

Bank stability, transparency and the safety net

Erlend W. Nier¹

Abstract:

Using bank-level data for over 500 banks in 32 different countries over the years 1994-2000, we relate the likelihood of a severe banking problem – as indicated by a dramatic decline in a bank's stock price – to both the existence of a deposit insurance scheme and to bank transparency. The new approach presented to address the issue also controls for a number of macro- as well as bank-level factors that might also play a role in affecting the likelihood of a severe banking problem. The results indicate that while the effect of deposit insurance on financial stability depends on the particular design features of the regime, bank transparency unambiguously reduces the chance of severe banking problems. These results are strongest for economies in which the financial and institutional environment is relatively weak and the potential for moral hazard and asymmetric information is relatively high. Overall, the results suggest that improvements in bank transparency, as could be brought about by requirements on banks to disclose information, may be an important and effective tool to enhance banking system stability.

Key words: Banking Crises, Transparency, Deposit insurance

JEL Classification: G21, G28, G30

¹ Correspondence address: Erlend Nier, Bank of England, Threadneedle Street, London EC2R 8AH, United Kingdom. Tel: +44 207 6013239, erlend.nier@bankofengland.co.uk. I thank participants of the 2004 European Finance Association conference in Maastricht and the 2004 Federal Reserve Bank of Atlanta conference on Regulation and Financial Stability for their comments. All errors or omissions are those of the author. The views expressed in this paper are those of the author and do not necessarily represent those of the Bank of England.

1. Introduction

Episodes of financial instability throughout the 1990s in countries as diverse as Japan (1990s), Mexico (1994) and the East Asian and South East Asian economies (1997) have heightened the concern among policymakers that the financial sector can be prone to banking problems and crises. Despite this, there is little agreement as to what structural causes may lie behind episodes of banking problems and what structural policies might therefore help to reduce the incidence of crises. This paper attempts to contribute to this important academic and policy debate by providing some new evidence on the role of two key structural factors: the safety net (deposit insurance) and bank transparency. In contrast to much of the literature that analyses structural features at the country level, this study analyses the impact of structural features at the bank-level, resulting in a large number of observations and improved statistical power, compared to existing cross-country studies.

In the wake of recent banking crises, a number of official bodies, including the IMF (see Fischer, 1999), and the Basel Committee on Banking Supervision (2003) have called for increased transparency of banking firms. These calls relate to the suspicion that ‘recent crises owe some of their intensity to a general lack of transparency about the sizes of positions that had been built up by both borrowers and lenders’ and that ‘practices and policies responsible for the depth of recent crises would not have been undertaken, had they been required to be made public’ (Fischer, 1999, p. 563). As a policy response, the stated aim of Pillar 3 disclosures introduced by the revised Basel Accord is to provide incentives for banks to ‘more prudently manage their risks’. However, despite these efforts, to date there is hardly any evidence on the beneficial effect of transparency on bank stability. In addition, there could be an important trade-off. In particular, while enhanced transparency may improve banks’ incentives *ex ante*, it may be less clear whether transparency is necessarily a good thing *ex post*, when a bank might have hit hard times and provision of information could have a destabilising effect. Furman and Stiglitz (1998), for example, suggest that ‘greater transparency would have greatly aggravated the banking crisis in the United States in the 1980s, because many major banks would have had to shut down, greatly curtail their lending or receive substantial injections of equity’ (p. 69).

There is little agreement, moreover, as regards the benefits of deposit insurance for financial stability. In an attempt to stem off systemic crises, a large and increasing number of countries rely on explicit deposit insurance schemes (Garcia (1999), Demirgüç-Kunt and Kane (2002)). However, there could be an important trade-off, here as well. Deposit insurance schemes may reduce the likelihood of a depositor run and may thus be beneficial *ex post*. At the same time, as a number of authors, eg Krugman (1998), have

pointed out, deposit insurance schemes may create adverse incentives *ex ante*, which might increase the likelihood of financial crises by increasing the incentive for banks to take excessive risks.

As argued by Eichengreen and Arteta (2000), the available cross-country evidence on the effect of deposit insurance on bank stability, while already extensive, has not been conclusive. As for the effect of transparency, the existing cross-country evidence is as yet very limited and likewise, arguably does not admit any firm conclusions. This paper starts by observing that existing cross-country research has remained inconclusive for a number of reasons. First, most of the existing literature defines episodes of financial instability at the country-level, using a definition of a banking crisis that may require considerable judgement in its application to particular cases². Indeed, a number of ‘competing’ lists of banking crises exist that differ in detail. Eichengreen and Arteta (2000) showed how these differences appear to affect the results of cross-country research into the causes of such crises. Second, structural factors, such as the extent of depositor protection and the degree of bank transparency, are inherently difficult to measure. The degree of bank transparency is multi-dimensional and particularly hard to capture empirically, see, for example Bushman and Smith (2003). Third, the incidence of banking problems is likely to be affected by a large number of factors, including macro-economic influences which should be controlled for in empirical work. Finally, in the face of these difficulties the marginal impact of structural factors is likely to be difficult to isolate in a cross-country set-up that offers only a relatively small number of observations on the dependent (crisis) variable, as well as on independent structural factors, such as provided by a cross-country measure of transparency.

This paper addresses some of these difficulties and assesses the marginal effect of structural factors on the likelihood of bank instability using panel-data techniques applied to bank-level data. Our dataset covers 550 banks in 32 different countries over the years 1994-2000. Using this dataset we examine banking problems at the bank level, using a market indicator of financial distress. In particular, we assess the likelihood of a bank experiencing a dramatic fall in its stock price in any given year and relate the likelihood of such an event –which we take as indicative of a severe banking problem - for any particular bank and in any particular year to structural factors, while controlling for macro- as well as bank-level factors that might also play a role in affecting the likelihood of such a bank-level crisis event. Using bank-level data and exploiting the time dimension in a panel data set-up results in a dramatic increase in statistical power due to an increase in the number of observations as compared with cross-country studies. This enables us to isolate the effects of both deposit insurance and transparency. In particular, we make use of bank-level information on disclosure that is derived from the BankScope database. Using these data we construct an index that is based on whether a bank discloses a number of dimensions of its

² This has been emphasised by Caprio and Klingebiel (2003).

risk exposure, covering 17 categories related to interest rate risk, credit risk, liquidity risk and market risk. This information enables us to measure transparency bank by bank and in each year of the sample.

Our results indicate that the effect of deposit insurance on the likelihood of banking problems will depend on the particular design features of the scheme. While deposit insurance per se appears to reduce the likelihood of crisis, when compared to a regime with implicit deposit insurance, schemes that afford unlimited coverage to depositors increase the likelihood of crises. By contrast, bank transparency unambiguously reduces the chance of severe banking problems. These results are strongest for economies in which the financial and institutional environment is relatively weak and the potential for moral hazard and asymmetric information is relatively high. This suggests that improvements in bank transparency, as could be brought about by requirements on banks to disclose information, may be an important and effective device to promote financial stability.

The remainder of this paper is organised as follows. Section 2 offers some conceptual background and section 3 describes prior empirical literature. Section 4 outlines our research strategy, setting out in detail the way we measure transparency and the incidence of banking problems. Section 5 presents the main empirical results. Section 6 offers a number of extensions that aim to shed light on the conditions under which transparency and deposit insurance design features might become particularly important. Section 7 discusses a number of further robustness checks, before section 8 summarises our findings and concludes.

2. Conceptual background

To motivate further our interest in deposit insurance and transparency on bank stability this section briefly reviews the extant theoretical literature linking these factors to stability. This shows that both deposit insurance and transparency may have conflicting *ex ante* and *ex post* effects on bank stability.

Transparency

A number of recent papers have explored the idea that transparency could have beneficial *ex ante* effects on bank stability, see for example Cordella and Yeyati (1998), Boot and Schmeits (2000) and Hyytinen and Takalo (2003). The main idea is that increased transparency enhances market discipline on banks. And the key argument is that bank transparency increases the sensitivity of a bank's funding terms to the risk it takes and that this can create incentives for the bank to control its risk (*ex ante* discipline). This logic holds if deposits are not fully insured. But it also applies more generally to the part of a bank's funding that is not covered by deposit insurance, such as subordinated debt and inter-bank liabilities.

While these studies suggest that increasing the level of transparency may reduce bank risk-taking and improve bank stability *ex ante*, it may be less clear whether transparency is beneficial *ex post*, ie when an adverse shock has occurred and the bank is already in difficulty. On the one hand, transparency could be detrimental *ex post* if it further destabilises banks that are hit by exogenous shocks. In particular, market responses may aggravate the position of a bank which is suffering from temporary and recoverable weakness and these market responses could be more accentuated when more information is provided, see Cordella and Levi-Yeyati (1998), Morris and Shin (2002). On the other hand, transparency could be beneficial *ex post* if it limits informational contagion to banks that are not exposed to the same shock. That is, transparency could help markets and depositors distinguish between those banks that are insolvent and those banks that are fundamentally sound, Chen (2000), Gorton and Huang (2002)³.

Deposit insurance

The beneficial *ex post* effect of deposit insurance has first been modelled in the seminal paper by Diamond and Dybvig (1983). In this model, a belief that other depositors will run the bank creates a self-fulfilling incentive for all depositors to run, resulting in costly early liquidation of long-term assets. In this model, deposit insurance can eliminate the bank-run equilibrium, increasing the stability of the bank *ex post*.

The *ex ante* effects of deposit insurance are less clear-cut. On the one hand, flat-rate deposit insurance may result in adverse risk-shifting incentives for the bank, which might have a destabilising effect, (Merton (1977)). In particular, when the threat of a run is removed by a comprehensive deposit insurance scheme banks might behave less prudently than they otherwise would, see Calomiris and Kahn (1991) and Diamond and Rajan (2001). On the other hand, Gropp and Vesala (2004) argue that the introduction of an explicit, but limited deposit insurance scheme may have beneficial, rather than adverse *ex ante* incentive effects. Their model shows that such a scheme can serve as a credible commitment on the part of governments not to bail out non-deposit creditors and may thus serve to increase the force of market discipline *ex ante*.

