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Abstract

Motivated by recent public policy debates on the role of market discipline in banking stability, I examine the impact of greater bank disclosure in mitigating the likelihood of systemic banking crisis. In a cross sectional study of banking systems across 49 countries in the 90s, I find that banking crises are less likely in countries with financial reporting regimes characterized by (i) comprehensive disclosure (ii) informative disclosure, (iii) timely disclosure and (iv) more stringent auditing.

JEL Classification: G21, G28
Key Words: Banking Crisis, Disclosure, Transparency, Audit Stringency

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I. Introduction

Although banking crises[1] have been a common feature of banking systems for a long time – the U.S. alone experienced eleven banking panics between 1800 and the beginning of the World War I (Baim and Calomiris (2001)) – the crises of recent times have been rather severe. The cost of bailing out troubled banks in a banking crisis ranges between 20 and 50 percent of a country's GDP, with a resolution time that can extend up to nine years (Honohan and Klingebial(2000)[2]. Hoggarth and Saport (2001) report the average fiscal costs of banking crisis resolution to be 16% of GDP, and the cumulative real output losses from banking crises to be above 17% of GDP. As an example, Indonesia incurred 50% of its GDP in resolving the 1997 crisis. Banking problems are also believed to be at the center of the recent financial upheaval that engulfed emerging and transition economies (Caprio and Klingebial (1996)).

These financial crises of the late 1990s coupled with recent corporate scandals around the world have brought to the fore the public debate on the need to strengthen market discipline through greater disclosure and transparency. Enhanced transparency via greater disclosure of accurate and timely information about banks is believed to improve market discipline, which could reduce the likelihood of banking crisis. This paper investigates empirically the impact of greater disclosure and transparency on banking system stability.

The role of disclosure and transparency to banking system stability is not well understood, however. Economic theory provides conflicting predictions about the benefits of greater disclosure. The 'Disclosure-Stability' view holds that greater disclosure and the consequent transparency facilitates efficient allocation of resources by improving market discipline. Increased transparency permits greater market discipline whereby strong banks are rewarded for their risk management and performance and weak banks are penalized with higher

[1] I use banking crisis to mean systemic banking crisis. Banking instability refers to existence of adverse impact from dysfunctions in the banking system or the risk thereof (Canoy et al (2001), and encompasses both individual bank instability (bank failure), and banking crisis. The former refers to a failure of a financial institution, and the latter describes the situation where an individual financial institution failure leads to many *simultaneous* failures of other financial institutions. This is different from 'contagion' where an individual failure leads to 'one or more *sequential* failures'. Banking crisis could be 'systemic' or borderline. 'Systemic' banking crises are episodes of crises where most or all bank capital in the system is exhausted (Caprio and Klingebial (1996). I provide the detailed criteria by which I classify banking crisis in section II below.

[2] By contrast, the U.S. banking crisis of the Great Depression of the 1930s, when almost a quarter of U.S. banks bankrupted, the negative net worth of the failed banks was only 3 percent of GDP (Beim and Calomiris (2001)).Other countries had similar histories of both infrequent banking crises and low cost of banking collapse. In the pre World-War I era, the countries that experienced major banking crisis include Argentina (in 1890), Australia (1893), Brazil (1892), Italy (1893) and Norway (1901), but the negative net worth of their failed banks never exceeded 1 percent of GDP, nor the costs of cleaning up exceeded 10 percent of GDP. In fact, countries such as Canada, Germany, Japan, Mexico, Russia, and Sweden avoided banking crisis completely during that era (Beim and Calomiris (2001)).

costs of raising capital and deposits, thereby enabling early detection of weak banks before they drag the entire banking system into crisis. That is, market discipline provides incentives for banks to manage their risk prudently and operate efficiently, thereby reducing the severity and frequency of bank failures.

On the other hand, the 'Disclosure-fragility' view holds that disclosure may lead to interpretation of specific information about banks' financial conditions unjustifiably as indicator of widespread problems in the banking system, thereby leading to bank runs or stock market collapse (Calomiris and Mason (1997), Gilbert and Vaughan (1998) and Kaufman (1994)). Disclosure of financial problems at a bank may lead to the bank's failure through a bank run. It may also lead to an overreaction in the financial markets jeopardizing the ability of the bank to raise capital. This lack of investor confidence could spread to the entire banking system, causing systemic banking failure. In that case, rather than providing market discipline to improve resource allocation, more disclosure and transparency leads to the collapse of the banking system causing in failure of both strong and weak banks alike.

The theoretical ambiguities about the impact of greater disclosure on bank stability are reflected in the public policy debate and the reluctance of countries in adopting pro-disclosure policies. International organizations such as the Basle Committee, the World Bank, and the International Monetary Fund recommend countries to enhance the transparency of their banking sectors by improving disclosure. Yet, despite these calls, disclosure and transparency is not always the hallmark of banking sector reform policies in all countries. Japan, for example, while undergoing a long period of banking crisis in recent years, adopted a policy of less disclosure in the midst of its banking crisis. Since 1998, banks in Japan are required to report securities at book rather than at market value (understating liabilities), to provide own estimate of market value of real estate holdings, and to net loans and deposits to same customers (underreporting risk) [Jordan et al. (1999)].

The study of bank disclosure and bank performance is especially important in light of the ongoing public policy initiatives that rely on disclosure and transparency as a centerpiece of regulatory reforms in the banking sector. The Basel committee is finalizing a framework for bank capital adequacy for the new century. The New Basel Capital Accord relies on minimum capital requirement (pillar 1) and supervisory review of bank assessment of capital relative to risk (pillar 2), complemented by market discipline via greater disclosure requirements (pillar 3)

(see BCBS (2003)). By providing flexibility for banks in measuring their risk and capital adequacy, the New Accord brought market discipline into focus as a supplemental tool in bank capital regulation.

Despite its importance in banking sector policy and the surrounding theoretical ambiguity, there is little cross-country empirical evidence on disclosure and bank fragility. For the U.S., Jordan et al. (1999) examine the impact of disclosing supervisory information on troubled U.S. banks during financial crisis, and report that doing so does not lead to destabilization of the banking system. Baumann and Nier (2003) examine the relation between disclosure and bank capital and risk, and report an inverse relation between disclosure and bank risk-taking. They do not study banking crises, however. There is a growing empirical literature on banking crises; yet the literature does not address the role of disclosure and transparency. Demirguc-Kunt and Detragiache (1998) and Beck et al. (2003) investigate respectively the role of macroeconomic stability and banking regulation in banking crisis. Cull, Senbet and Sorge (2003) and Demirguc-Kunt and Detragiache (2002) examine the relations between deposit insurance design features and banking crises. Barth, Caprio and Levine (2004) explore the relation between bank regulation and banking crisis, but they do not address the issue of disclosure and transparency directly. In the context of the effectiveness of regulation, they examine the degree of private monitoring on bank performance and fragility. They find that while private monitoring increases bank performance, it has no association with bank fragility, and pose the issue as a puzzle. I focus on financial disclosure and audit stringency as part of the private monitoring, and find that this has indeed a robust positive role in fostering bank stability.

The paper studies the impact of increased bank disclosure requirements and stronger auditing regulatory regime on the likelihood of suffering a systemic banking crisis based on data on 49 countries over the period 1990 through 1997. I examine the impacts of both overall improvements in disclosure, including its comprehensiveness, timeliness and informativeness, as well as disclosure of specific items relevant to the ability of outside investors to assess bank risk and capital adequacy. Similarly, I examine the impacts of improvements in overall external auditing stringency, thus the credibility of disclosure, and of the specific regulatory requirements that improve audit effectiveness. To draw accurate inferences about the impact of disclosure and audit stringency on bank crisis, I control for a number of factors that may influence banking fragility. I control for differences in the macro economic environments of banks, the overall

institutional quality of countries, and for differences in bank market structure, such as the degree of competition, concentration, ownership structure, capital regulations, entry regulations, and restrictions on bank activity.

