)	(0.25)	(0.30)	(1.83) *	(1.79) *	(1.71)
Credit to GDP t-1	0.0254	0.0116	0.0165	0.2027	0.2203	0.2532
	(0.61)	(0.22)	(0.31)	(1.47)	(0.91)	(2.07) *
Government ownership of banks t-1	-0.0391	-0.0388	-0.0311	0.1063	0.1083	0.1380
	-(1.64)	-(1.69) *	-(1.24)	(1.10)	(1.09)	(1.64)
(Gov.ownshp. of banks*dummy for<20%gov.ownshp) t-1		0.1096			-0.1207	
		(0.57)			-(0.12)	
(Dummy for countries under an exchange rate peg) t-1	3.3036	3.0940	4.2141	7.9559	7.9767	7.3069
	(2.50) **	(2.01) **	(2.00) *	(1.13)	(1.11)	(1.03)
Forbearance			1.4736			8.9396
			(0.70)			(1.39)
Liquidity support			-0.8087			3.8155
			-(0.52)			(0.51)
Guarantee			0.9666			-8.7233
			(0.44)			-(1.08)
Constant	2.3128	2.7212	-0.7622	-8.5876	-9.2389	-16.0836
	(0.88)		-(0.26)	-(0.85)	-(0.73)	-(1.66)
Number of observations	30	30	18	23	23	20
R-squared	0.46	0.47	0.61	0.49	0.5	0.63

*, ** denote significance at the 10 and 5 percent level, respectively

Table 7 presents OLS estimates for the cost of crises. Across all specifications, we find that government ownership of banks seems to reduce the output losses associated with crises, but increase the fiscal costs. Because the number of observations is small and the coefficients on the government ownership variable are not significant for the most part, these estimations should be considered preliminary and their results should be taken with caution.

IV. Preventing and Mitigating Crises

The review of factors behind crises and our empirical findings suggest a path for government officials who want to prevent or at least mitigate the impact of banking crises. A first step is to

develop financial infrastructure,[23] which is needed by a healthy financial system. Better information and contracting will lead to broader financial sector development and, in particular, a greater role for equity finance relative to debt and less dependence on bank finance. One reason why institutional underdevelopment and especially a poor legal environment are found to be conducive to crises is that they lead to greater dependence on banking and hence a more lopsided financial system. When state ownership is present, the demand for better infrastructure is especially weak and its absence can forestall the development of the banking system and of nonbank institutions.[24] Rather than investing significant amounts in state-owned banks, governments would be better served by greater investments in infrastructure. Such government actions would not only help the banking system in the future, but, more importantly, they would improve the nonbank financial sector and give residents the possibility of getting better financial services from private, nonbank intermediaries.

Second, there is no substitute for sound macro policies, meaning not only those that do not add to volatility, but also actually dampen it. Without these policies, inflation will be higher, thereby driving out long-term debt and leaving the corporate sector —and therefore the banks— with more fragile balance sheets. Sound macro policies entail avoiding lending booms, which is ultimately the responsibility of the central bank, and thereby lessening the scope for a subsequent bust. They also include paying attention to the exchange rate and liquidity policies. As shown by Domaç and Martinez Peria (2000), if the currency is pegged, the risk of crises is lower, but these episodes tend to be more severe. Therefore, the authorities have to be especially vigilant against exchange rate misalignments. If the government adopts a flexible exchange rate, then the goal must be to lessen 'lean against the wind' behavior when a domestic boom yields asset values that are detached from underlying economic fundamentals.

[23] As used in World Bank (forthcoming, 2001), the term "financial infrastructure" is intended to capture the framework of rules and systems within which firms and households plan, negotiate, and perform financial transactions. As such, it would include: legal and regulatory structures (including rule and contract enforcement mechanisms); supervisory resources and practices; information provision (e.g., accounting and auditing rules and practices, credit bureaus, rating agencies, public registries); liquidity facilities; payments and securities settlement systems; and exchange systems (e.g., trading and listing services, trading rules, communication and information platforms).

[24] In fact, Barth, Caprio, and Levine (2000) show that greater state ownership leads to less nonbank financial sector development.

Banking crises are often preceded by deposit runs and/or a drying up of liquidity in the inter-bank market. Both banking regulations and macroeconomic policies should be consistent with an adequate liquidity policy to deal with unexpected crises that can destabilize the payment systems. In this sense, a policy of requiring banks to meet certain prudent liquidity ratios and of securing contingent credit lines from abroad may be a wise course of action.

Third, incentives induced by the regulatory framework in the financial system should be designed so that the sector acts as a shock absorber, rather than a magnifier of risks. In most countries, the safety net under the banking system —principally lender of last resort facilities and explicit or implicit deposit insurance— encourages greater bank dependence and hence less stability. In practice, greater state ownership has often functioned like a blanket deposit insurance. Instead, governments should avoid this type of unconditional insurance and design safety nets to encourage healthy balance (debt-equity, and banking/non-banking), effective risk management, and oversight of banks by owners, markets, and intermediaries. For countries coming out of a period of control, attention to the incentive framework and the safety net will help ensure better-sequenced financial liberalization, thereby again lessening the likelihood of a crisis from this source.

