Corporate Governance, Regulation, and Bank Risk Taking

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Abstract

This paper evaluates the impact of ownership structure, franchise value, investor protection laws, and bank regulations on the risk taking behavior of banks around the world. In simultaneously examining an individual bank's private governance structure and the policy environment in which it operates, we find that large owners with substantial cash-flow rights induce banks to increase risk, but the two key components of Basel II – capital requirements and official supervisory oversight of banks – do not affect bank risk taking. Rather, regulations that promote loan diversification and allow banks to diversify cash-flows by engaging in non-lending activities reduce bank risk.

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1. Introduction

By selecting, financing, and monitoring firms, banks influence capital allocation, economic activity, and risk (Allen and Gale, 2000, and Levine, 2006). Many governments, however, fear that a bank's private governance arrangements, including its ownership structure, will not produce a desirable allocation of capital, and therefore enact regulations to shape bank behavior (Benston and Kaufman, 1996; Barth et al., 2006). Yet, no previous empirical research studies how a bank's ownership structure combines with a wide array of national laws and regulations to shape bank risk taking.

In this paper, we evaluate the impact of ownership structure, franchise value, investor protection laws, and bank regulations on the risk taking behavior of banks around the world; thus, we simultaneously examine an individual bank's private governance structure and the policy environment in which it operates. In contrast, past work examines subsets of these factors. For example, Demirgüç-Kunt and Detragiache's (2002) cross-country study of deposit insurance and banking crises does not control for regulations designed to limit bank risk taking or for bank-level governance traits. In turn, Saunders et al. (1990) and Demsetz et al. (1997) show how ownership structure, franchise value, and other bank-level characteristics influence bank risk taking in the United States. They cannot, however, test whether numerous laws and regulations shape bank risk taking, and it is unclear whether their results generalize to banks in other countries with different policies. By collecting new data on bank ownership and management and merging it with data on bank regulations and investor protection laws, we simultaneously examine the impact of a bank's private governance arrangements and national policies, along with potential interactions between the two, on bank risk taking.

Theory advertises the advantages of simultaneously examining bank-level governance and national policies. Banks are a complex nexus of agency problems and conflicting interests that interact to influence risk taking. As in any limited liability firm, stockholders have incentives to increase bank risk after collecting funds from bondholders and depositors (Galai and Masulis, 1976; Esty, 1998). At the same time, national policies may influence these risk taking incentives. If bank creditors believe the government insures their investments, they will monitor bank behavior less rigorously, intensifying the ability and incentives of stockholders to increase risk (Merton, 1977; Keeley, 1990).

Traditional agency problems between bank managers and stockholders also influence bank risk taking (Jensen and Meckling, 1976). If managers have accumulated bank-specific human capital, enjoy private benefits of control, and have a large proportion of their non-human wealth linked to the bank, they will tend to allocate assets in an excessively safe rather than a value-maximizing manner (Demsetz and Lehn, 1985; Kane, 1985; Saunders et al., 1990).

The ability of managers to adjust bank risk for their own benefit, however, depends on investor protection laws and the ownership structure of the bank (Shleifer and Wolfenzon, 2002; John et al., 2005). For instance, ineffective investor protection laws tend to tip the balance of governance power toward bank insiders, including managers. In contrast, large shareholders have greater incentives and power to limit managerial discretion than small shareholders even in the absence of effective investor protection laws (Shleifer and Vishny, 1986; Caprio et al., 2005). From this perspective, an owner with large voting and cash-flow rights will have the authority and financial motivation to prevent managers from taking excessively safe investments.

Moreover, bank regulations and product market conditions influence the resolution of conflicting interests among stockholders, managers, and depositors (Buser et al., 1981; Morck et

al., 1988). For instance, Gorton and Rosen (1995) and DeYoung et al. (1996) argue that intense competition that lowers the franchise value of incumbent banks intensifies incentives for both stockholders and managers to increase risk. At the same time, governments frequently construct bank regulations with the explicit objective of limiting bank risk taking. Thus, omitting one of these potentially important governance factors from the analyses might yield inaccurate inferences on the other potential determinants of bank risk taking.

To analyze the impact of private governance mechanisms and national policies on bank risk, we construct a novel database on almost 300 banks across 48 countries, where we compile new data on bank ownership, the ownership claims of senior bank managers, and the identity of large owners. Specifically, we measure ownership structure by (i) the fraction of voting rights and cash-flow rights owned directly or indirectly by controlling shareholders (if there are any controlling shareholders) and the identity of these large shareholders (i.e., whether they are individuals, corporation, other financial institutions, or the state), (ii) whether the founder of the bank or a descendent is on the bank's board of directors, (iii) whether large owners are on the bank's board of directors, and (iv) the voting and cash-flow rights of senior managers.

The key findings are as follows. First, bank risk is systematically higher in banks that have large owners with substantial cash flow rights, which is consistent with core theories of the firm. To measure each bank's risk taking, we use (i) the bank's z-score, which equals return on assets plus the capital-asset ratio divided by the standard deviation of asset returns, and (ii) the bank's stock return volatility. The positive relationship between these measures of bank risk and the cash flow rights of owners holds when using instrumental variable and while controlling for an array of bank-level and country-level characteristics.

Second, the results do not support key components of many traditional policy approaches to limiting bank risk taking. In particular, cross-country differences in the two most emphasized components of Basel II – capital requirements and official supervisory oversight of banks – are unassociated with bank risk taking. Furthermore, indicators of prompt corrective action policies and loan provisioning stringency requirements do not account for cross-bank differences in risk taking. As discussed further below, these results contradict the thrust of prudential bank regulation advocated by the Basle Committee and other international institutions. We also find that banking system concentration and profitability do not independently influence individual bank risk taking when controlling for bank ownership structure.

Third, regulations that promote diversification, either by requiring banks to diversify their loan portfolios or by allowing banks to engage in an assortment of lending and non-lending activities, reduce bank risk. While a desire to reduce bank risk has motivated regulatory restrictions on bank activities (e.g., Glass-Steagall), we find that these regulatory restrictions increase bank risk. This finding is consistent with the view that diversifying income flows lowers bank risk and lends additional support to work questioning the value of restricting bank activities (White, 1986, Kroszner and Rajan, 1994, Gande et al, 1997). Furthermore, allowing banks to diversify income through non-lending activities only reduces risk in economies with well developed equity markets, i.e., allowing banks to diversify income flows by providing equity market services only lowers risk when there are reasonably active equity markets.

This paper relates to an enormous literature on bank regulation. The Basel II Accords promote the adoption of strict capital adequacy standards, the development of powerful supervisory agencies, and the creation of market disciplining mechanisms. Our results, however, suggest that the first two pillars of Basel II – capital adequacy standard and official supervision –

have little impact on bank risk taking. This supports the evidence in Barth et al (2004, 2006), who find that these two pillars neither promote bank stability nor bank efficiency. Rather, Beck et al. (2007) find that powerful supervisory agencies tend to increase corruption in lending. Similarly, we find no evidence that prompt corrective action or strict loan provisioning reduces bank risk. The research in this paper, instead, stresses a different regulatory strategy. In countries with sufficiently active securities markets, banks can diversify their income flows and reduce risk by engaging in non-lending services. In countries without active securities markets, diversification guidelines that encourage banks to hold diversified loan portfolios reduce bank risk. Thus, regulations focused on allowing and encouraging banks to diversify lower bank risk, but direct supervisory oversight, capital standards, and early intervention policies do not.

This paper also relates to a growing body of work on the governance of banks (Prowse, 1997, and Macey and O'Hara, 2003). Although we do not have information on CEO compensation packages (Houston and James, 1995, and John and Qian, 2003) or comprehensive information on the composition of each bank's board of directors (Adams and Mehran, 2003), we do compile information on the identity, if any, of controlling owners and their voting and cash flow rights, the ownership claims of senior managers, and information on whether large owners are on the board of directors and whether the bank's founder or descendants are still associated with the bank. We find banks with controlling shareholders exhibit significantly higher risk taking behavior than widely-held, managerially-controlled banks. In contrast to the Demsetz et al. (1997) study of U.S. banks, however, we do not find that franchise value exerts an independent effect on bank risk, nor does the relationship between ownership structure and bank risk depend on franchise value. Caprio et al (2007) find that banks with controlling shareholders and substantial cash-flow rights are more highly valued. They interpret this as evidence that

cash-flow rights concentration improves corporate governance and reduces expropriation by insiders. Our paper identifies an alternative, though potentially complementary, explanation for the positive association between cash-flow rights and bank valuations. Controlling shareholders induce bank managers to increase bank risk, with positive repercussions on bank valuations.

Our analysis faces several limitations. First, Coles, Lemmon, and Meschke (2006) present a pessimistic critique of the ability of standard instrumental variables to identify the impact of ownership on valuations. Although we examine the relationship between ownership and bank risk taking, many of these criticisms hold. Thus, we compile new data on the ownership and management structure of each bank that we believe represent more valid instrumental variables than those traditionally used to identify ownership. Furthermore, we control for a large set of bank-level and country-level traits to minimize the possibility of omitted variable bias. Second, many theoretical models make predictions of how the cash-flow rights of owners and managers influence corporate risk taking *conditional* on each owner's and manager's portfolio. That is, an owner's or manager's appetite for bank risk may be a function of the rest of her portfolio. This information is unavailable, so we do not condition on the wealth characteristics of each owner and manager. Third, we do not examine optimal risk taking. We make the more limited contribution of presenting the first evidence on the relationship between bank risk taking and both the bank's private governance arrangements and national banking policies.

The paper is organized as follows. Section 2 summarizes the data, while Section 3 discusses the main results. Section 4 presents extensions. Section 5 concludes.

2. Data and Variables

We build a new database on bank risk, bank ownership, bank regulations, and other bank-specific and country characteristics. Data permitting, we collect data on the 10 largest publicly listed banks (as defined by total assets at the end of 2001) in those countries for which LLSV (1998) assembled data on shareholder rights.[1] Since some countries have fewer than 10 publicly listed banks with stock market valuations, this yields information on a maximum of 296 banks across 48 countries. Focusing on the largest banks enhances comparability. Also, the largest banks tend to comply with international accounting standards and have the most liquid shares, reducing concerns that accounting or liquidity differences drive the results.[2] The sample accounts for on average over 80 percent of total banking system assets across the 48 countries. When eliminating countries for which the sample covers less than 50 percent of total banking system assets as reported by the country's supervisory agency, the results are unchanged.