³ In the context of the recent emerging market crises, Ferguson (1998) suggested that: 'Standards for the transparency of and disclosure of private financial information were extremely lax. Once problems arose, it was difficult for creditors to distinguish good risks from bad and this caused them to withdraw their funds indiscriminately.'

3. Prior empirical literature

Potentially conflicting ex post and ex ante effects as regards both deposit insurance and transparency beg the question: on balance, what is the ‘net’ effect of these structural factors on the likelihood and depth of banking problems and crises?

Transparency

While, as outlined below, an extensive literature examined the impact of deposit insurance, to date there is hardly any evidence on the effect of transparency on bank stability. In a recent paper, Barth, Caprio and Levine (2004) analysed the implications of various features of the regulatory and supervisory regime, including bank transparency, for the likelihood of banking crises in a sample of 51 countries during the late 1980s and 1990s. Across countries, the incidence of a banking crisis was defined using an account of crises compiled by Caprio and Klingebiel (2003), while transparency was measured at the country-level as a summary variable that included information on a number of features relating to the market’s ability to monitor banks⁴. Using a logit approach that controlled for inflation prior to the onset of the crisis as well as for other features of the regulatory regime, the authors did not find a significant effect of transparency in these regressions. As the authors point out, one of the difficulties for their analysis is that their transparency variable relates to the 1998-2000 period, while many of the crises occurred throughout the 1990s. Another problem may be that the cross-country measure of transparency could be correlated with numerous other country characteristics. Finally, the marginal impact of transparency on the incidence of crises may be difficult to isolate using a cross-country approach that offers a relatively small number of observations.

Deposit insurance

The implications of deposit insurance for the likelihood of banking problems has been examined in a number of cross-country studies, eg Demirgüç-Kunt and Detragiache (1998), Rossi (1999) Demirgüç-Kunt and Detragiache (2002) and Eichengreen and Arteta (2000), among others. The seminal study by Demirgüç-Kunt and Detragiache (1998) analysed the likelihood of systemic banking crises during the period 1980 to 1994 for a sample of 65 countries. Using a logit analysis, they found that the existence of deposit insurance increased the likelihood of crises in their sample, controlling for a number of macro-variables. Demirgüç-Kunt and Detragiache (2002) extended this analysis to examine in more detail

⁴ These were (i) whether banks’ accounts were required to be audited, (ii) the percentage of a countries’ top 10 banks that were rated by a rating agency (iii) whether or not the country had an explicit deposit insurance scheme (iv) whether banks were

various design features of deposit insurance schemes, as well as the interaction of deposit insurance with other features of the institutional environment. They found that the adverse impact of deposit insurance on bank stability was stronger when the institutional environment was weak. Also, the impact of deposit insurance on bank stability tended to be stronger the more extensive was the coverage offered to depositors⁵. However, Eichengreen and Arteta (2000) argued that the evidence in favour of the notion that deposit insurance weakened bank stability was fragile: using a different definition of crises countries and a slightly different deposit insurance variable, they found a negative coefficient on the deposit insurance variable, ie the opposite of the result found by Demirgüç-Kunt and Detragiache (1998)⁶. Taking their findings together with insignificant coefficients reported by other studies, eg Rossi (1999), they concluded that as regards cross-country evidence, ‘there is at least as much evidence that deposit insurance has favourable effects – that it provides protection from depositor panics – as that it destabilises banking systems by weakening discipline in emerging markets’ Moreover, in a recent analysis of European bank-level data, Gropp and Vesala (2004) find evidence that the introduction of explicit deposit insurance schemes tended to reduce banks’ risk taking, in line with the finding by Eichengreen and Arteta (2000).

4. Research Design

We use annual data on 550 listed banks from 32 countries⁷ over the years 1994-2000. A number of the countries in our sample experienced a banking crisis during the sample period – eg Argentina, Brazil, Indonesia, Japan, Korea, Malaysia, Taiwan, Turkey and Thailand, but most banks in our sample are from countries that did not experience a banking crisis during the period under study. However, rather than analysing stability at the country level, this paper defines banking problems at the bank-level, resulting in a large number of observations.

In particular, large changes in banks’ stock prices are used as a *market indicator* of a financial distress. Arguably, a bank is experiencing a severe problem when its stock price drops dramatically in any given year. And crucially, the stock price response not only measures the extent to which risk has materialised,

required to disclose off balance sheet items, risk management procedures and non-performing loans and (v) whether subordinated debt counted as regulatory capital.

⁵ Hovakimian, Kane and Laeven (2003) found similar results in a study of risk-shifting, using a sample of 390 banks from 56 countries for the period 1991 to 1999. In particular, they found that while deposit insurance resulted in significant risk-shifting on average, the tendency for explicit deposit insurance to exacerbate risk-shifting was tempered by incorporating loss control features such as risk-sensitive premia and coverage limits. In addition, introducing explicit deposit insurance has had adverse effects in environments that were low in political and economic freedom and high in corruption.

⁶ Eichengreen and Arteta (2000) found some support for the notion that the interaction between a weak institutional environment and deposit insurance increases the likelihood of crises.

⁷ These are Austria, Australia, Argentina, Belgium, Brazil, Canada, Chile, Finland, France, Germany, Greece, Hong Kong, Indonesia, Ireland, Israel, Italy, Japan, Korea, Malaysia, the Netherlands, Norway, Poland, Portugal, Singapore, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, the UK and the US.

but should also incorporate the effect of any resulting responses in credit spreads the bank might be subject to.

A bank was thus defined to have a severe problem - or to be in crisis - if its stock return fell into the lowest 5% of the unconditional distribution of annual equity returns for all banks and years in our sample⁸. Using this, an indicator variable $c(i,t)$ was constructed for each bank and year where $c(i,t) = 1$ if the bank is in crisis and $c(i,t) = 0$ if it is not. Box 1 provides an analysis of the distribution of this variable across countries and time. In so doing it also explores how the frequency of bank-level problems, as defined using our market indicator, is related to the incidence of country-wide banking crises, as defined by Caprio and Klingebiel (2003). While a priori, there is little reason to expect this relationship to be exact, it turns out that there is a reasonably close mapping between the frequency of bank-level problems, as indicated by large declines in stock prices, and the incidence of banking crises as identified by Caprio and Klingebiel.

We study the likelihood that a bank experiences a severe problem, ie $c(i,t)=1$, in any given year and relate this likelihood to structural factors, while controlling for macro- as well as bank-level factors that might also play a role in affecting the likelihood of such an event. In particular, we hypothesise that

$$\Pr[c(i,t) = 1] = F(X, \beta)$$

where F is the normal distribution function, X is a vector of explanatory variables and β is a vector of parameters. The vector of explanatory variables X can be written as

$$X = (M, B, S)$$

It includes macro-economic control variables (M), bank-specific control variables (B) as well as structural determinants of banking stability that are the focus of the analysis. The parameters are estimated using a probit estimator that is applicable to panel data⁹.

⁸ It turned out in these cases the stock price fell by some 50 % or more. A return that is worse than minus 50% would therefore need to be thought of as a tail event that would indicate a severe problem.

⁹ We use the population-averaged GLS probit estimator with robust standard errors as described in the STATA handbook

Box 1: Market indicators of bank crises and banking crises

One way of validating market indicators of banking problems is to compare how they perform against a benchmark of known cases of banking crises *ex post*. Table I provides a heat-map of the distribution of our bank crisis variable across countries and years. For each country and year it shows the average of $c(i,t)$ or, equivalently, the frequency of a bank crisis under our measure. While the definition of crisis in this paper is based on market returns, Caprio and Klingebiel (2003) define a systemic banking crisis as a situation where much or all of bank capital in a given country is exhausted. Using some judgement in applying this definition, they provide an account of systemic and smaller banking crises across countries. According to this, systemic banking crises occurred in the following countries during our sample period: Argentina (1995), Brazil (1994–1999), Finland (1991–1994), Indonesia (1997–2002)¹⁶, Japan (1991–2002), Korea (1997–2002), Malaysia (1997–2002), Poland (1990s), Taiwan (1997–1998), Thailand (1997–2002) and Turkey (2000–2002)¹⁶. Applying a threshold of 10 percent to the average of $c(i,t)$, ie 10 per cent of banks in a country experienced stock returns of -50 per cent or worse, provides a reasonably close map between the market indicator we use and the account offered by Caprio and Klingebiel (2003). In particular, the market indicator catches the crises in Brazil, the south-east Asian crises in Indonesia, Malaysia and Thailand, the east Asian crises in Taiwan and Korea, as well as the European crises in Turkey and Poland. It does not, however catch Argentina's 1995 crisis, nor the crises in Japan and Finland. The latter two crises started well before our sample period begins, which may be one reason why one does not see stock market reactions during our sample period. Moreover, in both countries banks have enjoyed continued government support, which might have limited stock market reactions, see Hoggarth, Jackson and Nier (2003). In addition, in some cases the market indicator records a crisis when there is none according to Caprio and Klingebiel (2003). For instance, Hong Kong did not, during the 1990s experience a banking crisis, even though there was a large bank failure in 1998. High values on the market indicators for the years 1994 and 1997 and 1998 might conceivably be due to contagion in this case.

