### Bank Board Structure and Performance: Evidence for Large Bank Holding Companies

Renée B. Adams<sup>1</sup>

Hamid Mehran<sup>2</sup>

University of Queensland and ECGI

Federal Reserve Bank of New York

#### Abstract

The subprime crisis highlights how little we know about the governance of banks. This paper addresses a long-standing gap in the literature by analyzing the relationship between board governance and performance using a sample of banking firm data that spans 34 years. We find that board independence is not related to performance, as measured by a proxy for Tobin's Q. However, board size is positively related to performance. We propose a new instrument for board size, a measure of flight availability to BHC headquarters. Reverse causality does not appear to be driving our results. They also do not appear to be driven by M&A activity. We provide new evidence that increases in board size due to the addition of directors who also hold subsidiary directorships appear to add value as BHC complexity increases. We conclude that banks may have unique features that suggest caution in applying regulations motivated by research on the governance of non-financial firms to banking firms.

JEL classification: G34; G21; J41; L22

Keywords: Corporate Governance; Board Structure; Banking Industry; Holding Company; Complexity

<sup>&</sup>lt;sup>1</sup>Corresponding Author. UQ Business School, University of Queensland, Brisbane, QLD 4072, Australia. Telephone: +61-7-3346 8001. E-mail: r.adams@business.uq.edu.au.

<sup>&</sup>lt;sup>2</sup>33 Liberty Street, New York, NY 10045-0001. Telephone: (212) 720-6215. Fax: (212) 720-1582. The views in this paper are my own and do not reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System.

### Bank Board Structure and Performance: Evidence for Large Bank Holding Companies

#### Abstract

The subprime crisis highlights how little we know about the governance of banks. This paper addresses a long-standing gap in the literature by analyzing the relationship between board governance and performance using a sample of banking firm data that spans 34 years. We find that board independence is not related to performance, as measured by a proxy for Tobin's Q. However, board size is positively related to performance. We propose a new instrument for board size, a measure of flight availability to BHC headquarters. Reverse causality does not appear to be driving our results. They also do not appear to be driven by M&A activity. We provide new evidence that increases in board size due to the addition of directors who also hold subsidiary directorships appear to add value as BHC complexity increases. We conclude that banks may have unique features that suggest caution in applying regulations motivated by research on the governance of non-financial firms to banking firms.

JEL classification: G34; G21; J41; L22

Keywords: Corporate Governance; Board Structure; Banking Industry; Holding Company; Complexity

#### 1 Introduction

Most studies of board effectiveness exclude financial firms from their samples. As a result, we know very little about the effectiveness of banking firm governance.<sup>3</sup> But it has arguably never been as important to understand the governance of banking firms as it is now following the subprime mortgage crisis. This financial crisis differs from previous financial crises in that bank governance is being accorded a large part of the blame for the crisis. For example, the Organization for Economic Co-Operation and Development (OECD) Steering Group on Corporate Governance argues that board failures in financial firms are a major cause of the financial crisis (Kirkpatrick, 2009) and has launched an action plan to improve their governance. Similarly, the U.K. government commissioned Sir David Walker to recommend measures to improve board-level governance at banks.

But, in order to evaluate and propose changes to banking firms' governance structures, it is important to understand how banks are typically governed and whether and how banking firm governance differs from the governance of unregulated firms. This last issue is particularly important since many governance reform proposals are motivated by studies of non-financial organizations. For example, the Walker Review (Walker, 2009, p. 41) points out that the boards of listed U.K. banks in 2007/8 were larger than those of other listed companies. This is problematic because of "a widely-held view that the overall effectiveness of the board, outside a quite narrow range, tends to vary inversely with its size. That view would probably tend to converge around an "ideal" size of 10-12 members,... This view appears to be confirmed by behavioral studies of group size as described briefly..., attached as Annex 4." Annex 4 describes that a problem with large boards is that they suffer, amongst other problems, from "groupthink" and argues that the optimal group size is less than 12 peo-

