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DEPOSIT INSURANCE AND EXTERNAL FINANCE

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ABSTRACT

Countries around the world differ substantially in the relative importance of their banks and capital markets in providing investment financing. This paper examines one potential explanation for the cross-country differences in the importance of banks and capital market financing of investment. It is our contention that much of the variation across countries in the depth and breadth of capital markets can be explained by a combination of the existence of deposit insurance and the extent to which a country's banking system is state owned. We provide both an equilibrium model predicting and empirical evidence showing that countries with explicit deposit insurance and a high degree of state-owned bank assets have smaller equity markets, a lower number of publicly traded firms and a smaller amount of bank credit to the private sector. Finally, our results suggest that the effects of deposit guarantees are more important than the origins of national legal systems.

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1 Introduction

Capital markets serve an essential purpose in the growth and development of modern economies. They provide for the efficient channeling of funds from savers to investors. There are two basic methods for financing capital investment: primary issuance of equity or bonds, and securing of bank loans. Looking around the world, we see that countries differ substantially in the relative importance of banks and capital markets in providing investment financing. Equity market capitalization currently ranges from close to zero in countries like Austria, Argentina and Greece to nearly 2 times GDP in the UK, South Africa and Malaysia. The importance of bank loan financing is essentially the mirror image of this. What accounts for the cross-country differences in the importance of banks and capital market financing of investment?

The purpose of this paper is to address this question directly. It is our contention that much of the variation across countries in the depth and breadth of capital markets can be explained by a combination of the existence of deposit insurance and the extent to which a country's banking system is state owned.

Because of the importance of financial intermediation, and the difficulties associated with potential bank failures, governments in most countries have established a set of institutional structures to insure the stability of their banking systems. Primary among these is the creation of deposit insurance. By insuring deposits, banks' liability holders are significantly less likely to request the return of callable deposits, reducing the chances of bank runs. But at the same time, deposit insurance subsidizes bank risk-taking activities and allows the payment of lower interest rates to depositors.[1] This channels money through banks, and

[1] See Demirgüç-Kunt and Huizinga (2004) who use a cross-country sample to show that deposit insurance decreases rates of return paid by banks, reduces market discipline faced by banks and their managers, and increases banks' risk taking. Demirgüç-Kunt and Detragiache (2002) and Demirgüç-Kunt and Kane (2002) extend this analysis, finding that deposit insurance increases the probability of banking crises and financial

away from financial markets. Direct state bank ownership has a similar impact.[2]

We present a simple, three sector model, in which the economy is composed of firms, banks and households. The firms require operating capital and can obtain it either through equity issuance or from bank loans. Banks take deposits from households and make loans to firms, while households both allocate their wealth and purchase the firms' output. The model allows us to show how increases in deposit insurance (or the percentage of the banking system that is state owned) both reduces the size of the capital market and shrinks the amount of bank credit to the private sector, and may decrease the number of firms seeking equity financing.

In order to examine the predictions of the model, we study a data set composed of 49 countries. Of these, 33 currently have explicit deposit insurance and 42 have some state ownership of banks, ranging from less than 2 percent to almost 90 percent. The data confirm the predictions of the model. An increase in either state bank ownership or presence of deposit insurance both decreases the size of capital markets and the extent of bank lending. For example, we would predict that decreasing the percentage of the banking system that is state owned from 36%, as it is in Italy, to zero would increase in the size of the capital market from less than 10 percent to over 30 percent of GDP and a raise in the level of bank lending from 57 percent to close to 90 percent of GDP.

Our conclusions are in contrast with those in La Porta, López-de-Silanes, Shleifer and Vishny (1997), who study the relationship between law and finance. La Porta, et. al note the importance of the countries' legal system in determining the structure of the financial system. In particular, they point out that investors provide capital to firms only if they believe they will get their money back. For equity holders, this means that they must be able to vote

instability. Finally, Cull, Senbet and Sorge (2004) find that generous deposit insurance may lead to financial instability in lax regulatory environments.

[2]See Barth, Caprio Jr., and Levine (2001) and La Porta, López-de-Silanes and Shleifer (2000).

out directors and managers who do not pay them. For creditors and holders of bonds, this means that they must have authority to repossess collateral. Furthermore, these nominal legal rights must be accompanied by confidence that the laws will be enforced. La Porta, et. al go on to show that the depth of financial markets depends crucially on the degree of law enforcement in a country and the origin of a countries legal system, which they divide into four families: English, German, Scandinavian and French. The results we present below suggest that the extent of state bank ownership and nature of deposit insurance are more important than the form of legal organization in determining a country's financial structure.

The remainder of the paper is organized as follows: The model developed in the section 2 allows us to study the impact of an increase in the level of deposit indemnity in a country. These implications are tested in section 3 where we provide empirical evidence that deposit insurance has a detrimental effect on the development of both external capital and private credit markets. We also find that, once explicit deposit insurance and state-owned bank assets are introduced into the analysis, the legal family origin variables lose importance in explaining the differences between countries in the development of the external capital markets. Section 4 concludes.

