Credibility of Non-insurance and Governance as Determinants of Market Discipline and Risk-taking in Banking

Apanard Angkinand
Department of Economics
University of Illinois at Springfield
e-mail: aangk2@uis.edu

Clas Wihlborg
Center for Law, Economics and Financial Institutions at CBS (LEFIC)
Copenhagen Business School
e-mail: cw.fi@cbs.dk

Preliminary, Oct 16, 2006

Abstract:
Using bank level data we ask how deposit insurance systems and governance of banks affect the degree of market discipline on banks risk-taking. Market discipline is determined by (lack of) explicit deposit insurance as well as by the credibility of non-insurance of groups of depositors and other creditors. Furthermore, market discipline depends on the responsiveness of bank managers to market incentives. Therefore, country and bank level governance structures are considered; possibly in interaction with deposit insurance. An expected U-shaped relationship between explicit deposit insurance coverage and banks' risk-taking is influenced by country and bank specific institutional factors, including bank ownership. Since risk-taking cannot be directly observed we use proxies based on non-performing loans and bank capital. We analyze specifically how government ownership, foreign ownership, concentration of ownership and shareholder rights affect the disciplinary effect of partial deposit insurance systems in industrial countries and in emerging market economies.

JEL Classification: G21; G28; F43

Keywords: Deposit Insurance; Banking Crisis; Non-performing Loans, Market Discipline; Bank Ownership; Bank Governance

1. Introduction

Commercial banking has long been considered special because of a perceived high risk of market failure, and because most creditors are explicitly or implicitly insured to safeguard against losses in case banks fail. The rationale for this insurance is banks' role as liquidity providers and the risk of contagious bank runs. Without going into the economic validity of the risk of bank runs and contagion, it is a fact that supervisory authorities and governments in all countries offer a degree of insurance of banks' creditors. There is explicit deposit insurance in many countries, and expected bailouts imply a degree of implicit insurance. To the extent bail-outs and other forms of implicit insurance are expected the full or partial non-insurance of banks' creditors is not credible. As a result market discipline can be weak even in the complete absence of explicit insurance creditors.

While many academics have emphasized market discipline as a device to influence banks' risk-taking for a long time, regulatory bodies until recently have viewed their own activities as substitutes for market discipline. The Basel Committee's recent proposal for a new Capital Accord for Credit Institutions (Basel II) represents a deviation from this view in that it considers discipline as the Third Pillar of the Capital Adequacy Framework. Although the actual proposal does not go far, its view of market discipline as an integral aspect of the regulatory framework – and one that can be enhanced by regulatory measures – represents a break in regulatory philosophy.

By market discipline we mean that banks are given incentives by market participants' choices of depository institutions to assign costs of capital to investment activities reflecting the banks' best evaluation of risk from the point of view of share- and debt holders including depositors. Market discipline also enhances incentives to compete by means of credit-evaluation and pricing skills. If banks' creditors are insured their choices of depository institutions will be less sensitive to perceptions about banks' risk-taking. Therefore, shareholders have an incentive to use too much low-cost debt financing to finance relatively risky loans.

Effective market discipline requires not only that there are credibly non-insured stakeholders in banks, but also that banks' governance structures provide management with appropriate incentives to evaluate and price risk on loans and other activities in response to market signals. The corporate governance literature is rich in its analyses of potential conflicts of interest between managers and shareholders, and the impact of corporate law and ownership

structures on these conflicts. We draw on this literature to analyze to characterize the governance structures of banks.

The objective of this paper in general terms is to analyze how market discipline affects banks risk-taking as reflected in non-performing loans, bank capital, market values and ratings. We build conceptually on previous work in Angkinand and Wihlborg (2005) and (2006) wherein risk-taking is analyzed on the country level using banking crisis events and non-performing loans as proxies. Hypotheses are developed based on the assumptions that the effectiveness of market discipline on risk-taking depends on (i) the existence and credibility of non-insurance of creditor groups, and (ii) corporate governance structures of banks as reflected in managerial incentives relative to shareholders and creditors. The first assumption refers to factors external to banks affecting risk-taking incentives, while the second assumption refers to internal factors.

In the following we review existing evidence on the impact on risk-taking and market discipline of deposit insurance schemes and bank governance characteristics in Section 2. Hypotheses with respect to risk-taking are developed in Section 3 with an emphasis on the role of credibility of non-insurance and the effect of governance characteristics on risk-taking. In section 4 the empirical methodology and data are described before results are presented and discussed in Section 5. The robustness of results are discussed further in Section 6. Conclusions and implications follow in Section 7.

2. Evidence on deposit insurance, bank governance, and banks' risk-taking

Risk-taking incentives can be the cause of banking crises and are likely to be relatively strong in countries with extensive protection of depositors and other creditors. This protection can be explicit or implicit. Stronger risk-taking incentives increase the burden on regulation and supervision to control and monitor banks' risk taking in order to reduce the likelihood of a banking crisis.

A number of empirical studies address the question of whether the existence and coverage of explicit deposit insurance schemes increase the probability of banking crises. Most studies focus on explicit coverage but implicit insurance is sometimes captured by proxies for institutional characteristics. In cross country analyses Demirgüç-Kunt and Detragiache (1997) and Hutchison and McDill (1999) use a dummy variable for explicit deposit insurance along with a number of variables capturing the state of economies to explain the occurrence of banking

crises in countries. Demirgüç-Kunt and Detragiache (2002) construct a variable that captures four different degrees of deposit insurance coverage. They found that greater coverage significantly increases the likelihood of crises but this effect is relatively weak in countries with high levels of supervisory and legal system quality[1]. Several other studies also show that the effect of explicit deposit insurance on banks' risk taking as measured by occurrence of banking crises depends on characteristics of the institutional environment. Barth, et al. (2004) and Cull et al. (2005) find that Rule of Law, but not prudential supervision, reduces the moral hazard effect of deposit insurance. Hovakimian et al. (2003) emphasize that effects of explicit deposit insurance depend on its design and credibility. Angkinand (2005) finds that corruption as well as greater deposit insurance coverage increases the likelihood of banking crisis. Ferńandez and Gonźalez (2005) find that the adverse effect on risk taking can be reduced by enhancing the effectiveness of accounting and auditing systems.

Other studies document a negative relation between explicit deposit insurance and banking crises for some countries and periods. For example Eichengreen and Arteta (2002) find in a large sample of developing countries that explicit deposit insurance schemes reduce the likelihood of banking crisis. Hoggarth et al. (2005) using a relatively small sample of countries do not find a significant general relationship between an explicit deposit insurance dummy and the probability of crises. However, when distinguishing between limited and unlimited deposit insurance coverage, they find that systems with limited coverage are strongly associated with a smaller probability of crisis.

Gonzales (2005) suggests that the observation in some papers that deposit insurance reduces risk-taking can be explained by the positive impact of deposit insurance on banks' charter values in a strictly regulated environment. Strict regulation reduces charter values and, therefore, induces greater risk taking, while deposit insurance mitigates these effects.

Reconciling the opposing views on the relationship between deposit insurance and risk-taking, Angkinand and Wihlborg (2005, 2006) hypothesize and estimate a U-shaped relationship between explicit deposit insurance coverage and banks' risk-taking. The U-shape is explained by the lack of credibility of non-insurance of banks' creditors in countries with no or low deposit

[1] Demirgüç-Kunt and Detragiache (2002) also construct a variable called the moral hazard index, which is found to increase the probability of banking crises. This index is built from the first principal component of deposit insurance features for no-coinsurance, foreign currency deposits covered, interbank deposits covered, type of funding, source of funding, management, membership and the level of explicit coverage.

insurance coverage. They find robust evidence for such a relationship using two proxies for risk-taking in a country's banking system; the occurrence of banking crisis in a country during a year and the ratio of non-performing loans to total loans. The U-shaped relationship is influenced by proxies for institutional quality and the credibility of non-insurance of some creditors. The framework of these paper will be further discussed and developed below.

Banking crises and excessive risk taking have been analyzed on the bank level as well. Gropp and Vesala (2004) use proxies for banks' risk exposure to analyze risk-taking in European banks. They find that an explicit deposit insurance system is associated with a decline in banks' risk-taking incentives in these countries. Nier and Baumann (2006) ask whether market discipline affect individual banks' risk-taking in a broader group of countries. They analyze banks' risk taking as a function of bank capital, market discipline variables, transparency measures, and a number of country and bank specific control variables. Risk-taking is measured by the share of non-performing loans in total assets and by provisions for non-performing loans. Market discipline is measured by the extent of deposit protection on the country level, the amount of uninsured funding, and the extent of government support on the bank level. Their results indicate that lack of explicit deposit insurance and high amounts of uninsured deposits are likely to reduce risk-taking through the impact on desired capital while the likelihood of government support reduces market discipline both directly and through the effect on desired capital.[2]

Demirgüç-Kunt and Huizinga (2004) take a different approach analyzing bank level interest rates in 30 countries. Deposit insurance and bank risk factors independently and interactively are introduced as explanatory variables. Explicit deposit insurance reduces interest rates as one would expect. The interaction term with banks' riskiness is positive and significant indicating that bank risk has a stronger impact on interest rates when there is explicit deposit insurance. This result can be interpreted to mean that explicit deposit insurance contributes to market discipline contradicting much of the analysis on the country level. .

Distinguin et al (2005) analyze whether banks' stock returns reflect information about bank risk by asking whether the returns contribute to predictions of distress for individual banks

[2] In another strand of literature using bank level data, market discipline is captured by the sensitivity of subordinated debt yields to changes in banks' risk-taking, as well as by the effects of changes in yield on bank behavior. Jagtiani et al (2002) analyze this issue using American bank data while Sironi (2000) studies European bank data. In both cases there was evidence that subordinated debt yields were sensitive to banks risk-taking while the impact of changes in yield on bank behavior was less clear.

in Europe. Distress is defined as a two-step decline in ratings within a year. They find weak predictive ability of stock returns when controlling for a number of observable factors. The existence of predictive ability would indicate that stock markets contribute to market discipline.

Market discipline refers to the incentives created in the market place as well as to bank managers' responses to these incentives. These responses depend on the objectives of bank managers and, therefore, on the governance structures of banks. In the corporate governance literature it is usually assumed that managers in a "good" governance structure maximize shareholders' wealth while the incentives to serve the interests of other stakeholders are provided by market forces, law, and regulation.

Kane (2000) discuss how legal system characteristics and information availability about banks affect the design of effective financial safety nets including deposit insurance. The main point made is that safety nets should be designed to fit country circumstances. This point is corroborated in several studies finding that risk-taking is influenced by the ownership structures of banks and the explicit or implicit contractual relationship between shareholders and managers. These studies of bank governance focused on either the United States or Japan. For instance, Saunders et al (1990) using a sample of 38 bank holding companies in the U.S. during 1978-85 find a positive relation between managerial ownership and risk-taking. Using a larger sample of 302 banks and savings institutions during the period 1988-1993, Chen et al. (1998) find a negative relation between managerial ownership and the level of risk taking. Their explanation is that managers become more risk-averse when their ownership stake increases. Risk-taking is measured by the volatility in daily stock returns and market interest rates.[3]

There are a number of recent cross-country studies of the impact of ownership on risk-taking and performance. Several of them indicate that state ownership of banks leads to inefficiency and poor performance (e.g. La Porta et al., 1998). One reason is that management in these banks could often come under pressure to serve particular political interests. Caprio and Martinez-Peria (2000) find evidence that a greater extent of state ownership of banks is associated with a higher likelihood of banking crises in developing countries during 1980-1995. Barth et al. (2004) and Berger et al. (2005) find that state-owned banks increase the ratio of non-

[3] Anderson and Fraser (2000) argue that the different results can be explained by changes in the regulatory environment between the 80s and the 90s. These changes affected banks' charter values in the USA. In the Japanese banking sector Konoshi and Yasuda (2004) observe that the relationship "between the stable shareholders' ownership and bank risk is nonlinear".

performing loans to total loans. However, Barth et al. do not find a significant impact of state ownership on banking crises, bank development and performance as measured by net interest margins and overhead costs. Byström (2004), on the other hand, find that the degree of state ownership is positively related to the bank failure rate prior to crises.