Key lessons on deposit insurance design (reviewed in World Bank, 2001) are to limit coverage (to 1-2 times per capita GDP, consistent with the perceived need to protect small depositors); keeping the deposit insurance scheme unfunded (but with access to funds) in order to encourage market discipline; and involving the private sector in the management and administration of the fund. Private sector involvement can help limit the reduction in market discipline and the impact on systemic risk of an overly liberal government scheme.

Ensuring that bank monitoring is working is a must for lessening the odds and costs of crises. With state-owned banks, there is no arms-length between the monitors – one set of bureaucrats is monitoring another. Moreover, there is no owner who has his/her own resources at risk – bureaucrats are acting as agents for the real owners, the taxpayers, and markets have little ability or incentive to monitor, as these banks are perceived to be government risk. With private banks, ensuring that owners have real capital at stake is a priority, and indeed enforcing civil and criminal legal penalties in the event that owners do not behave with the highest fiduciary standards is a way of going beyond limited liability and increasing owners' share of the downside risk.

As far as markets are concerned, large bank creditors, to the extent they feel exposed to losses, have clear incentives to monitor banks. Recent proposals attempt to capitalize on this incentive by forcing banks to issue subordinated debt, that is, a fixed claim that is only senior to equity. Not enjoying the upside gains of equity holders, but holding almost as much of the downside risk, subordinated debt holders would be highly motivated to police banks for excessive risk taking. Other large creditors —such as other banks in interbank markets— would also be motivated to monitor banks as well, as long as they were not under the presumption that they might be 'bailed out' if the bank got into difficulties.

A key to the success of subordinated debt is to ensure that the issuers are truly at arms-length from the holders of the debt, meaning that they neither should be related parties, nor should the issuer be allowed to provide comfort or guarantees to the holders. Notwithstanding the difficulty of doing so, Calomiris and Powell (2000) note the signs of success of this program in Argentina, and World Bank (2001) reviews other evidence that creditors can contribute to monitoring (in particular, Schmukler and Martinez-Peria (2000)).

Official supervisors are the remaining set of monitors, and recent evidence indicates that they provide independent information. But it is also crucially important to focus attention on the incentive structure for supervisors. As noted in World Bank (2001), supervisors face a skewed 'balance of terror' in a number of countries, to the extent that they can be sued for their actions and be held personally liable. On the other hand, they can look forward to higher income in the future by taking a job with a private bank. Thus, they face possibly large liability for tough enforcement now, and some chance of deferred gains for friendlier supervision. Instead, they need to be immune from civil liability for enforcement actions now, and should at the least face loss of deferred compensation (such as their pension) if irregularities are discovered during or after their careers. This would be in line with the optimal compensation structure long recognized for those charged with enforcing laws and regulations. Ensuring that their compensation today is sufficient is a minimum and the rationale for paying attractive pensions — deferred bonuses for effective enforcement, if you will— is convincing. This same approach is applied to law enforcement officers' compensation in some countries to the extent that if it is not possible to observe their actions well, they give them a generous pension – a deferred bonus, if you will – but confiscate that bonus if they are revealed to have engaged in violations of the laws as well as 'best practice.'

Lastly, the above results suggest that reducing state ownership will lower the likelihood and potentially the fiscal costs of banking crises. Indeed, if the government takes more seriously its role as regulator and provider of public goods —financial sector infrastructure— getting out of state ownership will lessen its own incentive conflict. State owned banks tend not to be monitored by either the private or public sector, which is likely why they are a danger to financial stability in addition to being a drain on financial sector development.

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Data Appendix

Below we list the variables and sources used for this study. The data is annual and it covers the period 1980-97.

* *Systemic banking crises dummy*: equals one during episodes identified as systemic following the criteria in Demirgüç-Kunt and Detragiache (1998). Source: Caprio and Klingebiel (1999) and Lindgren et. al (1996)

* *Inflation*: percentage change in the GDP deflator. Source: International Monetary Fund, International Financial Statistics, line 99bir

* *Terms of Trade Change*: change in the price of exports over imports. Source: World Bank, World Tables

* *Real Interest Rate*: Nominal interest rate minus inflation (calculated as the percentage change in the GDP deflator). Source: International Monetary Fund, International Financial Statistics, line 60B

* *M2:* Source: International Monetary Fund, International Financial Statistics, lines (34+35)

* *International Reserves:* Source: International Monetary Fund, International Financial Statistics, line 1ld

* *GDP per capita:* Source: World Bank, World Tables

* *Real GDP growth*: Source: World Bank, World Tables

* *Domestic Credit growth:* Source: International Monetary Fund, International Financial Statistics, line 32d

* *Private Credit/GDP:* Source: International Monetary Fund, International Financial Statistics, line 32d divided by line 99b

* *Cash/Assets*: Reserves of Deposit Money Banks / Assets of Deposit Money Banks. Source: International Monetary Fund, International Financial Statistics, line 20 divided by lines(22a + 22b + 22c +22d +22f)

* *Foreign Liabilities / Foreign Assets:* deposit money banks foreign liabilities to foreign assets Source: International Monetary Fund, International Financial Statistics, lines (26c+26cl) divided by line 21

* *Capital Flows to GDP*: Capital Account plus Financial Account + Net Errors and Omissions. Source: International Monetary Fund, International Financial Statistics, lines (78bcd + 78bjd +78cad)

* *Fiscal cost of crises* (% of GDP)Source: Honohan and Klingebiel (2000)

* *Exchange rate peg dummy:* equals one for those cases when a given country is under a fixed exchange rate regime. Source: IMF classification comes from "Annual Report on Exchange Arrangements and Exchange Restrictions" (AREAER).

