No. 2311

MARKET DISCIPLINE AND FINANCIAL SAFETY NET DESIGN

Aslı Demirgüç-Kunt and Harry Huizinga

FINANCIAL ECONOMICS

Centre for Economic Policy Research

ISSN 0265-8003

MARKET DISCIPLINE AND FINANCIAL SAFETY NET DESIGN

Aslı Demirgüç-Kunt, The World Bank
Harry Huizinga, CentER, Tilburg University and CEPR

Discussion Paper No. 2311
December 1999

Centre for Economic Policy Research
90–98 Goswell Rd, London EC1V 7RR
Tel: (44 20) 7878 2900, Fax: (44 20) 7878 2999
Email: cepr@cepr.org, Website: http://www.cepr.org

This Discussion Paper is issued under the auspices of the Centre's research programme in **Financial Economics**. Any opinions expressed here are those of the author(s) and not those of the Centre for Economic Policy Research. Research disseminated by CEPR may include views on policy, but the Centre itself takes no institutional policy positions.

The Centre for Economic Policy Research was established in 1983 as a private educational charity, to promote independent analysis and public discussion of open economies and the relations among them. It is pluralist and non-partisan, bringing economic research to bear on the analysis of medium- and long-run policy questions. Institutional (core) finance for the Centre has been provided through major grants from the Economic and Social Research Council, under which an ESRC Resource Centre operates within CEPR; the Esmée Fairbairn Charitable Trust; and the Bank of England. These organizations do not give prior review to the Centre's publications, nor do they necessarily endorse the views expressed therein.

These Discussion Papers often represent preliminary or incomplete work, circulated to encourage discussion and comment. Citation and use of such a paper should take account of its provisional character.

CEPR Discussion Paper No. 2311

December 1999

ABSTRACT

Market Discipline and Financial Safety Net Design*

An important question is whether the financial safety net reduces market discipline on bank risk-taking. For countries with varying deposit insurance schemes, we find that deposit rates continue to reflect bank riskiness. Cross-country evidence suggests that explicit deposit insurance reduces required deposit interest rates at a cost of reduced market discipline. Internationally, deposit insurance schemes vary widely in their coverage, funding, and management. Hence, there are widely differing views on how deposit insurance should optimally be structured. To inform this debate, we use a newly constructed data set of deposit insurance design features to examine how different design features affect deposit interest rates and market discipline.

JEL Classification: E43, G28
Keywords: market discipline, deposit insurance

Aslı Demirgüç-Kunt
DECRG
The World Bank
1818 H Street, NW
Washington
DC 20433
USA
Tel: (1 202) 473 7479
Fax: (1 202) 522 1155
Email: ademirguckunt@worldbank.org

Harry Huizinga
Tilburg University
PO Box 90153
5000 LE Tilburg
THE NETHERLANDS
Tel: (31 13) 466 2623
Fax: (31 13) 466 3042
Email: huizinga@kub.nl

* The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of The World Bank, its Executive Directors, or the countries they represent. We thank Thorsten Beck, Jerry Caprio, Stijn Claessens, Ed Kane, Tae Soo Kang and Maria Soledad Martinez Peria for comments on an earlier draft, and Anqing Shi and Tolga Sobaci for excellent research assistance.

Submitted 6 October 1999

NON-TECHNICAL SUMMARY

In the last two decades, we have seen a series of banking crises around the world where banks have become systematically insolvent. Banking crises have occurred in developed and developing countries alike. Prominently, the Asian crisis of 1997 involved banking crises in Thailand, Indonesia, Malaysia and Korea, with banks becoming insolvent after economic downturns and currency devaluations. Systemic bank insolvencies involve huge costs to the banks themselves, their customers and to governments. To make financial system breakdowns less likely and to limit their costs if they occur, all countries of the world have financial safety nets in place. These nets are amalgams of policies including explicit or implicit deposit insurance, the central bank's lending of last resort, bank insolvency resolution procedures, and bank regulation and supervision.

Bank safety nets are difficult to design and administer, because they have the conflicting objectives of protecting bank customers and reducing banks' incentives to engage in risky activities. In several countries including the US, the financial safety net – structured to reduce the vulnerability of the financial system – appears to have had quite the opposite result. Indeed, Kane (1989) identifies the US financial safety net, and notably fixed-rate deposit insurance and belated bank closures, as the single most important factor in explaining the catastrophic Savings and Loan crisis of the 1980s. Similarly, Demirgüç-Kunt and Detragiache (1998) find international evidence that the existence of an explicit deposit insurance scheme has contributed to banking system fragility.

To restrain bank risk-taking, financial safety nets generally rely on two mechanisms: (i) market discipline, and (ii) bank regulation. Bank creditors can exert market discipline by withdrawing their funds, or demanding higher interest rates from riskier banks. In the case of publicly traded banks, equity holders can also effect discipline. Bank regulations, in turn, can directly restrict a bank's operations, and prescribe corrective action if bank solvency is jeopardized. The challenge facing policy-makers is to ensure that the financial safety net enables, rather than undermines, market discipline. There is a real danger that regulatory forbearance policies and overly generous depositor protection increase rather than reduce the excessive bank risk-taking which has been the root cause of many bank failures.

A substantial literature discusses the potential effects of safety net design and implementation on market discipline. This literature proposes various design features such as limited insurance coverage, co-insurance, and private deposit insurance that leave some room for market discipline in an explicit (public) scheme of deposit insurance. See Kane (1999) for a general

discussion, and Ely (1986), Calomiris (1997) and Wall (1998) for specific proposals concerning private deposit insurance and (uninsured) subordinated bank debt. For lack of empirical evidence, this debate about deposit insurance design has been entirely theoretical and hypothetical. Hence, we do not know whether deposit design features that work well in theory work equally well in practice. The main purpose of this paper is to fill this gap in our knowledge.

First, we investigate empirically to what extent market discipline exists around the world. There is a considerable body of literature on market discipline, mostly for the US, that generally finds support for the existence of some market discipline by bank creditors. We contribute to this literature by extending the analysis to a large number of developed and developing countries. To do this, we investigate the sensitivity of (i) bank deposit interest rates, and (ii) deposit growth rates to indicators of bank risk. Specifically, we relate a bank's implicit cost of funds (measured as interest expenses divided by interest-paying debt) to bank risk measures such as the capitalization ratio, profitability and liquidity. This is done separately for 38 countries over the years 1990–7. In addition, for a larger set of 52 countries we examine whether market discipline entails that riskier banks are less able to attract deposits. To this aim, we relate the measured growth rate of (real) deposits to bank risk measures.

Second, and more importantly, we examine whether differences in market discipline across countries can be explained by different design features of financial safety nets. Evidence of this kind should be useful to policy-makers around the world, as they grapple with the question of how to design a financial safety net without undermining market discipline. To enable this work, we have collected detailed information on the nature of deposit insurance for over 50 countries. This data shows that there is considerable cross-country variation in key design features such as insurance coverage, co-insurance, source of funding and fund management. On a cross-country basis, we relate the extent of market discipline (in terms of bank deposit interest rates and deposit growth) to whether there exists an explicit deposit insurance scheme and, if so, how it is constituted.

Our country-level results show that many countries around the world retain some degree of market discipline, regardless of the different safety nets they may have. This may be due to incomplete coverage or lack of credibility of existing schemes, or reflect inherent costs involved in recovering funds even if schemes are fully credible. The cross-country regressions show that the existence of an explicit insurance lowers banks' interest expenses and makes interest payments less sensitive to bank risk factors, particularly to bank liquidity. Thus explicit deposit insurance is found to reduce market discipline on banks by their creditors. The Paper also presents results on how specific

deposit insurance design features affect bank deposit rates and bank risk-taking.

I. Introduction

In the last two decades, we have seen a series of banking crises around the world where banks have become systematically insolvent. Banking crises have occurred in developed and developing countries alike. Prominently, the Asian crisis of 1997 involved banking crises in Thailand, Indonesia, Malaysia and Korea, with banks becoming insolvent after economic downturns and currency devaluations.

Systemic bank insolvencies involve huge costs to the banks themselves, their customers and to governments. Bank failures may lead to the destruction of a bank's information capital garnered in previously nurtured bank-customer relationships. A disruption of bank lending and of the payments system may also cause a reduction in investment and other economic activity. Further, bank depositors potentially lose heavily because of bank failures. Last but not least, governments tend to incur large costs in remedying a banking crisis. To make financial system breakdowns less likely and to limit their costs if they occur, all countries of the world have financial safety nets in place. These nets are amalgams of policies including explicit or implicit deposit insurance, the central bank's lending of last resort, bank insolvency resolution procedures, and bank regulation and supervision.

Bank safety nets are difficult to design and administer, because they have the conflicting objectives of protecting bank customers and reducing banks' incentives to engage in risky activities. In several countries including the U.S., the financial safety net, structured to reduce the vulnerability of the financial system, appears to have had quite the opposite result. Indeed, Kane (1989) identifies the U.S. financial safety net, and notably fixed-rate deposit insurance and belated bank closures, as the single most

important factor in explaining the catastrophic Savings and Loan crisis of the 1980s. Similarly, Demirguc-Kunt and Detragiache (1998) find international evidence that the existence of an explicit deposit insurance scheme has contributed to banking system fragility.

To restrain bank risk taking, financial safety nets generally rely on two mechanisms: (i) market discipline, and (ii) bank regulation. Bank creditors can exert market discipline by withdrawing their funds, or demanding higher interest rates from riskier banks. In case of publicly traded banks, equity holders can also effect discipline. Bank regulations, in turn, can directly restrict a bank's operations, and prescribe corrective action if bank solvency is jeopardized. The challenge facing policy makers is to ensure that the financial safety net enables rather than undermines market discipline. There is a real danger that regulatory forbearance policies and overly generous depositor protection increase rather than reduce the excessive bank risk taking which has been the root cause of many bank failures.

A substantial literature discusses the potential effects of safety net design and implementation on market discipline. This literature proposes various design features such as limited insurance coverage, co-insurance, and private deposit insurance that leave some room for market discipline in an explicit (public) scheme of deposit insurance. See Kane (1999) for a general discussion, and Ely (1986), Calomiris (1997) and Wall (1998) for specific proposals concerning private deposit insurance and (uninsured) subordinated bank debt. For lack of empirical evidence, this debate about deposit insurance design has been entirely theoretical and hypothetical. Hence, we do not know whether deposit design

features that work well in theory work equally well in practice. The main purpose of this paper is to fill this gap in our knowledge.

First, we investigate empirically to what extent market discipline exists around the world. There is a considerable body of literature on market discipline mostly for the U.S. that generally finds support for the existence of some market discipline by bank creditors. We contribute to this literature by extending the analysis to a large number of developed and developing countries. To do this, we investigate the sensitivity of (i) bank deposit interest rates, and (ii) deposit growth rates to indicators of bank risk. Specifically, we relate a bank's implicit cost of funds (measured as interest expenses divided by interest-paying debt) to bank risk measures such as the capitalization ratio, profitability and liquidity. This is done separately for 38 countries over the years 1990-1997. In addition, for a larger set of 52 countries we examine whether market discipline entails that riskier banks are less able to attract deposits. To this aim, we relate the measured growth rate of (real) deposits to bank risk measures.

Secondly and more importantly, we examine whether differences in market discipline across countries can be explained by different design features of financial safety nets. Evidence of this kind should be useful to policy makers around the world, as they grapple with the question of how to design a financial safety net without undermining market discipline. To enable this work, we have collected detailed information on the nature of deposit insurance for over 50 countries. This data shows that there is considerable cross-country variation in key design features such as insurance coverage, co-insurance, source of funding and fund management. On a cross-country basis, we relate the extent of market discipline (in terms of bank deposit interest rates and

deposit growth) to whether there exists an explicit deposit insurance scheme, and, if so, how it is constituted.

The remainder of this paper is organized as follows. Section 2 discusses the deposit insurance information, and other data used in this study. Section 3 presents the empirical evidence on market discipline regarding deposit interest rates and deposit growth in individual countries. Section 4 examines how the existence of an explicit deposit insurance scheme affects market discipline, and particularly how it affects the relationship between bank interest expenses and bank risk factors. Section 5 examines how specific deposit insurance design features are valued by depositors, as reflected in required deposit interest rates, and how they affect market discipline. Section 6 concludes.