I find that the likelihood of systemic banking crisis is lower in countries with regulations that require (i) more comprehensive disclosure, (ii) more informative (i.e. accurate) disclosure, and (iii) more timely disclosure. I find that the likelihood of banking crisis is lower in countries whose banks provide more comprehensive information both in the core standard financial statements and in the supplemental notes. Countries with disclosure requirements for more supplemental financial information are less likely to suffer from banking crises. Specifically, banking crisis is less likely in countries that require disclosure of off-balance sheet transactions. I find that the likelihood of banking crisis is lower in countries that require a more accurate presentation of financial information in general and an accurate presentation of non-performing loans in particular. Consolidated financial reporting is considered to be more accurate (or informative) presentation, and I find that regulations that require consolidated financial reporting for related bank activities are associated with greater likelihood of banking system stability. Moreover, I find that banking system stability is enhanced by the timeliness of the financial reporting. The more frequent financial reporting, the less likely is banking crisis, all things constant.

The impact of greater banking disclosure to banking stability appears to be economically significant. An increase in bank disclosure by one standard deviation reduces the likelihood of banking crisis by about 3.5% per annum. In cost terms, applying this probability to the cumulative output loss of a typical banking crisis episode, the benefit translates to a saving of about ½ a percent of GDP. These results are not driven by reverse causality and are robust to a battery of sensitivity checks.

I find that the likelihood of systemic banking crisis is also lower in countries that require more stringent external auditing of bank financial reporting. In particular, banking crisis is lower in countries where external auditing is made a strong tool of bank supervision by requiring auditors to report to the supervisory agency, and where permitting auditors to meet supervisory agency without the consent of the auditee enhances auditor independence. Alternatively, in addition to disclosure comprehensiveness, informativeness and timeliness, disclosure credibility (as measured by external audit stringency) enhances banking system stability. I find that audit

stringency is complementary to bank disclosure in that the contribution of audit stringency to banking system stability is *in addition to* the benefit of bank disclosure.

Overall, the finding is consistent with the 'disclosure-stability' view. While improvements in disclosure in many dimensions are found to be either associated with greater bank stability or to have no significant relation to stability, I do not find greater disclosure to be related to bank fragility. In terms of current public policy, the results provide an empirical support for the New Accord's initiative in requiring greater disclosure as a source of banking system stability. Going forward, however, to enhance the benefits of greater disclosure, the results emphasize the importance of improving the credibility of financial reporting as well. While expanding the scope of bank disclosure, the New Accord fails to provide verification requirements beyond those required for financial reporting, and security registration. The results underscore the value of external auditing stringency in improving transparency and promoting bank stability.

The rest of the paper is organized as follows. Section II provides a detailed description of the data and the methodology. Section III presents the main results and Section IV provides additional robustness tests. Section V provides discussion and concluding remarks.

II. Methodology and Data

A. Methodology

I examine the relation between disclosure and banking fragility using a multivariate logit model. I estimate the probability that a systemic banking crisis will occur in a particular country in a particular time assuming this probability is a function of a set of explanatory variables of interest, X, and control variables, Z. Let $Crisis_{it}$ be an indicator variable that takes 1 if country i is in a systemic banking crisis in year t, and 0 otherwise. Let P_{it} be the probability (conditional) that systemic crisis occurs in country i in period t. The natural log of this likelihood of crisis given the explanatory variables, where β and λ are vectors of parameters to be estimated and $F(X_{it}\beta;Z_{it}\lambda)$ is the cumulative logistic distribution evaluated at $(X_{it}\beta;Z_{it}\lambda)$, is given by,

$$\ln L = \sum_{i=1}^{N}\sum_{t=1}^{T}\left(crisis_{t} Ln(F(X_{it}\beta;Z_{it}\lambda)\right) + (1-crisis_{t})Ln(1-F(X_{it}\beta;Z_{it}\lambda))$$

where, X is a vector of variables of interest and includes variables representing disclosure requirements and auditing regulatory requirements; and, Z is a set of control variables that include variables representing the banking industry structure, the quality of overall institutions and the macro-economic environment of countries.

In modeling the likelihood of crisis, I use the logistic function as the underlying probability distribution[3]. This conforms to earlier studies of banking crises (see, for example, Demirguc-Kunt et al. (2002)). In this logit specification, the estimates of the coefficients β and λ do not represent a marginal effect on the likelihood of crisis for a unit change in the underlying independent variable. Rather, the coefficients measure an increase in the log of the odds ratio, $\ln[P_{it}/(1-P_{it})]$, and this quantity depends on the values of the independent variables at which the likelihood is evaluated. A change in the independent variables will have different (nonlinear) effects on the likelihood of crisis depending on the initial crisis probability.

B. Variables

Crisis, the dependent variable, is an indicator variable that takes 1 if a country has undergone systemic banking crisis in the period 1990 through 1997. I construct the variable primarily based on the database of Caprio and Klingebial (2003), which provides comprehensive information on episodes of banking crisis since the 1970s for a large sample of countries. I supplement this information from data in Demirguc-Kunt and Detragiache (1998) particularly in dating the episodes. Systemic crises are, in general, episodes in which most or all bank capital in the banking system is exhausted. Consistent with previous research (Caprio and Klingebial (2003), Barth et al. (2004), Demirguc-Kunt (1998)), episodes are considered systemic if non-performing assets account for more than 10% of total assets or rescue cost amount to more than 2% of GDP or the crisis involved large scale nationalizations or the crisis involved bank runs where emergency measures are taken. I identify 22 such episodes in the 1990s (see Appendix I). I focus on the 1990s because I have data on disclosure and transparency – my independent variables – only for this period.

[3] I also use a probit model for robustness. No discernable differences shown between the two sets of estimates. On theoretical ground, there is no basis to prefer logit over probit and vice versa; they both are widely used in empirical economic research.

I use two sets of explanatory variables (the vector X), in addition to a set of control variables (the vector Z), to explain incidence of systemic banking crises (**Crisis**). These are data on (1) the regulation of disclosure practices, and (2) the regulation of auditing practices of banks.

Regulation of Disclosure Practices: Disclosure is mandated in all countries, and the respective supervisory body sanctions the minimum set of disclosure requirements. Data on disclosure requirements is obtained from a recent database on bank supervision and regulation maintained by the World Bank (Barth, et al. (2001). The database is constructed based on surveys of national bank regulatory and supervisory authorities in 1998 and 1999. I utilize the survey responses on issues of disclosure and auditing to construct indices of bank disclosure, disclosure informativeness and external audit stringency.

Bank Disclosure: the focal variable of interest, **Bank Disclosure**, measures the extent and comprehensiveness of financial reporting required of banks, and, specifically measures whether bank financial reports include information on bank risk management practices, accurately presents non-performing loans, presents a full picture of bank activity by reporting consolidated financial statements and presents comprehensive information by reporting off-balance sheet transactions. The variable is constructed as a principal component of four indicator variables: (i) an indicator variable with value 1 if banks are required to disclose risk management procedures to the public; (ii) a dummy variable that takes 1 if the regulation requires that accrued income on non-performing loans (NPL) should *not* be reported in the bank's income statement; (iii) an indicator variable that takes 1 if consolidated financial statements of bank and non-bank financial subsidiaries are required; and (iv) an indicator variable that takes 1 if off balance sheet items need to be disclosed to the public.

Non-reporting of NPL provides a more accurate representation of the financial health of the bank; consolidated financial statements are considered to be comprehensive; reporting off-balance sheet transactions provides a more complete picture of the conditions of the bank; and reporting risk management procedures enable investors to assess the risk profile and valuation of the bank better. Hence, these variables quantify good disclosure practices in specific areas of financial reporting. Moreover, each measure corresponds to the specific recommendations on disclosure by the Basel Committee's New Accord. To the extent that increased disclosure results in greater transparency and the consequent market discipline, the variable ***Bank Disclosure*** will be associated with lower rate of bank fragility. If, on the other hand, increased

disclosure causes misinterpretation and panic, the variable could be associated with greater fragility.

