Risk management, corporate governance, and bank performance in the financial crisis

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A R T I C L E   I N F O

A B S T R A C T

The recent financial crisis has raised several questions with respect to the corporate governance of financial institutions. This paper investigates whether risk management-related corporate governance mechanisms, such as for example the presence of a chief risk officer (CRO) in a bank's executive board and whether the CRO reports to the CEO or directly to the board of directors, are associated with a better bank performance during the financial crisis of 2007/2008. We measure bank performance by buy-and-hold returns and ROE and we control for standard corporate governance variables such as CEO ownership, board size, and board independence. Most importantly, our results indicate that banks, in which the CRO directly reports to the board of directors and not to the CEO (or other corporate entities), exhibit significantly higher (i.e., less negative) stock returns and ROE during the crisis. In contrast, standard corporate governance variables are mostly insignificantly or even negatively related to the banks' performance during the crisis.

1. Introduction

This paper investigates whether the presence of a chief risk officer (CRO) in the executive board of a bank, the line of reporting of the CRO, and other risk management-related corporate governance mechanisms (which are also termed "risk governance") positively affect bank performance during the recent financial crisis. The paper combines and further develops relevant previous findings from three major areas of research: corporate governance, enterprise risk management (ERM), and bank performance.

Whereas scandals such as Enron and Worldcom gave primarily rise to new developments in accounting practices, the financial crisis following the subprime meltdown in the US has led to a further growing awareness and need for appropriate risk management techniques and structures within financial organizations.[1] In quantitative risk management, the focus lies on how to improve the measurement and management of specific risks such as liquidity risk, credit risk, and market risk. On a structural level, the issue of how to integrate these risks into one single message to senior executives is being addressed. Earlier literature on risk management focused on single types of risk while missing out on the interdependence to other risks (Miller, 1992). Consequently, only in the 1990s, the academic literature started to focus on an integrated view of risk management (e.g., Miller, 1992; Miccolis and Shaw, 2000; Cumming and Mirtle, 2001; Nocco and Stulz, 2006; Sabato, 2010).

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[1] There are also recent academic studies which emphasize that flaws in bank governance played an important role in the poor performance of banks during the financial crisis of 2007/2008 (e.g., Diamond and Rajan, 2009). Also a recent OECD report concludes that the financial crisis can be to an important extent attributed to failures and weaknesses in corporate governance arrangements (Kirkpatrick, 2009). Moreover, Acharya et al. (2009) argue that a strong and independent risk management is necessary to effectively manage risk in modern-day banks as deposit insurance protection and implicit too-big-to-fail guarantees weaken the incentives of debtholders to provide monitoring and impose market discipline. Moreover, the increasing complexity of banking institutions and the ease with which their risk profiles can be altered by traders and security desks makes it difficult for supervisors to regulate risks.

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In addition, public policy makers around the world have started to question the appropriateness of the current corporate governance applied to financial institutions. In particular the role and the profile of risk management in financial institutions has been put under scrutiny. In many recent policy documents, comprehensive risk management frameworks are outlined in combination with recommended governance structures (e.g., Basel Committee on Banking Supervision, 2008; FSA, 2008; IIF, 2007; Walker, 2009). One common recommendation is to "put risk high on the agenda" by creating respective structures. This can involve many different actions. As already claimed by the Sarbanes-Oxley Act (SOX) in 2002, financial expertise is considered to play an important role. Other, more specific measures involve either the creation of a dedicated risk committee or designating a CRO who oversees all relevant risks within the institution (e.g., Brancato et al., 2006; Sabato, 2010).

Mongiardino and Plath (2010) show that the risk governance in large banks seems to have improved only to a limited extent despite increased regulatory pressure induced by the credit crisis. They outline best practices in banking risk governance and highlight the need to have at least (1) a dedicated board-level risk committee, of which (2) a majority should be independent, and (3) that the CRO should be part of the bank's executive board. By surveying 20 large banks, however, they find only a small number of banks to follow best practices in 2007. Even though most large banks had a dedicated risk committee, most of them met very infrequently. Also, most risk committees were not comprised of enough independent and financially knowledgeable members (see also Hau and Thum, 2009). And most of those large banks had a CRO but its position and reporting line did not ensure an appropriate level of accessibility and thus influence on the CEO and the board of directors.[2]

Whereas the role and importance of the CRO, and risk governance more generally, in the banking industry has been highlighted in the newspapers, in various reports (Brancato et al., 2006), as well as in practitioner-oriented studies (e.g., Banham, 2000), it has been largely neglected in the academic literature so far. The only exception we are aware of is the contemporaneous study by Ellul and Yerramilli (2011). They investigate whether a strong and independent risk management is significantly related to bank risk taking and performance during the credit crisis in a sample of 74 large US bank holding companies. They construct a Risk Management Index (RMI) which is based on five variables related to the strength of a bank's risk management, including a dummy variable whether the bank's CRO is a member of the executive board and other proxy measures for the CRO's power within the bank's management board. Their findings indicate that banks with a high RMI value in 2006 had lower exposure to private-label mortgage-backed securities, were less active in trading off-balance sheet derivatives, had a smaller fraction of non-performing loans, had lower downside risk, and a higher Sharpe Ratio during the crisis years 2007/2008.

Some other aspects of corporate governance in banks, such as board characteristics and CEO pay and ownership, have been addressed in a few recent academic studies (e.g., Beltratti and Stulz, forthcoming; Erkens et al., 2010; Fahlenbrach and Stulz, 2011; Minton et al., 2010). However, the literature on corporate governance and the valuation effect of corporate governance in financial firms is still very limited. Moreover, financial institutions do have their particularities, such as higher opaqueness, heavy regulation and intervention by the government (Levine, 2004), which require a distinct analysis of corporate governance issues. Consistently, Adams and Mehran (2003) and Macey and O'Hara (2003) highlight the importance of taking differences in governance between banking and non-banking firms into consideration.

Two recent studies by Beltratti and Stulz (forthcoming) and Fahlenbrach and Stulz (2011) analyze the influence of corporate governance on bank performance during the credit crisis. However, both studies rely on variables that have been used in the literature to analyze the relation between corporate governance and firm value of non-financial institutions. Fahlenbrach and Stulz (2011) analyze the influence of CEO incentives and share ownership on bank performance and find no evidence for a better performance of banks in which the incentives provided by the CEO's pay package are stronger (i.e., the fraction of equity-based compensation is higher). In fact, their evidence rather points to banks providing stronger incentives to CEOs performing worse in the crisis. A possible explanation for this finding is that CEOs may have focused on the interests of shareholders in the build-up to the crisis and took actions that they believed the market would welcome. Ex post, however, these actions were costly to their banks and their shareholders when the results turned out to be poor. Moreover, their results indicate that bank CEOs did not reduce their stock holdings in anticipation of the crisis, and that CEOs did not hedge their holdings. Hence, their results suggest that bank CEOs did not anticipate the crisis and the resulting poor performance of the banks as they suffered huge losses themselves.[3]

Beltratti and Stulz (forthcoming) investigate the relation between corporate governance and bank performance during the credit crisis in an international sample of 98 banks. Most importantly, they find that banks with more shareholder-friendly boards as measured by the "Corporate Governance Quotient" (CGQ) obtained from RiskMetrics performed worse during the crisis, which indicates that the generally shared understanding of "good governance" does not necessarily have to be in the best interest of shareholders. Beltratti and Stulz (forthcoming) argue that "banks that were pushed by their boards to maximize shareholder wealth before the crisis took risks that were understood to create shareholder wealth, but were costly ex post because of outcomes that were not expected when the risks were taken" (p. 3).

Erkens et al. (2010) investigate the relation between corporate governance and performance of financial firms during the credit crisis of 2007/2008 using an international sample of 296 financial firms from 30 countries. Consistent with Beltratti and Stulz (forthcoming), they find that firms with more independent boards and higher institutional ownership experienced worse stock returns during the crisis. They argue that firms with higher institutional ownership took more risk prior to the crisis which resulted in larger shareholder losses during the crisis period. Moreover, firms with more independent boards raised more equity capital during the crisis, which led to a wealth transfer from existing shareholders to debtholders. Minton et al. (2010) investigate how risk taking and U.S. banks' performance in the crisis are related to board independence and financial expertise of the board. Their results show that financial expertise of the board is positively related to risk taking and bank performance before the crisis but is negatively related to bank performance in the crisis. Finally, Cornett et al. (2010) investigate the relation between various corporate governance mechanisms and bank performance in the crisis in a sample of approximately 300 publicly traded US banks. In contrast to Erkens et al. (2010), Beltratti and Stulz (forthcoming), and Fahlenbrach and Stulz (2011), they find better corporate governance, for example a more independent board, a higher pay-for-performance sensitivity, and an increase in insider ownership, to be positively related to the banks' crisis performance.

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[2] Previous to the financial crisis of 2007/2008, the vast majority of banks did not have a CRO, but only a Head of Risk usually reporting to the CFO with no access to or influence on the short- or long-term strategy (and the associated risks) of the bank.

[3] In another recent study, however, Bebchuk et al. (2010) provide evidence that the top-five executive teams of Bear Stearns and Lehman Brothers cashed out large amounts of performance-based compensation during the 2000–2008 period. Moreover, they were able to cash out large amounts of bonus compensation that was not clawed back when the firms collapsed, as well as to pocket large amounts from selling shares.

