

Deposit Insurance Coverage, Ownership, and Banks' Risk-taking in Europe

Apanard Angkinand

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

Clas Wihlborg

Department of Finance and the Center for Law, Economics and Financial Institutions at
Copenhagen Business School (LEFIC)
e-mail: cw.fi@cbs.dk

Sept. 7, 2006

Abstract:

We ask how deposit insurance systems and ownership of banks affect the degree of market discipline on banks risk-taking and the probability of banking crises. 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 ownership structure of banks and the responsiveness of bank managers to market incentives. An expected U-shaped relationship between explicit deposit insurance coverage and banks' risk-taking is influenced by country specific institutional factors, including bank ownership. We analyze specifically how government ownership, foreign ownership and other aspects of bank governance affect the disciplinary effect of partial deposit insurance systems in industrial countries and in emerging market economies. The results of the empirical analysis are used to evaluate the coverage of deposit insurance systems in Eastern and Western European countries. The coverage that minimizes the probability of banking crisis and non-performing loans depends on county specific characteristics of bank governance. This "risk-minimizing" deposit insurance coverage is compared to the actual coverage in each country.

JEL Classification: G21; G28; F43

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

Deposit Insurance Coverage, Ownership, and Banks' Risk-taking in Europe

Abstract:

We ask how deposit insurance systems and ownership of banks affect the degree of market discipline on banks risk-taking and the probability of banking crises. 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 ownership structure of banks and the responsiveness of bank managers to market incentives. An expected U-shaped relationship between explicit deposit insurance coverage and banks' risk-taking is influenced by country specific institutional factors, including bank ownership. We analyze specifically how government ownership, foreign ownership and other aspects of bank governance affect the disciplinary effect of partial deposit insurance systems in industrial countries and in emerging market economies. The results of the empirical analysis are used to evaluate the coverage of deposit insurance systems in Eastern and Western European countries. The coverage that minimizes the probability of banking crisis and non-performing loans depends on county specific characteristics of bank governance. This "risk-minimizing" deposit insurance coverage is compared to the actual coverage in each country.

1. Introduction

Deposit insurance is generally considered an important part of the regulatory structure for the banking system. This regulatory structure should protect the “safety and soundness” of the banking system while providing banks with the appropriate rules and incentives to allocate credit efficiently. The double role of banks as liquidity providers and participants in credit and capital markets makes them potentially vulnerable to bank runs, since a large share of the assets cannot be liquidated quickly in case depositors want to convert their funds to cash. The limited information among depositors about the risk and value of bank assets can lead to “contagion” of bank runs (Diamond and Dybvig, 1983) from one bank to another. Contagion effects could also be caused by interbank claims on a distressed bank. The potential for contagion implies that the banking system is subject to “systemic risk” to a greater extent than other providers of credit.

Deposit insurance can limit the risk of bank runs by guaranteeing that depositors receive some, or all, of their deposited funds with reasonable speed even if their banks become insolvent or illiquid. In case of a liquidity crisis for a bank, the central bank can also act as a Lender of Last Resort (LOLR) by lending to a solvent bank facing a liquidity squeeze as a result of a run by depositors.

The flip side of the positive role of deposit insurance as a safeguard against bank runs and as a consumer protection device is a moral hazard problem caused by limited liability of banks’ shareholders and the reduced incentives of insured depositors to evaluate the riskiness of the banks they provide with funds. This moral hazard problem implies that banks have incentives to take on excessive risk on the asset side. These incentives are particularly strong if the value of the equity capital is low. Thus, deposit insurance systems can contribute to the very problem (systemic bank failure) they are designed to reduce.¹

One solution to the moral hazard problem would be to design a deposit insurance premium structure reflecting banks’ risk-taking. A private deposit insurance market is likely to fail for reasons of both moral hazard and adverse selection, however. Furthermore, the existence of government insurance, whether explicit or implicit, limits the scope for private insurance.

Regulation of banks’ behavior and asset allocation, and supervision of banks’ credit allocation and risk management systems have the purpose of limiting banks’ risk-taking. In addition, capital requirements can reduce risk-taking incentives by ensuring that there is always

¹ See, for example, Bhattacharya, et al. (1993)

shareholder capital at risk. The effectiveness of various measures intended to influence banks' risk-taking is likely to depend on the governance system for a country's banks.

While there is wide agreement on the need for deposit insurance within the regulatory structure of the banking system, there is little agreement on the optimal coverage of insurance systems. This coverage depends on a number of factors. For example, uncertainty about governments' and supervisors' responses to more or less severe banking crises affects the optimal coverage. Other areas of disagreement are the importance of moral hazard incentives created by deposit insurance, the ability of market participants (depositors) to make informed decisions about the riskiness of competing banks, and the responsiveness of banks' risk-taking behavior to more risk sensitive deposit interest rates. This last issue includes aspects of bank ownership and governance.

The substantial resources devoted to the design of a Capital Adequacy Framework by central bankers and regulators in the Basel Committee indicate that there is a strong concern about incentives for excessive risk-taking. Bank managers on the other hand tend to deny that there are incentives for excessive risk-taking. Such incentives need not reveal themselves as deliberate risk-taking. Instead it is the competition among banks with the opportunity to finance their lending activities at a near risk-free interest rate that induces them to prefer debt financing to equity financing. Furthermore, competition for funding will not be based on banks' risk evaluation and risk management skills. Benink and Benston (2005) show how banks' equity capital relative to total assets worldwide declined from a level similar to non-financial firms in the 20s to a level of around four percent in the late 80s when the Basel Committee began its work. During this period explicit and implicit guarantees of banks' liabilities were expanding. Implicit guarantees typically take the form of bail-outs of banks that rarely are allowed to fail.

Additional evidence of excess risk-taking is the frequency of banking crises around the world as documented by Caprio and Klingebiel (2002). Barth et al. (2006) argue that increased resources devoted to regulation and supervision and increased sophistication of supervisors have done little to reduce the incidence of banking crises. They call for increased reliance on market discipline in the regulatory framework for banks.

In this paper we ask how deposit insurance systems and governance affect the degree of market discipline on banks' risk-taking incentives and the probability of banking crises. The results are then applied on Europe. The theoretical and the empirical frameworks are based on

Angkinand and Wihlborg (2005). A key feature of that paper is the emphasis on credibility of non-insurance of groups of depositors and other creditors as the main factor determining the degree to which banks' risk-taking is disciplined by market forces. In this paper, we also investigate how the governance structures of banks, including ownership, shareholder and creditor protection, concentration, and supervisory policies, affect the credibility of non-insurance.

In Section 2 we review recent literature on the relationship between deposit insurance coverage and financial crises, and on the impact of ownership on banks' behavior and performance. Thereafter we lay out the theoretical framework for analysis of optimal deposit insurance coverage in Section 3. The impact of bank governance on risk-taking is discussed, and the hypothesis for the empirical work is presented. Data and empirical methodology are summarized in Section 4. Empirical relationships between risk-taking proxies, deposit insurance coverage, ownership and other governance factors are presented in Section 5. Deposit insurance systems in Western and Eastern Europe are evaluated in Section 6, and implications for design of deposit insurance schemes are discussed in the concluding Section 7.

2. Evidence on deposit insurance, ownership, 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 captured by proxies for institutional characteristics in some studies. The data on banking crises by country and year emanates from the World Bank. The criteria for banking crises in this data set is described in Caprio and Klingebiel (2002), who compiled the data from published sources and interviews with experts.

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 captured four different degrees of deposit insurance coverage. They find that greater coverage significantly increased the likelihood of crises but this effect is reduced significantly in countries with high levels of supervisory and legal system quality². Barth et al. (2004) and Cull et al. (2005) support this view with respect to rule of law but not with respect to prudential regulation and supervision.³ Angkinand (2005) analyzing the impact of institutional variables on the relationship between occurrence of banking crisis and deposit insurance observes a limited but significant positive impact of a corruption variable.

While the above studies supported a positive relation between explicit deposit insurance and banking crises, Eichengreen and Arteta (2002) find in a large sample of developing countries that explicit deposit insurance schemes reduced the likelihood of banking crisis. Hoggarth et al. (2005) using a smaller sample and a shorter period 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.

Angkinand and Wihlborg (2005), linking explicit coverage and implicit protection, hypothesize and estimate a U-shaped relationship between explicit deposit insurance coverage and banks' risk-taking. They find robust evidence for such a relationship when risk-taking is captured by the occurrence of banking crisis in a country during a year, as well as by non-performing loans. The U-shaped relationship is influenced by proxies for institutional quality. The framework of that paper will be further discussed and developed below.

The mentioned papers employ logit estimation and use a crisis dummy as the dependent variable. A potential simultaneity problem arises because explicit deposit insurance schemes could have been introduced or expanded in response to banking crises. For this reason Demirgüç-Kunt and Detragiache (2002) use a two-stage logit model. The other papers mentioned above include only the first year of each crisis period and they lag the deposit insurance variable one year.

² 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.

³ Barth et al. employ a new database on bank regulation and supervision described in Barth et al. (2001).

Banking crises and excess risk-taking have also been analyzed on the bank level. Gropp and Vesala (2001) 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. Nier and Baumann (2006) test the impact of market discipline on banks' risk taking by considering both explicit and implicit aspects of depositor protection. 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 relative to total loans 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.⁴

The evidence reviewed so far indicates that countries' institutional characteristics should be considered when analyzing the effects of deposit insurance schemes on banks' risk taking. In this paper we incorporate characteristics of the governance of banks on the country level.

Bank governance refers to the (implicit and explicit) contractual relationships influencing the incentives of bank managers. In the corporate governance literature it is usually assumed that managers in a "good" governance system should maximize shareholders' wealth while the incentives to serve the interests of other stakeholders are provided by market forces, law, and regulation. In the literature discussed above, deposit insurance leads to a market failure with the consequence that it could be in the shareholders' interest to take on excessive risk from a social point of view.

Several studies have found that state ownership of banks lead 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

⁴ 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. Distinguin et al (2005) use banks' stock returns to evaluate whether these data were superior to ratings in predicting distress

(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-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.

For the effect of foreign ownership on banks' risk taking, the findings in the literature are 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 (2003) 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.

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.

3. Credibility of non-insurance, bank governance and market discipline in banking

In this section we first summarize the argument 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. Institutional factors influencing 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.

Both policy makers and banks' creditors recognize that the latter are implicitly guaranteed to some extent. The absence of explicit guarantees leads to strong expectations that governments and regulators in times of crises will respond by issuing blanket guarantees of all creditors of banks or by bailing them out in other ways. Thus, non-insurance of all creditors is not credible.

The complete absence of guarantees of all creditors is not credible in banking for several reasons. First, banking crises tend to occur without much warning and, as a result, policy makers must react very quickly to stave off threats to the financial system. Second, an important function of the banking system is to supply liquidity, and lack of trust in the banking system can rapidly become very costly. Central banks can provide liquidity assistance to banks in distress, but the difficulty of distinguishing between liquidity- and insolvency crises in combination with the fear of contagion tends to compel governments to issue blanket guarantees of all creditors or to bail-out banks through, for example, rapid recapitalization. Third, banks are opaque with the implication that one bank's distress can lead to runs on healthy banks. Fourth, the failure of one bank can have systemic implications through interbank clearing and settlement systems.

