

The credit crisis around the globe: Why did some banks perform better?

by

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Abstract

Though overall bank performance from July 2007 to December 2008 was the worst since the Great Depression, there is significant variation in the cross-section of stock returns of large banks across the world during that period. We use this variation to evaluate the importance of factors that have been put forth as having contributed to the poor performance of banks during the credit crisis. Our evidence is inconsistent with the argument that poor governance of banks made the crisis worse, but it is supportive of theories that emphasize the fragility of banks financed with short-run capital market funding. Strikingly, differences in banking regulations across countries are generally uncorrelated with the performance of banks during the crisis, except that banks in countries with more restrictions on banking activities performed better, and are uncorrelated with observable risk measures of banks before the crisis. The better-performing banks had less leverage and lower returns in 2006 than the worst-performing banks.

1. Introduction

Throughout the world, many banks have seen most of their equity destroyed by the crisis that started in the U.S. subprime sector in 2007 and governments have had to infuse capital in banks in many countries to prevent outright failure. Yet, not all banks across the world performed equally poorly. In this paper, we investigate why some banks performed better than others, measuring performance by stock returns during the crisis. Academics, journalists, as well as policy-makers have argued that lax regulation, insufficient capital, excessive reliance on short-term financing, and poor governance contributed to making the crisis as serious as it was. If these factors did contribute to the crisis, we would expect that banks that were more exposed to these factors performed worse during the crisis.

Our experimental design is to examine whether characteristics of banks in 2006 are helpful in predicting their stock return performance during the crisis. Most of our analysis uses the period from July 1, 2007, to December 31, 2008. Our main sample includes all publicly-traded large banks, which we define as banks with assets in excess of \$50 billion in 2006. We also use a sample of all banks in countries with at least one large bank. With our definition of a large bank, 30 countries had at least one large bank. Our sample includes 165 banks with assets in excess of \$50 billion and 386 banks with assets in excess of \$10 billion.

Many analyses of the crisis have emphasized the run on the funding of banks that relied on short-term finance in the capital markets for a substantial fraction of their financing (see, for instance, Adrian and Shin (2008), Brunnermeier (2009), Gorton (2010), and Diamond and Rajan (2009)). We would expect the reliance on short-term finance of a bank to be inversely related to its reliance on deposit funding. In support of these analyses, we find strong evidence that banks that relied more on deposits for their financing in 2006 fared better during the crisis. These analyses have also emphasized how losses forced banks to reduce their leverage, perhaps through fire sales of securities, and how this effect would be greater for banks with more leverage. We find that large banks with less leverage in 2006 performed better during the crisis.

An OECD report argues that “the financial crisis can be to an important extent attributed to failures and weaknesses in corporate governance arrangements” (Kirkpatrick (2008)). Some academic studies also emphasize that flaws in bank governance played a key role in the performance of banks (Diamond and Rajan (2009), Bebchuck and Spamann (2009)). We use two proxies for governance. The first one is whether the bank has a controlling shareholder with ownership in excess of 10% of the bank’s shares. The second one is whether it has a board that is shareholder friendly according to Riskmetrics. To the extent that governance played a role, we would expect banks with better governance to have performed better. Generally, banks with more shareholder-friendly boards would be considered to have better governance from the perspective of shareholders. Banks with a controlling shareholder with ownership greater than 10% would have management with interests better aligned with the interests of shareholders. However, a powerful controlling shareholder could use control of a bank to benefit other related entities, so that it is not necessarily the case that greater ownership by the controlling shareholder means better alignment of interests of management with shareholders. There is no evidence that the performance of banks during the crisis is different when they have a controlling shareholder with ownership greater than 10% even though such banks have lower volatility and a higher distance to default estimate before the crisis. However, banks with a shareholder-friendly board performed worse during the crisis. Such a result is consistent with the view that banks that were pushed by their boards to maximize shareholder wealth before the crisis took risks that were understood to create wealth but turned out poorly.

We use the 2006 World Bank survey on bank regulation to examine the hypothesis that lax regulation led banks to taking excessive risks that caused large losses during the crisis (see, e.g., Dooley, Folkerts-Landau, and Garber (2009), Stiglitz (2009)). We use indices for the power of the regulators, oversight of bank capital, restrictions on bank activities, and private monitoring of banks. The only regulatory index correlated with the performance of banks during the crisis is the index of restrictions of bank activities. Barth, Caprio, and Levine (1999) show that the banking system is more fragile in countries where banking activities are more restricted. However, some observers, perhaps most visibly the former chairman of the Federal Reserve System Paul Volcker, have blamed the difficulties of banks during the

crisis on the activities of banks outside of the traditional banking activities of making loans and taking deposits. Indeed, we find that large banks in countries where bank activities were more restricted suffered less from the crisis. Yet, consistently with the evidence of Barth, Caprio, and Levine (1999), we find that the distance-to-default of banks is lower (so that their risk of default is higher) in countries with more restrictions on bank activities and the idiosyncratic volatility of a bank's stock returns is positively correlated with the index of restrictions of bank activities. Hence, restrictions on bank activities did not make banks less risky before the crisis using common measures of risk. Most likely, therefore, the restrictions on bank activities are associated with better performance of banks during the crisis because traditional bank activities were less exposed to the risks that turned out poorly during the crisis than were newer or less traditional bank activities. Strikingly, the other indices are uncorrelated with measures of bank risk computed before the crisis.

We also estimate regressions for banks in foreign countries only. With these regressions, we can evaluate whether banks from countries where the banking system was more exposed to the U.S. according to the Bank for International Settlements (BIS) statistics performed worse. These regressions allow us to assess whether holding U.S. exposures was a contagion channel (see, e.g., Eichengreen, Mody, Nedeljkovic, and Sarno (2009) for the view that assets were a contagion channel). Ideally, we would like to have data on so-called "toxic assets", but such data is not available globally. We find, however, that banks from countries where the banking system was more exposed to the U.S. performed worse. To investigate the role of global imbalances that some consider to be at the origin of the crisis (see, for instance, Economic Report of the President (2008)), we investigate whether banks in countries that were importers of capital performed worse. We find that banks in countries with a larger current account performed better.

A striking result is that the large banks that performed poorly during the crisis are banks that had high stock returns in 2006. This result holds even though we control for a bank's beta. It suggests that the banks that suffered the most from the crisis appeared to have policies that the market favored before the crisis.

Our study is limited by the data available. Ideally, we would like to have data on the nature of holdings of securities by banks. However, such data is generally not available. Another limitation of our study is that, in the fall of 2008, countries stepped in with capital injections and other forms of support of banks. Such intervention might have distorted returns. Yet, our results generally hold for returns measured from mid-2007 to just before the Lehman bankruptcy.

For governance studies, there is always considerable concern about endogeneity. Our study is not a governance study in the usual sense. We are concerned about the characteristics of banks that performed poorly and whether these characteristics are consistent with theories of why the crisis proceeded as it did. Our finding that banks with more shareholder-friendly boards performed worse is not evidence that boards should not be shareholder friendly. Rather, it shows that the exposures that such banks took on worked out poorly. These exposures might have been the right ones for the banks to take to maximize shareholder wealth, but a necessary corollary of risk-taking is that sometimes the risks taken lead to losses. Though the bank characteristics we investigate could be correlated with other variables that we do not account for, all these characteristics have theoretical motivations and we provide ancillary evidence supportive of our interpretations. At the very least, our results challenge those who favor the argument that poor governance at banks worsened the crisis by showing that banks with what is traditionally considered good governance, namely a shareholder-friendly board, performed worse during the crisis.

The paper proceeds as follows. In Section 2, we introduce the data that we use. In Section 3, we examine how the performance of banks during the crisis relates to governance, regulation, balance sheet composition, and country characteristics other than regulation. We also show how these attributes are related to bank risk before the crisis. We conclude in Section 4.

2. Data

To select the sample, we start from the financial institutions in Bankscope with assets in excess of \$10 billion at the end of 2006. There are 1,648 financial institutions in Bankscope that satisfy this criterion. We exclude financial institutions that are not publicly traded, that disappear before the middle

of 2007, and a few institutions for which the data appear inaccurate. We then require that a financial institution is a deposit-taking bank. For a financial institution to be in the sample as a deposit-taking bank, we require a deposit/asset ratio above 20% and a loan/asset ratio above 10%. With these restrictions, our dataset has 439 banks. Our dataset does not include U.S. investment banks. In this sample, there are 164 banks in 31 countries with total assets in excess of \$50 billion as of December 2006. The countries in which these banks are located have 386 banks with assets in excess of \$10 billion. Most of our analysis focuses on the sample of 165 large banks. We also discuss results for the sample of 386 banks in countries with large banks. These samples are based on information available at the end of 2006, so that they include banks that failed during the crisis.