In this paper, we argue that one important difference between financial and non-financial firms, that has to be taken into account, is the role of risk management in the governance structure of financial firms. While the importance of risk management has been recognized, the actual role of risk management in a corporate governance context still lacks common interpretation. We contribute to the existing literature by analyzing the influence of bank-specific corporate governance, and in particular "risk governance" characteristics on the performance of banks during the financial crisis. Most banks still seem to consider asset growth and a reduction of operational costs as the main drivers of profitability. Risk management has often the role of a support/control function. However, the last financial crisis has clearly demonstrated that the business of banks *is* risk, therefore the legitimate question arises whether the CRO should not hold a more important and powerful role within banks.

As in Beltratti and Stulz (forthcoming) and Fahlenbrach and Stulz (2011), we collect our measures of corporate governance for 2006, the last complete year before the financial crisis. We use both hand-collected data from 10 k (annual report) and Def 14A (Proxy Statement) forms in the SEC's EDGAR database as well as data from several commercial databases including RiskMetrics (formerly Investor Responsibility Research Center or IRRC) and ExecuComp. We investigate whether corporate and risk governance measures at the end of the year 2006 are significantly related to the banks' stock returns and ROE during the crisis period. Following Beltratti and Stulz (forthcoming) and Fahlenbrach and Stulz (2011), we define the crisis period to last from July 1, 2007, to December 31, 2008. Our results provide robust evidence that banks, in which the CRO reports directly to the board of directors, perform significantly better in the credit crisis while banks in which the CRO reports to the CEO perform significantly worse than other banks in our sample. This result confirms our hypothesis that the typical corporate governance structure with all executive board members reporting to the CEO is not the most appropriate for banking organizations. Hence, the CEO and CRO may have conflicting interests and while a stronger role of the CEO may increase growth and profitability in a good market environment, it may result in large losses in crises periods such as the recent credit crisis of 2007/2008 and vice versa.

In contrast, the relation between most of our other measures of risk governance and bank performance in the crisis is insignificant. Moreover, our results with respect to the standard corporate governance mechanisms indicate that a bank's stock returns (and ROE) during the crisis are either unaffected by standard corporate governance variables, such as CEO ownership or the corporate governance index of Gompers et al. (2003), or are even negatively related to certain governance mechanisms such as board size (i.e., positively related with board size which is usually considered to indicate poor governance; e.g., see Yermack, 1996) or board independence. Hence, our results on the "standard" corporate governance mechanisms are largely consistent with Beltratti and Stulz (forthcoming) and Fahlenbrach and Stulz (2011). These results suggest that banks were pushed by their boards to maximize shareholder wealth before the crisis and thereby took risks that were understood to create wealth but later turned out poorly in the credit crisis.

The remainder of the paper is organized as follows. Section 2 describes the sample and the variables. Section 3 reports the empirical results. Section 4 concludes.

2. Data and variables

2.1. Sample selection

As in Beltratti and Stulz (forthcoming) and Fahlenbrach and Stulz (2011), we collect data on various corporate governance variables for the year 2006, the last complete year before the financial crisis. As a starting point for our sample, we use all banks available in the COMPUSTAT Bank North America database in 2006. All banks in the COMPUSTAT Bank database are either primarily commercial banks (SIC code 6020) or savings institutions (SIC codes 6035 and 6036).[4] The initial count of 770 bank-years is reduced by all observations for which either a key variable (total assets, common shares outstanding, total common/ordinary equity, income before extraordinary items) is missing or total assets are less than USD 100 Mio. Additionally, we drop all bank-years which are not covered by the Center for Research in Security Prices (CRSP) database. This leaves us with a sample of 573 banks for which we attempt to collect corporate and risk governance measures from various sources as outlined below.

2.2. Corporate governance variables

Due to limited availability of governance data on banks as well as the neglect of risk management-specific governance data in commercial governance databases, such as for example RiskMetrics, we hand-collect most of our corporate governance variables from the banks' 10 k (annual report) and Def 14A (proxy statement) forms in the SEC's EDGAR database, and from company websites. For the first group of five hand-collected corporate governance variables, we target all 380 banks for which the 2006 annual report and 2007 proxy statement are available. Complete data is available for 372 banks.

The first variable we collect data on is a dummy variable whether the CRO is a member of the executive board (*CRO in executive board*). If the CRO is a member of the executive board, his influence and power are expected to be larger as compared to a CRO who is situated on the third management level. 49 of the 372 banks report that the CRO is a member of the executive board.[5] It is important to note that a strong CRO is not necessarily increasing bank value, in particular not in all market states. Even though the market in the short-run should perceive the appointment of a CRO to the executive board positively, the attitude might change over time if the CRO is powerful enough to be rigid during economic upturns. Before the 2007/2008 credit crisis banks had extremely high returns on equity of around 30%. In order to further increase profits and to satisfy shareholders, more risks had to be taken. In addition liquidity seemed endless.[6] At this point in time, a CRO should both recognize the tremendous risks and be able to induce the necessary reduction in risk exposure and concentrations. However, doing so may result in shareholders getting relatively lower returns compared to their peers in the industry with a weaker risk management structure, which might be difficult to explain to investors and even lead to decreasing stock prices. Therefore, the financial crisis of 2007/2008 provides an interesting setup to test the value of risk governance (and corporate governance more generally) which should then be recognized by the market and reflected in stock prices.

The second governance variable is a dummy variable, which is equal to one if the bank has a dedicated committee solely charged with monitoring and managing the risk management efforts within the bank (*Risk committee*). Banks, for which the variable *Risk*

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[4] 283 of our 372 banks in the final sample have a primary SIC code of 6020 assigned which indicates commercial banks, 61 banks have a primary SIC code of 6035 assigned which indicates federally chartered savings institutions, and 28 banks have a primary SIC code of 6036 assigned which indicates not federally chartered savings institutions. The respective NAICS codes are 522110 for the 283 commercial banks and 522120 for the 89 savings institutions.

[5] The 49 banks use the following titles: Chief Risk Officer, Chief Strategy and Risk Officer, Chief Credit and Risk Officer, Global Risk Executive, Director of Risk Management, Chief Risk Manager, Executive Vice President – Risk Management, Executive VP – Finance & Risk, and Risk Management Officer.

[6] A detailed analysis of the financial crisis of 2007/2008 is provided by Brunnermeier (2009).

committee has a value of zero, have either no committee in charge of risk management at all or the audit committee assumes responsibility. We would expect that having a risk committee in general indicates a stronger risk management and therefore better corporate governance. However, as for other board committees, the structure of the committee, the independence of the directors in the committee may matter as well – or even more. Therefore, we collect additional information on the risk committee for a reduced sample as explained below.

The third governance variable is board size, measured as the natural logarithm of the number of directors on a bank's board (*Ln(Board size)*). Yermack (1996) finds a negative relation between board size and firm value as measured by Tobin's Q. Adams and Mehran (2003) find that bank holding companies have on average larger boards of directors than manufacturing firms. They notice that these differences could be explained by regulatory differences as the regulatory requirements imposed on banks may act as substitutes for a sound corporate governance structure. Consequently, board size may be a less important corporate governance characteristic for banks as compared to non-banks. In fact, Beltratti and Stulz (forthcoming), using conventional indicators of good governance, even find that banks with more shareholder-friendly boards performed worse during the crisis.

The fourth variable we collect data on is board independence as measured by the percentage of independent outside directors on the board of directors (*Board independence*). We define independent directors as directors without any relation with the company except for their board seat. Hence, we classify directors with prior executive function, with a family relationship with an executive officer of the bank, or with any other business ties, such as for example lawyers or consultants doing other work for the bank as non-independent (or "gray") directors. For non-banks, Hermalin and Weisbach (1991) and Bhagat and Black (2002) find no significant relation between the percentage of outside directors and firm value (for a review of the literature, see Hermalin and Weisbach, 2003). Adams (2009) shows that banks with more independent board members even received relatively more money from the Troubled Assets Relief Program (TARP), which indicates that banks with a higher share of independent board members performed worse during the crisis. This finding is consistent with Beltratti and Stulz (forthcoming).

The fifth variable is the percentage of directors with experience (present or past) as an executive officer in a bank or insurance company (*% directors w. finance background*).[7] Recent corporate accounting scandals have led regulators to stress the importance of having financial experts on the board of directors. As stated in the Sarbanes-Oxley Act of 2002, a financial expert has among other things "an understanding of generally accepted accounting principles and financial statements".[8] Implicitly the assumption is that this understanding will lead to a better board oversight and ultimately serve the shareholders. In fact, Güner et al. (2008) find that financial experts significantly affect the finance and investment policies of (non-bank) firms on whose board they serve. They categorize outside directors into eight categories and find that the appointment of a commercial banker reduces the sensitivity of investment to cash flow as they extend large loans, particularly through their own bank. However, financially restricted firms do not benefit from such practices and financing is only increased for firms with a good credit and financial standing, but poor investment opportunities. Hence, banker

directors seem to act in the interest of creditors. Moreover, the appointment of investment bankers to a board of directors is associated with larger debt issues and worse acquisitions. Minton et al. (2010) show that the level of financial expertise among non-executive directors is positively related to risk taking before and during the financial crisis, better stock performance before the crisis, but worse performance in the crisis.

For the second group of (another five) hand-collected corporate/risk governance variables, which provide more detailed information on the risk committee and on the line of reporting of the CRO, we target the 86 banks for which the corporate governance index, or *G-Index*, of Gompers et al. (2003) is available. There are two reasons for this sample restriction: First, all these variables have to be hand-collected from the banks' annual reports in a time-consuming way. Second, availability of this more detailed information on the banks' risk management structure seems to be strongly correlated with bank size: Of the 86 banks, for which the Gompers, Ishii, and Metrick index is available, information on all five additional risk management variables is available for 85 banks. When looking at a random sample of 25 additional banks, complete data was available for none of them. Hence, we believe that even when attempting to collect data for all 372 banks in our sample, sample size would not substantially increase as the smaller banks do not report the necessary information in their annual reports. This is consistent with Ellul and Yerramilli (2011) who obtained information on similar risk management variables for 74 large US banks only.