Many countries have introduced partial deposit guarantee schemes in order to reduce the risk of runs of such magnitude that solvent banks must be closed while retaining an element of market discipline. There is little empirical evidence, however, with respect to the relation between the extent of the coverage of explicit deposit insurance and the strength of implicit guarantees of uninsured creditors.

The main argument put forward in AW (2005) is that market discipline discouraging excessive risk-taking requires (i) non-insurance of groups of creditors (or parts of their deposits) and (ii) that the non-insurance is credible. They also argue that (iii) the credibility of non-insurance of those not covered by deposit insurance schemes increases as the coverage of explicit insurance schemes expands. The greater the coverage of explicit schemes is, the lower is the probability that governments and supervisors must intervene rapidly in distress situations to guarantee the claims of non-insured creditors. We argue that the relation between the coverage of explicit insurance and the credibility of non-insurance depends on institutional and political factors including bank ownership.

The arguments above are illustrated in Figure 1. The horizontal axis depicts the extent of explicit insurance coverage (EC) of deposits and other claims on banks. On the vertical axis is the incentive of banks to take excessive risk (RT). 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 declines and moral hazard incentives become 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:

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

In figure (1), the expectation that $\delta RT_{Expl} / \delta EC > 0$ is described by the upward sloping line denoted "Explicit". It shows that market discipline declines and risk-taking (RT) increases as explicit insurance coverage (EC) expands at a constant degree of credibility of non-insurance.

Turning to the credibility of non-insurance (CNI), this variable is defined as the credibility of non-insurance per non-insured dollar. Lack of credibility of non-insurance of creditors implies a degree of implicit insurance described by the line denoted "Implicit". The line shows how risk-taking incentives caused by implicit insurance decline with increasing explicit coverage as a result of increased credibility of non-insurance ($\delta RT_{Impl} / \delta EC < 0$). AW (2005) discuss in greater detail how the impact of non-insurance on risk-taking depends on CNI as well as on the size of the non-insured group (1-EC) arriving at Figure 1.

The total effect on risk-taking from increasing explicit insurance coverage (EC) as expressed in the expression (1) is described by the vertical summation of the curves “Explicit” and “Implicit” in Figure 1. The total effect on risk-taking is shown as a U-shaped curve.

The U-shaped curve in Figure 1 is not a mathematical necessity. The exact conditions with respect to second derivatives in expression (1) are shown in AW (2005). Intuitively, the line “Explicit” must be characterized by decreasing effects on risk-taking of reduced explicit coverage. 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 (credibly) uninsured creditors can contribute substantially to market discipline. Similarly, starting from zero explicit coverage and very strong implicit protection of creditors, incentive effects of a declining implicit protection are decreasing as explicit coverage increases and credibility of non-insurance increases. The hypotheses below are based on these assumptions, but institutional characteristics of countries could affect the shape of the line “Implicit” in particular. The line “Explicit” could also be affected. If a variable that captures implicit protection of creditors can be included in the analysis, the relationship between deposit insurance coverage and risk-taking is dominated by the line “Explicit” in the figure.

[FIGURE 1 here]

In AW (2005) hypotheses are developed for the impact of institutional variables that may shift the lines “Explicit” and “Implicit” in the figure. In particular, it is argued that the line “Implicit” would shift down and flatten out by institutions contributing to credibility of non-insurance. Such a shift is shown in the figure by the line “Implicit × institution”. The institutional factors considered in AW (2005) are Powers and Procedures for Prompt Corrective Action, Rule of Law, Corruption, and Powers of Supervisors. The three first factors influencing implicit protection, in particular, are expected to shift the line “Implicit” as described in Figure 1. In this paper we focus on country characteristics affecting bank governance but we incorporate the mentioned institutional factors as well.

Risk taking and bank governance

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 is 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 1, 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 1. 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. 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.

Hypotheses with respect to quality of bank governance: *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 on country data. There are three groups of countries. One consists of industrialized countries. The other groups are emerging market countries and developing countries. Industrial and Emerging markets are analyzed separately. The dependent variable is a proxy for risk-taking while the independent variables include a proxy for explicit deposit insurance coverage, proxies for the quality of bank governance on the country level, and country specific control variables reflecting macroeconomic and institutional conditions and characteristics.

The Hypothesis above implies that 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.

The variables used to capture the quality of governance are discussed below. We use ownership characteristics, legal regimes, market concentration measures and proxies for stakeholders influence. These variables do not capture the quality of governance perfectly. Therefore, the effects of the different governance proxies depend on their relation to other influences on risk-taking than quality of governance alone. This issue is discussed in the result section.

4. Model Specification and Data

We use two proxies to capture risk-taking caused by lack of market discipline: the occurrence of banking crises and the ratio of non-performing loans to total loans in the banking system (NPLs) after controlling for a number of time specific macroeconomic variables that may contribute to crises and loan losses. The banking crisis proxy has one disadvantage in that a crisis in a country could have been triggered by runs on solvent banks rather than by excessive risk-

taking in the banking system. Runs on solvent banks are rare even in situations when a part of a banking system is distressed. Therefore, we do not believe that this problem with the banking crisis proxy is serious. Nevertheless, we use non-performing loans as an alternative proxy. This proxy does not have the same disadvantage; however, the time period with reliable data for non-performing loans is much shorter (1997-2003) than the period with crisis data (1985-2003).

Banking crises dates and definitions are taken from Caprio and Klingebiel (2002), who compile the data based on published financial sources and interviews with experts. There are two kinds of banking crises. A systemic banking crisis is defined as the situation when much or all of bank capital is exhausted, and a borderline banking crisis is identified when there is evidence of significant banking problems such as government intervention in banks and financial institutions. We construct a banking crisis dummy by assigning a value of one in the first year that crisis erupts and zero otherwise. To minimize the risk of simultaneity bias, we exclude the crisis years following the onset of crisis and use a one-year lag of all independent variables. The model specification for the banking crisis regressions is as follows:

$$L_{i,t} = \ln \left[\frac{P_{i,t}}{1 - P_{i,t}} \right] = \alpha + \delta_1 EC_{i,t-1} + \delta_2 (EC_{i,t-1})^2 + \gamma_j z_{j,i,t-1} + \beta_k x_{k,i,t-1} + \varepsilon_{i,t-1},$$

$$\text{where } P_{i,t} = \text{prob}(BC_{i,t-1} = 1 | EC, z, x) = \frac{1}{1 + e^{-(\alpha + \delta_1 EC_{i,t-1} + \delta_2 EC_{i,t-1}^2 + \gamma_j z_{j,i,t-1} + \beta_k x_{k,i,t-1})}}$$

$BC_{i,t}$ is the onset of banking crisis dummy variable. The subscript i refers to a country and t indicates time. 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. The proxy for EC enters with a lag to avoid a potential simultaneity problem caused by political decisions to adopt explicit deposit insurance schemes or alter the coverage limits as responses to banking crises. z_j is the different proxies for the quality of bank governance, which are obtained from various sources (discussed below). In order to test the Hypothesis above, proxies for governance quality are allowed to interact with the coverage of explicit deposit insurance variable (i.e. $EC_{i,t} \times z_{j,i,t}$).

For control variables, x is a k -element vector of macroeconomic and financial variables, including real GDP per capita, the real GDP growth rate, the ratio of money supply to international reserves, the ratio of domestic credit provided by banking sector to GDP, the ratio of the current account to GDP, the inflation rate, and the real interest rate. These are a standard set of control variables used in the reviewed literature. By using the same variables, our results become comparable to those in the literature where the quadratic relationship is not considered.

In a panel analysis, error terms are likely to be correlated over time and across countries, and unobserved country-specific components are likely to be correlated with the observable country characteristics or explanatory variables, which could lead to biased coefficient estimates. We address this problem in several ways: First, only the first crisis year within each crisis episode is in the data set. Restricting crisis years to the onset of crises should alleviate the problem of lack of independent observations by excluding the possibility that crisis in a given year is likely to be dependent on crisis in a previous year. Second, robust and clustering standard errors correct the covariance matrix for estimates of heteroskedasticity and allow any type of correlation among the observations across time within each country. We also test for the robustness of results by using the conditional random effects logit models that correct for unobserved heterogeneity problem.

The ratio of non-performing loans to total loans (NPL) is obtained from the IMF's Financial Stability Reports wherein the IMF has published own measures on the country level since 1997.⁵ An "unobserved effects panel data model" is employed in NPL regressions on the same set of variables as in the crisis regressions.⁶

$$NPL_{i,t} = \alpha + \delta_1 EC_{i,t-1} + \delta_2 (EC_{i,t-1})^2 + \gamma_j z_{j,i,t-1} + \beta_k x_{k,i,t-1} + \varepsilon_{i,t-1}$$

We examine the impact of explicit deposit insurance coverage and banks' governance structures on banks' risk-taking based on a cross-section time series analysis using a sample of more than 100 countries during the period of 1985-2003 when the occurrence of banking crisis is used, and 1997-2003 when NPL is used. We have chosen 1985 as the first year because banking systems in many OECD countries were heavily regulated before this year. In some model specifications, the

⁵ The NPL data and bank capital data in the IMF's Financial Stability reports are based on "National authorities and IMF staff estimates."

missing data for corporate governance variables and some economic variables reduce the sample coverage to about 50 countries. Implications for Western European countries will be based on analyses of 24 industrialized countries worldwide, while implications for Eastern Europe will be based on analyses of 41 Emerging market countries listed in Table 1.

Data for deposit insurance coverage for Western, and Central and Eastern Europe are presented in table 1. These data are taken from the Database of Deposit Insurance Around the World published by Demirgüç-Kunt et al. (2005), at the World Bank. In this table, “coverage limit” is the maximum coverage per deposit account within each deposit insurance system. The ratio between this coverage limit and the per capita deposit size (coverage per average deposit) represents our primary proxy for explicit deposit insurance coverage.

Currently all members of the European Union have adopted an explicit deposit insurance system. Coverage limits are similar among Western European countries although France, Italy, and Norway have higher limits than others. The coverage limits are significantly lower in some Central and Eastern European. Nevertheless, coverage per average deposit are higher in these lower income countries.

In banking crisis and NPL models, we introduce one of four variables used in AW (2005) to capture explicit deposit insurance coverage (EC). The one used here, *covdepint*, is constructed from the data on coverage per average deposit. *Covdepint* takes values on a scale 0 to 3 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 3 represents full coverage. A value of 1 implies that the coverage per average deposit is less than 5 but greater than 0. The values 1.5, 2, 2.5 correspond to intervals (low, high) for coverage per average deposit of (5, 10), (10, 15), and (15, < Full).

Another variable used in AW (2005) is the natural logarithm of (1+covdep), *Incovdep*. The correlation between *covdepint* and *Incovdep* is .95 for industrial countries and .91 for emerging markets. Although the *Incovdep* proxy has the advantage of being a continuous function of covdep, it is highly skewed while *covdepint* is reasonably symmetric.