Table 1 reports the list of countries that have at least one large bank. Japan has the largest number of banks in the sample, followed by the U.S. Several countries have only one large bank. In the remainder of this section, we describe the data as well as the performance measures that we use. Univariate statistics for the data discussed in this section are reported in Tables 1 and 2. Table 1 reports country characteristics. Table 2 reports data at the bank level. We winsorize the bank-level explanatory variables at the 1% and 99% level and report the data for the large banks only.

2.a. Bank returns

Our bank performance measure is buy-and-hold dollar stock returns. Our main focus is on returns from the middle of 2007 to the end of 2008. We call this period the crisis period. The start of the period seems uncontroversial. Banks performed poorly during the first quarter of 2009 as well, but one could argue that the returns of banks during that period were heavily influenced by uncertainty about resolution mechanisms and the possibility of nationalization. Not surprisingly, the average buy-and-hold dollar return in our sample is extremely poor at -34.49% for large banks. The standard deviation of these returns, 38.07%, is surprisingly high. These returns contrast sharply with the average return in 2006 of 32.55%.

2.b. Bank balance sheet and income characteristics

We investigate the hypothesis that characteristics of bank balance sheets and income statements before the start of the crisis help explain the performance of banks during the crisis. We obtain these data from Bankscope for 2006. Our choice of variables is largely dictated by data availability. For instance, it would be useful to have measures of the exposure of banks to subprime loans, but such data is not available from Bankscope – or, for that matter, any public source.

We use two different variables to capture the capital ratios of banks:

- a. Tier 1, defined as the ratio of tier 1 capital to total risk-weighted assets;
- b. Tangible equity, defined as the ratio of tangible equity to total liabilities. When we do not have data for intangible assets, we use total equity in the numerator.

The first measure is a regulatory capital ratio whereas the other is a ratio that capital markets focus on (see the arguments in Acharya, Gujral, and Shin (2009)). The average Tier 1 capital is 8.80% of risk-weighted assets in our sample, which is more than twice the Basel I requirement. While the lowest value of the Tier 1 ratio exceeds the Basel I requirement, it is noteworthy that the tangible equity ratio has a much lower minimum of 1.24%. Everything else equal, we would expect banks' performance during the crisis to be positively related to capital ratios before the crisis since a bank with more capital would suffer less from the debt overhang problem (Myers (1977)) and would have more flexibility to respond to adverse shocks. To capture the composition of the liabilities we use Deposit, which is defined as the ratio of deposits to assets. Deposit financing is not subject to runs with deposit insurance, but money market funding is subject to runs as discussed in Gorton (2010). We would therefore expect that banks with more deposit financing would have performed better. The range of Deposit is quite wide, as the lowest value is 25.18% and the highest is 91.23%.

We use several variables to characterize the asset side of the banks. First, we use Loans defined as the ratio of loans to total assets. Banks where Loans is higher would be banks with a smaller portfolio of securities. If banks that held fewer loans had more credit-risky securities, we would expect these banks to have performed worse because of the increase in credit spreads that took place during the crisis. However,

we do not have data on the holdings of securities, and banks that held government securities instead of loans would presumably have fared better. Therefore, we have no prediction for the relation between loans and performance. The range of Loans is similar to the range of Deposit. We also use Liquidity which we define as the ratio of liquid assets to total assets. Everything else equal, we would expect banks with more liquid assets to be in a better position to reduce their balance sheet and to cope with financing difficulties. Banks with more diversified activities derive less of their income from interest income. We use non-interest income as a fraction of total income and the measure of income diversity of Leaven and Levine (2009), defined as the absolute value of the difference between net interest income and other operating income divided by total operating income, as measures of the extent to which a bank's activities are diversified away from the traditional banking loan business. The range of non-interest income is extremely wide as the lowest value is 2.57% and the higher is 85.58%.

We use three measures of a bank's risk in 2006, namely its idiosyncratic volatility, beta, and a measure of distance to default. To estimate the idiosyncratic volatility and beta, we estimate a market model weekly from 2004 to 2006. The market portfolio is the MSCI World Index and the risk-free rate is the three-month T-bill rate. The distance-to-default is introduced by Leaven and Levine (2009) and is measured as the ratio of the return on assets plus the capital-asset ratio divided by the standard deviation of the return on assets. A higher distance-to-default means that a larger negative return is required to render the bank insolvent.

The last variable we consider is an indicator for state ownership, State. This variable takes value one if the state owns more than 10% of a bank. 6% of the banks in our sample have that level of state ownership.

2.c. Regulation

The regulation hypothesis for the performance of banks during the crisis is that lax regulation led banks to take risks that they would not have taken with tighter regulation. With this hypothesis, we would expect stricter regulation to be associated with better bank performance during the crisis. To test this

hypothesis, we use the data from the third survey of bank regulations conducted by the World Bank and discussed in Barth, Caprio, and Levine (2008). The survey results were made available in the summer of 2007. The survey consists of questions sent to regulators. Most questions are yes or no questions. The third survey had more than 300 questions and had responses from 142 countries. The indices we use are as follows:

- a) Official, an index of the power of the commercial bank supervisory agency, including elements like the rights of the supervisor to meet with and demand information from auditors, to force a bank to change the internal organizational structure, to supersede the rights of shareholders, and to intervene in a bank;
- b) Capital, an index of regulatory oversight of bank capital, including indicators for whether the sources of funds that count as regulatory capital can include assets other than cash and government securities, and whether authorities verify the source of capital;
- c) Restrict, an index of regulatory restrictions on the activities of banks, consisting, for example, of limitations in the ability of banks to engage in securities market activities, insurance activities, real estate activities, and to own nonfinancial firms;
- d) Private monitoring, an index that measures the degree to which regulations empower, facilitate, and encourage the private sector to monitor banks.

Table 1 shows the value of the regulation variables for the different countries in our sample. Except for private monitoring, the regulation indices vary widely across countries. It is important to note that the regulation variables concern depository banks. They do not capture, for instance, the regulatory status of U.S. investment banks – which are not in our sample. These regulatory variables do not capture either the stance of regulators. A country’s regulations might give a lot of flexibility to banks, but regulators might prevent banks from using that flexibility.

2.d. Bank-level governance

The governance hypothesis predicts that banks with better governance should have had higher returns during the crisis. Better governance could have acted through two channels. Many observers have argued

that traders and executives of banks had incentives to take risks that were not in the best interests of shareholders (see, for instance, Diamond and Rajan (2009)). If these observers are right, we would expect banks with better governance to have set incentives and controls to avoid taking risks that did not benefit shareholders. Hence, these banks should have performed better during the crisis if the risks that worked out poorly during the crisis were not in the interests of shareholders. Though this type of argument has been advanced by many observers, it is worthwhile to note that it does not follow from finance theory that poor governance necessarily leads to more risk-taking. Following Merton (1977), there is a considerable literature making the case that greater risk-taking can be in the interests of shareholders in the presence of deposit insurance.¹ Further, there is empirical evidence showing that poor governance can lead executives to take fewer risks to protect their private benefits from control (see, for instance, John, Litov and Yeung (2008)). These papers would predict that banks with better governance would take more risks, which would have led to poor performance during the crisis if the risks taken before the crisis had unexpected bad outcomes. The second channel through which governance could have affected performance is that once the crisis affected banks adversely, banks with better governance might have been better at coping with the crisis effectively because of better decisions (see Graham and Narasimhan (2004) for a similar perspective on how firms weathered the Great Depression). With this channel, banks with better governance might have made wiser decisions during the crisis and hence they would have had better returns.