<sup>&</sup>lt;sup>3</sup>Prior to the financial crisis, relatively few papers specifically analyzed the effectiveness of board structure in banking firms. Some exceptions were Brickley and James (1987) who used interstate branching restrictions in banking to examine whether internal control through the board substitutes for external control (the takeover market) in a cross-section of banks in 1979. Contrary to the substitution hypothesis, they found that banks from states with takeover restrictions had fewer outside directors than banks from other states. Brewer, Jackson and Jagtiani (2000) examined the effect of governance characteristics on merger premiums in banking during the 1990s. They found bid premiums increase with the independence of the target's board and that they are not affected by target board size. Byrd, Fraser, Lee and Williams (2001) examined the effect of internal governance arrangements on the probability that a thrift survives the thrift crisis of the 1980s. They found that firms which survived the crisis had a greater proportion of independent directors on the board. Adams (2009b) discusses additional literature.

ple. In support of the "groupthink" argument, the annex cites Janis (1972) which describes foreign-policy failures of governmental organizations. In support of the group size argument, the annex cites Dunbar (1993) which is a study extending findings concerning group size in non-human primates to modern humans. Thus, the suggestion that bank boards are too big in the Walker Review does not appear to take any special features of banks into account.<sup>4</sup>

The fact that bank boards are larger in the U.K. than those of other listed firms mirrors the findings for the U.S. (e.g. Adams and Mehran, 2003; Adams, 2009a; Booth, Cornett and Tehranian, 2002, Kroszner and Strahan, 2001). Moreover, this difference appears to be persistent since it has been documented for various time periods. Kroszner and Strahan, (2001) find for the 1992 Forbes 500 that banks have larger boards and a lower fraction of insiders than non-financial firms, even adjusting for firm size. Booth, Cornett and Tehranian (2002) compare the 100 largest banks to the 100 largest industrial firms in 1999 and find that they have larger boards with a greater proportion of outsiders. Adams and Mehran (2003) find that bank boards are larger and more independent over the period 1986-1999 using a sample of 35 large bank holding companies and data on large manufacturing firms from Yermack (1996), amongst others. Adams (2009a) finds that bank boards are larger and more independent than non-financial firms in the Riskmetrics database of S&P 1500 firms from 1996-2007.

Banks clearly appear to have different governance structures than non-financial firms. The question is whether these governance structures are ineffective, as the Walker Review seems to suggest. The purpose of this paper is to try to provide an answer to this question by examining the relationship between board composition and size and bank performance. We focus on large, publicly traded bank holding companies (BHCs) in the U.S., which are the banks that are mentioned most often in the context of the crisis.

Traditionally, the literature on board effectiveness argues that firm value will increase as boards become more independent because independent outsiders are considered to be more effective monitors of management and may also provide valuable advisory services to the firm (Boone, Fields, Karpoff and Raheja, 2007; Coles, Daniel and Naveen, 2008; Lehn, Patro and Zhao, 2008; Linck, Netter and Yang, 2008). From this perspective, the fact that bank boards are more independent than those of non-financial firms appears to be a good thing.

<sup>&</sup>lt;sup>4</sup>The Walker Review (2009) refrains from making a specific recommendation concerning board size because of a general argument that "decisions on board size will depend on particular circumstances, including the nature and scope of the business entity, its organizational structure and leadership style." (p. 41). This argument also does not appear to be made on the basis of any research on banks.

However, the relationship between board composition and performance for non-financial firms is inconclusive (Hermalin and Weisbach, 2003). One potential cost of outsiders is that they lack valuable firm-specific information, which some have argued has been a particular problem for banks during the financial crisis (e.g. Kirkpatrick, 2009; Walker, 2009). Thus, it is not clear that we should expect bank performance to increase in independence.