2 The Model

We begin by developing an equilibrium model to study the effects of explicit deposit insurance and state ownership of banks on equity markets and financial intermediation. Specifically, the model shows that an increase in depositors' protection leads households to shift their assets out of capital markets and into banks, reducing their equity holdings. Furthermore, an increase in bank deposit insurance also results in *(i)* a reduction in the amount of bank credit to firms; and *(ii)* possibly a lower number of publicly traded firms.

The economy consists of three sectors: manufacturing firms, banks and households. The production sector is represented by n monopolistic competitors, each of which produces an imperfectly substitutable good. Firms transform inputs into output, and their knowledge of this technology is summarized by a parameter we call A_i, and they differ in both their A_i and their output price, P_i. All agents in the economy are uncertain as to whether the productivity will be high ($\overline{A}_i$) or low ($\underline{A}_i$) for an individual firm. Each firm's objective is to maximize expected profits by choosing either of two sources of external finance -bank loans or equity issuance- in order to purchase the factors of production.

In addition to firms, there is a competitive financial sector composed of a representative bank. The bank has zero expected profits, but may go bankrupt. In the case of bankruptcy households recover their deposits (or a fraction thereof) depending on the extent to which the bank is insured.

Finally, a representative household makes bank and equity investment decisions in order to maximize expected utility from consumption across different states of nature, taking into account the (known) probabilities of high and low productivity and bankruptcy. The household's budget is given by its net returns on assets, which is state-dependent.

2.1 Production

Turning to the specifics of the model, each firm faces a decreasing returns to scale technology for production and it uses either of the two perfectly substitutable means of financing, external capital or bank loans, in order to purchase the inputs for production, before uncertainty about productivity is revealed. Since the only difference is the state-dependent productivity

A_i, the production function of an individual firm i can be written as:

$$\begin{aligned} \overline{Y}_i &= \overline{A}_i(S_i + L_i)^\theta \\ \underline{Y}_i &= \underline{A}_i(S_i + L_i)^\theta \end{aligned} \tag{1}$$

where $\overline{Y}_i$ and $\underline{Y}_i$ represent firm i's production in the high ($\overline{A}_i$) and low ($\underline{A}_i$) productivity states, respectively (with $\underline{A}_i < \overline{A}_i$), and $0 < \theta < 1$. π_S is the probability of the low productivity state ($\pi_S = \Pr(A_i = \underline{A}_i)$), which is common for all firms.

We define $P(A_i)$ as the price of firm i's commodity, conditional on the state of nature A_i. L_i is the amount of bank loans demanded by the firm and r_L its gross interest rate, which is honored by the firm regardless of whether the productivity level is high or low.

Moving to the financing decision, we define S_i as the equity issued by the firm, and assume that it pays a required gross return $\overline{r}_S$ and $\underline{r}_S$ to the stock holders in the high and low productivity states, respectively. $F(S)$ is the fixed cost all firms must incur in order to issue equity, and this must be paid before the productivity state is revealed. $F(S)$ takes a value of F if the firm issues stock and 0 otherwise.

Each firm's objective is to maximize expected profits:

$$(1 - \pi_S)[P(\overline{A}_i)\overline{Y}_i - r_L L_i - \overline{r}_S S_i - F(S)] + \pi_S[P(\underline{A}_i)\underline{Y}_i - r_L L_i - \underline{r}_S S_i - F(S)] \tag{2}$$

subject to the technology in equation (1).

For simplicity, we assume that in the low productivity state all firms' revenues are sufficiently low that, in equilibrium, they pay a gross rate equal to zero to the residual claimants

(equity holders). This normalization implies:

$$\overline{r}_S = r_S \ , \ \underline{r}_S = 0$$

Given the nature of the production function each firm will choose to finance its purchases of inputs exclusively through either equity financing or bank loans, depending on which source is least expensive. If a firm i decides to finance production through equity issuance, its expected profits are:

$$[\pi_S P(\underline{A}_i)\underline{A}_i + (1-\pi_S)P(\overline{A}_i)\overline{A}_i]^{\frac{1}{1-\theta}}(\theta^{\frac{\theta}{1-\theta}} - \theta^{\frac{1}{1-\theta}})[(1-\pi_S)r_S]^{\frac{-\theta}{1-\theta}} - F \tag{3}$$

On the other hand, if the firm chooses to use bank loans, expected profits are given by:

$$[\pi_S P(\underline{A}_i)\underline{A}_i + (1-\pi_S)P(\overline{A}_i)\overline{A}_i]^{\frac{1}{1-\theta}}(\theta^{\frac{\theta}{1-\theta}} - \theta^{\frac{1}{1-\theta}}){r_L}^{\frac{-\theta}{1-\theta}} \tag{4}$$

Firms choose their means of financing to maximize their profits. It can be easily shown that firms will choose bank loan financing whenever the gross interest rates is lower than the expected return they have to pay the share-holders ($r_L \leq (1-\pi_S)r_S$).