Recent cross-country research emphasizes the importance of the nature of ownership for bank performance and risk-taking. Most relevant for our study, Laeven and Levine (2008) consider the potential conflicts between managers and owners and analyze the relations between the risk taking of banks, their ownership structures, and bank regulations. They find that bank risk is generally higher in banks that have controlling shareholders with large stakes. However, they show that this effect is mitigated by the presence of strong shareholder protection laws. They conclude further that the impact of regulation on bank risk depends on whether the bank has a large controlling shareholder. Specifically,

¹ For an analysis of the moral hazard of deposit insurance under current U.S. rules, see Pennacchi (2009).

stricter regulation decreases bank risk when a bank is widely held but increases it when it has a large controlling shareholder.

To proxy for the nature of ownership, we create an indicator variable which takes value one if there is no shareholder who controls directly or indirectly more than 10% of the shares. To construct this indicator variable, we use data from Bankscope and data from company annual reports and/or proxy statements. We call this indicator variable Ownership. Forty-four percent of the banks are widely-held in our sample.

We also use Riskmetrics data to construct an index for whether the board is shareholder-friendly in 2006. The advantage of this index is that it is computed consistently across countries. Board attributes collected by Riskmetrics attempt to capture aspects of the functioning of the board of directors that relate to board independence, composition of committees, size, transparency, and how work is conducted. A firm has a specific board attribute if that attribute meets a minimum standard of good governance as defined by Riskmetrics. We add the attributes to form the index. The index is higher for more independent boards and is lower for staggered boards. This index has been used in the literature (see, for instance, Aggarwal, Erel, Stulz, and Williamson (2009)).

Though governance indices are widely used in empirical research, such use has both strengths and weaknesses. In particular, theoretical work shows that a governance attribute can be valuable for one firm but can destroy wealth in another firm, so that on theoretical grounds there is no necessary relation between such an attribute and firm value.² The literature has also questioned whether governance indices measure the right governance attributes (see, for instance, Bhagat, Bolton, and Romano (2008)). A further difficulty is that, as noted by Adams and Mehran (2003) for the U.S., regulation typically affects governance more for financial institutions than it does for other firms. In this paper, our ambition in using the board index is limited. The index evaluates boards according to criteria that are considered to be important by governance observers in the U.S. and we investigate whether these attributes are related to bank performance during the crisis. As can be seen in Table 2, there is a wide range of values for the

² See, for instance, Coles, Naveen, and Naveen (2008).

board index. The range is narrower within countries. However, it is interesting to note that there is substantial variation in the board index within the U.S. as well. The standard deviation of the index within the U.S. for the banks in our sample is roughly half its standard deviation across all banks.

2.e. Country-level governance and macroeconomic variables

There is now considerable evidence showing that country-level governance variables are important determinants of firm policies and valuations as well as of financial development. Empirical work shows that risk-taking is affected by shareholder rights as well as by a country's institutions, such as the institutions protecting property rights (see, for instance, John, Litov, and Yeung (2008)). At the level of a bank, we would expect that banks in countries with better institutions would be more likely to take decisions that maximize shareholder wealth. If bank executives took bad risks because they were not sufficiently focused on the interests of shareholders, we would expect banks to perform better during the crisis in countries with more protection of shareholder rights and stronger institutions. However, private benefits of control are higher in countries with poor shareholder rights and poor institutions. It could be that executives took fewer risks in such countries to protect their own interests. Hence, banks from these countries could perform better because executives paid less attention to maximizing shareholder wealth. As proxies for country-level governance, we use the country-level indicators of Kaufman, Kray, and Mastruzzi (2008). These indicators are obtained from combining several hundred individual variables measuring political stability, government effectiveness, regulatory quality, enforcement of the rule of law, corruption, and the extent to which a country's citizens are able to participate in selecting their government. We follow Kaufman et al. (1999) and consider the mean of the six variables for each country. We call this index Institution and a higher value of the index indicates better institutions. We measure shareholder protection using Anti-director, which is the anti-director index of La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) as revised in Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008). Anti-director index takes values from 0 to 5. A higher value means better shareholder rights. Our sample's

lowest value is 2. The country governance indices are shown for each country in Table 1, and Table 2 provides summary statistics for these indices.

The last three variables we report in Table 2 are a country's log GDP per capita, its current account balance to GDP, and, finally, the concentration of the banking sector measured as the ratio of the assets of the three largest banks divided by the total assets of the banking sector. We also show these variables for each country in Table 1. All three variables exhibit a fairly wide range. Some have argued that decreasing franchise value for banks forces them to take on more risk (e.g., Gorton and Rosen (1995)). We use concentration as a proxy for the value of bank franchises since a more concentrated banking system enables banks to earn monopoly rents.

3. Determinants of bank performance during the crisis

In this section, we first compare the characteristics of the banks that had the worst return performance (bottom quartile) and those that had the best return performance (top quartile) during the crisis. We then estimate multiple regressions to investigate the determinants of performance.

3.a. Characteristics of worst and best performing banks

Table 3 divides the sample into the top and bottom quartiles of return performance from the middle of 2007 to the end of 2008. By construction, the difference in average returns between these two groups is extremely large. The bottom-performing quartile banks had an average return over that period of -85.23%; in contrast, the top-performing banks had an average return of -14.57%. Strikingly, however, the banks that performed poorly during the crisis had extremely high returns in 2006 as their average return was 38.71%. In contrast, the banks that performed better during the crisis had a lower average return of 24.93% in 2006.

We see that the best-performing banks had significantly more equity and hence lower leverage at the end of 2006. The better-performing banks are more traditional banks. There is an extremely large difference in the ratio of deposits to assets between the best-performing and the worst-performing banks.

At the end of 2006, the average deposits to assets ratio was 69.66% for the best-performing banks and 50.15% for the worst-performing ones. Neither the ratio of loans to assets nor the ratio of liquid assets to total assets was significantly different between the two groups of banks. The worst-performing banks were significantly more diversified than the better-performing banks. Surprisingly, the worst-performing banks had less ex ante risk using the distance to default measure and using idiosyncratic volatility.

Strikingly, the better-performing banks come from significantly more tightly regulated countries, i.e., from countries with more powerful supervisors, more restrictions on what counts as capital, more restrictions on banking activities, and more private monitoring. Banks that performed better also come from countries with worse governance. The anti-director index does not differ between the best-performing banks and the worst-performing banks. The worst-performing banks are more likely to have diffuse ownership and have a significantly more shareholder-friendly board.

Finally, the worst-performing banks come from countries with higher GDP per capita, with a lower current account, and with higher bank concentration. The result for the current account is consistent with the view that sharp inflows of capital (the other side of the coin from a current account deficit) led to a worse credit boom. The result for bank concentration suggests that decreases in franchise value because of higher competition may not have been a factor. However, bank concentration does not measure competition to banks from financial institutions outside the banking sector.

3.b. Multiple regressions

The comparisons made in section 3.a. show that the banks that performed the worst during the crisis had on average, in 2006, better returns, more leverage, less deposits, lower ex ante risk, more shareholder-friendly boards, and came from countries with less strict regulation. The problem with these comparisons is that many of these bank characteristics are correlated. Further, they might be correlated with unobserved country characteristics. In this section, we therefore estimate multiple regressions to evaluate the relation between bank characteristics and bank performance. In some of these regressions, we control for country fixed effects. We cannot control for country fixed effects in all regressions because of

multicollinearity when we use our regulatory and macroeconomic variables. We therefore estimate regressions without the regulatory variables but with country fixed effects and regressions with regulatory and macroeconomic variables but without country fixed effects. In estimating the significance of the regression coefficients, we allow for clustering at the country level.

Regression (1) of Table 4 estimates the relation between bank performance and bank characteristics using country fixed effects for the sample of large banks. We do not report the estimates of the country fixed effects. The Tier 1 ratio has a positive significant coefficient. The deposit ratio does as well. To judge the economic significance of these coefficients, a one standard deviation increase in the Tier 1 ratio is associated with an increase in return of 12.98 percentage points and a one standard deviation increase in the deposit ratio is associated with an increase in return of 11.66 percentage points. Both effects are economically significant. Perhaps not surprisingly in light of Table 2, banks that performed better in 2006 have substantially worse returns during the crisis. Loans, non-interest income, the distance to default, the ownership variable, and the indicator variable for state ownership are not significant. Beta has a significant negative coefficient. Regression (2) has the same dependent and independent variables but a larger sample which includes smaller banks than regression (1). Tier 1 is no longer significant and Loans has a negative significant coefficient. Otherwise, the results are similar. Regression (3) is the same regression, except that we now add the board index. With the requirement of having data for the board index, our sample of large banks falls to 97. Board has a negative significant coefficient. A one standard deviation increase in the board index is associated with a decrease in return of 10.31 percentage points. With this regression, State now has a positive significant coefficient. The coefficients on the other variables are not affected if we remove State.