The large share of foreign ownership of the banking sectors in many emerging market economies in Eastern Europe and Latin America has stimulated research on the effects of foreign ownership on banking operations there. According to Lensink and Hermes (2006) the entry of foreign banks improves the performance of domestic banks although costs increase as well. Lensink and Naaborg (2006) focus on the transition economies and the expanding foreign ownership of banks, while Crystal et al. (2001) study Latin American experiences. The results indicate that foreign banks grow faster than domestic banks, and that they have greater loss absorption capacity. Foreign banks bring benefits to the domestic banking sector by bringing in technology and expertise in risk management. They also increase competition, thereby forcing domestic banks to increase efficiency. It has also been argued, however, that the intensified competition could induce weak domestic banks to take more risk.

The evidence with respect to effects of foreign ownership on banks' risk taking is mixed. Demirgüç-Kunt et al (1998) and Claessens et al. (2001) find that foreign ownership of banks is associated with lower financial fragility. Barth et al. (2004) find that the degree of foreign ownership could not explain the likelihood of banking crisis but restrictions on foreign bank entry and ownership are significantly associated with a higher likelihood. The importance these restrictions are supported by Levine (2004) in a study of bank level data for 47 countries. He finds that restrictions on the entry of foreign banks, not ownership, increase interest margins.

Caprio et al. (2004) and Barth et al. (2006) analyze whether the quality of bank governance across countries is influenced by rules with respect to shareholder rights and disclosure. They use the market to book values of banks as a proxy for quality of governance. The results show that greater transparency and stronger minority shareholder rights are associated with higher market values but also that concentration of ownership substitutes for shareholder protection. Tadesse (2005), Fernandez and Gonzalez (2005), and Nier and Baumann (2006) find that greater disclosure and transparency strengthen market discipline and reduce risk-taking of banks.

In a study of risk-taking on the country level, Angkinand and Wihlborg (2006)—from here on AW (2006)—ask whether ownership and shareholder rights influence the relationship between risk-taking and deposit insurance coverage. They find that deposit insurance coverage has little effect on risk-taking in countries where a large part of the banking system is foreign controlled while stronger shareholder rights reduce the risk-taking incentives of implicit deposit insurance in particular. In this paper we ask whether these results are robust in analysis of bank level data for risk-taking, ownership and other bank characteristics.

3. Credibility of Non-insurance, Risk-taking and Governance

In this section we first revisit the argument developed in Angkinand and Wihlborg (2005)—from here on AW(2005)--leading to the hypothesis that the relationship between risk-taking incentives and explicit deposit insurance coverage is likely to be U-shaped such that (excess) risk-taking is minimized at a positive but partial deposit insurance coverage. The Institutional factors influencing the credibility of non-insurance and, therefore, the strength of implicit insurance are also considered. Thereafter, we develop a hypothesis for the impact of the quality of bank governance on the relationship between deposit insurance coverage and banks' risk taking.

a. Deposit insurance and Banks Risk-taking (based on AW, 2005)

Market discipline requires that there are partly or fully non-insured creditors of banks and that this non-insurance has credibility. It can be expected that the credibility of non-insurance increases as explicit deposit insurance coverage expands. The greater the coverage of explicit schemes the lower is the probability that governments and supervisors must intervene rapidly in distress situations to guarantee the claims of non-insured creditors. This reasoning implies that the effect of explicit insurance schemes on the degree of market discipline discouraging excessive risk-taking depends on three factors: the coverage of explicit deposit insurance schemes, the credibility of non-insurance of those not covered by explicit schemes, and the relation between the coverage of explicit insurance and the credibility of non-insurance. We argue that the latter relation depends on institutional and political factors affecting the costs to policy makers of having groups of credibly non-insured creditors.

The arguments above are illustrated in Figure 1. On the horizontal axis we have the extent of explicit insurance coverage (EC) of deposits and other claims on banks. On the vertical axis we have the incentives of banks to take excessive risk (RT) as a result of lacking market

discipline. We interpret risk-taking (RT) as the probability of a bank's capital buffer being exhausted within a certain timeframe. In other words, market discipline is declining, while moral hazard incentives are becoming stronger, along the vertical axis. We distinguish between excessive risk-taking caused by explicit deposit insurance (RT_{Expl}) and excessive risk-taking caused by lack of credibility of non-insurance (RT_{Impl}). Taking into consideration that credibility of non-insurance depends on the explicit coverage it follows that:

$$(1)\quad \frac{\delta RT}{\delta EC} = \frac{\delta RT_{Expl}}{\delta EC} + \frac{\delta RT_{Impl}}{\delta EC}.$$

The line denoted "Explicit" shows how market discipline declines and risk-taking (RT) increases as explicit insurance coverage (EC) expands at a constant degree of credibility of non-insurance. We postulate the following relationship holding the credibility of non-insurance constant:

$$(2)\quad \frac{\delta RT_{Expl}}{\delta EC} > 0 \quad \text{and} \quad \frac{\delta RT^2_{Expl}}{\delta^2 EC} > 0$$

The second derivative implies that reducing explicit insurance has a relatively strong impact on risk taking if the explicit coverage is large, and a weak impact if explicit coverage is small as shown in Figure 1. In essence, there are "diminishing returns" in terms of market discipline when explicit coverage is reduced from full coverage and no market discipline. In other words, a relatively small group of uninsured creditors can contribute substantially to market discipline.

Turning to the credibility of non-insurance (CNI), this variable is defined as the credibility of non-insurance per non-insured dollar. The impact of non-insurance on risk-taking depends on CNI as well as on the size of the non-insured group (1-EC). In the following we focus on CNI while the impact of the size of uninsured groups is captured by RT_{Expl} as described in (2).

The relationship between explicit coverage (EC) and risk-taking effects of credible non-insurance is described by the line "Implicit" in Figure 1. This line is drawn under the assumption that risk-taking effects of explicit insurance are constant. It is assumed to have the following properties taking into consideration that CNI depends indirectly on the effect of the explicit coverage on the credibility of non-insurance:

(3a) $\frac{\delta RT_{Impl}}{\delta EC} = \frac{\delta RT_{Impl}}{\delta CNI}\frac{\delta CNI}{\delta EC}$, where

(3b) $\frac{\delta RT_{Impl}}{\delta CNI} < 0$ and $\frac{\delta RT^2_{Impl}}{\delta^2 CNI} > 0$, and

(3c) $\frac{\delta CNI}{\delta EC} > 0$ and $\frac{\delta CNI^2}{\delta^2 EC} < 0$

The expressions in (3b) state that risk-taking incentives are declining in credibility of non-insurance, and that increasing credibility has "diminishing returns" in terms of effect on risk-taking. The expressions in (3c) state that the credibility of non-insurance is increasing in explicit insurance coverage, and that increasing the explicit coverage has "diminishing returns" in terms of increased credibility on non-insurance. It follows that:

(4) $\frac{\delta RT_{Impl}}{\delta EC} < 0$ and that $\frac{\delta RT^2_{Impl}}{\delta^2 EC} > 0$

The expression described by (4) can be derived diagrammatically as well. Figure (2a) shows in the first quadrant how CNI increases as EC increases under assumption (3c). The second quadrant describes how risk-taking (RT) is affected by credibility of non-insurance (CNI) under assumption (3b). The third quadrant is a 45 degree line transporting RT to the fourth quadrant, where the relation (4) between risk-taking incentives and credibility of non-insurance is illustrated.

Expression (4) is described by the negatively sloping curve denoted Implicit in Figure 1. The total effect on risk-taking from increasing explicit insurance coverage (EC) as expressed in expression (1) is described by the vertical summation of the curves Explicit and Implicit in Figure 1. This summation is shown as the U-shaped curve RT.

Although the U shaped relationship described in Figure 1 constitutes the main hypothesis to be tested below, it follows from the above discussion that the U-shape as a mathematical necessity requires specific depends assumptions about the second derivatives in particular. If the second derivatives for both Implicit and Explicit had the opposite sign the RT-curve would have a maximum instead of a minimum. In this case the risk-minimizing deposit insurance system would be either no explicit insurance or a blanket guarantee. This would happen, for example, if

for low EC-coverage the effect of increased credibility of non-insurance would be smaller than the effect of increased explicit insurance, and for high EC-coverage if the relative effects were reversed.

We conclude this section by stating the first hypothesis from AW (2005):

Hypothesis 1a: Banks' risk-taking (reflecting strength of moral hazard incentives) depends on the coverage of explicit deposit insurance schemes in such a way that risk-taking is relatively high for very low and very high levels of coverage, and minimized when there is positive but partial coverage.

This hypothesis was tested in AW (2005) using two proxies for risk-taking on the country level; the occurrence of banking crisis and the share of non-performing loans in total loans of a country's banks.

FIGURES 1 and 2 here

1b. Effects on risk-taking of institutional variables and bank governance (Figure 1a)

Institutional factors affecting the credibility of non-insurance of depositors were considered in AW (2005). These factors were of two kinds. First, country level institutions that could strengthen or weaken implicit insurance of bank creditors were discussed. Second, the impact on risk-taking of the quality of banking supervision was taken into account.

The institutional factors included in the empirical analysis were Powers of Supervisors, Powers and Procedures for Prompt Corrective Action, Rule of Law, and Corruption. The following hypotheses were developed and tested:

Hypothesis 2a. Institutional characteristics, such as the existence of Prompt Corrective Action Procedures for banks in distress, ex ante insolvency procedures for banks, Rule of Law and other characteristic contributing to credibility of non-insurance of banks' creditors, cause improved market discipline, and therefore, a reduction in banks' risk-taking caused by moral hazard incentives. This reduction in risk-taking is relatively large at low levels of explicit coverage of deposit insurance schemes. Furthermore, the minimum level of risk-taking occurs at a lower level of explicit coverage.

Hypothesis 2b: Strengthened supervision and control of banks' risk-taking caused by moral hazard incentives leads to reduced risk-taking and less sensitivity of risk-taking to changes in explicit deposit insurance coverage.

We turn now to bank governance. The question asked is how quality of governance in banks affects the relationship between explicit deposit insurance coverage (EC) and risk-taking (RT). By high quality of governance we mean that the weight of shareholder wealth maximization in the objective of a bank's management is high.

In an efficient corporate governance system, shareholder's wealth maximization will also lead to the maximization of creditors' stake in a firm. In the case of banks, however, implicit and explicit insurance of creditors can lead to a conflict of interest between shareholders and creditors. This conflict of interest manifests itself in incentives for excessive risk-taking as analyzed above. In that analysis, the quality of governance from a shareholder perspective was held constant. Excessive risk-taking reflecting moral hazard occurs as a result of limited liability of shareholders, and lack of market discipline imposed by banks' creditors. The excess risk-taking implies a wealth transfer from creditors (or insurers of creditors) to shareholders.

High quality of bank governance implies that shareholders' objectives have a large weight in managers' incentives. In Figure 1b, shareholders prefer high risk-taking at low and high levels of EC. Thus, we expect greater quality of governance to induce more risk-taking at low and high levels of EC in Figure 1b. At an intermediate level of EC, shareholders' incentives to take excessive risk are relatively low as a result of market discipline imposed by creditors. Thus, higher quality of governance reduces risk-taking in an intermediate range of EC where market discipline is effective. Overall, higher quality of bank governance is expected to lead to a more pronounced U-shape for the relationship between risk-taking and explicit deposit insurance coverage.