Table I
Average of $c(i,t)$

Year	Argentina	Australia	Austria	Belgium	Brazil	Canada	Chile	Finland	France	Germany	Greece	Hong Kong	Indonesia	Ireland	Israel	Italy	
1994	0	0						0	0.08	0		0.60	1.00	0		0	
1995	0	0			0.14	0	0	0	0.07	0	0	0.08	0	0	0	0	
1996	0	0	0	0	0.09	0	0	0	0	0	0	0	0	0	0	0	
1997	0	0.13	0	0	0.20	0	0	0	0.07	0	0	0.29	0.50	0	0	0.04	
1998	0.25	0	0	0	0.22	0	0	0	0	0	0	0.07	0.60	0	0.25	0	
1999	0	0	0	0	0	0	0	0	0	0	0.20	0	0.60	0	0	0.07	
2000	0	0.17	0	0	0	0	0	0	0.06	0.05	0.17	0	0.75	0	0	0.03	
Total	0.05	0.04			0.11				0.04	0.01	0.08	0.13	0.57		0.05	0.02	
Year	Japan	Korea	Malaysia	Netherlands	Norway	Poland	Portugal	Singapore	Spain	Sweden	Switzerland	Taiwan	Thailand	Turkey	UK	USA	Total
1994	0	0	0	0	0	0	0	0	0.07	0	0	0	0	0	0	0.02	0.04
1995	0	0	0.17	0	0.13	0	0.25	0	0	0	0	0	0	0	0.09	0	0.02
1996	0	0	0	0	0	0	0	0	0	0	0	0	0.50	0	0	0.01	0.01
1997	0	0	0.67	0	0	0	0	0.17	0	0	0	0.75	0.50	0	0	0	0.07
1998	0.01	0	0	0	0	0	0	0	0	0	0	0.14	0	0.80	0	0.07	0.06
1999	0.03	0.27	0	0	0	0.10	0	0	0	0	0	0.09	0	0	0	0.08	0.05
2000	0.03	0.55	0.20	0	0	0.13	0	0	0	0	0	0.36	0.29	0.83	0	0.05	0.08
Total	0.01	0.14	0.17		0.02	0.05	0.03	0.03	0.01			0.25	0.17	0.40	0.01	0.04	0.05

Source: Bank calculations

	Between 0 and 0.1
	Between 0.1 and 0.5
	Between 0.5 and 0.75
	Greater than 0.75
	Systemic banking crisis according to Caprio and Klingebiel

¹⁶ According to Caprio and Klingebiel, both Indonesia and Turkey suffered a smaller or borderline systemic crisis in 1994.

(i) Structural variables (*S*)

We are interested in investigating the impact of structural factors on the likelihood of a bank experiencing a crisis, controlling for macroeconomic factors and observable bank-specific factors. In particular, we attempt to measure the impact of both bank transparency and deposit insurance on the likelihood of a bank experiencing crisis.

Bank transparency

Quantifying bank transparency is difficult. Arguably, banks are inherently opaque institutions and marginal differences in transparency across banks are difficult to measure with any precision. Also, the degree of transparency of a bank depends on a number of disclosure policies, such as hard disclosures in annual accounts, but also more qualitative information that may be useful in order to put hard information into perspective. In this study, two different measures of bank transparency are employed.

The first measure of transparency is based on whether the bank had a listing on a primary US exchange. Firms registered outside the US and listed on a primary US exchange may provide their US shareholders with financial statements prepared under their domestic (non-US) generally accepted accounting principles. But the Securities and Exchange Commission (SEC) requires such firms to reconcile their reported earnings and shareholder's equity to US GAAP as part of a Form-20 filing. It is widely believed that the quality of statements prepared in accordance with US GAAP is superior to alternative disclosure regimes¹⁰. Empirical research is largely supportive of this view. Amir, Harris and Venuti (1993) find that the reconciliation of earnings and shareholder's equity in Form-20 filings are value-relevant in the sense that they increase the association between accounting earnings and security returns. Leutz and Verrecchia (2000) show that German firms which have voluntarily adopted US GAAP for their reporting show lower measures of information asymmetry and higher stock liquidity compared to a control group of firms employing the German reporting regime. Apart from increasing the quality of disclosure, a US listing may also entail an increase in the quantity of disclosure as the Form 20 requires disclosure of information, which may not be required under the bank's national accounting regulations. We therefore constructed a measure of transparency based on whether the bank had a listing on a primary US exchange. The variable 'list' takes the value one if the bank is listed on the NYSE, the NASDAQ or the AMEX.

¹⁰ There has been a wave of accounting frauds in the USA. Typically, in these cases the published accounts did not meet the US accounting standards. These cases may not necessarily change the belief that accounts that do comply with US GAAP may be more informative than accounts that comply with alternative standards.

The US listing variable is an indirect measure of the amount of information available to investors. A second, alternative measure of transparency is based directly on how much information on its risk profile a bank provides in its annual accounts. In particular we constructed a disclosure index that records for 17 categories of possible disclosure whether or not the bank provides information in its published accounts as they are represented in the BankScope database. All of the 17 categories are related to one or more dimensions of the bank's risk-profile (interest rate risk, credit risk, liquidity risk and market risk). For each category, we have assigned a value of one if the bank provided information and zero, if the bank did not provide information. The variable 'disc', which is normalised to take values between zero and 1, is available bank by bank and for each year of our sample. A detailed description of this variable is provided in Box 2 and descriptive statistics can be found in Table A2. As regards the disclosure index as a measure of transparency two caveats are in order. First, the disclosure index only measures hard, quantifiable information and does not record differences in the amount of qualitative information provided by the banks or differences with respect to quantitative information that is not comparable across banks¹¹. Second, the disclosure index is based on the amount of information banks provide in annual accounts and does not take into account other potential channels of disclosure, such as information provided by rating agencies and supervisors.

Deposit Insurance

Demirgüç-Kunt and Sobaci (2000) provide a dataset on the existence and extent of deposit insurance schemes across countries¹². Using this dataset, we focus on aspects that in previous research emerged as important in determining the likelihood of banking crises and we re-examine these features in the context of our analysis of the drivers of bank crises. First, we investigate the effect of whether or not the bank is from a country where there exists an explicit deposit insurance scheme. Second, we analyse the effect of the scheme specifying coverage limits for depositors. In particular, we construct two dummy variables, as follows

Explicit =1 if there exists an explicit deposit insurance scheme,
=0 otherwise

Unlimited=1 if there exists an explicit deposit insurance scheme and coverage is unlimited,
=0 otherwise

¹¹ For instance, many banks publish Value at Risk (VAR) numbers relating to their market risk in annual accounts. However, there is no standard governing the presentation of this information. The key assumptions underlying the VAR calculations, such as investment horizon and confidence level is not uniform across banks. As a result the numbers are not comparable across banks and the information is not recorded in the BankScope database. See Hoggarth et al (2003) for further discussion.

¹² Using this dataset, Demirgüç-Kunt and Detragiache (2000) provide evidence that explicit deposit insurance tends to increase the likelihood of banking crises in a sample of 61 countries over the years 1980-97.

Box 2: The Composite Disclosure Index and Sub-indices

The composite disclosure index measures the level of detail which banks provide on 17 dimensions of accounting information in their published accounts. Table shown below lists the 17 sub-indices used in more detail. For each sub-index, a 0 was assigned if there was no entry in any of the corresponding categories and a 1 otherwise, except for the index for securities by type and the capital index. For the securities by type index, a 0 was assigned if there was no entry for any of the categories, a 1 if there was only an entry for the coarse breakdown and a 2 if there was an entry for the detailed breakdown. For the capital index, a 0 was assigned if there was no entry in any of the categories, a 1 if there was one entry only, a 2 if there were two entries and a 3 if there were three or four entries. Note that whenever a bank provides information on three of these items, one can infer the fourth. Providing three items was therefore viewed as informationally equivalent to providing four items.

Aggregating the information of the 17 sub-indices, we construct a composite disclosure index. The composite index was defined as

$$DISC = \frac{1}{21} \sum_{i=1}^{17} s_i$$

Table II: Disclosure indices

	Subindex	Categories
Assets		
Loans	S ₁ : Loans by maturity	Sub three months, three-six months, six months - one year, one-five years, five years +
	S ₂ : Loans by type ^(a)	Loans to municipalities/government, mortgages, HP/lease, other loans
	S ₃ : Loans by counterparty ^(a)	Loans to group companies, loans to other corporate, loans to banks
	S ₄ : Problem loans	Total problem loans
	S ₅ : Problem loans by type	Overdue /restructured /other non-performing
Other earning assets	S ₆ : Securities by type	Detailed breakdown: Treasury bills, other bills, bonds, CDs, equity investments, other investments Coarse breakdown: Government securities, other listed securities, non-listed securities
	S ₇ : Securities by holding purpose	Investment securities, trading securities
Liabilities		
Deposits	S ₈ : Deposits by maturity	Demand, savings, sub three months, three-six months, six months - one year, one-five years, five years +
	S ₉ : Deposit by type of customer	Banks deposits, municipal/government
Other funding	S ₁₀ : Money market funding	Total money market funding
	S ₁₁ : Long-term funding	Convertible bonds, mortgage bonds, other bonds, subordinated debt, hybrid capital
Memo lines		
	S ₁₂ : Reserves	Loan loss reserves (memo)
	S ₁₃ : Capital	Total capital ratio, tier 1 ratio, total capital, tier 1 capital
	S ₁₄ : Contingent Liabilities	Total contingent liabilities
	S ₁₅ : Off-Balance Sheet Items	Off-balance sheet items
Income statement		
	S ₁₆ : Non-interest Income	Net commission income, net fee income, net trading income
	S ₁₇ : Loan Loss Provisions	Loan loss provisions

(a) The categories chosen reflect the presentation in the BankScope database.

(ii) Macroeconomic conditions (*M*)

The existing literature highlights a number of macroeconomic factors that are associated with increases in the likelihood of banking sector problems. These include cyclical output swings, high interest rates, as well deteriorations in the country's terms of trade (Caprio and Klingebiel, 1996, Lindgren Garcia and Saal, 1996, Kaminsky and Reinhart, 1996).

In particular, existing studies suggest that banking crises occur towards the end of an economic upturn, that may be fuelled by a lending boom, Eichengreen and Arteta (2000). Since bank's credit decisions worsen with the time elapsed since the last downturn, such lending booms lead to fragility in that they result in banks making the wrong credit decisions towards the peak of the cycle, Berger and Udell (2003). To capture the state of the economic cycle and thus the overall health of the economy we include the lagged value of the rate of growth of GDP.