An additional reason for using an interval-variable like *covdepint* is that there is some essentially irrelevant variation from year to year in each country’s coverage-ratios. This variation

⁶ The Hausman test suggests the use of the random effects over fixed effects models (see section 5). In addition, this paper emphasizes effects of corporate governance and institutional variables which do not vary much over time,

is not likely to affect risk-taking behavior. In AW (2005) the results are quite robust with respect to choice of proxy for deposit insurance coverage. All results presented below are based on the use of *covdepint* as a proxy for explicit deposit insurance coverage. In one application we will present estimates of the risk-minimizing deposit insurance coverage in terms of both *covdepint* and *Incovdep*.

Turning to governance variables, we use several different kinds. The first group captures the general institutional quality of each country. This group includes the *Real GDP per Capita*, *Rule of Law*, and (lack of) *Corruption*. As noted in La Porta et al. (1998, 2002), poorer countries generally have weaker governance structures. Rule of Law and (lack of) Corruption are obtained from the International Country Risk Guide (ICRG). The second group taken from La Porta et al. includes the origins of legal regimes. The origins are classified in five groups: English common law, French civil law, German civil law, Scandinavian civil code, and Socialist/Communist law. In their studies, La Porta et al. find that common law countries have the strongest corporate governance in terms of investor protection, while French civil law countries have the weakest.

The third group of governance variables refers to ownership of banks. *State-* and *Foreign-Ownerships* are defined as the share of bank assets held by banks owned more than 50 percent by governments or foreigners (banks). The ownership data comes from the World Bank database of Bank Regulation and Supervision (See Barth et al. 2004 and 2006). We use data from both surveys in 1999 and 2001 to increase the variation of these variables.⁷

The fourth group of governance variables includes 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 in reorganization and liquidation processes.

Banking concentration in each country is captured by *Bank Deposit Concentration*. This variable shows the fraction of total deposits held by the 5 largest banks. Regulatory restrictions on securities activities are captured by *Securities Restrictions* and restrictions on banks'

implying that the fixed effects could lead to imprecise estimates (see Wooldridge, 2002, chapter 10).

⁷ We use 1999 survey for the period until 1999 and use 2001 survey for the period of 2000-2003 for the state and foreign ownership variables. For some countries that do not report the data in both surveys, we use the data wherever is available.

ownership of non-financial firms by *Own Nonfin Firm Restrictions*. A variable measuring banks' transparency and disclosure is called the *Private Monitoring Index*. Finally, we control for the quality of financial supervision using data for prompt corrective action procedures (*PCA*). All these variables are obtained from the same database presented in Barth et al. (2006).

Descriptions of all variables used in the analysis are presented in Table 2. The correlations among governance and institutional variables are reported in Table 3. Some instances of high correlations indicate that proxies overlap in their coverage. Choices among the variables are made when correlations are high.

5. Empirical Results with respect to institutional quality, legal regimes and ownership

As a starting point for the analysis we present in Table 4 results from AW (2005) for the relationship between explicit deposit insurance coverage and risk-taking as captured by onset of banking crisis as well as by the ratio of non-performing loans to total loans (NPL). There are controls for macroeconomic factors in these regressions but not for bank ownership and institutional country characteristics. The results show that the estimated coefficients for the deposit insurance coverage proxy (*covdepint*) are negative for the linear term and positive for the quadratic term across different model specifications and sub-samples⁸, supporting the U-shape hypothesis. The estimated coefficients for the linear and the quadratic terms are statistically significant at the one percent level in banking crisis regressions for the overall sample (Table 4, columns 1-2). When the countries are divided into separate groups for industrial and emerging market countries (columns 3 and 4) the U-shaped relationship remains robust although the significance levels of coefficients are reduced. The coefficients marked with a # have estimates that exclude zero within one standard deviation.

The signs for *covdepint* variables indicating a U-shaped relationship are present in the NPL regressions (columns 5-6) as well. The significance levels for the coefficients are lower than in the banking crisis regressions, however. Since we have fewer years with NPL data we do not distinguish between industrial and emerging market countries but we exclude developing countries in regressions marked Ind & Emg. Similar results are obtained when different proxies for deposit insurance coverage are used (not shown), and when only systemic banking crises are

included (not shown). Institutional variables are also introduced in AW (2005). They interact with deposit insurance coverage in order to capture their influences on credibility of non-insurance. The U-shaped relationship between proxies for excessive risk-taking and deposit insurance coverage is robust using different specifications and groups of countries. Thus, there is a level of partial deposit insurance coverage that minimizes the probability of banking crisis or the non-performing loans. This level is country specific. We explore determinants of this level further in the empirical analysis presented in Tables 5-8.

As a methodological note, we perform Hausmann tests to select the appropriate estimation methodology for panel analysis.⁹ The tests favor random effects models. As a result, all regressions for NPL reported here are estimated using random effects. The results we report for onset of banking crisis regressions are estimated using logit models with robust and clustering standard errors to correct for correlated error terms within countries. As robustness checks, we estimated the models by using the conditional random effects logit models as well.

We examine the effects of bank governance variables on the extent of risk-taking and the credibility of non-insurance by including in each regression one or more proxies of governance characteristics. The governance variables are introduced both independently and by interacting with the deposit insurance coverage variable (*covdepint*). The interaction occurs with the linear term rather than the quadratic term because we expect the stronger effect of institutional and governance variables on implicit depositor protection in the left part of Figure 1.

In Table 5 governance variables are represented by the real GDP per capita for general institutional quality and legal regimes as defined in La Porta et al. Table 6 results focus on the role of state and government ownership. Rule of law, (lack of) corruption, and supervision characteristics are introduced as proxies for general institutional quality in Table 7. Finally, Table 8 regressions include stakeholder rights, market monitoring proxies, and concentration instead of a proxy for general institutional quality.

⁸ We investigate whether the effects of deposit insurance coverage and corporate governance are different between a group of industrial and emerging market economies. We do not report separate regressions for developing countries due to the missing governance data for many countries.

i) General institutional quality and legal regimes (Table 5)

Real GDP per capita captures general institutional quality of a country while legal regimes are expected to be associated with different degrees of protection of minority shareholders and creditors.

Except for industrial countries alone (columns 5 and 6) a higher real GDP per capita is associated with a lower probability of banking crisis and lower NPL. In industrial countries real GDP per capita has a strong negative impact through the interaction term. The coefficients for legal regimes (with British common law as reference point) indicate that there are no significant differences in crisis proneness and NPL across different legal regimes.¹⁰ The results could be affected by high correlations between the legal regime variables and the level of real GDP per capita (see Table 3).

Before looking at the interactive terms we note that the U-shaped relationship between the onset of banking crisis and deposit insurance coverage remains in almost all specifications with the real GDP per capita and legal regimes. The interactive term is generally not significant in these regressions. In the NPL regressions, on the other hand, the reversed signs for *covdepint* and *covdepint squared* indicate an inverted U-shaped relationship, but the interaction terms with GDP/capita and the French legal regime must be considered as well. The sum of all coefficients for *covdepint* could indicate a positive or negative relation depending on the level of coefficients of interaction variables. We will elaborate more on this issue below.

The main conclusion from Table 5 regressions is that legal regimes do not contribute much to explain banks' risk-taking while general institutional quality seems to reduce risk-taking.

ii) General institutional quality, and state- and foreign ownership (Table 6)

Regressions reported in Table 6 include real GDP per capita, the extent of state ownership, and the extent of foreign ownership independently and by interacting each variable with deposit insurance coverage. We expect state (foreign) ownership to be associated with worse (better) bank governance, but risk-taking incentives could be influenced by ownership in other ways as

⁹ The probability values of the Hausmann chi-squares equal 0.24 for the banking crisis regression and 0.27 for NPLs regression suggesting the use of country random effects, not fixed effects models.

¹⁰ The estimated coefficient for German legal origin is significant at 10 percent in banking crisis regression for a sample including emerging markets. This result seems to depend on one country, S. Korea, with German tradition.

well. The effects of state ownership could depend on particular political pressures in various countries, and incentives in foreign-owned banks could be affected by home country conditions.

As in Table 5 the effect of real GDP per capita on its own on the onset of banking crises is negative and significant in emerging markets but positive in industrialized countries before considering the interaction term. NPLs are negatively and significantly affected by real GDP per capita in all countries, as well as in industrial plus emerging markets. State ownership seems to increase the incidence of banking crises as well as NPL although the coefficient is not significant in all regressions. The effect of foreign ownership on NPL is clearly and significantly negative for all, as well as for industrial plus emerging market economies. In banking crisis regressions foreign ownership standing alone increases the incidence of crisis in emerging market countries but there is a negative effect through the interaction with deposit insurance coverage. We will analyze the impact of the ownership variables in more detail after taking additional governance variables into account.

The U-shaped relationship between the onset of banking crises and deposit insurance coverage (*covdepint* without interaction) is significant for all countries, but for emerging markets alone the relationship is reversed when ownership variables are included. Thus, it seems that the ownership variables could be correlated with the degree of implicit creditor protection in banks. In NPL regressions both the linear and the quadratic terms are negative. The coefficients for interactive terms between *covdepint* and ownership variables must also be considered to determine whether deposit insurance coverage has a positive or negative effect on risk-taking. In banking crisis regressions the results suggest that the effect of deposit insurance coverage on risk-taking depend strongly on the extent of foreign ownership. The interaction term for foreign ownership and deposit insurance coverage is significant or close to significant, whereas the interaction term for state ownership is not significant. In other words, for countries with high deposit insurance coverage, foreign ownership seems to reduce the probability of banking crisis. This result is robust and discussed more after taking into account other proxies of institutional quality.

iii) Institutional quality, ownership and supervision (Table 7)

In a set of regressions presented in Table 7, we substituted *Rule of Law* and/or *Corruption* for real GDP per capita as proxies for general institutional quality, and we added a proxy for supervisory effectiveness. The correlations between *Rule of Law* and *Corruption* and between

these variables and real GDP per capita imply that only one of these variables will be significant. We also consider the strength of supervisory powers to intervene with “prompt corrective action” (PCA) to avert a banking crisis. This variable is introduced in case ownership variables are correlated with supervisory practices.

Comparing the results in Tables 6 and 7 we observe that coefficients for deposit insurance coverage and ownership variables are very similar. The significance of the interaction between foreign ownership and coverage has increased but it is not possible to determine which combination of variables captures general institutional quality best.

The supervisory variable (PCA) on its own is generally not significant in the banking crisis regressions but in NPL regressions its sign is significant and positive. The interactive term is negative in these cases, indicating that when explicit coverage is high supervisory practices contribute to a reduction in risk-taking.

Since the interaction variables make it difficult to interpret the coefficients for the different variables we draw figures describing the relationship between explicit deposit insurance and risk-taking proxies for different levels of state and foreign ownership. In Figures 2.a) and 2.b) coefficients in Table 7, column 3 for industrial + emerging economies, are used to illustrate how the U-shaped relationship in banking crisis regressions is affected by the ownership variables. The predicted values of the probabilities of banking crisis are plotted at different levels of *covdepint* and ownership variables, and at the mean of other control variables.