If the gross interest rate exceeds the expected gross equity payment ($r_L > (1-\pi_S)r_S$), the choice between loan and equity financing will depend on the size of the fixed cost of issuing shares. Combining equations (3) and (4), we can see that the firm will finance production through equity issuance whenever the following condition holds:

$$\widetilde{B}_i \geq K(\theta)F^{1-\theta}\left\{[(1-\pi_S)r_S]^{\frac{-\theta}{1-\theta}} - {r_L}^{\frac{-\theta}{1-\theta}}\right\}^{-(1-\theta)} \tag{5}$$

where $\widetilde{B}_i \equiv \pi_S P(\underline{A}_i)\underline{A}_i + (1-\pi_S)P(\overline{A}_i)\overline{A}_i$ and $K(\theta) \equiv \theta^{-\theta}(1-\theta)^{-(1-\theta)}$.

In those instances in which the inequality in equation (5) fails to hold, firms will obtain loans to finance their production. We assume that, as a result, k firms choose equity financing while $n-k$ firms obtain financing from banks. This separating equilibrium, characterized by the profit maximizing factor demands, is given by:

$$\begin{aligned} S_i &= \left[\frac{\theta \widetilde{B}_i}{(1-\pi_S) r_S}\right]^{\frac{1}{1-\theta}}, \quad L_i = 0, \quad i \in \{i_1, ..., i_k\} \\ L_i &= \left[\frac{\theta \widetilde{B}_i}{r_L}\right]^{\frac{1}{1-\theta}}, \qquad\qquad S_i = 0, \quad i \in \{i_{k+1}, ..., i_n\} \end{aligned} \tag{6}$$

This solution allows us to study the impact of changes in the required rate of return on firms' financing decision. In particular, we note that an increase in equity rate of return r_S has two separate effects. First, as r_S increases, each firm's individual demand for equity falls. And second, a higher r_S may lead some firms to shift from equity to loan financing, thereby reducing k.

2.2 Financial Intermediation

Turning to financial intermediation, we assume the presence of a representative financial institution, a fraction $\phi \in [0,1]$ of which is owned by the government, and the remaining $(1-\phi)$ is owned by the private sector. The bank has deposit liabilities on which it pays a gross rate of return r_D, that it takes as given. Furthermore, the bank faces a probability π_D of bankruptcy. We make the simplifying assumption that bankruptcy only occurs in the low productivity state [$Prob(A_i = \underline{A}_i | bankruptcy) = 1$] and that in this state households recover only the fraction of deposits that is covered by insurance. We also assume there are no reserve requirements, but allow the representative bank to hold excess reserves. This implies that at all times the total level of deposits (D) exceeds the quantity of loans (L)

made by the bank. That is, $D \geq \sum_{i \in \{i_{k+1},\ldots,i_n\}} L_i \equiv L$.

The state-owned portion of the representative financial intermediary is backed entirely by the government. Therefore, in the event of a bank failure the government will step in and return principal and interest to this fraction of depositors. Assuming that the government makes zero expected profits from this insurance policy, and that the state-owned portion of the bank has a (constant) management cost per unit of deposits c_1, the bank's cost per unit of deposits is:

$$c_G = c_1 + \pi_D r_D \tag{7}$$

where the term $\pi_D r_D$ equals the premium rate that the state-owned banks must to pay to the government.

For the privately-owned part of the bank there exists the option of acquiring privately supplied explicit deposit insurance, which insures a fraction $\lambda \in (0, 1)$ of deposits. The fraction λ captures the fact that not all bank deposits are covered by insurance, and this coverage may vary substantially across countries. Assuming that this scheme breaks even as well, the costs for privately owned banks per unit of deposits are:

$$c_P = c_2 + \lambda(I)\pi_D r_D \tag{8}$$

where c_2 is the per unit of deposits management costs of private banks, and $\lambda(I)$ is an indicator variable which takes the value of λ if the explicit scheme is adopted and 0 otherwise. Here, the term $\lambda(I)\pi_D r_D$ represents the premium rate per unit of deposits for explicit insurance purchased by a privately-owned banks.

The zero profit assumption implies that the gross return on loans must be equal to the

sum of the expected gross payoff to depositors and the intermediation costs:

$$r_L L = [(1 - \pi_D) r_D + \phi c_G + (1 - \phi) c_P] D \tag{9}$$

Substituting equations (8) and (9) into the right-hand side of equation (10) and dividing through by L, we obtain an expression for the gross loan rate charged by the financial institution:

$$r_L = [(1 - \pi_D^*) r_D + \phi c_1 + (1 - \phi) c_2] \frac{D}{L} \tag{10}$$

where $\pi_D^* = \pi_D (1 - \phi)[1 - \lambda(I)]$ is the actual probability that asset holders will not receive their bank deposits back. Clearly, π_D^* is lower when there is explicit deposit insurance and when a higher proportion of the bank is state owned, as both of these reduce the probability that the bank will default on its deposit liabilities.

2.3 Households

The representative household's objective is to maximize expected utility from the consumption of the n commodities produced by the firms. Income is provided by the net return on assets, which will depend on the particular state of nature. There are three possible outcomes that concern the household. In the first, when there is a high productivity state, the household receives returns on their equity investments as well as having its bank deposits returned safely. In this case, which occurs with probability $(1 - \pi_S)$, income is $(r_S - 1)S + (r_D - 1)D$. The second possibility, which occurs with probability $(\pi_S - \pi_D^*)$, is that productivity is in the low state, and so equities return nothing, but bank deposits are returned. This leads to an income of $(r_D - 1)D$. Finally, with probability π_D^* equities return nothing and banks are bankrupt without insurance, and so income is zero.