Disclosure Informativeness: measures the degree to which bank disclosure *accurately* represents the financial conditions of banks. For example, reporting interest income from non-performing loans as part of bank income overstates the true economic performance of the bank, as does the selective reporting of bank activities. ***Disclosure Informativeness*** is measured by aggregating whether non-performing loans are accurately presented and whether banks are required to present their bank and non-bank activities in a consolidated financial statement. It represents the principal component of the variables NPL and Consolidate.

Disclosure Timeliness: measures the degree to which bank disclosure is close to the decision time-point of potential users of the information. This is a function of the frequency with which information is available to users. Using survey data of accounting reporting practices around the world by the Center for International Financial Accounting Research (CIFAR), Bushman et al. (2003) constructs an index of the average frequency and comprehensiveness of interim reports for a sample of 60 countries. The frequency of interim reporting is a matter of disclosure regulation (CIFAR (1995). I use this index as a proxy for disclosure timeliness.

Supplemental Reporting: measures the extent of supplementary information (vis-a-vis the core financial statements) as required by countries' regulation. Out of the variables that constitute ***Bank Disclosure***, I construct a new variable that summarizes the extent of supplemental information by aggregating the requirement that banks provide information on risk management practices and the requirements for reporting of off-balance sheet transactions to the public. ***Supplemental Reporting*** is a principal component of Risk and Off-Balance Sheet.

In addition to these specific disclosure related variables, I also consider a variable to measure the degree of legal sanctions against bank officials for nonconformance to these regulations. The new variable, ***Director Liability***, aggregates (i) an indicator variable that takes the value 1 if directors in that country are legally liable for misleading information, and (ii) a variable that takes 1 if those legal sanctions have actually been enforced against directors in recent years.

Table 1 and 2 provide a summary of these variables. The disclosure variables exhibit wide variation across countries. **Bank disclosure** is negatively correlated with incidence of

banking crisis (though the relation is not statistically significant). The same is true of the relation between crisis and **disclosure informativeness, timeliness** and **supplemental information**.

Regulation of Audit Practices: The role of external auditors is critically important in bank disclosure. The benefit of disclosure is that it enables investors (market participants) to make accurate assessment of the firm's financial condition. In their loan decisions, banks collect private information from their customers. However, banks are reluctant to disclose proprietary information about their customers, making it difficult for outsiders, without access to individual loan information, to assess the health of the bank. This is more so in banks that lend to small firms which do not publicly disclose their information. Bank examiners and auditors have access to bank's individual loans and the banks' risk management practices. Hence they play an important role in validating the financial information disclosed by the banks.

Bank supervisory authorities regulate audit practices. Data on audit practices is obtained from the World Bank database on bank supervision and regulation (Barth et al. (2004)). I use survey responses on seven different audit practice measures to construct an aggregate index of external auditing stringency.

External Audit Stringency, the focal variable of interest, measures the degree to which external audits are independent, professional and rigorous as reflected by the regulations that govern bank-auditing practices. Specifically, it measures the stringency of external audit in terms of whether external audit is compulsory, whether the scope of external audit is mandated, whether there is a license requirement for auditors, and whether auditors have independence in reporting to supervisory bodies. The variable is a principal component of the following five indicator variables. (i) A dummy variable that takes 1 if external audit of banks is compulsory in the country. (Such audit is compulsory in all countries with the exception of Italy); (ii) an indicator variable that takes a value of 1 if there are specific regulatory requirements for the extent of audit; (To the extent that audits are costly, in the absence of minimum requirements, audit services could be undersupplied. Hence, the presence of such regulation improves audit services.) (iii) a variable that takes 1 if auditors are required to be licensed or certified; (iv) an indicator variable that takes 1 if auditors' report should be given to supervisory agency; and, finally, (v) a variable that takes 1 if supervisors can meet external auditors to discuss audit report *without* bank approval.

Quality third-party audit provides validation that bank-produced statements represent the financial condition of the bank as is, thereby increasing the credibility of the bank disclosure. To the extent that this enhances the ability of market participants to accurately assess the risk profile of the bank, and strengthen market discipline, increase in theses variables would be associated with lower rates of fragility.

In addition to these specific audit quality-related variables, I also consider the legal sanctions against auditors in the case of nonconformance. ***Auditor Liability*** measures the degree of legal sanctions against auditors in the case of nonconformance. I construct a variable by aggregating three variables that reflect legal burdens against auditors: (i) an indicator variable that takes 1 if auditors are legally required to report misconduct by managers/directors to supervisory agency, (ii) a variable that assumes the value 1 if legal action against external auditors be taken by supervisor for negligence, and (iii) a variable on legal enforcement which takes 1 if legal action has been taken against auditor in recent years.

Table 1 and 2 provide summary of the variables. The stringency of external audit varies extensively across countries. Table 1 shows that the External Audit Stringency variable exhibits wide variation ranging in value from –6.725 to 0.554. Countries high on audit stringency tend to have lower incidence of banking crisis (Table 2). Audit stringency and crisis exhibit significant negative correlation. Other indicators of audit professionalism, independence and audit rigor are all inversely correlated with incidence of crisis (not reported).

Control Variables: To examine the relations between disclosure, audit stringency and banking crises, I control for a number of factors. To control for macroeconomic (in) stability that are likely to affect the quality of bank assets thereby crisis probability, I use the average rate of **inflation** and the **external terms of trade**. This is consistent with previous research (e.g. Barth et al. (2004), Cull et al. (2003)). Inflation serves as a proxy for macroeconomic mismanagement that adversely affects the economy and the banking system. A chronically inflationary environment deteriorates the quality of bank assets and I expect inflation to increase bank crisis probability. External terms of trade capture the macro economic shocks that could adversely affect banks by increasing their non-performing loans. Improvements in terms of trade are expected to be associated with decreases in the likelihood of bank crises. **Per capita GDP** is included to control for the level of development of the country, and generally proxies for the quality of overall institutional environment. Banking sector problems could result from

weaknesses in the legal system which permeates widespread fraud, and/or weaknesses in the administrative capacity which is reflected in loose prudential supervision and regulation of the banking system. Per capita GDP is expected to measure differences across countries on these dimensions.

Recent research identifies banking industry structure as a potential determinant of bank crises. Beck et al. (2003) report that banking crisis is lower in countries with concentrated banking system and both Beck et al. (2003) and Barth et al. (2004) find that countries with banking industry structure that allows more competition and less regulatory restrictions have lower incidence of bank crises. I use ***bank concentration***, the share of assets of the three largest banks, to control for banking system concentration. I expect concentrated banking to be associated with less likelihood of crisis – a negative coefficient. To control for the degree of competition in the banking sector, I use a variable, ***bank competition***, which is a measure of banking competitive conduct obtained from Claessens and Laeven (2004). Using a methodology from Panzar and Rosse (1987), they develop an index of competitiveness based on bank-level data in a large cross-section of banking systems, as a sum of the elasticity of bank revenue to changes in input prices. The variable, ***bank competition***, takes values between 1 (perfect competition) and 0 (with less than 1 representing monopolistic competition). Claessens and Laeven (2004) find that banking systems with less entry restrictions, less restriction to foreign bank entry and activity restrictions are more competitive, but find no inverse relation between competitiveness and concentration. Barth et al. (2004) and Beck et al. (2003) report inverse relation between restrictive regulations against entry and activity, and bank crisis. I expect greater ***bank competition*** in the banking system to be associated with lower likelihood of banking crisis.

Table 1 summarizes the variables. The data displays enormous variations in the macroeconomic conditions and banking industry structure. Average inflation (log) ranges from 0.01 to 0.46 and, consistent with priors, is positively correlated with incidence of crisis. Bank concentration varies from a low of 19 percent to a high of 100 percent and, consistent with expectations, is associated with bank system stability, as is bank competition which has a significant negative correlation with incidence of crisis (Table 2). As would be expected, Per capita GDP is negatively correlated with incidence of banking crisis.