II. The data

This study combines cross-country institutional data on deposit insurance design and bank-level data on interest expenses, deposit growth and other derived variables. Information on deposit insurance schemes in individual countries as of 1997 is represented in Table 1. As reported in the table, we have put together this information from a variety of sources. As also seen in the table, many countries have moved to explicit deposit insurance schemes during the 1980s and 1990s, although there remain ample countries that do not have explicit deposit insurance. In the absence of explicit deposit insurance, there is implicit deposit insurance by national governments.[1]

[1] In the U.S., for instance, deposit insurance has frequently been extended to uninsured credits, but less so since the passage of the of FDIC Improvement Act of 1991 (see Benston and Kaufman, 1998).

As mentioned, a major cost of introducing explicit deposit insurance is that it potentially undercuts market discipline. In principle, this effect could be dampened by the adoption of features that enhance market discipline. The common element of such features is to ensure that there will be a credible first layer of private loss in case of bank failure. Such losses provide private parties with incentives to continue to monitor banks and to remain vigilant.

One market discipline-inducing feature is co-insurance. Co-insurance here means that depositors are contractually required to share in their bank's losses (up to a maximum percentage of deposits) regardless of deposit size. Relatively few countries, Chile, Colombia, Poland and the United Kingdom among them, have co-insurance.

Another way to induce some depositor vigilance is to ensure that insurance coverage is truly finite. Indeed, most countries in our sample specify an upper limit to officially protected deposits, with the exceptions of Mexico and Japan where de jure covered amounts are unlimited. One way to limit insurance coverage is to exclude interbank and foreign currency deposits. This is common in most countries (see table).

An important way to engage private parties in the deposit insurance scheme is to make them underwrite and manage some or all of the insurance. Table 1 reveals that there is extensive variation across countries in terms of the source of funding of deposit schemes, and in terms of fund management. Most explicit deposit insurance schemes establish insurance funds, and most of the payments into the fund come from banks, or jointly from banks and the government. There is also wide dispersion in the deposit insurance premium that banks have to pay into the fund. Making deposit insurance premiums risk-based is a sensible way to try to reduce bank risk taking. Yet, so far only

the U.S. has adopted risk-based insurance premiums. At least with hindsight, there appears to be no relationship between the deposit insurance premium and actual bank risk. For instance, the premiums in Norway and Japan are 0.015 and 0.084 percent of deposits per annum, while both countries have dealt with severe banking crises.

Finally, regarding fund membership, it is noteworthy that many developed countries, including the United States, do not have compulsory bank membership of the insurance fund.

Our bank-level data are derived from bank balance sheets and income statements, as available from the BankScope data base compiled by Fitch IBCA. The data set covers all OECD countries, as well as many developing countries. For a list of countries included in our work, see Table 2. Bank coverage is comprehensive for most countries, with covered banks roughly accounting for 90 percent of all bank assets nationwide. The sample covers the period 1990-1997, and includes about 2500 individual banks.

Table 2 also provides mean values for all bank-level variables used in the empirical work. Interest Expense is the annual interest expense divided by bank debt, excluding non-interest bearing debt if any. Interest Expense is thus an implicit interest rate on all de jure insured and uninsured bank liabilities. In most countries, bank liabilities that are not covered by explicit deposit insurance may enjoy de facto, implicit insurance. Hence, the dividing line between covered and uncovered liabilities is difficult to draw in practice.

Deposit Growth is the growth rate of a bank's customer and short term funding, after dividing by the GDP deflator. On average, banks in Costa Rica, Nigeria, and the United Kingdom were contracting during the sample period, while Ghana and Peru had

rather high annual real deposit growth rate of around 30 percent. Equity is book value of equity divided by bank assets. There is considerable variation in Equity across countries. While this may reflect different capital adequacies, it equally may reflect internationally differing definitions of book capital.

Profit is defined as net-of-tax profits divided by assets, and Liquidity is the ratio of liquid assets to assets. Higher values of the Equity, Profit and Liquidity variables presumably indicate lower bank riskiness for depositors. Overhead is defined as non-interest bank expenses divided by assets, reflecting bank variation in employment as well as wage levels. Differences in overhead may equally capture differences in banks' product mixes and the quality of service. Despite high wage levels, Overhead is lowest at around 1 percent for high-income countries, such as Japan and Luxembourg. It is notably high at 3.6 percent for the United States, perhaps reflecting the proliferation of banks and bank branches due to historical banking restrictions.

Finally, Short-Term Debt/Total Debt is a bank's customer and short term funding divided by total interest–bearing debt. This variable is a determinant of Interest Expense, if customer deposits receive different interest rates from, say, marketable notes and debentures. For most countries, Short-Term Debt/Total Debt is close to unity, reflecting the importance of short term debt in total debt.

Prior to the analysis outliers, some of them obvious data errors, are removed. Furthermore, we removed observations with negative equity and profits less than –3 percent, since we wanted to concentrate on solvent institutions. Insolvent institutions that continue to operate may be propped up by cheap credit from their respective central banks, which in turn may give the misleading impression that riskier banks have lower

interest expenses. On account of insufficient data, regressions for some individual countries could not be estimated. Data for these countries were also excluded from the cross-country regressions. Below, however, we report some sensitivity tests of how these steps in constructing the cross-country sample affect the results.

III. International evidence on market discipline

A. Do riskier banks pay higher interest rates?

In this section, we present empirical evidence on whether there is market discipline on banks for a range of individual countries. In principle, depositors can discipline banks that engage in excessive risk-taking, by demanding higher interest rates or by withdrawing their deposits. We start with the first issue. Several researchers have investigated whether the cost of debt finance for banks reflects their apparent default risk for the case of the United States (see Flannery (1998) for a recent survey). Researchers (Baer and Brewer 1986, Hannan and Hanweck 1988, and Brewer and Mondschean 1994) typically find that rates on large, partially uninsured CDs reflect bank riskiness. For the 1983-1991 period, Flannery and Sorescu (1996) similarly find that spreads on uninsured bank debentures (relative to a constructed callable treasury bond) significantly reflect bank risk in the years 1989-1891, a period when doubts arose whether federal regulators would fully bail out debt holders of bank holding companies. Using similar data only for 1983-1984, Avery, Belton and Goldberg (1988) and Gorton and Santomero (1990) had failed to find any such evidence. Relating time series of CD rates to bank-specific news as reflected in stock prices, Ellis and Flannery (1992) similarly find evidence that bank CD rates indeed reflect bank-specific risk. Finally, Cook and Spellman (1994) find that

risk premiums on fully insured deposits at Savings and Loans equally reflect bank risk factors in 1987, since the FSLIC guarantor of these deposits was technically insolvent at that time, causing doubts about the quality of its guarantees.

In summary, the U.S. experience shows that there is evidence of market discipline on banks by insured and uninsured debt holders alike. Specifically, insured deposit rates may reflect bank risk factors, if doubts arise about the credibility of the insurance coverage. The U.S. experience thus shows that the distinction between explicit and implicit deposit insurance becomes blurred, if there is a perceived risk of repudiation of deposit insurance obligations.

This subsection extends the evidence on market discipline through liability interest rates to a total of 38 countries. Specifically, for each country we estimate the following equation:

$$\text{Interest Expense}_{i,t} = \alpha + X_{i,t-1}\beta + \varepsilon_{i,t} \qquad (1)$$

where $\text{Interest Expense}_{i,t}$ is the ratio of interest expense to interest-bearing debt for bank i, $X_{i,t-1}$ is a vector of lagged bank variables, and $\varepsilon_{i,t}$ is a stochastic term. The vector $X_{i,t-1}$ includes Equity, Liquidity, and Profit as indices of bank risk. In addition, Overhead and Short Term Debt/Total Debt are included as controls. As higher values of the risk factors represent less risk, we expect these variables to enter an interest expense regression negatively if there is market discipline. Overhead would enter the regression negatively if banks with high overhead offer high quality services, and therefore can attract deposits at lower rates. Alternatively, Overhead may simply reflect bank inefficiency, and cause

depositors to demand higher rates to compensate for this inefficiency. The Short Term Debt/ Total Debt ratio can also have either sign, depending in part on the yield curve. Throughout, we take log transformations of all variables, and the right-hand-side bank variables are lagged one period.

For each country, we first estimate (1) using Ordinary Least Squares (OLS). Second, we estimate the equation using the means of all the bank variables. This provides us with *between* estimates indicating how the dependent variable changes, if we compare the independent variables across different banks. Third, we estimate the equation controlling for bank means (using the deviation from bank means for each variable). This provides us with *within* estimates telling us how the dependent variable changes with the independent variables, as these independent variables change for the same bank over time.

The OLS, *between,* and *within* estimates of (1) for each country separately are presented in Table 3. In each case, we only report the coefficients on the three risk factors, i.e. Equity, Profit, and Liquidity. Coefficients that are significant at 5 percent or less based on White's (1980) heteroskedasticity-consistent errors are bold-faced. The coefficients on the three risk factors are predominantly negative, which we take as evidence of market discipline. As a broad-brush index of market discipline, we can simply sum the three interest elasticities for a particular specification, with a negative sum suggesting market discipline. By this index, the OLS estimates imply that 30 out of 38 countries are more likely than not to have market discipline; for the *between* estimates, the number is 26 out of 34 countries; and for the *within* index the number is 24 out of 36 countries. Taking significant negative coefficients on risk factors to be evidence of

market discipline, we see that many countries have some market discipline, among them the United Kingdom and the United States. In the sample, Norway, Nigeria, Pakistan are among the countries that have suffered banking crises where depositors have been made whole. Not surprisingly, these countries are among the countries where we fail to find evidence of market discipline. An absence of market discipline can, of course, exist for various reasons. Depositors may simply fail to monitor banks closely; alternatively, bank regulators are relied upon to close insolvent banks promptly before depositor losses occur; or, as indicated, the safety net may be so complete as to eliminate all risk for depositors. Regressions for individual countries do not allow us to infer the underlying causes of any absence or presence of market discipline.

B. Do riskier banks attract fewer deposits?

This section considers whether deposit growth of banks varies with their apparent default risk. A small literature has considered this issue for the U.S. and elsewhere. Kane (1987), for instance, finds that depositors withdrew funds only from those Ohio institutions that were covered by the Ohio insurance fund when the latter was in crisis. Park (1995) and Park and Peristiani (1998) similarly find that riskier U.S. thrifts experienced smaller deposit growth during the 1980s. More specifically, these authors find that deposit growth is negatively related to the estimated probability of thrift default. Considering banks in Argentina, Chile and Mexico, Martinez Peria and Schmukler (1998) find that deposits are negatively related to lagged bank risk factors derived from accounting data.

In this section, we provide evidence on the relationship between deposit growth and bank risk factors for 52 countries. We estimate an equation analogous to (1), where the dependent variable is Deposit Growth, now defined as the log difference of this period's real deposits and last period's real deposits. Real deposits are calculated as nominal deposits deflated by the GDP deflator. The explanatory variables again include the log transformations of the lagged bank risk factors (Equity, Profits, and Liquidity). Positive coefficients on these risk factors indicate market discipline, as then deposit growth is relatively higher at safer banks. As controls, we include Overhead and Size, defined as deflated total assets. Again, banks with high Overhead may grow relatively slowly or quickly, while the Size variable introduces a possible scale effect on deposit growth. Scale effects may be important if a policy of too-large-to-fail stimulates the growth of deposits at large banks regardless of their measured risk factors.

As before, we obtain OLS, *between*, and *within* estimates for the deposit growth equation for each country. The results are given in Table 4.

As seen in Table 4, the fit of the deposit growth regressions, as proxied by adjusted R-squares, is quite poor. The low explanatory power and generally inconclusive results may reflect that actual deposit growth rates result from several opposing forces. On the one hand, insolvent or near-insolvent banks may wish to pursue a risky growth strategy on the off-chance of overcoming their difficulties. Riskier banks may succeed in attracting additional deposits if they pay interest rates that are high enough. Such a growth strategy would maximally exploit the bank safety net.[2]Alternatively, risky banks may decide or be forced by regulators to scale down by selling off assets and reducing deposit taking. Retrenchment may be the preferred strategy, if bank charter values are

considerable. The choice between growth and retrenchment strategies may further be affected by agency problems between management and shareholders. Specifically, bank managers have to reckon that a bankruptcy may wipe out a considerable share of their human capital.[3]

On balance, it is not clear whether one should expect riskier banks to have relatively high deposit growth. Therefore, the revealed low explanatory power of deposit growth regressions is not surprising. Thus, we conclude that markets force riskier banks to pay higher interest rates, even if it is not clear whether riskier banks are forced by the market to retrench.