2.1 Ownership Structure

Our major data contribution is the collection of information about each bank's ownership and management structure. We use data from Bankscope, the Bankers Almanac, annual reports, 20-F filings for banks with American Depositary Receipts, proxy statements, and country-specific publications. Also, many individual banks and national institutions (e.g., Central Banks, regulatory authorities) maintain company websites that we used to compile ownership data. Finally, since non-financial institutions own bank shares and we seek to trace bank ownership through corporations back to individuals, we also use Worldscope, which contains ownership data of firms, along with 20-F filings, company reports, and filings with national stock

[1] We do not include New Zealand, for which LLSV (1998) collected data on shareholder protection laws, because all its major banks are subsidiaries of Australian banks.

[2] Recent work on the ownership of non-financial corporations has focused on the 10 or 20 largest firms in the country for the same reasons (LLS, 1999; LLSV, 2002). Since there are significantly fewer banks than non-financial firms, our 10-banks-per-country criterion is comparable to this research.

exchanges and securities regulations to identify the ultimate owners of corporations that own shares in banks. The ownership data are from 2001 except in a few cases, where we use 2000 data. Ownership patterns are very stable, so this should not induce problems.

In the remainder of this subsection, we describe how we define and identify (1) whether the bank has a controlling owner, (2) the identity of the controlling owner if any, (3) the control and cash-flow rights of the controlling owner, (4) when the bank was founded, (5) whether the founder, the descendants of the founder, and or the controlling owner are on the bank's board of directors, and (6) the control and cash-flow rights of senior management.

2.1.a. Control rights

We classify a bank as having a controlling owner if the shareholder has direct and indirect voting rights that sum to 10 percent or more. If no shareholder holds 10 percent of the voting rights, we classify the bank as widely held. Since 10 percent voting rights is frequently sufficient to exert control, this cut-off is used extensively (e.g., LLS, 1999; LLSV, 2002). All of the results, however, hold when using a 20 percent cut-off.

While direct ownership involves shares registered in the shareholder's name, indirect ownership involves bank shares held by entities that the ultimate shareholder controls. Since the principal shareholders of banks are frequently themselves corporations, we find the major shareholders in these entities. Often, we need to trace this indirect ownership chain backwards through numerous corporations to identify the ultimate controllers of the votes.

Mechanically, we first identify all major shareholders who control over 5 percent of the votes. We use 5 percent because (1) it provides a significant threshold and (2) most countries do not mandate disclosure of ownership shares below 5 percent. Next, if these major shareholders are themselves corporations, we find the major shareholders of these corporations. We continue

this search until we find the ultimate owners of the votes. For example, a shareholder has *x* percent indirect control over bank A if she controls directly firm C that, in turn, controls directly firm B, which directly controls *x* percent of the votes of bank A. The control chain from bank A to firm C can be a long sequence of firms, each of which has control (greater than 10 percent voting rights) over the next one. If there are several chains of ownership between a shareholder and the bank, we sum the control rights across all of these chains. When multiple shareholders have over 10 percent of the votes, we pick the largest controlling owner.

We find the identity of large owners and divide banks into four categories. First, widely-held banks do not have a controlling owner, i.e., no legal entity owns 10 percent or more of the voting rights. Second, we create three distinct categories of controlling owners who own a minimum of 10 percent of the voting rights of the bank: (1) the State, (2) a family (or individual), and (3) other shareholders (including voting trusts and foundations).

2.1.b. Cash-flow rights

The controlling shareholder may hold cash-flow (CF) rights directly and indirectly. For example, if the controlling shareholder of bank A holds the fraction *y* of cash-flow rights in firm B and firm B in turn holds the fraction *x* of the cash-flow rights in Bank A, then the controlling shareholder's indirect cash-flow rights in bank A equals the product of *x* and y. If there is an ownership chain, we use the products of the cash-flow rights along the chain. To compute the controlling shareholder's total cash-flow rights we sum direct and all indirect cash-flow rights.

2.1.c. Management Structure and Ownership

We also collect data on each bank's management. In particular, Founder is a dummy variable that takes a value of one if the founder of the bank is on the management or supervisory board of the bank, and zero otherwise. Descendant is a dummy variable that takes a value of one

when a family descendant of the founding family of the bank is on the management or supervisory board of the bank, and zero otherwise. Shareholder on Mgt Board is a dummy variable that takes a value of one if the controlling shareholder has a seat on the management board of the company, and zero otherwise. Finally, Management Ownership equals the cash-flow rights of executive managers and directors (excludes those of non-executive managers). We were only able to calculate the combined cash-flow rights of the senior management team, not the cash-flow rights of each senior manager. We use this information to assess the determinants of bank risk taking.

2.2 Bank Risk Taking

We measure bank risk taking using (1) the z-score of each bank, as measured by return on assets plus the capital-asset ratio divided by the standard deviation of asset returns, and (2) the volatility of stock returns. The z-score is a measure of bank stability and indicates the distance from insolvency. It combines accounting measures of profitability, leverage and volatility. Specifically, if we define insolvency as a state where losses surmount equity ($E<-\pi$) (where E is equity and π is profits), A as total assets, $ROA=\pi/A$ as return on assets and $CAR = E/A$ as capital-asset ratio, the probability of insolvency can be expressed as prob($-ROA<CAR$). Let $\sigma(.)$ denote the standard deviation of (.). If profits are assumed to follow a normal distribution, it can be shown that $z = (ROA+CAR)/\sigma(ROA)$ is the inverse of the probability of insolvency.[3] Specifically, z indicates the number of standard deviation that a bank's return on assets has to drop below its expected value before equity is depleted and the bank is insolvent (Roy, 1952; Hannan and Hanwick, 1988; Boyd, Graham and Hewitt, 1993; and De Nicolo, 2000). Thus, a higher z-score indicates that the bank is more stable.

[3] To calculate the standard deviation of the return on assets, we require at least four years of data.

While the z-score has been used widely in the financial and non-financial literature, it is subject to several caveats. First, it considers only the first and second moment of the distribution of profits and ignores the potential skewness of the distribution (De Nicolo 2000). However, this measurement bias is less of a concern if it is uniformly distributed across banks and countries. A second concern is the reliance of the z-score on accounting data whose quality might vary across countries. Specifically, several papers have shown the tendency of firms to smooth reported earnings over time and that the degree of earnings smoothing varies with the degree of institutional development (see, for example, Leuz, Nanda and Wysocki, 2003). This, however, should bias the results against finding a significant relationship between ownership structure, regulations and bank risk.

We calculate the z-score for a sample of 288 banks across 48 countries, with the number of banks included in our sample varying from a high of 10 in the United States and some other countries, and a low of 1 in Argentina, among others. The results in this paper, however, are not affected if we only include countries with data on at least three banks. We calculate the return on assets, its standard deviation and the capital-asset ratio over the period 1995-2001. Since z-scores might vary with the time period over which they are measured, we test the sensitivity of our results to the time period over which z-scores are computed.

We confirm our results when using the volatility of equity returns as a measure of bank risk. This equals the annualized volatility of weekly equity returns during the year 2001, which is also used by Saunders, Strock, and Travlos (1990), Demsetz, Saidenberg, and Strahan (1997), and Esty (1998). The results are robust to estimating equity volatility over different periods. We use the total return index of the stock (that includes reinvested dividends) from Datastream to calculate the stock returns of each bank. Relying on equity volatility as a measure of bank risk

reduces our sample because we have daily data on stock market returns for 219 out of 288 banks. We therefore use z-scores as our main measure of bank risk.

2.3 Shareholder rights and laws

In terms of investor protection laws, we use data on the statutory rights of minority shareholders and rules against self-dealing.

RIGHTS is the LLSV (1998) index of the legal protection of shareholders across countries. This index captures the stance of corporate law toward shareholder protection and ranges from zero to six, where larger values indicate greater legal protection of shareholder rights. The six components included in the index are whether proxy voting by mail is mandated by law, whether shares are blocked or deposited prior to a general shareholder meeting, whether cumulative voting is mandated by law, whether minority shareholders face difficulty challenging resolutions that benefit controlling shareholders, whether pre-emptive rights are mandated by law, and whether the law mandates minimum capital requirements for a single shareholder to call a shareholders' meeting.

SELF-DEALING is the anti-self-dealing index from Djankov et al. (2005), which is an index of the strength of minority shareholder protection against self-dealing by the controlling shareholder. This index measures the ways in which the shareholder protection law deals with corporate self-dealing by starting with a fixed self-dealing transaction, and then measuring the hurdles that the controlling shareholder must pass in order to get away with this transaction. The anti-self-dealing index is increasing in the number of hurdles. The index of anti-self-dealing is the average of an index of ex-ante private control of self-dealing and an index of ex-post private control of self-dealing by investors. The index of ex-ante private control of self-dealing captures immediate disclosure and approval requirements imposed by law before transactions can legally

take place, while the index of ex-post private control of self-dealing captures the degree of disclosure and the ease of proving wrongdoing after the decision to enter into the transaction have been made.

2.4 Bank Regulations

This paper evaluates whether key bank regulations shape individual bank risk taking. The recently assembled database by Barth et al (2006) provides cross-country information on a wide array of bank regulations. In selecting which of these regulatory indicators to examine, we used two criteria. First, we choose regulations stressed by the Basle Committee on bank regulation. Consequently, we emphasize capital regulations and the powers of the official supervisory agency to monitor and discipline banks. These two regulations also underpin efforts by the International Monetary Fund and World Bank to improve bank regulation. Second, we analyze regulations that theoretical models and past empirical work highlight as reducing risk. Thus, we examine regulatory restrictions on bank activities, which some theories suggest will boost bank stability by preventing banks from engaging in very risky activities and other theories suggest will boost bank fragility by preventing banks from diversifying income flows. Along these same lines, we study regulations that induce banks to diversify portfolios along with regulations that stress the stringency of loan classifications.

CAPITAL is an index of regulatory oversight of bank capital. As described in Annex 1, this index includes information on whether the source of funds that count as regulatory capital can include assets other than cash, government securities, or borrowed funds, and whether the authorities verify the sources of capital. CAPITAL also includes information on the extent of

regulatory requirements regarding the amount of capital banks must hold. One rationale for imposing strict capital regulations is to improve governance.