We now turn to the regressions that use the regulatory variables. In regression (4) we replace the country fixed effects with country-level variables that include the regulatory variables, the ratio between current account and GDP and the log of GDP per capita. The regression omits the distance to default and non-interest income since these variables were not significant (and are not if they are included). We find that the coefficient on restrictions of bank activities is positive and significant. A one standard deviation

increase in the index corresponds to an increase in return of 5.30 percentage points. None of the other regulatory variables are significant. Regression (5) is the same regression, but now the sample includes all banks with assets in excess of \$10 billion. The key difference is that in Regression (5) the regulatory variables are not significant, suggesting that the constraints placed by regulation were less relevant for smaller banks.

The bank characteristics could be viewed as depending on the regulatory variables and other country characteristics. Consequently, regressions that have both bank characteristics and regulatory variables could underestimate the relation between performance and regulation. To investigate this possibility, we also estimate regressions of bank performance on country variables only. Regression (6) in Table 4 shows the estimates for such a regression using the sample of large banks. The sample is larger because we require no information about banks except for their performance during the crisis. We find that the performance of banks is positively related to Restrict, negatively related to GDP per capita, and, finally, positively related to the current account. The economic significance of the coefficient on Restrict is roughly similar to what it is in regressions with bank characteristics. The other regulatory variables are not significant. The estimates of this regression are therefore consistent with the estimates of Regression (4). It is useful to note that the highest correlation coefficient among the regulatory variables is only 0.247 for the correlation coefficient between the index of the power of supervisors and the index of restrictions on bank activities, so that the information conveyed by the various indices differs.

In Regression (7) of Table 4 we re-estimate Regression (1) of Table 4 replacing the non-interest income with the income diversity index and adding an indicator variable for banks that have exposure to one or several structured investment vehicles (SIVs). We use the list of such banks given in Acharya and Schnabl (2009). Following Acharya and Schnabl (2009), we would expect banks with exposure to SIVs to be banks that more aggressively engaged in regulatory arbitrage. The coefficient on the SIV indicator variable, SIV, is not significant. In other words, given the other bank characteristics in our regressions, the banks with SIV exposure did not perform worse than other banks. This result is surprising given the

attention paid to SIVs early in the crisis and the concerns arising from the SIV assets brought back by banks on their balance sheet. The coefficient on the income diversity index is not significant either.

Regressions (8) and (9) of Table 4 use only non-U.S. banks. In these regressions, we add country characteristics. In addition to log of GDP per capita, we add the current account to GDP ratio, Institution, the anti-director index, and the measure of exposure of the banking system to the U.S. We find that the current account has a positive significant coefficient and the exposure measure has a negative significant coefficient in Regression (8), which uses the sample of large banks. The same variables are significant in Regression (9) that uses the sample of all banks. Strikingly, the measure of income diversity has a negative significant coefficient in that regression, but deposits no longer has a significant coefficient. Institution has a significant positive coefficient. The current account has a positive significant coefficient, so that banks in countries with a current account surplus performed better. Finally, banks from countries with greater banking exposure to the U.S. performed significantly worse.

3.c. Risk and bank characteristics

To better understand the role of the governance and regulatory variables, we estimate (but do not tabulate) regressions using information available from Bloomberg on write-downs for 65 banks in our sample from 17 countries. Because of the small sample, the information from these regressions is limited, but it is nevertheless interesting. We regress the ratio of writedowns to assets on the board index, Tier 1 capital ratio, the log of assets, the ratio of deposits to assets, the index of the power of the supervisor, the index of capital supervision, and the index on restrictions on bank activities. We find that the writedown ratio is positively related to the board index, to the index of restrictions on bank activities, and to the index of the power of supervisors. The index is negatively related to the log of assets and to the deposit ratio. Neither the Tier 1 capital ratio nor the index of capital supervision are significant. This regression supports our interpretation that banks with a more shareholder-friendly board took more risks that worked out poorly and that banks with more deposits fared better during the crisis. The positive significant coefficients on the regulatory indices are unexpected. They raise the question of whether banks more

strongly regulated were forced to take writedowns more aggressively than banks that were more weakly regulated. If this were the case, we would expect banks to raise funds more aggressively. Using data for capital raisings by banks from Bloomberg, we find that banks from countries with more powerful supervisors raised capital more aggressively. However, banks from countries with more restrictions on bank activities did not raise more funds relative to their write-downs. Consequently, these banks may have been riskier.

To investigate whether regulation reduces the risk of banks ahead of the crisis, we investigate how the risk of banks in 2006 is related to bank and country characteristics. In particular, we would like to understand how governance and regulation affected bank risk-taking as it could be observed through the leverage choice, distance-to-default, and idiosyncratic volatility.

In Table 5, we first estimate similar regressions to those of Table 4 using idiosyncratic volatility as the dependent variable. Regression (1) uses the sample of large banks. This regression has bank characteristics and country fixed effects. Banks with more non-interest income have higher idiosyncratic risk and banks with dispersed ownership have lower idiosyncratic risk. No other variable is significant. In Regression (2), we also include as a regressor the board index. No variable is significant. Finally, Regression (3) uses the regulatory variables, the current account, and the log of GDP per capita instead of country fixed effects. The log of assets, Tier 1 capital, and the log of GDP per capita all have negative significant coefficients, but no regulatory variable has a significant coefficient.

Regressions (4) to (6) use the distance to default as the dependent variable. Not surprisingly, banks with more non-interest income have a lower distance to default and banks with diffuse ownership have a greater distance to default. In addition, banks with a more shareholder-friendly board have a lower distance to default. Again, no regulatory variable is significant.

The last three regressions in the table, regressions (7) to (9), use tangible equity as the dependent variable. Again, no regulatory variable is significant. This is so even though the index of the power of the supervisors and the index of bank restrictions have high positive correlation coefficients with tangible equity (the coefficients are respectively 0.33 and 0.30).

We also estimated regressions with risk measures as dependent variables and only regulatory indices and GDP per capita as independent variables (not tabulated). With these regressions, the only regulatory variable that is significant is the index of power of supervisors in the regression for tangible equity. The coefficient on the index has a positive coefficient and a p-value of 0.096. It follows that the lack of significance of the regulatory indices in the risk regressions is not explained by the fact that bank characteristics are affected by regulations.

3.d. Alternative specifications

In addition to the regressions discussed in Section 3.b., we investigated the robustness of our results using other specifications and other data. Given the importance of the U.S. and Japan in the dataset, we estimated our regressions omitting each of these countries, one at a time. Most of our results are unaffected when we do so. However, the board index is only marginally significant when excluding U.S. banks in some specifications, the index of restrictions on bank activities is only marginally significant in some specifications, and the ownership variable attracts a significantly negative coefficient when estimating the specification of regression (4) of Table 4.

The regressions in Table 4 do not include the country's market return as an explanatory variable. The rationale for this is that the market return depends on the performance of the banking sector during the crisis. Nevertheless, we checked to see whether our inferences were altered by the inclusion of the market index as an explanatory variable to address the concern that the market index might be an omitted variable whose omission biases the estimates of the coefficients on the country-specific independent variables. We find that our conclusions are unchanged.

We estimated the regressions of Table 4 using different variables. In particular, we used the index for bank concentration. It was never significant. We also used the liquidity ratio. It was not significant either, but it was highly correlated with some other bank characteristics we use. We replaced the distance to default with the idiosyncratic volatility. The idiosyncratic volatility is generally not significant. We substituted the tangible equity ratio for the Tier 1 ratio. This ratio is generally significant and its inclusion

does not affect our conclusions. We also estimated the regressions using additional governance variables that are available from Riskmetrics concerning the ease with which a bank can be taken over, whether audit procedures are shareholder friendly, and whether compensation schemes are shareholder friendly. These variables were not significant. Finally, we used the insider ownership variable from Worldscope instead of the controlling ownership variable. Our results are unchanged using that variable. We also investigated interactions of the regulatory variables with bank characteristics and the ownership indicator variables as in Levine and Laeven (2009). This investigation was not successful because of multicollinearity between the non-interacted variables and the interacted variables.