C. Sample Selection

I attempt to explain the likelihood of suffering banking crisis given information on the regulatory environment governing disclosure and auditing in different countries. The data on regulation of disclosure and auditing, from the World Bank, is based on surveys of bank supervisory bodies in the late 90s. Barth et al. (2004) reports that the regulatory and supervisory environment does not change significantly over time. Yet, it is reasonable to assume that the survey results reflect the period closest to when the survey was taken more accurately than the distant past. Hence, due to these data limitations, and to minimize the problem of reverse causality, I focus on explaining incidence of banking crisis in the 90s (1990 through 1997). For this period, I cover all countries with data on bank regulation and supervision and data on crises as my sample. This results in a sample size of 49 countries with 22 episodes of crises (not counting the length of time of each crisis) involving 23 countries. Appendix I presents the list of countries in the sample and the episodes of crisis in the 1990s.

III. Results

A. Disclosure Requirements and Banking Crises

Table 3 presents the results on the empirical relation between greater disclosure requirements and banking system stability. The table indicates that greater disclosure requirements reduce the likelihood of suffering a systemic banking crisis. The disclosure variable enters the empirical models with a large statistically significant negative sign. The inverse relation between greater disclosure and banking fragility holds controlling for macroeconomic sources of instability as well as banking industry structure. In column (1) disclosure is associated with lower likelihood of systemic banking crisis controlling for macro-economic sources of bank instability. Column (2) indicates that disclosure lowers the likelihood of banking crisis controlling for banking industry structure. The results hold in column (3) where I account for both sets of controls. Crisis probability is lower as well after controlling for the level of countries development as a proxy for overall institutional quality (column (4)).

The results support the thesis that greater disclosure enhances bank system stability via strengthening market discipline. The impact of greater disclosure to bank stability is economically large. For example, based on the complete model estimates in column (4),

increasing disclosure by one standard deviation would lower the likelihood of banking crisis by about 3.5 percent[4]. This is a significant reduction, given that crisis probabilities are very low at any point in time (the mean value is about 6%). Hoggarth and Saport (2001) report the cumulative output loss of the average banking crisis to be about 16 percent of GDP. Applying the crisis-ameliorating probabilities, the impact of greater disclosure would be a saving of roughly about ½ percent of GDP.

With respect to the control variables, confirming economic theory and previous empirical results, improvements in external terms of trade reduces crisis probability while unbridled inflation increases crisis probability. More developed economies are less likely to suffer systemic banking crisis indicating the positive role of the overall quality of the institutional environment. As predicted, bank concentration lowers banking crisis probability confirming the results in Beck et al. (2003). Also, as expected, banking crisis is less likely in more competitive banking systems. While this is broadly consistent with earlier findings (Barth et al. (2004)) and Beck et al. (2003)) that regulatory restrictions as to entry and bank activity fosters bank fragility, the direct evidence that increased competitive conduct (or competitiveness) lowers the likelihood of banking crisis is a new finding in this paper. The seemingly contradictory findings that both concentrated and competitive markets foster stability could be interpreted as that it is the contestability of markets that matter. Alternatively, large banks through their diversification ability strengthen banking system stability while increased competition curbs the banks' potential extractive tendencies. Overall, the model fits the data well, correctly predicting crises episodes more than 93 % of the time.

Panel B of Table 3 explores the disclosure-stability link by focusing on the role of specific disclosure properties. Panel B indicates that for bank disclosure to have impact on banking system stability, disclosure has to be accurate (or informative), timely and comprehensive. Improvements in bank disclosure informativeness reduce banking system crisis probability (column 5), as does enhancing the timeliness of bank reports (column (6)).

Supplementary information, in addition to the standard financial statements, appears to significantly impact the effectiveness of bank disclosure to stability. Such information, in the

[4] Noting that the predicted value from the model provides an estimate for $Ln(p_{it}/(1+p_{it}))$, increasing Disclosure by one standard deviation (i.e. 0.945), holding the other variables at their mean levels, increases $Ln(p_{it}/(1+p_{it}))$ by -3.325 (i.e. -3.519X 0.945). Solving for p_{it}, probability that banking crisis would occur in country i during period t, $p_{it} = e^{-3.325}/(1+e^{-3.325})$, which is equal to 0.0347.

form of a detailed discussion of bank risk management practices and off-balance sheet transactions allow informed assessment of bank risk profile by market participants, fostering market disciple to work. Column (7) indicates the impact of this type of information in enhancing banking stability.

In general, specific requirements meant to increase greater accuracy and comprehensiveness of disclosure are associated with higher probability of bank stability. In particular, regulatory requirements that call for consolidated financial statements for banks (Column 9), and requirements for disclosure of off-balance sheet transactions (Column 10) to the public lower the likelihood of bank crises. Requirements for accurate reporting of non-performing loans (Column 8) enters with a negative sign (implying that it reduces bank fragility), but are significant only at 20% level. Similarly, disclosure of risk management methods (Column 11), while enters with the right sign, is not significant at the conventional levels. Regulations that sanction legal liability on directors for misinformation have no statistically significant impact on fragility (column 12). This may reflect the fact that those sanctions could be covered in the countries' security laws, and hence could be redundant when packaged as bank regulation. To see if the impacts of disclosure requirements on banking stability are simply reflections of the legal sanctions against managers for misinformation, in column (13), I include both the disclosure and the directors' liability variables. Greater disclosure fosters banking system stability after accounting for legal liability.

Overall, the results are consistent with the disclosure-stability view that greater disclosure fosters bank stability via market discipline. The results are also supportive of the goal of the third pillar of the New Basal Capital Accord that aims to encourage market discipline by developing a set of disclosure requirements that allow market participants to assess bank risk positions and capital adequacy. The benefits of the specific recommendations in areas of supplemental reporting, consolidation, and reporting risk methodologies for fostering bank stability are validated by the findings.

B. Regulation of Audit Practices and Banking Crises

Table 4 indicates that regulations that call for stringent external audit of bank-generated information lowers the likelihood of banking crises. External Audit Stringency enters the

regressions with a large statistically significant negative coefficient in all specifications. In column (1), greater audit stringency is associated with lower likelihood of systemic banking crisis, controlling for macro-economic sources of bank instability. Column (2) indicates that banking systems with stringent external audit requirements are less vulnerable to crisis, controlling for banking industry structure. The inverse relation between audit stringency and bank fragility holds in column (3) where I account for both sets of controls. The same holds, when, in addition, I control for countries' level of development.

Evaluating the marginal effects of audit stringency, we see that a one standard deviation increase in the audit variable based on the full model in column (4) results in a decrease in crisis probability by about 25 percent, a much larger effect than the impact of disclosure. However, one should note that a comparison of the two could be misleading as the audit stringency variable has a much wider distribution than the disclosure variable. Nonetheless, the computation provides a sense of how large the economic impact of strengthening audit requirements is.

To evaluate if this effect of audit stringency on bank crisis is simply a proxy for the impact of greater disclosure, column (5) explicitly controls for bank disclosure. More stringent external audit requirements foster bank stability, controlling for greater disclosure. The result indicates that stringent auditing is not a substitute for accurate and comprehensive disclosure. Rather regulations that call for more vigilant external audit complement greater disclosure in fostering banking system stability.

The results also indicate that the control variables act as predicted. The overall effects of bank concentration and bank competition on crisis likelihood are still negative and significant. Terms of trade improvements reduce and higher inflation increases crisis probability. In addition, the models fit the data well, correctly identifying episodes of crises up to 95% of the time.

Panel B of Table 4 examines the link between auditing stringency and bank system stability further by focusing on specific external auditing-related regulatory requirements. In general, specific requirements meant to increase external audit stringency are associated with lower likelihood of banking crises. Measures meant to represent strengthening of auditor independence appear to be most important (columns (7) and (8). These are the requirements for external audit reports to be submitted to supervisory authorities, and the requirement that bank supervisory authorities can meet external auditors to discuss audit reports *without* bank approval.