IV. Market discipline and deposit insurance

One of the important factors that potentially affects market discipline is the financial safety net. The safety net is the whole of financial regulations and institutions that seeks to prevent or limit depositor losses in case of an (impending) bank failure. By this definition, the safety net includes explicit and implicit deposit insurance, bank insolvency resolution practices, regulatory forbearance policies, and the central bank's functioning as a lender of last resort. Thus, variation in the extent of market discipline across countries should in part reflect international differences in the operation of the financial safety net. In this section, we present the results of tests of the impact of explicit deposit insurance, as part of the safety net, on market discipline via deposit rates and deposit growth. To do this, it is necessary to combine cross-country bank level data and

[2] Of course, portfolio choice in addition to growth may affect bank risk.
[3] Several authors have examined how agency problems may affect bank risk taking. Saunders, Strock and Travlos (1990) find that 'stock-holder controlled' banking firms tend to take on more risk than

institutional data that reflect differences in the financial safety net. To our knowledge, this is the first attempt to systematically examine the impact of the safety net on market discipline.

Focusing first on the cost of bank liabilities, we estimate the following equation:

$$\text{Interest Expense}_{i,j,t} = \alpha + X_{i,j,t-1}\beta + Y_{j,t}\gamma + \delta D_{j,t} + D_{j,t} X_{i,j,t-1}{}' \phi + \varepsilon_{i,j,t} \qquad (2)$$

where $X_{i,j,t-1}$ is a vector of variables for bank i in country j lagged one period, $X_{i,j,t-1}{}'$ is the subset of this vector comprising the three risk factors (Equity, Profits, and Liquidity), $Y_{j,t}$ is a vector of macroeconomic controls for country j, $D_{j,t}$ is a dummy variable flagging the existence of an explicit deposit insurance regime and, finally, $\varepsilon_{i,j,t}$ is a stochastic term. The macroeconomic controls are Inflation (calculated as the log difference of this period's GDP deflator and last period's GDP deflator), Growth (the log difference of this period real GDP and last period's real GDP), the Government Rate (the log of the Tbill rate where available; otherwise the discount rate), and Gnp/cap (the log of real GNP per capita). In some specifications, we also include interaction terms of the deposit insurance dummy, $D_{j,t}$ with the bank risk factors $X_{i,j,t-1}$'.

As before, negative estimates of β are interpreted as evidence of market discipline. A negative (positive) estimate of δ would indicate that the existence of an explicit deposit insurance scheme reduces (increases) bank interest expenses. A reduction of required deposit rates on account of deposit insurance suggests that on balance depositors value deposit insurance (taking into account any induced effects on bank risk

---

'managerially controlled' firms. Gorton and Rosen (1995) instead argue that entrenched managers, who

taking and the likelihood of bank failure). The interaction terms of the deposit insurance variable with bank risk factors enable us to estimate whether an explicit deposit insurance system reduces or enhances market discipline. Specifically, positive estimates of the ϕ coefficients suggest that explicit deposit insurance reduces market discipline, since the absolute value of $\beta + \phi$ becomes smaller (for a negative estimate of β), indicating a reduced sensitivity of liability interest rates to bank risk factors.

Versions of equation (2) are estimated by OLS, and for mean values of all variables by he *between* estimator.[4] In both cases, we weigh the observations by the inverse of the number of banks in the country. To be precise, in the OLS regressions the weight is the inverse of the number of banks in a given year, while in the *between* estimation it is the inverse of the overall number of banks in a country.

We estimate three different specifications. First, we estimate (2) without including the deposit insurance dummy or any of its interaction terms. The results are given in columns 1.a and 1.b of Table 5 for the *between* and OLS estimates, respectively. Equity enters negatively in both columns, but is only significant in b. Profit also enters negatively in both columns, although it is only significant in a. Strongest support for market discipline comes from the Liquidity variable, which is negative and highly significant in both columns. Overall, these results confirm our country-level results supportive of the existence of market discipline. Turning to our control variables, the negative coefficient on Overhead suggests a trade-off between interest and non-interest expenses. The positive coefficient on the Short Term Debt/Total Debt variable, in turn, suggests that on average short term bank debt is more expensive. Among the macro

---

own considerable stock in a bank, may take on more risk.

variables, we see that the Government Rate enters positively, while Inflation is not significant. The coefficients on Growth and Gnp/cap are negative and positive, respectively, where significant. The negative coefficients on Growth may reflect that banks in high-growth countries have lower default probabilities, and hence need to pay their deposit holders lower interest rates. The positive coefficient on Gnp/capita may further be due to ceilings on deposit rates that keep these rates lower in developing countries.

Second, we add the deposit insurance dummy to the regression. The results are reported in columns 2.a and 2.b, with significant negative coefficients.[5] This suggests that an explicit deposit insurance scheme causes depositors to perceive their deposits to be safer, leading to lower implicit bank interest rates. To estimate the size of the deposit insurance effect on deposit rates, we calculate the predicted values of the implicit interest expense evaluated at mean values for all bank and macro variables for the two cases of explicit deposit insurance (the insurance dummy equals one) and implicit deposit insurance (the insurance dummy equals zero). After taking antilogs, we find that explicit deposit insurance reduces the average deposit rate by 46 and 67 basis points on the basis of specifications 2b and 2a, respectively.[6]

In the final two columns of Table 5, we present the results of regressions where we also include the three risk variables interacted with the deposit insurance dummy. For

---

[4] We do not report *within* estimates as there is no variation in the deposit insurance dummy over time for the countries in our sample except for Greece and Peru.

[5] Included banks are from 28 countries: Australia, Austria, Belgium, Bolivia, Denmark, Finland, France, Greece, Ireland, Luxembourg, Mexico, Nigeria, Nepal, the Netherlands, New Zealand, Norway, Pakistan, Peru, the Philippines, Russia, Sri Lanka, South Africa, Spain, Switzerland, Taiwan, Thailand, the United Kingdom, and the United States.

[6] Our result is consistent with the finding of Bartholdy, Boyle and Stover (undated) that explicit deposit insurance reduces the deposit rate by 25 basis points. These authors, however, consider a rather small

the *between* estimates of column 3.a, the only risk variable that is significant is Liquidity. The sign of Liquidity itself is negative, as expected. The coefficient of the interacted Liquidity variable also is significant, but instead positive. In the presence of explicit deposit insurance, interest sensitivity to bank liquidity is thus significantly lower. This suggests that explicit deposit insurance reduces market discipline. An F-test of the hypothesis of $\beta + \phi = 0$ is rejected, indicating that deposit insurance reduces, but not fully eliminates market discipline through deposit rates. In column 3.b, the only risk variable that is significant is again Liquidity, with the expected negative sign. Among the interacted risk variables, Liquidity is again significant and positive, strengthening the evidence that deposit insurance reduces market discipline. However, in this specification the interaction term with Equity is also significant and negative, weakening the evidence.[7] Finally, note that the interaction terms do not materially affect the significance levels of the various bank and macro controls in columns 3.a and 3.b.

---

sample of 13 OECD countries. Another difference is that these authors use a representative CD rate for a particular country so that no bank-specific (risk) factors are included.

[7] Book equity frequently is a lagging indicator of accurately measured equity and hence may be less informative of a bank's stability than a measure of liquid assets. Several sensitivity tests were performed to check the robustness of the results in Table 5. In parallel, we re-entered various sets of observations that were previously eliminated. First, we returned observations eliminated because there were too few observations from a particular country. This produces 6 additional countries (to a total of 34 countries) in the deposit insurance-inclusive regressions in Table 5 (but only 50 more observations in the 2 OLS specifications). Also, we put back observations with bank-variable outliers (such as institutions with negative equity, or profits less than –3 percent of assets, or interest expenses exceeding 50 percent of assets). This produced 407 additional observations in the 2 deposit insurance-inclusive OLS regressions. Next, we restored observations excluded because of obvious bank-variable errors (banks with impossibly negative balance sheet items), producing 12 additional observations in the 2 OLS specifications. Finally, we lifted the restrictions that the underlying inflation rate and the government interest rate not exceed 100 percent. None of these 4 sensitivity checks produces a deposit variable or an interaction variable that is significant in any of the regressions of Table 5 where it was not, and vice versa. Putting back the high-inflation observations does yield the result that Interest Expense is positively related to the Government Rate, but negatively to Inflation.

On the basis of the international evidence, we conclude that explicit deposit insurance reduces bank liability rates for the banking sector.[8] Also, we find evidence that deposit insurance makes individual bank interest rates less sensitive to bank risk factors, especially liquidity, thereby reducing market discipline on banks.

Analogously to (2), one can also estimate the impact of deposit insurance on the growth rate of deposits. Table 6 reports these results. In the regressions, the only risk variable that is significant is Equity, with the expected positive sign. Thus, we find some evidence that well-capitalized banks attract more deposits, as expected with market discipline. As for the earlier individual country regressions, however, adjusted R-squares are very low as evidence of a rather poor fit of the model. The explicit insurance dummy enters the various specifications only with insignificant coefficients.[9] Thus, we find no evidence that deposit insurance on average causes higher or lower deposit growth. Deposit growth equations with interaction terms of the deposit insurance variable with bank risk factors have equally low explanatory power and are not reported.

[8] To see whether deposit insurance on net makes funding cheaper to banks, one also has to take into account the insurance premiums that banks have to pay. From Table 1, we see that most countries charge deposit premiums that are less than the range of 46-67 basis points. Hence, deposit insurance on net appears to provide a subsidy. According to Buser, Chen and Kane (1981), it is this subsidy that entices banks to accept the regulations that often come with deposit insurance. An important objective of deposit insurance, however, is to prevent destructive bank runs. If successful in this regard, deposit insurance can lower deposit rates to the benefit of the banks even if there is no implicit subsidy forthcoming.

[9] Included banks are from 46 countries: Australia, Austria, Belgium, Benin, Bolivia, Canada, China, Colombia, Costa Rica, Denmark, Ecuador, Finland, France, Ghana, Greece, Hong Kong, Honduras, Hungary, India, Indonesia, Ireland, Japan, Jordan, Kenya, Korea, Luxembourg, Mali, Mexico, Nepal, the Netherlands, New Zealand, Nigeria, Norway, Pakistan, Peru, the Philippines, Russia, Taiwan, Thailand, South Africa, Spain, Sri Lanka, Switzerland, the United Kingdom, the United States, and Zambia.

V. How do differences in deposit insurance design affect bank funding costs and market discipline?

An increasing number of countries has adopted explicit deposit insurance systems in response to bank system fragility around the world. As a case in point, the European Union requires member states to have an explicit deposit insurance system in place since 1994.[10] In its policy advice, the IMF has also advocated the adoption of explicit deposit insurance systems.[11] Notwithstanding the current movement to explicit schemes, the U.S. experience has shown that a badly designed and administered deposit insurance scheme can exacerbate bank moral hazard to increase risk (see Kane, 1989). Hence, the details of deposit insurance design may be very important in shaping banks' incentives to take on undue risk.

So far in the paper, we have shown that the existence of explicit deposit insurance (i) reduces the interest rates required by depositors, and (ii) also reduces market discipline. In this section, we investigate whether several specific deposit insurance design features (as presented in Table 1) affect bank deposit rates and market discipline. In particular, we estimate a set of cross-country regression of the following

$$\text{Interest Exp.}_{i,j,t} = \alpha + X_{i,j,t-1}\beta + Y_{j,t}\gamma + \delta D_{j,t} + \phi D_{j,t} F_{j,t} + D_{j,t} F_{j,t} X_{i,j,t-1}\text{'}\theta + \varepsilon_{i,j,t} \quad (3)$$

where $F_{j,t}$ is the value of a particular design feature, and other variables are as defined before. Typically, a design feature is a categorical variable that indicates whether or not a system has a particular design feature. For instance, the co-insurance design feature is a

[10] See Lars Fredborg (1995).
[11] For details, see Garcia (1999).

dummy variable that indicates whether an explicit insurance system features co-insurance by depositors. Only two design features (the coverage limit and the deposit insurance premium) are scale variables. As before, in some specifications we also include interaction terms of a particular deposit insurance design feature with the bank risk factors. Again, positive estimates of the θ coefficients suggest that the design feature reduces market discipline.