OFFICIAL is an index of the power of the commercial bank supervisory agency. As specified in Annex 1, OFFICIAL includes information on the rights of the supervisory agency to meet with, demand information from, and take legal action against auditors; to force a bank to change its internal organizational structure, management, directors, etc.; to oblige the bank to provision against potential losses and suspend dividends, bonuses, and management fees; and to supersede the rights of shareholders and intervene in a bank and/or declare a bank insolvent. We include this variable since official supervisor might use their powers to reduce bank risk taking. We also conduct the analyses using components of OFFICIAL that focus only on the disciplinary powers of the supervisory agency. That is, we include information on the power of the supervisory agency to force a bank to change its internal organizational structure, management, directors, etc.; to oblige the bank to provision against potential losses, and suspend dividends, bonuses, and management fees; and to supersede the rights of shareholders and intervene in a bank and/or declare it insolvent. We confirm all of our findings with this alternative indicator.

RESTRICT is an index of regulatory restrictions on the activities of banks. This index measures regulatory impediments to banks engaging in (1) securities market activities (e.g., underwriting, brokering, dealing, and all aspects of the mutual fund industry), (2) insurance activities (e.g., insurance underwriting and selling), (3) real estate activities (e.g., real estate investment, development, and management), and (4) the ownership of nonfinancial firms. Limiting the range of activities in which banks can participate is one potential mechanism for limiting the ability of insiders to expropriate bank resources (Boyd, Chang, and Smith, 1998).

DIVERSIFICATION is an index of diversification guidelines imposed on banks. The index captures the degree to which there are explicit, verifiable, quantifiable guidelines regarding asset diversification for banks. Examples of such guidelines include requirements of some minimum diversification of loans among sectors, or sectoral concentration limits. Thus, these regulations are not directed credit programs; they are regulations designed to ensure the diversification of bank loan portfolios. For example, Appendix 1 gives the values of the index of activity restrictions and the index of diversification guidelines for each country.

Because bank risk and franchise value are affected by the generosity of the deposit insurance scheme in the country, we also collect information on whether the country has deposit insurance or not. DI is a dummy variable that takes a value of one if the country has explicit deposit insurance, and zero otherwise, and is calculated using data on deposit insurance schemes for all countries from Demirguc-Kunt, Karacaovali, and Laeven (2005).

2.5 Other country-level and bank-level control variables

We control for a large number of country-level and bank-level characteristics. In particular, we control for bank growth, size, profitability, liquidity, and loan loss reserves. At the country level, we control for the level of economic development, aggregate economic volatility, institutional development, including the effectiveness of the legal system in enforcing contracts, and the degree of competition in national banking markets.

2.6 Summary statistics

Table 1 provides summary statistics of our main variables and Appendix 1 lists the averages of the z-scores, equity volatilities, cash-flow rights, and the regulatory measures of activity restrictions and diversification guidelines for each country's banks. Annex 1 provides more detailed definition of the variables.

Appendix Table 1 shows a wide variation in bank fragility across countries. Column (1) presents the average of z-scores across all banks for each country in the sample. The higher the z-score, the more stable the banks in the country. The z-scores indicate that profits have to fall by more than 66 times their standard deviation in Austria to deplete bank equity, but profits only need to fall by less than one standard deviation in Thailand to eliminate bank equity. Our estimates of equity volatility of banks display a similar variation (column 2). Volatility of equity returns vary from a low of 12 percent per annum in Austria to a high of 118 percent in Peru. The average equity volatility is 40 percent.

Table 1 and Appendix Table 1 also provide summary statistics on the average cash-flow rights of banks, and the index of activity restrictions and diversification guidelines by country. Cash-flow rights equals the cash-flow rights of the controlling owner. Column (3) of Appendix Table 1 advertises the importance of incorporating the degree of ownership concentration in our analyses of the governance of banks. There is enormous cross-country variation in the average degree of cash-flow rights in our sample of banks. In 8 out of 48 countries, the controlling owner averages more than 50 percent of the cash flow rights, but in 5 other countries there is either no bank with a controlling owner or the average degree of cash flow rights is less than five percent.

The data indicate that although more than 90 percent of the banks in Canada, Ireland, and the United States (in our sample) are widely held, 22 out of 48 countries do not have a single

widely held bank (among their largest banks). Overall, the cross-country average for widely held is only 29 percent so that in the average country 71 percent of the largest, listed banks have a controlling shareholder.

Besides indicating that widely held banks are the exception rather than the rule, the data also suggest that family ownership and state ownership of banks are very important across countries. In the average country, a family is the controlling owner in 35 percent of banks. In 15 countries, families control 50 percent or more of the banks in our sample. In the average country, the State is the controlling owner in 18 percent of banks. While the State is not a controlling owner in any bank in 28 countries, the State is the controlling owner in more than half of the sampled banks in Egypt, India, Indonesia, and Thailand. Given the potentially enormous impact of state ownership, we examine this specifically below.

The correlation matrix in Table 2 shows that more stable banks (as measured by higher z-score or lower equity volatilities) have lower CF rights, and are located in countries with fewer activity restrictions and a higher score on the index of diversification guidelines. Furthermore, the two measures of bank risk – the z-score and equity volatility – are (negatively) correlated with a statistically significant correlation coefficient of 38 percent. In other words, on average we find that banks with higher z-scores display lower equity volatility.

3. Bank Risk: Main Results

a. Framework

This section presents the main results on the relationship between bank risk taking and ownership structure, laws, and regulations. We first present ordinarily least squares (OLS) regressions. If the estimation errors are correlated across banks within the same country, this bias

the estimated coefficient standard errors downwards. Consequently, we allow for clustering at the country level and correct standard errors accordingly. We do not use country fixed effects because we want to examine many country characteristics explicitly. Next, we use instrumental variables (IV) regressions to identify whether ownership structure, laws, and regulations exert a causal effect on bank risk taking. Throughout these analyses, the dependent variable is the z-score of an individual bank. All of the results hold when using the volatility of each bank's stock price, which we discuss below when we present robustness tests and extensions.

b. Ownership, Laws, and Regulations

Table 3 provides the basic OLS results. Each regression controls for recent bank performance (Revenue growth) and the overall level of the economic development in the bank's country (Per capita income). As demonstrated below, the results also hold when controlling for the volatility of economic activity as well as many other bank and country characteristics. We always include the cash-flow rights (CF) of the controlling owner if there is one. CF equals zero if the bank is widely-held.

Larger cash-flow rights are associated with greater risk taking. CF enters negatively and significantly in all nine regressions in Table 3, indicating that the negative relationship between CF and bank stability (as measured by each bank's z-score) is robust to controlling for numerous bank and country traits. Furthermore, the coefficient on CF does not fluctuate much across the different specifications, highlighting the independent link between cash-flow rights and bank stability. The economic size of the coefficient on CF is not inconsequential. Based on column 1, a one standard deviation change in CF is associated with change in z-score of over four, where the mean of z-score is 24 and the standard deviation is 22. These results are consistent with the following view: (i) equity holders have an incentive to increase risk taking, (ii) equity holders'

incentives are frequently at odds with other bank stakeholders, and (iii) controlling shareholders with substantial cash-flow rights have greater incentives and power to increase bank risk taking than small shareholders.

Investor protection laws are not associated with risk taking. The La Porta et al (1998) measure of the legal rights of minority shareholders (Rights) does not enter significantly. Furthermore, Caprio et al (2005) find that Rights boosts the valuation of banks, and the impact of Rights on valuation is particularly pronounced when CF is small. So, we also included the interaction between Rights and CF to test whether the relationship between Rights and risk taking depends on CF. In unreported regressions, this interaction term enters insignificantly. We also include the Djankov et al (2005) indicator of the degree to which laws restrict self-dealing among corporate insiders (Self-dealing). As shown, Self-dealing is not significantly associated with bank risk taking. These results do not imply that the law is unimportant. Rather, for our sample of the largest banks in each country, ownership structure exerts a more powerful influence on risk taking than laws designed to protect small shareholders.

Two of the major pillars underlying the Basle II recommendations on bank supervision and regulation are unassociated with bank risk taking. A major focus of the Basle II recommendations involves capital adequacy requirements. However, the index of the stringency of capital regulations (Capital) does not enter the bank stability regression significantly. Similarly, the index of each country's official supervisory power to discipline banks (Official) does not account for bank risk taking. This result is consistent with Barth et al (2006) who find that strengthening official supervisory power tends to intensify corruption without increasing banking system stability or efficiency.

Rather, regulations stressing diversification – either loan diversification guidelines (Diversification) or regulations permitting revenue diversification through non-lending activities (Restrict) – are associated with less risk taking by banks. In particular, Diversification enters positively and significantly, suggesting that regulations stressing loan diversification are associated with greater bank stability. In turn, Restrict enters negatively. Regulations that impede banks from providing non-lending financial services reduce the bank's ability to diversify income flows with adverse implications on bank stability. The economic magnitudes are non-negligible. From equations 4 and 5, a one standard deviation change in Restrict or Diversification translates into a change in z-score of about six, which is more than one-quarter of a standard deviation of the sample z-scores.

Finally, we do not find a strong link between deposit insurance (DI) and bank risk. The DI dummy variable indicates whether a country has an explicit deposit insurance system, or not. We have also conducted the analyses using the Demirgüç-Kunt and Detragiache (2002) measure of the generosity of the deposit insurance system and obtain the same result. These findings differ from Demirgüç-Kunt and Detragiache (2002) and Barth et al. (2004), who find that more generous deposit insurance makes national banking systems more prone to systemic failure. In contrast, we examine each country's largest banks, which may be "too-big-to-fail" and hence insensitive to measured differences in deposit insurance.