The effect of state ownership is described in Figure 2.a). It can be seen that the strongest increase in the probability of crisis occurs in countries with relatively low levels of deposit insurance coverage, while the effect for very high levels of explicit protection is reversed but much smaller.

The impact of foreign ownership is illustrated in Figure 2.b). The U-shaped relationship turns into a downward sloping one at high levels of foreign ownership. At these high levels, the impact of foreign ownership is very strong. Using the 75th percentile of observations with the highest foreign ownership to plot the curve, the risk-minimizing deposit insurance coverage is full coverage according to the figure. This result can be explained by unresponsiveness of foreign-owned banks to risk-taking incentives provided by explicit deposit insurance systems in the host countries. Furthermore, foreign banks bring in risk management expertise. However, the relatively small effect of foreign ownership for low levels of explicit coverage implies that

foreign banks can take advantage of implicit creditor protection as much as domestic banks do. Intuitively, lack of explicit protection induces governments to issue blanket guarantees in times of crises benefiting all banks.

iv) Ownership, stakeholder protection and market monitoring (Table 8)

The final set of regressions is shown in Table 8. Variables capturing corporate governance characteristics of countries are substituted for more general institutional variables used so far. We focus on regressions for NPL because the observations for the governance variables used in this table exist only for 1999 and 2001. The ownership variables are the same as in previous tables. *Shareholder Rights* (minority protection) and *Creditor Rights* are those of La Porta et al (1998). *Securities Restrictions* capture restrictions on banks activities outside conventional commercial banking. The *Private Monitoring Index* is a proxy for transparency of banks' external information, and *Bank Deposit Concentration* captures the degree of concentration in each country's banking system. These variables are from Barth et al (2006). Other corporate governance variables are included in the list of variables in Table 2 and the correlation table 3 but results are not presented for all of them since some only seem to substitute for one of the variables included in Table 8.

The regressions presented in Table 8 for NPL in All countries (columns 1-3) and Industrial plus Emerging markets (columns 4-6) include three specifications beginning in columns 1 and 4 with all variables included but no interaction terms. Then in columns 2 and 4 all interaction terms are added while the variable for securities restrictions is excluded because of its seeming irrelevance. The insignificant interaction terms with state ownership, creditor rights, and private monitoring are dropped in columns 3 and 6 where we have a specification allowing analysis of foreign ownership, shareholder rights and concentration, and their interactions with deposit insurance coverage.

The U-shaped relationship between NPL and deposit insurance coverage is significant or nearly so in all regressions in Table 8 although this was not the case for NPL in the previous table. Possibly, the corruption and law variables in Table 7 may be correlated with unobservable implicit guarantees. State/Foreign ownership without interaction have positive/negative effects on NPL, as before, but state ownership is not significant across all specifications. Concentration as well as shareholder rights have significant negative coefficients in all specifications, while creditor rights seem relevant in regressions for all countries but not for industrial plus emerging

markets. The Private Monitoring Index capturing market disclosure is near significant with a negative sign for all countries. It can be seen in Table 3 that this variable is correlated with shareholder rights (.41). The results indicate that market monitoring could play a disciplinary role for banks risk-taking as suggested in the new Capital Adequacy Framework, Basel II.

Turning to interactions with deposit insurance coverage we focus here on shareholder rights and concentration. The interaction term for shareholder rights is positive (although significant only for industrial plus emerging countries) indicating that the decline in NPL associated with strong protection of minority shareholders occurs more strongly when explicit depositor protection is weak. This relationship is illustrated in Figure 2.c) where the downward sloping part of the U-shaped relation between NPL and explicit coverage (at low levels of explicit coverage) flattens with stronger shareholder rights. Thus, in countries where depositor protection is primarily implicit, shareholder rights seem to reduce incentives for excessive risk-taking. This result is in accordance with our Hypothesis for effects of quality of bank governance. However, we do not observe the same reduction in risk-taking incentives of shareholder rights at high levels of explicit depositor protection.

Turning finally to concentration in the banking system, it is clear that concentration is associated with less NPL. The interaction with *covdepint* is positive as for shareholder rights. Thus, the reduction in risk-taking in concentrated banking systems occurs most strongly when there is little explicit coverage indicating that there is less need for explicit coverage in concentrated banking system. This result can be viewed as evidence that the implicit protection of creditors is relatively strong in concentrated banking systems.

6. Deposit insurance coverage and ownership in Europe

To illustrate the implications of the results presented above we turn to an evaluation of deposit insurance coverage in Western and Eastern Europe. We ask what explicit deposit insurance coverage would minimize risk-taking as measured by probability of banking crisis and non-performing loans for each country? This exercise is clearly pushing the results but it sheds light on the interdependence between deposit insurance and governance variables.

The exercise is presented in Table 9 where column (1) shows the actual explicit deposit insurance coverage in each country as the coverage limit per average (per capita) deposit amount (Covdep). The figure in parenthesis is the corresponding value of the proxy *Covdepint* used in

regressions. Each value for this proxy covers a range of values for *covdep*. Columns (2) – (6) show estimates of the deposit insurance coverage that would minimize either the probability of banking crisis or non-performing loans (NPL). Each column is derived using coefficients from one of the regressions. Actual values of the variables interacting with *covdepint* are used to find the quadratic expression for the dependent variable as a function of *covdepint* for each country. The first order condition for a minimum is used to solve for the risk-minimizing value of *covdepint* for each regression and each country. From an economic policy point of view there is a question whether deposit insurance should be designed to minimize the risk of crisis or non-performing loans. The results show that the choice of objective makes a substantial difference.

Estimates for Western Europe in column (2) are derived from the banking crisis regression for industrialized countries in Table 7, column (6). Estimates for Eastern Europe are derived from the regression for emerging market countries in Table 7, column (8). The figures presented in column (2) refer to minimizing values for the interval variable *covdepint*. Take Austria as an example. The minimizing *covdepint* value is 1.35 while the actual *covdepint* value given to Austria is 1. Since the latter value covers a range for *covdep* we cannot draw the conclusion that Austria should increase its coverage. In column (2) the Western European countries with *covdepint* values below the minimizing estimates are Denmark, Finland, and Norway, while the only country with excessive coverage based on these estimates is Italy.

The results for Eastern Europe in the same column are more striking. Since the coefficient for the squared *covdepint* in Table 7, column (8) is negative the U-shape for emerging markets is reversed. Thus, we derive a risk-maximizing value for *covdepint*. If this value is negative, full coverage is risk-minimizing while if it is above 3, zero coverage is risk minimizing. In column 3 we obtain full coverage as risk minimizing for all Eastern European countries except Cyprus and Slovenia. Looking more closely at the input figures the differences are explained by the share of foreign ownership of bank assets. High foreign ownership implies that the country can expand the explicit coverage as noted in previous sections.

To check for consistency the same exercise is conducted using the regression coefficients in Table 7, column 4, for industrial plus emerging market countries. This regression implies the existence of a crisis-minimizing deposit insurance coverage between zero and full. The estimates are shown in column (4), Table 9. Although the estimates for Eastern Europe are less extreme, they are consistent with the results in column (2). Cyprus and Slovenia have relatively low risk

minimizing values for *covdepint*, while all the other countries have values above two and close to three. The latter figure indicates full insurance.

Specific levels for the crisis minimizing coverage per average deposits can be derived if the proxy for deposit insurance coverage is *Incovdep*, the natural log of $(1+Covdep)$, instead of *covdepint*. After making this substitution in the regressions used to derive the figures in column (2), the estimates in column (3) are derived. Although the two proxies are strongly correlated, results can be different as a result of the skewness of *Incovdep*. To make the distribution more symmetric we exclude countries with covdep-ratios above 30 in the regressions.¹¹

For Eastern Europe we obtain the same results with the new proxy for deposit insurance coverage. The results for Western Europe are different, however, and in the case of Italy contradictory. The countries that appear to have excessive coverage relative to crisis minimizing values are Germany, Greece and Italy, while Austria, Finland Luxembourg, the Netherlands, Norway, Sweden, Switzerland, and the UK should increase coverage in order to reduce the likelihood of crisis. The estimate for the UK indicates that coverage should be nearly full to minimize the probability of crisis. This result for the UK, as well as for Luxembourg, is explained by the very high foreign ownership of banks there. The result for Germany is also extreme in the sense that zero coverage seems to minimize the risk of crisis.

Turning to the NPL-minimizing values for deposit insurance coverage the results differ greatly. The regression used for calculation of NPL-minimizing values of *covdepint* is shown in Table 8, column (6), and the estimates are shown in Table 9, column (6). The estimates here indicate that all Eastern European countries should reduce their deposit insurance coverage. In Western Europe it appears that Italy and Germany should increase their coverage. The results here are very much driven by concentration in banking. High concentration seems to reduce the need for explicit deposit insurance, presumably because the implicit insurance becomes stronger. All Eastern European countries have high concentration. Most Western European countries have high concentration as well but Germany and Italy are the exceptions in this respect.

Finally, we substitute the continuous proxy for deposit insurance coverage, *Incovdep*, for the interval proxy as in the banking crisis regressions. The NPL minimizing value for covdep appears negative for all countries in column (7). Thus, all countries should have zero coverage to

¹¹ The regression results are not shown but can be obtained from the authors upon request.

minimize NPL according to these estimates. The high concentration in each country has an even stronger effect on these results than in column 6.

As a general observation the NPL minimizing values are lower than the crisis minimizing values but there are differences across countries. It is not surprising that these differences across countries exist, since banks and banking systems have different abilities to absorb non-performing loans.

Foreign ownership and concentration in the banking sector seem to be the variables that impact most strongly on the crisis-minimizing and NPL-minimizing deposit insurance schemes. Both variables reduce the need for explicit coverage. NPL is particularly sensitive to concentration. The results indicate that, given the high concentration in both Eastern and Western Europe, deposit insurance coverage could be reduced in most countries to reduce NPL. The high foreign ownership in Eastern Europe, on the other hand, enables the countries in Eastern Europe to expand deposit insurance coverage without risking banking crisis.

Should the deposit insurance scheme be designed to minimize the risk of crisis or non-performing loans? We would argue that minimizing the likelihood of banking crisis is more appropriate. Either way, the figures presented here should not be taken as decisive evaluations of deposit insurance systems but as illustrations of how the analysis of deposit insurance schemes and market discipline can be applied.

7. Summary and Conclusions

Building on research showing that there generally exists a partial deposit insurance system that maximizes the impact of market discipline on banks' risk-taking, we have analyzed how country specific conditions with respect to ownership and governance of banks interact with deposit insurance systems to determine the impact of market discipline on banks' risk-taking. The proxies we use for risk-taking are the occurrence of banking crisis during a year and non-performing loans relative to total loans. Using data for 100 countries we focus on industrial and emerging market economies.

The results indicate that the U-shaped relationship between the onset of banking crisis and deposit insurance coverage is robust when governance variables are introduced. The relationship is less robust for non-performing loans. With some specifications we obtain the

result that the risk minimizing deposit insurance scheme is either zero coverage or full coverage depending on country specific institutional characteristics.