Other studies emphasise that banking crises may result from a materialisation of interest rate risk. For example, in the United States in the early 1980s the Savings and Loans institutions found themselves with substantial fixed-interest assets when market interest rates and consequently their funding costs, rose sharply (Mishkin, 1996). A high short term nominal interest rates may be due to various factors, such as a high rate of inflation or a restrictive monetary policy. It may also have played a role for some of the recent episodes of banking crises in emerging market economies where policy interest rates were raised to defend currency pegs. We therefore include the lagged value of the short-term interest rate prevailing in each country as an explanatory variable to capture problems arising from difficulties in managing the banks' maturity mismatch.

Finally, we account for terms of trade imbalances by including the country's current account position. A current account deficit means that imports exceed exports at the prevailing exchange rate. This increases the likelihood of a depreciation, which, in turn may affect the banking system in a number of ways. First, when domestic borrower's are exposed to a depreciation, this might increase their probability of default. Second, when banks borrow in foreign currency and lend in domestic currency, an unexpected depreciation of the domestic currency threatens bank profitability, even if it does not affect the incidence of non-performing loans¹³. We thus include the lagged value of the current account balance as a reverse proxy of such currency risk.

¹³ Demirguc and Detragiache (1996) did not find a significant effect of exchange realignments in their crisis regressions. More generally, the evidence on the impact of the exchange rate regime is mixed, see Eichengreen and Arteta (2000).

(iii) Bank-specific control variables (*B*)

Whether or not a particular bank runs into problems not only depends on the condition of the economy as a whole. It also depends on the extent to which a bank is exposed to the underlying risks relative to its peers. An indicator of a bank's risk is the bank's beta. Beta measures the correlation of a bank's stock price with the overall stock index in the bank's country of origin. It should therefore capture the bank's exposure to the macro-economic risks the country faces. In theory, as a summary measure of risk, beta measures exposure to macroeconomic risk irrespective of whether the source of risk is the banking book or the trading book. It is therefore a useful *market indicator* of both the bank's credit risk and its market risk. In addition, it may capture interest rate risk to the extent that this is a major source of macroeconomic risk in a given country. We therefore include the lagged value of each bank's beta as a bank-specific control variable.

Prior studies also found that more profitable banks were less likely to fail in the immediate future than less profitable banks, eg Logan (1999). This may imply that, on average, it takes some time before a bank's condition deteriorates sufficiently for a bank to enter financial distress. Poor current returns may then increase the likelihood of financial distress in the shorter term. Alternatively, high current profitability may be a signal of good management, reducing the likelihood of a future crisis. We follow the existing literature and include the lagged value of the bank's return on assets as a bank-specific control variable.

A final bank-specific control variable is the bank's size. A number of prior studies found that larger banks were less likely to fail than smaller banks, eg Logan (1999). This is usually attributed to better opportunities to achieve diversified loan portfolios. Indeed, size may be associated with both better sectoral as well as geographical diversification. Size was measured as the lagged value of the log of total assets.

5. Results

Tables 1 to 5 contain the main results. In addition to the variables discussed in detail above, all regressions also include a time trend. This is included since the incidence of banking problems is higher in the later years than in the earlier years of the sample, see Box 1. In each table, the first column shows our preferred specification, including all control variables, the second column shows bank-specific variables only and the third column shows bank-specific variables only.

The effect of bank transparency is analysed in Tables 1 and 2. In table 1 we include the lagged¹⁴ value of the disclosure index as a measure of transparency. It appears that banks that disclose more information are less likely to experience a crisis. This result is significant at the 5 per cent level (with a p-value of 0.01, Column 1) and robust across specifications. One way of interpreting the result is that banks that disclose more information reduce the scope for moral hazard and are thus less at risk of a crisis. Note that, while the benchmark regression controls for an observable measure of risk (beta), moral hazard is associated with an increase in risk factors that are not easily observable¹⁵. An example is an increase in portfolio risk due to large exposures to particular institutions or sectors, another a lack of controls against operational risk. Another way of explaining the result is that banks that disclose more information are less at risk of informational contagion that arises due to limited information on the part of depositors and investors.

Table 1: Disclosure and banking problems: probit regressions

	(1) Probit	(2) Probit	(3) Probit
Dep. Variable	c(i, t)	c(i, t)	c(i, t)
L1Disc	-0.5644 **	-0.5020 ***	-0.6021 ***
Year	0.1710 ***	0.0902 ***	0.1712 ***
Logsize	-0.0797 **	-0.0819 ***	
L1Beta	0.2717 *	0.3442 ***	
L1Roa	-7.2689 **	-3.5110 ***	
L1Current	-0.0030 *		-0.0018
L1Interest	0.0001		0.0000
L1Gdp_g	5.1397 *		2.6073
Constant	-341.9816 ***	-180.4627 ***	-343.4534 ***
No. of obs.	2531	3004	2597
No. of banks	537	532	546
Wald chi2	60.78	44.81	47.93
Prob > chi2	0	0	0

All variable definitions are provided in Table A1. A variable name preceded by L1 denotes the one year lag of that variable.

*** Statistical significance at the one percent level

** Statistical significance at the five percent level

* Statistical significance at the ten percent level

Table 2 analyses the effect of the US listing variable as an alternative measure of transparency. While the coefficient appears somewhat less significant than the coefficient on the disclosure index, overall, the regressions shown in Table 2 confirm the conclusions drawn from Table 1. Again, we find that a greater degree of transparency is associated with a decrease in the likelihood of a bank crisis¹⁶.

¹⁴ We include the lagged value rather than the contemporaneous value to avoid simultaneity problems. For instance, a large drop in the bank's equity price may prompt the bank to change its disclosure policy.

¹⁵ Further econometric analysis reveals that when size is controlled for beta appears unrelated disclosure. This is plausible: since beta is observable it should not be subject to moral hazard (hidden action).

¹⁶ All US banks in the sample have a US listing. The result could thus be driven by US banks being less likely to experience a crisis than banks from other countries. However, the results shown in Table 2 are robust to the inclusion of a US dummy and to the exclusion of all US banks from the sample.

Table 2: US listing and banking problems: probit regressions

	(1) Probit	(2) Probit	(3) Probit
Dep. Variable	c(i, t)	c(i, t)	c(i, t)
List	-0.1926 *	-0.3252 ***	-0.1616
Year	0.1664 ***	0.0807 ***	0.1627 ***
Logsize	-0.0972 ***	-0.1004 ***	
L1Beta	0.2874 *	0.3699 ***	
L1Roa	7.0400 **	-3.2729 ***	
L1Current	-0.0029 *		-0.0018
L1Interest	0.0003 **		0.0002 *
L1Gdp_g	5.9436 **		3.3120
Constant	-332.9417 ***	161.3727 ***	-326.8047 ***
No. of obs.	2555	3030	2621
No. of banks	541	566	550
Wald chi2	52.96	47.37	44.92
Prob > chi2	0	0	0

All variable definitions are provided in Table A1. A variable name preceded by L1 denotes the one year lag of that variable.

*** Statistical significance at the one percent level

** Statistical significance at the five percent level

* Statistical significance at the ten percent level

The effect of deposit insurance is analysed in Tables 3 and 4. The results in Table 3 indicate that an explicit deposit insurance scheme appears to reduce the likelihood of a banking problem. The coefficient on the dummy for explicit insurance is negative and significant at the 1 per cent level. Recall that Demirgüç-Kunt and Detragiache (2002) found a positive coefficient on the same variable in their study of systemic banking crisis, while others, notably Eichengreen and Arteta (2000) found a statistically negative coefficient, in contrast with the Demirgüç-Kunt and Detragiache (2002) result. The results reported here confirm the Eichengreen and Arteta (2000) finding of a negative relationship using bank-level data. They are also in line with bank-level findings reported by Gropp and Vesala (2004)

Table 3: Explicit insurance and banking problems: probit regressions

	(1) Probit	(2) Probit	(3) Probit
Dep. Variable	c(i, t)	c(i, t)	c(i, t)
Explicit	-0.4839 ***	-0.5072 ***	-0.7117 ***
Year	0.1681 ***	0.0861 ***	0.1720 ***
Logsize	-0.0852 ***	-0.0795 ***	
L1Beta	0.2113	0.2688 **	
L1Roa	-6.2043 **	-3.0297 **	
L1Current	-0.0031 **		-0.0025 **
L1Interest	0.0003 **		0.0003 **
L1Gdp_g	4.5097 *		2.3232
Constant	-336.1291 ***	-172.12 ***	-344.8911 ***
No. of obs.	2555	3030	2621
No. of banks	541	566	550
Wald chi2	63.08	65.36	57.82
Prob > chi2	0	0	0

All variable definitions are provided in Table A1. A variable name preceded by L1 denotes the one year lag of that variable.

*** Statistical significance at the one percent level

** Statistical significance at the five percent level

* Statistical significance at the ten percent level

One potential explanation for the negative coefficient is that, in line with Diamond and Dybvig (1983) explicit insurance helps to avoid depositor runs and that this beneficial effect dominates the potential adverse effects arising from increased moral hazard incentives. Alternatively, as Demirgüç-Kunt and Kane (2002) and Gropp and Vesala (2004) point out, many countries that do not provide an explicit scheme provide an implicit form of deposit insurance. Without an explicit scheme, depositors and other bank creditors may exert political pressure to force taxpayers to supply unlimited guarantees in the case of bank failures. In this case, an explicit scheme may be a way of limiting the government's pay-out to depositors. This in turn could imply that an explicit scheme may limit rather than exacerbate banks' risk-shifting incentives when compared to an implicit scheme.