To strengthen the argument further, assume that shareholder wealth maximization plays little or no role for bank managers. The moral hazard incentives caused by limited liability of shareholders are then weak or irrelevant. It is safe to assume, however, that there is a degree of stigma to being the manager of a failed bank, but this stigma is reduced for managers of banks with relatively high explicit or implicit coverage of deposit insurance. Furthermore, the greater the explicit or implicit coverage, the less concerned are depositors and other insured creditors about bank failure. Under these assumptions the U-shaped curve describing risk-taking incentives at different levels of explicit coverage is flatter when shareholders have relatively low weight in managers' objective (not shown). At an intermediate level of EC, where shareholders

have little or no incentive to take excessive risk, lower quality of governance leads to increased risk-taking by management.

Hypothesis 3: Hypothesis with respect to quality of bank governance (Figure 1b): The relationship between explicit deposit insurance coverage and risk-taking is described by a flatter curve for banks with relatively low quality of governance from shareholders' point of view. Thus, we expect risk-taking to be higher at very low and very high levels of explicit coverage in banks with relatively high quality of governance. At intermediate levels of explicit coverage where market discipline is potentially strong, we expect risk-taking to decrease with higher quality of bank governance.

This hypothesis is to be tested along with hypotheses 1 and 2 on bank level data for banks in two groups of countries. The two groups are industrialized and emerging market countries. Some developing countries are included in our sample denoted "all countries" but the number of banks in the developing group are too few for separate analysis. The dependent variable is a proxy for risk-taking while the independent variables include a proxy for explicit deposit insurance coverage, proxies for quality of bank governance on the country, as well as the bank level, country specific control variables reflecting macroeconomic and institutional conditions, and bank specific control variables. We discuss proxies for these types of variables below.

Hypothesis 3 implies that corporate governance variables interact with the variable describing explicit deposit insurance coverage to determine risk-taking incentives. The empirical specification allows for such interaction as well as independent effects of governance quality on risk-taking.

4. Model Specification and Data

We estimate the following model specification for risk-taking in bank j in country i in period t:

$$\begin{aligned} \text{Risk}_{j,i,t} = {} & \alpha + \delta_1 \text{EC}_{i,t-1} + \delta_2 (\text{EC}_{i,t-1})^2 + \gamma_j \text{CorpGov}_{j,i,t-1} + \beta_k \text{Institutions}_{k,i,t-1} \\ & + \phi_k \text{Macro}_{k,i,t-1} + \omega_k \text{Bank}_{k,i,t} + \varepsilon_{i,t} \end{aligned} \quad (5)$$

A number of proxies for bank risk-taking will be tested but two will be considered the a priori most appropriate ones. The first proxy is the ratio of non-performing loans relative to equity capital. This variable can be employed in a panel analysis for the period 1995-2005 and is

estimated by using the country random effects model.[4] The second main proxy is the standard deviation of non-performing loans relative to the average equity capital. This variable is calculated using the annual data for non-performing loans and capital for each bank. Therefore, the cross-section OLS estimation with the robust standard errors is employed. Other proxies are discussed below.

A variable measuring the explicit coverage of deposit insurance, EC, enters in the quadratic functional form (proxies of EC are discussed below). Our hypothesis of a U-shaped relationship between banking crises and the degree of explicit protection is supported if the estimated coefficient for the squared term (δ_2) is positive and significant, and if the estimated coefficient for the linear term (δ_1) is negative and significant. Implicit creditor protection is captured by the downward sloping part of the quadratic function. The proxy for deposit insurance coverage, as well as proxies for other country characteristics, enters with a one-period lag to avoid potential simultaneity problems. Specifically, we avoid bias caused by deposit insurance coverage being caused by large loan losses.

Proxies for implicit creditor protection are introduced as well among the bank-specific variables. One proxy is the share of each bank's deposits in total deposits in the country. We expect that a relatively large bank is more likely to be "too big to fail" and be bailed out in a distress. Another proxy is the Fitch indicator of government support.[Not yet included] If these variables fully capture implicit creditor protection the relationship between deposit insurance coverage will be dominated by the upward sloping line "Explicit" in Figure 1 and the sign for EC in expression (5) should be positive. However, we do not expect these proxies to fully capture the extent of implicit insurance and its relation with explicit insurance.

CorpGov is the different proxies for the quality of bank governance and ownership. The sources of these variables, which are both bank- and country specific, are discussed below. In order to test Hypothesis 3 in particular, proxies for governance quality are allowed to interact with the quadratic term for explicit deposit insurance coverage (i.e. $EC^2_{i,t} \times CorpGov_{j,i,t}$). [5]According to Hypothesis 3 the positive coefficient for the EC-squared term should become

[4] The panel is unbalanced due to the missing data for some independent variables in some years. The Hausman specification test suggests the use of random effects over fixed effects models.

[5] The governance variable interacting with the squared covdepint contributes to a flatter relationship between covdepint and risk-taking if the coefficient for the interactive variable has the opposite sign relative to the coefficient for (covdepint × covdepint) alone.

smaller with increasing governance quality. Few governance variables are "pure" in the sense that they capture only the quality of governance from a shareholder perspective. For example, both state and foreign ownership can affect bank behavior through other channels than quality of governance. Also, ownership concentration is expected to raise governance quality only in systems where opportunities for private benefit extraction are low.

In regressions, we control for the differences in country characteristics by including both the quality of domestic institutions (Institutions) and macroeconomic variables (Macro). The latter includes the real GDP growth rate, the inflation rate, and the real interest rate, while GDP/capita reflects the general institutional quality in a country.[6]

Differences in bank characteristics are controlled for by a set of bank specific variables including the cost income ratio, liquidity relative to total assets, net interest margin, bank capital relative to assets, and the bank's market share in deposits. A bank's equity capital is particularly interesting since the risk-taking is expected to be decreasing in the equity to total assets ratio. There is a potential simultaneity problem when the proxy for risk-taking is non-performing loans/total assets but less so when the main proxies, non-performing loans/capital and the standard deviation of non-performing loans/capital, are used. Robustness checks controlling for simultaneity are conducted. These bank-specific control variables are the same as those used in other studies reviewed above. Thereby, the comparability between our results and those in the literature is high.

The BankScope database is the source for balance sheet and income statement data. We limit the sample to publicly traded banks because we use market data for one of risk measures (and we will control for banks' betas relative to a world index). Furthermore, important governance variables are available only for these banks. The data is an unbalance panel covering a total of 518 banks in 53 countries of which 16 are industrialized and 37 emerging market countries for the period 1995-2005.[7]

The critical variables in our analysis are risk-taking and explicit deposit insurance coverage. The two main proxies for risk-taking were mentioned above; non-performing loans/equity capital and the standard deviation of non-performing loans/equity capital. Additional proxies used and discussed in the result section are non-performing loans/total assets,

[6] In AW (2006) Rule of Law and (Lack of) Corruption were used as alternative proxies.
[7] We do not include developing countries in the analysis due to the lack of bank corporate governance variables.

the standard deviation of stock market returns (annually based on monthly data, and risk-weighted assets/total assets. The last variable is interesting from a regulatory point of view, since it reflects the risk weights assigned to assets according to Basel 1. We are particularly interested in comparing this regulatory measure of risk with the other measures.

A potentially important adjustment is made to the Bankscope data on non-performing loans since the sum of these loans for banks in a country differs from the figure for non-performing loans reported in the IMF's Financial Stability reports. We consider the data in these reports superior to the Bankscope data since the IMF bases the data on observation and analysis in individual countries. It is common that countries' supervisors allow banks not to recognize all non-performing loans immediately and countries use different definitions. For these reasons we adjust all banks' non-performing loan figures with an adjustment factor. This factor is the same for all banks within a country and equals the IMF ratio for non-performing loans to total loans divided by the same Bankscope ratio. The Bankscope ratio is obtained by summing up non-performing loans and total loans over banks within the same country.

Proxies for deposit insurance coverage are based on data for deposit insurance systems worldwide in the Database of Deposit Insurance Around the World published by Demirgüç-Kunt et al. (2005), at the World Bank. Specifically, the coverage limit is found there. This limit is the maximum coverage per deposit account within each deposit insurance system. Since we do not have data on the share of actual deposits covered we construct a proxy, *covdep*, defined as the coverage limit divided by per capita deposit (coverage per average deposit).

AW (2005) uses four different proxies for explicit deposit insurance coverage (EC) of which three are based on covdep.. The one used here, *covdepint*, is an interval variable constructed from covdep. *Covdepint* takes values on a scale 0 to 10 representing intervals for the value of coverage limit per average deposit. A value of 0 is assigned for a country without explicit deposit insurance and a value of 10 represents full coverage. A value of 1 implies that the coverage per average deposit is less than 1, A value of 2 corresponds to a covdep between 1 and 3, thereafter the intervals become increasingly wide as shown in Appendix.

Another variable used in AW (2005) is the natural logarithm of (1+covdep), *lncovdep*. The correlation between *covdepint* and *lncovdep* is .95 for industrial countries and .91 for emerging markets. Although the *lncovdep* proxy has the advantage of being a continuous function of covdep, it is highly skewed with a few countries having very high numbers. An

advantage with the interval variable, *covdepint,* is that it is not sensitive to time variation in the covdep variable. We do not believe that such time variation reflects changing perceptions about coverage in a country. In AW (2005) the results are quite robust with respect to choice of proxy for deposit insurance coverage.

Turning to governance variables, we use several different kinds. The first group captures the general institutional quality of each country. As mentioned, this group includes only *Real GDP per Capita* in this paper. As noted in La Porta et al. (1998, 2002), poorer countries generally have weaker governance structures. The results in AW (2006) are robust with respect to the choice of institutional quality variable. The second group of governance variables refers to ownership of banks. A *Govt-Owned Bank* is defined as the percent of equity owned by the government or state when the largest shareholder is the state. Foreign-Owned Bank is a dummy variable with the value equal to 1 when the largest owner is a foreign block-holder. Institutional ownership is defined by the percent of equity held by institutional owners excluding mutual funds and other pure portfolio investors. *Ownership concentration* (or *3 Largest Shareholders*) is defined as the share of equity held by the three largest owners. All ownership data have been obtained from Reuters database.[8] The latest data have been used. Thus, there is no time variation in these data.

The third group of governance variables includes country-proxies for stakeholder rights, market monitoring and regulation. *Shareholder Rights* and *Creditor Rights* data are those of La Porta et al. (1998). The index of shareholder rights ranges from 0 to 6 with a higher value reflecting stronger protection of minority shareholders against managers or dominant shareholders. The index of creditor rights range from 0 to 4 with a higher value reflecting greater protection of secured creditors in particular. A variable measuring banks' transparency and disclosure is called the *Private Monitoring Index*.[9]

Definitions of all variables used in the analysis are presented in data appendix. Descriptive statistics of these variables are reported in Table 1. The correlations among variables are reported in Table 2.

[8] Two additional governance variables from Reuters that we consider are the percent of ownership by largest stakeholder/insider (Largest shareholders) and the total percent of ownership share of all stakeholders and insiders (Stake/Insiders-Owned). These two variables are highly correlated with *3 Largest Shareholders*(see Table 2); therefore, we do not present the results here.

[9] AW (2006) consider legal regimes as well but they have very little explanatory power for risk-taking in country analysis. That Paper also includes the quality of financial supervision using data for prompt corrective action procedures (*PCA*) from the database presented in Barth et al. (2006)

5. Empirical analysis of banks' risk-taking

Empirical results are presented in Tables 3-6. We begin with a comparison of regressions using a number of alternative proxies for risk taking before focusing on the ratio of Non-Performing Loans to Equity Capital in log (ln(NPL/Capital)) and the standard deviation of NPL relative to the average Capital (StdNPL/AvgCapital) in the remaining tables. In Table 4 industrial and emerging market countries are analyzed separately with and without governance variables. In Table 5 interactions between deposit insurance coverage and governance variables are added. Finally, Table 6 shows some results of robustness checks.