Assuming that households have power utility, they will maximize:

$$(1-\pi_S)C(\overline{A})^{\frac{1}{\gamma}} + (\pi_S - \pi_D^*)C(\underline{A})^{\frac{1}{\gamma}}; \quad \gamma > 1 \tag{11}$$

subject to the budget constraints:

$$P(\overline{A})C(\overline{A}) = (r_S - 1)S + (r_D - 1)D \tag{12}$$

$$P(\underline{A})C(\underline{A}) = (r_D - 1)D \tag{13}$$

$$W = S + D \tag{14}$$

where:

$$C(A) \equiv \left(\frac{1}{n}\sum_{i=1}^{n} C(A_i)^{\frac{\alpha-1}{\alpha}}\right)^{\frac{\alpha}{\alpha-1}} \tag{15}$$

$$P(A) \equiv \left(\frac{1}{n}\sum_{i=1}^{n} P(A_i)^{1-\alpha}\right)^{\frac{1}{1-\alpha}} \tag{16}$$

$$A_i \in \{\overline{A}_i, \underline{A}_i\} \tag{17}$$

W is the agent's total wealth (which we assume fixed), γ is the inverse of the coefficient of relative risk aversion, α is the elasticity of substitution between goods in utility and π_S and π_D^* (as defined in subsections 2.1 and 2.2) are the positive probabilities faced by the household of losing its entire investment in stock shares and bank deposits, respectively.

It is straightforward to verify that the household's demand for each asset will depend directly on the asset's own rate and inversely on the probability of default by the issuer.[3] Equilibrium in the economy is achieved by the usual market clearing conditions in the goods

[3] See Technical Appendix for details.

and asset contingent commodity markets.[4]

2.4 Comparative Statics and Testable Implications

We are interested in using the model to study the impact of both the introduction of an explicit deposit insurance system and an increase in the share of the banking system owned by the state on firm financing. In particular, we study how each of these institutional changes affects the number of firms issuing equity, the extent of issuance and the amount of bank credit extended.

In the model, explicit deposit insurance exists when the variable $\lambda(I)$ in equation (8) is greater than zero. We study this in three steps. First, we examine the impact on the household's asset allocation decision, second we look at the consequence of the firm's financing decision, and finally we ask about the effect on bank lending activity.

Looking at the household, we see that an increase in $\lambda(I)$ lowers π_D^*, the probability that banks will not return depositor balances. Keeping k, the number of firms issuing equity, fixed,[5] reduces π_D^* by $\pi_D(1-\phi)\lambda$, causing the asset holder to shift wealth away from equity towards bank deposits. For a given r_D, equity market equilibrium will require a higher yield on stocks and a lower issuance of equity by individual firms.

By changing the required rate of return on equity, the introduction of deposit insurance will also change the firm's financing decision. This is ambiguous, and we do not know whether fewer firms will issue equity following the change. To see why, consider the marginal equity issuing firm as defined by the condition in equation (5). This firm faces an increase in the required return on equity that it would issue, but may also face an increase in the interest rate

[4] The reader is referred to Blanchard and Kiyotaki (1987) for an analogous derivation of the equilibrium in the goods market.

[5] The model described in Section 3 does not give us an unambiguous answer as to whether or not k remains fixed. However, we assume for the comparative staics exercise that k remains unchanged to facilitate the analysis.

charged by the bank for a loan. If the increase in the expected return on equity, $(1-\pi_S)r_S$, is larger than the increase in the loan rate, r_L, then the marginal firm will turn from equity to loan financing.

Turning to the bank, we see that implementation of a deposit insurance system creates an increase in the demand for bank deposits by the households, lowering π_D^*. As a result, the loan rate r_L will increase for a given k, thereby reducing bank loans to the representative firm.

Increasing the share of bank assets owned by the state is analogous to the introduction of explicit deposit insurance. To see why, consider an increase in the parameter ϕ. Again, π_D^* falls, raising the level of bank deposits and increasing the loan rate charged to firms. The impact of the representative firm's decision to issue equity is still ambiguous, although those that do issue, reduce the amount.

These comparative statics results provide us with three testable hypotheses. Looking across countries, we expect to see that those with either explicit deposit insurance or high levels of state-bank ownership should have less equity issuance, a lower level of bank loan financing, and possibly fewer publicly traded firms. We now take these predictions to the data.

3 Empirical Results

We now proceed to examine the impact of deposit insurance and state-bank ownership on financial markets using a cross-sectional data set composed of 49 countries. Our data sources are described in the data appendix. Our empirical tests are based on regressions of the size of external capital markets, the number of firms issuing equity and the extent of bank lending on measures of the extent of state ownership of banks and the presence of explicit deposit

insurance. We also include a set of controls, including measures of the growth and level of GDP. As noted by La Porta, López de Silanes, Shleifer and Vishny (1997), these variables are likely to contribute to the degree of development of equity and debt markets in an economy. Because of the linkage between law enforcement and the degree of external finance, we also include the LLSV's index measuring the "Rule of Law."