The opinions described in the Walker Review cited above suggest that there should be a negative relationship between bank board size and performance due to the costs of decisionmaking in large groups. The evidence for non-financial firms is consistent with the idea that, on average, the costs of large boards outweigh their benefits.<sup>5</sup> For example, Yermack (1996) finds that, on average, firm performance is lower for non-financial firms with larger boards in a sample from 1984-1991. Coles, Daniel and Naveen (2008) find similar results in a sample of non-financial firms from 1992-2001 (regressions not reported, but see Panel A of Figure 2). However, recent literature examining determinants of board size and composition suggests that larger and more complex firms will require more advice from their boards and thus have larger boards (e.g. Boone, Fields, Karpoff and Raheja, 2007; Coles, Daniel and Naveen, 2008; Lehn, Patro and Zhao, 2008 and Linck, Netter and Yang, 2008). Consistent with this argument, Coles, Daniel and Naveen (2008) and Graham, Hazarika and Narasimhan (2008) find that larger boards appear to add value in more complex firms. Because large publicly traded banks can all be considered to be complex, it is plausible that the relationship between board size and performance is positive for BHCs even though their boards are larger than in non-financial firms.

We examine the relationship between board composition and size and performance in a sample of data on 35 BHCs from 1986-1999. Since we hand collected governance characteristics from proxy statements, we deliberately focused on a relatively small number of BHCs over a longer period of time to ensure that there would be sufficient variation in governance variables which typically do not change much over time. In addition, we collected detailed data on variables that have received attention in the law, economics, and organization literature and which are recognized to be correlated with sound corporate governance, but that are generally not studied as a group due to high data collection costs. Since internal governance mechanisms are ultimately simultaneously chosen, the richness of this data enables us to limit omitted variable bias in performance regressions both by using firm fixed effects and by controlling for possible interdependencies among governance mechanisms. To investigate

<sup>&</sup>lt;sup>5</sup>Hermalin and Weisbach (2003) argue that the consensus in the economic literature is that an increase in board size will have a negative effect on firm performance.

alternative explanations for our findings, we extend this sample by collecting data on board size, board composition and performance for these banking firms from 1964-1985. Our data provides information on bank governance over a 34 year time period prior to the recent governance reform movement embodied in the Sarbanes-Oxley Act of 2002 and revised listing requirements at the major exchanges. Thus, it helps us document persistent governance choices banks have made in the absence of strong external governance pressure. As such, it serves as a useful baseline against which to analyze any proposed governance changes.

Consistent with previous studies in governance (e.g. Caprio, Laeven and Levine, 2007), we examine the relationship between banking firm board structure and performance as proxied by a measure of Tobin's Q. As in many studies of non-financial firms, we find that the proportion of independent outsiders on the board is not significantly related to performance. However, in contrast to the findings for non-financial firms in Yermack (1996), Eisenberg, Sundgren and Wells (1998) and Coles, Daniel and Naveen (2008), the natural logarithm of board size is, on average, positively related to Tobin's Q in our sample.

Since we use firm fixed-effects in our regressions, this finding is consistent with the idea that increases in board size add value because banks are growing in complexity over time. However, we cannot give it a causal interpretation without first investigating several possible alternative explanations. An obvious concern is reverse causality. For example, CEOs of BHCs may like to increase board size to increase their control as Jensen (1993) argues. Since potential directors presumably prefer to join boards of firms that are performing well, we would observe board size increasing when BHCs perform well. Thus, the positive coefficient on board size in our performance regressions may be picking up a causal relationship from performance to board size rather than the other way around. In order to address this endogeneity problem, we need an instrumental variable that is correlated with board size but uncorrelated with performance except through variables already included in our regression. As our instrument, we use a measure of flight availability to airports in the cities in which BHC headquarters are located. We argue that this is a measure of the cost of recruiting advisors and as such should be correlated with board size. On the other hand, we believe it is uncorrelated with performance because we control for location by using firm fixed-effects.

Using our instrument, we perform a Hausman test of the hypothesis that board size is uncorrelated with the error term and find that we cannot reject the null. To the extent that our instrument is valid, this suggests that endogeneity of board size due to reverse causality is not a big concern. However, another concern is that our results could be driven

by endogeneity due to omitted variables relating to M&A activity. The time period of our sample was a period of active consolidation in the banking industry as a consequence of the deregulation of interstate banking restrictions. It is common to add directors of target firms to the board of the acquirer in friendly acquisitions (e.g. Lehn, Patro and Zhao, 2008), as most banking M&As are. Since M&A activity is plausibly correlated with performance, as well as board size, our findings could be driven by omitted variables relating to M&A activity. We investigate this possibility but find little evidence that M&A activity is driving our results. For example, we find that board size is positively correlated with performance during the period 1965-1985, a period in which there was relatively little M&A activity because of regulatory restrictions on interstate banking.