For banks with a risk committee, we additionally collect data on the number of times the risk committee of the respective banks met in 2006 (*Nr. of meetings of risk committee*), the number of directors in the risk committee (*Nr. of directors in risk committee*), and the percentage of independent directors in the risk committee (*% of indep. directors in risk committee*). All three of these variables are assigned a value of zero for banks with no risk committee.[9] In addition, we collect data on two variables related to the line of reporting and therefore power of the CRO within the banks: A dummy variable whether the CRO reports directly to the board of directors (*CRO reports to board*) and a dummy variable whether the CRO reports to the CEO (*CRO reports to CEO*). We expect that a CRO has more power if he reports directly to the board of directors. This is important if the CEO and CRO have conflicting interests, and the CEO focuses on a maximization of sales, assets, and profit growth rates while the CRO's main concern is to keep in check the risk taken to attain these goals.[10]

Finally, we augment the set of 10 hand-collected corporate governance variables by nine additional governance variables from four commercial databases: RiskMetrics Governance Legacy database, RiskMetrics Directors Legacy database, Standard & Poor's ExecuComp database, and Thomson Financial's CDA/Spectrum database. The availability of these variables reduces sample size to between 55 and 86 observations. The first variable, which we obtain from the RiskMetrics Governance Legacy database, is the widely-used corporate governance index, or *G-Index*, of Gompers et al. (2003). The G-Index comprises 24 corporate governance provisions related to the companies' anti-takeover protection. The 24 governance attributes are coded in a way that a value of one indicates a stronger anti-takeover protection (and therefore lower shareholder rights) and a value of zero indicates more exposure to the market for corporate control (and therefore better

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[7] In unreported robustness tests, we use a broader definition of finance background. Specifically, we also classify CPAs, CFAs, mutual fund, hedge fund, or private equity fund managers, REIT managers or professors in finance, economics, or accounting as directors with finance background. However, the results remain virtually unchanged and therefore are not reported in any tables.

[8] See Section 407 "Disclosure of Audit Committee Financial Expert" of the Sarbanes-Oxley Act.

[9] As the latter two variables are never estimated to be significant in our buy-and-hold return regressions, we do not report results from regressions including these two variables to conserve some degrees of freedom. The inclusion of these two variables leaves results reported in Tables 3–5 virtually unchanged.

[10] In addition, we collected data on specific risk committees (such as for example a market risk committee). However, the dummy variable measuring the existence of specific risk committees is never estimated significantly in our empirical analyses in Section 3. Therefore, we only report results on the *Risk committee* variable but not any dummy variables indicating specific risk committees.

shareholder rights). As the index is simply the sum of the 24 attributes, lower index values indicate stronger shareholder rights and vice versa. In unreported robustness tests, we use a reduced version of the G-Index as proposed by Bebchuk et al. (2009). This index, usually termed 'E-Index', includes only those six provisions which have been shown to be mainly responsible for the negative relation between the G-Index and firm value.[11]

We collect six variables related to the board of directors from the RiskMetrics Directors Legacy database. The first variable is a dummy variable whether the CEO is also the chairman of the board of directors. Fama and Jensen (1983) and Jensen (1993) argue that agency costs in large organizations can be reduced by separating decision management from decision control, and that the board of directors is only an effective device for decision control if it limits the decision discretion of top managers. However, the majority of empirical studies find no significant difference in valuation between firms with separated and firms with combined CEO/chairman positions (e.g., Brickley et al., 1997; Dahya and Travlos, 2000; Schmid and Zimmermann, 2008). Brickley et al. (1997) conclude that the costs associated with a breakup of a combined position are larger than the benefits for the majority of firms. The second variable is defined as the fraction of the board which predates the appointment of the CEO (*% of directors joining board before CEO*). These directors are presumably more independent from the CEO and more likely (and willing) to provide monitoring tasks and enforce unpopular decisions such as for example a CEO turnover. The next variable is the fraction of directors on the board that is older than 72 (*% of directors older than 72*). Often it is argued that in weakly governed firms with no effective process for evaluating individual directors, old incumbent directors may be allowed to stay on a board as long as they wish. Hence, a high fraction of old directors (aged 72 or older) may indicate poor governance and in particular a lack of a sound evaluation process of directors.[12] The fourth variable aims at measuring attendance problems of the board of directors (*Director non-attendance*). The variable is defined as the percentage of directors who attend less than 75% of board meetings. Following Fich and Shivdasani (2006), we also use a dummy variable for whether a board is busy (*Busy board*). Specifically, we classify a board as busy if a majority of outside directors holds three or more directorships. The sixth and final variable is a dummy variable which equals one if the bank's nominating committee is exclusively comprised of independent directors (*Independent nominating committee*).

As equity ownership may provide important incentives to bank CEOs to maximize bank value and limit the bank's risk exposure, we include the CEO's equity ownership as an additional corporate governance variable (*Ln(USD ownership of CEO)*). Specifically, our measure of CEO ownership is defined as the natural logarithm of the US dollar value of all shares owned by the CEO as obtained from Standard and Poor's ExecuComp database. In unreported robustness tests, we also use the percentage ownership of the CEO as an alternative measure of CEO ownership.[13] As a further

alternative measure of financial incentives provided to bank CEOs, we use the percentage of share-based (i.e., shares and options) to total compensation. Total compensation includes salary, bonus, and the value of all option and share grants in the respective year. However, as for the two ownership measures, the coefficient on this variable is never estimated to be significant while our main results remain qualitatively unchanged. Therefore, we do not report the results based on this compensation-based variable in a table.

Finally, we use the percentage of institutional shareholdings, i.e., shareholders owning more than 5% of a firm's equity, as a further corporate governance variable (*Institutional shareholdings*). We obtain the data on this variable from Thomson Financial's CDA/Spectrum database. As owners of such large blocks of shares may have the necessary knowledge, power, and incentives to provide monitoring and exert control, the variable *Institutional shareholdings* may either enhance the effectiveness of other corporate governance mechanisms or work as a substitute for them.

2.3. Measures of bank performance

We use three alternative measures of bank performance. Following Fahlenbrach and Stulz (2011) and Beltratti and Stulz (forthcoming), our first measure of bank performance are the banks' buy-and-hold returns over the time period July 1, 2007, to December 31, 2008 (*Buy-and-hold returns*). We use monthly holding period returns from CRSP to compute cumulative buy-and-hold returns.

Alternatively, in unreported robustness tests, we use alphas from a Carhart (1997) 4-factor model instead of raw returns. The alphas are estimated as the intercept of the following time-series regression which is estimated at the bank level:

$$R_t = \alpha + \beta_1 RMRF_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t + \varepsilon_t \tag{1}$$

where R_t is the excess return to the respective bank's stock in month t, $RMRF_t$ is the month t value-weighted market return minus the risk-free rate, and SMB_t (small minus big), HML_t (high minus low), and MOM_t are the month t returns on zero-investment factor-mimicking portfolios designed to capture size, book-to-market, and momentum effects, respectively.[14]

In further unreported robustness tests, we also extend the crisis period to include the 21 months from July 1, 2007, to March 31, 2009. For the alpha estimation, we exclude all banks with less than 12 observations for the 18-month-period and in case of the 21-month-period all banks with less than 12 observations for the first 18 months or no observation for the 3 months of the year 2009.[15]

As alternative measures of bank performance, we use two measures of bank profitability during the crisis. The first profitability measure we use is return on equity (*ROE*), defined as the banks' cumulative net income over the years 2007 and 2008, divided by the book value of equity as of year end 2006. The second profitability measure we use is return on assets (*ROA*), defined as the banks' cumulative net income over the years 2007 and 2008, divided by total assets as of year end 2006.[16] As the results based on both *ROE* and *ROA* are very similar, we only report results on *ROE* (in Table 5).

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[11] The six provisions are: (1) Staggered board, (2) Limitation on amending bylaws, (3) Limitation on amending the charter, (4) Supermajority to approve a merger, (5) Golden parachute, and (6) Poison pill.

[12] It is important to note that in certain cases such "old" directors may in fact be the most effective and productive directors as they presumably are also the most experienced directors.

[13] The motivation for using the dollar value of the CEO's ownership as our main measure of CEO incentives is that more money invested in absolute terms may provide stronger (financial) incentives to the CEO as compared to a higher percentage ownership in the bank. Specifically, we would expect that an ownership stake of USD 50 million, which amounts to roughly 21.10% (1.60%) of the market cap for the median (mean) bank in our sample but only 0.0002% for the largest bank, provides similarly strong financial incentives to the CEOs of both the median and the largest bank in our sample as in both cases this is likely to represent a very high fraction of his/her personal wealth. The results based on both measures of CEO ownership are qualitatively identical.

[14] For details on the construction of the factors, see Fama and French (1993) and Carhart (1997). We obtained the data on all four risk factors from Kenneth French's website at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[15] The results based on all these alternative return-based measures of bank performance are similar and therefore we only report results based on the 18-month buy-and-hold returns, as used in both Beltratti and Stulz (2011) and Fahlenbrach and Stulz (2011), for space reasons.

[16] Alternatively, we define *ROE* (*ROA*) as the banks' cumulative net income over the years 2007–2009, divided by the book value of equity (total assets) as of year end 2006. The results remain similar and therefore are not reported in a table for space reasons.