We are interested in explaining variation in the ratio of (publicly held) stock market capitalization to gross national product (External Capital/GNP), the ratio of bank credit extended to the private sector to gross domestic product (Private Credit/GDP) and the ratio of domestic firms listed in a given country to its population (Listed Domestic Firms/Population). For each of these, we look at three sets of explanatory variables. In our baseline specification, we regress each one of the variables of interest on the controls, the share of state-owned bank assets (as the proxy for implicit insurance) and a zero-one dummy variable to account for the presence of explicit deposit insurance. This provides our baseline set of results.

Next, we study the relative importance of deposit insurance and state ownership on the one hand and legal origin on the other. To do this, we first look at regression including only the legal origin dummy variables (French, German and Scandinavian), and the controls. To this we then add the deposit insurance measures.

3.1 Equity Market Size

Table 1 displays our results using External Capital as a ratio to GNP as the dependent variable. If we only consider deposit insurance and state-owned bank assets (jointly with the control variables) as regressors (labeled "Specification 1"), the results are as predicted by the model. Both explicit deposit insurance and state ownership are negatively correlated

with on the ratio of the stock market capitalization to gross national product, although only the coefficient on the latter is statistically significantly different from zero (at the 1% level). Looking at the Specification 3, we see that this result is robust to including the legal origin dummy variables; the coefficient of state owned banks slightly changes from -0.676 to -0.602, but it remains significant at the 1% level.

Table 1
Dependent variable: External Capital/GNP

Explanatory variable	Specification 1	Specification 2	Specification 3
Intercept	0.4785	-0.0341	0.4228
p-value	*(0.17)*	*(0.93)*	*(0.28)*
Growth	0.0678	0.0674	0.0658
p-value	*(0.01)*	*(0.00)*	*(0.01)*
Log GNP	-0.0090	0.0019	-0.0026
p-value	*(0.79)*	*(0.96)*	*(0.92)*
Rule of Law	0.0135	0.0460	0.0154
p-value	*(0.41)*	*(0.04)*	*(0.48)*
French origin		-0.2813	-0.1819
p-value		*(0.01)*	*(0.04)*
German origin		-0.2880	-0.1309
p-value		*(0.06)*	*(0.34)*
Scandinavian origin		-0.3141	-0.1676
p-value		*(0.03)*	*(0.21)*
State-owned bank assets	-0.6765		-0.6024
p-value	*(0.00)*		*(0.00)*
Explicit deposit insurance	-0.1581		-0.0937
p-value	*(0.18)*		*(0.43)*
R^2	0.468	0.362	0.509
No. of observations	45	45	45

Another important observation is that the legal origin variables lose explanatory power when deposit insurance and state-owned bank assets are incorporated into the model. In the

absence of the insurance variables, all of the legal origin dummies are significantly different from zero at the 5% level (with "French" being significant at the 1% level). When deposit insurance and state-bank ownership are included in the estimation, only the coefficient of French legal origin remains significantly different from zero at the 10% level. In fact, in Specification 3 we cannot reject the null hypothesis that all of the legal origin coefficients are jointly equal to zero (using a chi-squared test with heteroskedastic consistent errors) at the 10% level. This suggests that the cross-country variation in the size of external capital markets is better explained by the presence or absence of explicit or implicit deposit insurance than it is by the origin of legal systems.

What are the quantitative implications of these results? In tables 2.A and 2.B we examine two subsamples of countries: the Euro Area and Latin America. For the countries in each subgroup, we present an estimate of the amount of the potential change in the external capital/GNP ratio if these countries were to reduce their level of state-ownership of banks to a benchmark level. For the Euro Area the benchmark is the percentage of state-owned bank assets of the United Kingdom, whereas for the Latin American countries we use Chile as the comparison.

Table 2.a
External Capital/GNP (EMU countries)

Country	Actual	Predicted /1
Austria	0.06	0.36-0.40
Italy	0.08	0.30-0.32
Portugal	0.08	0.23-0.25
Germany	0.13	0.35-0.38
Belgium	0.17	0.34-0.36
Spain	0.17	0.18-0.18
France	0.23	0.33-0.35
Finland	0.25	0.43-0.46
Ireland	0.27	0.30-0.30
Netherlands	0.52	0.58-0.58

/1 Range of level of External Capital/GNP ratio for a fraction of state-owned bank assets of 0% (figure for the UK).

Table 2.b
External Capital/GNP (Latin-American countries)

Country	Actual	Predicted /2
Argentina	0.07	0.32-0.35
Venezuela	0.08	0.31-0.34
Colombia	0.14	0.35-0.37
Brazil	0.18	0.25-0.26
Mexico	0.22	0.32-0.33
Peru	0.40	0.44-0.45

/2 Range of level of External Capital/GNP ratio for a fraction of state-owned bank assets of 19.72% (figure for Chile).