Of course, it is possible that other sources of endogeneity exist than the ones we consider here. However, in addition to controlling for a wide range of governance variables and firm fixed-effects, we examined the two sources which seemed the most plausible to us given the nature of the banking industry. At this stage, our results are at least suggestive that for banking firms the advantages of larger boards may outweigh their costs.

To further increase confidence in this result, we examine whether the value of large boards appears to be driven by BHC complexity, similar to Coles, Daniel and Naveen (2008) and Graham, Hazarika and Narasimhan (2008). We examine measures of operational, geographic and financial complexity, but do not generally find that large boards add more value as BHC complexity grows. We argue that one reason for this may be that some directors are more suited than others to help the BHC's management deal with complexity. In particular, BHC directors often have subsidiary directorships. It is plausible that these directors play a particular role in coordinating activities in the holding company and thus dealing with complexity. Consistent with this argument, we find that when complexity increases, firm performance improves when BHCs have more of their directors sitting on subsidiary boards. Our conclusion is that there may be several reasons why large boards add value in BHCs. But, one reason appears to be that larger boards may contain a larger number of directors who also sit on subsidiary boards. It is plausible that these directors are more informed about the workings of the institution as a result of their additional service, so that their advice is particularly useful in helping the BHC's management deal with complexity.

Our paper contributes to the literature in several ways. First, to our knowledge we analyze the most extensive time series of data on bank board governance in the literature. Our paper complements other papers examining governance over long periods of time, e.g.

Koles and Lehn (1999) who analyze the governance of the U.S. airline industry over a 22 year period and Lehn, Patro and Zhao (2008) who examine determinants of the size and structure of boards of 82 manufacturing firms from 1935-2000. Second, our paper complements a stream of research documenting that shareholder governance mechanisms, such as ownership, are important for bank behavior. Barth, Caprio and Levine (2004) find in a sample of 107 countries that bank development, performance and stability are higher in countries with more private-sector control of banks. Laeven and Levine (2008) show that private ownership by banks is related to their risk-taking and Caprio, Laeven and Levine (2007) show, amongst others, that bank valuations are higher in countries with stronger shareholder protection laws after controlling for the effect of bank regulation. Similarly, we show that board-level governance mechanisms, such as size and composition, are related to bank valuations. Because the BHCs in our sample all have the same regulator, the Federal Reserve, our results also control for the effect of regulation at the BHC level.

Our paper also complements the literature on non-financial firms arguing that some firms may benefit from large boards (e.g. Boone, Fields, Karpoff and Raheja, 2007; Coles, Daniel and Naveen, 2008; Lehn, Patro and Zhao, 2008 and Linck, Netter and Yang, 2008). However, in our sample, increases in board size are not generally value-enhancing as firm complexity increases, in contrast to Coles, Daniel and Naveen (2008) and Graham, Hazarika and Narasimhan (2008). Instead, increases in board size due to additions of directors who also sit on subsidiary boards appear to be important. As far as we know, there is no literature documenting that subsidiary directorships are common in non-financial firms. We appear to be the first to document that such subsidiary directorships may be important for banks. Overall our findings highlight the need to exercise caution in reforming bank governance following the subprime mortgage crisis. Simply adopting proposals that are largely motivated by research on non-financial firms are unlikely to be effective.

Because our firms are banks, it is natural to ask whether our findings are driven by regulatory constraints on their boards. Thus, we first review regulation concerning governance in Section 2. We describe that there are few bank regulations pertaining to governance. However deregulation may have had an impact on our results, which we analyze in terms of M&A activity later in the paper. Next, we discuss theoretical predictions concerning the relationship between board structure and performance. Section 3 describes the data. This Section also presents an analysis of the representativeness of our sample. In Sections 4, we investigate the relation between board structure and firm value using OLS. Section 5 presents our instrumental variable analysis. We analyze the role of M&A activity and com-

plexity in Section 6. In this Section we also examine the role of subsidiary directorships. We examine the robustness of our performance results to using return on assets as an alternative performance measure in Section 7. We conclude in Section 8.