Table 4 suggests that unlimited coverage increases the likelihood of a bank to experience a crisis. This result appears statistically strong, with the coefficient significant at 5 per cent in the benchmark model. This result is in line with existing cross-country evidence, such as Demirgüç-Kunt and Detragiache (2002) and underscores the moral hazard incentives resulting from unlimited coverage. In particular, with unlimited coverage, depositors are not at risk of loss when the bank defaults. Consequently, there is little incentive for depositors to monitor bank activities. In addition, the yield that depositors demand will not depend on the risk taken by the bank, creating strong moral hazard incentives for the banks.

Table 4: Unlimited insurance and banking problems: probit regressions

	(1) Probit	(2) Probit	(3) Probit
Dep. Variable	c(i, t)	c(i, t)	c(i, t)
Unlimited	0.2718 **	-0.0456	0.1109
Year	0.1669 ***	0.0806 ***	0.1601 ***
Logsize	-0.1105 ***	-0.0898 ***	
L1Beta	0.2952 *	0.3377 ***	
L1Roa	-7.1742 **	-3.4914 ***	
L1Current	-0.0030 *		-0.0017
L1Interest	0.0003 **		0.0002 **
L1Gdp_g	6.4484 **		3.1392
Constant	-333.8718 ***	-161.337 ***	-321.6375 ***
No. of obs.	2555	3030	2621
No. of banks	541	566	550
Wald chi2	47.31	37.16	41.93
Prob > chi2	0	0	0

All variable definitions are provided in Table A1. A variable name preceded by L1 denotes the one year lag of that variable.

*** Statistical significance at the one percent level

** Statistical significance at the five percent level

* Statistical significance at the ten percent level

Across tables 1-4, all three macroeconomic variables show the expected sign, and all of them are statistically significant in most equations. Across all equations, the current account variable is assigned a significantly negative sign, suggesting that a high current account deficit increases the likelihood of bank crises. Likewise, a high short term interest rate appears to be associated with an increase the likelihood crisis. And there appears to be some evidence that crisis events are preceded by high growth rates in GDP, a finding that is consistent with prior evidence that banking problems tend to emerge close to the peak of the economic cycle.

Finally, the bank-specific variables are assigned the expected sign and the coefficients are generally statistically significant. Banks with high exposure to macroeconomic factors (beta) appear to be more at risk of a crisis. Larger banks appear less likely to experience a crisis. Finally, more profitable banks appear less crisis-prone.

Table 5 shows a number of multiple regressions that include our measure of disclosure as well as the key features of the deposit insurance regime at the same time. The results confirm the conclusion that the impact of deposit insurance depends on the design features of the regime. Explicit deposit insurance per se appears to reduce the incidence of banking problems. Unlimited coverage, on the other hand appears to increase this probability. Transparency, by contrast appears to unambiguously reduce the incidence of banking problems¹⁷.

6. Extensions

What factors might influence the strength of the effects of transparency and deposit insurance on the likelihood of banking crises? Theory and prior evidence provides a number of further hypotheses that can be examined in our set-up.

¹⁷ Limited correlation between the disclosure measure and features of the safety net enables us to measure their separate impact in Table 5. By contrast, it turned out that there is considerable negative correlation between the listing variable and features of the safety net. In particular, banks from countries with unlimited deposit insurance appear to have few banks that have a listing in the United States (with the correlation between the two variables as high as -35%), making multiple regressions subject to multicollinearity problems. For this reason we prefer the specification shown in Table 5.

Table 5: Multiple structural variables and banking problems: probit regressions

	(1) Probit	(2) Probit	(3) Probit
Dep. Variable	c(i, t)	c(i, t)	c(i, t)
L1Disc	-0.6173 ***	-0.5683 ***	-0.7223 ***
Explicit	-0.5773 ***	-0.5365 ***	-0.7924 ***
Unlimited	0.3306 ***	0.0335	0.2567 **
Year	0.1845 ***	0.0980 ***	0.1906 ***
Logsize	-0.0823 **	-0.0669 **	
L1Beta	0.2000	0.2664 **	
L1Roa	-6.0170 ***	-3.0468 **	
L1Current	-0.0031 ***		-0.0026 **
L1Interest	0.0001		0.0001
L1Gdp_g	5.5735 ***		3.0915
Constant	-368.4068 ***	-195.6069 ***	-381.4891 ***
No. of obs.	2531	3004	2597
No. of banks	537	562	546
Wald chi2	66.73	90.41	60.06
Prob > chi2	0	0	0

All variable definitions are provided in Table A1. A variable name preceded by L1 denotes the one year lag of that variable.

*** Statistical significance at the one percent level

** Statistical significance at the five percent level

* Statistical significance at the ten percent level

The effect of financial development

First, there reason to believe that the strength of the effect of transparency might differ across countries. Theory (Giannetti, 2003 and 2005) suggests that for countries with weak financial development and few domestic savings, openness to capital inflows and lack of transparency work together to produce a lemon's problem that eventually causes the collapse of the banking system. Likewise, policymakers have identified lack of transparency as a potential factor that might cause or exacerbate banking problems mainly in the context of the emerging market banking crises in the 1990s. These considerations suggest that lack of transparency might have a stronger effect on the likelihood of banking problems in countries where domestic financial markets are less well developed.

In order to test this hypothesis we use the stock market capitalisation in each country, scaled by GDP, (stmcap) as a proxy for the financial development of a country. In order to test whether financial development affects the strength of the effect of a lack of transparency we interact this variable with our measures of transparency. Table 6, Column 1 shows the main result. First, the disclosure variable retains its negative sign, suggesting that more transparency reduces the incidence of banking problems. Second, financial development per se appears to reduce the likelihood of banking problems. And third, the effect of transparency on the likelihood of banking problems is less pronounced in countries with a high level of financial development, as measured by the size of the stock market in each country.

Table 6: Transparency, financial development and banking problems: probit regressions

	(1) Probit	(2) Probit	(3) Probit	(4) Probit
Dep. Variable	c(i, t)	c(I, t)	c(i, t)	c(i, t)
L1Disc	-0.9100 ***	-1.5662 ***		
List			-0.4723	-1.0168 **
Explicit	-0.5542 ***	-0.5572 ***	-0.7888 ***	-0.5067 ***
Unlimited	0.2387 **	0.3188 **	0.3652 ***	0.5729 ***
Year	0.1876 ***	0.1674 ***	0.1496 ***	0.1482 ***
Logsize	-0.0792 **	-0.0590	-0.0924 **	-0.0544
L1Beta	0.2059	0.1856	0.2062	0.1886
L1Roa	-5.6322 ***	-3.9459	-5.1245 ***	-3.3749
L1Current	-0.0022 *	-0.0032 **	-0.0021	-0.0031 **
L1Interest	0.0001	0.0001	0.0003 **	0.0002 *
L1Gdp_g	5.3270 ***	5.7120 **	5.5924 **	5.7419 **
Stmcap	-0.4434 **		-0.3384 **	
Pcredit		-1.1291 **		-1.4362 **
L1Discstmcap	0.4857 *			
L1Discpcredit		1.9433 **		
L1Liststmcap			0.6423 **	
L1Listpcredit				2.3233 ***
Constant	-374.5178 ***	-334.0994 ***	-298.6114 ***	296.5685 ***
No. of obs.	2517	2449	2541	2473
No. of banks	531	510	535	514
Wald chi2	79.28	68.23	73.73	50.42
Prob > chi2	0	0	0	0

All variable definitions are provided in Table A1. A variable name preceded by L1 denotes the one year lag of that variable.

*** Statistical significance at the one percent level

** Statistical significance at the five percent level

* Statistical significance at the ten percent level

The results in Table 6 suggest that this conclusion does not depend critically on the specific way that either transparency or financial development is measured. In Table 6 column 2 the ratio of private (both bank and bond market) credit to GDP (pcredit) is used as an alternative measure of financial development and the results are unchanged. In Table 6, columns 3 and 4, the US listing variable is used as an alternative measure of transparency and is interacted with stock market development and credit market development, respectively. The main result is confirmed: lack of transparency increases the chance of banking problems and this effect appears stronger, the poorer is the financial development of the country.

These findings might have important implications for public policy. They confirm that lack of transparency might have been one of the key ingredients causing the emerging market banking crises in the 1990s. They further suggest that increases in bank transparency will have a stronger marginal effect on the incidence of banking crises where the overall level of financial development is still weak.

The role of the institutional preconditions – rule of law

What factors might influence the impact of deposit insurance on the likelihood of banking problems? In their study, Demirgüç-Kunt and Detragiache (2002) found that explicit deposit insurance was associated with a higher probability of banking crises the more so if the institutional environment, proxied by an index measuring the degree of the rule of law in each country, was weak. This is plausible since moral hazard created by deposit insurance could be a greater problem in countries with weaker institutions where it is more difficult to monitor and curb bank risk-taking and fraud.

Following the prior literature, we therefore interact our deposit insurance variables with an index of the extent to which the rule of law is upheld in each country. Table 7 contains the results. Column 1 shows that a stronger rule of law is associated with a reduction in the likelihood of banking problems. In Column 2 we interact the rule of law index with the deposit insurance variables. We find that explicit deposit insurance reduces the chance of severe banking problems, but that this effect is reduced for countries with a strong institutional environment. We also find that unlimited insurance increases the likelihood of severe banking problem, but that this effect is less pronounced in countries where rule of law is strong. In other words, for countries where the institutional environment is weak, the effects of deposit insurance on the likelihood of banking problems are more pronounced, suggesting, as did prior evidence, that the potential to engage in moral hazard is stronger in those countries.