The regression results regarding the impact of different design features on implicit interest rates are reported in Table 7. For those design features that are significant, we also investigate their impact on market discipline by introducing interaction terms with risk factors. The results of these regressions including interaction terms are reported in Table 8. As with the deposit insurance dummy, design features hardly vary over time. Therefore, we only estimate the pooled-OLS specification and the *between* specification based on mean values. In Table 7, we report OLS and *between* estimates of the coefficients β, δ and ϕ, and in Table 8 we do the same for β, δ, ϕ and θ.

In the first column of table 7, we include a dummy variable for the existence of co-insurance. Since this is a design feature that introduces additional depositor risk, we expect Co-insurance to enter the regressions with a positive sign. The estimated coefficients are indeed positive but insignificant, perhaps because only two counties in the sample (Ireland and the United Kingdom) have co-insurance.

The next column in table 7 investigates the impact of the explicit coverage limit on interest rates. The coverage limit is calculated as the statutory coverage limit (as in Table 1) divided by GDP per capita. Ceteris paribus, one expects a higher coverage limit to lower required deposit rates, as higher coverage should enhance depositor safety. The

general equilibrium effect may be opposite, however, if enhanced coverage exacerbates bank moral hazard and thus increases the probability of bank failure. The probability of bankruptcy remains important to depositors despite deposit insurance, if not all of their deposits are covered, if the announced deposit insurance is not fully credible, or if bank failure involves resource costs to depositors not covered by the insurance scheme. In both the OLS and *between* specifications, the coverage limit variable enters with a positive sign, although it is only significant at the 10 percent level in the OLS specification. Paradoxically, these results suggest that a (marginal) increase in the announced coverage limit on average is not valued by depositors.

The next two columns in table 7 refer to the insurance coverage of foreign currency deposits and interbank deposits in explicit systems, respectively. The positive and significant coefficient in the foreign coverage equation for the OLS specification again suggests that expanded coverage tends to increase interest rates, or at least that it offsets the decrease in interest rates that explicit insurance without the expanded coverage would bring.

The next set of columns include dummy variables relating to the ex ante funding of the scheme, and what sources the funding comes from. The funding variable takes on a value of 0 if the scheme is implicit or unfunded and uncallable, a value of 1 if the fund is unfunded but callable, and a value of 2 if the scheme is funded. The OLS estimation of the regression with this Funding variable yields a positive and significant sign. A funded scheme thus is estimated to significantly reduce the amount by which an explicit scheme would lower deposit rates. A funded scheme may lead to a smaller reduction in implicit interest rates compared to an unfunded scheme, because the presence of funds earmarked

for insolvency resolution may introduce strong incentives for banks to up their risk so as to increase the likelihood of being able to 'raid' the insurance fund.

The next variable represents the source of the funding. This sourcing variable takes on a value 0 if the insurance system is implicit, a value of 1 if funds come from banks only, a value of 2 if funds come from the government and banks, and a value of 3 if funds come from the government only. The estimated coefficient on the source-of-funds variable is negative and significant for both OLS and *between* specifications. Thus, the more heavily the government is involved in the funding, the lower are required deposit rates. This may reflect that government funding is deemed more credible than bank funding.

Next, we analyze whether the premium level (as a percentage of deposits) paid by the banks affect the implicit rates. If anything, we expect a higher premium to lead to lower implicit rates, as the insurance premiums should to some extent be passed on to a bank's deposit customers. However, we find no evidence of premium pass-through to a bank's deposit customers.

The next two variables relate to the fund's management. The first variable takes on a value of 0 if the scheme is implicit, a value of 1 if the management is public, a value of 2 if the management is jointly public and private, and a value of 3 if management is entirely private. This management index enters with negative and significant coefficients in both OLS and *between* specifications. This suggests that private management is more effective in keeping in check the moral hazards associated with deposit insurance. In an additional regression, individual dummy variables for joint and private management

similarly suggest that private management of insurance funds leads to a greater reduction in interest rates.

Finally, we have a membership dummy variable, that equals 1 if bank membership in the insurance scheme is compulsory and zero otherwise. Ex ante, we may think that voluntary bank membership in the scheme leads to compounded problems of adverse selection and moral hazard, leading to higher deposits rates. However, the membership variable turns out to be insignificant in either regression specification.

To see the impact of the design features on market discipline, we next consider Table 8. Positive interaction terms of a deposit insurance feature with bank risk factors suggest that the particular feature weakens market discipline. Looking at the OLS estimates, we find evidence that a higher explicit coverage and funding only from government sources reduce market discipline, while joint or private management of funds improves market discipline. The results concerning the insurance coverage of foreign currency deposits or the existence of ex ante funding are less clear, since in these instances the interactions of the feature with the Equity variable are also significant, and with a negative sign. Turning to the *between* estimates, we find that the interaction terms with Liquidity are positive and significant for the reported design features (except for the coverage limit and joint management of funds), indicating a reduction in market discipline.

VI. Conclusions

Policy makers around the world design and operate financial safety nets so as to prevent costly bank insolvencies. However, designing and implementing an effective

safety net is a difficult task, since overgenerous protection of banks may easily introduce risk-enhancing moral hazard, and destabilize the very system it is meant to protect. The challenge facing policy makers is to provide depositor protection without unduly undermining market discipline. The design of the safety net is therefore crucial in providing the right mix of market and regulatory discipline of banks. A considerable amount of theoretical and prescriptive literature exists on this issue. At this point, empirical work is desperately needed to better inform policy recommendations. Empirical work of this kind has been lacking because of an absence of available information on safety net design across countries.

This paper makes two important contributions to the literature. First, for a large number of developed and developing countries we analyze bank-level interest expense and deposit growth data to investigate if there is any evidence of market discipline in individual countries. Second, using cross-country information on deposit insurance systems we investigate the impact of explicit deposit insurance and its key features on bank interest rates and market discipline.

Our country-level results show that many countries around the world retain some degree of market discipline, regardless of the different safety nets they may have. This may be due to incomplete coverage or lack of credibility of existing schemes, or reflect inherent costs involved in recovering funds even if schemes are fully credible.

To investigate the linkages between market discipline and deposit insurance, we estimate regressions with cross-country data. Here our results show that the existence of an explicit insurance lowers banks' interest expenses and makes interest payments less

sensitive to bank risk factors, particularly to bank liquidity. Thus explicit deposit insurance is found to reduce market discipline on banks by their creditors.

We also investigate whether specific deposit insurance design features matter, since the various countries with explicit deposit insurance operate systems with vastly different coverage, funding, and management. Here our results suggest that higher explicit coverage, broader coverage, and the existence of earmarked insurance funds increase required deposit rates, while a government provision of funds and private management of deposit insurance lower deposit rates.

We also examine the impact of these features on market discipline. We find that higher coverage and government-funding only reduce market discipline, while private and especially joint management of insurance schemes may improve market discipline. There is also some evidence that the existence of an earmarked fund and broader insurance coverage reduce market discipline, but these results are less clear.

This research has important policy implications. Deposit insurance is found to be valued by bank creditors, since it leads to lower required interest rates. The increase in perceived safety for depositors, however, comes at a cost of a reduction in market discipline. Thus at a broad level, the adoption of an explicit deposit scheme involves the trade-off between increased depositor safety and reduced market discipline on banks.

To probe deeper, it is necessary to evaluate the desirability of key deposit insurance design features. Our evidence on this count suggests that higher explicit coverage limits on average are undesirable, as they increase interest rates and reduce market discipline. If anything, this suggests that currently coverage limits tend to be too high. Private or joint management of funds equally lead to lower rates and improved

market discipline alike, and are therefore deemed desirable. Government-only funding of the deposit insurance scheme is found to lower required deposit rates, but at a cost of lower market discipline. Thus, this feature again presents policy makers with an important trade-off between depositor safety and bank risk taking. Finally, broader coverage of deposit insurance and the existence of an earmarked fund also are found to increase deposit rates, while there is evidence –although weaker- that these features reduce market discipline. Hence, these features may be undesirable.

References

Avery, Robert B, Terrence M. Belton and Michael A. Goldberg, 1988, Market discipline in regulating bank risk: new evidence from the capital markets, *Journal of Money, Credit, and Banking* 20, 597-610.

Baer, Herbert and Elijah Brewer, 1986, Uninsured deposits as a source of market discipline: a new look, *Quarterly Journal of Business and Economics* 24, 3-20.

Bartholdy, Jan, Glenn W. Boyle and Roger D. Stover, undated, Deposit insurance, bank regulation and interest rates: some international evidence, mimeo, University of Otago, New Zealand.

Benston, George J. and George G. Kaufman, 1998, Deposit insurance reform in the FDIC Improvement Act: the experience to date, *Economic Perspectives* 22 (Federal Reserve Bank of Chicago), 2-20.

Brewer, Elijah III and Thomas H. Mondschean, 1994, An empirical test of the incentive effects of deposit insurance, *Journal of Money, Credit, and Banking* 26, 146-164.

Buser, Stephen A., Andrew H. Chen, and Edward J. Kane, 1981, Federal deposit insurance, regulatory policy, and optimal bank capital, *Journal of Finance* 35, 51-60.

Calomiris, Charles, 1997, The postmodern safety net: Lessons from developed and developing economies. Washington: American Enterprise Institute.

Cook, Douglas O. and Lewis J. Spellman, 1994, Repudiation risk and restitution costs: toward understanding premiums on insured deposits, *Journal of Money, Credit, and Banking* 26, 439-459.

Demirguc-Kunt, A. and E. Detragiache, 1998, The determinants of banking crises in developed and developing countries, IMF Staff Papers 45, 81-109.

Ellis, David M. and Mark J. Flannery, 1992, Does the debt market assess large banks' risk?, *Journal of Monetary Economics* 30, 481-502.

Ely, Bert, 1986, Private sector depositor protection is still a viable alternative to federal deposit insurance, *Issues in Bank Regulation* winter, 40-47.

Flannery, Mark J., 1998, Using market information in prudential bank supervision: a review of the U.S. empirical evidence, *Journal of Money, Credit, and Banking* 30, 273-305.

Flannery, Mark J. and Sorin M. Sorescu, 1996, Evidence of bank market discipline in subordinated debenture yields: 1983-1991, *Journal of Finance* 51, 1347-1377.

Garcia, Gillian G., 1999, Deposit insurance: a survey of best practices, IMF WP/99/54, Washington, D.C.

Gorton, G. and R. Rosen, 1995, Corporate control, portfolio choice, and the decline of banking, *Journal of Finance* 50, 1377-1420.

Gorton, Gary and Athony M. Santomero, 1990, Market discipline and bank subordinated debt, *Journal of Money, Credit, and Banking* 22, 119-128.

Fredborg, Lars, 1995, EC deposit-guarantee directive, *International Financial Law Review*.

Hannan, Timothy H. and Gerald A. Hanweck, 1988, Bank insolvency risk and the market for large certificates of deposit, *Journal of Money, Credit, and Banking* 20, 203-211.

Kane, Edward J., 1987, Who should learn what from the failure and delayed bailout of the ODFG? in Federal Reserve Bank of Chicago, *Proceedings* from a Conference on Bank Structure and Competition, 306-326

Kane, Edward J., 1989, The S&L insurance Mess: How Did it Happen?, Washington, D.C.: Urban Institute Press.

Kane, Edward J., 1999, Designing financial safety nets to fit country circumstances: a progress report, mimeo, World Bank.

Martinez Peria, Maria Soledad and Sergio L. Schmukler, 1999, Do depositors punish banks for "bad" behavior?, Policy Research Paper no. 2058, World Bank, Washington, D.C.

Park, Sangkyun, 1995, Market discipline by depositors: evidence from reduced-form equations, *Quarterly Review of Economics and Finance* 35, 497-514.

Park, Sangkyun and Stavros Peristiani, 1998, Market discipline by thrift depositors, *Journal of Money, Credit, and Banking* 30, 347-364.