The results in these tables suggest that most Euro Area countries (especially Austria, Italy, Germany, Portugal and Belgium) would experience significant increases in the ratio of external capital markets to GNP if they were to privatize their banking systems. For example, we predict that if Italy were to privatize its banks, the external capital/GNP ratio would move from 0.08 to 0.30. Similarly, all of the Latin American countries in the sample (primarily Argentina, Venezuela and Colombia), could experience a rise in the size of their external capital markets if they would move closer to Chile. By our estimates, Argentina and Venezuela would sustain increases similar to those of Italy.

3.2 Credit to the Private Sector

Table 3 presents the results of the three specifications of the model using the Private Credit-GNP as the dependent variable. As predicted by our model, we see that Private Credit/GNP is lower in countries with explicit deposit insurance and a high proportion of state-owned banks. The results reported in Specification 1 show that both coefficients of interests are negative and statistically significantly different from zero at the 5% level. Once again, the results are robust to incorporating the legal origin dummy variables.

Table 3
Dependent variable: Private Credit/GDP

Explanatory variable	Specification 1	Specification 2	Specification 3
Intercept	0.0457	0.1294	0.3805
p-value	*(0.87)*	*(0.68)*	*(0.19)*
Growth	0.0237	0.0343	0.0143
p-value	*(0.31)*	*(0.24)*	*(0.58)*
Log GNP	0.0244	-0.0266	-0.0071
p-value	*(0.39)*	*(0.40)*	*(0.80)*
Rule of Law	0.0674	0.1056	0.0748
p-value	*(0.00)*	*(0.00)*	*(0.00)*
French origin		-0.0837	-0.0224
p-value		*(0.28)*	*(0.77)*
German origin		0.2787	0.3522
p-value		*(0.09)*	*(0.03)*
Scandinavian origin		-0.3569	-0.2389
p-value		*(0.00)*	*(0.02)*
State-owned bank assets	-0.4548		-0.4369
p-value	*(0.00)*		*(0.00)*
Explicit deposit insurance	-0.1651		-0.1602
p-value	*(0.02)*		*(0.01)*
R^2	0.545	0.570	0.658
No. of observations	48	48	48

As in the previous case, the significance of the legal origin variables is sensitive to the inclusion of the deposit insurance variables. Introducing the explicit insurance and state-owned bank assets regressors causes the German legal origin variable to become significantly positive at the 5% level (the wrong sign), whereas the Scandinavian legal origin variable is no longer different from zero at the 1% level.

To gauge quantitative importance, we again compare the Euro Area and Latin American countries to the U.K. and Chile, respectively. In addition, we combine this effect with the

elimination of the explicit deposit insurance scheme to get approximate ranges for the potential levels of the Private Credit/GDP ratio. Again, we find sizeable effects, with increases in overall private credit by the order of 30% of GDP for many of the countries.

Table 4.a
Private Credit/GDP (EMU countries)

Country	Actual	Predicted /1
Italy	0.57	0.88-0.89
Finland	0.60	0.89-0.90
Belgium	0.77	1.05-1.06
Portugal	0.78	1.05-1.06
Spain	0.78	0.95-0.96
Ireland	0.79	0.97-0.98
France	0.84	1.07-1.08
Austria	0.98	1.36-1.38
Netherlands	1.06	1.26-1.26
Germany	1.10	1.42-1.43

/1 Range of Private Credit/GDP ratio for a fraction of state-owned bank assets of 0% (figure for the UK) and elimination of explicit deposit insurance.

Table 4.b
Private Credit/GDP (Latin-American countries)

Country	Actual	Predicted /2
Venezuela	0.08	0.50-0.53
Mexico	0.17	0.48-0.51
Peru	0.19	0.46-0.48
Argentina	0.20	0.63-0.66
Colombia	0.24	0.64-0.67
Brazil	0.26	0.56-0.58
Ecuador	0.29	0.39-0.39
Uruguay	0.32	0.55-0.56

/2 Range of Private Credit/GDP ratio for a fraction of state-owned bank assets of 19.72% (figure for Chile) and elimination of explicit deposit insurance.

These results are consistent with the findings of Demirgüç-Kunt and Huizinga (1999) and Demirgüç-Kunt and Detragiache (1999) who conclude that explicit deposit insurance has a demonstrably detrimental effect on financial intermediation. They are also consistent with

evidence that less developed financial markets tend to exhibit a higher government ownership of banks, as presented by Barth, Caprio Jr. and Levine (1999), La Porta, López de Silanes, Shleifer and Vishny (2000) and others.

3.3 Number of Firms Financed Through Equity Market

Table 5 presents the results of the three specifications, using Listed Domestic Firms per one million inhabitants as the dependent variable. Our model yields no clear prediction on the sign of the likely affect. What we find is that considering only explicit deposit insurance and state-owned bank assets as regressors, the coefficients of both variables are negative and deposit insurance has a statistically significant (at the 5% level) effect on Listed Domestic Firms/Population. This latter result is robust to including the legal origin dummy variables in specification 3. The coefficient of the explicit deposit insurance variable is equal to -22.4 in the absence of the legal origin dummies and it changes to -18.4 once these variables are included in the regression, but it still remains significant at the 5% level. Controlling for income, growth and law enforcement, countries that have an explicit deposit insurance system have, on average, between 18 and 22 less publicly traded firms per million inhabitants than they would otherwise.