#### 2 BHC boards and performance

The theoretical governance literature argues that boards fulfill their duties of advising and monitoring management by choosing board composition and size appropriately (Adams and Ferreira, 2007; Harris and Raviv, 2008; Raheja, 2005). The empirical literature on non-financial firms finds evidence consistent with this view (e.g. Boone, Fields, Karpoff and Raheja, 2007; Coles, Daniel and Naveen, 2008; Lehn, Patro and Zhao, 2008 and Linck, Netter and Yang, 2008). Because boards of publicly traded BHCs have the same legal responsibilities as boards of non-financial firms, i.e., the duty of care and loyalty, BHC board composition and size should play a similarly important role in the execution of BHC boards' duties. However, because banks differ in several important aspects from non-financial firms, it is not necessarily clear that these variables should have the same impact on BHC firm performance. Most obviously, regulation could change the relationship between board structure and performance (e.g. Booth, Cornett, Tehranian, 2002). Banks also differ in their capital structure and organizational form from non-financial firms. We discuss some regulatory influences on BHC board structure below (see also Adams, 2009b). We then make some predictions about the impact of BHC board composition and size on performance.

#### 2.1 Institutional and regulatory influences on bank boards

Although BHC boards may have played a role in prior banking and finance crises, they never played a sufficiently large role for regulators to impose significant restrictions on them.<sup>6</sup> Thus, perhaps surprisingly, there are few constraints on BHC boards other than those imposed on publicly traded BHCs post-2002 by the Sarbanes-Oxley Act and recently revised exchange listing standards. If a BHC is troubled, it must submit written notice to the Federal Reserve Board thirty days before adding or replacing members of its board. Otherwise the only formal restriction is that a director of a BHC may not be a director of another BHC in the same city, town or Regional Metropolitan Area (RMSA). A director of a BHC with more

 $<sup>^6\</sup>mathrm{As}$  we discuss below, most restrictions on governance are at the bank level, not the BHC level.

than \$2.5 billion in total assets may not be the director of another BHC with over \$1.5 billion total assets (Federal Reserve Regulation L).

This does not mean that regulators cannot influence BHC boards. Most directly, regulators may provide informal guidance to boards in the form of Supervision and Regulation (SR) letters and examination manuals. Adams and Mehran (2003) provide some examples of such regulatory guidance. However, none of their examples suggests that regulators directly intervene in board functioning or affect board structure decisions at the BHC level. For example, regulators expect boards to review budgets and risk-management policies (Adams and Mehran, 2003, footnote 5), but they do not dictate how boards should carry out these duties. Moreover, these regulations and expectations may not always be enforced in practice. For example, even though Federal Reserve Banks in theory penalize directors for poor attendance behavior, Adams and Ferreira (2008) document that the attendance behavior of BHC directors is worse than in non-financial firms.

More indirectly, regulatory restrictions on subsidiary bank boards may influence BHC boards. One key way in which BHCs differ from non-financial firms is that they are by definition all holding companies. This means that each subsidiary bank or BHC is separately chartered with its own board. The implication of this structure for BHCs appears to be that activities of subsidiaries are influenced through their boards. As Adams (2009b) documents, directors of the parent BHC will often sit on the board of subsidiaries and in some cases all BHC directors will sit on the board of the BHC's lead bank. This means that these directors are subject to board-level regulatory restrictions at the bank level. These restrictions will vary depending on whether the bank is a state or national bank.

All state banks are subject to state banking law in the state they are chartered. Amongst others, these laws may impose state residency or US citizenship requirements, require directors to own stock in the bank and/or impose restrictions on the operation or structure of the board. To give just two examples, New York State Banking Law requires that bank boards consist of between 5 and 15 members, half of which must be US citizens. In addition, bank boards must hold regular monthly meetings at least ten times a year. Alabama Banking Law requires that bank directors hold stock in the bank or parent holding company and that bank boards hold bimonthly meetings. State banks that choose to be members of the Federal Reserve System are also subject to Regulation L which limits simultaneous directorships in state member banks.

National banks are governed by the National Banking Act in Title 12 of the US Code.