Regulations that set standards about the amount and extent of audit (column (6)) is not statistically related to bank stability (though the variable carries the right sign). I do not report on the impacts of having compulsory auditing and the requirements for auditors to be licensed because, in my sample, almost all countries require audited financial statements (except in Italy) and licensed or certified auditors. The variables do not exhibit cross-country variation.

Regulations that sanction additional legal liability against auditors and enforcement of those sanctions do not appear to materially affect bank stability. It might be that those sanctions are covered in the countries' security laws and could be redundant in banking regulations. To see if the impact of external audit stringency to banking stability is merely a reflection of the legal sanctions against auditors, column (10) includes both auditor liability and audit stringency. External audit stringency robustly reduces crisis probability controlling for auditor liability.

The findings support the disclosure-stability view in that stringent external audit complements greater disclosure in fostering bank stability. The results are consistent with the notion that external audit add value to market discipline by providing third-party verification of information that banks are reluctant to release to the public voluntarily. In their loan decisions, banks collect private information from their customers. Banks are reluctant to disclose proprietary information about their customers, making it difficult for outsiders, without access to individual loan information, to assess the health of the bank. External auditors have access to bank's individual loans and the banks' risk management practices. By validating through their audit report, external auditors enrich the information environment, allowing investors to assess bank health, and market discipline to work in fostering bank stability.

In this respect, the New Basal Capital Accord, while requiring extensive disclosure, does not recommend external audit beyond required for financial reporting purposes. The evidence suggests that there may be value in extending audit requirements to cover the newly required disclosure.

IV. Robustness Checks

To ensure accurate inference and avoid mechanical explanations for the main results so far, I provide a series of sensitivity checks in this section. First, the main results of the paper, the inverse relation between disclosure and banking system fragility and between external audit

stringency and fragility is robust to measuring the focal variables – **Bank Disclosure** and **External Audit Stringency** - differently. In column (1), (2) and (3) of Table 5, I measure **Bank Disclosure** and **External Audit Stringency** as sums of the component indicator variables rather than as principal components. The effect of greater disclosure and audit stringency on crisis likelihood is negative and very significant. In addition, I use measures of restrictions to entry into the banking sector and regulatory restrictions on bank activity as alternative measure of the competitiveness of the banking sector, instead of the variable, bank competition (results not reported). The main results remain robust.

Second, defining crisis episodes differently does not change the main findings. In column (4), the crisis event is defined in such a way that if a country experiences a banking crisis in any year in the 90s, it is considered as a crisis country for the entire sample period. The effect of greater disclosure and audit stringency remains negative and highly significant. In column (5), when the crisis period lasts more than a year, I define as the crisis year (event) only the first year of the crisis period and exclude the subsequent crisis years from the analysis. The impact of disclosure and external audit stringency is unaffected by such a change.

Column (6) checks whether the main finding is sensitive to whether a banking system has experienced recent crisis. I include an indicator variable that takes 1 if the country has gone through a banking crisis in the 80s. The results hold controlling for recent crisis history.

Column (7) controls for the features of countries' deposit insurance systems. Demirguc-Kunt et al. (2002) report that explicit deposit insurance increases (weakly) banking instability via exasperating the risk-shifting incentives of banks. To account for this possibility, I include an indicator variable for explicit deposit insurance countries, similar to the way Demirguc-Kunt et al. (2002) did. Greater disclosure and audit stringency reduces crisis probability, controlling for the design feature of the banking safety net.

In column (8), I estimate the model using a random-effects panel specification so as to (i) account for intra-country and intra-year correlations in the error terms and (ii) properly control for *all other* non-observable country-related and non-observable year-related sources of crisis probability. The model accounts for any omitted country related and industry related factor. Disclosure and audit stringency have robust negative impacts on bank fragility.

Finally, the results from the multivariate logistic regression so far do not explicitly control for the potential for endogeneity. It might be argued that banking fragility could lead to

lower disclosure due to fears of greater instability from disclosing bank problems. Alternatively, because the survey data on disclosure regulation is collected following the crises periods, it could be argued that a country's experience of crisis might be dictating its choice of disclosure regime. For example, a country that experienced recent crises could adopt a policy of increased disclosure and transparency (i.e., a positive relation between crisis and disclosure). I examine these possibilities of reverse causality using instrumental variables to identify the exogenous component of disclosure and audit stringency.

Based on theory and recent empirical works, I use the legal origin of countries as instruments. La Porta et al. (1998) show that civil law countries tend to support government intervention relative to private property rights. To the extent that disclosure and audit requirements are government sanctions, their prevalence could be partially dictated by the legal tradition of the country whereas the latter has little effect on the probability of crisis. Legal origin has also been extensively used as an instrument in the finance-growth literature (see Levine (2003)) as well as in the banking crises literature (see, e.g., Barth et al. (2004)). I estimate an instrumental variables model with legal origin as instruments. In the first stage regressions, the data does not reject the validity of the instruments. Columns (9) and (10) present the instrumental variables results. They confirm the major findings in Table 3 and Table 4 that (i) greater disclosure requirements lower the likelihood of systemic banking crisis; and (ii) more stringent external audit increases the likelihood of banking system stability. Hence controlling for simultaneity via the instruments does not alter the major findings of the inverse relation between disclosure and bank fragility and audit stringency and bank fragility. The results therefore are less likely to be explained by reverse causality.

V. Conclusion

While the history of banking crises stretches as far back as there has been banking systems, recent banking crises have been more frequent and costly. The recurring financial crises of the late 1990s coupled with recent corporate scandals around the world have brought to the fore the public debate on the need for strengthening market discipline through greater disclosure and transparency.

The role of disclosure and transparency to banking system stability is not well understood, however. While the 'disclosure-stability' view holds that greater disclosure fosters stability through reducing informational asymmetries, the 'disclosure-fragility' view emphasizes the negative externalities that may be associated with greater disclosure and its potential to stymie stability. Reflecting the theoretical debate, disclosure policies have not made significant inroads in bank regualtions around the world despite calls for more transparency by concerned international policy makers.

The paper examines the role of greater disclosure in fostering banking system stability. Based on data on a cross-section of forty-nine countries in the 1990s, the paper studies the impact of increased bank disclosure requirements and stronger auditing regulatory regimes on the likelihood of suffering systemic banking crisis.

The study documents that greater disclosure and stringent external audit requirements are strongly associated with banking system stability. Specifically, the likelihood of systemic banking crisis is lower in countries with regulations that require (i) more comprehensive disclosure, (ii) more informative disclosure, (iii) more timely disclosure; and (iv) more stringent external auditing of bank reporting. The impact of greater banking disclosure to banking stability appears also to be economically large. The results indicate that greater disclosure results in significant savings in countries' real output loss that is often associated with banking system instability.

In policy terms, the findings provide empirical regularities consistent with the goals of the third pillar of the New Basal Capital Accord that aims to encourage market discipline by developing a set of disclosure requirements that allow market participants to assess bank risk positions and capital adequacy. The New Accord's initiatives in requiring greater disclosure are consistent with the broader regulatory objectives of promoting banking system stability. The benefits of the specific recommendations of the initiative in the areas of supplemental reporting, consolidation, reporting risk methodologies, and frequency of reporting in fostering banking system stability are validated in the findings. To further enhance the benefits of greater disclosure, the results emphasize the importance also of improving the credibility of reporting. While expanding the scope of bank disclosure, the New Accord does not provide verification requirements beyond those required for accounting reporting, and security registration. The

results underscore the value of external audit stringency in improving transparency and promoting bank stability.