2.4. Financial control variables

In our regressions, we control for various bank characteristics as of end of the year 2006 which may help to explain bank performance during the financial crisis. The data to construct all these variables are obtained from the COMPUSTAT Bank North America database. The choice of control variables is based on Laeven and Levine (2007), Beltratti and Stulz (forthcoming), and Fahlenbrach and Stulz (2011), and partly dictated by data availability. We start with the four variables used in Fahlenbrach and Stulz (2011) and augment our set of control variables by another three variables.

The first variable is the 18-month buy-and-hold returns over the time period July 1, 2005, to December 31, 2006 (*Buy-and-hold returns* (*lagged*)) to investigate whether banks performing well before the crisis are taking on larger risks which are then reflected in poor performance during the crisis.[17] In the regressions with *ROE* (or *ROA*) as dependent variables we additionally control for lagged *ROE* (or *ROA*) defined as the banks' net income divided by the book value of equity (total assets), both variables as of year end 2006. To investigate whether the market valuation of the firm, and therefore the market's growth expectations, are associated with the performance during the crisis, we use the market-to-book ratio (*Market-to-book ratio*). The third variable is bank size (*Ln(assets)*), measured as the log of total assets. The fourth variable is the ratio of tier 1 capital to total risk-weighted assets (*Tier1 capital ratio*) which, from a regulator's point of view, is a core measure of a bank's financial strength. Everything else equal, we would expect banks' performance during the crisis to be positively related to *Tier1 capital ratio* 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.

The next variable we include is the ratio of deposits to total assets (*Deposits/assets*). As deposit financing is not subject to runs with deposit insurance, but money market funding is subject to runs (e.g., Gorton, 2010), we would expect that banks with more deposit financing perform better during the crisis. We use the ratio of loans to total assets (*Loans/assets*) to characterize the asset side of banks. Specifically, banks with higher values of *Loans/assets* are 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. In contrast, banks that held government securities instead of loans would presumably have performed better (e.g., Beltratti and Stulz, forthcoming). Hence, the expected relation between *Loans/assets* and bank performance is unclear.

Finally, Laeven and Levine (2007) and Schmid and Walter (2009) show that a functional diversification of financial institutions is negatively associated with firm value. As diversification may be related to both firm value and corporate governance, we additionally control for the banks' diversification activities. Our measure of the diversity of a bank's business is based on Laeven and Levine (2007) and attempts to measure where a bank lies along the spectrum from pure commercial banking (i.e., lending) to specialized investment banking (i.e., fee/trading-based activities). The variable *Income diversity* is defined as follows:

Income diversity

$$= 1 - \left| \frac{\text{Net interest income} - \text{Other operating income}}{\text{Total operating income}} \right| \quad (2)$$

Net interest income is interest income minus interest expense. Other operating income includes net fee income, net commission income, and net trading income. Total operating income includes net interest income, net fee income, net trading income, and net commission income. A specialized loan-making bank will have a larger ratio of net interest income to total operating income, while a specialized investment bank is expected to have a larger share of other operating income (fees, commissions, and trading income). *Income diversity* takes on values between zero and one with higher values indicating greater diversification.[18]

We winsorize the variables *Buy-and-hold returns, Buy-and-hold returns (lagged), ROE, ROE (lagged), ROA, ROA (lagged), Market-to-book ratio, Tier 1 capital ratio, Deposits/assets,* and *Loans/assets* at the 1st and 99th percentile. In unreported robustness tests, however, we find our results to remain qualitatively unchanged if we omit this winsorizing.

2.5. Endogeneity

One major concern in corporate governance studies is endogeneity. This paper is not a corporate governance study in the usual sense. We are interested in identifying bank characteristics, in particular related to their governance and risk management structure, which are significantly related to crisis performance. Our empirical setup mitigates endogeneity concerns due to reverse causality as we regress crisis performance on (lagged) pre-crisis bank characteristics. However, the bank characteristics we investigate could be correlated with other variables that we cannot account for, also introducing endogeneity problems. Unfortunately, there are no valid instruments to econometrically account for a potential endogeneity. Therefore, as the majority of other papers on governance and bank crisis performance (e.g., Erkens et al., 2010; Beltratti and Stulz, forthcoming; Fahlenbrach and Stulz, 2011), we follow another avenue and show that all these bank characteristics have theoretical motivations and we provide ancillary evidence supportive of our interpretations.

Another potential source of endogeneity may be the inclusion of the lagged dependent variable (the banks' crisis performance) as control variable in our regression specifications. Due to the autocorrelation in the dependent variable, the regressors may be correlated with the error terms resulting in biased regression coefficients. This alternative channel of endogeneity is probably of a lesser concern for our study as the coefficient of the lagged dependent variable is often estimated to be insignificant. Nevertheless, to check for the robustness of our results, we alternatively reestimate all our regression specifications without the lagged dependent variables as controls and find the results to remain qualitatively unchanged (not reported in tables for space reasons).

3. Empirical analysis

3.1. Descriptive statistics

Table 1 reports descriptive statistics for our measures of bank crisis performance, the corporate and risk governance variables, and the financial control variables. Panel A reports descriptive statistics for the large sample including 372 bank observations. Panel B reports descriptive statistics for the reduced sample which is

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[17] Alternatively, depending on the return variable used as dependent variable, we use the 21-month buy-and-hold returns over the time period April 1, 2005, to December 31, 2006, or the Carhart (1997) alpha of the monthly returns over the lagged 18- or 21-month time period, respectively.

[18] In unreported robustness tests, we additionally use a number of additional control variables such as for example the natural logarithm of bank age and leverage defined as total debt (calculated as total assets minus the book value of equity) divided by total assets. While the former is never estimated to be significant in the multivariate analyses, the coefficient on leverage is always negative and sometimes significant indicating a negative relation between leverage in 2006 and stock returns during the credit crisis.

Table 1

Descriptive statistics. The table reports descriptive statistics for all variables used in the paper's main analyses for the large sample of 372 banks (Panel A) and the restricted sample with data available for both the RiskMetrics Governance Legacy database *and* hand-collected corporate and risk governance variables (Panel B). The variables included in both panels are: *Buy-and-hold returns* are the banks' stock returns over the period from July 2007 to December 2008. *Buy-and-hold returns* (lagged) are the banks' stock returns over the period from July 2005 to December 2006. *ROE* (*ROA*) is the banks' cumulative net income over the years 2007 and 2008, divided by the book value of equity (total assets) as of year end 2006. *ROE* (*lagged*) (*ROA* (*lagged*)) is the banks' net income divided by the book value of equity (total assets), both variables as of year end 2006. *CRO in executive board* is a dummy variable which is equal to one, if the bank's CRO is a member of the executive board. *Risk committee* is a dummy variable whether the bank has a risk committee. *Board size* is the number of directors on the board. *Board independence* is the percentage of independent outside directors on the board. *% directors w. finance background* is the percentage of directors with experience (present or past) as an executive officer in a bank and insurance company. *Institutional shareholdings* is the percentage of a bank's shares owned by large shareholders with ownership stakes of ⩾5%. *Market-to-book ratio* is the market value of equity divided by the book value of equity, *Tier 1 capital ratio* is the ratio of tier 1 capital to total risk-weighted assets, *Deposits/assets* is the ratio of deposits to total assets, and *Loans/assets* is the ratio of loans to total assets. *Income diversity* is defined as one minus the difference between net interest income and other operating income divided by total operating income and measures where a bank lies along the spectrum from pure commercial banking to specialized investment banking. Panel B additionally includes the following variables: *Nr. of meetings of the risk committee* is the number of times the risk committee of the respective banks met in 2006. *% of independent directors in risk committee* is the percentage of independent directors in the risk committee. Note that the three variables related to the risk committee are reported for the 22 banks in the smaller sample which do have a risk committee. The variables in all other banks are set equal to zero. *CRO reports to board* and *CRO reports to CEO*, are dummy variables which are equal to one if the CRO directly reports to the board of directors or to the CEO, respectively. *G-Index* is the governance index of Gompers et al. (2003) which comprises 24 anti-takeover provisions. *Independent nominating committee* is a dummy variable which equals one if the bank's nominating committee is exclusively comprised of independent directors. *Combined CEO/chair* is a dummy variable whether the CEO is also the chairman of the board of directors. *% of directors joining board before CEO* is the fraction of the board which predates the appointment of the current CEO. *% of directors older than 72* is the fraction of directors on the board that is older than 72. *Director non-attendance* is defined as the percentage of directors who attend less than 75% of board meetings. *Busy board* is a dummy variable whether a majority of outside directors holds three or more directorships. *USD ownership of CEO* is the dollar value of all equity and option holdings of the CEO.