These results suggest that the connections among bank risk, ownership, and regulation go beyond the view that successful countries (i) adopt good laws that foster a reduction in ownership concentration and (ii) implement effective regulations that induce banks to behave prudently. In particular, the findings hold when controlling for both the country's economic success as measured by per capita income and for the legal rights of small shareholders (as

proxied by Rights and Self-dealing). Thus, the results do not simply reflect different levels of economic or legal system development. We next address the problem of identification.

c. Identification, Instrumental Variables, and Potential Biases

c.1. Identification strategy

The potential endogenous determination of bank risk, ownership, and regulations raise concerns. For instance, high risk banks may develop concentrated ownership structures if diffuse shareholders have a particularly difficult time monitoring risky investments. Similarly, banking system risk might create demands for the government to impose regulatory restrictions on bank activities. More formally, in our estimation equation, $z = \beta X + u$, where z is the vector of bank z-scores, X the matrix of explanatory variables, u the error term, and β the vector of estimated coefficients. OLS estimation is consistent only if $\mathrm{Cov}\{u, X_i\} = 0$ for each regressor i in X. This means that there are no unobservable firm characteristics that affect both ownership and bank risk. If $\mathrm{Cov}\{u, X_i\} \neq 0$, then the estimated OLS coefficients will be biased and the model no longer describes the conditional expectation of bank risk given the explanatory variables.

To reduce this potential problem, we undertake three strategies. While none is perfect, they all yield the same conclusions. First, we "saturate" the regression with a large number of bank and country characteristics to capture as much of the error term u as possible (see also Demsetz and Lehn, 1985, and Bitler et al., 2005) to minimize the possibility that $\mathrm{Cov}\{u, X_i\} \neq 0$. These results are presented below in Tables 5 and 6. Second, for over 200 banks in our sample, we were able to trace changes in ownership structure over time. Ownership structure is highly stable. While this does not eliminate potential biases, it does indicate that ownership structure does not respond to annual changes in bank risk.

Third, we use instrumental variable to reduce potential simultaneity bias. We use four different sets of instrumental variables to identify the independent impact of ownership structure on bank risking taking. The first instrumental variable that we use equals the average cash-flow rights of other banks in the country as an instrument for each bank's CF. This instrument will capture industry and country factors that explain CF. A positive feature of this instrument is that innovations in the risk of one bank will not necessarily influence the cash-flow rights of other banks. A negative feature of this instrument, however, is that if innovations in national bank risk affect bank ownership across all banks, then this instrument will not reduce endogeneity bias. This possibility, however, seems unlikely because (i) our examination of evolution of bank ownership indicates that ownership changes extremely little over time except when there is a major individual bank event (i.e., a merger or acquisition) and (ii) the results hold when controlling for national economic volatility. For regressions using the average cash-flow rights of other banks in the country as an instrumental variable, we exclude countries with only one bank because we can only compute the cash-flow instrument for countries with more than one bank. This instrument enters the first-stage regression for CF significantly at the one percent level as shown in Table 4 column 1.

The second instrumental variable for CF equals the year the bank was founded (Founded). Older banks have had more time to diversify ownership. Innovations in bank risk will not influence the year that the bank was founded. Furthermore, Founded is unlikely to affect bank risk directly. Rather, by reducing the cash-flow rights of the largest owner, Founded affects the incentives of the owner to influence bank risk taking. Founded enters the first-stage regression with a p-value of 0.059 (column 2).

For the third instrumental variable set, we jointly include Founded and a dummy variable denoting whether the founder of the bank is on the management or supervisory board (Founder) as instruments for each bank's cash-flow rights. If the founder of the bank is still on the management or supervisory board, this implies a continuing large, controlling role with correspondingly high cash-flow rights. Furthermore, these rights shape the incentives of the controlling owner toward risk taking, so that Founded affects bank risk through CF. [4] The partial correlation coefficient between CF and Founder is 0.17 and is significant at the one percent level, indicating that founders retain a larger share of CF rights if they are still active as members of the bank's board. As shown in column 3, Founded and Founder explain cross-bank variation in cash-flow rights, jointly entering the first-stage at the ten percent significance level. These instruments also pass the test of the over-identifying restrictions, which is consistent with the hypothesis that these instruments only explain bank risk through their affect on CF. Indeed, if we simply regress z-score on CF, Founder, and Founded, CF enters negatively and significantly while the joint hypothesis that Founder and Founded enter with zero coefficients is not rejected. While some may argue that Founder is determined by bank risking, which would invalidate Founder as an instrument for CF, we use Founder as an instrument in some of our analyses.

Finally, we jointly include the cash-flow rights of other banks, Founded, and Founder. These instruments jointly enter the first-stage significantly at the one percent level and also pass the over-identification test as listed in column 4.

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[4] Some may disagree with this point. There is strong evidence that family-owned firms under-perform after ownership is handed over to the second generation – the so-called succession problem (see, for example, Bennedsen et al. 2005; Bertrand et al. 2005). There is mixed evidence, however, on the performance of family-owned firms in general (see, for example, Morck et al. 1988; McConaughy et al.1998; Morck et al. 2000; Anderson and Reeb, 2003; and Pérez-González, 2003). While these researchers attempt to identify the impact of management on firm performance, some may argue that managerial ownership is endogenous to firm performance, including risk taking. This would make Founder an invalid instrument for CF. The counter argument is that ownership is likely to remain more concentrated if the founder of the company is still on the board of the company. Econometrically, we (a) note that Founder and CF are highly correlated and (b) demonstrate that we can cannot reject the null hypothesis that Founder only affects bank risk through CF. Also, as shown, the results hold when using alternative instruments.

To identify the independent impact of regulations on bank risk taking, we use instrumental variables based on the analyses in Barth et al (2006). They show that bank regulations reflect national legal and political systems. They further show that exogenous factors, such as the religious composition of the country and the legal origin of the country, influence legal and political systems and hence banking regulations. Consequently, we use religious composition and legal origin indicators as instrumental variables for bank regulation. The four religious composition indicators are the percentage of the population that is (i) Catholic, (ii) Muslim, (iii) a different non-protestant religion, and (iv) Protestant, where we only include the first three as instruments. The four legal origin indicators are whether the country's company/commercial law is derived from (i) British common law, (ii) French civil law, (iii) German civil law, or (iv) Scandinavian civil law, where we include the first three as instruments. Religious composition and legal origin are used as instruments for both Restrict and Diversification. While it is possible that religion and legal origin explain bank risk through channels other than the bank regulatory regime, we test for this. As shown in Table 4 (columns 5 and 6), these instruments explain cross-country variation in these Restrict and Diversification but we do not reject the hypothesis that the instruments explain bank risk only through their ability to explain national bank regulations. Furthermore, the regulatory variables are measured in 1999, while the bank risk variables are computed in 2001.

In presenting the instrumental variable results, we first examine the impact of CF on bank risk using the four different instruments discussed above. We do not include other regressors in these first four estimates to focus only on endogeneity between bank risk and CF. Then, we also include Revenue growth to control for bank performance and Per capita income to control for national economic conditions. Next, we turn to the regulatory variables. We examine Restrict

and Diversification using religious composition and legal origin as instrumental variables. Finally, we examine ownership structure (CF) and regulations (either Restrict or Diversification) simultaneously, where religious composition and legal origin are the instrumental variables for the regulation variables, while Founded and Founder instrument for CF.

c.2. Instrumental variable results

The instrumental variable results confirm that CF reduces bank stability. This result holds when (i) using different instrumental variables, (ii) controlling for national bank regulations, and (iii) controlling for Revenue growth and Per capita income. The estimated coefficient on CF from the IV specification is about three-times greater than that from the OLS regressions. From column 2, the results indicate that a one standard deviation increase CF lowers z-score by over 12, which is substantial given that the sample standard deviation of z-score is about 22. The fact that the IV estimate of the coefficient on CF is larger in absolute value terms than the OLS estimate suggests that OLS underestimates the true causal effect of CF on bank stability. It is possible that the downward bias of the OLS estimate is due to measurement error or to the possibility that the true incentives to take risk vary negatively with CF across banks.

The instrumental variable results also confirm that regulations that permit or encourage diversification reduce bank risk. Restrict enters all of the regressions negatively and significantly, which indicates that regulatory restrictions on bank activities reduce bank stability. Furthermore, Diversification enters positively and significantly, suggesting that diversification guidelines enhance bank stability. We do not include the two regulatory variables simultaneously because we do not have sufficiently powerful instruments to identify both Restrict and Diversification. Again the estimated coefficients suggest that Restrict and Diversification have economically meaningful impacts on bank stability. A one standard deviation in Restrict

(Diversification) yields a change in z-score of about one-half (two-fifths) of a standard deviation. In sum, regulations stressing diversification – either loan diversification guidelines or regulations permitting revenue diversification – reduce bank risk.

2. Bank Risk: Robustness Tests and Extensions

This section provides a series of robustness tests and extensions. We first assess the sensitivity of the results to controlling for additional country-level and bank-level factors. Then, we examine different definitions and indicators of ownership structure. Next, we examine different sub-samples of countries. Besides representing an additional sensitivity check, this provides greater information on when particular regulations effectively reduce risk taking. Finally, we show that the results hold when using alternative measures of bank risk.

a. Additional Country-Level Controls

In Table 5, we control for Revenue Growth and Per capita income, while testing whether the results on CF, Restrict, and Diversification are robust to including numerous country-level traits. The regressions are estimated using OLS with clustering at the country level.

We include three institutional indicators. Enforce is a measure of the degree to which the law is fairly and effectively enforced. Corrupt is a measure of the degree of official corruption, where higher values signify less corruption. Law is a measure of the degree to which the rule of law operates in the country. These are all subjective measures based on surveys. Although these institutional indicators are highly correlated with each other and with Per capita income, our goal is to use these indicators to gauge the strength of the linkages between bank risk and both ownership structure and bank regulations.

We continue to find the ownership structure and regulations associated with diversification shape bank risk taking even when controlling for these institutional indicators. The coefficients on CF and Diversification remain significant and of similar sizes to the estimates in Table 3. The significance of the coefficient on Restrict, however, weakens, reflecting the strong negative correlation between regulatory restriction on bank activities and institutional development.

Table 5 also includes indicators of financial system conditions that might influence franchise value and the governance of banks. First, we include a measure of banking system concentration that equals the percentage of banking system assets held by the five largest banks (Concentration). As shown theoretically by Allen and Gale (2001) and found empirically by Beck et al (2006a, b), greater bank concentration reduces the likelihood of suffering a systemic banking crisis. Using bank-level data and controlling for the regulations and ownership structure, we do not find a significant link between Concentration and bank risk (Table 5, column 4). Moreover, it does not change the other results.

Second, mergers and acquisition (M&A) might affect corporate governance. If a bank is poorly managed, then M&As are one possible mechanism for upgrading management. In column 5, we include an indicator of M&A activity, which equals the percentage of the traded companies on the country's stock exchange that were targeted in completed merger or acquisition deals during the 1990s. M&A, however, does not enter significantly, nor does it alter the other findings.