One result with respect to governance variables is that a country's legal regime does not seem to have much impact on our proxies for risk-taking. Legal regime is a very crude indicator for governance systems, however.

The strongest and most consistent result across country groups and specifications is obtained for the role of foreign ownership of banks. The greater the share of foreign owned banks in a country, the lower is the incidence of banking crisis and non-performing loans, and this effect is stronger at high levels of deposit insurance coverage. Thus, countries with substantial foreign ownership can expand the coverage without inducing more risk-taking. It seems that banks' risk-taking behavior is determined by home country rather than host country conditions in spite of the fact that most foreign owned banks are organized as independent subsidiaries and host country deposit insurance systems apply.

The results for state ownership are weaker but generally countries with a large share of state ownership have a greater incidence of banking crisis and larger non-performing loans in relative terms. The increased risk associated with state ownership appears relatively large when the explicit deposit insurance coverage is low. The reason could be that implicit coverage is perceived as relatively strong for state-owned banks.

High concentration in the banking sector, strong minority shareholder protection and relatively high transparency also reduce banks' risk-taking by our proxies. Concentration is associated with less non-performing loans and appears to reduce the need for deposit insurance. The explanation could be that high concentration implies stronger implicit protection of depositors.

The effect of shareholder protection is relatively strong when the explicit deposit insurance coverage is low. This is additional evidence that banks respond to market discipline unless the explicit coverage is very high, and that disclosure enhances market discipline. Thus, proposed Basel II disclosure recommendations could contribute to greater market discipline in many countries.

The explicit deposit insurance coverage that minimizes the probability of banking crisis or non-performing loans depends on country specific ownership and governance conditions. We illustrated this point by using the regression results and 2003-values for ownership and

governance variables to derive the deposit insurance coverage that minimizes the probability of banking crisis or non-performing loans for each country. The coverage that minimizes the likelihood of banking crisis seems very different from the coverage minimizing non-performing loans. In Eastern Europe in particular the results are contradictory. Our estimates indicate that most countries could introduce full coverage without causing banking crisis because most banks are foreign owned. However, to minimize non-performing loans in Eastern Europe the deposit insurance coverage should be zero. Clearly, more research is needed to determine optimal deposit insurance schemes.

References

- Angkinand, Apanard (2005) "Deposit Insurance and Financial Crises: Investigation of the Cost-Benefit Trade-Off", *Claremont Working Paper*, Claremont Graduate University.
- Angkinand, Sawangngoeny, and Wihlborg (2006) "Banking Crises: Definitions and Explanations", presented at the Annual Meetings of the Western Economic Associations and prepared for a special issue of *International Interactions*.
- 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.
- 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.
- Benink, Harald and George Benston (2005) "The Future of Banking Regulation in Developed Countries: Lessons from and for Europe", *Financial Markets, Institutions & Instruments*, 14(5), 289-328.
- Benston, G.J., R.A. Eisenbeis, P.M. Horvitz, E.J. Kane and G.G. Kaufman (1986), *Perspectives on Safe and Sound Banking*, MIT Press, Cambridge, Massachusetts.
- 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.
- Bhattacharya, Sudipto, and Anjan V. Thakor (1993). "Contemporary Banking Theory." *Journal of Financial Intermediation*, 3; 2-50.
- 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 and Daniela Klingebiel (2002), "Episodes of Systemic and Borderline Financial Crises," in: Daniela Klingebiel and Luc Laeven (eds.), *Managing the Real and Fiscal Effects of Banking Crises*, World Bank Discussion Paper No. 428, Washington, D.C.
- 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.

- Claessens, Stijn, Asli Demirgüç-Kunt, and Harry Huizinga (2001). “How Does Foreign Entry Affect Domestic Banking Markets?”, *Journal of Banking and Finance*, 25(5), pp. 891–911.
- Cooper, Russell and Thomas W. Ross (2002). “Bank Runs: Deposit Insurance and Capital Requirements”, *International Economic Review* 43; 55-72.
- Crystal, Jennifer, B. Gerard dages and Linda S. Goldberg, (2001), “Does Foreign Ownership 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).
- Diamond, Douglas W. and Philip H. Dybvig (1983). “Bank Runs, Deposit Insurance, and Liquidity”, *The Journal of Political Economy*, 91(3); 401-419.
- 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
- Gropp, Reint and Jukka Vesala (2001). “Deposit Insurance and Moral Hazard: Does the Counterfactual Matter?”, *European Central Bank Working Paper* No. 47, March.
- Hoggarth, Glenn, Patricia Jackson, and Erlend Nier (2005) “Banking Crises and the Design of Safety Nets”, *Journal of Banking & Finance*, 29; 143-159.
- 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.
- 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.
- 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.

Wooldridge, Jeffrey M. (2002) *Econometric Analysis of Cross Section and Panel Data*. The MIT Press.

Table 1. Deposit Insurance Coverage (in 2003) and Governance of Banks for European Countries

Country Code	Coverage Limit (Local Currency)	Coverage Limit (Euro) [†]	Coverage Limit per Average Deposit per ^{††}	Government Ownership in 2001	Foreign Ownership in 2001	Shareholder rights	Creditor rights	Bank deposit concentration	
Western Europe									
Austria	AUT	EUR 20,000	20,000	0.84	0	19.8	2	3	33.2
Belgium	BEL	EUR 20,000	20,000	0.81	0	-	0	2	87
Denmark	DNK	DKK 300,000	40,212	2.32	0	0	2	3	80.5
Finland	FIN	EUR 25,000	25,000	1.85	0	6.2	3	1	99.7
France	FRA	EUR 70,000	70,000	3.87	0	-	3	0	70
Germany	DEU	EUR 20,000	20,000	0.79	42.2	4.3	1	3	20.9
Greece	GRC	EUR 20,000	20,000	1.67	22.8	10.8	2	1	76.2
Iceland	ISL	ISK 2,091,000	23,379	1.51	0	0	-	-	100
Ireland	IRL	EUR 20,000	20,000	0.71	-	-	4	1	.
Italy	ITA	ITL 200 Million	103,291	8.59	10	5.7	1	2	52.2
Luxembourg	LUX	EUR 20,000	20,000	0.12	5.05	94.64	-	-	27.75
Netherlands	NLD	EUR 20,000	20,000	0.68	3.9	2.2	2	2	90.7
Norway	NOR	NOK 2,000,000	238,027	5.81	0	19.2	4	2	86
Portugal	PRT	EUR 25,000	25,000	2.12	22.8	17.7	3	1	79
Spain	ESP	EUR 20,000	20,000	1.27	0	8.5	4	2	43.7
Sweden	SWE	SEK 250,000	27,564	0.92	0	1.8 ^{†††}	3	2	90
Switzerland	CHE	CHF 30,000	19,234	0.37	14.2	10.71	2	1	69
United Kingdom	GBR	GBP 35,000	49,586	1.89	0	46	5	4	24
Central and Eastern Europe									
Bulgaria	BGR	BGL 15,000	7,395	10.87	17.6	74.56	4	3	59.43
Cyprus	CYP	EUR 20,000	20,000	1.92	4.2	12.7	-	-	90.9
Czech Republic	CZE	CZK 810,025	25,057	5.10	3.8	90	3	3	77
Estonia	EST	EKK 100,000	6,391	3.13	0	98.9	3.75	4	99.4
Hungary	HUN	HUF 3,000,000	11,423	4.02	9	88.8	3	3.75	68.6
Latvia	LVA	LVL 3,000	4,410	4.07	3.2	65.2	3.5	4	69
Lithuania	LTU	LTL 45,000	12,933	12.05	12.16	78.19	3.75	3	93.4
Malta	MLT	MTL 8,400	19,500	-	0	60.04	-	-	87.55
Poland	POL	PLN 106,304.2	22,563	13.58	23.5	68.7	3	2.25	63.4
Romania	ROM	ROL 125,222,000	3,049	12.30	41.8	47.3	3	4	65.8
Slovakia	SVK	SKK 925,498.3	22,374	7.39	4.4	85.5	2.5	4	71.9
Slovenia	SVN	SIT 5,100,000	20,754	3.38	12.2	20.6	2.5	4	70.9

[†] converted using the exchange rates at the end of 2003; ^{††} The data of average per deposit per capita for Norway, Sweden, U.K. is unavailable. Therefore, the coverage limit per GDP per capita is reported for these three countries; ^{†††} data in 1999
See table (2) for sources of data

Other Industrial and Emerging Market Countries included in the sample

Industrial countries	Emerging Market Economies				
Australia	Argentina	Hong Kong	Malaysia	Peru	Thailand
Canada	Brazil	India	Mexico	Philippines	Turkey
Japan	Chile	Indonesia	Morocco	Russia	Ukraine
New Zealand	China	Israel	Nigeria	Singapore	Venezuela
United States	Colombia	Jordan	Pakistan	South Africa	Zimbabwe
	Egypt	South Korea	Paraguay	Sri Lanka	

Table 2. Data Description

Variable	Description	Source
The Onset Banking Crisis	The onset of banking crisis dummy, which is equal to 1 in a first year of each banking crisis episode (both systemic and nonsystemic banking crises), and 0 otherwise	Caprio and Klingebiel (2002)
The Onset of Systemic Banking Crisis	The onset of systemic banking crisis dummy, which is equal to 1 in a first year of each systemic banking crisis episodes, and 0 otherwise	Caprio and Klingebiel (2002)
NPLs	The ratio of bank non-performing loans to total loans (%)	IMF
Real GDP Per Capita	Real GDP per capita (constant 2000 US\$). The data is in 100 U.S.\$	WDI
Real GDP Growth Rate	Real GDP growth (annual %)	WDI
CA to GDP	Current account balance (% of GDP)	WDI
Growth of Domestic Credit	The growth rate of domestic credit provided by private sector (% of GDP)	WDI
M2 to Reserve	The ratio of money and quasi money (M2) to gross international reserves	WDI
Inflation	Inflation, consumer prices (annual %)	WDI
Real Interest Rate	Real interest rate (%)	WDI
Covdepint (Coverage Limit to Deposits per Capita–interval data)	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 is equal =0 if there is no explicit deposit insurance coverage =1 if the coverage to GDP per capita ratio is between (0,5) =1.5 if the coverage to GDP per capita ratio is between [5,10) =2 if the coverage to GDP per capita ratio is between [10,15) =2.5 if the coverage to GDP per capita ratio is greater than or equal 15 =3 if there is blanket deposit guarantee	Authors' construction Coverage to GDP per capita ratio is from Demirgüç-Kunt et al. (2005)
English, French, German, Scandinavian, Socialist Legal Origin	The dummy variable of the origin of English, French, German, Scandinavian, Socialist legal regimes	La Porta et al. (2002)
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)
Government/foreign Ownership	The fraction of the banking system's assets that are 50% or more government/foreign owned.	The World Bank Survey of Bank Regulation and Supervision, 2001
Bank deposit concentration	The degree of concentration of deposits in the 5 largest banks	Barth et al. (2004)

Table 2. Data Description (continued)