Table 7: Rule of law and banking problems: probit regressions

	(1) Probit	(2) Probit	(3) Probit
Dep. Variable	c(i, t)	c(i, t)	c(i, t)
L1Disc	-0.5713 **		-2.0225 *
Explicit	-0.2619 *	-1.9479 **	-1.9969 ***
Unlimited	0.0856	2.7607 ***	2.6269 ***
Year	0.1735 ***	0.1634 ***	0.1690 ***
Logsize	-0.0566	-0.0530	-0.0396
L1Beta	0.1504	0.0932	0.0832
L1Roa	-4.6972 ***	-4.6630 ***	-4.7785 **
L1Current	-0.0021 *	-0.0032 **	-0.0030 **
L1Interest	-0.0001	0.0003 **	0.0000
L1Gdp_g	5.1058 ***	3.3702 *	3.3294 *
L1Explicitrlaw		0.1920 **	0.1970 **
L1Unlimrlaw		-0.3320 ***	-0.3174 ***
L1Disclaw			0.2054
Rlaw	-0.1526 ***	-0.2025 ***	-0.3355 ***
Constant	-345.7495 ***	-325.5732 ***	-335.7722 ***
No. of obs.	2496	2520	2496
No. of banks	526	530	526
Wald chi2	129.9	144.63	200.89
Prob > chi2	0	0	0

All variable definitions are provided in Table A1. A variable name preceded by L1 denotes the one year lag of that variable.

*** Statistical significance at the one percent level

** Statistical significance at the five percent level

* Statistical significance at the ten percent level

Finally, we check whether the strength of transparency might likewise depend on the institutional environment. This might be thought likely for similar reasons that the institutional environment affects the strength of deposit insurance. Weak rule of law might provide greater risk-taking incentives and thus increase the force of transparency to reduce these incentives. Empirically, we find some evidence that lack of transparency indeed has a stronger effect on the likelihood of banking problems where the institutional environment is weak. However, this effect is not quite as strong statistically as the result on financial development, with a P-value of 11%.

7. Robustness

Further control variables

In principle a number of influences other than those considered thus far might plausibly have an impact on the likelihood of banking problems. First, bank's capital position and differences in capital regulation might have an effect on the likelihood of banking problems. Second, countries might differ in the intensity and methods of banking supervision and these differences might affect bank stability across countries. Third, the competitive environment in which banks operate, which in turn might be determined by the regulatory regime, might affect the likelihood of financial instability. Some measures of these differences have been made available by the World Bank (Barth et al 2002) and have been used in previous research.

We check the robustness of our findings by including these variables one at a time into our preferred specification (Table 5). First, we find that a bank-level measure of the bank's capital ratio –defined as the ratio of book equity to debt and deposit liabilities and derived from BankScope - does not appear to significantly affect the likelihood of banking problems as defined in this study, Table 8, Column 1. We also included a variable that measures the - albeit limited -variation in required capital ratios across countries and found that this variable, likewise, did not have a significant effect on the likelihood of banking problems (result not shown). On the other hand we find that a measure of the stringency of the definition of regulatory capital appears to be associated with a significant reduction in the likelihood of banking problems, Table 8, Column 2. However, the effects of disclosure and deposit insurance are robust to the inclusion of the capital ratio as well as the variable measuring the stringency of capital requirements in columns (1) and (2).

8: Multiple structural variables and banking problems: probit regressions

	(1) Probit	(2) Probit	(3) Probit	(4) Probit	(5) Probit	(6) Probit
Dep. Variable	c(i, t)	c(i, t)	c(i, t)	c(i, t)	c(i, t)	c(i, t)
L1Disc	-0.6184 ***	-0.5917 ***	-0.6248 ***	-0.6649 ***	-0.6378 ***	-0.6126 ***
Explicit	-0.5777 ***	-0.5224 ***	-0.6964 ***	-0.7040 ***	-0.6620 ***	-0.6138 ***
Unlimited	0.3304 ***	0.3917 ***	0.3159 **	0.2985 **	0.4023 ***	0.3284 **
Year	0.1845 ***	0.2009 ***	0.1870 ***	0.2009 ***	0.2003 ***	0.1836 ***
Logsize	-0.0824 **	-0.0594 *	-0.0805 **	-0.0793 **	-0.0838 **	-0.0750 **
L1Beta	0.2003	0.1695	0.2005	0.2047	0.1984	0.1932
L1Roa	-5.9974 ***	-5.8534 **	-5.3386 ***	-5.5301 ***	-5.4114 ***	-5.9372 ***
L1Current	-0.0031 **	-0.0020	-0.0018	-0.0027 **	-0.0029 **	-0.0022
L1Interest	0.0001	0.0000	0.0001	0.0001 *	0.0001	0.0001
L1Gdp_g	5.5674 ***	4.9304 **	5.0667 **	4.8729 **	4.5751 **	5.9551 ***
L1Cap	-0.0034					
Capstring		-0.2166 ***				
Suppower			0.0281			
Activ				0.0276		
Entry					0.1176 *	
Bankconc						-0.0422
Constant	-368.4095 ***	-401.0170 ***	-373.7825 ***	-401.2400 ***	-400.708 ***	-366.718 ***
No. of obs.	2531	2446	2504	2446	2446	2479
No. of banks	537	512	523	512	512	526
Wald chi2	66.97	97.81	73.62	76.56	81.58	73.55
Prob > chi2	0	0	0	0	0	0

All variable definitions are provided in Table A1. A variable name preceded by L1 denotes the one year lag of that variable.

*** Statistical significance at the one percent level

** Statistical significance at the five percent level

* Statistical significance at the ten percent level

Second, a measure of the official powers of the supervisor across countries does not significantly affect the likelihood of banking problems in our sample Table 8, Column 3. This finding confirms cross-country evidence provided by Beck, Demirgüç-Kunt and Levine (2005) where this variable was not found to have a measurable effect on the likelihood of banking crises. Moreover, as is apparent from Table 8, Column (3), the effects of disclosure and deposit insurance are robust to the inclusion of this variable.

Third, to gauge the effect of market structure and competition on the likelihood of banking problems we first include a summary measure of restrictions on the activities banking institutions may engage in (activ), but do not find this variable to have a significant effect in these regressions, column (4). A measure of cross-country differences in entry restrictions (entry) appears to increase the likelihood of banking problems, a finding that is significant at the 10% level. However, we do not find a standard measure of bank concentration (fraction of deposits attributed to the 5 largest banks) to have a

statistically significant effect, when this is included in our benchmark regression, Table 8, Column 6¹⁸. We conclude that overall, the variables that proxy for market structure and the degree of competition show only a weak effect on the likelihood of banking problems, if any. Moreover, inclusion of all of these variables does not appear to affect the size or significance of the measured coefficients on disclosure and deposit insurance.

Cross-country versus within country differences

Differences in the economic environment across countries are difficult to capture empirically. Despite the tests carried out so far, there might therefore be a concern that some aspects of the environment might not have been adequately controlled for. One way to control for *all* aspects of the environment banks face in different countries is to introduce a set of country dummy variables. The aspects controlled for includes differences in the deposit insurance regime, which cannot therefore be analysed when country dummy variables are introduced. Moreover, use of country dummies also controls for cross-country variation in transparency, which may be related to differing degrees of peer pressure, governance structures and regulatory standards. Introducing country dummy variables is thus a way of assessing at the same time how much of the explanatory power of the transparency variables is due to such cross-country differences in transparency, and how much of the explanatory power is due to a variation of transparency across banks within a country and across time. In particular, one would expect the effect of disclosure on the likelihood of a bank crisis to be the weaker in regressions including country dummy variables, relative to the benchmark regressions, the more the benchmark effect of disclosure relates to cross-country differences in transparency. Table 9 shows the results, where estimation is based on simple OLS¹⁹.

First, a number of country dummies (Brazil, Turkey, Indonesia, Korea Malaysia and Thailand) are assigned significantly positive coefficients, indicating that, in line with the analysis in Box 1, there is marked cross-country variation in the likelihood of severe banking problems in our sample. Further, while without country dummies, Table 9, Column (2) the coefficient of disclosure is -0.73, the size of the coefficient is reduced to -0.45 when country dummies are included, Table 9, column (1). Moreover, while without country dummies, the coefficient is significantly different from zero at the one per cent level, including country dummies results in the disclosure variable being significant only at the 10 per cent level. This suggests that cross-country variation in disclosure is important for the benchmark result, but that within country differences in disclosure also contribute to the overall finding of a negative

¹⁸ If anything, in line with prior empirical cross-country evidence, Beck, Demirgüç-Kunt and Levine (2005), concentration tends to reduce the likelihood of severe banking problems.

¹⁹ Standard errors take account of the panel data structure of the dataset, utilising a cluster option. The reason for using OLS rather than probit is that the probit estimator no longer converges when the country dummy set is included.

influence of disclosure on the likelihood of crises. A similar conclusion can be drawn from comparing Table 9, Columns (3) and (4), where when country dummies are included, the listing variable retains its negative sign, but turns just insignificant at the 10 per cent level (P-value 0.19).