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Table 1: Summary Statistics

Variable	N	Mean	Std Dev	Minimum	Maximum
Crisis	392	0.060	0.397	0	1.000
Bank Disclosure	378	0.274	0.869	-1.800	1.935
Disclosure Informativeness	394	0.009	1.002	-3.505	0.565
Disclosure Timeliness	304	65.28	25.54	17.39	99.28
Supplemental Reporting	409	0.272	0.841	-1.295	1.392
Presentation of Non-Performing Loans	402	0.858	0.350	0	1.000
Reporting Consolidated Statements	417	0.879	0.326	0	1.000
Reporting Off-Balance Sheet To Public	417	0.860	0.348	0	1.000
Reporting Risk Management Practice	417	0.329	0.471	0	1.000
Director Liability	377	0.011	1.105	-2.941	1.044
External Audit Stringency	313	0.024	1.124	-6.725	0.554
Compulsory Audit	313	0.981	0.137	0	1.000
Required Extent of Audit	313	0.709	0.455	0	1.000
License Requirement	313	0.981	0.137	0	1.000
Auditor Report to Supervisor	313	0.962	0.192	0	1.000
Auditor Meet Supervisor without consent of Bank	313	0.709	0.455	0	1.000
Auditor Liability	417	0.013	0.924	-1.408	1.100
Bank Competition	198	0.649	0.104	0.410	0.860
Bank Concentration	420	0.715	0.219	0.190	1.000
External Terms of Trade	383	0.024	0.092	-0.189	0.232
Log of average Inflation	423	0.115	0.102	0.010	0.460
Per capita GDP	319	8.428	1.661	5.000	10.701

Table 2: Correlations

	system	Bank Disclosure	Disclosure Informativeness	Disclosure Timeliness	Supplemental Reporting	External Audit Stringency	Bank Concentration	Bank Competition	External Terms of Trade	Inflation
Bank Disclosure	-0.00731									
	(0.8885)									
Disclosure Informativeness	-0.0286	0.1229								
	(0.888)	(0.018)								
Disclosure Timeliness	-0.0054	0.2719	0.3704							
	(0.575)	(0.0001)	(0.0001)							
Supplemental	-0.0289	0.9225	0.2129	0.2946						
Reporting	(0.564)	(0.0001)	(0.0001)	(0.0001)						
External Audit Stringency	-0.26675	-0.19825	0.1387	-0.1837	-0.1507					
	(<0.0001)	(0.0001)	(0.0058)	(0.002)	(0.0022)					
Bank Concentration	0.05374	0.05404	0.3231	-0.0844	0.0649	0.29267				
	(0.2041)	(0.2999)	(0.0001)	(0.1416)	(0.1901)	(<.0001)				
Bank Competition	-0.26343	0.00250	0.1854	0.0866	0.1972	0.15144	0.41617			
	(<.0001)	(0.9709)	(0.005)	(0.1966)	(0.0025)	(0.0234)	(<.0001)			
External Terms of Trade	0.02583	-0.30211	-0.2734	-0.1448	-0.2675	0.03622	-0.06772	-0.01916		
	(0.6144)	(<.0001)	(0.0001)	(0.0153)	(0.0001)	(0.5293)	(0.1860)	(0.7755)		
Inflation	0.01597	-0.37016	-0.0925	-0.5021	-0.4202	0.20828	0.09893	0.29594	-0.01223	
	(0.7432)	(<.0001)	(0.1118)	(0.0001)	(0.0001)	(0.0002)	(0.0420)	(<.0001)	(0.8153)	
Per Capita GDP	-0.13094	0.42028	0.1527	0.48889	0.3366	-0.12436	-0.25521	-0.05737	-0.30561	-0.52670
	(0.0069)	(<.0001)	(0.0024)	(0.0001)	(0.0001)	(0.0110)	(<.0001)	(0.3844)	(<.0001)	(<.0001)

Table 3: Bank Disclosure and Banking Crises

The estimated coefficients are parameter estimates of multivariate logistic models. The dependent variables is an indicator variable, crisis, that takes on the value one fi there is a systemic banking crisis and the value zero otherwise. Bank Concentration is a measure of concentration in the banking industry, calculated as the fraction of assets held by the three largest banks in each country averaged over the sample period. Bank Competition is a measure of degree of competitive conduct in the banking industry, calculated as the sum of elasticities bank revenue to changes in input prices from Cleassens and Laeven (2004). External Terms of Trade is the logarithm of the ratio of export price index to import price index for a country. Inflation is the logarithm of average inflation rate. Bank Disclosure is a measure of the extent and comprehensiveness of financial reporting required of banks. Disclosure Informativeness is a measure of the degree to which bank disclosure accurately represents banks' financial condition. Disclosure Timeliness is a measure of the bank disclosure is made on timely basis, calculated as the value is an index of the average frequency and comprehensiveness of interim financial reports. Supplemental Reporting is a measure of the extent of supplementary information as required by countries' banking regulation. Director Liability is a measure of the degree of legal sanctions against bank officials for nonperformance vis-à-vis the bank regulations. Presentation of Non-Performing Loans, Reporting Consolidated Financial Statements, Reporting Off-balance Sheet to Public, and Reporting Risk Management Practices are dummy variables that take the value one if the countries' bank regulation requires the specific provision and the value zero otherwise. Per capita GDP is the logarithm of real per capita GDP. Numbers in parenthesis are standard errors. The sample period is 1990 through 1997. Detailed variable definitions are given in Appendix II.

	Panel A				**Panel B**								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Bank Concentration		-3.463[b] (1.394) 0.013	-6.864[b] (2.762) 0.013	-7.483[b] (3.1748) 0.0184	-13.276[a] (4.372) 0.002	-1.927 (1.592) 0.226	-7.934[b] (3.684) 0.031	-16.769[b] (6.6486) 0.0117	-9.430[b] (3.9420) 0.0167	-7.354 (3.7751) 0.0514	-10.326[b] (4.0849) 0.0115	-13.258[a] (4.930) 0.0072	-8.002[b] (3.497) 0.0221
Bank Competition		-3.377 (1.912) 0.773	-16.850[b] (6.668) 0.0115	-16.075[a] (5.7350) 0.0051	-9.633[a] (3.195) 0.002	-11.455[a] (3.443) 0.0009	-16.025[b] (6.748) 0.018	-8.979[a] (3.1899) 0.0049	-9.436[a] (3.2311) 0.0035	-20.350[b] (7.9479) 0.0105	-7.418[b] (3.0532) 0.0151	-8.486[a] (3.146) 0.0070	-17.458[a] (6.112) 0.0043
External Terms of Trade	-8.8716[a] (2.175) <.0001		-22.109[a] (5.738) 0.0001	-18.501[a] (5.2192) 0.0004	-13.972[a] (4.097) 0.0007	-5.130 (4.292) 0.232	-15.757[a] (4.996) 0.002	-11.427[a] (3.6296) 0.0016	-13.312[a] (4.0093) 0.0009	-17.152[a] (5.6095) 0.0016	-9.755[a] (3.3507) 0.0036	-11.490[a] (3.911) 0.0033	-22.029[a] (6.143) 0.0003
Inflation	-0.9026 (1.794) 0.615		11.565[a] (3.997) 0.004	10.028[a] (3.8654) 0.0095	14.255[a] (4.436) 0.001	5.511[b] (2.531) 0.0295	7.720 (3.877) 0.047	15.070[a] (5.6825) 0.0080	11.488[a] (3.4984) 0.0010	9.6487[b] (4.0308) 0.0167	8.895[b] (3.6492) 0.0148	13.14729[a] (4.4667) 0.0051	12.711[a] (4.719) 0.0071
Bank Disclosure	**-0.4776[b] (0.225) 0.0337**	**-0.591[b] (0.261) 0.0234**	**-3.889[a] (1.056) 0.0002**	**-3.5191[a] (0.9987) 0.0004**									**-3.981[a] (1.128) 0.0004**
Disclosure Informativeness					**-0.8255[b] (0.4242) 0.0517**								
Disclosure Timeliness						**-0.0248[c] (0.0144) 0.0891**							
Supplemental Reporting							**-3.113[a] (0.967) 0.001**						
Presentation of Non-Performing Loans								-2.4420 (1.7923) 0.1730					
Reporting Consolidated Statements									-1.934[c] (1.1137) 0.0825				
Reporting Off-Balance Sheet To Public										-4.7716[a] (1.4379) 0.0009			
Reporting Risk Management Practice											-1.1666 (1.1066) 02919		
Director Liability												-0.4617 (0.4667) 03225	-0.7073 (0.584) 0.2260
Per Capita GDP				-0.3790 (0.2424) 0.1180	0.0446 (0.206) (0.828)	-0.4910 (0.253) 0.0520	-0.834[a] (0.245) 0.0007	-0.9381[a] (0.3409) 0.0059	-0.2727 (0.3366) 0.4179	-0.8290[a] (0.2454) 0.0007	-0.7011[a] (0.2404) 0.0035	-0.7376[a] (0.2584) 0.0043	-0.2949 (0.270) 0.2749
Model χ^2	19.985[a] 0.0002	24.737[a] <.0001	81.897[a] (<.0001)	84.577[a] (<.0001)	68.846[a] <.0001	34.379[a] <.0001	85.366[a] <.0001	66.618[a] (<.0001)	70.8748[a] (<.0001)	83.664[a] (<.0001)	71.493[a] (<.0001)	67.789[a] (<.0001)	88.923[a] (<.0001)
% success	68.2	71.2	92.0	93.3	91.4	80.9	94.0	90.5	91.7	93.5	91.5	91.1	93.1
Pseudo R^2	0.086	0.119	0.5199	0.5369	0.437	0.23	0.532	0.4229	0.4420	0.4782	0.4459	0.418	0.462