Third, we control for banking system profitability. In very profitable environments, banks might be reluctant to take excessive risk. We include the return on assets averaged across all banks in the country (Country-average ROA). As shown in column six, Country-average ROA

does not enter significantly and we continue to find that CF boosts risk-taking, while regulations that foster diversification reduce bank risk. Furthermore, as we discuss below, we also confirm this paper's results when eliminating banks associated with major mergers and acquisitions.

Fourth, national economic volatility may determine both bank risk and ownership structure. Consequently, we control for the volatility of economic output as measured by the standard deviation of real per capital GDP over the last five years. As shown in column 7, the volatility of aggregate output does not have an independent link with bank risk when conditioning on the bank's private governance structure and the national policy environment. Similar results hold when using the volatility of economic growth. Moreover, conditioning on macroeconomic volatility does not change any of the results on ownership structure or bank regulations.

We studied whether the impact of private governance mechanism on bank risk taking depends importantly on bank regulations and other national policies. In particular, the incentives and ability for a large owner to increase bank risk might be a function of official regulatory power, capital regulations, the existence and generosity of the deposit insurance regime, the effectiveness of the legal system in enforcing contracts, and whether the country has democratic political institutions. Thus, we included interaction terms between CF and each of these country traits. These interaction terms never entered significantly.

b. Additional Bank-Level Controls

Next, we control for numerous individual bank traits. In particular, we include measures of (i) the bank's growth over the last three years, (ii) the bank's size, (iii) the bank's loan loss provisions, (iv) bank's liquidity ratio (liquidity assets divided by liquid liabilities), (v) whether the bank holds more than ten percent of the country's deposits as an indicator of whether the banks is "too-big-to-fail," and (vi) whether the bank was recently intervened by the government. Table 6 provides these results. When including these additional bank-level variables, we confirm our main results. Greater cash-flow rights are associated with a drop in bank stability as measured by bank z-scores, while regulations that encourage diversification increase bank stability. Furthermore, since we trace the ownership history of banks, we have information on whether banks undergo a major acquisition or merger in the next five years. Banks that are about to experience a major event might behave differently from other banks. Thus, we re-did the analyses eliminating these banks and confirm the paper's findings. This also indicates one of the problems with extending our analyses to a panel. Besides limits on data availability on owners and managers, ownership structure is extremely stable in most banks, which reduces the value of panel studies. Moreover, substantial changes in ownership structure typically occur only in banks experiencing a major event, such as merger or acquisition, which frequently makes their accounting data incomparable over time or the data series simply stop.

c. More on Ownership and Managers

We had concerns about the ownership structure indicators. For instance, we are mixing firms with a controlling owner (CF>0) with widely-held firms (CF=0). In Table 7's column 1, we restrict the sample to only firms with a controlling owner and confirm the results. Furthermore, we use a cut-off of ten percent in defining a controlling owner. Others, however,

might argue for a higher cut-off. In column 2, we use a cut-off of 20 percent and show that this does not affect our findings. Moreover, some theoretical models suggest that owners with a very large proportion of their wealth tied to the bank will become excessively prudent. From this perspective, if control and cash-flow rights become very high, we should see a drop in bank risk. To assess this possibility, we include a dummy variable that takes on the value one if CF is above the sample median and zero otherwise (High CF). High CF is positively associated with bank stability (column 6), but it does not enter significantly. In unreported extensions, we also entered CF-squared to test for nonlinearities, but the quadratic term did not enter significantly. Finally, the state is the controlling owner of some of these banks (almost 20 percent). If the state has different attitudes toward risk from those of private equity holders, then state controlled banks should be treated separately. In column 7, we include a dummy variable of whether the bank is state controlled. It enters insignificantly and does not alter the other results.

Moreover, we stressed above the value of simultaneously examining an owner's power (voting rights) and incentives (cash-flows) in assessing the impact of ownership on risk taking. Thus, we believe it is more meaningful to examine CF, rather than examining voting rights. In column 3, we use voting rights and note that it only enters significantly at the ten percent level. Similarly, we stress that our focus on risk taking is different from a focus on valuation. With valuation, the wedge between voting rights and cash-flow rights (Wedge) provides a good signal of whether owners have strong incentives to expropriate bank resources (Caprio et al., 2005). In particular, when owners have control rights but few cash flow rights (large Wedge), they have both the power and the incentives to expropriate corporate resources. With our focus on risk taking, however, cash-flow rights are crucial, not the Wedge. Indeed, columns 4 and 5 stress that there is a robust link between CF and bank risk taking, but Wedge does not enter significantly.

Finally, we examine potential overlaps and interactions between large owners and management. We first include a dummy variable that equals one if the controlling shareholder is on the management board. Critically, this does not change the coefficient on CF as shown in Table 7, column 8. Holding other factors constant, large owners with greater cash-flow rights increase the risk taking behavior of banks. Thus, from purely an ownership perspective, being on the board does not change the relationship between CF and risk taking. However, the dummy variable enters positively and significantly. When managers are also the largest controlling owner, this is associated with greater bank stability (a higher z-score). This is consistent with the view that when a person is both a senior manager and the controlling owner, she has considerable financial and human capital wealth tied to the bank, which is associated with a reduction in risk taking. Second, we include the variable Managerial Ownership, which equals the total cash-flow rights of the management team. The cash-flow rights of the management team is as large as 68 percent, but is less than one-half of one percent in 75 percent of the banks. As shown in column 9, Managerial Ownership enters insignificantly and does not change any of the other findings. We interpret these results as indicating that marginal changes in managerial ownership have no appreciable influence on bank risk taking. Only when the controlling owner is on the management team, indicating that she has large financial and human capital wealth invested in the bank, do we observe significant changes in bank risk taking.

d. Alternative measures of bank stability

Thus far, we have focused on the z-score of individual banks in 1981 to gauge bank stability. This is only one potential measure of bank fragility and it is only for a single year. To assess the sensitivity of our results, this section uses three alternative measures of bank risk taking: (i) the average z-score of each bank computed over the period 1995-2001 (Alternative Z-score), (ii) the volatility of the bank's equity returns during the period 2001 (Volatility), and (iii) the volatility of the bank's equity returns over the period 1999-2001 (Three-year Volatility).

As shown in Table 8, the key results are robust to using alternative measures of bank risk taking. Higher CF is associated with greater risk taking and regulations that promote or facilitate diversification of portfolios and income flows tend to reduce bank risk. As in the earlier tables, either Restrict or Diversification enters significantly in all of the specifications, and they both enter significantly in some. This provides a clear message about regulations focused on diversification in general. In the next section, we extend the results to provide information on when diversification is most effective at reducing bank risk taking.

e. An extension and alternative samples

In this subsection, we examine different subsamples to test the sensitivity of the results and extend the analyses. First, for some countries, we do not much data on the banking system. We do not want these countries to dominate the findings. Consequently, in columns 1 and 2 of Table 9, we exclude countries with only one bank, while in columns 3 and 4 we exclude countries where the banks in our sample account for less than 50 percent of total banking system assets in the country. As shown, the results hold for these subsamples of banks.

Next, we test whether the relationship between bank regulations and bank risk depends on specific laws. We hypothesize that a bank will more effectively diversify its income flow

through the provision of non-lending financial services when a legal infrastructure exists that supports non-lending financial services. A legal system that does not protect minority shareholders hinders equity market development and therefore impedes the ability of banks to diversify income flows through equity-market-linked services. Thus, regulatory restrictions on bank activities will increase bank risk only in countries with strong shareholder protection laws.

Operationally, we split the sample between countries with comparatively strong minority shareholder rights and countries where the legal infrastructure is focused on defining and defending the rights of small shareholders. Specifically, columns 5 and 6 present regressions for countries with strong shareholder protection laws, i.e., where Rights is above the sample median. In turn, columns 7 and 8 provide results for countries with weak shareholder protection laws.

The results indicate that regulatory restrictions on bank activities increase bank risk when the country has strong shareholder protection laws. Put differently, Restrict increases bank risk when the bank could have diversified its income flows by providing non-lending services in a comparatively well-functioning equity markets. However, Restrict has little effect on bank risk in countries where the bank could not have diversified its income flow through non-lending services because the legal infrastructure does not provide much support for these non-lending services. In turn, regulations that offer diversification guidelines for bank loan portfolios are most effective in countries with weak shareholder protection laws. More generally, these results suggest that in countries with limited equity market development, which is also associated with lower levels of economic development, diversification guidelines encourage banks to diversify their assets with positive repercussions on bank stability.

3. Conclusions

In this paper, we examined the impact of ownership structure, franchise value, investor protection laws, and bank regulations on the risk taking behavior of banks. From a corporate finance perspective, we evaluate how ownership and management structure influence bank risk. From a policy perspective, we study which regulations shape bank risk taking. A critical contribution of this paper is that we simultaneously examine an individual bank's private governance structure, including its ownership and management structure, and the legal and regulatory environment in which the bank operates. Since both bank-level and country-level factors influence bank behavior, it is valuable to examine these together. We do this by collecting new information on the ownership and management structure of banks and merging it with existing data on bank regulations around the world.

We find that large owners with substantial cash-flow rights induce banks to increase risk. This is consistent with a variety of theoretical models predicting that (i) bank equity holders have incentives to increase risk after collecting deposits and debt from investors and (ii) large owners with substantial cash-flows have the power (voting rights) and incentives (cash-flow rights) to induce that bank's managers to increase risk taking. We find little independent impact of bank franchise value or investor protection laws on bank risk taking. In terms of regulatory policies, the two key components of Basel II – capital requirements and official supervisory oversight of banks -- do not reduce bank risk taking. Rather, regulations that promote loan diversification reduce bank risk, while regulations that restrict banks from diversifying income flows by providing non-lending services increase bank risk taking.