The choice of proxies for risk-taking (Table 3)

Our a priori choice of proxies for risk-taking of individual banks is NPL/Capital in log and stdNPL/AvgCapital. Both can be viewed as proxies for the banks' willingness to expose the bank to the possibility that loan losses exceed equity capital. The advantage of the standard deviation variable is that it reflects a probability distribution. Differences in this variable reflect differences in the probability of default at a given expected level of NPL. On the other hand, it cannot be used in a panel analysis since the standard deviation must be calculated from annual data. The NPL variable is a proxy for risk-taking (probability of default) under the assumption that observed NPL in a particular period reflect expected loan losses in previous periods for a given probability distribution. In the regressions we take the log of NPL/Capital to reduce the weight of relatively extreme values of the ratio. If capital is very low, extreme values are likely to exist. It is not obvious which of these proxies captures the probability of default the best. They capture different aspects of the expected default probability of a bank.

The other risk-taking proxies in Table 3 are Non-Performing Loans relative to Total Assets (NPL/TA), "adjusted" NPL/TA, Risk-Weighted Assets/Total Assets, the standard deviation of Capital relative to average Capital (StdCap/AvgCapital), and the Volatility of Stock Price.

The disadvantage with NPL/TA is that it does not reflect the bank's ability to absorb loan losses. On the other hand, the closely related NPL/Total Loans has been used by Nier and Baumann (2006) on the bank level and AW (2005, 2006) on the country level. As described

above, the adjusted NPL/TA is the NPL/TA from Bankscope adjusted with a country factor reflecting the difference between IMF data and Bankscope data for NPL.

The ratio of risk-weighted assets/total assets reflects risk-taking according to risk-weights specified in Basel I. These risk-weights have been severely criticized for defining the weights too broadly, allowing banks to conduct so called risk arbitrage between loans with different risk but the same risk weights. We include this variable out of curiosity to see how results compare.

The standard deviation of capital relative to average capital (StdCap/AvgCapital) is similar to StdNPL/AvgCapital but influenced by all factors influencing capital. Since banks in most countries are involved in a variety of activities outside traditional commercial banking the sources of variation in capital can vary across banks and countries. Finally, the market based standard deviation of stock prices are similarly influenced by all factors affecting bank value. This value can also be affected by expected bail-outs of shareholders.

Some results are noteworthy in Table 3 where industrialized and emerging market countries are included. The hypothesized negative sign for deposit insurance coverage (*covdepint*) and the positive sign for its squared term appear in regressions for NPL/Capital as well as Adjusted NPL/Capital before taking logs (columns 1 and 2) but not for log values where outliers have less weight (column 3). In the following we will use the log values of the variable in order to avoid that a few extreme observations affect the results. The hypothesized signs are also obtained in the cross-section regression for StdNPL/AvgCapital (column 8).

For bank-specific control variables, the ratio of liquid assets/total assets and the ratio of capital/total assets have a consistently significantly negative effect on most proxies of bank risk-taking. Banks that hold a large volume of liquid assets to meet unexpected withdrawals are perceived to be safer and less risk taking. Banks with a higher capital ratio are also less risk takers supporting the idea of capital requirements. The cost/income ratio is significantly positive in most regressions, suggesting that less efficient banks with a higher cost seem to take more risks. For macroeconomic variables, the coefficients of the real GDP per capita and real GDP growth rate are negative and significant in most regressions, suggesting that banks' risk taking is higher in countries with low institutional quality as measured by GDP per capita, and in countries with low GDP growth rates.

The regression for Risk-Weighted Assets/TA in column 6 differs from all the others in that Capital/TA has a near significant positive sign. We expect that a higher equity capital ratio

should reduce risk-taking incentives of shareholders. The result when using the Volatility of Stock Price as the proxy of bank risk-taking (column 7) is also different. The coefficients of some bank- and country-specific control variables including Liquid Asset/TA, Cost/Income, and GDP/Capital are opposite from other regressions.

By comparing different proxies of risk taking, we find that a standard list of bank- and country-specific explanatory variables used in the literature behaves overall in accordance with expectations in the NPL/CAP regressions (columns 1-3) and the StdNPL/AvgCAP (column 8).

Risk-taking, deposit insurance, and corporate governance (Tables 4 and 5)

Regressions reported in Table 4 include bank and country corporate governance variables. Results with the interaction terms between governance variables and covdepint are reported in Table 5. Since the data availability for bank corporate governance is limited, we also report results that use the same specifications as in Table 3 but include only observations where governance variables are available (columns 1, 4, and 7 in Table 4). We find that the ln(NPL/CAP) regression in column 1, Table 4, is comparable to that in Table 3. In Table 4 the coefficients for covdepint and its squared value have the expected signs revealing a possible U-shaped relationship except for stdNPL/Capital in Emerging markets. The significant coefficients for both covdepint variables are particularly those in ln(NPL/Capital) regressions for industrialized countries. The coefficients are only weakly significant when governance variables are introduced without interactions. For emerging markets the coefficients on deposit insurance variables depends on which proxy for risk-taking is used.

The statistical significance for Deposit Share could explain why the U-shape does not appear for emerging market countries. Deposit share, intended to capture greater implicit insurance as a result of Too Big to Fail, seems to have a positive effect on risk taking in emerging market countries, but the opposite in industrial countries. In Table 5, columns 5 and 6, the signs of covdepint are reversed and become significant in the emerging market sample when interaction terms are included. This indicates that risk minimizing deposit insurance coverage is either zero or full. This is consistent with results on country data in AW (2006). The interaction term must be considered as well before the shape of the relationship can be determined on a country by country basis.

For the StdNPL/AvgCAP regressions, results in Tables 4 and 5 show that the hypothesized U-shaped relationship is significant and robust for the sample including both industrial and emerging market countries. The U-shaped relationship remains both with and without corporate governance (column 3 in Table 4 and column 2 in Table 5) (regression result when governance variables are excluded is not shown). The squared terms are less significant when the two country groups are separated. In the cross-section analysis of stdNPL/capital the number of observations becomes lower than in the panel analysis. This could affect the significance levels of estimated relationships.

Turning to governance variables we begin by comparing the regressions without interaction terms in Table 4 and with these terms in Table 5. The foreign and the state ownership variables as well as the ownership concentration proxy enter more significantly when interaction with deposit insurance coverage is allowed. In these cases the interaction terms are significant as well. We see this as an indication that external and internal factors influence market discipline interactively as predicted in the theory section. However, it is harder to establish the effects of increased quality of governance since the governance and ownership proxies are not unambiguously correlated with quality of governance.

Turning first to the country level governance variables (included only in Table 4) it can be observed that both shareholder rights and private monitoring have negative effects on risk-taking quite consistently. The coefficients for private monitoring in particular are not significant, however, with the exception of one of the regressions for both industrialized and emerging markets. Creditor rights are significant only for industrialized countries when ln(NPL/capital) is the dependent variable. In this case the sign is as expected negative. Before turning to Table 5 it can also be noted that both the ownership concentration variable and the government ownership variable seem to affect risk taking in opposite ways in industrialized and emerging market economies. However, when interaction terms are introduced some of these differences between emerging and industrialized countries turn out to be the result of country specific conditions as indicated by the interaction terms.

In Table 5 we focus particularly on the bank-specific governance variables and their interaction with deposit insurance coverage. Beginning with ownership concentration (3 Largest Shareholders) the impact on risk-taking of ownership concentration seems to be positive except in emerging markets when ln(NPL/capital) is used. The (negative) interaction terms indicate—

although they are not significant across the board—that the effect of ownership concentration is less important where deposit insurance coverage is high.

Foreign ownership influences risk-taking negatively and often significantly across countries and choice of proxy. This results is consistent with findings in AW (2006). The exception is the StdNPL/AvgCap regression for the sample of emerging markets where the sign is the opposite (column 6, Table 5).[10]

The interaction term between foreign ownership and the square of covdepint is mostly positive where the negative coefficient for foreign ownership is significant (in ln(NPL/capital) regressions). Thus, foreign ownership reduces risk-taking but the reduction is smaller where deposit insurance coverage is high. In other words, foreign ownership is less important for risk-taking in countries with high coverage where moral hazard incentives presumably are high. We illustrate this relation in a figure below.

Government ownership influences risk taking positively across all regressions in Table 5 and significantly or nearly so in both groups of countries when ln(NPL/Capital) is the proxy. The interaction term is consistently negative. Thus, the greater the deposit insurance coverage the smaller is the effect of government ownership on risk-taking. This result is consistent with Hypothesis 3 if governments as owners have little concern for external shareholders. The hypothesis stated that risk-taking would not be much influenced by (external) shareholders interests and that these interests would favor risk-taking when moral hazard incentives are relatively strong.

Another way to approach Hypothesis 3 is to compare the signs for the squared covdepint and the interaction with this variable. In regressions where the sign for the squared term on its own is positive as in regressions 1-3 in table 5, a negative sign for the interactive term means that the interaction variable contributes to a flattening of the U-shaped curve or even a reversal of the U-shape. If government ownership is associated with "low quality governance", then the hypothesis is confirmed for this interaction variable in these regressions.

Looking at the foreign ownership variable in the same three equations exhibiting the hypothesized relationship between explicit coverage and risk-taking, foreign ownership increases

[10] Institutional ownership in banks seems to provide similar results to foreign ownership such that the increase in the level of institutional ownership reduces banks' risk taking. However, the result in Table 5 for the sample of industrial countries shows that the higher institutional ownership is associated with the higher ratio of NPL relative to capital.

the weight of the quadratic term (and the curvature) in columns 1 and 3 for ln(NPL/Capital) in regressions for industrialized countries alone and the two country groups together. If foreign ownership represents higher quality governance these results support Hypothesis 3.

Ownership concentration reduces the curvature of the deposit insurance-risk-taking relationship in regressions in column 2 and 3 but increases the curvature in the regression for both groups of countries in column 1. The ambiguity with respect to the relationship between ownership concentration and quality of governance remains.

Since the interaction variables make it difficult to interpret the coefficients for deposit insurance coverage and governance variables, we conclude the analysis by drawing figures describing the relationship between explicit deposit insurance and risk-taking proxies for different levels of ownership. Some results are opposite from what we expected and we plan to further analyze them by improving bank governance data, non performing loan data and by performing robustness checks.[11]

In Figure 3a, we use regression from column 3 Table 5 for the sample of industrialized countries to illustrate how the U-shaped relationship in a risk-taking regression is affected by the level of foreign ownership. Without foreign ownership, the relationship between risk taking and explicit deposit insurance is U-shaped although the curvature is less pronounced. The U-shaped relationship turns into a more curved line at high levels of foreign ownership. If foreign ownership is associated with high quality governance in industrialized countries, then our Hypothesis 3 is supported by the figure.

Figure 3b is another example illustrating how ownership concentration affects the relationship between risk taking and deposit insurance coverage. The same regression from column 3 Table 5 is used to calculate predicted risk taking using the minimum and maximum values of ownership concentration (the % of shares held by three largest shareholders). We expected that ownership concentration would strengthen shareholder interests and contribute to a more curved relationship. According to the figure this seems to be the case in industrialized countries.

[11] The primary source of our bank governance data is from Reuters. We plan to complement these governance data by using the ownership data from Bankscope and/or official sources from individual countries. In the robustness check, we will perform, for example, the simultaneous equations since some bank specific variables such as the Capita/TA ratio and/or ownership variables might cause endogeneous problem in the estimation.