Variable	Description	Source
Private monitoring index	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)
Rated by agencies	The percentage of the top 10 banks that are rated by international credit rating agencies. This variable is one sub-component of the private monitoring index.	Barth et al. (2004)
Bank accounting	The higher value of this variable indicates more informative bank accounts.	Barth et al. (2004)
Securities restrictions	The extent to which banks may engage in underwriting, brokering, and dealing in securities, and all aspects of the mutual fund industry. The higher value indicates more restriction.	Barth et al. (2004)
Own nonfin firm restrictions	The level of regulatory restrictions on bank ownership of non-financial firms. The higher value indicates more restrictive.	Barth et al. (2004)
Law	The rule of law and order index with the scale of 1-6; high values indicate better quality of law and order.	International Country Risk Guide
Lack of Corruption	The lack of corruption index with the scale of 1-6; high values indicate less corruption.	International Country Risk Guide
PCA (Prompt Corrective Power)	This variable is constructed by summing 6 survey questions relating to bank intervention powers (yes=1, no=0). This variable is then multiplied by 1 for a country with formally established law that identifies pre-determined levels of bank solvency deterioration which force automatic action such as intervention. PCP variable is scaled 0-6.	Barth et al. (2004)

Table 3. Correlation for Governance and Institutional Variables

	Covdepint	GDP per Cao	English origin	French origin	German origin	Scandinavian origin	Socialist origin	Govt ownership	Foreign Ownership	Shareholder rights	Creditor rights	Bank deposit concentration	Private monitoring index	Rated by agencies	Bank accounting	Securities restrictions	Own nonfin firm restrictions	PCA	Law
GDP per Cap	0.33	1.00																	
English origin	-0.01	0.12	1.00																
French origin	0.00	-0.34	-0.59	1.00															
German origin	0.07	0.40	-0.17	-0.26	1.00														
Scandinavian origin	0.20	0.42	-0.13	-0.21	-0.06	1.00													
Socialist origin	-0.15	-0.22	-0.24	-0.38	-0.10	-0.08	1.00												
Govt ownership	0.01	-0.30	-0.08	-0.08	0.02	-0.16	0.30	1.00											
Foreign Ownership	-0.22	-0.19	-0.05	0.07	-0.18	-0.16	0.19	-0.29	1.00										
Shareholder rights	-0.07	0.06	0.49	-0.44	-0.19	-0.01	0.13	-0.12	0.05	1.00									
Creditor rights	-0.36	-0.30	0.31	-0.44	0.04	-0.10	0.28	0.17	0.09	0.05	1.00								
Bank deposit concentration	-0.15	-0.19	0.02	-0.03	-0.26	0.28	0.03	0.02	0.03	-0.14	-0.17	1.00							
Private monitoring index	0.20	0.37	0.38	-0.30	0.02	0.02	-0.09	-0.02	-0.12	0.41	0.04	-0.05	1.00						
Rated by agencies	0.34	0.50	-0.02	-0.03	0.20	-0.06	-0.04	0.02	-0.25	0.11	-0.25	-0.29	0.56	1.00					
Bank accounting	0.08	0.09	0.16	0.03	-0.19	-0.12	-0.04	-0.16	0.09	0.11	-0.04	-0.04	0.55	0.15	1.00				
Securities restrictions	-0.02	-0.29	-0.08	0.00	-0.14	0.07	0.16	0.18	-0.13	0.05	0.17	0.16	-0.12	-0.17	-0.08	1.00			
Own nonfin firm restrictions	-0.12	-0.34	-0.03	0.05	-0.13	-0.13	0.14	0.22	-0.10	0.00	0.24	0.10	-0.06	-0.09	-0.09	0.68	1.00		
PCA	0.09	-0.17	-0.25	0.18	0.10	-0.16	0.10	0.01	0.05	-0.08	0.08	-0.03	0.05	0.15	0.03	0.19	0.21	1.00	
Law	0.11	0.62	0.06	-0.34	0.19	0.30	0.11	-0.19	-0.04	0.11	-0.04	0.04	0.28	0.41	0.05	-0.23	-0.21	-0.16	1.00
Lack of corruption	0.07	0.59	0.01	-0.24	0.18	0.42	-0.06	-0.23	-0.04	0.07	-0.17	0.16	0.20	0.29	0.12	-0.17	-0.24	-0.24	0.59

Table 4 Risk-taking Proxies and Explicit Deposit Insurance Coverage (from AW 2005)

This table shows the results of the relationship between explicit deposit insurance coverage (Covdepint) and banks' risk-taking. Risk-taking is proxied by the onset of banking crises and the ratio of non-performing loans to total loans. Banking crisis regressions are estimated using the logit model; standard errors are robust and clustered standard errors within country. NPLs regressions are estimated using the random country effects model. *, ** 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.

Dependent Variable	The Onset of Banking Crisis				NPLs	
	All	Ind & Emg	Ind	Emg	All	Ind & Emg
Sample	(1)	(2)	(3)	(4)	(5)	(6)
Real GDP Growth t_{-1}	-0.056** (0.017)	-0.086* (0.079)	-0.179# (0.153)	-0.070# (0.170)	-0.414** (0.000)	-0.431** (0.000)
CA to GDP t_{-1}	0.011 (0.335)	-0.082* (0.069)	-0.243** (0.000)	-0.031 (0.497)	0.016 (0.792)	0.104# (0.213)
Growth of Dom Credit t_{-1}	0.511** (0.000)	0.223 (0.589)	0.924** (0.017)	0.094 (0.859)	-0.112 (0.928)	0.526 (0.651)
M2 to Reserve t_{-1}	0.006** (0.024)	0.012 (0.508)	0.029 (0.349)	0.015 (0.494)	-0.157** (0.050)	-0.104 (0.210)
Inflation t_{-1}	-0.001 (0.485)	-0.002 (0.466)	0.061# (0.126)	-0.002 (0.483)	0.009# (0.117)	0.010* (0.096)
Real Interest Rate t_{-1}	0.003 (0.577)	0.000 (0.977)	-0.003 (0.612)	-0.004 (0.836)	0.074** (0.027)	0.121** (0.007)
Covdepint t_{-1}	-1.224** (0.009)	-1.467** (0.003)	-0.714 (0.439)	-0.875# (0.256)	-1.911# (0.272)	-2.702# (0.148)
(Covdepint \times Covdepint) t_{-1}	0.450** (0.007)	0.537** (0.002)	0.366# (0.162)	0.331# (0.238)	0.678# (0.227)	0.611# (0.286)
Constant	-2.759** (0.000)	-2.435** (0.000)	-3.832** (0.000)	-2.349** (0.000)	13.259** (0.000)	12.210** (0.000)
N	1646	726	311	415	433	298
Pseudo-R2/Within R2	0.029	0.054	0.187	0.021	0.082	0.122
Chi-Square	28.385	27.368	143.500	7.995	38.538	37.512
Prob>Chi-Square	0.000	0.001	0.000	0.434	0.000	0.000

Table 5 Deposit Insurance Coverage, Institutional Quality and Legal Regimes

This table reports the estimation results of the impact of corporate governance on banks' risk-taking and how it depends on deposit insurance coverage (Covdepint). Risk-taking is proxied by the onset of banking crises and the ratio of non-performing loans to total loans. Corporate governance variables are captured by the real GDP per capital and the dummy of the origin of legal regimes (English-common-law, French-, German-, Scandinavian-, and Socialist-civil-law). Banking crisis regressions are estimated using the logit model; standard errors are robust and clustered standard errors within country. NPLs regressions are estimated using the random country effects model. *, ** 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.

Dependent Variable	The Onset of Banking Crises								NPLs	
	All		Ind & Emg		Ind		Emg		All	Ind & Emg
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Real GDP Growth _{t-1}	-0.055** (0.018)	-0.078* (0.060)	-0.089* (0.055)	-0.073# (0.117)	-0.308* (0.097)	-0.331# (0.303)	-0.064# (0.185)	-0.055# (0.237)	-0.429** (0.000)	-0.456 (0.000)
CA to GDP _{t-1}	0.017# (0.164)	-0.026# (0.314)	-0.068# (0.175)	-0.087# (0.167)	-0.358** (0.001)	-0.593** (0.028)	-0.015 (0.741)	-0.018 (0.707)	0.173** (0.012)	0.265 (0.004)
Growth of Dom Credit _{t-1}	0.507** (0.000)	0.644** (0.001)	0.331 (0.457)	0.150 (0.761)	0.616# (0.131)	1.216** (0.016)	0.042 (0.931)	-0.286 (0.609)	0.791 (0.554)	1.122 (0.388)
M2 to Reserve _{t-1}	0.006** (0.013)	0.010* (0.082)	0.015 (0.499)	0.018 (0.439)	0.081* (0.057)	0.070# (0.196)	-0.005 (0.818)	0.004 (0.862)	0.020 (0.839)	0.059 (0.560)
Real Interest Rate _{t-1}	0.005 (0.458)	0.006 (0.409)	0.004 (0.612)	-0.006 (0.786)	-0.018# (0.141)	0.068 (0.523)	-0.001 (0.963)	0.003 (0.881)	0.067* (0.076)	0.160** (0.003)
Inflation _{t-1}	-0.001 (0.447)	-0.003# (0.160)	-0.002 (0.350)	-0.003 (0.393)	0.146** (0.008)	0.284* (0.051)	-0.002 (0.517)	-0.001 (0.629)	0.006 (0.335)	0.011* (0.085)
Covdepint _{t-1}	-1.068** (0.031)	-1.326** (0.016)	-1.584** (0.003)	-1.182* (0.060)	0.277 (0.897)	-2.972 (0.341)	-1.172# (0.102)	-0.788 (0.290)	1.936 (0.355)	1.124 (0.623)
(Covdepint × Covdepint) _{t-1}	0.423** (0.032)	0.513** (0.019)	0.587** (0.005)	0.499** (0.029)	0.963** (0.027)	2.197** (0.042)	0.344# (0.292)	0.315 (0.345)	-0.690# (0.275)	-0.886# (0.203)
Real GDP per Capita _{t-1}	-0.003 (0.379)	-0.006* (0.069)	-0.004# (0.259)	-0.005# (0.115)	0.038** (0.000)	0.075* (0.053)	-0.017** (0.013)	-0.016* (0.097)	-0.069** (0.000)	-0.071* (0.000)
(GDP per cap × Covdepint) _{t-1}	0.000 (0.939)	0.000 (0.958)	0.000 (0.918)	0.000 (0.849)	-0.014* (0.096)	-0.016# (0.246)	0.007 (0.464)	0.012# (0.242)	0.009# (0.179)	0.013** (0.049)
French		-0.266 (0.544)		0.258 (0.638)		2.713 (0.427)		0.291 (0.647)	-3.855# (0.165)	0.317 (0.920)
German		0.843# (0.113)		0.938* (0.086)		0.961 (0.485)		0.825* (0.078)	-0.817 (0.846)	0.510 (0.905)
Scandinavian		1.053# (0.141)		1.069# (0.132)		-1.243 (0.452)		-	-2.376 (0.628)	-1.262 (0.800)
Socialist		0.429# (0.311)		0.265 (0.549)		-		-0.161 (0.767)	-2.526 (0.389)	0.256 (0.936)
(French × Covdepint _{t-1})		-0.141 (0.666)		-0.142 (0.733)		1.508# (0.220)		-0.678# (0.150)	-0.402 (0.731)	-1.470# (0.298)
Constant	-2.662** (0.000)	-2.143** (0.000)	-2.166** (0.000)	-2.466** (0.000)	-11.775** (0.000)	-21.143** (0.017)	-1.604** (0.002)	-2.004 (0.000)	18.595** (0.000)	16.807** (0.000)
N	1640	927	700	646	285	267	415	379	336	258
Pseudo-R2/Within R2	0.033	0.075	0.065	0.071	0.334	0.469	0.055	0.059	0.113	0.204
Chi-Square	30.389	56.342	31.678	38.352	36.62	39.59	15.587	17.37	79.999	81.374
Prob>Chi-Square	0.001	0.000	0.000	0.001	0.000	0.000	0.112	0.183	0.000	0.000

Table 6 Deposit Insurance Coverage, Institutional Quality and Ownership.