Saunders, A., E. Strock, and N.G. Travlos, 1990, Ownership structure, deregulation, and bank risk taking, *Journal of Finance* 41, 871-895.

Wall, Larry, 1998, A plan for reducing future deposit insurance losses: puttable subordinated debt, *Economic Review*, Federal Reserve Bank of Atlanta (July/August), 2-17.

White, Halbert, 1980, A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity, *Econometrica* 48, 817-838.

Table I. Deposit Insurance System Features

Implicit denotes lack of an explicit scheme. Date established refers to data of statute enactment. Co-insurance is a dummy variable that takes on a value of one if depositors face a deductible in their insured funds. Coverage limit refers to the amount the authorities insure explicitly. Foreign currency deposits and Interbank deposits take a value of one if insurance coverage extends to those areas. Funding takes a value of one if the scheme is funded ex-ante. Source of funding can be from government only (2), banks and government (1), or banks only (0). The premium banks pay is given as a percentage of deposits or liabilities. Management of the fund can be official (1), official/private joint (2), or private (3). Membership of the fund can be compulsory or voluntary. Sources: "Deposit protection arrangement: a survey", Alexander Kyei, IMF WP/90/134, Washington, D.C.; "Global Surveys", Institute of International Bankers, 1998, 1997, 1996, 1995, 1994; "Korea introduces bank deposit insurance scheme", Dong Won Ko, International Financial Law Review, April 1997; "Banking failures in developing countries: an auditor's perspective", Javed Nizam, International Journal of Government Auditing, January 1998; "Belgium implements deposit guarantee-scheme", Andre Bruyneel, and Axel Miller, International Financial Law Review, June 1995; "Incentive structure and resolution of financial institution distress: Latin American experience", Thomas Glaessner, and Ignacio Mas, Latin America and the Caribbean Regional Office, World Bank, November 1991; "Reform of the Finnish deposit guarantee scheme", Veli-Pekka Valori and Jukka Vesala, Bank of Finland Bulletin, March 1998; "Japan: Stimulation package", anon., Oxford Analytica Brief, December 1997; "EC deposit-guarantee directive", Lars Fredborg, International Financial Law Review, December 1995.

Countries	Type: Implicit (0), Explicit (1)	Date Established	Co-insurance	Coverage Limit (National Currency or ECU)	Foreign Currency Deposits Covered	Interbank Deposits Covered	Funding: Unfunded (0), Funded (1)	Source of Funding: Banks only (0), Gov. and Banks (1), Gov. only (2)	Insurance Premium of Deposits or Liabilities	Management: Public (1), Joint (2), Private (3)	Membership: Voluntary (0), Compulsory (1)
Argentina	1	1979 & 1995	0	20,000 US $	1	n.a.	1	1	.0018-.0072 of average deposits	2	1
Australia	0										
Austria	1	1979	0	260,000 ATS	0	0	0	0	callable	3	1
Bahrain	1	1993	n.a.		1	n.a.	n.a.		n.a.	n.a.	n.a.
Belgium	1	1985	0	15,000 ECU	0	0	1	0	.0002 of deposits from clients	2	1
Benin	0										
Bolivia	1	1991	0	4,200 SDR	n.a.	n.a.	0		n.a.	n.a.	n.a.
Botswana	0										
Canada	1	1967	0	60,000 Can. $	0	0	1	1	0.0016 of insured deposits	1	1
Chile	1	1986	1	90% of demand deposits up to 120 Ch$	n.a.	n.a.	0	2	callable	1	0
China	0										
Colombia	1	1985	1	75% per deposit or Col$ 10 Mil.	0	1	1	0	0.09% of short-term liab., others 0.0015	1	1

Costa Rica	0										
Denmark	1	1988	0	300,000 DKR	1	0	1	0	0.002 of total deposits	3	1
Dominican Rep.	1	1962	0	RD $ 8,000	n.a.	n.a.	1	0		2	0
Ecuador	0										
Finland	1	1969	0	150,000 FIM	n.a.	0	1	1	0.0005 to 0.0030 of insured deposits	3	1
France	1	1980	0	400,000 Fr	0	0	0	0	callable	3	0
Germany	1	1966	0	30% of banks' equity capital	1	0	1	0	0.0003 of deposits	3	0
Ghana	0										
Greece	1	1995	0	20,000 ECU	n.a.	n.a.	1	0	0.00025-0.0125 of eligible deposits	2	1
Guatemala	0										
Honduras	0										
Hong Kong	0										
Hungary	1	1993	0	1,000,000 Ft	1	0	1	0	0.002 of total deposits	1	1
India	1	1962	0	Rs 100,000 = 1 Lakh	1	0	1	1	0.0005 of deposits	3	1
Indonesia	0										
Ireland	1	1989	1	90% of 20,000 ECU	1	1	1	0	0.002 of deposits	1	1
Italy	1	1987	1	100% of first 200 Mil. ITL and 80% of next 800Mil.	0			0	callable	3	0
Japan	1	1971	0	Full coverage until March 2001	1	1	1	1	0.00084 of insured deposits	2	1
Jordan	0										
Kenya	1	1985	0	K Sh 100,000	0	0	1	1	0.004 of deposits	1	1
Korea	1	1996	0	20,000,000 WON	n.a.	n.a.	1	1	0.0002 of insured deposits	2	n.a.
Luxembourg	1	1989	0	15,000 ECU	1	0	0	0	callable	3	1
Malaysia	0										
Mali	0										
Mexico	1	1986	0	No limit	1	n.a.	1	0	0.003 of covered	1	1

									liab.		
Nepal	0										
Netherlands	1	1979	0	20,000 ECU	1	0	0			2	1
New Zealand	0										
Nicaragua	0										
Nigeria	1	1988	0	50,000 N	0	0	1	0	0.00937of deposits	1	1
Norway	1	1961	0	2,000,000 NOK	1	n.a.	1	1	0.00015 of total assets	2	0
Pakistan	0										
Panama	0										
Papua New Guinea	0										
Paraguay	0										
Peru	1	1993	0	4,600 Sl.	0	n.a.	1	1	0.0075 of total deposits	2	0
Philippines	1	1963	0	P 100,000	1	0	1	1	0.002 of total deposits	2	1
Poland	1	1995	1	Max. 90% of 3000 ECU	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.
Russia	0										
Saudi Arabia	0										
Singapore	0										
South Africa	0										
Spain	1	1977	0	15,000 ECU	1	0	1	1	0.0002 of deposits	2	0
Sri Lanka	0										
Sweden	1	1996	0	250,000 SEK	n.a.	0	1	0	0.0025 of deposits	n.a.	n.a.
Switzerland	1	1984	0	30,000 Sw F	n.a.	n.a.	0	1	callable	1	0
Taiwan	1	1985	0	1,000,000 NT	0	0	1	1	0.00015 of insured deposits	1	0
Thailand	0										
United Kingdom	1	1982	1	75% of 20,000 GBP	0	0	1	1	.003 max	1	1
United States	1	1934	0	100,000 US $	1	1	1	1	0.0024	1	0
Zimbabwe	0										

Table II. Bank Characteristics by Country

Interest Expense is the ratio of interest expense to interest paying debt. Deposit Growth is the percentage growth in real deposits. Equity is book value of equity (assets minus liabilities) to total assets. Liquidity is defined as liquid assets to total assets. Profit is given by before tax profits divided by total assets. Overhead is personnel expenses and other non-interest expenses over total assets. Short Term Debt/Total Debt is customer and short term funding to total interest paying debt. Data source is the BankScope data base of Fitch IBCA. Figures are 1990-1997 averages.

	Interest Expense	Deposit Growth	Equity	Liquidity	Profit	Overhead	Short Term Debt/ Total Debt
Argentina	0.078	0.207	0.129	0.128	0.009	0.070	0.949
Australia	0.068	0.109	0.070	0.097	0.008	0.025	0.915
Austria	0.054	0.048	0.063	0.127	0.006	0.025	0.918
Bahrain	0.051	.	0.130	0.078	0.017	0.014	0.977
Belgium	0.057	0.082	0.057	0.203	0.004	0.022	0.984
Benin	0.021	0.081	0.064	0.001	0.021	0.037	0.981
Bolivia	0.090	0.131	0.085	0.138	0.006	0.046	0.984
Canada	.	0.084	0.082	0.196	0.000	0.020	0.978
Chile	.	0.051	0.114	0.310	0.004	0.031	0.918
China	.	0.189	0.100	0.309	0.013	0.014	0.840
Colombia	.	0.105	0.137	0.219	0.017	0.084	0.930
Costa Rica	.	-0.038	0.153	0.268	0.025	0.051	0.952
Denmark	0.042	0.041	0.108	0.226	0.009	0.035	0.968
Dominican Rep.	.	0.176	0.101	0.308	0.019	0.063	0.619
Ecuador	.	0.278	0.145	0.302	0.031	0.073	0.931
Finland	0.058	0.075	0.053	0.165	-0.001	0.018	0.761
France	0.072	0.029	0.074	0.144	0.000	0.033	0.897
Germany	0.053	0.059	0.074	0.272	0.002	0.025	0.947
Ghana	.	0.301	0.105	0.487	0.044	0.069	0.980
Greece	0.096	0.225	0.067	0.327	0.009	0.035	0.997
Guatemala	.	0.093	0.084	0.230	0.007	0.058	0.816
Haiti	.	0.132	0.045	0.501	0.010	0.042	0.942
Honduras	.	0.172	0.129	0.262	0.020	0.043	0.899
Hong Kong	.	0.043	0.138	0.364	0.007	0.021	0.921
Hungary	.	0.141	0.097	0.090	0.018	0.043	0.943
India	.	0.260	0.118	0.242	0.013	0.024	0.933
Indonesia	.	0.240	0.103	0.219	0.010	0.028	0.892
Ireland	0.057	0.291	0.071	0.210	0.006	0.011	0.980
Italy	0.060	0.007	0.083	0.349	0.005	0.035	0.887
Japan	.	0.006	0.038	0.133	0.000	0.014	0.952
Jordan	0.052	0.040	0.064	0.326	0.007	0.025	0.985
Kenya	.	0.260	0.109	0.331	0.009	0.037	0.996
Korea	.	0.221	0.069	0.164	0.002	0.027	0.871
Luxembourg	0.072	0.046	0.046	0.430	0.004	0.011	0.945
Mali	.	0.087	0.048	0.001	0.010	0.069	.
Malta	0.042	0.187	0.060	0.207	0.010	0.014	0.993
Mexico	0.228	0.123	0.075	0.220	0.004	0.043	0.956
Morocco	.	0.119	0.084	0.335	0.007	0.027	0.996
Nepal	0.052	0.266	0.070	0.379	0.023	0.024	0.987

	Interest Expense	Deposit Growth	Equity	Liquidity	Profit	Overhead	Short Term Debt/ Total Debt
Netherlands	0.057	0.100	0.086	0.357	0.005	0.014	0.883
New Zealand	0.065	0.102	0.049	0.101	0.009	0.027	0.974
Nicaragua	0.056	.	0.061	0.262	0.010	0.053	0.888
Nigeria	0.075	0.085	0.096	0.571	0.020	0.085	0.998
Norway	0.064	0.074	0.064	0.058	0.009	0.023	0.903
Pakistan	0.070	0.164	0.067	0.433	0.005	0.030	1.000
Panama	0.062	0.117	0.082	0.195	0.012	0.020	0.948
Peru	0.077	0.311	0.101	0.239	0.012	0.077	0.988
Philippines	0.073	0.151	0.132	0.257	0.020	0.042	0.999
Poland	0.121	.	0.113	0.235	0.022	0.038	0.986
Russia	0.137	0.113	0.135	0.449	0.038	0.083	0.987
Senegal	0.020	0.087	0.064	0.000	0.022	0.048	0.981
Singapore	0.034	0.107	0.122	0.313	0.011	0.012	0.990
South Africa	0.116	0.150	0.084	0.164	0.011	0.039	0.925
Spain	0.070	0.104	0.088	0.179	0.006	0.030	0.990
Sri Lanka	0.084	0.113	0.104	0.207	0.017	0.035	0.877
Switzerland	0.045	0.055	0.108	0.177	0.007	0.035	0.831
Taiwan	0.054	0.204	0.082	0.148	0.007	0.015	0.999
Thailand	0.082	0.160	0.069	0.094	0.007	0.019	0.961
Tunisia	0.052	0.040	0.065	0.191	0.009	0.020	0.906
United Kingdom	0.060	-0.038	0.100	0.319	0.010	0.027	0.931
United States	0.035	0.071	0.082	0.126	0.011	0.036	0.826

Table III. **Market Discipline – Interest Elasticities**

The equation estimated is Interest Expense$_t$ = α + β_1 Equity$_{t-1}$ + β_2 Profit$_{t-1}$ + β_3 Liquidity$_{t-1}$+ β_4 Overhead$_{t-1}$+ β_5 Short Term Debt/Total Debt$_{t-1}$+ ε_t . Log transformations of variables are taken. The dependent variable is the ratio of interest expense to interest paying debt. Equity is book value of equity (assets minus liabilities) to total assets. Liquidity is defined as liquid assets to total assets. Profit is given by before tax profits divided by total assets. Overhead is personnel expenses and other non-interest expenses over total assets. Short term debt to total debt is customer and short term funding to total interest paying debt. Data source is the BankScope data base of Fitch IBCA. The sample period for each country is 1990-1997, where available. Three different estimation methods are used. The first one pools cross-bank time-series data and uses Ordinary Least Squares. The Between Estimator takes mean values for each bank over the sample period. The Within Estimator uses pooled data but includes bank and time fixed effects. Significance tests are based on White's heteroskedasticity consistent errors. Bold numbers are significant at levels equal to or less than 5 percent.