[a] significant at 1 percent; [b] significant at 5 percent; [c] significant at 10 percent

Table 4: External Audit Stringency and Banking Crises

The estimated coefficients are parameter estimates of multivariate logistic models. The dependent variables is an indicator variable, crisis, that takes on the value one fi there is a systemic banking crisis and the value zero otherwise. Bank Concentration is a measure of concentration in the banking industry, calculated as the fraction of assets held by the three largest banks in each country averaged over the sample period. Bank Competition is a measure of degree of competitive conduct in the banking industry, calculated as the sum of elasticities bank revenue to changes in input prices from Cleassens and Laeven (2004). External Terms of Trade is the logarithm of the ratio of export price index to import price index for a country. Inflation is the logarithm of average inflation rate. External Audit Stringency is a measure of the degree to which external audits are independent, professional and rigorous as reflected in bank regulations governing audit practices. Bank Disclosure is a measure of the extent and comprehensiveness of financial reporting required of banks. Auditor Liability is a measure of the degree of legal sanctions against auditors in the case of nonperformance vis-à-vis the bank regulations**.** Required Extent of Audit, Auditor Report to Supervisor, and Auditor Meet Supervisor without Consent of Bank are dummy variables that take the value one if the countries' bank regulation requires the specific provision and the value zero otherwise. Per capita GDP is the logarithm of real per capita GDP. Numbers in parenthesis are standard errors. The sample period is 1990 through 1997. Detailed variable definitions are given in Appendix II.

	Panel A					**Panel B**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Bank Concentration		-1.006 (1.491) 0.499	-5.357[b] (2.637) 0.0422	-19.342[b] (7.8088) 0.0133	-6.7264 (4.4331) 0.1292	-23.8571 (17.0279) 0.1612	-16.774[b] (7.0253) 0.0170	-16.524[b] (6.6529) 0.0130	-12.027[b] (4.667) 0.0100	-19.012[b] (7.385) 0.0100
Bank Competition		-4.512[b] (2.141) 0.0351	-8.380[b] (3.524) 0.0174	-10.806[a] (3.9334) 0.0060	-18.417[a] (6.6996) 0.0060	-14.573[c] (8.3552) 0.0811	-10.589[a] (3.8956) 0.0066	-8.152[b] (3.4979) 0.0198	-8.343[b] (3.345) 0.0126	-10.280[a] (4.214) 0.0.015
External Terms of Trade	-7.422[a] (2.155) 0.0006		-10.252[a] (3.378) 0.0024	-6.652[c] (3.5002) 0.0574	-14.9872[a] (5.0292) 0.0029	-0.00876 (9.7175) 0.9993	-7.766[b] (3.2688) 0.0175	-10.038[a] (3.6057) 0.0054	-9.775[a] (3.450) 0.0046	-6.433[c] (3.517) 0.0673
Log of Average Inflation	2.713 (1.645) 0.099		9.603[a] (2.405) <.0001	20.377[a] (7.6006) 0.0073	12.0865[a] (4.6049) 0.0087	26.8497 (20.1855) 0.1835	17.212[b] (6.8609) 0.0121	16.427[a] (5.8772) 0.0052	11.0189[a] (4.1294) 0.0076	19.213[b] (8.078) 0.0174
External Audit Stringency	**-0.704[a] (0.215) 0.0011**	**-0.4623[a] (0.1327) .0005**	**-0.3732 (0.282) 0.185**	**-0.985[a] (0.3715) 0.008**	**-0.7785[b] (0.3373) 0.0210**					**-0.9783[a] (0.366) (0.0075)**
Bank Disclosure					**-3.6350[a] (1.1072) 0.0010**					
Required Extent of Audit						-2.9237 (2.8774) 0.3096				
Auditor Report to Supervisor							-3.5564[a] (1.3024) 0.0063			
Auditor Meet Supervisor without consent of Bank								-1.361[b] (0.7042) 0.0533		
Auditor Liability									0.0422 (0.5895) 0.9421	0.1990 (0.707) 0.778
Per Capita GDP				-1.449[a] (0.538) 0.0071	-0.7507[a] (0.3761) 0.0460	-1.6103 (1.1767) 0.1712	-1.4607[a] (0.5273) 0.0056	-0.8725[a] (0.3364) 0.0095	-0.7458[a] (0.2741) 0.0076	-1.435[a] (0.513) 0.0051
Model χ^2	25.768[a] <.0001	38.017[a] <.0001	58.149[a] <.0001	76.378[a] (<.0001)	90.8366[a] (<.0001)	69.918[a] (<.0001)	76.989[a] (<.0001)	71.783[a] (<.0001)	67.578[a] (<.0001)	81.699[a] (<.0001)
% success	69.6	75.5	89.4	91.2	94.8	91.9	92.1	92.2	91.0	92.2
Pseudo R^2	0.106	0.181	0.363	0.476	0.5277	0.4361	0.4802	0.4477	0.421	0.400

[a] significant at 1 percent; [b] significant at 5 percent; [c] significant at 10 percent

Table 5: Robustness Tests

The estimated coefficients are parameter estimates of multivariate logistic models. The estimates under column (8) are maximum likelihood estimates of a random effects model with random country and year effects. The coefficient estimates of the country and year effects are not reported. The estimates in column (9) and (10) are estimates of two stage instrumental variables models, where countries' legal origins are used as instruments. The dependent variables is an indicator variable, crisis, that takes on the value one fi there is a systemic banking crisis and the value zero otherwise. Bank Concentration is a measure of concentration in the banking industry, calculated as the fraction of assets held by the three largest banks in each country averaged over the sample period. Bank Competition is a measure of degree of competitive conduct in the banking industry, calculated as the sum of elasticities bank revenue to changes in input prices from Cleassens and Laeven (2004). External Terms of Trade is the logarithm of the ratio of export price index to import price index for a country. Inflation is the logarithm of average inflation rate. External Audit Stringency is a measure of the degree to which external audits are independent, professional and rigorous as reflected in bank regulations governing audit practices. Bank Disclosure is a measure of the extent and comprehensiveness of financial reporting required of banks. Crisis in 80s Dummy is an indicator variable that takes the value one if the country has undergone a systemic banking crisis in the 1980s and the value zero otherwise. Explicit Deposit Insurance is an indicator variable that takes the value one if the country has an explicit deposit fixed-premium deposit insurance scheme and the value zero otherwise. Per capita GDP is the logarithm of real per capita GDP. Numbers in parenthesis are standard errors. The sample period is 1990 through 1997. Detailed variable definitions are given in Appendix II.