Finally, it can also be noticed that the strongest impact of the governance variables seems to be associated with low credibility of non-insurance or implicit insurance. In other words changes in governance variables seem to affect risk-taking incentives more strongly when the incentives are created by implicit creditor protection than by explicit protection.

6. Robustness Check [Table 6] Incomplete

We intend to adjust the NPL/Capital ratios as done in Table 3 with an adjustment factor based on IMF data but the country adjustment factor must be checked more.

Introducing simultaneity between risk-taking proxies and some bank specific characteristics like the cost income ratio does not affect the results.

We plan correcting for simultaneity between Cap/TA and NPL/Cap, and possible with stdNPL/Capital as well, and between each ownership variables and NPL/Cap.

-

7. Conclusion

Comparing the results with respect to the relationship between risk-taking and deposit insurance coverage in this paper with the results in AW (2005) and (2006) the results here-- using bank specific data rather than country data--are less robust. One reason could be the greater noise in bank level data and the difficulty of controlling for all possible relevant bank characteristics. Furthermore, the proxies for risk-taking in the country analyses were the occurrence of banking crisis and non-performing loans relative to total loans while our preferred proxies in this bank level study are non-performing loans relative to bank equity capital and the standard deviation of non-performing loans relative to average capital for the data period. In spite of these differences the U-shaped relationship, reflecting that extensive non-insurance of banks' creditors is not credible, turns out to be significant in regressions for industrialized countries in particular. The lack of significance in some regressions can be explained by implicit insurance being partially captured by some of the bank-specific variables. In particular, the market share of the bank could reflect "Too Big to Fail" protection.

We focused the analysis on bank-specific governance and ownership variables and their interaction with risk-taking incentives created by implicit and explicit depositor protection. The

main governance variables, ownership concentration, foreign ownership and government ownership, are not unambiguously related to quality of governance from a shareholder perspective. Testing the hypothesis with respect to the impact of quality of governance therefore implies testing of a joint hypothesis with respect to the relationship between our governance variables and the quality of governance, and the relationship between quality of governance and risk-taking behavior at different levels of explicit deposit insurance coverage.

The results with respect to the impact on risk-taking of ownership variables are generally sensible; government ownership increases risk-taking, foreign ownership reduces risk-taking while ownership concentration seems to affect risk-taking in opposite ways in industrialized and emerging market countries. The interaction with deposit insurance coverage leads to results that confirm our hypothesis for industrialized countries if foreign ownership and ownership concentration are related to high quality governance. The impact of these variables on risk-taking seems to be particularly strong in countries with low deposit insurance coverage and high implicit coverage caused by lack of credibility of non-insurance.

Data Appendix

Variable	Description	Source
Dependent Variables (The bank-specific proxies of risk taking)		
NPL/Capital	the ratio of non-performing loans (NPL) to total capital (total capital = retain earning+common share+preference shares)	Bankscope
AdjNPL/Capital	the adjusted ratio of NPL/total capital	Bankscope
ln(NPL/Capital)	the natural logarithm of NPL/Capital	Bankscope
NPL/TA	the ratio of non-performing loans (NPL) to total assets	Bankscope
Adjusted NPL/TA	the adjusted ratio of NPL to total assets	Bankscope
Risk-Weighted Assets/TA	the ratio of risk weighted-assets and off balance sheet risk measured under the Basle rules to total assets	Bankscope
Volatility of Stock Price	the standard deviation of monthly stock market price	Bankscope
StdNPL/AvgCapital	the ratio of standard deviation of NPLs to its average capital (the standard deviation and average are calculated from annual data during 1997-2005)	Bankscope
StdCapital/AvgCapital	the ratio of standard deviation of bank's capital to its average capital (the standard deviation and average are calculated from annual data during 1997-05)	Bankscope
Independent Variables		
Covdepint (Coverage Limit Per Deposit Per Capita—Interval)	The interval data of the ratio of deposit insurance coverage per deposits per capita. The value of this variable is assigned based on a value of the coverage to deposits per capita. This variable = 0 if there is no explicit deposit insurance coverage, 1 if the coverage to deposit per capita ratio (covdep) is between (0,1), 2 if covdep is between [1,2), 3 if covdep is between [2,3), 4 if covdep is between [3,5), 5 if covdep is between [5,10), 6 if covdep is between [10,15), 7 if covdep is between [15,20), 8 if covdep is between [20,50), 9 if covdep is greater than 50, and 10 for the full coverage.	Authors' construction Coverage limit to deposit per capital is from Demirgüç-Kunt et al. (2005)
Bank Corporate Governance Variables		
Largest shareholders	% ownership by largest stakeholder/insider	Reuters
3 largest shareholders	% Sum of three largest shareholder/institution owners	Reuters
Stake/Insiders-Owned	total % ownership share of all stakeholders and insiders	Reuters
Institution-Owned	total % ownership share of all institutional owners	Reuters
Govt-Owned	% held by government if government = stakeholder	Reuters
Foreign-Owned	The dummy variable of foreign ownership of bank. This dummy has a value of 1 if the largest ownership is foreign and 0 otherwise.	Reuters
Country Corporate Governance Variables		
Private Monitoring	An aggregate index of 11 survey questions, grouped into 4 sub-components relating to private supervision (yes = 1; no=0). These components are 1. certified audit required, 2. percent of 10 biggest banks rated internationally, 3.whether this is an explicit deposit insurance scheme, and 4. the informative financial statements. The questions also include the disclosure of risk management procedures and off-balance sheet items, and whether the subordinated debt is allowable as part of capital. This index ranges from 0 to 11; higher values indicate more private supervision.	Barth et al. (2004)

Data Appendix (cont.)

Variable	Description	Source
Shareholder Rights	An index aggregating six characteristics of shareholder rights: proxy by mail allowed, shares not blocked before meeting, cumulative voting or proportional representation allowed, oppressed minorities in place, percentage of share capital to call an extraordinary meeting, and preemptive right to new issues. The index ranges from 0 to 6 with a higher value indicating the increase in shareholder protection.	La Porta et al. (1998) and Pistor et al (2000)
Creditor Rights	An index aggregating four characteristics of creditor rights: no automatic stay on secured assets, secured creditors paid first, restrictions on going into reorganization, and management does not stay in reorganization. The index ranges from 0 to 4 with a higher value indicating the increase in creditor protection.	La Porta et al. (1998) and Pistor et al (2000)
Bank Specific Variables		
Liquid Asset/TA	the ratio of liquid asset/total assets	Bankscope
NIM	the ratio of net interest margin/total assets	Bankscope
Capital/TA	the ratio of capital/total assets (Capital = retain earning+common share+preference shares)	Bankscope
Cost/Income	the ratio of cost to income	Bankscope
Deposit Share	the ratio of total deposits of each bank to total deposits of all banks in country i	Bankscope
Country Specific Variables		
GDP/Cap	Real GDP per capita (constant 2000 US$).	WDI
GDP Growth	Real GDP growth (annual %)	WDI
Inflation	Inflation, consumer prices (annual %)	WDI
Real interest rate	Real interest rate (%)	WDI

References

Anderson, Ronald C. and Donald R. Fraser (2000) "Corporate Control, Bank Risk Taking, and the Health of the Banking Industry", *Journal of Banking and Finance*, 24, 1383-1398.

Angkinand, Apanard (2005) "Deposit Insurance and Financial Crises: Investigation of the Cost-Benefit Trade-Off", *Claremont Working Paper*, Claremont Graduate University.

Angkinand, Apanard and Clas Wihlborg (2005) "Deposit Insurance Coverage, Credibility of Non-insurance and Banking Crisis", *LEFIC Working paper* No. 2005-010, Center for Law, Economics and Financial Institutions, Copenhagen Business School.

----------(2006) "Deposit Insurance Coverage, Ownership, and Banks' Risk-taking in Europe", *LEFIC Working paper,* Center for Law, Economics and Financial Institutions, Copenhagen Business School, and presented at The Changing Geography of Banking Conference, Ancona, Italy.

Barth, James R., Gerard Caprio Jr., and Ross Levine (2004). "The Regulation and Supervision: What Works Best?", *Journal of Financial Intermediation,* 13; 205-248.

Barth, James R., Gerard Caprio Jr., and Ross Levine (2006), *Rethinking Bank Regulation; Till Angels Govern*, Cambridge University Press.

Berger, Allen N., Clarke, George R. G., Cull, Robert, Klapper, Leora F. and Udell, Gregory F. (2005). "Corporate Governance and Bank Performance: A Joint Analysis of the Static, Selection, and Dynamic Effects of Domestic, Foreign, and State Ownership." *Journal of Banking & Finance*, 29, 2179-2221.

Byström, Hans N.E. (2004) "The Market's View on the Probability of Banking Sector Failure: Cross-Country Comparisons", *International Financial Markets, Institutions, and Money* 14, 419-438.

Caprio, Gerard, Luc Laeven, and Ross Levine (2004), "Governance and bank valuation", *Policy Research Working Paper Series* 3202, The World Bank.

Caprio, Gerard and Maria Soledad Martinez-Peria (2000), "Avoiding Disaster: Policies to Reduce the Risk of Banking Crises", *Discussion Paper*, Cairo, Egypt: Egyptian Center for Economic Studies.

Chen, Carl R., Thomas L. Steiner, and Ann Marie Whyte (1998), "Risk-Taking Behavior and Management Ownership in Depository Institutions", *The Journal of Financial Research*, XXI(1), Spring, 1-16.

Claessens, Stijn, Aslí Demirgüç-Kunt, and Harry Huizinga (2001). "How Does Foreign Entry Affect Domestic Banking Markets?", *Journal of Banking and Finance*, 25(5), pp. 891–911.

Crystal, Jennifer, B. Gerard dages and Linda S. Goldberg, (2001), "Does Foreign Owneship Contribute to Sounder banks in Emerging Markets? The Latin American Experience", *Conference Paper*, Open Doors: Foreign Participation in Financial Systems in Developing Countries, The Brookings Institution, Washington D.C., April.

Cull, Robert, Lemma W. Senbet, and Marco Sorge (2005). "Deposit Insurance and Financial Development", *Journal of Money, Credit, and Banking,*37(1); 43-82

Demirgüç-Kunt, Asli and Enrica Detragiache (1997). "The Determinants of Banking Crises: Evidence from Developing and Developed Countries", *IMF Working Paper* No. 106 International Monetary Fund: Washington, D.C.

Demirgüç-Kunt, Asli and Enrica Detragiache (2002). "Does Deposit Insurance Increase Banking system Stability? An Empirical Investigation", *Journal of Monetary Economics* 49; 1373-1406.

Demirgüç-Kunt, Asli and Harry Huizinga (2004). "Market Discipline and Deposit Insurance." *Journal of Monetary Economics,* 51, 375-399.

Demirgüç-Kunt, Asli, Karacaovali and L. Laeven (2005). "Deposit insurance around the World: A comprehensive database", *World Bank Policy Research Working Paper*, Washington, DC.

Demirgüç-Kunt, Asli, Ross Levine, and Hong-Ghi Min (1998) "Opening to Foreign Banks: Stability, Efficiency and Growth", in *The Implications of Globalization Financial Markets*, ed. by A. Meltzer (Korea: Bank of Korea).

Distinguin, Isabelle, Philippe Rous and Amine Tarazi (2005), "Market Discipline and the Use of Stock Market Data to Predict Financial Distress" *Working paper*, University of Limoges.

Eichengreen, Barry and Carlos Arteta (2002) "Banking Crises in Emerging Markets: Presumptions and Evidence" in Mario I. Blejer and Marko Skreb (eds) *Financial Policies in Emerging Markets*. Cambridge, Mass.: MIT Press.