	Pooled-OLS					Between Estimates					Within Estimates				
	Equity	Profit	Liquidity	Adj.R-sq.	N	Equity	Profit	Liquidity	Adj. R-sq.	N	Equity	Profit	Liquidity	Adj. R-sq.	N
Argentina	0.053	**0.169**	**-0.132**	0.03	153	0.212	**0.442**	**-0.254**	0.27	51	-0.250	0.041	0.018	0.04	137
Australia	0.073	-0.019	-0.042	0.12	134	0.171	**-0.289**	0.006	0.05	39	0.172	-0.243	-0.025	0.28	128
Austria	-0.209	-0.112	**-0.093**	0.14	159	0.144	-0.230	-0.109	0.02	43	**-0.050**	0.019	-0.042	0.33	155
Bahrain	0.178	**-2.282**	0.020	0.44	25	.	.	.	.	.	0.013	0.037	0.018	0.75	25
Belgium	-0.082	-0.385	**-0.869**	0.33	185	-0.035	**-0.721**	**-0.093**	0.48	46	0.022	-0.027	-0.022	0.45	181
Bolivia	-0.047	0.194	-0.243	0.17	41	-0.096	0.479	**-0.551**	0.42	13	-0.107	-0.082	-0.074	0.47	40
Denmark	0.048	**-0.418**	**-0.183**	0.42	243	0.154	**-0.664**	**-0.172**	0.48	55	-0.033	-0.063	**-0.094**	0.78	242
Finland	0.398	0.075	-0.014	0.00	35	**0.665**	**-1.020**	**0.623**	0.67	7	**0.392**	0.074	-0.091	0.75	34
France	0.035	**-0.116**	**-0.105**	0.10	840	0.062	**-0.312**	**-0.137**	0.14	217	-0.066	0.009	-0.007	0.21	827
Germany	**0.120**	-0.086	**-0.070**	0.15	1082	**0.192**	-0.068	**-0.072**	0.20	260	-0.084	-0.083	-0.009	0.43	1082
Greece	-0.086	0.239	0.190	0.04	60	-0.206	0.118	0.036	0.20	15	0.034	0.229	-0.018	0.73	58
Ireland	-0.126	-0.930	**0.098**	0.21	27	-0.110	-0.942	**0.170**	0.26	13	0.102	**-0.677**	**-0.027**	0.11	25
Italy	-0.087	0.088	**-0.243**	0.38	69	**-0.107**	**0.186**	**-0.130**	0.40	52	-0.060	-0.154	**-0.088**	0.77	67
Luxembourg	**-0.129**	-0.138	**-0.052**	0.12	633	-0.110	0.334	-0.048	0.13	122	**-0.142**	-0.344	**-0.033**	0.30	630
Malta	-0.139	-0.358	0.030	0.30	19	.	.	.	.	.	0.005	**-0.370**	0.004	0.86	18
Mexico	-0.159	-0.319	-0.162	0.12	37	-0.089	**-0.717**	-0.005	0.30	19	**-1.014**	**-0.425**	**-0.043**	0.72	30
Nepal	0.042	-0.174	**-0.404**	0.63	12	.	.	.	.	.	0.234	**-0.430**	**-0.686**	0.82	10
Netherlands	**-0.119**	0.040	0.018	0.19	114	-0.083	0.017	0.021	0.21	32	0.049	-0.163	0.000	0.19	110
New Zealand	0.028	-0.105	-0.072	0.36	25	0.021	**-0.922**	-0.033	0.47	9	-0.011	0.418	0.097	0.69	23
Nicaragua	**-0.401**	-0.061	-0.259	0.32	33	**-0.530**	0.057	-0.214	0.12	13	.	.	.	.	.
Nigeria	0.264	-0.470	0.410	0.00	57	0.284	-0.611	0.431	0.01	25	-0.076	0.079	0.753	0.25	46
Norway	-0.157	-0.033	-0.058	0.10	73	-0.493	0.382	-0.014	0.39	15	-0.066	-0.036	**0.062**	0.61	73
Pakistan	0.026	0.176	0.011	0.07	87	0.011	0.507	0.013	0.08	20	**-0.326**	**0.434**	0.199	0.56	87
Panama	-0.121	0.001	-0.003	0.00	51	0.082	-0.566	0.075	0.00	24	**-0.619**	**1.206**	0.060	0.58	49
Peru	**-0.492**	-0.092	**-0.327**	0.20	78	**-0.831**	**-0.522**	**-1.238**	0.78	22	-0.168	0.082	0.130	0.17	77
Philippines	**-0.483**	0.372	**-0.230**	0.20	83	**-0.580**	0.261	**-0.488**	0.39	22	**-0.210**	0.285	-0.027	0.74	79
Poland	0.064	-0.147	-0.033	0.00	106	**0.323**	-0.262	-0.033	0.09	38	.	.	.	.	.

	Pooled-OLS					Between Estimates					Within Estimates				
	Equity	Profit	Liquidity	Adj.R-sq.	N	Equity	Profit	Liquidity	Adj. R-sq.	N	Equity	Profit	Liquidity	Adj. R-sq.	N
Russia	-0.268	0.170	**-0.418**	0.08	91	-0.161	0.205	**-0.581**	0.10	49	-0.001	-0.012	0.276	0.52	31
Singapore	-0.162	0.290	-0.147	0.00	58	**-0.660**	0.097	**-0.467**	0.00	12	0.005	0.128	0.144	0.69	58
South Africa	**0.158**	-0.089	-0.014	0.25	49	**0.171**	-0.201	0.011	0.52	15	**0.181**	-0.064	-0.111	0.63	47
Spain	0.005	-0.011	0.046	0.03	353	0.076	-0.068	0.065	0.03	80	**-0.269**	0.137	0.023	0.69	342
Sri Lanka	**-0.114**	-0.352	-0.142	0.32	25	.	.	.	.	.	0.079	-0.096	**-0.197**	0.62	24
Switzerland	**0.097**	**-0.289**	**-0.182**	0.25	781	0.130	-0.260	**-0.153**	0.23	174	**-0.198**	-0.122	**-0.067**	0.53	766
Taiwan	-0.018	-0.061	-0.003	0.01	119	-0.044	0.006	**-0.131**	0.15	27	-0.026	**-0.136**	**0.130**	0.52	119
Thailand	**0.232**	**-0.739**	0.022	0.21	94	**0.382**	**-0.995**	-0.149	0.63	16	0.053	-0.229	-0.001	0.87	92
Tunisia	**-0.255**	-0.005	0.083	0.32	60	-0.034	-0.139	-0.243	0.21	10	**-0.134**	-0.234	-0.043	0.84	60
United Kingdom	0.011	**-0.284**	**-0.478**	0.20	169	-0.106	0.092	-0.021	0.14	53	0.147	-0.190	-0.010	0.15	162
United States	**-0.171**	0.017	**-0.073**	0.13	2373	-0.064	0.073	**-0.079**	0.16	526	**-0.163**	**-0.087**	**-0.051**	0.58	2346

Table IV. Market Discipline – Deposit Growth

The equation estimated is Deposit Growth$_t$ = α + β_1 Equity$_{t-1}$ + β_2 Profit$_{t-1}$ + β_3 Liquidity$_{t-1}$+ β_4 Overhead$_{t-1}$+ β_5 Size$_{t-1}$+ $\varepsilon_{,t}$. Log transformations of variables are taken. The dependent variable is the real deposit growth. Equity is book value of equity (assets minus liabilities) to total assets. Liquidity is defined as liquid assets to total assets. Profit is given by before tax profits divided by total assets. Overhead is personnel expenses and other non-interest expenses over total assets. Size is given by total assets. Bank data are from the BankScope data base of Fitch IBCA, and the GDP deflator used to construct Size$_{t-1}$ is from the IMF's International Financial Statistics. The sample period for each country is 1990-1997, where available. Three different estimation methods are used. The first one pools cross-bank time-series data and uses Ordinary Least Squares. The Between Estimator takes mean values for each bank over the sample period. The Within Estimator uses pooled data but includes bank and time fixed effects. Significance tests are based on White's heteroskedasticity consistent errors. Bold numbers are significant at levels equal to or less than 5 percent.

	Pooled-OLS					Between Estimates					Within Estimates				
	Equity	Profit	Liquidity	Adj. R-sq.	N	Equity	Profit	Liquidity	Adj. R-sq.	N	Equity	Profit	Liquidity	Adj. R-sq.	N
Argentina	**0.209**	0.010	-0.045	0.15	148	-0.089	-0.061	-0.005	0.07	51	**0.600**	-0.004	-0.106	0.40	135
Australia	0.092	0.077	-0.026	0.06	137	-0.116	0.143	0.012	0.13	40	0.127	0.053	**-0.051**	0.07	131
Austria	0.086	0.065	-0.011	0.08	170	0.057	**0.266**	-0.015	0.18	45	0.201	**-0.123**	0.001	0.15	167
Belgium	-0.014	0.000	-0.003	0.04	160	-0.034	0.129	0.003	-0.01	46	**0.236**	0.153	0.002	0.19	154
Bolivia	**0.179**	0.028	**0.121**	0.12	43	0.306	-0.044	0.177	0.13	14	0.176	0.141	**0.151**	0.15	41
Canada	0.022	**0.084**	-0.012	0.06	242	-0.080	**0.178**	0.001	0.13	56	**0.385**	0.022	**-0.059**	0.33	234
Chile	-0.350	-0.120	-0.153	0.04	89	-0.230	0.131	-0.350	0.08	26	-0.033	-0.218	-0.037	0.05	86
China	0.123	0.093	-0.134	-0.02	37	0.269	-0.345	-0.220	-0.09	15	-0.516	1.205	0.252	0.06	30
Colombia	**-0.131**	0.088	0.023	0.03	94	**-0.214**	0.001	0.000	0.13	23	-0.051	0.078	0.046	0.36	90
Costa Rica	-0.016	-2.399	-0.134	-0.09	30	-0.194	-7.542	-1.063	0.00	15	-0.251	0.411	0.137	0.34	23
Denmark	0.077	-0.035	**0.061**	0.10	249	0.101	-0.007	**0.167**	0.45	56	**0.275**	0.023	0.009	0.50	248
Dominican Rep.	0.131	0.100	-0.317	-0.01	47	0.060	0.039	**-0.557**	0.58	15	0.261	0.436	0.226	0.14	45
Ecuador	**1.228**	**-0.645**	-0.170	0.26	24	0.465	**-0.836**	-0.341	0.12	14	**1.010**	**-1.123**	0.048	0.82	16
Finland	0.148	-0.148	-0.016	-0.15	35	**-0.749**	**0.270**	**-0.270**	0.78	7	**0.680**	-0.037	-0.019	0.30	34
France	**-0.053**	**0.086**	0.026	0.02	1177	**-0.089**	0.059	0.036	0.02	272	0.119	0.025	0.004	0.04	1150
Germany	-0.0027	0.0878	-0.006	0.02	1125	-.0500	0.088	0.005	0.01	265	**0.244**	0.095	**-0.038**	0.15	1125
Ghana	0.987	-0.165	-0.036	-0.05	12	**2.084**	-0.305	0.066	-0.25	7	-0.476	0.221	-0.116	1.00	9
Greece	0.181	-0.496	0.002	0.05	24	0.263	**-0.627**	0.244	-0.22	12	**0.688**	**-0.712**	-0.212	0.42	24
Guatemala	**0.287**	**-0.467**	-0.134	0.33	105	**0.335**	**-0.533**	-0.067	0.40	33	**0.656**	**-0.368**	-0.141	0.57	99
Haiti	-0.403	-0.042	**-1.485**	0.35	10	-0.733	-0.196	-2.067	.	5	-2.404	-32.452	-8.690	1.00	8
Hong Kong	0.019	-0.124	0.056	0.03	75	-0.100	-0.134	-0.051	-0.14	24	0.261	-0.065	0.202	0.22	71
Honduras	-0.241	-0.198	0.279	0.25	23	**-0.370**	-0.121	0.371	0.06	9	**0.643**	-0.028	0.032	0.07	21
Hungary	**0.138**	0.028	-0.033	0.13	44	0.057	0.247	-0.022	-0.02	25	**0.133**	-0.114	-0.037	0.29	41