	Mean	Minimum	Lower quartile	Median	Upper quartile	Maximum	Standard deviation	N
Panel A: Large sample								
Buy-and-hold returns	0.6199	0.0454	0.3456	0.5715	0.8888	1.6225	0.3553	372
Buy-and-hold returns (lagged)	1.1600	0.7390	1.0075	1.1317	1.2760	1.8801	0.2124	372
ROE	0.0843	−0.7658	0.0225	0.1330	0.2138	0.4236	0.2041	372
ROE (lagged)	0.1087	−0.0464	0.0776	0.1117	0.1376	0.2405	0.0479	372
ROA	0.0074	−0.0771	0.0025	0.0121	0.0192	0.0348	0.0191	372
ROA (lagged)	0.0099	−0.0040	0.0072	0.0099	0.0126	0.0207	0.0043	372
CRO in executive board	0.1263	0.0000	0.0000	0.0000	0.0000	1.0000	0.3327	372
Risk committee	0.0806	0.0000	0.0000	0.0000	0.0000	1.0000	0.2727	372
Board size	10.7661	5.0000	9.0000	10.000	13.0000	23.0000	3.1787	372
Board independence	0.7752	0.3750	0.7000	0.7857	0.8750	1.0000	0.1114	372
% directors w. finance background	0.2247	0.0000	0.1429	0.2000	0.2857	0.7500	0.1158	372
Institutional shareholdings	0.2991	0.0002	0.1170	0.2500	0.4667	0.9397	0.2252	372
Market-to-book ratio	1.8862	0.6464	1.4371	1.7917	2.2317	3.8823	0.6029	372
Total assets	17,805	168	696	1272	3441	1459,737	113,412	372
Tier 1 capital ratio	0.1134	0.0624	0.0934	0.1074	0.1258	0.2304	0.0303	372
Deposits/assets	0.7391	0.4048	0.6879	0.7517	0.8068	0.8937	0.0939	372
Loans/assets	0.6969	0.2477	0.6399	0.7129	0.7788	0.9192	0.1239	372
Income diversity	0.5795	0.3295	0.5101	0.5728	0.6342	0.9934	0.1094	372
Panel B: Small sample								
Buy-and-hold returns (lagged)	1.1221	0.7404	1.0089	1.1100	1.2147	1.5867	0.1686	85
ROE	0.1066	−0.6054	0.0479	0.1733	0.2494	0.4236	0.2224	85
ROE (lagged)	0.1293	0.0293	0.0929	0.1247	0.1530	0.2405	0.0482	85
ROA	0.0106	−0.0667	0.0048	0.0169	0.0222	0.0348	0.0198	85
ROA (lagged)	0.0120	0.0024	0.0093	0.0118	0.0145	0.0207	0.0039	85
CRO in executive board	0.3647	0.0000	0.0000	0.0000	1.0000	1.0000	0.4842	85
Risk committee	0.2353	0.0000	0.0000	0.0000	0.0000	1.0000	0.4267	85
Nr. of meetings of the risk committee	4.1364	0.0000	0.0000	4.0000	7.0000	9.0000	3.2410	85
% of indep. directors in risk committee	0.5644	0.0000	0.0000	0.7917	1.0000	1.0000	0.4542	85
Nr. of directors in risk committee	3.8182	3.0000	3.0000	3.0000	5.0000	6.0000	2.3429	85
CRO reports to board	0.0824	0.0000	0.0000	0.0000	0.0000	1.0000	0.2765	85
CRO reports to CEO	0.0706	0.0000	0.0000	0.0000	0.0000	1.0000	0.2577	85
Board size	12.8909	7.0000	10.0000	13.000	15.0000	20.0000	3.0903	85
Board independence	0.7785	0.3750	0.7059	0.7857	0.8571	0.9333	0.1027	85
% directors w. finance background	0.2249	0.0556	0.1333	0.1818	0.2857	0.7500	0.1334	85
Institutional shareholdings	0.5287	0.0416	0.4009	0.5483	0.6592	0.9397	0.2012	85
G-Index	9.6747	3.0000	8.0000	10.000	12.0000	15.0000	2.8504	85
Independent nominating committee	0.7636	0.0000	1.0000	1.0000	1.0000	1.0000	0.4288	55
Combined CEO/Chair	0.7636	0.0000	1.0000	1.0000	1.0000	1.0000	0.4288	55
% of directors joining board before CEO	0.4379	0.0000	0.1111	0.4000	0.6667	1.0000	0.3423	55
% of directors older than 72	0.0856	0.0000	0.0000	0.0000	0.1500	0.5300	0.1306	55
Director non-attendance	0.0123	0.0000	0.0000	0.0000	0.0000	0.2000	0.0364	55
Busy board	0.0727	0.0000	0.0000	0.0000	0.0000	1.0000	0.2621	55
USD ownership of CEO	41,900,000	347,483	4861,831	20,000,000	41,300,000	282,000,000	63,000,000	69
Market-to-book ratio	2.1216	1.1249	1.6282	2.0019	2.4160	3.7329	0.6154	85
Total assets	63,058	2047	6008	10,058	28,482	1459,737	218,997	85
Tier 1 capital ratio	0.1013	0.0637	0.0870	0.0980	0.1125	0.1620	0.0197	85
Deposits/assets	0.6945	0.4048	0.6475	0.7044	0.7648	0.8855	0.1019	85
Loans/assets	0.6462	0.2477	0.5898	0.6708	0.7255	0.8579	0.1219	85
Income diversity	0.6311	0.3504	0.5496	0.6191	0.7000	0.9934	0.1235	85

restricted to banks for which data on additional corporate governance variables is available from RiskMetrics and Execucomp.

The results in Panel A show that, as expected, our sample banks performed very poorly during the credit crisis. The average (median) bank had a stock price performance of −38.01% (−42.85%) over the 18-month crisis period. This is comparable to, but even somewhat higher than the mean (median) bank crisis return of −51.49% (−52.34%) reported by Beltratti and Stulz

(forthcoming) for their sample of 164 international banks. In contrast, our sample banks did quite well during the 18-month period ending in December 2006 with mean (median) returns of 16.00% (13.17%). Mean *ROE* and *ROA* also decreased in the crisis of 2007/2008 as compared to their values in 2006. However, the median, 75-percentile, and maximum values increased in the crisis as compared to their 2006 values. In contrast, the minimum and 25-percentile values substantially decreased as expected. Regarding the size of our sample banks, Panel A reports a mean (median) asset value of USD 17.81 (1.27) billion for the 372 US banks. Hence, our sample includes more and smaller banks than the samples in both Beltratti and Stulz (forthcoming) and Fahlenbrach and Stulz (2011). Beltratti and Stulz (forthcoming) report a mean (median) asset value of USD 348.96 (130.18) billion for their sample of 164 international banks and Fahlenbrach and Stulz (2011) of USD 129.31 (15.50) billion for their sample of 95 US banks. Both of these samples are more comparable to our smaller sample including 85 US banks and summarized in Panel B of Table 1. The mean (and median) asset value in Panel B is USD 63.06 (10.06) billion. The average (median) *Tier 1 capital ratio* is 11.34% (10.76%), indicating that most banks in our sample are well capitalized in 2006. Even the minimum *Tier 1 capital ratio* of 5.51% is considerably higher than the prevailing regulatory requirement of 4% in 2006 (Basel Committee on Banking Supervision, 2006). For space reasons, we do not comment on the descriptive statistics of the other financial control variables.

Regarding our corporate and risk governance variables, we find that 12.63% of the banks in our sample have a CRO in their executive board in 2006. This figure is lower as compared to previously reported figures (e.g., Brancato et al., 2006; Ross, 2005). However, our sample is substantially larger and includes also smaller banks than these studies. In fact, in unreported tests, we find that the mean (median) asset value of banks with a CRO in the executive board is USD 86.30 (7.25) billion as compared to USD 7.90 (1.05) billion for banks which do not. 8.06% of our sample banks have a dedicated risk committee. Mean (median) board size is 10.77 (10) directors for 2006. This figure is smaller than those reported in Adams and Mehran (2003) and Andres and Vallelado (2008) for example. There might be two reasons for the finding of smaller boards of directors. First, our sample is substantially larger than the one in Adams and Mehran (2003) and includes smaller banks. In fact, the correlation between bank size and board size is 0.43 and statistically significant at the 1% level.[19] Second, Adams and Mehran (2003) show that there is a trend towards smaller boards in the time period from 1986 to 1999. As our descriptive statistics are based on 2006, the lower figures may partly result from this trend. The mean and median values of *Board independence* are 77.52% and 78.57%, respectively. Only three banks in our sample do not have a majority of independent directors on the board (and therefore do not fulfill the independence requirements as set forth by the NYSE). Compared to earlier studies the percentage of independent directors seems to have increased (e.g., Adams and Mehran, 2003) confirming the trend of increasing board independence induced by regulatory efforts. About one fifth (22.47%) of the directors in our sample banks have a finance background, defined as having executive experience in either a bank or an insurance company. Finally, 29.91% (25.00%) of the mean (median) bank in our sample is owned by large blockholders with an ownership stake of 5% or more.

The descriptive statistics on the smaller sample of 85 banks in Panel B reveal that the performance of these relatively larger banks was better during the crisis as compared to the return figures in Panel A, with a mean (median) return of −26.03% (−27.19%). Similarly, mean and median crisis ROE and ROA are also somewhat

higher for the sample in Panel B. Consistent with the previous discussion, the percentage of banks with a CRO in the executive board is substantially higher in this sample of larger banks (36.47% – or 31 banks). Moreover, the percentage of banks with a dedicated risk committee is substantially higher, 23.53% as compared to 8.06%, and board size is substantially larger with a mean (median) number of directors on the board of 12.89 (13.00). In contrast, the percentage of independent outside directors and directors with finance background on the board is similar between the two samples. For the firms with a risk committee, the average number of meetings of the risk committee is 4.14 times a year, the mean percentage of independent outside directors in the risk committee is 56.44%, and the average number of directors in the risk committee is 2.82. Of the 85 banks, seven banks (8.24%) have a CRO who reports directly to the board of directors. Six banks (7.06%) have a CRO who reports to the CEO. The mean (median) value of the G-Index is 9.67 (10.00). Cremers and Ferrell (2010) report a median value of 10 for their sample of approximately 1800 financial and non-financial firms in 2006. Hence, the anti-takeover protection in our sample of large US banks seems to be very similar to that of non-financial firms. 76.36% of the banks in our sample have a nominating committee that is exclusively comprised of independent directors. 76.36% of sample banks have a combined CEO/chairman position. 43.79% of directors joined the board before the current CEO took office, 8.56% of directors are older than 72 years, and only 1.23% of directors attended less than 75% of board meetings in 2006. 7.27% of boards are classified as busy, indicating that a majority of outside directors holds three or more directorships.