Table 5
Dependent variable: Publicly Traded Domestic Firms/Population

Explanatory variable	Specification 1	Specification 2	Specification 3
Intercept	22.7027	30.9284	19.8913
p-value	*(0.18)*	*(0.12)*	*(0.30)*
Growth	-0.8766	-0.0803	-1.3462
p-value	*(0.53)*	*(0.95)*	*(0.37)*
Log GNP	-0.5876	-2.3238	-0.0248
p-value	*(0.77)*	*(0.18)*	*(0.99)*
Rule of Law	3.7684	4.5959	4.2759
p-value	*(0.00)*	*(0.00)*	*(0.00)*
French origin		-21.6525	-18.8699
p-value		*(0.00)*	*(0.01)*
German origin		-22.9014	-18.6687
p-value		*(0.01)*	*(0.02)*
Scandinavian origin		-21.9895	-19.0603
p-value		*(0.04)*	*(0.14)*
State-owned bank assets	-6.9624		3.6743
p-value	*(0.62)*		*(0.82)*
Explicit deposit insurance	-22.3987		-18.4046
p-value	*(0.03)*		*(0.02)*
R^2	0.293	0.316	0.402
No. of observations	49	49	49

Again, the legal origin variables lose their explanatory power when incorporating deposit insurance and state-owned bank assets into the model. Once the latter variables are included in the regression, the French and German legal origin dummies are no longer significant at the 1% level (although they stay significant at the 5% level), whereas the Scandinavian legal origin variable is no longer significant at the 10% level. The null hypothesis of all legal origin coefficients being jointly equal to zero fails to be rejected for the 5% significance level, but it is rejected for a 10% level.

3.4 Testing for endogeneity

Summarizing the results of the previous three subsections, we find there is evidence supporting the hypothesis of an adverse effect of both explicit and implicit deposit insurance (controlling for GNP, growth and law enforcement) on the development of external finance. In particular, the presence of deposit insurance schemes is associated with a less developed equity market, a lower number of domestic firms per capita, and smaller amount of bank loans extended to the private sector.

In this last subsection we examine if countries with more restrictions to the capital market exhibit a larger degree of participation by the government in bank asset holdings. Specifically, we run the regression of state ownership of banks on three indices: antidirector rights, creditor rights and one share-one vote rules, all of which we normalize to be between 0 and 1. These indices give information about the level of investor protection in each country and were obtained from Tables 2 and 4 of La Porta, López de Silanes, Shleifer and Vishny (1998).

The estimation yields the following outcome (p-values are in parenthesis):

SBA = 0.462 - 0.447ADR + 0.023SV + 0.146CR

(0.00) (0.01) (0.80) (0.15) $R^2 = 0.144$

where SBA stands for state-owned bank assets; ADR for anti-director or shareholders' rights; SV for one-share one-vote and CR for creditors' rights.

The results are mixed: the evidence suggests that countries with a higher level of shareholder protection exhibit a significantly smaller participation of the government in financial intermediation, whereas this participation is larger in countries with a higher degree of protection of creditor rights, although it is only significant at the 15% level.

We also test the null hypothesis that the sum of all coefficients of the indices is signifi-

cantly different than zero, and we fail to reject it at the 10% level. Hence, we cannot conclude that, overall, a higher degree of investor protection is associated with higher state-ownership of bank assets.

From this exercise, we find that the data does not significantly suggest that countries with higher degree of capital market restrictions exhibit larger holdings of bank assets by the government. Hence, there is little evidence of the presence of simultaneity bias in the estimates.

4 Conclusions

The provision of a government safety net to bank depositors through either explicit deposit insurance or implicitly through state ownership of bank assets has both costs and benefits. In this paper we examine the impact of deposit guarantees on the development of external financing, such as equity issuance and bank credit to the private sector. We begin with an equilibrium model in which firms finance production either through equity issuance or bank loans, households allocate wealth between equity and bank deposits, and banks have deposit liability and make loans. The model predicts that an increase in deposit insurance, either implicit or explicit, will reduce both equity issuance and bank financing of firms, and may reduce the number of firms issuing equity. The reason for this is straightforward. Increasing depositor's protection makes bank deposits more attractive than the (riskier) equity shares, requiring higher rates for the latter and resulting in a lower issuance of stocks. Bank credit extended to the private sector will also fall in the presence of either explicit or implicit deposit insurance, as a consequence of a less efficient intermediation process (higher intermediation costs).

We provide empirical results based on a cross section of 49 countries. The data are

consistent with the predictions of the model, as we find that countries with more extensive bank deposit insurance tend to have smaller capital and financial markets and a lower number of publicly traded firms per capita. In contrast to previous work by La Porta, López-de-Silanes, Vishny and Shleifer, we suggest that these effects are more important than the origins of a country's legal system.

Technical Appendix

The comparative statics analysis performed in subsection 2.4 relies on the fact that the representative household's demand for bank deposits and equity rises with their own return rate and decreases with the probability of default by banks and equity issuing firms, respectively. In this appendix we show that the household's demand for bank deposits will depend directly on the deposit rate and inversely on the probability of default by the banks. An analogous proof can be performed to show that equity demand depends directly on the equity return rate and inversely on the probability of default by the firms.