	Pooled-OLS					Between Estimates					Within Estimates				
	Equity	Profit	Liquidity	Adj. R-sq.	N	Equity	Profit	Liquidity	Adj. R-sq.	N	Equity	Profit	Liquidity	Adj. R-sq.	N
Indonesia	**0.160**	-0.097	-0.028	0.06	347	**0.174**	-0.387	-0.027	0.07	95	**0.168**	0.037	-0.039	0.07	339
Ireland	0.126	0.028	-0.047	0.48	50	**0.314**	**-1.505**	**-0.096**	0.60	17	-0.146	**0.746**	-0.012	0.45	48
Italy	-0.015	0.217	0.031	0.03	73	-0.074	**0.427**	-0.004	0.24	53	0.213	0.224	0.065	0.32	71
Japan	**0.095**	-0.041	**0.019**	0.18	775	**0.147**	-0.173	**0.043**	0.42	148	**0.198**	**-0.131**	**-0.069**	0.24	773
Jordan	-0.082	**-0.674**	0.044	0.30	39	-0.723	3.708	-0.020	.	6	0.309	-0.110	-0.049	0.19	39
Kenya	0.172	-0.959	-0.219	0.17	10	-0.006	**-1.792**	**0.363**	0.67	9	-1.272	2.889	1.552	.	6
Korea	**0.169**	0.135	**0.136**	0.24	125	0.166	**0.337**	**0.147**	0.36	29	0.166	-0.131	**0.028**	0.01	125
Luxembourg	0.063	0.127	-0.028	-0.02	125	-0.098	-0.078	-0.030	0.04	68	0.174	0.210	-0.036	0.02	125
Malta	**0.399**	-0.664	-0.019	-0.08	18	0.239	-2.113	-0.042	.	6	-0.231	0.482	0.042	0.04	17
Mexico	0.223	**0.322**	0.036	0.63	25	0.338	0.527	**0.376**	0.58	12	**0.998**	**0.456**	-0.049	0.76	19
Morocco	-0.034	0.128	-0.034	0.22	27	**-0.475**	**0.165**	**0.545**	0.44	7	0.075	**-0.528**	**-0.600**	0.31	26
Nepal	**-0.390**	-0.016	**-0.126**	0.70	15	-1.116	0.583	-0.184	.	6	**-0.330**	**-0.633**	**-0.597**	0.81	13
Netherlands	**0.300**	0.055	-0.038	0.01	176	0.199	0.359	-0.046	-0.10	44	-0.101	-0.395	-0.116	0.03	170
New Zealand	-0.017	-0.138	-0.004	-0.15	24	-0.006	**-0.763**	0.012	-0.09	9	**0.425**	**0.496**	0.036	0.73	22
Nigeria	0.036	**0.558**	**-0.555**	0.09	41	-0.100	**0.876**	**-0.857**	0.36	20	**0.421**	0.239	-0.254	0.56	37
Norway	**0.135**	-0.026	0.030	0.21	72	**0.221**	**-0.190**	**0.044**	0.66	15	-0.058	**0.050**	**0.058**	0.31	72
Pakistan	**0.111**	0.015	-0.030	0.29	87	**0.092**	0.005	-0.076	0.37	21	**0.304**	-0.225	-0.143	0.41	86
Panama	0.098	0.160	0.022	-0.03	40	-0.066	0.196	0.038	-0.36	16	0.312	-0.376	-0.072	0.11	36
Peru	0.164	0.171	**-0.330**	0.21	94	0.192	0.180	-0.209	0.08	22	**0.416**	0.117	**-0.480**	0.44	93
Philippines	**0.189**	-0.050	**-0.091**	0.19	110	**0.250**	0.003	-0.045	0.52	27	**0.166**	**-0.400**	**-0.251**	0.45	103
Singapore	**0.534**	**-0.724**	-0.200	0.34	57	0.397	-0.690	-0.303	-0.03	12	0.880	-0.467	0.113	0.51	57
South Africa	-0.118	0.082	0.015	0.00	75	-0.198	0.308	0.017	-0.12	24	-0.122	0.179	0.056	0.00	71
Spain	-0.038	**0.122**	-0.016	0.00	349	-0.093	0.101	-0.023	-0.04	80	**0.224**	0.020	0.017	0.12	337
Sri Lanka	**0.144**	-0.115	0.059	0.12	24	-0.297	1.686	1.194	.	6	-0.090	**0.720**	0.146	0.26	23
Switzerland	-0.031	0.046	0.014	0.00	712	-0.094	-0.077	0.033	0.05	178	**0.305**	0.090	0.003	0.11	691
Thailand	0.100	-0.173	**-0.087**	0.07	96	0.156	-0.201	**-0.184**	0.61	16	0.042	-0.026	**-0.130**	0.23	94
Tunisia	0.057	-0.048	**-0.073**	0.13	59	0.069	-0.179	**-0.062**	0.16	10	0.034	0.004	-0.074	0.38	59
United Kingdom	**0.478**	-0.165	**-0.097**	0.09	275	0.308	0.166	-0.065	0.02	80	**0.407**	0.066	0.036	0.20	266
United States	-0.015	0.009	-0.007	0.00	2346	-0.044	0.045	-0.009	0.00	525	0.069	0.007	0.002	0.02	2326

Table V. Deposit Interest Rates and Deposit Insurance

The estimated model is Interest Expense$_{[Bank= i, Country=j, Time= t]}$= α + β_1 Equity$_{i,j,t-1}$ + β_2 Liquidity$_{i,j,t-1}$+ β_3 Profit$_{i,j,t-1}$ + β_4 Overhead$_{i,j,t-1}$ + β_5 Short Term Debt/Total Debt$_{i,j,t-1}$ + β_6 Inflation $_{j,t}$ + β_7 Growth$_{j,t}$ + β_8 Government Rate$_{j,t}$ + β_9Gnp/cap$_{j,t}$ + β_{10}Deposit Insurance $_{j,t}$ + $\varepsilon_{i,j,t}$. Log transformations of variables are taken. The dependent variable is the ratio of interest expense to interest paying debt. Equity is book value of equity (assets minus liabilities) to total assets. Liquidity is defined as liquid assets to total assets. Profit is given by before tax profits divided by total assets. Overhead is personnel expenses and other non-interest expenses over total assets. Short Term Debt/Total Debt is customer and short term funding to total interest paying debt. Inflation is the annual inflation rate from the GDP deflator. Growth is the annual growth rate of real GDP per capita. Gnp/cap is the real GNP per capita. Deposit Insurance is a dummy variable that takes on a value one if an explicit deposit insurance scheme exists. Bank data are from the BankScope data base of Fitch IBCA, and macro data are from the IMF's International Financial Statistics. The sample period is 1990-1997. For each specification, column a uses averaged bank data for the sample period, and column b uses time-series cross-section pooled data. Estimation technique is weighted least squares, with the weight being the inverse of the number of banks for the country in column a and inverse of the number of banks in a given year in column b. Specification 3 also includes interaction terms of the first three variables with the deposit insurance dummy. White's heteroscedasiticy consistent standard errors are given in parentheses.

	(1.a)	(1.b)	(2.a)	(2.b)	(3.a)	(3.b)
Equity	-.014	-.047***	-.020	-.048**	.013	.047
	(.027)	(.020)	(.028)	(.022)	(.053)	(.042)
Profit	-.142**	-.066	-.148**	-.068	-.107	-.183
	(.072)	(.040)	(.073)	(.041)	(.111)	(.106)
Liquidity	-.079***	-.039***	-.080***	-.042***	-.187***	-.158***
	(.013)	(.007)	(.013)	(.007)	(.033)	(.021)
Overhead	-.112***	-.105***	-.118***	-.115***	-.124***	-.117***
	(.024)	(.015)	(.024)	(.015)	(.025)	(.015)
Short term debt/total debt	.051***	.066***	.052***	.071***	.053***	.079***
	(.020)	(.022)	(.019)	(.021)	(.017)	(.018)
Inflation	.919	.256	1.004*	.316	.971	.269
	(.528)	(.346)	(.551)	(.353)	(.552)	(.348)
Growth	-1.115	-1.371***	-.549	-1.533***	-1.121	-1.881***
	(.956)	(.436)	(.972)	(.455)	(.967)	(.437)
Government rate	.493***	.618***	.470***	.587***	.472***	.588***
	(.066)	(.038)	(.062)	(.039)	(.061)	(.040)
Gnp/cap	-.028	.024*	-.023	.021	-.035	.011
	(.021)	(.013)	(.020)	(.014)	(.020)	(.014)
Deposit insurance			-.093***	-.065***	-.083	.286
			(.038)	(.029)	(.432)	(.314)
Equity x					-.038	-.124**
Deposit insurance					(.065)	(.051)
Profit x					-.045	.138
Deposit insurance					(.147)	(.114)
Liquidity x					.128***	.134***
Deposit insurance					(.035)	(.022)
No. of obs.	1581	5183	1565	5113	1565	5113
No. of countries	30	30	28	28	28	28
Adj. R-square	.46	.45	.47	.44	.48	.46
F value	152***	469***	139***	400***	112***	332***

***,**, and * indicate statistical significance at 1, 5, and 10 percent, respectively.

Table VI
Deposit Growth and Deposit Insurance

The estimated model is $\text{Deposit Growth}_{[\text{Bank= i, Country=j, Time= t}]} = \alpha + \beta_1 \text{Equity}_{i,j,t-1} + \beta_2 \text{Liquidity}_{i,j,t-1} + \beta_3 \text{Profit}_{i,j,t-1} + \beta_4 \text{Overhead}_{i,j,t-1} + \beta_5 \text{Inflation}_{j,t} + \beta_6 \text{Growth}_{j,t} + \beta_7 \text{Government Rate}_{j,t} + \beta_8 \text{Gnp/cap}_{j,t} + \beta_9 \text{Deposit Insurance}_{j,t} + \varepsilon_{i,j,t}$. Log transformations of variables are taken. The dependent variable is the percentage growth in real deposits. Equity is book value of equity (assets minus liabilities) to total assets. Liquidity is defined as liquid assets to total assets. Profit is given by before tax profits divided by total assets. Overhead is personnel expenses and other non-interest expenses over total assets. Inflation is the annual inflation rate of the GDP deflator. Growth is the annual growth rate of real GDP per capita. Gnp/cap is the real Gnp per capita. Deposit Insurance is a dummy variable that takes on a value of on if there exists an explicit deposit insurance scheme. Bank data are from the BankScope data base of Fitch IBCA, and macro data are from the IMF's International Financial Statistics. The sample period is 1990-1997. For each specification, column a uses averaged bank data for the sample period. Column b uses time-series cross-section pooled data. Estimation technique is weighted least squares, with the weight being the inverse of the number of banks for the country in column a and inverse of the number of banks in a given year in column b. White's heteroskedasticity-consistent standard errors are given in parentheses.