To obtain a first impression on potential differences between banks with a CRO in the executive board and banks, in which the CRO is not a member of the executive board, we compare the various risk management, corporate governance, and control variables between these two groups of banks. The results are reported in Table 2. Most importantly, the results show that the crisis returns do not differ significantly between banks with and banks without a CRO in the executive board. However, banks with a CRO in the executive board exhibit both higher *ROE* and *ROA*. With respect to the risk management variables, banks with a CRO in the executive board are significantly more likely to have a dedicated risk committee and to have a CRO reporting either directly to the board or to the CEO. Hence, banks with a CRO in the executive board generally have a stronger risk management. In contrast, the picture with respect to the corporate governance variables is mixed. Banks with a CRO in the executive board have higher institutional ownership, are more likely to have a nominating committee which is exclusively comprised of independent directors, and have a lower percentage of directors on the board who are older than 72 years indicating a superior corporate governance structure. However, banks with a CRO in the executive board also have a larger board on average and are more likely to combine the CEO and chairman positions which is both generally considered to indicate poorer corporate governance. The financial control variables show that banks with a CRO in the executive board are significantly larger, more likely to be diversified, and have lower *Tier 1 capital ratio*, *Deposits/assets*, and *Loans/assets*. However, to deduce some conclusive evidence with respect to the effect of the *CRO in executive board* dummy variable and the other risk management and corporate governance variables on the banks' crisis performance, we have to rely on multivariate analyses as many of the explanatory variables are correlated with each other as well as with the banks' crisis performance.

3.2. Multivariate analysis

Table 3 reports the results from regressions of *Buy-and-hold returns* on alternative sets of corporate/risk governance variables,

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[19] Consequently, board size is larger in the smaller sample reported in Panel B, containing larger banks. Mean (median) board size is 12.89 (13.00) for the sample of 85 large US banks.

Table 2
Comparisons of banks with a CRO in the executive board and other banks. The table presents a comparison of the variables used in the paper's main multivariate analyses between banks with a CRO in the executive board and banks with no CRO in the executive board. The equality of means is tested using a standard *t*-test (*p*-values are reported in the fourth column).

	CRO in exec. board		Difference	*p*-value	Nr. of obs. CRO in exec. board	
	Yes	No			Yes	No
Buy-and-hold returns	0.6151	0.6206	−0.0055	0.9219	325	47
ROE	0.1230	0.1066	0.0164**	0.0278	325	47
ROA	0.0110	0.0098	0.0012*	0.0714	325	47
Risk committee	0.3830	0.0369	0.3461***	0.0000	325	47
Nr. of meetings of risk com.	2.2581	0.6667	1.5914***	0.0044	54	31
CRO reports to board	0.1613	0.0370	0.1243**	0.0455	54	31
CRO reports to CEO	0.1935	0.0000	0.1935***	0.0006	54	31
Board size	12.2128	10.5569	1.6559***	0.0008	325	47
Board independence	0.7915	0.7728	0.0187	0.2824	325	47
% directors w. finance background	0.2090	0.2270	−0.0180	0.3210	325	47
Institutional shareholdings	0.4716	0.2749	0.1967***	0.0000	325	47
G-Index	9.8710	9.4364	0.4346	0.5054	55	31
Independent nominating committee	0.9130	0.6316	0.2814**	0.0150	38	23
Combined CEO/Chair	0.8696	0.6579	0.2117*	0.0705	38	23
% of dir. joining board before CEO	0.4356	0.4487	−0.0131	0.8856	38	23
% of directors older than 72	0.0324	0.1202	−0.0878**	0.0186	38	23
Director non-attendance	0.0180	0.0070	0.0110	0.2341	38	23
Busy board	0.0870	0.0789	0.0081	0.9138	38	23
Ln(USD ownership of CEO)	16.4248	16.4208	0.0040	0.9918	51	28
Buy-and-hold returns (lagged)	1.1333	1.1638	−0.0305	0.3578	325	47
Market-to-book ratio	1.9304	1.8798	0.0506	0.5918	325	47
Total assets	86,296.12	7899.99	78396.12***	0.0000	325	47
Tier 1 capital ratio	0.1051	0.1146	−0.0095**	0.0441	325	47
Deposits/assets	0.7043	0.7442	−0.0399***	0.0063	325	47
Loans/assets	0.6679	0.7011	−0.0332*	0.0852	325	47
Income diversity	0.6345	0.5715	0.0630***	0.0002	325	47

* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

and control variables. The regression specification reported in Column 1 only includes the set of five hand-collected corporate governance variables with availability for all 372 sample banks along with *Institutional shareholdings* and the seven control variables. The regression specification in Column 2 additionally includes the *G-Index*. Column 3 additionally includes the six corporate governance variables related to the board of directors and obtained from the RiskMetrics Directors Legacy database. Column 4 includes the five hand-collected corporate governance variables with availability for all 372 sample banks, *Institutional shareholdings*, and the measure of CEO ownership, *Ln*(*USD CEO ownership*). Adding the corporate governance variables obtained from the commercial databases substantially decreases sample size while the number of explanatory variables increases resulting in relatively small degrees of freedom in some of our regression specifications. As many of our explanatory variables turn out to be insignificant in most (or all) specifications, as a further robustness check of our results, we employ a backward stepwise regression approach to obtain a more parsimonious model. We use a 10% significance level cutoff for exclusion of variables from the model. The results are reported in Column 5.

Most importantly, the results show that the coefficients on both *CRO in executive board* and *Risk committee* are never estimated to be significant. Hence, having a CRO in the executive board and having a risk committee both do not seem to positively affect the banks' stock returns during the recent credit crisis. The coefficient on *Ln*(*Board size*) is positive and significant in all five specifications. The variable measuring the percentage of independent outside directors on the board is always negative but significant in only two specifications. This finding is consistent with Adams (2009) who shows that banks that received money from the TARP (Troubled Asset Relief Program) fund have more independent boards.

Hence, board characteristics that are usually considered good corporate governance were negatively related with bank performance during the credit crisis.[20] This finding is consistent with Beltratti and Stulz (forthcoming) and may indicate that banks were pushed by their boards to maximize shareholder wealth before the crisis and took risks that were understood to create wealth but later turned out poorly during the credit crisis. The coefficient on *% directors w. finance background* is negative in all specifications and significant in two of them. This finding contradicts the recently often heard call for having more financial experts on the board of directors. As this finding is in fact somewhat counter-intuitive, we additionally tested a broader definition of the variable *% directors w. finance background* which includes, besides former and present executive officers in a bank or insurance company, CPAs, CFAs, mutual fund, hedge fund, or private equity fund managers, REIT managers or professors in finance, economics, and accounting as directors with finance background. Based on this alternative specification, the coefficient on the *% directors w. finance background* remains negative in all specifications but is significant only in the first column (at the 5% level). The finding of a negative relation between the financial expertise of non-executive directors and bank performance in the crisis, however, is consistent with the findings of Minton et al. (2010). They show that the level of financial expertise among non-executive directors is positively related to risk taking before and during the financial crisis, better stock performance before the crisis, but worse performance in the crisis. The coefficient on *Institutional shareholdings* is negative and statistically significant in all five

[20] Adams and Mehran (2003) provide an additional (or alternative) explanation for a positive relation between board size and bank performance: The size of bank boards may need to be larger, at least as compared to industrial firms, due to a higher complexity of the business and the related advisory requirements.

Table 3

Regressions of buy-and-hold returns on corporate governance variables. The table reports the results from OLS regressions of *Buy-and-hold returns* on alternative sets of risk and corporate governance variables and control variables. *Buy-and-hold returns* are the banks' stock returns over the 18-month period from July 2007 to December 2008. *Buy-and-hold returns* (lagged) are the banks' stock returns over the 18-month period from July 2005 to December 2006. Variable definitions are provided in Table 1. The selection of explanatory variables in Column 5 is based on a backward stepwise regression approach with a 10% significance level cutoff for exclusion of variables from the model. *t*-Statistics are reported in parentheses.

Dependent variable: *Buy-and-hold returns* (from July 1, 2007, to December 31, 2008)					
	(1)	(2)	(3)	(4)	(5)
Constant	1.190***	2.504***	2.417**	2.896***	0.636***
	(3.064)	(2.786)	(2.427)	(2.750)	(3.166)
CRO in executive board	−0.024	−0.071	−0.052	−0.095	
	(−0.423)	(−1.145)	(−0.576)	(−1.321)	
Risk committee	−0.093	0.076	0.100	−0.010	
	(−1.190)	(0.968)	(0.912)	(−0.103)	
Ln(Board size)	0.214***	0.293**	0.327*	0.377**	0.236***
	(3.167)	(2.061)	(1.848)	(2.171)	(4.198)
Board independence	−0.321*	−0.536	−1.400***	−0.844	
	(−1.792)	(−1.016)	(−3.267)	(−1.552)	
% directors w. finance background	−0.378**	−0.295	−1.027**	−0.203	
	(−2.328)	(−0.820)	(−2.245)	(−0.436)	
Institutional shareholdings	−0.242**	−0.466**	−0.237	−0.352	−0.226***
	(−2.427)	(−2.252)	(−0.591)	(−1.542)	(−2.895)
G-Index		−0.009			
		(−0.777)			
Independent nominating committee			0.161		
			(1.167)		
Combined CEO/Chair			−0.004		
			(−0.025)		
% of directors joining board before CEO			−0.005		
			(−0.035)		
% of directors older than 72			0.415		
			(1.341)		
Director non-attendance			−1.860		
			(−1.430)		
Busy board			−0.066		
			(−0.389)		
Ln(USD ownership of CEO)				−0.037	
				(−1.206)	
Buy-and-hold returns (lagged)	−0.275***	0.312	0.499	−0.205	−0.273***
	(−3.453)	(1.252)	(1.601)	(−0.872)	(−3.469)
Market-to-book ratio	0.154***	0.127**	0.139*	0.123	0.169***
	(4.863)	(2.109)	(1.693)	(1.570)	(6.104)
Ln(Total assets)	0.018	−0.103**	−0.098*	−0.048	
	(0.827)	(−2.385)	(−1.906)	(−0.944)	
Tier 1 capital ratio	0.835	1.773	0.027	0.692	1.077*
	(1.327)	(0.788)	(0.007)	(0.247)	(1.929)
Deposits/assets	−0.118	−0.678	−0.494	−0.055	
	(−0.513)	(−1.275)	(−0.656)	(−0.080)	
Loans/assets	−0.909***	−0.730**	−0.858**	−1.383***	−0.895***
	(−6.188)	(−2.470)	(−2.375)	(−4.165)	(−6.742)
Income diversity	−0.232	−0.845**	−0.656*	−0.511	
	(−1.226)	(−2.301)	(−1.702)	(−1.283)	
Observations	372	86	61	79	372
R-squared	0.257	0.477	0.545	0.416	0.236

* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

specifications. Hence, blockholders do not seem to have been able to provide effective monitoring with respect to the risks taken in the banks. The coefficients on the *G-Index*, all six board characteristics obtained from RiskMetrics as well as on the CEO's USD ownership are all insignificant.

Consistent with Beltratti and Stulz (forthcoming), we find a negative and significant coefficient on the lagged buy-and-hold returns in Columns 1 and 5. This finding is also consistent with the notion that banks that suffered the most in the crisis appeared to have policies that the market favored before the crisis. However, this result does not hold in our smaller samples in Columns 2–4. Also Fahlenbrach and Stulz (2011) find no significant relation between the banks' stock returns in the crisis and pre-crisis returns. The coefficient on the market-to-book ratio is always positive and significant in four of the five specifications. This finding is

consistent with Fahlenbrach and Stulz (2011), reporting a negative relation between the book-to-market ratio and crisis returns. Possibly banks with low market valuations (and growth potential) in 2006 took larger risks which then turned out poorly. The coefficient on the variable *Loans/assets* is estimated to be negative and significant in all five columns. Hence, our sample banks seem to have held mainly low-risk securities, such as government bonds, instead of loans. Beltratti and Stulz (forthcoming) also report negative but mostly insignificant coefficients on this variable. It is important to note that in our sample of commercial banks and savings institutions the mean and median values of *Loans/assets* are very high, 69.69% and 71.29%.[21] The coefficient on *Income diversity*

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[21] The respective values in Beltratti and Stulz (2011) are 55.82% and 58.71%.

is estimated to be negative in all four specifications, and is significant in two. This result is consistent with Laeven and Levine (2007) and Schmid and Walter (2009) who both show that a functional diversification of financial institutions is negatively associated with firm value. However, the finding that diversification is negatively associated with the banks' returns in the credit crisis is surprising as we would expect that this is exactly when the benefits of diversification are most important. Hence, either diversification is associated with so many cost-driving problems reducing the banks' profitability that even in financial crises the costs of diversification outweigh the benefits and/or the commercial banks and savings institutions in our sample diversified into activity areas that were hit even harder by the crisis. In fact, in unreported tests, we find that a higher value of *Income diversity* is associated with a larger share of other operating income (fees, commissions, and trading income) as compared to total operating income indicating investment banking activities (the correlation is 0.57 and significant at the 1% level). The coefficients on all other control variables are mostly insignificant.

Table 4 reports the results of the same five regressions as reported in Table 3 but augmented with the three additional variables related to risk governance: *Nr. of meetings of the risk committee*, *CRO reports to board*, and *CRO reports to CEO*.[22] The results show that once we control for these additional risk management characteristics, the coefficient on *Risk committee* is negative and significant in Columns 1, 2, and 5 while the coefficient on *Nr. of meetings of the risk committee* is positive and significant in these three columns. Hence, simply having a risk committee does not seem to be beneficial for the banks' crisis performance. However, having a more dedicated committee that meets more frequently seems to positively affect the banks' performance in the crisis. Most importantly, however, the results in Table 4 show that banks, in which the CRO reports directly to the board of directors, perform significantly better during the credit crisis than other banks. This result supports our initial hypothesis that risk governance in general and the line of reporting of the CRO in particular are important to the banks' crisis performance. Our empirical results support the many qualitative statements about the importance of an effective reporting line from the CRO to the board of directors (e.g., Mongiardino and Plath, 2010; Sabato, 2010). In contrast, banks in which the CRO reports to the CEO perform significantly worse, which is congruent with our hypothesis that the CEO may have a different agenda than the CRO, thus neglecting the importance of risk and emphasizing the growth of assets without a defined risk appetite strategy. The results with respect to all other corporate governance (and financial control) variables remain qualitatively unchanged.

Fahlenbrach et al. (2011) show that banks that performed poorly during the 1998 crisis, which was considered at the time to be the most dramatic crisis since the Great Depression, also performed poorly in the crisis of 2007/2008. Hence, in the first two columns of Table 5, we additionally control for the banks' performance during the crisis of 1998. Following Fahlenbrach et al. (2011), we calculate the 1998 crisis performance as the buy-and-hold return starting on August 3, 1998, the first trading day in August 1998, and calculated until the lowest share price of the respective bank's stock is reached within the year 1998. Column 1 of Table 5 replicates the first column of Table 3 and Column 2 of Table 5 replicates the first column of Table 4, both augmented with the 1998 crisis performance as additional explanatory variable. Of the 372 (85) banks in the large (small) sample, 248 (75) already existed in 1998. The results for the large sample in Column 1 are consistent with the results in Fahlenbrach et al. (2011) and show that banks which performed poorly

(well) in the crisis of 1998 also performed poorly (well) in the recent crisis of 2007/2008. Moreover, our results show that the pre-crisis performance from July 2005 to December 2006 is negatively related to the 2007/2008-crisis performance. Hence, while there is persistence in crisis performance, the pre-crisis performance remains negatively related to the crisis performance indicating that well-performing banks in a good/normal market environment are poor performers in the crisis and vice versa. In the smaller sample of 75 banks, the coefficients on both variables measuring past performance are insignificant. Finally and most importantly, our results with respect to the corporate and risk governance measures are robust to the inclusion of the 1998-crisis performance in both columns.

In Columns 3 and 4 of Table 5, we replace *Buy-and-hold returns* as dependent variable by *ROE*. As the results remain qualitatively similar as in Tables 2 and 3, we only report the results for the specifications in Columns 1 and 5 of Table 4. The specification in Column 1 includes the original five hand-collected governance variables included in Table 3, the three additional hand-collected governance variables related to the banks' risk management as included in Table 4, and *Institutional shareholdings*. Column 5 repeats the backward stepwise regression approach with *ROE* as dependent variable. The choice of governance/risk variables is the same as in Column 5 in Table 4, with one additional variable chosen (*Ln(Board size)*). The coefficients on the *G-Index*, the six board characteristics from RiskMetrics, and CEO ownership are never estimated to be significant and further reduce sample size while the reported results remain similar. Therefore, we do not report further specifications including these variables for space reasons. Most importantly, the coefficient on *CRO reports to board* remains positive and significant and the coefficient on *CRO reports to CEO* remains negative and significant in both specifications. The coefficient on *Risk committee* is negative and significant while the coefficient on *Nr. of meetings of the risk committee* is positive and significant in both specifications. Hence, the results in Table 5 confirm the previous finding in Table 4 that just having a risk committee does not necessarily help banks' crisis performance. However, having a more dedicated committee that meets more frequently seems to positively affect the banks performance in the crisis. An important difference as compared to Tables 2 and 3 is that the coefficient on *Board independence* is now insignificant in Column 3 and not included in Column 4. In contrast, the coefficients on both *Ln(Board size)* and *Institutional shareholdings* remain negative and significant in both specifications.

We perform a number of additional robustness tests. First, we reestimate the regressions in all three multivariate tables and include the eight corporate governance variables from all three commercial databases (RiskMetrics Governance, RiskMetrics Board, and ExecuComp). This further reduces sample size and increases the number of regressors resulting in low degrees of freedom (in Table 4 this results in 54 observations and 24 regressors). Therefore, we do not report these results in our tables, but consider this to be a particularly strong robustness test of our main results. Second, and as explained in Section 2.2, we use the alpha from a Carhart (1997) four factor model instead of raw returns as a measure of the banks' crisis performance. Third, we extend the crisis period to include the 21 months from July 2007 to March 2009 for both the buy-and-hold returns as well as the Carhart (1997) alpha. Fourth, we alternatively define *ROE* (and also *ROA*) as the banks' cumulative net income over the years 2007 to 2009, divided by the book value of equity (total assets) as of year end 2006. Next, we include leverage and the natural logarithm of bank age as additional control variables in the regressions. Finally, we repeat all analyses and omit the winsorizing of the variables *Buy-and-hold returns*, *Buy-and-hold returns* (*lagged*), *ROE*, *ROE* (*lagged*), *Market-to-book ratio*, *Tier 1 capital ratio*, *Deposits/assets*, and *Loans/assets*.

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[22] As explained in Section 2.3, to conserve some degrees of freedom, we do not include the variables *Nr. of directors in risk committee* and *% of indep. directors in risk committee* in any of the reported regression specifications as they are never estimated to be significant.