Let us rewrite the optimization problem (11)-(14) as follows:

$$D = \arg\max(1-\pi_S)\left[\frac{(r_S-1)W-(r_S-r_D)D}{P(\overline{A})}\right]^{\frac{1}{\gamma}} + (\pi_S-\pi_D^*)\left[\frac{(r_D-1)D}{P(\underline{A})}\right]^{\frac{1}{\gamma}} \qquad \text{(A1)}$$

The first order condition is given by:

$$-(1-\pi_S)\left(\frac{r_S-r_D}{P(\overline{A})}\right)\left[\frac{\Psi}{P(\overline{A})}\right]^{\frac{1-\gamma}{\gamma}} + (\pi_S-\pi_D^*)\left(\frac{r_D-1}{P(\underline{A})}\right)\left[\frac{(r_D-1)D}{P(\underline{A})}\right]^{\frac{1-\gamma}{\gamma}} = 0 \qquad \text{(A2)}$$

where $\Psi = (r_S-1)W-(r_S-r_D)D$.

Rearranging (A2) results in the following equation:

$$\left[(1-\pi_S)\left(\frac{r_S-r_D}{P(\overline{A})}\right)\right]^{\frac{\gamma}{1-\gamma}}\frac{\Psi}{P(\overline{A})}=\left[(\pi_S-\pi_D^*)\left(\frac{r_D-1}{P(\underline{A})}\right)\right]^{\frac{\gamma}{1-\gamma}}\frac{(r_D-1)D}{P(\underline{A})} \tag{A3}$$

Taking logs on both sides of equation (A3) and totally differentiating, setting $d\pi_S = dr_S = dW = dP(\overline{A}) = dP(\underline{A}) = 0$, we obtain:

$$\begin{aligned} & -\left(\frac{\gamma}{1-\gamma}\right)\frac{dr_D}{r_D}-\Psi^{-1}(r_S-r_D)\frac{dD}{D}+\Psi^{-1}D\frac{dr_D}{r_D} \\ = & -\left(\frac{\gamma}{1-\gamma}\right)\frac{d\pi_D^*}{\pi_D^*}+\left(\frac{\gamma}{1-\gamma}\right)\frac{dr_D}{r_D}+(r_D-1)\frac{dD}{D}+D\frac{dr_D}{r_D} \end{aligned} \tag{A4}$$

Rearranging terms yields:

$$\left(\frac{-2\gamma}{1-\gamma}+\Psi^{-1}-1\right)\frac{dr_D}{r_D}=\left(\Psi^{-1}(r_S-r_D)+(r_D-1)\right)\frac{dD}{D}-\left(\frac{\gamma}{1-\gamma}\right)\frac{d\pi_D^*}{\pi_D^*} \tag{A5}$$

Since $\gamma > 1$, $\Psi^{-1} > 0$, and assuming $r_S > r_D$ in order to achieve a non-zero demand for equity in equilibrium, we have:

$$\frac{-2\gamma}{1-\gamma}+\Psi^{-1}-1>0\ ;\ \ \Psi^{-1}(r_S-r_D)+r_D-1>0\ ;\ \ \frac{-\gamma}{1-\gamma}>0$$

which implies:

$$\frac{dD}{dr_D}>0\ ;\ \ \frac{dD}{d\pi_D^*}<0$$

Hence, demand for bank deposits depends directly on its own return rate and inversely on the probability that asset holders will not receive their bank deposits back.

Data Appendix

The data for *Explicit Deposit Insurance* comes from Table I of Demirgüç-Kunt and Detragiache (2002), Table I of Demirgüç-Kunt and Huizinga (2004) and the Data Appendix from Cull, Senbet and Sorge (2004). A value of '1' is assigned to countries who had an explicit deposit insurance system in place in 1994. The *Index of the share of assets of the top* 10 *banks owned or controlled by the government* is obtained from Table 2 of La Porta, López-de-Silanes and Shleifer (2000). For this variable, we considered their measure for government ownership of banks, which is defined as the percentage share of the assets of the top 10 banks in a given country owned by the government of that country in 1995, divided by 100.

Private Credit is the ratio of bank debt held by the private sector to GDP, measured for 1996 (except for the case of Nigeria, where the data is from 1994. This ratio was obtained from the International Financial Statistics Yearbook, edited by the IMF by dividing the sum of entries 32d-g by entry 99b.

The remaining information was obtained from Table II of LLSV (1997). *External Capital* is the ratio of the stock market capitalization held by minorities to gross national product, for 1994. *Domestic Firms* stands for the ratio of domestic firms listed in a given country to its population (in millions), for 1994.

Legal Family identifies the legal origin or Commercial Law of each country, where '1' stands for English, '2' for French, '3' for German and '4' for Scandinavian origin. *Rule of Law* is an index of the assessment of law and order tradition in a country (average between 1982 and 1995). *GDP growth* is the average annual growth of gross domestic product between 1970 and 1993 and *Log GNP* is the logarithm of gross national product for 1994.

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