* *Explicit deposit insurance dummy*: equals one if a country has adopted an explicit deposit insurance system. Source: Demirgüç-Kunt and Detragiache (2000)

* *Financial liberalization dummy*: equals one during periods of interest rate liberalizations. Source: Demirgüç-Kunt and Detragiache (1999).

* *Forbearance dummy*: equals one if the government extended forbearance in any of the following ways: (i)banks were left open in distress (i.e., unable to pay depositors, no access to inter-bank market, or widely believed to be insolvent for at least three months); (ii) banks were permitted to function under existing management though known to be severely undercapitalized; and (iii) regulations were relaxed or the current regulatory framework was not enforced for at least twelve months. Source: Honohan and Klingebiel (2000)

* *Liquidity support dummy*: equals one if the government provided substantial liquidity support to insolvent institutions. Source: Honohan and Klingebiel (2000)

* *Guarantee dummy*: equals one if the government offered explicit or implicit guarantees during the crisis. Source: Honohan and Klingebiel (2000)

Appendix

Table A1. Countries and Crises Included, 1980-1997

Country Name	Crises Based on Demirgüc-Kunt And Detratgiache (1998)
Algeria	1990 – 1992 (systemic)
Argentina	1980 – 1982 (systemic)
	1989 – 1990 (systemic)
	1995 (systemic)
Australia	1989 – 1992 (non-systemic)
Austria	no crises
Bahrain	no crises
Bangladesh	1987 – 1997 (systemic)
Belgium	no crises
Bolivia	1986 –1987 (systemic)
	1994 – 1997 (systemic)
Brazil	Not in sample
	1994 – 1996 (systemic)
Canada	1983 – 1985 (non-systemic)
Chile	1981 – 1987 (systemic)
Colombia	1982 – 1987 (systemic)
Costa Rica	1987 (systemic)
	1994 – 1997 (non-systemic)
Cote d'Ivoire	1988 – 1991 (systemic)
Cyprus	
Denmark	1987 – 1992 (non-systemic)
Dominican Republic	no crises
Ecuador	not in sample
	1996 – 1997 (systemic)
Egypt	not in sample
	1991 – 1995 (non-systemic)
El Salvador	1989 (systemic)
Finland	1991 – 1994 (systemic)
France	1994 – 1995 (non-systemic)
Germany	no crises
Greece	1991 –1995 (non-systemic)
Guatemala	not in sample
	1993 – 1995 (systemic)
Honduras	no crises
India	1991 – 1997 (systemic)
Indonesia	1992 – 1997 (systemic)
Ireland	no crises
Israel	1970s – 1983 (systemic)
Italy	1990 – 1995 (non-systemic)
Japan	1992 – 1997 (systemic)
Jordan	1989 – 1990 (systemic)
Kenya	1985 – 1989 (systemic)
	1993 – 1995 (systemic)
Korea	1997 (systemic)
Lebanon	1988 – 1987 (systemic)
Malaysia	1982 – 1987 (systemic)
	1997 (systemic)
Mexico	1981 – 1982 (systemic)
	1994 – 1997 (systemic)

Table A1. Countries and Crises Included, 19801997 (continued)

Country Name	Crises Based on Demirgüc-Kunt And Detratgiache (1998)
Morocco	no crises
Nepal	1988 – 1997 (systemic)
Netherlands	no crises
New Zealand	1987 – 1990 (non-systemic)
Nigeria	1991 – 1995 (systemic)
	1997 (non-systemic)
Norway	1987 – 1993 (systemic)
Panama	1988 – 1989 (systemic)
Paraguay	1995 – 1997 (systemic)
Peru	1983 – 1990 (systemic)
Philippines	1981 – 1987 (systemic)
Portugal	no crises
Saudi Arabia	no crises
Senegal	1983 – 1991 (systemic)
Singapore	no crises
South Africa	1985 (systemic)
Spain	1970s – 1985 (systemic)
Sri Lanka	1989 – 1993
Sweden	1990 – 1994 (non-systemic)
Switzerland	no crises
Tanzania	1988 – 1997 (systemic)
Thailand	1983 – 1987 (systemic)
	1997 (systemic)
Tunisia	1991 – 1995 (systemic)
Turkey	1982 – 1985 (systemic)
	1991 (non-systemic)
	1994 (non-systemic)
United Kingdom	1984 (non-systemic)
	1991 (non-systemic)
	1995 (non-systemic)
United States	1980 – 1992 (systemic)
Uruguay	1981 – 1985 (systemic)
Venezuela	1994 – 1997 (systemic)