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Table 1. Summary statistics

This table reports summary statistics of the main variables. Z-score is the z score of the bank; the higher the score, the lower the probability of bank default. Volatility is the volatility of the equity returns of the bank. CF is cash flow rights of the controlling shareholder of the bank. Revenue growth is the growth in total revenues of the bank over the past year. State is a dummy variable denoting whether the state is the controlling shareholder in the bank. Founded is the year the bank was founded. Founder is a dummy variable denoting whether the founder of the bank is on the management or supervisory board. Descendant is a dummy variable denoting whether a family descendant of the founding family of the bank is on the management or supervisory board. Control is control rights of the controlling shareholder of the bank. Multiple is a dummy variable that takes a value of one if there are multiple controlling owners. Shareholder on mgt board is a dummy variable that takes a value of one if the controlling shareholder has a seat on the management board of the company. Per capita income is the log of GDP per capita of the country. Rights is an index of anti-director rights. Self-dealing is an index of anti self-dealing. Restrict is an index of activity restrictions. Diversification is an index of diversification guidelines. Capital is an index of capital regulation. Official is an index of official supervisory power. DI is a dummy variable indicating whether the country has explicit deposit insurance. A more detailed definition of the variables can be found in Annex 1.

Variable	Number of banks	Mean	Std. Dev.	Min	Max
Bank-level					
Z-score	288	23.85	21.63	-1.03	170.31
Volatility	219	0.40	0.23	0.03	1.99
CF	296	0.27	0.28	0.00	1.00
Revenue growth	269	0.02	0.23	-0.86	1.87
State	296	0.18	0.38	0.00	1.00
Founded	296	1914.37	72.36	1472.00	1999.00
Founder	296	0.03	0.17	0.00	1.00
Descendant	296	0.14	0.34	0.00	1.00
Control	296	0.33	0.30	0.00	1.00
Multiple	296	0.14	0.34	0.00	1.00
Shareholder on mgt board	296	0.35	0.48	0.00	1.00
Country-level					
Per capita income	48	8.79	1.49	5.54	10.70
Rights	48	2.98	1.31	0.00	5.00
Self-dealing	48	0.48	0.24	0.08	1.00
Restrict	41	9.02	2.40	5.00	14.00
Diversification	41	0.41	0.50	0.00	1.00
Capital	41	3.12	1.25	0.00	5.00
Official	40	9.93	2.65	3.00	14.00
DI	47	0.70	0.46	0.00	1.00

Table 2. Correlation matrix

This table reports the correlations between the main variables. Z-score is the z score of the bank; the higher the score, the lower the probability of bank default. Volatility is the volatility of the equity returns of the bank. CF is cash flow rights of the controlling shareholder of the bank. Revenue growth is the growth in total revenues of the bank over the past year. Restrict is an index of activity restrictions. Diversification is an index of diversification guidelines. P-values denoting the significant level of each correlation coefficient are in parentheses.

	Z-score	Volatility	Revenue growth	CF	Restrict	Diversification
Z-score	1					
Volatility	***-0.375	1				
	(0.000)					
Revenue growth	***0.205	*-0.144	1			
	(0.002)	(0.059)				
CF	***-0.230	***0.353	**-0.146	1		
	(0.000)	(0.000)	(0.024)			
Restrict	***-0.293	***0.224	-0.061	***0.235	1	
	(0.000)	(0.001)	(0.379)	(0.000)		
Diversification	***0.234	***-0.240	-0.074	*-0.103	***-0.264	1
	(0.000)	(0.001)	(0.286)	(0.097)	(0.000)	

Table 3. Bank stability, ownership and bank supervision

Dependent variable is Z score. Sample of 10 largest listed banks in the country in terms of total assets, if available. Revenue growth is the bank's average growth in total revenues during the last year. CF is the fraction of the bank's ultimate cash-flow rights held by the controlling owners and zero if there is no controlling owner. We use 10 percent as the criteria for control. All bank-level data are for the year 2001. Per capita income is the log of GDP per capita of the country. Rights is an index of anti-director rights for the country. Self-dealing is the anti self-dealing index from Djankov et al. 2005. Restrict is an index of activity restrictions. Diversification is an index of diversification guidelines. Capital is an index of capital regulation. Official is an index of official supervisory power. DI is a dummy variable indicating whether the country has explicit deposit insurance. Regressions are estimated using OLS with clustering at the country-level. Standard errors that control for clustering at the country-level are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Revenue growth	9.066	9.181	9.360	9.822	11.209	9.939	9.578	10.066	11.457*
	(6.507)	(6.449)	(6.289)	(6.157)	(6.926)	(6.674)	(7.139)	(6.083)	(6.079)
CF	-14.750***	-14.166***	-14.992***	-12.098**	-12.624**	-15.101***	-14.390***	-14.318***	-10.763**
	(4.773)	(4.347)	(4.592)	(4.983)	(4.691)	(5.268)	(5.233)	(4.897)	(4.370)
Per capita income	2.908***	2.915**	3.173***	2.084*	2.960***	2.814**	3.038**	3.340***	2.328**
	(1.062)	(1.089)	(1.057)	(1.108)	(1.022)	(1.230)	(1.431)	(0.891)	(0.957)
Rights		0.758							
		(1.354)							
Self-dealing			-10.401						
			(7.059)						
Restrict				-2.304**					-1.787**
				(0.855)					(0.826)
Diversification					12.025***				9.896***
					(3.853)				(3.604)
Capital						-1.409			
						(1.646)			
Official							-0.231		
							(0.922)		
DI								-4.794	
								(3.268)	
Observations	269	269	269	236	236	236	229	269	236
R-squared	0.10	0.10	0.11	0.14	0.15	0.09	0.09	0.10	0.18
Number of countries	46	46	46	40	40	40	39	46	40

Table 4. Instrumental variables

Dependent variable is Z score of a bank. CF is the fraction of the bank's ultimate cash-flow rights held by the controlling owners and zero if there is no controlling owner. We use 10 percent as the criteria for control. Per capita income is the log of GDP per capita of the country. All bank-level data are for the year 2001. Regressions are estimated with instrumental variables with clustering at the country-level. In regression (1), we use the average CF of other banks in the country as instrument for CF. We exclude countries with one bank. In regression (2), we use the year of foundation of the bank as instrument for CF. In regression (3), we use the year of foundation of the bank and a dummy variable denoting whether the founder of the bank is on the management or supervisory board as instruments for CF. In regression (4), we use the following instruments for CF: year of foundation of the bank, a dummy variable denoting whether the founder of the bank is on the management or supervisory board, and the average CF of other banks in the country. In regression (5), we use religion and legal origin dummy variables as instruments for Restrict. In regression (6), we use religion and legal origin dummy variables as instruments for Diversification. In regressions (7) to (9), we use the following instruments for CF: year of foundation of the bank, a dummy variable denoting whether the founder of the bank is on the management or supervisory board, and the average CF of other banks in the country. In regression (8), we use religion and legal origin dummy variables as instruments for Restrict. In regression (9), we use religion and legal origin dummy variables as instruments for Diversification. Restrict is an index of activity restrictions. Diversification is an index of diversification guidelines. We also include the p-values of a test of excluded instruments and the overidentification test of all instruments. Standard errors that control for clustering at the country-level are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CF	-43.471***	-70.495**	-71.667**	-43.286***			-42.348***	-37.624**	-46.045***
	(11.016)	(35.124)	(34.003)	(11.055)			(15.761)	(16.220)	(11.364)
Restrict					-4.465***			-2.023	
					(1.417)			(1.804)	
Diversification						18.144**			10.823**
						(7.393)			(5.078)
Per capita income							1.175		
							(1.683)		
Revenue growth							11.495*	11.457*	13.216**
							(5.946)	(5.940)	(6.579)
Test of excluded instruments (p-value)	0.000***	0.059*	0.051*	0.000***	0.000***	0.001***	0.000***	0.000***	0.000***
Overidentification test (p-value)	--	--	0.789	0.514	0.508	0.116	0.851	0.451	0.811
Observations	283	288	288	283	253	253	266	236	236
Number of countries	43	48	48	43	41	41	43	40	40

Table 5. Other country-level control variables

Dependent variable is Z score. Revenue growth is the bank's average growth in total revenues during the last 3 years. CF is the fraction of the bank's ultimate cash-flow rights held by the controlling owners and zero if there is no controlling owner. We use 10 percent as the criteria for control. All bank-level data are for the year 2001. Per capita income is the log of GDP per capita. Restrict is an index of activity restrictions. Diversification is an index of diversification guidelines. Enforce is an index of enforcement of contracts. Corrupt is an index of corruption. Law is a measure of law and order tradition. Concentration is the 5-bank concentration ratio in terms of total assets. M&A activity is the percentage of traded companies listed on the country's stock exchange that have been targeted in completed mergers or acquisitions deals during the 1990s. Source of the merger data is Rossi and Volpin (2005). Country-average ROA is the return on assets averaged across all banks in the country. GDP Volatility equals the standard deviation of the logarithm of GDP (in 2000 U.S. dollars) over the period 1997-2001. Regressions are estimated using OLS with clustering at the country-level. Standard errors that control for clustering at the country-level are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Revenue growth	11.284*	11.463*	11.048*	13.977**	12.446*	10.820*	13.169**
	(6.174)	(6.246)	(6.167)	(6.599)	(6.276)	(5.966)	(5.891)
CF	-9.723**	-9.855**	-9.455**	-9.720**	-11.876**	-9.953**	-9.772**
	(4.282)	(4.585)	(4.305)	(4.417)	(4.591)	(4.587)	(4.617)
Per capita income	-0.055	1.713	0.038	2.603***	2.318	2.509**	2.105**
	(2.720)	(1.262)	(2.619)	(0.892)	(1.553)	(0.960)	(1.024)
Restrict	-1.708*	-1.547	-1.720*	-1.665**	-1.930**	-1.741**	-2.265***
	(0.853)	(0.924)	(0.860)	(0.780)	(0.737)	(0.820)	(0.768)
Diversification	10.661***	9.825***	10.549***	10.350***	9.375**	9.891***	10.884***
	(3.808)	(3.581)	(3.719)	(3.611)	(3.833)	(3.619)	(3.477)
Enforce	1.960						
	(2.089)						
Corrupt		1.779					
		(2.220)					

Law			1.598				
			(1.623)				
Concentration				7.464			
				(8.116)			
M&A					-0.043		
					(0.117)		
Country-average ROA						81.172	
						(126.605)	
GDP Volatility							-41.444
							(66.886)
Observations	236	236	236	233	230	236	226
R-squared	0.18	0.18	0.18	0.18	0.17	0.18	0.21
Number of countries	40	40	40	39	39	40	39