Fernandez, Ana and Francisco Gonzalez (2005) "How accounting and auditing systems can counteract risk-shifting of safety-nets in banking: Some international evidence", *Journal of Financial Stability*, 1(4), 466-500

Gonzales, Francisco (2005), "Bank Regulation and Risk-taking Incentives: An International Comparison of Bank Risk", Journal of Banking and Finance, 29, Nr 5, May, pp 1153-84

Gropp, Reint and Jukka Vesala (2004), "Deposit Insurance, Moral Hazard and Market Monitoring", *Review of Finance*, 8, 571-602.

Hoggarth, Glenn, Patricia Jackson, and Erlend Nier (2005) "Banking Crises and the Design of Safety Nets", *Journal of Banking & Finance, 29; 143-159.*

Hovakimian, A., Edward Kane, and Luc Laeven (2003), "How Country and Safety-Net Characteristics Affect Bank Risk Shifting", *Journal of Financial Services Research*, 23(3),177-204.

Hutchison, Michael and Kathleen McDill (1999) "Are All Banking Crises Alike? The Japanese Experience in International Comparison", *Journal of the Japanese and International Economics,* 13; 155-180.

Kane, Edward J. (2000),"Designing Financial Safety Nets to Fit Country Circumstances", *Policy Research Working Paper* 2453, The World Bank, Washington D.C.

Konoshi, Masura and YukihiroYasuda (2004), "Factors Affecting Bank Risk Taking: Evidence From Japan", *Journal of Banking & Finance*, 28, 215-232.

Jagtiani, Julapa, George Kaufman, and Catharine Lemieux (2002), "The Effect of Credit Risk on Bank and Bank Holding Company Bond Yields: Evidence from the Post-FDICIA Period", *Journal of Financial Services Research*, 25 (4), Dec. p 559.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny (1998). "Law and Finance", *The Journal of Political Economy*, Vol. 106, No.6.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny (2002). "Government Ownership of Banks", *The Journal of Finance*, Vol. LVII, No.1 February.

Lensink, Robert and Niels Hermes (2006), "The Short-term Effects of Foreign Bank Entry on Domestic Bank Behavior. Does Economic Development Matter?" *Journal of Banking and Finance*, Forthcoming

Lensink, R. and I. Naaborg (2006), "Banking in Transition Economies: A Study of Foreign Ownership and Performance", European Journal of Finance, Forthcoming.

Levine, Ross (2004) "Denying Foreign Bank Entry: Implications for Bank Interest Margins" in *Banking Market Structure and Monetary Policy* by Luis Antonio Ahumada and J. Rodrigo Fuentes (eds), Santiago, Central Bank of Chile.

Nier, Erlend and Baumann, Ursel (2006). "Market Discipline, Disclosure and Moral Hazard in Banking", *Journal of Financial Intermediation,* 15; 332–361

Pistor, Katharina, Martin Raiser, and Stanislaw Gelfer (2000) "Law and Finance in Transition Economies", *Economics of Transition, Vol. 8, pp. 325-368.*

Saunders, Anthony, Elizabeth Strock, and Nickolaos G. Travlos (1990), "Ownership Structure, Deregulation, and Bank Risk Taking", The Journal of Finance, XLV(2), June, 643-654.

Sironi, A. (2000), "Testing for Market Discipline in the European Banking Industry: Evidence from Subordinated Debt Issues" *Working Paper*, Bocconi University, Milan.

Tadesse, Solomon (2005) "Banking Fragility and Disclosure: International Evidence", *Working Paper* no. 748, William Davidson Institute at the University of Michigan Stephen M. Ross Business School in its series.

Figure 1. Hypothesized relationships between explicit deposit insurance coverage (EC) and risk-taking (RT)

Figure 1a the U-shape relationship and the impact of institutional variables.

The Relationship Between Market Discipline as measured by Risk-taking (RT) and Explicit Deposit Insurance Coverage (EC). Explicit DI is drawn at a constant credibility of non-insurance. Implicit DI is drawn at a constant level of explicit coverage. PCA x Implicit DI shows how the curve Implicit DI shifts as a result of Prompt corrective action procedures (PCA). The top dotted line is the vertical sum of Explicit DI and Implicit DI. The lower dotted line is the vertical sum of Explicit DI and Implicit DI x PCA

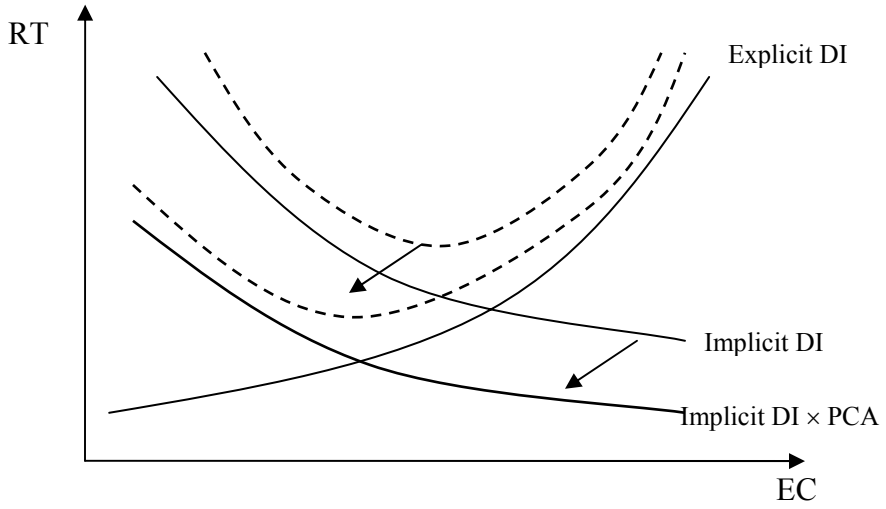


Figure 1b the U-shape relationship and the impact of bank corporate governance

Good quality of corporate governance implies that shareholders' objectives have a large weight in managers' incentives.

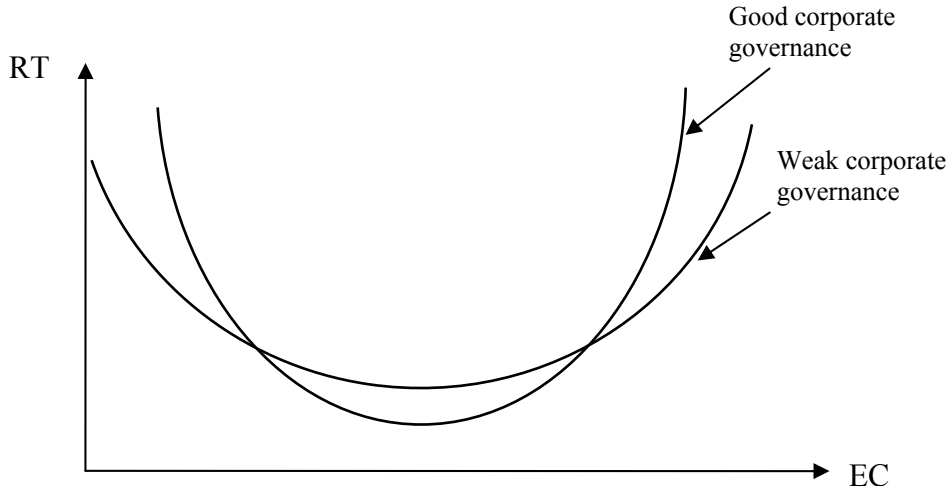


Figure 2a. Explicit Coverage (EC), Credibility of Non-Insurance (CNI), and Risk-Taking (RT)
The curve 3b refers to assumptions in expression 3b in the text

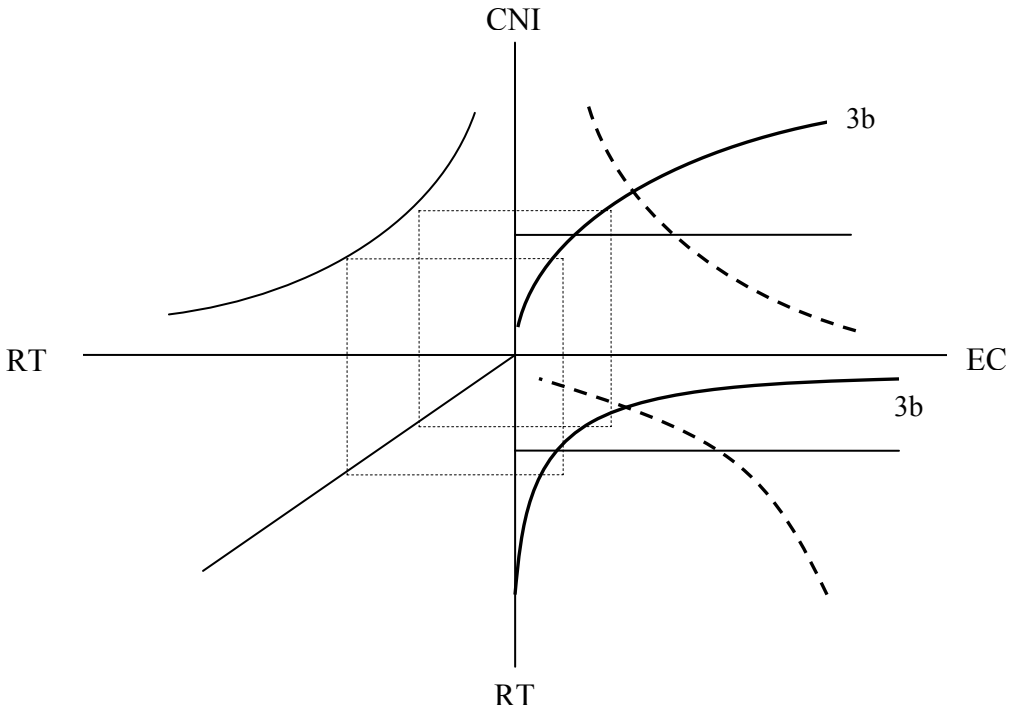


Figure 2.b. Effects of institutional variables Prompt Corrective Action (PCA) and Supervision