Table 4

Regressions of buy-and-hold returns on extended set of corporate and risk governance variables. The table reports the results from OLS regressions of *Buy-and-hold returns* on alternative sets of risk and corporate governance variables and control variables. *Buy-and-hold returns* are the banks' stock returns over the 18-month period from July 2007 to December 2008. *Buy-and-hold returns* (*lagged*) are the banks' stock returns over the 18-month period from July 2005 to December 2006. Variable definitions are provided in Table 1. The selection of explanatory variables in Column 5 is based on a backward stepwise regression approach with a 10% significance level cutoff for exclusion of variables from the model. *t*-Statistics are reported in parentheses.

Dependent variable: Buy-and-hold returns (from July 1, 2007, to December 31, 2008)					
	(1)	(2)	(3)	(4)	(5)
Constant	1.262	1.507[*]	2.275[*]	0.841	0.300
	(1.547)	(1.844)	(2.001)	(0.865)	(1.096)
CRO in executive board	−0.040	−0.015	0.009	−0.066	
	(−0.636)	(−0.232)	(0.101)	(−0.864)	
Risk committee	−0.307[**]	−0.351[***]	−0.337	−0.231	−0.494[***]
	(−2.607)	(−2.903)	(−1.489)	(−1.283)	(−5.988)
Nr. of meetings of the risk committee	0.048[**]	0.056[**]	0.056	0.041	0.071[***]
	(2.338)	(2.572)	(1.441)	(1.552)	(4.938)
CRO reports to board	0.241[***]	0.253[***]	0.326[**]	0.288[***]	0.241[***]
	(2.829)	(2.938)	(2.487)	(2.699)	(4.046)
CRO reports to CEO	−0.278[**]	−0.316[**]	−0.371[**]	−0.304[*]	−0.303[***]
	(−2.007)	(−2.275)	(−2.146)	(−1.810)	(−3.742)
Ln(Board size)	0.240[*]	0.268[**]	0.308[*]	0.290[**]	
	(1.879)	(2.053)	(1.676)	(2.164)	
Board independence	−0.035	−0.043	−1.157[**]	0.197	
	(−0.074)	(−0.087)	(−2.523)	(0.314)	
% directors w. finance background	−0.126	−0.145	−0.956[*]	−0.159	
	(−0.402)	(−0.444)	(−2.029)	(−0.414)	
Institutional shareholdings	−0.713[***]	−0.677[***]	−0.278	−0.794[***]	−0.731[***]
	(−4.463)	(−3.832)	(−0.733)	(−3.204)	(−6.114)
G-Index		−0.005			
		(−0.502)			
Independent nominating committee			0.087		
			(0.567)		
Combined CEO/Chair			−0.055		
			(−0.354)		
% of directors joining board before CEO			0.075		
			(0.430)		
% of directors older than 72			0.183		
			(0.418)		
Director non-attendance			−2.415[*]		
			(−1.784)		
Busy board			0.229		
			(1.492)		
Ln(USD ownership of CEO)				0.032	
				(0.961)	
Buy-and-hold returns (lagged)	0.318	0.202	0.351	0.392	
	(1.529)	(0.894)	(1.113)	(1.486)	
Market-to-book ratio	0.117[*]	0.131[**]	0.100	0.146[*]	0.122[**]
	(1.958)	(2.154)	(1.206)	(1.905)	(2.174)
Ln(Total assets)	−0.059	−0.057	−0.090	−0.083	
	(−1.276)	(−1.182)	(−1.405)	(−1.483)	
Tier 1 capital ratio	3.450	3.291	−0.555	2.226	5.885[***]
	(1.518)	(1.417)	(−0.130)	(0.743)	(3.171)
Deposits/assets	−0.620	−0.729	−0.202	−0.722	
	(−1.411)	(−1.592)	(−0.247)	(−1.326)	
Loans/assets	−0.429	−0.492[*]	−0.729[**]	−0.496	
	(−1.395)	(−1.657)	(−2.038)	(−1.435)	
Income diversity	−0.544[*]	−0.658[*]	−0.553	−0.629[*]	
	(−1.686)	(−1.816)	(−1.239)	(−1.662)	
Observations	85	85	55	69	85
R-squared	0.540	0.545	0.607	0.507	0.464

[*] Significance at the 10% level.
[**] Significance at the 5% level.
[***] Significance at the 1% level.

The results of all these robustness tests remain qualitatively similar and therefore are not reported in tables for space reasons.

4. Conclusion

In this paper, we analyze the influence of bank-specific corporate governance, and in particular "risk governance" characteristics on the performance of banks during the financial crisis. Most importantly, our results show that banks, in which the CRO reports directly to the board of directors, perform significantly better in the financial crisis while banks in which the CRO reports to the CEO perform significantly worse than other banks in our sample. This result supports our initial hypothesis that risk governance in general and the reporting line of the CRO in particular are important to the banks' crisis performance as the CEO and CRO may have conflicting interests and if the CRO reports to the CEO, the risk agenda may not receive the appropriate attention.

In contrast, and consistent with Beltratti and Stulz (forthcoming) and Fahlenbrach and Stulz (2011), we find either no significant or even a negative relation between a bank's performance during the crisis and standard corporate governance variables such as

Table 5

Regressions of buy-and-hold returns and ROE on extended set of corporate and risk governance variables. The table reports the results from OLS regressions of *Buy-and-hold returns* (Columns 1 and 2) and *ROE* (Columns 3 and 4) on alternative sets of risk and corporate governance variables and control variables. *Buy-and-hold returns* are the banks' stock returns over the 18-month period from July 2007 to December 2008. *Buy-and-hold returns* (*lagged*) are the banks' stock returns over the 18-month period from July 2005 to December 2006. *Buy-and-hold returns* (*1998*) are the banks' buy-and-hold returns starting on August 3 1998, the first trading day in August, and calculated until the lowest stock price is reached until year end of 1998 (see Fahlenbrach et al., 2011). *ROE* is the banks' cumulative net income over the years 2007 and 2008, divided by the book value of equity as of year end 2006. *ROE* (*lagged*) is the banks' net income divided by the book value of equity, both variables as of year end 2006. Variable definitions are provided in Table 1. The selection of explanatory variables in Column 4 is based on a backward stepwise regression approach with a 10% significance level cutoff for exclusion of variables from the model. *t*-Statistics are reported in parentheses.

Dependent variable	Buy-and-hold returns (July 07 to December 08)		ROE	
	(1)	(2)	(3)	(4)
Constant	1.041**	1.212	−0.534	0.318
	(2.183)	(1.323)	(−0.860)	(1.009)
CRO in executive board	−0.007	−0.016	0.004	
	(−0.111)	(−0.231)	(0.094)	
Risk committee	−0.085	−0.286**	−0.244**	−0.245***
	(−1.159)	(−2.172)	(−2.517)	(−2.789)
Nr. of meetings of the risk committee		0.045**	0.046***	0.040***
		(2.034)	(3.114)	(3.014)
CRO reports to board		0.294***	0.095**	0.067*
		(3.152)	(2.008)	(1.924)
CRO reports to CEO		−0.315**	−0.166**	−0.115*
		(−2.222)	(−2.077)	(−1.819)
Ln(Board size)	0.245***	0.294**	0.165	0.198**
	(2.896)	(2.266)	(1.612)	(2.113)
Board independence	−0.214	−0.473	0.068	
	(−0.871)	(−0.935)	(0.191)	
% directors w. finance background	−0.505**	−0.595**	−0.079	
	(−2.289)	(−2.218)	(−0.262)	
Institutional shareholdings	−0.074	−0.590***	−0.221*	−0.233**
	(−0.602)	(−2.829)	(−1.871)	(−2.079)
Buy-and-hold returns (1998)	0.451***	0.105		
	(2.825)	(1.010)		
ROE (lagged)			−0.123	1.574***
			(−0.161)	(3.509)
Buy-and-hold returns (lagged)	−0.324***	0.202	0.089	
	(−3.211)	(1.080)	(0.579)	
Market-to-book ratio	0.174***	0.117*	0.168**	
	(4.696)	(1.744)	(2.550)	
Ln(Total assets)	−0.022	−0.057	0.047**	
	(−1.043)	(−1.102)	(2.024)	
Tier 1 capital ratio	−0.881	2.819	1.852	
	(−1.001)	(1.303)	(1.573)	
Deposits/assets	0.073	−0.151	−0.127	
	(0.255)	(−0.314)	(−0.413)	
Loans/assets	−0.886***	−0.428	−0.333	−0.610**
	(−4.946)	(−1.240)	(−1.578)	(−2.496)
Income diversity	−0.276	−0.545	−0.733***	−0.608***
	(−1.203)	(−1.516)	(−3.241)	(−2.806)
Observations	248	75	85	85
R-squared	0.283	0.574	0.530	0.393

* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

CEO ownership, board independence, or shareholder rights as proxied by the G-Index of Gompers et al. (2003). This may indicate that banks were pushed by their boards to maximize shareholder wealth before the crisis and took risks that were understood to create wealth but later turned out poorly in the credit crisis.

Hence, our results show that standard governance measures as used in a large body of literature on corporate governance and its valuation effect in non-financial firms may fall short in describing the relevant governance structure of banks, in particular with respect to their crisis performance. Our results highlight the importance of the so-called "risk governance" in banks. Specifically, we conclude that banks, to be better prepared to face the next financial crisis, have to significantly improve the quality and profile of their risk management function, but also embed the appropriate risk governance having CEO and CRO at the same level, ideally both reporting to the board of directors. This, however, may come at the cost of a lower performance in a normal (i.e., non-crisis) market environment.

Acknowledgements

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