Government interventions took place in the last quarter of our crisis sample period. To investigate whether they affect our inferences, we re-estimate our regressions using returns computed with an end date just prior to the bankruptcy of Lehman Brothers. We find that the estimates of the coefficients on our bank characteristics are not substantially affected. However, the index of restrictions on banking activities is not significant over that period.

4. Conclusion.

In this paper, we investigate the determinants of large bank stock return performance across the world during the period from the beginning of July 2007 to the end of December 2008. This period corresponds to the greatest destruction of bank wealth since the Great Depression. We find that large banks with more shareholder-friendly boards performed worse during that period. In contrast, large banks with more Tier 1 capital, more deposits, and more loans performed better. Banks from countries with more restrictions on bank activities had higher returns as well.

Overall, our evidence shows that bank governance, regulation, and balance sheets before the crisis are all helpful in understanding bank performance during the crisis. Analyses of the crisis that emphasize the fragility of banks financed with short-term funds raised in the money markets are strongly supported by our empirical work, as are analyses that emphasize the role of bank capital. Banks from countries with current account surpluses fared significantly better during the crisis, while banks from countries with

banking systems more exposed to the U.S. fared worse. These latter results show that macroeconomic imbalances and the traditional asset contagion channel are related to bank performance during the crisis.

We find no support for analyses that attribute an important role to governance in the crisis since banks with more shareholder-friendly boards, which are banks that conventional wisdom would have considered to be better governed, fared worse during the crisis. Either conventional wisdom is wrong, as suggested by Adams (2009), or this evidence is consistent with the view that banks that took more risks rewarded by the market – perhaps because the market did not assess them correctly *ex ante* – before the crisis suffered more during the crisis when these risks led to unexpectedly large losses. Strong evidence supportive of the latter interpretation is that the performance of large banks during the crisis is negatively related to their performance in 2006. In other words, the banks that the market rewarded with large stock returns in 2006 are the banks whose stock suffered the largest losses during the crisis.

The results for the role of regulation are at best mixed. Except for the index on bank restrictions, regulation indices are not related to bank performance. Banks from countries with more restrictions on bank activities performed better, but banks in these countries were not less risky before the crisis when risk is measured using the distance to default, idiosyncratic volatility, and leverage. Hence, restrictions on banking activity did not result in banks taking less observable risks, but may have prevented banks from being active in lines of business that performed poorly during the crisis. Further research should attempt to construct indices that reflect the stance of the regulators. The regulatory indices are measures of formal rights and duties of regulators and banks, but activist regulators may have affected risk-taking by banks quite differently from passive regulators even when these different regulators had the same rights.

References

- Acharya, Viral V., Irvind Gujral, and Hyun Song Shin, Dividends and bank capital in the financial crisis of 2007-2009, unpublished working paper, New York University, New York, NY.
- Acharya, Viral V., and Philipp Schnabl, 2009, Securitization without risk transfer, unpublished working paper, New York University, New York, NY.
- Aggarwal, R., Isil Erel, René M. Stulz, and Rohan Williamson, 2009, Do U.S. firms have the best corporate governance? A cross-country examination of the relation between corporate governance and shareholder wealth, *Review of Financial Studies*, forthcoming.
- Adams, Renée, 2009, Governance and the financial crisis, unpublished paper, University of Queensland, Brisbane, Australia.
- Adams, Renée, and Hamid Mehran, 2003, Is corporate governance different for bank holding companies, *Economic Policy Review* 9, 123-142.
- Adrian, Tobias, and Hyun Shin, 2008, Liquidity and leverage, *Journal of Financial Intermediation*, forthcoming.
- Bhagat, Sanjai, Brian Bolton, and Roberta Romano, 2008, The promise and peril of corporate governance indices, *Columbia Law Review* 108, 1803-1882.
- Barth, James R., Gerard Caprio, Jr., and Ross Levine, 1999, Banking systems around the globe: Do regulation and ownership affect performance and stability?, unpublished working paper, World Bank, Washington, D.C.
- Barth, James R., Gerard Caprio, Jr., and Ross Levine, 2004, Bank regulation and supervision: What works best?, *Journal of Financial Intermediation* 13, 205-248.
- Barth, James R., Gerard Caprio, Jr., and Ross Levine, 2008, Banking regulations are changing: For better or worse?, *Comparative Economic Studies* 50, 537-563.
- Bekaert, Geert, Campbell Harvey, and Angela Ng, 2005, Market integration and contagion, *The Journal of Business* 78, 39-69.
- Brunnermeier, Markus K., 2009, Deciphering the liquidity and credit crunch 2007-2008, *Journal of Economic Perspectives* 23, 77-100.
- Caprio, Gerard, Luc Laeven and Ross Levine, 2007, Governance and bank valuation, *Journal of Financial Intermediation* 16, 584-617.
- Coles, Jeffrey L., Daniel D. Naveen, and Lalitah Naveen, 2008, Boards: Does one size fit all, *Journal of Financial Economics* 87, 329-356.
- Diamond, Douglas W., and Raghuram G. Rajan, 2009, The credit crisis: Conjectures about causes and remedies, *American Economic Review* 99, 606-610.
- Djankov, S., R. La Porta, F. Lopez-de-Silanes, and A. Shleifer, 2008, The law and economics of self-dealing, *Journal of Financial Economics* 88, 430-465.

- Doidge, Craig, C. Andrew Karolyi and René M. Stulz, 2007, Why do countries matter so much for corporate governance?, *Journal of Financial Economics* 86, 1-39.
- Dooley Michael P., David Folkerts-Landau, and Peter M. Garber, 2009, Bretton Woods II still defines the international monetary system, unpublished working paper, National Bureau of Economic Research, Cambridge, MA.
- Eichengreen, Barry, Ashoka Mody, Milan Nedeljkovic, and Lucio Sarno, 2009, How the subprime crisis went global: Evidence from bank credit default swap spreads, unpublished working paper, National Bureau of Economic Research, Cambridge, MA.
- Gorton, Gary, 2010, *Slapped by the invisible hand*, Oxford University Press, Oxford, England.
- Gorton, Gary and Richard Rosen, 1995, Corporate control, portfolio choice, and the decline of banking, *Journal of Finance* 50, 1377-1420.
- Graham, John, and Krishnamoorthy, Narasimhan, 2004, Corporate survival and managerial experiences during the Great Depression, unpublished working paper, Duke University, Durham, North Carolina.
- John, Kose, Lubomir Litov and Bernard Yeung, 2008, Corporate governance and risk-taking, *Journal of Finance* 63, 1679-1728.
- Kaufman, Daniel, Kraay, Aart, and Massimo Mastruzzi, 2008, Governance matters VII: Aggregate and individual governance indicators, 1996-2007, unpublished working paper, World Bank, Washington, D.C.
- Kirkpatrick, Grant, 2008, The corporate governance lessons from the financial crisis, report, OECD, Paris, France.
- La Porta, Rafael, Florencio Lopez-De-Silanes and Andrei Shleifer, 1999, Corporate ownership around the world, *Journal of Finance* 54, 471-517.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. Vishny, 1998, Law and finance, *Journal of Political Economy* 106, 1113-1155.
- Laeven, Luc, and Ross Levine, 2008, Bank governance, regulation, and risk taking, *Journal of Financial Economics*, forthcoming.
- Merton, Robert C., 1977, An analytic derivation of the cost of deposit insurance and loan guarantees: An application of modern option pricing theory, *Journal of Banking and Finance* 1, 3-11.
- Myers, Stewart C., 1977, Determinants of corporate borrowing, *Journal of Financial Economics* 5, 147-175.
- Pennacchi, George G., 2009, Deposit insurance, working paper, University of Illinois, Champaign, Ill.

Stiglitz, Joseph E., 2010, *Freefall: America, free markets, and the sinking of the world economy*, W.W. Norton & Company, Inc. New York, NY.

Taylor, 2009, *The financial crisis and the policy responses: An analysis of what went wrong*, unpublished working paper, Stanford University, Palo Alto, CA.