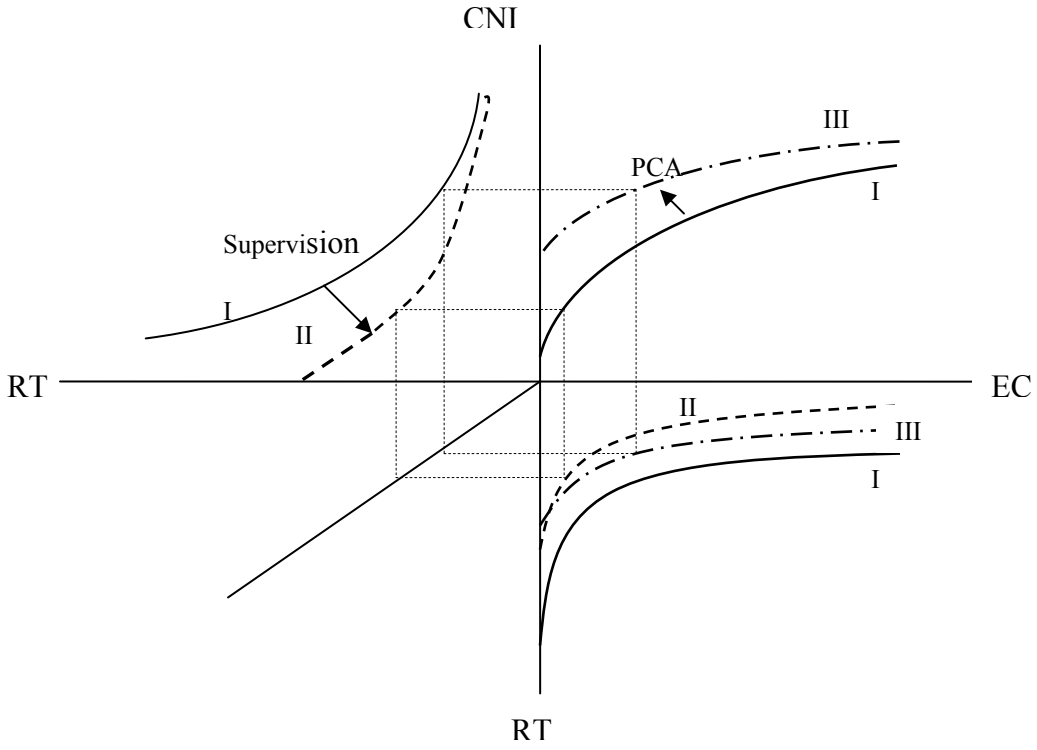
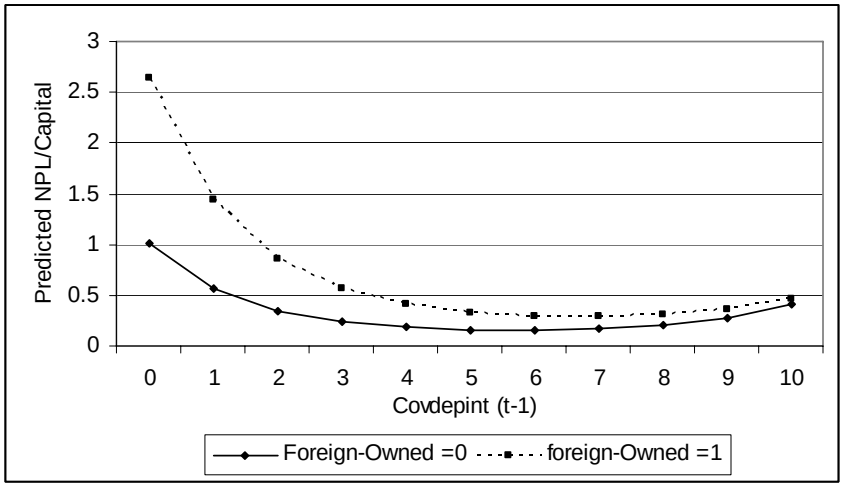


Figure 3 Risk taking at different levels of deposit insurance coverage and corporate governance

Figures below plot the predicted values of NPL/CAP at different levels of coverage limit of deposit per capita (covdepint). These predicted values are calculated by using the minimum and maximum values of bank governance variables (see Table 1) and using the mean values of other independent variables. Both figures 3a and 3b use the values from regression in column 3, Table 5, for the sample of industrial countries.

3a risk taking and explicit deposit insurance at different levels of foreign ownership of banks



3b risk taking and explicit deposit insurance at different levels of bank concentration
(measured by the percent of shares held by three largest shareholders)

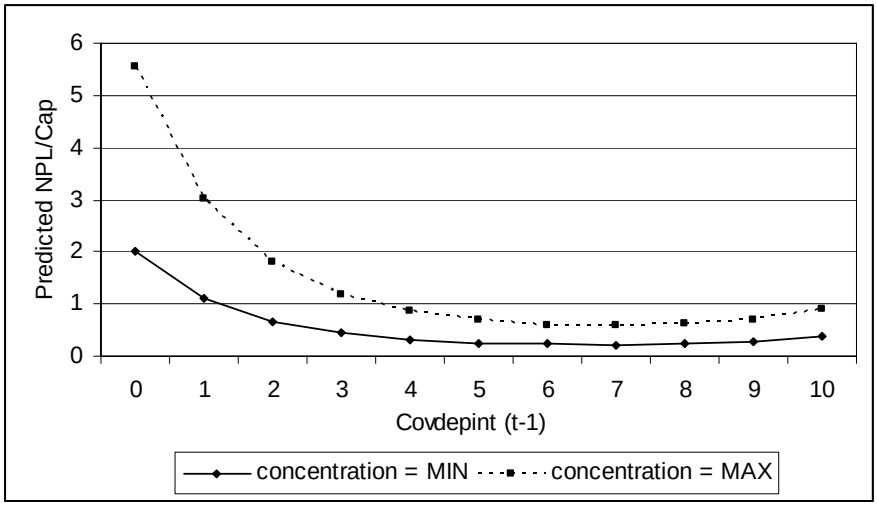


Table 1. Descriptive Statistics

Variable	Obs	Mean	Std.	Min	Max
Dependent Variables: Risk-Taking					
NPL/Capital	2405	0.832	1.244	0	20.631
Adjusted NPL/Capital	2183	0.884	2.464	0	97.810
ln(NPL/Capital)	2405	-0.875	1.347	-8.386	4.539
NPL/TA	2405	0.049	0.055	0	0.746
Adjusted NPL/TA	2405	0.050	0.064	0	1.021
Risk-Weigted Assets/TA	1427	0.631	0.145	0	1
Volatility of Stock Price	1305	1.189	3.733	0	65.334
StdNPL/AvgCapital	504	0.313	0.670	0	8.200
StdCapital/AvgCapital	638	0.289	0.176	0.020	1.071
Control Variables					
$Covdepint_{t-1}$	2405	5.767	3.442	0	10
$Covdepintsq_{t-1}$	2405	45.098	38.896	0	100
Liquid Asset/TA	2405	0.258	0.195	0.007	0.910
NIM	2405	4.632	5.260	-6	57.1
Capital/TA	2405	8.506	7.047	0.610	97.820
Cost/Income	2405	65.867	25.451	7.350	394.050
Deposit Share	2405	0.059	0.114	1.8E-06	1
GDP/Cap	2405	16.786	15.300	0.352	38.2004
Growth GDP_{t-1}	2405	1.373	3.190	-14.296	23.2612
$Inflation_{t-1}$	2405	4.693	8.690	-3.947	140.08
Real $Interest\ Rate_{t-1}$	2405	7.208	8.752	-45.521	70.7445
Corporate Governance					
3 largest shareholders	1129	0.291	0.282	0	0.997
Foreign-Owned	1129	0.077	0.267	0	1
Govt-Owned	1129	0.038	0.136	0	0.750
Institution-Owned	1129	0.090	0.142	0	0.958
Private Monitoring	1129	0.088	0.877	0.07	0.11
Shareholder Rights	1129	0.038	0.962	0.01	0.05
Creditor Rights	1129	0.024	1.020	0	0.04

Table 2. Correlation Matrices

Dependent Variables (Proxies of Risk Taking)

	NPL/Cap	Adjusted NPL/Cap	ln(NPL/Cap)	NPL/TA	Adjusted NPL/TA	RiskWAsset/ TA	Volatility of Stock Price	StdNPL/ AvgCap
Adjusted NPL/Cap	0.93	1						
ln(NPL/Cap)	0.74	0.72	1					
NPL/TA	0.89	0.85	0.75	1				
Adjusted NPL/TA	0.71	0.85	0.62	0.86	1			
RiskWAsset/TA	-0.01	-0.03	-0.21	0.04	0.01	1		
Volatility of Stock Price	-0.14	-0.14	-0.27	-0.16	-0.15	0.03	1	
StdNPL/AvgCap	0.70	0.62	0.52	0.76	0.61	0.09	-0.10	1
StdCap/AvgCap	0.13	0.09	-0.13	0.11	0.04	0.27	-0.08	0.24

Corporate Governance

	3 Largest Shareholders	Largest shareholders	Stake/Insiders-Owned	Institution-Owned	Foreign-Owned	Govt-Owned	Private Monitoring	Shareholder Rights
Largest shareholders	0.96	1						
Stake/Insiders-Owned	0.93	0.91	1					
Institution-Owned	-0.09	-0.20	-0.30	1				
Foreign-Owned	-0.20	-0.20	-0.27	0.13	1			
Govt-Owned	0.32	0.30	0.27	-0.02	-0.08	1		
Private Monitoring	-0.26	-0.29	-0.25	0.38	-0.05	-0.32	1	
Shareholder Rights	-0.14	-0.13	-0.13	0.16	-0.07	0.08	0.02	1
Creditor Rights	0.03	0.04	-0.05	-0.15	0.10	0.29	-0.59	-0.05

Table 3 Alternative Proxies for Risk-Taking and Explicit Deposit Insurance Coverage

This table shows the relationship between explicit deposit insurance coverage (Covdepint) and banks' risk-taking using a sample of industrial and emerging market economies. Regressions in columns 1-7 are estimated using the country random effects model. Regressions in columns 8-9 are estimated using OLS with robust standard errors (R2 and F-Stat are reported in the places of Within R2 and Chi-Square). *, ** indicate the significance levels of 10%, and 5% respectively. # indicates the coefficient value zero that falls outside one standard deviation of the estimate. The numbers in parentheses are p-values.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variable	$\frac{NPL}{CAP}$	$\frac{AdjNPL}{CAP}$	$\ln(\frac{NPL}{CAP})$	$\frac{NPL}{TA}$	$\frac{AdjNPL}{TA}$	Risk-Weigted Assets/TA	Volatility of Stock Price	$\frac{StdNPL}{AvgCAP}$	$\frac{StdCAP}{AvgCAP}$
Method	Random Effect (panel)	Random Effect (panel)	Random Effect (panel)	Random Effect (panel)	Random Effect (panel)	Random Effect (panel)	Random Effect (panel)	OLS (cross-section)	OLS (cross-section)
Covdepint $_{t-1}$	-0.053#	-0.133**	0.013	0.002	0.020**	0.012#	0.142	-0.125**	0.012#
	(0.160)	(0.028)	(0.786)	(0.423)	(0.000)	(0.288)	(0.527)	(0.000)	(0.102)
Covdepintsq $_{t-1}$	0.008**	0.018**	0.000	0.000	-0.002**	-0.001	-0.012	0.019**	0.000
	(0.016)	(0.001)	(0.973)	(0.877)	(0.000)	(0.368)	(0.511)	(0.000)	(0.614)
Liquid Asset/TA	-1.171**	-0.643*	-1.820**	-0.060**	-0.082**	-0.278**	0.539	-0.682**	0.182**
	(0.000)	(0.095)	(0.000)	(0.000)	(0.000)	(0.000)	(0.585)	(0.018)	(0.000)
NIM	0.005	-0.005	0.014**	0.001**	0.001#	0.019**	0.025	-0.011#	0.003#
	(0.417)	(0.722)	(0.008)	(0.037)	(0.173)	(0.000)	(0.426)	(0.107)	(0.130)
Capital/TA	-0.036**	-0.040**	-0.057**	0.000**	0.000**	0.002#	-0.040**	-0.007**	0.000
	(0.000)	(0.000)	(0.000)	(0.013)	(0.041)	(0.129)	(0.005)	(0.026)	(0.922)
Cost/Income	0.009**	0.007**	0.005**	0.000**	0.000**	0.000**	-0.010**	0.004#	0.001#
	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.036)	(0.025)	(0.145)	(0.190)
Deposit Share	-0.097	-0.667#	0.510**	-0.004	-0.011	0.068*	-1.045	0.320	-0.052
	(0.680)	(0.203)	(0.022)	(0.720)	(0.453)	(0.091)	(0.348)	(0.444)	(0.371)
GDP/Cap $_{t-1}$	-0.025**	-0.022**	-0.040**	-0.001**	-0.002**	0.001	0.103**	-0.018**	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.738)	(0.003)	(0.000)	(0.030)
GDP Growth $_{t-1}$	-0.034**	-0.020#	-0.026**	-0.002**	0.000	-0.005**	-0.015	-0.007	0.013**
	(0.000)	(0.285)	(0.000)	(0.000)	(0.596)	(0.000)	(0.762)	(0.662)	(0.021)
Inflation $_{t-1}$	-0.005#	-0.013#	-0.005#	0.000	0.000	-0.008**	-0.020	0.000	0.002**
	(0.251)	(0.237)	(0.218)	(0.454)	(0.674)	(0.000)	(0.664)	(0.967)	(0.015)
Real Int Rate $_{t-1}$	-0.010**	-0.008#	-0.003	0.000#	-0.001**	-0.005**	0.001	-0.002#	-0.002**
	(0.014)	(0.228)	(0.408)	(0.139)	(0.009)	(0.001)	(0.980)	(0.289)	(0.034)
Constant	1.210**	1.469**	0.028	0.048**	0.040**	0.638**	1.183#	0.520*	0.144**
	(0.000)	(0.000)	(0.893)	(0.000)	(0.008)	(0.000)	(0.200)	(0.054)	(0.003)
Within R2	0.109	0.017	0.194	0.069	0.080	0.152	0.003	0.206	0.158
No. of Obs	2404	2182	2405	2404	2181	1428	1304	504	638
No of Banks	518	504	518	518	504	318	312	504	638
Chi-Square	302.314	100.204	580.048	188.596	181.287	140.914	24.669	5.35	9.28
Prob(Chi-sq>0)	0.010	0.000	0.000	0.010	0.000	0.000	0.010	0.000	0.000