This table reports the estimation results of the impact of corporate governance on banks' risk-taking and how it depends on deposit insurance coverage (Covdepint). Risk-taking is proxied by the onset of banking crises and the ratio of non-performing loans to total loans. Corporate governance variables are captured by the extent of state and foreign ownerships of banks. Banking crisis regressions are estimated using the logit model; standard errors are robust and clustered standard errors within country. NPLs regressions are estimated using the random country effects model. *, ** 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.

Dependent Variable	The Onset of Banking Crises				NPLs	
	All	Ind & Emg	Ind	Emg	All	Ind & Emg
Sample	(1)	(2)	(3)	(4)	(5)	(6)
Real GDP Growth _{t-1}	-0.096** (0.006)	-0.113** (0.027)	-0.359# (0.267)	-0.095# (0.125)	-0.409** (0.000)	-0.476** (0.000)
CA to GDP _{t-1}	0.017# (0.315)	-0.073# (0.178)	-0.407** (0.000)	-0.009 (0.863)	0.135** (0.039)	0.223* (0.057)
Growth of Dom Credit _{t-1}	0.178 (0.625)	0.361 (0.456)	0.851# (0.288)	0.163 (0.790)	0.505 (0.696)	1.097 (0.640)
M2 to Reserve _{t-1}	0.026# (0.198)	-0.010 (0.753)	0.061 (0.500)	-0.006 (0.871)	-0.029 (0.793)	0.689* (0.099)
Real Interest Rate _{t-1}	-0.002# (0.283)	-0.003# (0.248)	0.126 (0.342)	-0.003 (0.401)	0.072** (0.030)	0.073# (0.248)
Inflation _{t-1}	0.006 (0.507)	0.002 (0.863)	-0.011 (0.563)	-0.005 (0.774)	0.007# (0.219)	0.004 (0.575)
Covdepint _{t-1}	-0.960# (0.217)	-0.594 (0.459)	-0.582 (0.839)	0.639 (0.466)	-0.125 (0.955)	-0.246 (0.938)
(Covdepint × Covdepint) _{t-1}	0.460* (0.080)	0.473# (0.111)	1.049# (0.114)	-0.084 (0.754)	-0.213 (0.751)	-0.926# (0.275)
Real GDP per Capita _{t-1}	0.000 (0.985)	-0.002 (0.583)	0.036* (0.050)	-0.023* (0.052)	-0.059** (0.000)	-0.075** (0.008)
(GDPpercap × Covdepint) _{t-1}	-0.001 (0.525)	-0.001 (0.769)	-0.015** (0.019)	0.038** (0.000)	0.007# (0.209)	0.020 (0.371)
State Ownership _{t-1}	0.010** (0.041)	0.015* (0.083)	0.011 (0.770)	0.015# (0.232)	0.045# (0.255)	0.034 (0.560)
(State Own × Covdepint) _{t-1}	-0.002 (0.645)	-0.010# (0.168)	0.002 (0.807)	-0.009# (0.142)	-0.008 (0.710)	0.003 (0.941)
Foreign Ownership _{t-1}	0.007# (0.121)	0.010# (0.229)	-0.015# (0.180)	0.026** (0.027)	-0.064** (0.048)	-0.107** (0.046)
(Foreign Own × Covdepint) _{t-1}	-0.013# (0.159)	-0.026** (0.007)	0.086* (0.075)	-0.082** (0.000)	0.017 (0.361)	0.019 (0.512)
Constant	-3.094** (0.000)	-2.558** (0.000)	-10.872* (0.057)	-2.445** (0.021)	17.115** (0.000)	18.385** (0.000)
N	1132	618	234	384	372	189
Pseudo-R2/Within R2	0.050	0.091	0.380	0.183	0.116	0.293
Chi-Square	43.133	38.268	54.680	55.267	72.913	60.575
Prob>Chi-Square	0.000	0.000	0.000	0.000	0.000	0.000

Table 7 Deposit Insurance Coverage, Ownership, Institutional Quality and Supervision

This table reports the estimation results of the impact of corporate governance on banks' risk-taking and how it depends on deposit insurance coverage (Covdepint). Risk-taking is proxied by the onset of banking crises and the ratio of non-performing loans to total loans. Corporate governance variables are captured by the extent of state and foreign ownerships of banks. Regressions control for the quality of domestic institutions (rule of law and lack of corruption) and supervisors' prompt corrective action (PCA). Macroeconomic control variables (the same set as in tables 4-6) are included in regressions, but not reported. Banking crisis regressions are estimated using the logit model; standard errors are robust and clustered standard errors within country. NPLs regressions are estimated using the random country effects model. *, ** 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.

Dependent Variables	The Onset of Banking Crises								NPLs			
	All		Ind & Emg		Ind		Emg		All		Ind & Emg	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Covdepint _{t-1}	-0.752# (0.316)	-0.996# (0.206)	-0.959 (0.3341)	-1.012# (0.266)	22.292** (0.021)	-1.745 (0.734)	0.141 (0.952)	-1.651 (0.451)	-0.520 (0.823)	0.644 (0.785)	-6.130** (0.032)	-1.900 (0.468)
(Covdepint × Covdepint) _{t-1}	0.471* (0.064)	0.478* (0.075)	0.453* (0.096)	0.564* (0.057)	2.513# (0.236)	2.926** (0.004)	-0.120 (0.808)	-0.197 (0.658)	-0.379 (0.533)	-0.431 (0.473)	0.134 (0.834)	0.044 (0.942)
State Ownership _{t-1}	0.016** (0.007)	0.016** (0.006)	0.018** (0.031)	0.013# (0.188)	0.126# (0.128)	0.062# (0.173)	0.028** (0.005)	0.014# (0.229)	0.085** (0.027)	0.045# (0.220)	0.058# (0.177)	0.017 (0.699)
(State Own × Covdepint) _{t-1}	-0.001 (0.867)	-0.001 (0.826)	-0.008 (0.361)	-0.008 (0.358)	-0.072# (0.215)	-0.019 (0.419)	-0.006 (0.676)	0.003 (0.879)	-0.021 (0.386)	-0.000 (0.994)	-0.011 (0.665)	0.012 (0.635)
Foreign Ownership _{t-1}	0.013** (0.036)	0.013** (0.036)	0.013# (0.164)	0.012# (0.167)	-0.065** (0.004)	-0.028** (0.048)	0.035** (0.003)	0.035** (0.002)	-0.024 (0.434)	-0.036# (0.226)	-0.095** (0.024)	-0.091** (0.025)
(Foreign Own × Covdepint) _{t-1}	-0.019** (0.028)	-0.017* (0.058)	-0.028** (0.001)	-0.027** (0.000)	0.040 (0.369)	0.021 (0.675)	-0.046** (0.001)	-0.065** (0.000)	-0.016 (0.424)	-0.009 (0.630)	0.013 (0.565)	0.012 (0.580)
Law _{t-1}	-0.001 (0.995)		-0.155 (0.454)		6.462** (0.028)		-0.390# (0.180)		-2.147** (0.007)		-3.217** (0.001)	
(Law × Covdepint) _{t-1}	-0.085 (0.382)		0.020 (0.900)		-5.115** (0.000)		0.153 (0.544)		0.778** (0.028)		1.597** (0.000)	
Lack of Corruption _{t-1}		0.003 (0.989)		-0.216 (0.484)		0.386 (0.797)		-0.747* (0.096)		-3.068** (0.001)		-4.340** (0.000)
(Lack Corrupt × Covdepint) _{t-1}		-0.048 (0.693)		-0.025 (0.889)		-1.254** (0.019)		0.953** (0.030)		0.432 (0.374)		0.625# (0.183)
PCA _{t-1}	0.035 (0.573)	0.035 (0.620)	-0.013 (0.891)	-0.036 (0.756)	0.771* (0.098)	1.623** (0.018)	-0.097 (0.358)	-0.171# (0.181)	0.682# (0.109)	0.350 (0.407)	1.304** (0.010)	0.686# (0.143)
(PCA × Covdepint) _{t-1}	0.016 (0.844)	0.024 (0.804)	0.079 (0.427)	0.060 (0.498)	1.293# (0.296)	-0.059 (0.929)	0.136 (0.482)	0.237 (0.385)	-0.161 (0.442)	-0.090 (0.665)	-0.539** (0.029)	-0.406* (0.085)
Constant	-3.220** (0.000)	-3.231** (0.000)	-2.043# (0.103)	-1.889# (0.190)	-40.931** (0.017)	-4.268 (0.650)	-1.772# (0.286)	-0.794 (0.696)	17.171** (0.000)	18.809** (0.000)	23.325** (0.000)	24.114** (0.000)
N	890	890	606	606	234	234	372	372	339	339	256	256
Pseudo-R2/Within R2	0.071	0.069	0.102	0.107	0.538	0.477	0.148	0.184	0.165	0.144	0.278	0.226
Chi-Square	50.925	50.881	51.339	63.129	67.77	48.79	54.334	49.861	68.187	75.527	81.862	92.141
Prob>Chi-Square	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 8 Deposit Insurance Coverage, Ownership, Shareholder and Creditor Rights, Market Monitoring

This table reports the estimation results of the impact of corporate governance on banks' risk-taking and how it depends on deposit insurance coverage (Covdepint). Risk-taking is proxied by the ratio of non-performing loans to total loans. The additional aspects of corporate governance variables include shareholders' and creditors rights, the deposit concentration of banking systems, financial disclosure (proxied by private monitoring index), and the restrictions of banks' activities. NPLs regressions are estimated using the random country effects model. *, ** 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.