Table 1. Country characteristics. The sample is composed of banks in 31 countries that had at least one bank with assets larger than \$50bn as of December 2006. We distinguish between banks and large banks. Banks (whose number in each country is reported in the second column) have loan/assets larger than 10% and deposit/assets larger than 20%. Large banks (whose number is in the third column) have total assets larger than \$50bn as of December 2006. Country characteristics are computed in 2006, prior to the beginning of the financial crisis. Log GDP is the log of real GDP per capita in dollars for 2006, Current account is the ratio between the current account deficit and GDP for 2006, Concentration is the ratio between the assets of the three largest banks in each country and total assets of the national banking system in 2006. ADRI is the anti-director index of LLSV (1998) as revised in Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008). The variable Institution is the simple average of six indicators reported by Kaufmann, Kraay and Mastruzzi (2008) called voice, political stability, government effectiveness, regulatory quality, rule of law, corruption. The regulation variables come from Caprio, Laeven and Levine (2007) using data in the 2007 database (revised in June 2008) downloaded from the World Bank (<http://econ.worldbank.org>). Official is an index of the power of the commercial bank supervisory agency, Capital is an index of regulatory oversight of bank capital, Restrict is an index of regulatory restrictions on the activities of banks, and Private Monitoring is an index of monitoring on the part of the private sector.

Country	Number of banks	Number of large banks	Log gdp	Current account	Concentration	ADRI	Institution	Official	Capital	Restrict	Private Monitoring
Australia	8	5	10.50	-5.32	0.62	4	1.60	13	4	10	7
Austria	6	4	10.57	2.83	0.61	2.5	1.59	10	5	7	4
Belgium	3	3	10.54	2.65	0.81	3	1.36	11	3	7	6
Brazil	7	4	8.68	1.25	0.54	5	-0.08	14	5	9	7
Canada	8	6	10.58	1.40	0.56	4	1.64	6	4	8	6
China	11	10	7.61	9.53	0.59	1	-0.56	10	4	15	7
Denmark	4	1	10.83	2.89	0.78	4	1.83	10	5	9	7
Germany	13	11	10.48	6.13	0.68	3.5	1.51	8	7	7	7
France	16	5	10.52	-0.51	0.62	3.5	1.18	8	8	9	7
Great Britain	11	9	10.60	-3.31	0.50	5	1.56	8	6	4	7
Greece	9	3	10.09	-11.10	0.67	2	0.66	10	4	8	7
Hong Kong	9	2	10.22	12.08	0.68	5	1.45	11	4	5	7
India	19	2	6.63	-1.06	0.33	5	-0.15	10	8	11	6
Ireland	5	5	10.87	-3.57	0.53	5	1.56	12	2	7	7
Israel	5	2	9.97	5.04	0.77	4	0.59	10	4	12	7
Italy	16	8	10.37	-2.59	0.32	2	0.59	7	4	12	7
Japan	81	22	10.44	3.91	0.39	4.5	1.24	12	6	11	8
Korea	5	4	9.89	0.57	0.51	4.5	0.63	11	4	9	8
Malaysia	10	1	8.69	16.01	0.46	5	0.36	13	6	11	7
Netherlands	4	3	10.63	9.33	0.78	2.5	1.63	7	5	6	8
Norway	3	1	11.19	17.23	0.95	3.5	1.72	8	8	11	6
Portugal	4	2	9.82	-10.03	0.88	2.5	1.01	14	8	12	6
Russia	4	1	8.84	9.54	0.19	4	-0.76	8	7	8	6
Singapore	3	3	10.36	25.42	0.86	5	1.48	13	7	10	8
South Africa	6	5	8.60	-6.31	0.75	5	0.48	10	9	10	8
Spain	10	6	10.24	-8.97	0.63	5	0.92	11	9	7	8
Sweden	4	4	10.68	8.59	0.94	3.5	1.72	5	4	10	6
Switzerland	13	2	10.89	14.40	0.87	3	1.79	14	6	8	6
Taiwan	16	7	9.68	7.18	0.27	3	0.76	13	7	13	7
Turkey	9	1	8.96	-6.03	0.50	3	-0.07	N.A.	N.A.	N.A.	N.A.
USA	63	22	10.71	-6.00	0.32	3	1.27	13	6	11	7

Table 2. Summary Statistics The sample includes 164 banks in Bankscope with returns available from Datastream, with loan/assets larger than 10%, deposit/assets larger than 20%, and total assets larger than \$50bn as of 2006. Returns are in percent. Firm characteristics are computed in 2006, prior to the beginning of the financial crisis. Tier 1 is the ratio of Tier 1 capital to risk-weighted assets, income diversity from Leaven and Levine (2009) is defined as 1 minus the absolute value of the ratio between the difference between net interest income and other operating income and total operating income, non-interest is the share of operating income not due to interest income, log Z is the distance-to-default estimated as $Z=(ROA+CAR)/volatility(ROA)$ where CAR is equity/asset ratio and ROA is return on assets for the period 1996-2006, Beta is the slope of the regression of weekly excess stock returns on the MSCI World excess return for the period 2004-2006, Idiosyncratic volatility is the annualized standard deviation of the residuals from the market model estimated over the same period; the other bank characteristics are Deposits, Loans, Liquid assets (all these variables are normalized by total assets) and Tangible equity (equity minus intangible assets whenever available or equity when intangible assets is not available divided by total liabilities). The bank balance sheet and income variables are winsorized at the 1% and 99% levels and are expressed in percentage terms. State is a dummy variable equal to 1 when the State or a public authority holds more than 10% of the shares directly or indirectly. The regulation variables come from Caprio, Laeven and Levine (2007) using data in the 2007 database (revised in June 2008) downloaded from the World Bank (<http://econ.worldbank.org>). Official is an index of the power of the commercial bank supervisory agency, Capital is an index of regulatory oversight of bank capital, Restrict is an index of regulatory restrictions on the activities of banks, and Private monitoring is an index of monitoring on the part of the private sector. The variable Institution is the simple average of six indicators reported by Kaufmann, Kraay and Mastruzzi (2008) called voice, political stability, government effectiveness, regulatory quality, rule of law, corruption. ADRI is the anti-director index of LLSV (1998) as revised in Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008). Ownership is a dummy variable equal to 1 when no shareholder holds more than 10% of the shares directly or indirectly. To construct Board we follow Aggarwal, Erel, Stulz, and Williamson (2008) and sum 25 board attributes that are available for U.S. firms as well as for foreign firms from the Riskmetrics CGQ dataset. Log GDP is the log of real GDP per capita in dollars for 2006, Current account is the ratio between the current account deficit and GDP for 2006, Concentration is the ratio between the assets of the three largest banks in each country and total assets of the national banking system in 2006.

	Observations	Minimum	Maximum	Average	Median	Standard deviation
Stock returns						
- 2006	156	-34.49	267.06	32.55	27.57	38.07
- July 2007 - Dec. 2008	164	-99.95	29.14	-51.49	-52.34	27.87
Bank characteristics						
- Tier 1	146	4.40	17.05	8.80	8.35	2.33
- Tangible equity	164	1.24	14.06	5.52	5.18	2.66
- Deposits	164	25.18	91.23	59.59	58.03	17.94
- Loans	164	19.55	82.81	55.82	58.71	14.74
- Liquid assets	164	1.96	65.14	19.59	16.67	14.23
- Assets	164	50.41	2070.02	348.96	130.18	480.13
- Income diversity	162	0.04	0.99	0.52	0.51	0.25
- Non-interest	164	2.57	85.58	41.18	41.01	18.82
- Log Z	158	0.55	5.89	3.45	3.46	1.05
- Beta	159	0.21	1.76	0.88	0.90	0.36
- Idiosyncratic volatility	159	9.38	60.25	24.47	21.53	9.23
- State	150	0.00	1.00	0.06	0.00	0.24
Regulation and institution						
- Official	163	5.00	14.00	10.51	11.00	2.42
- Capital	163	2.00	9.00	5.67	6.00	1.64
- Restrict	163	4.00	15.00	9.64	10.00	2.64
- Private monitoring	163	4.00	8.00	7.06	7.00	0.78
- Institution	164	-0.76	1.83	1.05	1.24	0.62
- ADRI	164	1.00	5.00	3.63	3.50	1.15
Corporate governance						
- Ownership	158	0.00	1.00	0.44	0.00	0.50
- Board	104	6.00	21.00	12.29	11.48	3.74
Macroeconomic variables						
- Log GDP	164	6.63	11.19	10.11	10.44	0.93
- Current account	164	-11.1	25.42	1.25	1.40	7.08
- Concentration	164	18.68	94.95	53.35	53.35	18.34