Title 12 specifies that national banks must have between 5 and 25 directors, who must be citizens of the US and a majority of whom must reside in the state, territory or district of the bank or within 100 miles of it for at least a year prior to and during their term. Directors must take an oath upon election or appointment, must hold stock in the bank or parent holding company and may not serve for more than 3 years. The OCC has jurisdiction over governance issues and may grant waivers to these laws.

To the extent that the board of the BHC and the board of subsidiary banks overlap, these bank-level board regulations may affect board structure at the BHC level. Although it is difficult to make any specific predictions about the impact of bank-level regulation, it is possible that state and national bank residency requirements and Regulation L restrictions on interlocks will limit the potential pool of directors BHCs have at their disposal. This problem is likely to get worse the more subsidiaries the BHC has, as each subsidiary must have sufficient directors for its board.<sup>7</sup> If so, these bank-level regulations may make it more difficult to detect beneficial effects of large and independent boards in BHCs.

Changes in regulation may also indirectly affect BHC boards. Prior to 1975, no state allowed interstate banking. But by 1994 restrictions on interstate banking were eliminated with the passage of the Riegle-Neal Interstate Banking and Efficiency Act. Jones and Critchfield (2005) argue that the Riegle-Neal Act (along with prior state level interstate banking laws) was a major cause of consolidation in the banking industry. They show, for example, that the number of banks dropped from 14,884 in 1984 to 7,842 in 2003. M&A activity affects board governance in several ways. First, it is common to add directors of target firms to the board of the acquirer in friendly acquisitions, as most banking M&As are. This may lead to potentially permanent increases in board size. Second, M&A activity may have disciplining effects even if it is friendly. Thus, the existence of an active market for corporate control may lead to general improvements in board effectiveness (see Shranz, 1993), even though some have suggested that bank managers may engage in mergers to protect their own interests, e.g. to obtain higher compensation (e.g. Bliss and Rosen, 2001) or too-big-to fail status (e.g. Penas and Unal, 2004).

In the 1990s, banks were also increasingly allowed to engage in investment banking activities (with all restrictions on such activities formally abolished by the passage of the

<sup>&</sup>lt;sup>7</sup>Adams and Mehran (2003, footnote 5) also discuss that it may be difficult for banks to find sufficient directors because they are held to a higher standard of accountability. This problem is likely to have gotten worse in the aftermath of the financial crisis.

Gramm-Leach-Bliley Act in 1999), which may have influenced bank boards by changing the nature of the competitive environment as well as the expertise required for directors. Overall, deregulation may have had an important impact both on BHC board structure, as well as the relationship between board structure and performance. We examine this issue in more detail in Section 6.

#### 2.2 BHC board composition and performance

The literature on non-financial firms argues that firms choose board composition to balance monitoring and advising needs. Independent outsiders, i.e. directors who have no direct financial, family or interlock ties with management, are considered to be more effective monitors of management because they are in theory less beholden to management (e.g. Hermalin and Weisbach, 2003). In addition, they bring a different perspective to bear on problems management faces and thus serve a valuable advisory role. This role is likely to be particularly important in complex firms. A potential disadvantage of outside directors is that they may lack relevant firm-specific information, which is likely to be especially problematic for small growth firms. Consistent with these arguments, Boone, Fields, Karpoff and Raheja (2007), Coles, Daniel and Naveen (2008), Lehn, Patro and Zhao (2008) and Linck, Netter and Yang (2008) provide evidence in samples of non-financial firms that the proportion of outsiders on the board is positively related to measures of firm complexity, such as size. Coles, Daniel and Naveen (2008) document that firm performance increases in the proportion of insiders in high R&D firms.

Ex ante there is no reason to believe that similar arguments should not hold for banks. Because the banks in our sample are all large, established banks, we expect them to have a large proportion of independent directors. It is less clear what the relationship between board independence and firm performance should be. On the one hand, the literature argues that firm performance should increase with independence as a measure of the monitoring intensity of the board. On the other hand, there may be costs associated with independence due to outside directors' lack of firm-specific knowledge (e.g. Adams and Ferreira, 2007). In the case of banks, these costs may be exacerbated because regulatory restrictions may act to limit the pool of directors from which BHCs can choose, as we argue above. Ultimately, the relationship between performance and independence must be determined empirically.