Table 4 Risk-Taking, Explicit Deposit Insurance Coverage, and Corporate Governance

Risk-taking is proxied by the log of NPL/Capital and the ratio of standard deviation of NPL to average capital (StdNPL/AvgNPL). The NPL/Capita regressions are estimated using the country random effects model. The StdNPL/AvgCap regressions are estimated using OLS with robust standard errors (R2 and F-Stat are reported in the places of Within R2 and Chi-Square). Columns 1, 4, 7 exclude governance variables, but use the same observations as when governance variables are included. *, ** indicate the significance levels of 10%, and 5% respectively. # indicates the coefficient value zero that falls outside one standard deviation of the estimate. The numbers in parentheses are p-values. All=all countries, Ind = Industrial country, Emg = Emerging market economies.

Sample	(1) IND & EMG	(2) IND & EMG	(3) IND & EMG	(4) IND	(5) IND	(6) IND	(7) EMG	(8) EMG	(9) EMG
Dependent Variable	$\ln(\frac{NPL}{CAP})$	$\ln(\frac{NPL}{CAP})$	$\frac{StdNPL}{AvgCAP}$	$\ln(\frac{NPL}{CAP})$	$\ln(\frac{NPL}{CAP})$	$\frac{StdNPL}{AvgCAP}$	$\ln(\frac{NPL}{CAP})$	$\ln(\frac{NPL}{CAP})$	$\frac{StdNPL}{AvgCAP}$
Method	Random Effect (panel)	Random Effect (panel)	OLS (cross-section)	Random Effect (panel)	Random Effect (panel)	OLS (cross-section)	Random Effect (panel)	Random Effect (panel)	OLS (cross-section)
$Covdepint_{t-1}$	-0.005	-0.043	-0.067#	-0.440**	-0.275#	-0.496	-0.061	-0.031	0.028
	(0.961)	(0.492)	(0.140)	(0.000)	(0.126)	(0.455)	(0.587)	(0.707)	(0.738)
$Covdepintsq_{t-1}$	0.001	0.005	0.010**	0.033**	0.021#	0.058	0.014#	0.009#	0.001
	(0.893)	(0.331)	(0.007)	(0.000)	(0.133)	(0.393)	(0.177)	(0.221)	(0.948)
3 Largest Shareholders		-0.154	-0.034		0.548#	0.060		-0.362#	0.080
		(0.539)	(0.743)		(0.152)	(0.683)		(0.264)	(0.581)
Foreign-Owned		0.084	-0.095#		0.007	-0.071		-0.377#	-0.116
		(0.697)	(0.274)		(0.981)	(0.402)		(0.162)	(0.373)
Govt-Owned		-0.393	-0.316**		2.094	0.820#		-0.387	-0.538**
		(0.365)	(0.042)		(0.481)	(0.313)		(0.357)	(0.014)
Institution-Owned		-1.583**	-0.157		-0.490	-0.038		-0.824#	-0.495#
		(0.001)	(0.333)		(0.377)	(0.822)		(0.287)	(0.182)
Private Monitoring		-0.374**	0.010		-0.019	-0.130		-0.159#	-0.028
		(0.000)	(0.790)		(0.943)	(0.526)		(0.289)	(0.749)
Shareholder Rights		0.033	-0.093**		-0.660**	0.051		-0.193*	-0.216**
		(0.582)	(0.007)		(0.026)	(0.917)		(0.061)	(0.001)
Creditor Rights		-0.036	0.034		-0.753**	-0.245		0.115#	0.065
		(0.619)	(0.388)		(0.034)	(0.775)		(0.189)	(0.342)
Liquid Asset/TA	-1.782**	-1.153**	0.088	-0.136	-1.252**	0.374	-1.709**	-0.810**	0.187
	(0.000)	(0.000)	(0.758)	(0.744)	(0.004)	(0.508)	(0.000)	(0.022)	(0.667)
NIM	0.051**	-0.065**	-0.018	0.205**	0.012	0.109**	-0.005	-0.021#	-0.066**
	(0.014)	(0.000)	(0.332)	(0.000)	(0.819)	(0.038)	(0.814)	(0.300)	(0.038)
Capital/TA	-0.098**	-0.127**	-0.012#	-0.205**	-0.234**	-0.030**	-0.067**	-0.098**	-0.010
	(0.000)	(0.000)	(0.129)	(0.000)	(0.000)	(0.011)	(0.000)	(0.000)	(0.346)
Cost/Income	0.002*	0.002**	0.001	-0.007**	0.004*	-0.007#	0.004**	0.002**	0.000
	(0.058)	(0.021)	(0.747)	(0.012)	(0.090)	(0.117)	(0.003)	(0.019)	(0.880)
Deposit Share	1.024**	0.825*	0.408#	-4.966**	0.014	-0.551	1.476**	0.422	0.823#
	(0.014)	(0.100)	(0.233)	(0.000)	(0.994)	(0.384)	(0.001)	(0.434)	(0.129)
GDP/Cap_{t-1}	-0.042**	-0.014**	-0.006#	-0.047**	0.071**	-0.053	-0.025	-0.022	-0.019#
	(0.001)	(0.030)	(0.129)	(0.000)	(0.007)	(0.409)	(0.389)	(0.387)	(0.154)
GDP Growth $_{t-1}$	-0.016#	-0.011*	0.027	-0.051**	-0.008	0.096	-0.040**	-0.031**	-0.020
	(0.153)	(0.092)	(0.354)	(0.025)	(0.565)	(0.548)	(0.001)	(0.000)	(0.516)
Inflation $_{t-1}$	-0.007	-0.007#	0.004	-0.604**	-0.274**	-0.148	-0.003	-0.007	-0.001
	(0.505)	(0.287)	(0.708)	(0.000)	(0.000)	(0.678)	(0.813)	(0.345)	(0.951)
Real Int Rate $_{t-1}$	0.007	0.011**	-0.003#	-0.129**	0.010	0.306#	0.002	0.008#	0.002
	(0.435)	(0.024)	(0.262)	(0.000)	(0.644)	(0.124)	(0.861)	(0.162)	(0.506)
Constant	0.345	4.194**	0.696#	4.015**	2.934#	2.726#	0.093	2.404*	1.360#
	(0.338)	(0.000)	(0.131)	(0.000)	(0.210)	(0.241)	(0.823)	(0.080)	(0.116)
Within R2	0.193	0.206	0.204	0.231	0.309	0.208	0.276		
No. of Obs	1129	1129	222	686	686	132	443	443	90
No of Banks	226	226	222	133	133	132	93	93	90
Chi-Square	272.26	482.50	4.19	2040.01	790.50	2234.72	159.79	206.37	1.94
Prob(Chi-sq>0)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012

Table 5 Risk-Taking, Explicit DI Coverage, and Corporate Governance with Interaction Terms

Bank- and country-specific control variables (Liquid Asset/TA, NIM, Capital/TA, Cost/Income, Deposit Share, GDP/Cap, GDP Growth, Inflation, and Real Interest Rate) are included, but not reported.

Risk-taking is proxied by the log of NPL/Capital and the ratio of standard deviation of NPL to average capital (StdNPL/AvgNPL). The NPL/Capita regressions are estimated using the country random effects model. The StdNPL/AvgCap regressions are estimated using OLS with robust standard errors (R2 and F-Stat are reported in the places of Within R2 and Chi-Square). *, ** indicate the significance levels of 10%, and 5% respectively. #P indicates the coefficient value zero that falls outside one standard deviation of the estimate. The numbers in parentheses are p-values. All=all countries, Ind = Industrial country, Emg = Emerging market economies.

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	IND & EMG	IND & EMG	IND	IND	EMG	EMG
Dependent Variable	$\ln(\frac{NPL}{CAP})$	$\frac{StdNPL}{AvgCAP}$	$\ln(\frac{NPL}{CAP})$	$\frac{StdNPL}{AvgCAP}$	$\ln(\frac{NPL}{CAP})$	$\frac{StdNPL}{AvgCAP}$
Method	Random Effect (panel)	OLS (cross-section)	Random Effect (panel)	OLS (cross-section)	Random Effect (panel)	OLS (cross-section)
Covdepint (lag)	-0.016 (0.827)	-0.040 (0.388)	-0.666** (0.005)	-0.033 (0.940)	0.192** (0.004)	0.054 (0.481)
Covdepintsq (lag)	0.001 (0.862)	0.011** (0.006)	0.050** (0.007)	-0.004 (0.929)	-0.012* (0.065)	0.014# (0.127)
3 Largest Shareholders	-0.187# (0.302)	0.225# (0.185)	1.450** (0.000)	0.256# (0.214)	-0.281# (0.208)	1.110** (0.001)
Foreign-Owned	-0.390** (0.010)	-0.013 (0.926)	-0.945** (0.000)	-0.188# (0.107)	-1.134** (0.000)	0.443* (0.094)
Govt-Owned	1.091** (0.001)	0.303 (0.330)	2.675# (0.258)	0.289 (0.730)	1.064** (0.001)	0.382 (0.454)
Institution-Owned	-0.550** (0.020)	-0.188# (0.290)	0.739** (0.030)	0.058 (0.701)	-1.360** (0.000)	-0.404# (0.149)
Govt-Owned × Covdepintsq	-0.040** (0.000)	-0.013# (0.130)	-0.041# (0.202)	0.007 (0.742)	-0.036** (0.000)	-0.018# (0.139)
Foreign-Owned × Covdepintsq	0.010** (0.000)	-0.002 (0.524)	0.008** (0.007)	0.002 (0.393)	0.019** (0.000)	-0.014** (0.038)
3 Largest × Covdepintsq	0.011** (0.001)	-0.008* (0.083)	-0.003 (0.584)	-0.004 (0.570)	0.001 (0.861)	-0.032** (0.001)
Private Monitoring	-0.160* (0.069)	0.031 (0.453)	-1.379** (0.000)	-0.237** (0.036)	-0.394** (0.000)	0.015 (0.835)
Shareholder Rights	-0.176** (0.004)	-0.106** (0.004)	1.212** (0.002)	0.005 (0.993)	-0.450** (0.000)	-0.183** (0.000)
Creditor Rights	0.141** (0.023)	-0.029 (0.460)	0.892** (0.037)	-0.292 (0.776)	0.231** (0.000)	0.048 (0.459)
Constant	2.225** (0.006)	0.375 (0.437)	14.516** (0.000)	4.249# (0.229)	4.260** (0.000)	0.246 (0.739)
Within R2	0.239	0.223	0.317	0.193	0.34	0.399
No. of Obs	1129	222	686	132	443	90
No of Banks	226	222	133	132	93	90
Chi-Square	419.29	4.01	2397.19	2351.85	379.97	2.01
Prob(Chi-sq>0)	0.000	0.000	0.000	0.0000	0.000	0.016