Table 3. Summary Statistics for banks in the first and fourth quartiles of stock return performance from July 1, 2007 to December 31, 2008

This table compares the characteristics of banks in the bottom quartile of stock return performance relative to those in the top quartile of stock return performance. The sample includes 164 banks in Bankscope with returns available from Datastream, with loan/assets larger than 10%, deposit/assets larger than 20%, and total assets larger than \$50bn as of 2006. Returns are in percent. Firm characteristics are computed in 2006, prior to the beginning of the financial crisis. Tier 1 is the ratio of Tier 1 capital to risk-weighted assets, income diversity from Leaven and Levine (2009) is defined as 1 minus the absolute value of the ratio between the difference between net interest income and other operating income and total operating income, non-interest is the share of operating income not due to interest income, log Z is the distance-to-default estimated as $Z=(ROA+CAR)/volatility(ROA)$ where CAR is equity/asset ratio and ROA is return on assets for the period 1996-2006, Beta is the slope of the regression of weekly excess stock returns on the MSCI World excess return for the period 2004-2006, Idiosyncratic volatility is the annualized standard deviation of the residuals from the market model estimated over the same period; the other bank characteristics are Deposits, Loans, Liquid assets (all these variables are normalized by total assets) and Tangible equity (equity minus intangible assets whenever available or equity when intangible assets is not available divided by total liabilities). The bank balance sheet and income variables are winsorized at the 1% and 99% levels and are expressed in percentage terms. State is a dummy variable equal to 1 when the State or a public authority holds more than 10% of the shares directly or indirectly. The regulation variables come from Caprio, Laeven and Levine (2007) using data in the 2007 database (revised in June 2008) downloaded from the World Bank (<http://econ.worldbank.org>). Official is an index of the power of the commercial bank supervisory agency, Capital is an index of regulatory oversight of bank capital, Restrict is an index of regulatory restrictions on the activities of banks, and Private monitoring is an index of monitoring on the part of the private sector. The variable Institution is the simple average of six indicators reported by Kaufmann, Kraay and Mastruzzi (2008) called voice, political stability, government effectiveness, regulatory quality, rule of law, corruption. ADRI is the anti-director index of LLSV (1998) as revised in Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008). Ownership is a dummy variable equal to 1 when no shareholder holds more than 10% of the shares directly or indirectly. To construct Board we follow Aggarwal, Erel, Stulz, and Williamson (2008) and sum 25 board attributes that are available for U.S. firms as well as for foreign firms from the Riskmetrics CGQ dataset. Log GDP is the log of real GDP per capita in dollars for 2006, Current account is the ratio between the current account deficit and GDP for 2006, Concentration is the ratio between the assets of the three largest banks in each country and total assets of the national banking system in 2006. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Mean of banks in the bottom quartile of the distribution of returns	Mean of banks in the top quartile of the distribution of returns	Test for equality of means (p values)
Stock returns			
- 2006	38.71	24.93	0.071*
- July 2007 - Dec. 2008	-85.23	-14.57	0.000***
- Sep. 12 - Oct. 10, 2008	-47.47	-21.40	0.000***
Bank characteristics			
- Tier 1	8.56	9.61	0.064*
- Tangible equity	4.10	6.18	0.000***
- Deposits	50.15	69.66	0.000***
- Loans	56.40	56.47	0.982
- Liquid assets	20.45	16.08	0.152
- Assets	485.00	223.00	0.013**
- Income diversity	0.56	0.42	0.014**
- Non-interest	43.60	34.20	0.028**
- Log Z	3.61	3.26	0.095*
- Beta	0.83	0.93	0.223
- Idiosyncratic volatility	22.39	26.02	0.046*
Regulation and institution			
- Official	10.07	11.24	0.021**
- Capital	5.19	6.15	0.007***
- Restrict	8.00	10.51	0.000***
- Private monitoring	6.83	7.32	0.003***
- Institution	1.35	0.91	0.001***
- ADRI	3.66	3.65	0.961
- State	0.10	0.00	0.046**
Corporate governance			
- Ownership	0.46	0.42	0.007***
- Board	13.43	11.24	0.051*
Macroeconomic variables			
- Log GDP	10.55	9.84	0.000***
- Current account	-0.03	2.58	0.074*
- Concentration	57.01	48.79	0.050**

Table 4. Returns regressions for July 2007-December 2008

The regressions estimate the relation between buy-and-hold stock returns over the period July 2007-December 2008 and bank characteristics. The sample includes banks in Bankscope with returns available from Datastream, with loan/assets larger than 10%, deposit/assets larger than 20%, and total assets larger than \$50bn as of 2006. Returns are in percent. Regressions 1, 3, and 4 include only banks with assets in excess of \$50 billion in 2006. Regressions 2 and 5 include all banks with assets in excess of \$10 billion in 2006 in countries that have a least one large bank. Firm characteristics are computed in 2006, prior to the beginning of the financial crisis. Tier 1 is the ratio of Tier 1 capital to risk-weighted assets, income diversity from Leaven and Levine (2009) is defined as 1 minus the absolute value of the ratio between the difference between net interest income and other operating income and total operating income, non-interest is the share of operating income not due to interest income, log Z is the distance-to-default estimated as $Z=(ROA+CAR)/volatility(ROA)$ where CAR is equity/asset ratio and ROA is return on assets for the period 1996-2006, Beta is the slope of the regression of weekly excess stock returns on the MSCI World excess return for the period 2004-2006, Idiosyncratic volatility is the annualized standard deviation of the residuals from the market model estimated over the same period; the other bank characteristics are Deposits, Loans, Liquid assets (all these variables are normalized by total assets) and Tangible equity (equity minus intangible assets whenever available or equity when intangible assets is not available divided by total liabilities),. The bank balance sheet and income variables are winsorized at the 1% and 99% levels and are expressed in percentage terms. State is a dummy variable equal to 1 when the State or a public authority holds more than 10% of the shares directly or indirectly. The regulation variables come from Caprio, Laeven and Levine (2007) using data in the 2007 database (revised in June 2008) downloaded from the World Bank (<http://econ.worldbank.org>). Official is an index of the power of the commercial bank supervisory agency, Capital is an index of regulatory oversight of bank capital, Restrict is an index of regulatory restrictions on the activities of banks, and Private monitoring is an index of monitoring on the part of the private sector. The variable Institution is the simple average of six indicators reported by Kaufmann, Kraay and Mastruzzi (2008) called voice, political stability, government effectiveness, regulatory quality, rule of law, corruption. ADRI is the anti-director index of LLSV (1998) as revised in Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008). Ownership is a dummy variable equal to 1 when no shareholder holds more than 10% of the shares directly or indirectly. To construct Board we follow Aggarwal, Erel, Stulz, and Williamson (2008) and sum 25 board attributes that are available for U.S. firms as well as for foreign firms from the Riskmetrics CGQ dataset. Log GDP is the log of real GDP per capita in dollars for 2006, Current account is the ratio between the current account deficit and GDP for 2006, *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Adj.-R² is adjusted R-squared.