Establishing the empirical relationship between performance and board independence for banks is complicated by the fact that it is difficult to measure independence in banks. As the Federal Reserve Bank of Atlanta's The Director's Primer points out, bank directors often represent some of the best customers of the bank (Federal Reserve Bank of Atlanta, 2002, p. 47). As we describe in Section 3, it is generally difficult to determine which directors are customer-directors. Although publicly traded BHCs are supposed to disclose related party transactions, they often simply state that lending relationships with directors' employers are not made on preferential terms without disclosing which directors are associated with customers. A good example can be found in Citibank's 2009 proxy statement at http://www.citigroup.com/citi/fin/data/ar09cp.pdf. It is likely that customers themselves do not wish this information to be disclosed. Customer-directors are likely to have different incentives and motivations than other outside directors. To correctly measure board independence, it is important to be able to identify them. Unfortunately, this is virtually impossible. This means that measures of board independence in banking are potentially always overstated, which could lead to biased inference in regression analysis. Furthermore, it is difficult to sign the bias. To at least partially address this problem, we estimate our performance regressions both with the fraction of independent outsiders, as defined conventionally, as well as with the fraction of non-insiders, i.e. all directors who are not currently working for the bank. This is consistent with specifications in Coles, Daniel and Naveen (2008) and Graham, Hazarika and Narasimhan (2008), who focus on non-insiders' role as advisors. We do not focus solely on the proportion of non-insiders because if the number of insiders is stable over time, then changes in non-insiders simply reflect changes in board size. Furthermore, it is interesting to determine the relation between board independence and performance, because this is the measure emphasized in the Sarbanes-Oxley Act of 2002.

#### 2.3 BHC board size and performance

The governance literature argues that firms choose board size to balance advisory needs with the costs of decision-making in large groups. Dalton, Daily, Johnson and Ellstrand (1999) argue that large boards may be beneficial because they increase the pool of expertise and resources available to the organization. However, Jensen (1993) argues that as board size increases, boards become less effective at monitoring management because of free-riding problems amongst directors and increased decision-making time. Consistent with this argument, Yermack (1996) finds that, on average, firm performance is lower for firms with larger boards in a sample of non-financial firms. In their sample of non-financial firms, Coles, Daniel and Naveen (2008) also find that firm performance is on average lower for firms with

larger boards (see e.g. Panel A of Figure 2). However, when they interact board size with measures of complexity, they find that firm performance increases in board size for complex firms. Thus, the advisory benefits of larger boards appear to outweigh their costs in complex firms. Their analysis suggests that the reason why the literature has generally found that board size is negatively correlated with performance in samples of non-financial firms is because these samples consist predominantly of relatively simple firms in which the costs of larger boards outweigh the benefits.

In contrast, our sample consists entirely of large banks which can all be considered to be complex. In fact, legislators and regulators specifically identified bank size and complexity as contributing to the financial crisis (e.g. Felsenthal, 2009). For example, large BHCs are organizationally complex, in the sense of having many subsidiaries with their own boards. With more subsidiaries there may be a need for more representatives from subsidiary boards on the BHC board, both to facilitate coordination amongst the different subsidiaries and to facilitate monitoring. These arguments suggest that the average effect of board size on BHC performance may be positive.

However, several factors may counteract the beneficial effects of large boards in complex BHCs. Adams and Ferreira (2008) document that outside directors on large BHC boards have more attendance problems at board meetings than directors in non-financial firms. This is direct evidence that large BHC boards suffer from free-riding problems, as Jensen (1993) argues. Furthermore, the fact that BHCs have many subsidiary boards makes the role of the parent BHC board in dealing with complexity less clear. If many issues can be dealt with by the boards of subsidiaries, then it is not clear that the size of the parent BHC boards needs to be big in order to provide advice to the CEO. It may also be difficult to staff large BHC boards with sufficiently good directors if regulatory restrictions on subsidiary boards limit the pool of directors from which the BHC can choose. Finally, acquirers may need to appoint directors from targets to their boards as the result of negotiations over terms in friendly M&A transactions (see e.g. Wulf, 2004). If the BHCs in our sample undertook many M&A transactions following the elimination of interstate banking restrictions, then their boards may have been larger than optimal. As with board composition, the net effect of board size on performance must be determined empirically.