	1	2	3	4	5	6	7	8	9 IV	10 IV
Bank Concentration	-20.464[a] (6.2325) 0.0010	-21.484[b] (8.8770) 0.0155	-22.3606[a] (6.9441) 0.0013	4.1210[c] (2.3965) 0.0855	0.3510 (7.1482) 0.9608	6.4004[b] (3.1137) 0.0398	-7.5412 (4.698) 0.1085	-1.2498 (1.8051) 0.4898	-2.1634 (1.531) 0.1577	-2.1585 (1.5314) 0.1587
Bank Competition	-29.5716[b] (14.1675) 0.0369	-11.1511[a] (4.0093) 0.0054	-24.6885[b] (10.1235) 0.0147	-9.1419[a] (3.5171) 0.0093	-11.9331 (8.1550) 0.1434	-12.3598[a] (4.0134) 0.0021	-16.115[b] (7.140) 0.0240	-3.585 (2.389) 0.1339	-16.459[a] (4.525) 0.0003	-16.393[a] (4.5609) 0.0003
External Terms of Trade	-44.0846[b] (18.5030) 0.0172	-5.6872 (3.7396) 0.1283	-36.4107[a] (13.8346) 0.0085	-3.5655 (3.2484) 0.2724	-7.3000 (6.3557) 0.2507	-7.4815[c] (4.2367) 0.0774	-15.555[a] (4.908) 0.0015	-6.8488[b] (2.9776) 0.0228	-2.5983 (3.025) 0.3903	-2.6190 (3.0308) 0.3875
Inflation	31.8420[b] (12.4148) 0.0103	22.9841[a] (8.7937) 0.0090	31.8411[a] (10.0900) 0.0016	-2.4940 (2.7385) 0.3624	6.9267 (6.6802) 0.2998	-4.2299 (2.9737) 0.1549	9.0285[c] (4.975) 0.0696	1.3434 (2.8266) 0.6353	4.6521[c] (2.433) 0.0559	4.6338[c] (2.4374) 0.0573
Bank Disclosure - Alternative	**-7.6168[b]** **(3.2857)** **0.0204**		**-6.8749[a]** **(2.537)** **0.0067**							
External Audit Stringency - Alternative		**-1.0738[b]** **(0.4556)** **0.0184**	**-0.8414[b]** **(0.4048)** **0.0377**							
Bank Disclosure				**-3.1645[a]** **(0.5984)** **<.0001**	**-2.5155[c]** **(1.4507)** **0.0829**	**-4.9436[a]** **(1.5489)** **0.0014**	**-3.1668[a]** **(1.0838)** **0.0035**	**-0.6259[c]** **(0.3578)** **0.0823**	**-3.6860[b]** **(1.526)** **0.0157**	
External Audit Stringency				**-2.0935[a]** **(0.4826)** **<.0001**	**-1.5593[c]** **(0.9440)** **0.0986**	**-2.7507[a]** **(0.7968)** **0.0006**	**-0.6811[b]** **(0.3496)** **0.0514**	**-0.5218[c]** **(0.2996)** **0.0829**		**-1.0180[b]** **(0.4215)** **0.0157**
Crisis in 80s Dummy						-1.9282 (1.3406) 0.1503				
Explicit Deposit Insurance							1.5396 (1.4605) 0.2918			
Per capita GDP	-0.00646 (0.4747) 0.9891	-1.4008[b] (0.5488) 0.0107	-0.3434 (0.4835) 0.4775	-1.5096[a] (0.3010) <.0001	-1.0991[c] (0.5832) 0.0595	-2.1154[a] (0.5896) 0.0003	-1.0685[b] (0.5328) 0.0449	-0.2169 (0.1837) 0.2397	-0.6021[a] (0.207) 0.0036	-0.5998[a] (0.2075) 0.0038
Model χ^2	95.0770[a] (<.0001)	74.5921[a] (<.0001)	100.2814[a] (<.0001)	74.4796[a] (<.0001)	11.5356[a] (<.0732)	126.7186[a] (<.0001)	92.094[a] (<.0001)	584.9[a] (<.0001)	55.2715[a] (<.0001)	49.2495[a] (<.0001)
% success	94.7	92.4	96.0	93.3	95.8	93.3	95.2	NA	86.9	85.5
Pseudo R^2	0.5930	0.4652	0.6224	0.3383	0.2607	0.5755	0.585	NA	0.239	0.2845

[a] significant at 1 percent; [b] significant at 5 percent; [c] significant at 10 percent

Appendix I: Systemic Banking Crises in the 1990s

Country	Banking Crisis in 1990s	Country	Banking Crisis in 1990s
Australia		Japan	1992-97
Austria		Jordan	1990
Bahrain		Kenya	1993
Belgium		Korea, South	1997
Botswana		Lesotho	
Burundi		Malaysia	1997
Canada		Mauritania	1990-93
Chile		Mexico	1994-97
Denmark		Nepal	
El Salvador		Nigeria	1991-95
Egypt		Pakistan	
Finland	1991-94	Peru	1990
France		Philippines	
Germany		Portugal	
Ghana		Singapore	
Greece		Sri Lanka	1990-93
Guatemala		Sweden	1990-93
Guyana	1993-95	Switzerland	
Honduras		Thailand	1997
India	1991-97	Turkey	1991, 1994
Indonesia	1992-97	United Kingdom	
Ireland		U.S.A.	1990-92
Israel		Venezuela	1993-97
Italy	1990-95	Zambia	
Jamaica	1996-97		

Appendix II: Definition of Main Variables

Variables	Definition
Dependent Variables:	
Crisis	Indicator variable that takes 1 if a country has undergone systemic banking crisis in the period 1990 through 1997.
Explanatory Variables:	
Bank Disclosure	A measure of the extent and comprehensiveness of financial reporting required of banks. Its values are the principal component of four indicator variables: (i) Presentation of Non-Performing Loans - a variable that takes 1 if bank regulation requires that accrued income on non-performing loans should not be reported; (ii) Reporting Consolidated Financial Statements - a variable that takes 1 if consolidated financial statements of bank and non-bank subsidiaries are required; (iii) Reporting Off-Balance-Sheet to the Public - a variable that takes 1 if off balance sheet items are required to be disclosed to the public; and (iv) Reporting Risk Management Practice - a variable that takes 1 if banks are required to disclose risk management practices to the public.
Disclosure Informativeness	A measure of the degree to which bank disclosure accurately represents banks' financial condition. Its values are the principal components of the indicator variables in (i) and (ii) above
Disclosure Timeliness	A measure of the bank disclosure is made on timely basis. Its value is an index of the average frequency and comprehensiveness of interim financial reports.
Supplemental Reporting	A measure of the extent of supplementary information as required by countries' banking regulation. Its values are the principal component of variables in (iii) and (iv) above.
Director Liability	A measure of the degree of legal sanctions against bank officials for nonperformance vis a vis the bank regulations.
External Audit Stringency	A measure of the degree to which external audits are independent, professional and rigorous as reflected in bank regulations governing audit practices. The index is the principal component of five indicator variables: (i) Compulsory Audit - a variable that takes 1 if external audit is compulsory in the country; (ii) Required Extent of Audit - a variable that assumes the value 1 if bank regulation sanctions the extent of the external audit; (iii) License Requirements - a variable that takes 1 if auditors are required to be licensed or certified; (iv) Auditor Report to Supervisor - a variable that takes 1 if auditors' report should be given to the bank supervisory agency; and (v)Auditor Meet Supervisor without Consent of Bank - a variable that takes 1 if the bank supervisory agency can meet the external auditors to discuss audit report without the consent of the bank auditee.
Auditor Liability	A measure of the degree of legal sanctions against auditors in the case of nonperformance vis a vis the bank regulations.
Control Variables:	
Bank Concentration	The degree of concentration in the banking industry, measured as share of assets of the three largest banks in the country, averaged over the period 1990 through 1997.
Bank Competition	The degree of competitive conduct in the banking industry, measured as the sum of elasticities bank revenue to changes in input prices from Cleassens and Laeven (2004)
External Terms of Trade	The logarithm of the ratio of export price index to import price index for a country
Inflation	The logarithm of the average inflation rates
Per capita GDP	The logarithm of real per capita GDP

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