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5	Regression 6	Regression 7	Regression 8	Regression 9
Constant	-35.585 (0.758)	7.2120 (0.879)	65.202 (0.574)	-62.515 (0.571)	-15.694 (0.783)		39.100 (0.701)	-50.308 (0.548)	54.203 (0.262)
Tier 1	5.568 (0.022)**	1.194 (0.371)	5.507 (0.070)*	3.954 (0.019)**	1.113 (0.223)		5.314 (0.012)**	3.975 (0.009)***	1.038 (0.219)
Deposits	0.645 (0.005)***	0.419 (0.019)**	0.659 (0.009)***	0.426 (0.005)***	0.465 (0.004)***		0.562 (0.037)**	0.140 (0.236)	0.206 (0.086)*
Loans	-0.501 (0.263)	-0.488 (0.006)***	-0.701 (0.186)	-0.098 (0.763)	-0.311 (0.082)*		-0.608 (0.134)	0.173 (0.554)	-0.299 (0.078)*
2006 return	-0.317 (0.003)***	-0.110 (0.039)**	-0.490 (0.035)**	-0.162 (0.046)*	-0.182 (0.001)***		-0.307 (0.008)***	-0.144 (0.094)*	-0.196 (0.003)***
Log assets	-2.645 (0.542)	-2.824 (0.200)	-4.991 (0.180)	-1.747 (0.621)	-3.521 (0.066)*		-5.027 (0.212)	1.826 (0.620)	-2.575 (0.196)
Beta	-40.394 (0.007)***	-20.762 (0.033)**	-23.415 (0.273)	-13.207 (0.056)**	-11.749 (0.058)*		-42.170 (0.011)**	-24.001 (0.015)**	-15.415 (0.038)**
Log Z	1.648 (0.567)	2.160 (0.255)	-0.039 (0.988)				-0.037 (0.989)	0.014 (0.995)	1.159 (0.449)
Non-interest Income	0.110 (0.239)	-0.109 (0.583)	0.067 (0.342)				-7.355 (0.299)	-12.695 (0.278)	-25.119 (0.003)***
Owner	-3.148 (0.462)	1.409 (0.764)	-2.864 (0.401)	-6.813 (0.240)	2.235 (0.665)		-3.832 (0.447)	-8.101 (0.188)	-1.110 (0.846)
State	4.514 (0.552)	8.120 (0.307)	24.248 (0.003)***	1.597 (0.793)	1.040 (0.882)		5.802 (0.463)	-9.159 (0.230)	-3.907 (0.597)
Board			-2.758 (0.035)**						
SIV							9.084 (0.184)		
Log GDP				-3.220 (0.354)	-2.609 (0.235)	-9.254 (0.087)*		-4.756 (0.124)	-2.994 (0.030)**
Current				0.159 (0.694)	0.403 (0.163)	0.717 (0.031)**		0.930 (0.029)**	0.780 (0.033)**
Official				-1.705 (0.133)	-0.859 (0.403)	0.312 (0.782)			
Capital				2.774 (0.151)	1.744 (0.308)	2.413 (0.196)			
Restrict				2.008 (0.071)*	1.015 (0.351)	2.301 (0.092)*			
Private				4.033 (0.498)	6.389 (0.235)	4.010 (0.328)			
ADRI						-0.282 (0.910)		4.005 (0.309)	3.703 (0.208)
BIS								-3.772 (0.009)***	-2.900 (0.014)**
Instit						11.243 (0.208)			
Number of Adj.-R ²	131 0.484	283 0.427	97 0.552	134 0.267	286 0.407	167 0.111	130 0.497	109 0.335	225 0.396

Table 5. Risk regressions

The regressions estimate the relation between various measures of ex ante risk over the period July 2007-December 2008 and bank characteristics. The sample includes banks in Bankscope with returns available from Datastream, with loan/assets larger than 10%, deposit/assets larger than 20%, and total assets larger than \$50bn as of 2006. The dependent variable in regressions 1-3 is idiosyncratic volatility, the dependent variable in regressions 4-6 is the log of the distance to default, and the dependent variable in regressions 7-9 is tangible equity. Returns are in percent. Firm characteristics are computed in 2006, prior to the beginning of the financial crisis. Tier 1 is the ratio of Tier 1 capital to risk-weighted assets, income diversity from Leaven and Levine (2009) is defined as 1 minus the absolute value of the ratio between the difference between net interest income and other operating income and total operating income, non-interest is the share of operating income not due to interest income, log Z is the distance-to-default estimated as $Z=(ROA+CAR)/volatility(ROA)$ where CAR is equity/asset ratio and ROA is return on assets for the period 1996-2006, Beta is the slope of the regression of weekly excess stock returns on the MSCI World excess return for the period 2004-2006, Idiosyncratic volatility is the annualized standard deviation of the residuals from the market model estimated over the same period; the other bank characteristics are Deposits, Loans, Liquid assets (all these variables are normalized by total assets) and Tangible equity (equity minus intangible assets whenever available or equity when intangible assets is not available divided by total liabilities). The bank balance sheet and income variables are winsorized at the 1% and 99% levels and are expressed in percentage terms. State is a dummy variable equal to 1 when the State or a public authority holds more than 10% of the shares directly or indirectly. The regulation variables come from Caprio, Laeven and Levine (2007) using data in the 2007 database (revised in June 2008) downloaded from the World Bank (<http://econ.worldbank.org>). Official is an index of the power of the commercial bank supervisory agency, Capital is an index of regulatory oversight of bank capital, Restrict is an index of regulatory restrictions on the activities of banks, and Private monitoring is an index of monitoring on the part of the private sector. The variable Institution is the simple average of six indicators reported by Kaufmann, Kraay and Mastruzzi (2008) called voice, political stability, government effectiveness, regulatory quality, rule of law, corruption. ADRI is the anti-director index of LLSV (1998) as revised in Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008). Ownership is a dummy variable equal to 1 when no shareholder holds more than 10% of the shares directly or indirectly. To construct Board we follow Aggarwal, Erel, Stulz, and Williamson (2008) and sum 25 board attributes that are available for U.S. firms as well as for foreign firms from the Riskmetrics CGQ dataset. Log GDP is the log of real GDP per capita in dollars for 2006, Current account is the ratio between the current account deficit and GDP for 2006, Concentration is the ratio between the assets of the three largest banks in each country and total assets of the national banking system in 2006. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Adj.-R² is adjusted R-squared.

	Idiosyncratic volatility			Log of distance to default			Tangible equity		
	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5	Regression 6	Regression 7	Regression 8	Regression 9
Constant	0.177 (0.167)	0.220 (0.262)	1.013 (0.000)***	7.589 (0.001)***	7.485 (0.005)***	1.525 (0.518)	21.974 (0.040)**	24.383 (0.076)*	31.601 (0.003)***
Tier 1	-0.004 (0.286)	-0.003 (0.394)	-0.007 (0.053)*	-0.000 (0.997)	0.022 (0.739)	0.034 (0.598)			
Deposits	-0.000 (0.948)	-0.000 (0.251)	0.000 (0.895)	-0.008 (0.406)	-0.022 (0.814)	-0.004 (0.626)	0.003 (0.889)	0.000 (0.993)	-0.007 (0.777)
Loans	0.001 (0.129)	0.000 (0.569)	-0.001 (0.331)	-0.012 (0.079)*	-0.007 (0.315)	0.006 (0.546)	-0.018 (0.470)	-0.020 (0.520)	-0.032 (0.188)
2006 return	0.000 (0.170)	-0.000 (0.463)	-0.000 (0.373)	-0.003 (0.248)	0.004 (0.556)	0.003 (0.502)	-0.005 (0.553)	-0.011 (0.653)	-0.013 (0.063)*
Log assets	-0.004 (0.393)	-0.003 (0.613)	-0.021 (0.001)***	-0.104 (0.230)	-0.106 (0.268)	0.080 (0.389)	-0.805 (0.075)*	-1.019 (0.040)**	-1.239 (0.002)***
Non-interest	0.001 (0.077)*	0.002 (0.400)	0.000 (0.936)	-0.020 (0.009)***	-0.014 (0.036)**	-0.009 (0.194)	0.006 (0.690)	0.014 (0.143)	0.001 (0.976)
Owner	-0.028 (0.053)*	-0.018 (0.111)	-0.009 (0.480)	0.483 (0.050)**	0.448 (0.054)*	0.229 (0.190)	0.339 (0.383)	0.734 (0.100)*	0.499 (0.166)
State	0.016 (0.480)	-0.008 (0.345)	0.076 (0.061)*	-0.118 (0.806)	-0.035 (0.680)	0.064 (0.913)	-0.607 (0.579)	1.705 (0.006)***	-0.005 (0.994)
Boardi		0.002 (0.511)			-0.084 (0.091)*			0.086 (0.519)	
Log GDP			-0.043 (0.007)***			0.193 (0.219)			-0.391 (0.332)
Current			0.001 (0.646)			-0.025 (0.248)			-0.019 (0.649)
Official			0.000 (0.963)			-0.064 (0.241)			0.180 (0.245)
Capital			-0.011 (0.188)			0.065 (0.481)			-0.091 (0.676)
Restrict			-0.002 (0.583)			-0.060 (0.373)			0.130 (0.393)
Private			0.031 (0.214)			-0.132 (0.524)			0.181 (0.453)
Number of	135	99	134	131	97	130	135	99	134
Adj.-R ²	0.771	0.718	0.304	0.557	0.558	0.125	0.575	0.532	0.356