Dependent Variable is NPLs

	All			Ind & Emg		
	(1)	(2)	(3)	(4)	(5)	(6)
Covdepint _{t-1}	-5.086** (0.036)	-7.484 (0.421)	-11.666** (0.004)	-4.139# (0.121)	-10.555 (0.363)	-7.927* (0.085)
(Covdepint × Covdepint) _{t-1}	1.852** (0.015)	2.257** (0.016)	2.393** (0.003)	1.227# (0.126)	1.137# (0.281)	1.281# (0.148)
State Ownership	0.039 (0.342)	-0.030 (0.689)	0.026 (0.542)	0.080* (0.089)	0.007 (0.933)	0.067# (0.195)
Foreign Ownership	-0.003 (0.905)	-0.144** (0.006)	-0.128** (0.007)	-0.019 (0.574)	-0.092# (0.112)	-0.073# (0.172)
Deposit concentration	-0.169** (0.003)	-0.211** (0.002)	-0.224** (0.000)	-0.158** (0.009)	-0.175** (0.009)	-0.176** (0.011)
Shareholder rights	-1.666* (0.058)	-2.897* (0.079)	-2.062# (0.133)	-1.345# (0.171)	-2.683# (0.117)	-1.979# (0.202)
Creditor rights	-1.483* (0.078)	0.118 (0.936)	-0.886# (0.288)	-0.797 (0.409)	0.421 (0.800)	-0.372 (0.700)
Private monitoring index	-1.542* (0.058)	-1.067 (0.420)	-1.653* (0.053)	-1.123# (0.256)	-1.508 (0.376)	-1.269# (0.242)
Securities restrictions	0.714 (0.627)			2.439# (0.207)		
(Foreign Own × Covdepint) _{t-1}		0.090** (0.008)	0.086** (0.003)		0.038# (0.305)	0.026 (0.455)
(Deposit Conc × Covdepint) _{t-1}		0.041** (0.036)	0.046** (0.014)		0.036* (0.056)	0.038** (0.043)
(Shareholder × Covdepint) _{t-1}		0.818 (0.391)	0.325 (0.692)		1.024# (0.293)	0.607 (0.495)
(Creditor × Covdepint) _{t-1}		-0.602 (0.456)			-0.507 (0.566)	
(State Own × Covdepint) _{t-1}		0.034 (0.430)			0.040 (0.363)	
(Priv monitor × Covdepint) _{t-1}		-0.469 (0.580)			0.268 (0.811)	
Constant	48.018** (0.000)	51.361** (0.000)	56.506** (0.000)	36.424** (0.001)	48.227** (0.004)	44.913** (0.000)
N	200	193	193	170	163	163
Within R2	0.098	0.165	0.144	0.191	0.229	0.212
Chi-Square	61.243	67.998	71.449	57.908	59.163	56.610
Prob>Chi-Square	0.000	0.000	0.000	0.000	0.000	0.000

Table 9. Comparing Actual and Risk-minimizing Explicit Deposit Insurance Coverage in Europe (2003) Column (1) shows the actual levels of coverage per average deposit, *Covdep*, and the corresponding *Covdepint* value in parenthesis. Column (2) shows the level of *Covdepint* that minimizes the prob. of banking crisis based on regressions for industrial countries in Table 7, col. (6) and regressions for emerging markets in Table 7, col (8). Column 3 shows the *Covdep* that minimizes prob. of crisis based on the same regressions as in column (2) but *lnCovdep* was substituted for *Covdepint*. Column (4) is comparable with Column (2) but estimates are based on one regression for both industrial and emerging market countries. Col. (5) shows the *Covdepint* that minimizes NPL based on regression in Table 8 column (6). *Covdep* values minimizing NPL in column (6) are based on the same regression as column (5) but *lnCovdep* substitutes for *Covdepint*. *Covdepint* is defined over intervals of *Covdep* (see Table 2) while *lnCovdep* is $\ln(1+ Covdep)$. NPL = Non Performing Loans⁷/total loans.

Country	(1) Actual Coverage Limit per Average Deposit (<i>Covdepint</i>)	(2) <i>Covdepint</i> minimizing prob. of crisis, based on Table 7, col. 6 for W. Europe. Col. 8 for E. Europe	(3) <i>Covdep</i> minimizing prob. of crisis; regression as in col. (2) but <i>lnCovdep</i> is coverage proxy	(4) <i>Covdepint</i> minimizing prob of crisis; based on Table 7, col 4, ind+emg.	(5) <i>Covdepint</i> minimizing NPL based on Table 8, col. 6; sample of ind + emg	(6) <i>Covdep</i> minimizing NPL from regression as in col. (7) but <i>lnCovdep</i> is proxy fro coverage
Western Europe						
Austria	0.8 (1)	1.4	5.6	1.2	2.0	Zero
Belgium	0.8 (1)	-	-	-	-	-
Denmark	2.3 (1)	1.5	1.9	0.9	1.5	Zero
Finland	1.9 (1)	1.6	5.1	1.1	1.0	Zero
France	3.9 (1)	-	-	-	-	-
Germany	0.8 (1)	1.3	zero	1.4	2.5	Zero
Greece	1.7 (1)	0.9	0.6	1.4	1.5	Zero
Iceland	1.5 (1)	1.3	0.9	0.8	-	-
Ireland	0.7 (1)	-	-	-	-	-
Italy	8.6 (1.5)	0.9	0.8	1.2	2.0	Zero
Luxembourg	0.1 (1)	1.1	Full	Full	-	-
Netherlands	0.7 (1)	1.4	2.5	1.1	1.4	Zero
Norway	5.8 (1.5)	1.3	10.8	1.4	1.8	Zero
Portugal	2.1 (1)	1.1	2.5	1.6	1.1	Zero
Spain	1.3 (1)	1.1	1.7	1.0	1.5	Zero
Sweden	0.9 (1)	1.5	3.5	1.1	1.1	Zero
Switzerland	0.4 (1)	1.3	2.8	1.4	1.6	Zero
United Kingdom	1.9 (1)	1.2	41.6	1.9	1.1	Zero
Central and Eastern Europe						
Bulgaria	10.9 (2)	Full	Full	2.9	0.6	Zero
Cyprus	1.9 (1)	Zero	Zero	1.2	-	-
Czech Rep	5.1 (1.5)	Full	Full	Full	0.4	Zero
Estonia	3.1 (1.5)	Full	Full	Full	Zero	Zero
Hungary	4.0 (1)	Full	Full	2.9	0.6	Zero
Latvia	4.0 (1)	Full	Full	2.5	0.7	Zero
Lithuania	12.1 (2)	Full	Full	2.6	0.2	Zero
Malta	-	Full	Full	2.1	-	-
Poland	13.6 (2)	Full	Full	2.6	0.8	Zero
Romania	12.3 (2)	Full	Full	2.3	1.0	Zero
Slovakia	7.4 (1.5)	Full	Full	2.7	0.7	Zero
Slovenia	3.4 (1)	Zero	Zero	1.3	1.3	Zero

Figure 1. Hypothesized relationships between explicit deposit insurance coverage (EC) and risk-taking (RT) and the impact of institutional and banks' ownership variables.

This figure shows the relationship between market discipline as measured by Risk-taking (RT) and Explicit Deposit Insurance Coverage (EC). The line Explicit is drawn at a constant degree of credibility of non-insurance (CNI). The line Implicit is drawn at a constant level risk taking caused by explicit deposit insurance coverage. The two lines are added vertically.

The line Implicit \times Institution shows how the curve Implicit shifts as a result of institutions (and bank ownerships and financial supervisions) enhancing the CNI. The top dotted line is the vertical sum of Explicit and Implicit. The lower dotted line is the vertical sum of Explicit and Implicit \times Institution

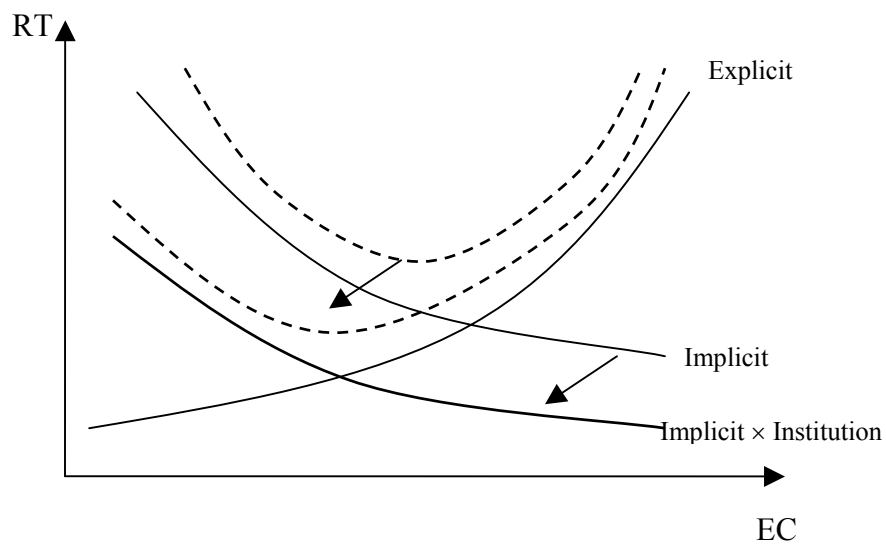
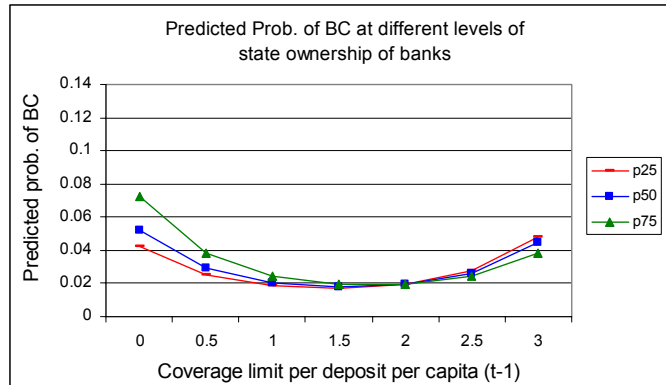


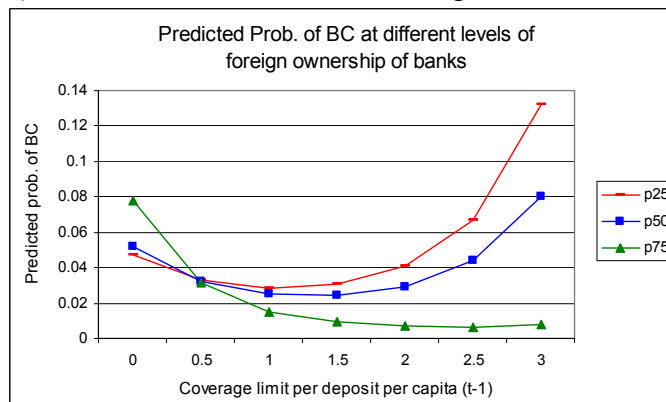
Figure 2 Risk-taking at different levels of deposit insurance coverage and corporate governance

Figures below plot the predicted values of banking crises and NPLs from selected regressions at different levels of coverage limit of deposit per capita. The predicted values are calculated by varying the levels of selected governance variables (at the 25th, 50th, and 75th percentiles) and using the mean values of other independent variables.

a) Predicted values are based on regression 3, table 7



b) Predicted values are based on regression 3, table 7



c) Predicted values are based on regression 6, table 8