Table 9: Disclosure, US listing and banking problems: OLS regressions including country dummy variables

	(1) OLS	(2) OLS	(3) OLS	(3) OLS
Dep. Variable	c(i, t)	c(i, t)	c(i, t)	c(i, t)
L1Disc	-0.0454 *	-0.0730 ***		
List			-0.0241	-0.0227 ***
Year	0.0121 ***	0.0133 ***	0.0113 ***	0.0124 ***
Logsize	-0.0022	-0.0106 ***	-0.0026	-0.0129 ***
L1Beta	0.0086	0.0394 ***	0.0088	0.0412 ***
L1Roa	-0.6924 ***	-1.1009 ***	-0.7053 ***	-1.0874 ***
L1Current	0.0010	-0.0002	0.0001	-0.0002
L1Interest	0.0000	0.0000	0.0000	0.0000 **
L1Gdp_g	0.4848 **	0.4766 ***	0.4975 **	0.5937 ***
Dummy Argentina	0.0213		0.0354	
Dummy Australia	-0.0362		-0.0237	
Dummy Austria	0.0237		0.0292	
Dummy Belgium	0.0039		0.0194	
Dummy Brazil	0.0887 ***		0.0762 **	
Dummy Chile	-0.0371		-0.0224	
Dummy Finland	-0.0398		-0.0398	
Dummy France	0.0145		0.0215	
Dummy Germany	-0.0159		-0.0041	
Dummy Greece	0.0390		0.0534	
Dummy Ireland	-0.0195		-0.0296	
Dummy Italy	-0.0061		-0.0028	
Dummy Netherlands	-0.0252		-0.0096	
Dummy Norway	-0.0095		-0.0136	
Dummy Poland	0.0134		0.0176	
Dummy Portugal	0.0142		0.0184	
Dummy Spain	-0.0203		-0.0167	
Dummy Sweden	-0.0195		-0.0249	
Dummy Switzerland	-0.0031		0.0035	
Dummy Turkey	0.3432 ***		0.3570 ***	
Dummy UK	-0.0067		0.0021	
Dummy Canada	-0.0308		-0.0035	
Dummy Israel	0.0349		0.0355	
Dummy US	0.0112		0.0354	
Dummy Hong Kong	-0.0341		-0.0342	
Dummy Indonesia	0.4247 ***		0.4282 ***	
Dummy Korea, Rep	0.1043 ***		0.1077 ***	
Dummy Malaysia	0.1529 ***		0.1524 ***	
Dummy Singapore	-0.0302		-0.0268	
Dummy Thailand	0.1493 ***		0.1516 ***	
Constant	-24.0285 ***	-26.2490 ***	-22.5615 ***	-24.6299 ***
No. of obs.	2531	2531	2555	2555
Adj R-squared	0.1238	0.0538	0.1224	0.0534

All variable definitions are provided in Table A1. A variable name preceded by L1 denotes the one year lag of that variable.

*** Statistical significance at the one percent level

** Statistical significance at the five percent level

* Statistical significance at the ten percent level

Endogeneity of Disclosure Variable

One potential concern with our analysis is that the disclosure variable might be endogenous. We routinely include the lagged value of disclosure to counter potential simultaneity resulting from banks that are hit by a crisis deciding to reduce their level of disclosure. But there could be a remaining endogeneity problem if there is an unobservable, or latent variable, that determines both the decision to disclose information this period and the likelihood of crisis next period. In particular, it is conceivable that banks that are crisis-prone decide to provide little information, because they want to hide their true state, and that those same banks are more likely to experience a crisis for the same underlying reason. In order to investigate this possibility we run instrumental variables regressions, as follows: In a first step, the disclosure variable is regressed on a number of observable exogenous regressors. In a second step, the predicted value of this regression of the disclosure variable, which is a function of observable exogenous variables only, is used in the probit regression. The variables used in the first stage regressions include a number of bank-specific variables (loan ratio, return on equity, size, market share and the cost-income ratio). In addition, we exploit the cross-country dimension of our dataset and include country dummy variables, which would reflect the average level of the disclosure in each country. Since we know that disclosure varies through time, we also include a linear time trend (year) as an explanatory variable. Finally, to make sure that as a result of including year we do not create a variable that has a simple time trend, we interact year with the set of country dummy variables. As a result the predicted change in the instrumented variable through time will be specific to each country and therefore mimic the actual change in that variable at the country level. Again, this approach is motivated by a finding that the average change in disclosure is very different across countries.

Table 10 reports the second stage regression using the predicted value of the first stage regression in lieu of the disclosure variable. The results in Table 10 suggest that endogeneity is not a major issue for our regression. The coefficient on the instrumented disclosure variable retains both its sign and its level of economic significance, when compared to the benchmark result presented in Table 1.

Table 10: Disclosure and banking problems: Instrumental variables (IV) probit regressions

	(1) Probit	(2) Probit	(3) Probit
Dep. Variable	c(i, t)	c(i, t)	c(i, t)
L1Disc(IV)	-1.0483 **	-1.2922 ***	-0.9528 **
Year	0.1796 ***	0.0933 ***	0.1814 ***
Logsize	-0.0629 **	-0.0633 **	
L1Beta	0.2793	0.3665 ***	
L1Roa	-8.0971 *	-4.2163 **	
L1Current	0.0035 *		-0.0019
L1Interest	0.0001		0.0000
L1Gdp_g	4.1358		1.5007
Constant	-359.0691 ***	-186.2674 ***	-363.5694 ***
No. of obs.	2466	2912	2522
No. of banks	519	544	527
Wald chi2	59.94	40.64	52.43
Prob > chi2	0	0	0

All variable definitions are provided in Table A1. A variable name preceded by L1 denotes the one year lag of that variable.

*** Statistical significance at the one percent level

** Statistical significance at the five percent level

* Statistical significance at the ten percent level

8. Conclusion

This paper offers a new approach for assessing the marginal effect of structural factors on the likelihood of crises that involves panel-data techniques applied to bank-level data. Our dataset covers more than 500 banks in 32 different countries over the years 1994-2000. Using this dataset we assess the likelihood of a bank experiencing a dramatic fall in its stock price in any given year and relate the likelihood of such an event for any particular bank and in any particular year to both the existence of a deposit insurance scheme and to bank transparency, while controlling for macro- as well as bank-level factors that might also play a role in affecting the likelihood of such an event. Our results indicate that the effect of deposit insurance will depend on the particular design features of the scheme. Deposit insurance per se appears to reduce the likelihood of crisis, when compared to a regime with implicit deposit insurance. On the other hand, schemes that afford unlimited coverage to depositors appear to increase the likelihood of crises. By contrast we find that bank transparency unambiguously reduces the likelihood of banking problems. Moreover, these results are strongest for economies in which the financial and institutional environment is relatively weak and the potential for moral hazard and adverse selection is relatively high. But they are found to be robust to the inclusion of a number of controls that reflect other aspects of the regulatory and competitive environment. Our findings therefore point to further increases in bank transparency and disclosure as an important element for the design of future international regulatory standards to enhance financial stability.

Appendix

Table A1: Definitions of the Variables and Data Sources

DATA SOURCE	VARIABLE	DESCRIPTION
BankScope	Disc	disclosure index, as described in Box 1
	List	listing=1 if bank is listed on NYSE, NASDAQ or AMEX, otherwise 0
	Roa	return on assets
	Logsize	logarithm of total assets
Bloomberg	c(i,t)	crisis dummy
	Beta	Beta
International Financial Statistics (IFS)	gdp_g	real GDP growth
	Interest	short-term interest rate
	Current	Current account
World Bank (Beck et al 1999)	Pcredit	Private credit by deposit money banks and other financial institutions to GDP
	Stmcap	Stock market capitalization to GDP
La Porta et al (1998)	Rlaw	Rule of Law. Assessment of the law and order tradition in the country produced by the country risk rating agency International Country Risk (ICR), on a scale of 1 to 10, as described further in La Porta et al (1998)
Barth et al (2003)	Capstring	Overall capital stringency, as described further in Barth et al
	Suppower	Official supervisory power, as described further in Barth et al
	Activ	Restrictions on bank activities, as described further in Barth et al
	Entry	Entry into banking requirements, as described further in Barth et al
	Bankconc	Fraction of deposits held by the five largest banks