	(1.a)	(1.b)	(2.a)	(2.b)
Equity	.049***	.058***	.049**	.056***
	(.021)	(.013)	(.022)	(.013)
Profit	-.123	.007	-.128	.007
	(.076)	(.026)	(.077)	(.026)
Liquidity	.008	-.002	.006	-.003
	(.006)	(.004)	(.007)	(.004)
Overhead	.037**	.024	.041**	.026
	(.016)	(.015)	(.016)	(.015)
Inflation	.043	-.421**	-.040	-.486**
	(.406)	(.174)	(.412)	(.176)
Growth	1.745***	1.051***	1.713**	-1.060***
	(.652)	(.337)	(.692)	(.351)
Government rate	-.023	-.014	-.016	-.009
	(.037)	(.022)	(.035)	(.022)
Gnp/cap	-.026***	-.023***	-.028***	-.027***
	(.009)	(.006)	(.010)	(.008)
Deposit insurance			-.005	.009
			(.030)	(.020)
No. of obs.	2205	7321	2182	7238
No. of countries	50	50	46	46
Adj. R-square	.04	.04	.04	.04
F value	12***	36***	11***	33**

***,**, and * indicate statistical significance at 1, 5, and 10 percent, respectively.

Table VII. Deposit Interest Rates and Deposit Insurance Design Features

The estimated model is Interest Expense$_{[Bank= i, Country=j, Time= t]}$= $\alpha + \beta_1$ Equity$_{i,j,t-1}$ + β_2 Liquidity$_{i,j,t-1}$ + β_3 Profit$_{i,j,t-1}$ + β_4 Overhead$_{i,j,t-1}$+ β_5 Short Term Debt/Total Debt$_{i,j,t-1}$ + β_6 Inflation $_{j,t}$+ β_7 Growth$_{j,t}$ + β_8 Government rate$_{j,t}$ + β_9Gnp/cap$_{j,t}$ + β_{10}Deposit Insurance $_{j,t}$ + β_{11}Insurance design feature $_{j,t}$ + $\varepsilon_{i,j,t}$. Log transformations of variables are taken. The dependent variable is the ratio of interest expense to interest paying debt. Equity is book value of equity (assets minus liabilities) to total assets. Liquidity is defined as liquid assets to total assets. Profit is given by before tax profits divided by total assets. Overhead is personnel expenses and other non-interest expenses over total assets. Short Term Debt/Total Debt is customer and short term funding to total interest paying debt. Inflation is the annual inflation rate from the GDP deflator. Growth is the annual growth rate of real GDP per capita. Gnp/cap is the real GNP per capita. Deposit Insurance is a dummy variable that takes a value of one if an explicit deposit insurance scheme exists. In each specification a deposit design feature is included. Only the estimated coefficients for deposit insurance variables are reported below. Bank data are from the BankScope data base of Fitch IBCA, and macro data are from the IMF's International Financial Statistics. The sample period is 1990-1997. For each specification, Panel A uses time-series cross-section pooled data and Panel B uses averaged bank data for the sample period. Estimation technique is weighted least squares, with the weight being the inverse of the number of banks in a given year in Panel and the inverse of the number of banks for the country in Panel B. White's heteroskedasticity consistent standard errors are given in parentheses.

	Is there Co-insurance?	Explicit Coverage Limit	Are Foreign Currency Deposits Covered?	Are Interbank Deposits Covered?	Type of Fund: Unfunded or Implicit (0), Unfunded but Callable (1), Funded (2)	Source of Funding: Implicit (0), Banks only (1), Government and Banks (2), Government only (3)	Insurance Premium as % of Deposits	Fund Management Dummy: Implicit (0), Public (1), Joint (2), Private (3)	Individual Dummy Variables for Joint, and Private Management	Membership: Voluntary (0), Compulsory (1)
Panel A. Pooled-OLS										
Deposit	-.078***	-.208***	-.071**	-.188***	-.133***	.057	-.163***	.124***	.038	-.061**
Insurance	(.030)	(.038)	(.035)	(.033)	(.036)	(.059)	(.029)	(.056)	(.050)	(.030)
Design	.077	.010*	.057**	.001	.042**	-.072***	.005	-.096***	(J) -.114**	.007
Elements	(.049)	(.006)	(.029)	(.023)	(.017)	(.025)	(.008)	(.019)	(.041)	(.022)
									(P)-.193***	
									(.038)	
N, country	4994,27	4196,21	3954,24	3705,22	5113,28	5072,27	3166,20	5072, 27	5072,27	5072,27
Adj. R-sq.	.43	.42	.45	.39	.44	.45	.41	.46	.46	.44
F value	349***	277***	295***	214***	366***	372***	202***	388***	356***	367***
Panel B. Between Estimates										
Deposit	-.099***	-.110***	-.074	-.167***	-.129***	.022	-.124***	.050	-.023	-.072
Insurance	(.038)	(.049)	(.053)	(.044)	(.055)	(.071)	(.046)	(.079)	(.071)	(.047)
Design	.051	.005	.006	-.015	.024	-.057*	-.009	-.062***	(J) -.041	.002
Elements	(.074)	(.006)	(.044)	(.037)	(.027)	(.031)	(.108)	(.026)	(.056)	(.032)
									(P)-.124**	
									(.052)	
N, country	1538,27	1316,22	1256,24	1190,22	1565,28	1552,27	974,20	1552, 27	1552, 27	1552, 27
Adj. R-sq.	.47	.47	.47	.44	.47	.47	.45	.48	.48	.47
F value	124***	105***	101***	85***	127***	128***	75***	130***	119***	127***

***,**, and * indicate statistical significance at 1, 5, and 10 percent, respectively.

Table VIII
Market Discipline and Deposit Insurance Design Features

The estimated model is Interest Expense$_{[Bank= i,\ Country=j,\ Time= t]}$= α + β_1 Equity$_{i,j,t-1}$ + β_2 Liquidity$_{i,j,t-1}$ + β_3 Profit$_{i,j,t-1}$ + β_4 Overhead$_{i,j,t-1}$ + β_5 Short Term Debt/Total Debt$_{i,j,t-1}$ + β_6 Inflation $_{j,t}$ + β_7 Growth$_{j,t}$ + β_8 Government Rate$_{j,t}$ + β_9Gnp/cap$_{j,t}$ + β_{10}Deposit Insurance $_{j,t}$ + β_{11} Insurance design feature$_{j,t}$ + β_{12} Insurance design feature $_{j,t}$ xEquity$_{i,j,t-1}$ + β_{13}Insurance design feature$_{j,t}$ xLiquidity$_{i,j,t-1}$ + β_{14} Insurance design feature $_{j,t}$ xProfit$_{i,j,t-1}$ + $\varepsilon_{i,j,t}$. Log transformations of variables are taken. The dependent variable is the ratio of interest expense to interest paying debt. Equity is book value of equity (assets minus liabilities) to total assets. Liquidity is defined as liquid assets to total assets. Profit is given by before tax profits divided by total assets. Overhead is personnel expenses and other non-interest expenses over total assets. Short Term Debt/Total Debt is customer and short term funding to total interest paying debt. Inflation is the annual inflation rate from the GDP deflator. Growth is the annual growth rate of real GDP per capita. Gnp/cap is the real GNP per capita. Deposit Insurance is a dummy variable that takes a value one if an explicit deposit insurance scheme exists. Insurance design features correspond to those in Table 7. Three additional variables are interactions of the first three variables with the insurance design feature. Bank data are from the BankScope data base of Fitch IBCA, and macro data are from the IMF's International Financial Statistics. The sample period is 1990-1997. For each specification, panel A uses time-series cross-section pooled data. Panel B uses averaged bank data for the sample period. Estimation technique is weighted least squares, with the weight being the inverse of the number of banks in a given year in panel A and the inverse of the number of banks for the country in panel B. Below only the risk factors, deposit insurance variables, and their interaction terms are reported. White's heteroscedasiticy consistent standard errors are given in parentheses.

Panel A: OLS Estimates

	Explicit Coverage Limit	Are Foreign Currency Deposits Covered?	Type of Fund: Unfunded or Implicit (0), Unfunded but Callable (1), Funded (2)	Source of Funding: Implicit (0), Banks only (1), Government and Banks (2), Gov. only (3)	Fund Management Dummy: Implicit (0), Public (1), Joint (2), Private (3)	Individual Dummy Variables for Joint, and Private Management
Equity	.022	.024	.034	-.001	.032	.006
	(.029)	(.028)	(.033)	(.036)	(.037)	(.033)
Profit	-.194**	-.123**	-.180**	-.170**	-.181**	-.176***
	(.067)	(.064)	(.086)	(.088)	(.086)	(.076)
Liquidity	-.069***	-.076***	-.099***	-.082***	-.092***	-.057***
	(.011)	(.010)	(.013)	(.015)	(.017)	(.016)
Deposit	-.225***	-.089**	-.174***	.018	.098	.037
insurance	(.039)	(.035)	(.035)	(.060)	(.056)	(.050)
Design feature	.173**	.026	.216	.179	-.021	(J) .174
	(.079)	(.249)	(.156)	(.154)	(.115)	(.267)
						(P)-.155
						(.333)
Equity x	-.005	-.224***	-.069**	-.039	-.050**	(J) -.087**
Design feature	(.015)	(.057)	(.026)	(.024)	(.016)	(.043)
						(P)-.122***
						(.043)
Profit x	.050**	.128	.080	.082	.046	(J) .159
Design feature	(.022)	(.081)	(.051)	(.053)	(.037)	(.089)
						(P) .094
						(.098)
Liquidity x	.011**	.069***	.047***	.037***	.024***	(J) .003
Design feature	(.005)	(.023)	(.011)	(.011)	(.007)	(.019)
						(P) .026
						(.020)
No. of obs.	4196	3954	5113	5072	5071	5072
No. of countries	21	24	28	27	27	27
Adj. R-square	.43	.47	.45	.45	.46	.46
F value	226***	247***	302***	299***	313***	240***

***,**, and * indicate statistical significance at 1, 5, and 10 percent, respectively.

Panel B: Between Estimates

	Explicit Coverage Limit	Are Foreign Currency Deposits Covered?	Type of Fund: Unfunded or Implicit (0), Unfunded but Callable (1), Funded (2)	Source of Funding: Implicit (0), Banks only (1), Government and Banks (2), Government only (3)	Fund Management Dummy: Implicit (0), Public (1), Joint (2), Private (3)	Individual Dummy Variables for Joint, and Private Management
Equity	-.022	.008	-.014	-.033	.022	.007
	(.039)	(.035)	(.046)	(.049)	(.049)	(.044)
Profit	-.143*	-.176	-.140	-.143	-.159	-.196**
	(.078)	(.091)	(.098)	(.105)	(.104)	(.096)
Liquidity	-.088***	-.123	-.127***	-.133***	-.154***	-.105***
	(.017)	(.020)	(.023)	(.025)	(.029)	(.027)
Deposit	-.117**	-.086	-.137***	.009	.056	-.025
insurance	(.054)	(.054)	(.056)	(.074)	(.082)	(.073)
Design feature	.046	.489	.089	.095	-.091	(J) .449
	(.062)	(.548)	(.249)	(.258)	(.200)	(.582)
						(P)-.422
						(.655)
Equity x	-.003	-.120	-.003	.016	-.032	(J) -.066
Design feature	(.013)	(.071)	(.036)	(.035)	(.025)	(.066)
						(P)-.078
						(.067)
Profit x	.019	.190	-.001	.007	-.011	(J) .188
Design feature	(.021)	(.175)	(.079)	(.086)	(.065)	(.189)
						(P) -.070
						(.208)
Liquidity x	.002	.080**	.036**	.041**	.042***	(J) .024
Design feature	(.004)	(.035)	(.016)	(.017)	(.013)	(.029)
						(P) .071**
						(.035)
No. of obs.	1316	1256	1565	1552	1552	1552
No. of countries	22	24	28	27	27	27
Adj. R-square	.47	.48	.47	.48	.49	.48
F value	83***	83***	101***	103***	106***	81***

***,**, and * indicate statistical significance at 1, 5, and 10 percent, respectively.