Table 6. Other bank-level control variables

Dependent variable is Z score. CF is the fraction of the bank's ultimate cash-flow rights held by the controlling owners and zero if there is no controlling owner. We use 10 percent as the criteria for control. Per capita income is the log of GDP per capita of the country. Restrict is an index of activity restrictions. Diversification is an index of diversification guidelines. All bank-level data are for the year 2001. Three-year revenue growth is the three-year lagged average growth in total net revenues. Revenue growth is the one-year lagged average growth in total net revenues. Size is the log of total assets. Loan loss provision ratio is the ratio of the bank's loan loss provisions to net interest income. Liquidity ratio is the ratio of the bank's liquid assets to liquid liabilities. Too-big-to-fail is a dummy variable that takes a value of one if the bank's share in the country's total deposits exceeds 10%. Data on total deposits of deposit-taking institutions in the country is obtained from the IFS data of the IMF. Banks taken over by State during crisis is a dummy variable that takes a value of one for banks that were taken over by the government during a recent banking crisis (post-1995) and are still government controlled, and zero otherwise. Regressions are estimated using OLS with clustering at the country-level. Standard errors that control for clustering at the country-level are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

	(1)	(2)	(3)	(4)
CF	-8.693**	-10.235**	-11.317**	-9.601**
	(3.556)	(4.555)	(4.454)	(4.615)
Per capita income	2.433***	2.929***	2.251**	2.328**
	(0.840)	(1.011)	(0.955)	(0.941)
Restrict	-0.992	-0.961	-1.853**	-1.642*
	(0.797)	(0.829)	(0.796)	(0.837)
Diversification	7.269**	9.049**	9.801***	9.914***
	(3.169)	(3.876)	(3.606)	(3.615)
Three-year revenue growth	26.480***			
	(8.050)			
Revenue growth		5.303	11.488*	13.966**
		(5.783)	(5.994)	(5.832)
Size		-0.681		
		(0.800)		
Loan loss provision ratio		-1.725		
		(2.806)		
Liquidity ratio		-34.802		
		(22.653)		
Too-big-to-fail			-1.656	
			(2.614)	
Banks taken over by State during crisis				-14.057**
				(5.708)
Observations	208	218	236	236
R-squared	0.19	0.15	0.18	0.18
Number of countries	39	39	40	40

Table 7. More on ownership

Dependent variable is Z score. Revenue growth is the bank's average growth in total revenues during the last year. Per capita income is the log of GDP per capita of the country. CF is the fraction of the bank's ultimate cash-flow rights held by the controlling owners and zero if there is no controlling owner. We use 10 percent as the criteria for control. Per capita income is the log of GDP per capita of the country. Restrict is an index of activity restrictions. Diversification is an index of diversification guidelines. All bank-level data are for the year 2001. Regression (1) includes only banks with a controlling shareholder (10% or more of control rights). In regression (2) we use 20% rather than 10% as a cutoff point to determine control. Regression (3) includes control rights rather than cash-flow rights. In regression (4) includes the wedge between CF and control rights defined as the ratio of CF rights to Control rights. Regression (5) includes both CF rights and the wedge between CF and control rights. Regression (6) includes High CF, a dummy variable that takes a value of one if CF rights is above the median level of CF rights in the sample, and zero otherwise. Regression (7) includes a dummy variable that takes a value of one if the state is the ultimate owner, and zero otherwise. Regression (8) includes a dummy variable that takes a value of one if the controlling shareholder has a seat on the management board of the company, and zero otherwise. Regression (9) adds a variable that equals the total cash-flow rights of senior management. Regressions are estimated using OLS with clustering at the country-level. * significant at 10%; ** significant at 5%; *** significant at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Revenue growth	7.277	11.449*	11.570*	10.389	11.474*	11.616*	11.541*	11.942*	12.639*
	(6.444)	(6.100)	(6.342)	(6.414)	(6.110)	(6.074)	(6.093)	(6.251)	(6.460)
Per capita income	1.922	2.384**	2.466***	2.472**	2.332**	2.435**	2.500***	2.911***	2.947***
	(1.305)	(0.955)	(0.910)	(0.952)	(0.949)	(0.964)	(0.921)	(0.817)	(0.859)
Restrict	-1.622	-1.791**	-1.876**	-1.827**	-1.788**	-1.788**	-1.826**	-2.013**	-2.063**
	(1.011)	(0.828)	(0.832)	(0.849)	(0.818)	(0.807)	(0.814)	(0.816)	(0.851)
Diversification	11.052***	9.965***	10.318***	10.198***	9.893***	9.577**	10.198***	10.424***	10.719***
	(3.993)	(3.619)	(3.685)	(3.754)	(3.618)	(3.689)	(3.503)	(3.506)	(3.687)
CF	-10.428**				-10.915*	-18.401**	-12.314**	-15.167***	-14.895***
	(5.007)				(6.139)	(6.981)	(5.083)	(4.112)	(3.984)
CF 20%		-9.918**							
		(4.113)							
Control			-7.820*						
			(4.271)						
Wedge				-4.428	0.126				
				(2.727)	(3.868)				
High CF						5.123			
						(4.188)			
State							2.944		
							(3.937)		
Shareholder on mgt board								7.083**	7.440**
								(3.228)	(3.298)
Managerial ownership									-6.476
									(8.485)
Observations	165	236	236	236	236	236	236	236	232
R-squared	0.20	0.17	0.17	0.17	0.18	0.18	0.18	0.19	0.20
Number of countries	38	40	40	40	40	40	40	40	40

Table 8. Alternative measures of bank stability

Dependent variable in regressions (1) and (2) is the volatility of equity returns during the year 2001 based on weekly total equity returns. Dependent variable in regressions (3) and (4) is the volatility of equity returns during the period 1999 to 2001 based on weekly total equity returns. Dependent variable in regressions (3) and (4) is average Z-score over period 1995-2001, when available, calculated as sample period average return on assets plus the capital adequacy ratio at year-end 2001 divided by the standard deviation of return on assets over the sample period. Revenue growth is the bank's average growth in total revenues during the last 3 years. CF is the fraction of the bank's ultimate cash-flow rights held by the controlling owners and zero if there is no controlling owner. We use 10 percent as the criteria for control. All bank-level data are for the year 2001. Restrict is an index of activity restrictions. Diversification is an index of diversification guidelines. Regressions are estimated using OLS with clustering at the country-level. Standard errors that control for clustering at the country-level are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)
	Volatility		Three-year Volatility		Alternative Z score	
Revenue growth	-0.189	-0.206*	-0.063	-0.087	8.123	10.399*
	(0.117)	(0.118)	(0.107)	(0.099)	(6.419)	(5.950)
CF	0.205**	0.192**	0.239***	0.182**	-14.293***	-9.996**
	(0.091)	(0.094)	(0.085)	(0.086)	(4.916)	(4.449)
Per capita income	-0.056***	-0.056***	-0.052**	-0.042**	2.999***	2.350**
	(0.017)	(0.017)	(0.022)	(0.019)	(1.098)	(0.965)
Restrict		0.006		0.037***		-1.899**
		(0.008)		(0.011)		(0.846)
Diversification		-0.103**		-0.064		9.985**
		(0.041)		(0.048)		(3.761)
Observations	198	182	198	182	269	236
R-squared	0.23	0.27	0.09	0.16	0.09	0.17
Number of countries	38	38	38	38	46	40

Table 9. Alternative samples

Dependent variable is Z score. Revenue growth is the bank's average growth in total revenues during the last 3 years. CF is the fraction of the bank's ultimate cash-flow rights held by the controlling owners and zero if there is no controlling owner. We use 10 percent as the criteria for control. All bank-level data are for the year 2001. Restrict is an index of activity restrictions. Diversification is an index of diversification guidelines. Regressions (1) and (2) include only countries with more than one sampled bank. Regressions (3) and (4) include only countries where we have 50% or more coverage of assets of listed banks. Regressions (5) and (6) include only countries with strong shareholder protection defined as countries with above median level of Rights in the sample. Regressions (7) and (8) include only countries with weak shareholder protection defined as countries with below median level of Rights in the sample. Regressions are estimated using OLS with clustering at the country-level. Standard errors that control for clustering at the country-level are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Exclude countries with one bank		Exclude countries with poor coverage		Countries with strong shareholder protection		Countries with weak shareholder protection	
Revenue growth	9.065	11.621*	9.034	12.502*	15.841*	13.992	2.255	4.350
	(6.514)	(6.114)	(6.880)	(6.459)	(8.530)	(8.494)	(7.359)	(6.716)
CF	-15.029***	-10.913**	-14.048***	-10.086**	-27.955***	-18.872***	-15.159**	-12.591**
	(4.828)	(4.394)	(4.919)	(4.472)	(8.665)	(4.876)	(5.854)	(5.279)
Per capita income	2.865**	2.331**	3.172***	2.894***				
	(1.073)	(0.961)	(1.130)	(0.945)				
Restrict		-1.802**		-1.348		-3.690***		-1.146
		(0.830)		(0.841)		(0.703)		(0.931)
Diversification		9.943***		12.028***		0.479		15.390***
		(3.641)		(3.791)		(4.349)		(3.541)
Observations	266	234	252	226	101	79	168	157
R-squared	0.10	0.18	0.10	0.19	0.12	0.22	0.03	0.17
Number of countries	43	38	41	36	15	15	27	27

Annex 1 Variable Names and Definitions

This table describes the variables collected for the 46 countries included in our sample. We present the description and the sources of each variable.