Table A.2: Average disclosure indices by country

	S1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12	s13	s14	s15	s16	s17	disc
ARGENTINA	0.71	0.71	0.00	0.36	0.00	1.43	0.63	0.71	0.71	0.71	0.38	0.71	0.59	0.54	0.54	0.71	0.71	0.48
AUSTRALIA	0.00	0.94	0.00	0.90	0.89	1.80	0.85	0.90	0.92	0.88	0.94	0.94	2.56	0.93	0.93	0.00	0.94	0.73
AUSTRIA	0.07	0.54	0.00	0.00	0.00	1.22	0.00	0.61	0.61	0.00	0.61	0.07	0.44	0.60	0.53	0.61	0.04	0.28
BELGIUM	0.56	0.13	0.00	0.09	0.00	1.13	0.25	0.44	0.56	0.38	0.56	0.00	0.38	0.19	0.19	0.56	0.38	0.28
BRAZIL	0.78	0.75	0.00	0.74	0.74	1.56	0.78	0.78	0.78	0.78	0.76	0.75	0.48	0.57	0.57	0.75	0.75	0.59
CANADA	0.53	0.26	0.16	0.54	0.03	1.38	0.79	0.26	0.60	0.61	0.26	0.30	1.53	0.75	0.75	0.00	0.73	0.45
CHILE	0.71	0.74	0.00	0.67	0.71	1.47	0.00	0.74	0.74	0.69	0.74	0.07	0.65	0.07	0.07	0.72	0.72	0.45
FINLAND	0.79	0.00	0.00	0.63	0.08	1.58	0.00	0.79	0.79	0.79	0.79	0.00	2.25	0.75	0.75	0.79	0.79	0.55
FRANCE	0.00	0.89	0.10	0.34	0.02	1.77	0.00	0.85	0.86	0.74	0.63	0.16	1.01	0.82	0.82	0.88	0.88	0.51
GERMANY	0.08	0.72	0.00	0.00	0.00	1.60	0.08	0.08	0.80	0.30	0.80	0.06	0.34	0.79	0.79	0.80	0.10	0.35
HONG KONG	0.51	0.95	0.34	0.72	0.05	1.90	0.48	0.96	0.67	0.96	0.87	0.88	0.99	0.88	0.88	0.82	0.82	0.65
INDONESIA	0.87	0.37	0.00	0.23	0.23	1.67	0.84	0.89	0.72	0.88	0.88	0.22	0.68	0.87	0.87	0.89	0.87	0.57
IRELAND	0.72	0.00	0.00	0.50	0.50	1.44	0.72	0.72	0.72	0.72	0.72	0.72	1.94	0.59	0.59	0.72	0.72	0.57
ISRAEL	0.93	0.73	0.00	0.60	0.00	1.81	0.45	0.93	0.93	0.00	0.92	0.91	1.84	0.83	0.83	0.75	0.84	0.63
ITALY	0.58	0.84	0.00	0.35	0.00	1.69	0.84	0.84	0.84	0.82	0.79	0.16	1.63	0.82	0.82	0.84	0.83	0.61
JAPAN	0.00	0.87	0.00	0.72	0.81	1.72	0.87	0.87	0.83	0.87	0.57	0.45	0.98	0.87	0.87	0.87	0.86	0.62
KOREA, REP. OF	0.86	0.80	0.35	0.16	0.01	1.35	0.79	0.54	0.54	0.79	0.78	0.81	1.54	0.29	0.29	0.88	0.54	0.54
MALAYSIA	0.53	0.65	0.00	0.43	0.35	1.42	0.67	0.65	0.65	0.58	0.71	0.65	0.69	0.63	0.63	0.49	0.49	0.49
NETHERLANDS	0.10	0.73	0.42	0.08	0.00	1.71	0.00	0.73	0.77	0.77	0.83	0.00	0.77	0.50	0.50	0.73	0.67	0.44
NORWAY	0.00	0.88	0.00	0.68	0.66	1.75	0.09	0.88	0.88	0.79	0.88	0.88	2.48	0.87	0.87	0.88	0.88	0.68
POLAND	0.76	0.00	0.00	0.53	0.06	1.39	0.71	0.77	0.76	0.57	0.72	0.47	0.91	0.58	0.76	0.76	0.74	0.50
PORTUGAL	0.96	0.00	0.00	0.73	0.82	1.93	0.00	0.96	0.96	0.96	0.96	0.21	1.36	0.88	0.88	0.96	0.96	0.65
SINGAPORE	0.84	0.45	0.18	0.39	0.39	1.68	0.39	0.00	0.79	0.75	0.80	0.39	1.04	0.82	0.82	0.75	0.54	0.52
SPAIN	0.00	0.94	0.71	0.60	0.09	1.92	0.00	0.95	0.96	0.74	0.96	0.17	1.80	0.96	0.96	0.96	0.96	0.65
SWEDEN	0.85	0.00	0.00	0.73	0.83	1.65	0.60	0.70	0.85	0.80	0.85	0.18	2.48	0.75	0.75	0.85	0.85	0.65
SWITZERLAND	0.68	0.66	0.00	0.06	0.02	1.34	0.70	0.63	0.70	0.45	0.78	0.05	0.23	0.50	0.50	0.80	0.48	0.41
TAIWAN	0.86	0.00	0.00	0.62	0.67	1.74	0.85	0.81	0.85	0.00	0.79	0.16	0.98	0.75	0.75	0.88	0.86	0.55
THAILAND	0.00	0.58	0.00	0.32	0.32	1.10	0.48	0.00	0.58	0.39	0.58	0.09	0.66	0.58	0.58	0.58	0.58	0.35
TURKEY	0.55	0.35	0.00	0.46	0.50	1.07	0.17	0.44	0.50	0.38	0.49	0.10	0.13	0.53	0.53	0.55	0.54	0.35
UNITED KINGDOM	0.31	0.66	0.09	0.56	0.52	1.67	0.21	0.86	0.88	0.72	0.87	0.59	1.55	0.51	0.51	0.85	0.88	0.58
USA	0.00	0.90	0.82	0.87	0.13	1.74	0.90	0.04	0.10	0.90	0.87	0.87	2.62	0.83	0.83	0.85	0.90	0.67

Bibliography

- Abrams, B.A. and Haung, C.J., 1987, Predicting bank failures: the role of structure in affecting recent failure experiences in the USA. *Applied Economics*, 19, 1291-1302.
- Barth, J.R., Caprio, G. and Levine, R., 2004, Bank Regulation and Supervision: What Works Best? *Journal of Financial Intermediation*, 13, 205-248
- Beck, T., Demirgüç-Kunt, A. and Levin, R., 2005, Bank concentration and Fragility: NBER Working Paper No 11500
- Berger, A.N. and Udell, G.F., 2003, The Institutional Memory Hypothesis and the Procyclicality of Bank Lending Behaviour. BIS working paper No. 125.
- Bhattacharya, S., Boot, A. and Thakor, A., 1998, The Economics of Bank Regulation. *Journal of Money, Credit and Banking*, Vol. 30, 745-770.
- Bushman, R.M. and Smith, A.J., 2003, Transparency, Financial Accounting Information and Corporate Governance. *Federal Reserve Bank of New York Economic Policy Review* 9, No.1, April, 65-87.
- Caprio, G. and Klingebiel, D., 1996, Bank Insolvencies: Cross-Country Experience. Policy Research Working Paper No. 1620, World Bank.
- Caprio, G. and Klingebiel, D., 2003, Episodes of Systemic and Borderline Financial Crises. World Bank, January 2003.
- Cordella, T. and Yeyati, E.L., 1998, Public Disclosure and Bank Failures. CEPR Discussion Paper No. 1886.
- Demirgüç-Kunt, A. and Detragiache, E., 1998, The Determinants of Banking Crises in Developed and Developing Countries. *IMF Staff Papers*, Vol. 45, 110-131.
- Demirgüç-Kunt, A. and Detragiache, E., 2002, Does deposit insurance increase banking system stability? An empirical investigation. *Journal of Monetary Economics*, Vol. 49(7), 1373-1406.
- Demirgüç-Kunt, A. and Kane, E., 2002, Deposit Insurance Around the Globe: Where Does It Work? *Journal of Economic Perspectives*, 2002, Vol. 16(2), 175-195.
- Diamond, D. and Dybvig, P., 1983, Bank Runs, Deposit Insurance and Liquidity. *Journal of Political Economy*, Vol. 91(3), 401-19.
- Diamond, D. and Rajan, R.G., 2001, Liquidity risk, liquidity creation and financial fragility: a theory of banking. *Journal of Political Economy*.
- Eichengreen, B. and Arteta, C., 2000, Banking Crises in Emerging Markets: Presumptions and Evidence. University of California, Berkeley, mimeo.
- Ferguson, R., 1998, The Asian Crisis: Lessons to be Learned and Relearned. Address before America's Community Bankers (Washington DC, March 4 1998).
- Fischer, S., 1999, Reforming the International Financial System. *The Economic Journal*, Vol. 109, 557-76.
- Furman, J. and Stiglitz, J.E., 1998, Economic Crises: Evidence and Insights from East Asia. *Brookings Papers on Economic Activity*, 1-136.

- Garcia, G., 1999, Deposit Insurance: A Survey of Actual and Best Practice. IMF Working Paper 99/54.
- Giannetti, M (2003), Bank-firm Relationships and Contagious Banking Crises. *Journal of Money, Credit and Banking*, Vol 35, pages 239–61.
- Giannetti, M., (2005), Liberalization and Banking Crises: The Role of Capital Inflows and Lack of Transparency. Mimeo, Stockholm School of Economics. <http://ssrn.com/abstract=556072>
- Gorton, G. and Huang, L., 2002, Bank Panics and the Endogeneity of Central Banking. NBER Working Paper 9102.
- Gropp, R. and Vesala, J., 2004, Deposit Insurance, Moral Hazard and Market Monitoring. ECB Working Paper No. 302.
- Hellmann, T.F., Murdoch, K.C. and Stiglitz, J.E., 2000, Liberalization, Moral Hazard in Banking and Prudential Regulation: Are Capital Requirements Enough? *American Economic Review*, Vol. 90, 147-165.
- Herring, R.J. and Vankudre, P., 1987, Growth opportunities and Risk-Taking by Financial Intermediaries. *Journal of Finance*, Vol. 42, 583-600.
- Hoggarth, G., P. Jackson and E. Nier, 2003, Market Discipline and Financial Stability. In: Litan, Pomerleano and Sundararajan (Eds.), *The Future of Domestic Capital Markets in Developing Countries*, Brookings Institute, pp. 125-152.
- Hovakimian, A., Kane, E.J. and Laeven, L., 2003, How Country and Safety-Net Characteristics Affect Bank Risk Shifting. *Journal of Financial Services Research*, Vol. 23, 177-204.
- Hyytinen, A. and Takalo, T., 2003, Preventing systemic crises through bank transparency. Bank of Finland Discussion Paper, 25, 2003.
- Kaminsky, G. and Reinhart, C., 1998, The Twin Crises: The Causes of Banking and Balance of Payment Problems. *American Economic Review*, Vol. 88, 473-500.
- Krugman, P., 1998, What Happened to Asia, mimeo, Massachusetts Institute of Technology.
- La Porta, Rafael, Lopez-de-Silanes, Florencio and Shleifer, Andrei and Vishny, Robert W. (1998): “Law and Finance”, *Journal of Political Economy*, Vol. 106, pp. 1114-1155
- Lindgren, C.-J., Garcia, G. and Saal, M.I., 1996, Bank Soundness and Macroeconomic Policy. Washington, International Monetary Fund.
- Logan, A., 1999, The early 1990s small banks crisis: leading indicators. Bank of England Financial Stability Review, December 1999.
- Matutes, C. and Vives, X., 1996, Competition for Deposits, Fragility and Insurance. *Journal of Financial Intermediation*, Vol. 5, 184-216.
- Merton, R.C., 1977, An Analytical Derivation of the Cost of Deposit Insurance Loan Guarantees. *Journal of Banking and Finance*, Vol.1, 3-11.
- Mishkin, F.S., 1996, Understanding Financial Crises: A Developing Country Perspective. NBER Working Paper No. 5600.

Morris, S. and Shin, H., 2002, Social Value of Public Information. *American Economic Review*, Vol. 92, 1521-1534.

Radelet, S. and Sachs, J.D., 1998, The East Asian Financial Crisis: Diagnosis, Remedies, Prospects. *Brookings Papers on Economic Activity*, Vol. 1, 1-90.

Rossi, M., 1999, Financial Fragility and Economic Performance in Developing Countries: Do Capital Controls, Prudential Regulation and Financial Supervision Matter? IMF Working Paper WP/99/66, May.