Variable	Description
Z score	Z is the bank-level z-score computed as the average return on assets plus average capital adequacy ratio divided by standard deviation of return on assets. Return on assets is calculated as the ratio of pre-tax profits to total assets. Capital adequacy ratio is calculated as the ratio of equity capital to total assets. Averages and standard deviation are calculated over the period 1995-2001, when available. Source: Bankscope and authors' calculations.
Equity volatility	Volatility of equity returns during 2001 based on weekly total stock returns. Source: Datastream.
Control	Fraction of the bank's voting rights, if any, owned by its controlling shareholder. To measure control, we combine a shareholder's *direct* (i.e., through shares registered in her name) and *indirect* (i.e., through shares held by entities that, in turn, she controls) *voting* rights in the banking firm. A shareholder has an x percent indirect control rights over a bank if (i) she controls directly firm A (i.e., she owns more than 10 percent of the voting rights of firm A) which, in turn, directly controls x percent of the votes of the bank; or (ii) she controls directly firm B which in turn controls firm A (or any sequence of firms forming a control chain) which, in turn, controls x percent of the bank. Thus, the control chain can involve a sequence of companies linking the bank with the ultimate owner. A bank in our sample has a controlling shareholder if the sum of her direct and indirect voting rights exceeds 10 percent. When multiple shareholders meet our criteria for control, we assign control to the shareholder with the largest voting stake. Source: Authors' calculations based on Bankscope, Worldscope, the Bankers Almanac, 20-F filings, and company websites.
CF	Fraction of the firm's ultimate cash-flow rights, if any, owned by its controlling shareholder. CF values are computed as the product of all the equity stakes along the control chain. See "Control" for a description of a control chain. The controlling shareholder may hold cash-flow rights directly (i.e., through shares registered in her name) and indirectly (i.e., through shares held by entities that, in turn, she controls). If there is a control chain, then we use the products of the cash-flow rights along the chain. For example, if the controlling shareholder of bank A holds the fraction *y* of cash-flow rights in firm B and firm B in turn holds the fraction *x* of the cash-flow rights in Bank A, then the controlling shareholder's indirect cash-flow rights in bank A are equal to the product of *x* and y. To compute the controlling shareholder's total cash-flow rights we sum direct and all indirect cash-flow rights. Source: Authors' calculations based on Bankscope, Worldscope, the Bankers Almanac, 20-F filings, and company websites.
Wedge	The ratio of cash-flow rights and control rights. Source: Authors' calculations.
High CF	Dummy variable taking a value of one if CF rights is above the median level of CF rights in the sample (21.5%), and zero otherwise.
Multiple	Dummy variable that takes a value of one if there are multiple owners with control rights of 10% or more, and zero otherwise.
Revenue growth	The bank's average growth in total revenues during the last year. Source: Bankscope.
Too-big-to-fail	Equals one if the bank's share in the country's total deposits exceeds 10% in 2001, and zero otherwise. Source: Bankscope and IFS.
Loan loss provision ratio	Ratio of the bank's loan loss provisions to net interest income in 2001. Source: Bankscope.
Liquidity ratio	Ratio of the bank's liquid assets to liquid liabilities in 2001. Source: Bankscope.
Size	Logarithm of total assets of the bank in millions of US dollars in 2001. Source: Bankscope.
State	Dummy variable that indicates whether the state is the controlling shareholder in the bank. Source: Authors' calculations
Founder	Dummy variable denoting whether the founder of the bank is on the management or supervisory board. Source: Bankers Almanac, Bankscope, Company annual report, Company website.
Descendant	Dummy variable denoting whether a family descendant of the founding family of the bank is on the management or supervisory board. Source: Bankers Almanac, Bankscope, Company annual report, Company website.
Founded	The year the bank was founded. Source: Bankers Almanac, Bankscope, Company annual report, Company website.
Legal origin	Dummy variables denoting whether the origin of the country's legal system is English, French, German or Scandinavian. Source: LLSV (1998).
Religion	Vector of variables denoting the shares of the population that is protestant, catholic, Muslim or other. Source: LLSV (1998).
Restrict	Index of regulatory restrictions on banks ability to engage in securities market activities, the insurance business, conduct real estate activities, or own non-financial firms. Source: Barth, Caprio, and Levine (2003).

Variable	Description
Diversification	Index of diversification guidelines imposed on banks. The index takes a value of one if there are explicit, verifiable, quantifiable guidelines regarding asset diversification for banks, and zero otherwise. Source: Barth, Caprio, and Levine (2003).
Capital	Regulatory restricts on bank capital. Index that includes information on the following questions. 1. Is the minimum capital-asset ratio requirement risk weighted in line with the Basel guidelines? 2. Does the minimum ratio vary as a function of market risk? 3. Are market value of loan losses not realized in accounting books deducted from capital? 4. Are unrealized losses in securities portfolios deducted? 5. Are unrealized foreign exchange losses deducted? 6. What fraction of revaluation gains is allowed as part of capital? 7. Are the sources of funds to be used as capital verified by the regulatory/supervisory authorities? 8. Can the initial disbursement or subsequent injections of capital be done with assets other than cash or government securities? 9. Can initial disbursement of capital be done with borrowed funds? Source: Barth, Caprio, and Levine (2003).
Official	Index of official supervisory power. Adds one for an affirmative response to each for the following 14 questions: 1. Does the supervisory agency have the right to meet with external auditors to discuss their report without the approval of the bank? 2. Are auditors required by law to communicate directly to the supervisory agency any presumed involvement of bank directors or senior managers in elicit activities, fraud, or insider abuse? 3. Can supervisors take legal action against external auditors for negligence? 4. Can the supervisory authority force a bank to change its internal organizational structure? 5. Are off-balance sheet items disclosed to supervisors? 6. Can the supervisory agency order the bank's directors or management to constitute provisions to cover actual or potential losses? 7. Can the supervisory agency suspend the directors' decision to distribute: a) Dividends? b) Bonuses? c) Management fees? 8. Can the supervisory agency legally declare-such that this declaration supersedes the rights of bank shareholders-that a bank is insolvent? 9. Does the Banking Law give authority to the supervisory agency to intervene that is, suspend some or all ownership rights-a problem bank? 10. Regarding bank restructuring and reorganization, can the supervisory agency or any other government agency do the following: a) Supersede shareholder rights? b) Remove and replace management? c) Remove and replace directors? Source: Barth, Caprio, and Levine (2003).
Independence	The degree to which the supervisory authority is independent from the government and legally protected from the banking system. Source: Barth, Caprio, and Levine (2003).
DI	Dummy variable indicating whether the country has explicit deposit insurance or not (yes=1; no=0). Source: Demirguc-Kunt, Karacaovali, and Laeven (2005).
Per capita income	Log of gross domestic product per capita in 2001. Source: World Development Indicators.
Rights	Index of anti-director rights for the country. Formed by adding one when: (1) the country allows shareholders to mail their proxy vote, (2) shareholders are not required to deposit their shares prior to the General Shareholders' Meeting, (3) cumulative voting or proportional representation of minorities on the board of directors is allowed, (4) an oppressed minorities mechanism is in place, (5) the minimum percentage of share capital that entitles a shareholder to call for an Extraordinary Shareholders' Meeting is less than or equal to 10 percent (the sample median), or (6) when shareholders have preemptive rights that can only be waived by a shareholders meeting. The range for the index is from zero to six. Source: La Porta et al. (1998).
Self-dealing	Anti self-dealing index from Djankov et al. (2005)
Enforce	Index of legal enforcement of contracts in the country from LLSV (1998).
Corrupt	Index of corruption in the country from LLSV (1998).
Law	Measure of law and order tradition in the country from LLSV (1998).
Concentration	5-bank concentration ratio in terms of total assets. Source: Authors' calculations based on data from Bankscope.
Country-average ROA	Return on assets averaged across all banks in the country in 2001. Return on assets is calculated as pre-tax profits over total assets. Source: Bankscope.
M&A activity	Percentage of traded companies listed on the country's stock exchange that have been targeted in completed mergers or acquisitions deals during the 1990s. Source: Rossi and Volpin (2005).

Appendix 1 Bank risk, Cash-flow rights, Activity restrictions, and Diversification Guidelines by Country

Country	Z-score	Volatility	CF	Restrict	Diversification	Number of banks
Argentina	31.19	0.47	0.47	8.75	1	1
Australia	34.78	0.24	0.01	8	0	9
Austria	66.36	0.12	0.40	5	1	3
Belgium	23.41	0.31	0.54	9	1	1
Brazil	12.85	0.55	0.42	10	0	7
Canada	58.28	0.25	0.00	7	1	7
Chile	24.07	0.27	0.24	11	0	4
Colombia	17.19	0.44	0.32	n.a.	n.a.	5
Denmark	27.49	0.22	0.15	8	0	10
Ecuador	20.53	n.a.	0.52	n.a.	n.a.	5
Egypt	28.64	0.34	0.19	13	1	7
Finland	21.26	0.38	0.37	7	0	2
France	23.53	0.25	0.40	6	1	6
Germany	25.04	0.43	0.32	5	0	5
Greece	14.92	0.43	0.33	9	0	8
Hong Kong	22.22	0.34	0.35	n.a.	n.a.	7
India	15.73	0.33	0.62	10	0	9
Indonesia	5.36	0.56	0.75	14	0	8
Ireland	27.33	0.35	0.00	8	1	6
Israel	26.57	0.28	0.43	13	0	8
Italy	25.20	0.43	0.13	10	0	10
Japan	11.86	0.41	0.26	13	1	5
Jordan	30.02	n.a.	0.23	11	1	7
Kenya	11.24	0.45	0.18	10	0	4
Korea, Rep. Of	5.84	0.70	0.26	9	0	10
Malaysia	11.19	0.36	0.30	10	1	6
Mexico	19.33	0.40	0.58	12	0	1
Netherlands	33.15	0.37	0.17	6	0	2
Nigeria	12.19	n.a.	0.15	9	0	7
Norway	31.48	0.26	0.05	n.a.	n.a.	9
Pakistan	12.41	0.30	0.50	n.a.	n.a.	7
Peru	21.04	1.18	0.55	8	1	3
Philippines	35.56	0.42	0.29	7	1	10
Portugal	36.63	0.22	0.24	9	1	6
Singapore	32.48	0.38	0.27	8	0	2
South Africa	13.68	0.35	0.15	8	1	10
Spain	34.78	0.25	0.18	7	1	10
Sri Lanka	32.61	0.50	0.14	7	0	5

Sweden	26.84	0.33	0.09	9	0	3
Switzerland	54.06	0.37	0.26	5	1	5
Taiwan	34.64	0.49	0.23	12	0	10
Thailand	0.85	0.63	0.52	9	0	7
Turkey	5.80	0.86	0.53	12	0	10
United Kingdom	40.56	0.37	0.02	5	0	6
Uruguay	22.16	n.a.	0.00	n.a.	n.a.	1
USA	20.21	0.37	0.00	12	0	10
Venezuela	24.22	0.34	0.32	10	1	3
Zimbabwe	14.91	n.a.	0.06	n.a.	n.a.	1
Total	23.85	0.40	0.27	9.23	0.39	288