#### 3 Data

Our primary sample of firms consists of a random sample of 35 publicly traded BHCs which were amongst the 200 largest (in terms of book value of assets) top tier BHCs for each of the years 1986-1996. We collected additional data on these firms for the years 1997-1999 even if they were no longer among the top 200. However, the number of firms drops from 35 to 32 during those years due to M&A activity. The requirement that the firms must be publicly traded made it possible to collect data on board size and composition as well as other internal governance characteristics of the firms from proxy statements filed with the SEC. In addition, we collected balance sheet data from the fourth quarter Consolidated Financial Statements for Bank Holding Companies (Form FR Y-9C) from the Federal Reserve Board and stock price and return data from CRSP.<sup>8</sup> Because of the high cost of hand collecting detailed internal governance variables over the 1986-1999 period, we could only focus on a relatively small number of BHCs.

Although the requirement that data be available on these firms for at least 10 years may introduce a survivorship bias, as Boyd and Runkle (1993) argue, survivorship bias may not be a serious problem in the banking industry since the FDIC generally does not allow large BHCs to fail. In addition, we allow our firms to enter the sample in an extended data set we collect on our sample firms for the period 1965-1985. We discuss how we extend our sample to 1965-1985 in section ??. Because we impose no restrictions on our sample firms prior to 1986, our analysis of this time period serves as a robustness check that our results are not driven by sample selection. We discuss the extent to which our primary sample can be considered to be representative in more detail after describing how we define our performance and governance measures in the descriptive statistics' Section below.

#### 3.1 Descriptive statistics

In Table 1A, we present descriptive statistics concerning select financial variables and governance characteristics of our primary sample.

-Insert Table 1A-E about here-

<sup>&</sup>lt;sup>8</sup>The governance data is measured on the date of the proxy at the beginning of the corresponding fiscal year. We adjust our data collection procedures to account for the fact that proxies disclose some governance characteristics for the previous fiscal year and others for the following fiscal year.

#### 3.1.1 Financial variables

Our primary measure of performance is a proxy for Tobin's Q, which we define to be the ratio of the firm's market value to its book value of assets. The firm's market value is calculated as the book value of assets minus the book value of equity plus the market value of equity. Return on assets (ROA) is calculated as the ratio of net income to the book value of assets. We also calculate a measure of bank capital, its primary capital ratio, which we define as the sum of the book value of common stock, perpetual preferred stock, surplus, undivided profits, capital reserves, mandatory convertible debt, loan and lease loss reserves, and minority interests in consolidated subsidiaries minus intangible assets.

Table 1A indicates that average Tobin's Q for our sample firms during 1986-1999 is 1.05 and average ROA is 1%. An average BHC has 41.0 billion dollars in assets and primary capital of 8%. While we do not show them in the tables, there are several trends in the variables that we note here. Perhaps the most important of these are the trends in performance and firm size. While annual returns are more volatile, Tobin's Q and ROA show an upward trend since the end of the 1990-1991 recession. This is consistent with the upward trend in performance for the banking industry as a whole during this period (see also Stiroh, 2000). Also striking is the trend in firm size, measured by the book value of assets, reflecting the increase in consolidation in the banking industry during the sample period. An average sample firm has \$18.7 billion of assets at the end of 1986 and increases in size to \$91.5 billion of assets in 1999.

#### 3.1.2 Governance variables

Consistent with other studies (see Hermalin and Weisbach, 2003), we consider a director to be "an insider" if he works for the firm and "affiliated" if he has had any previous business relationship with the firm or family relationship with its officers. Since we follow the BHCs in our sample over a period of at least 10 years, we are also able to identify whether any directors are former officers of the BHC (generally the CEO or Chairman). We also consider these directors to be insiders. All other directors are outsiders. We should note that our classification of who is an independent outsider is stricter than in many other studies: a director is not an outsider if he was an officer or had any business relationship with the BHC in any of the 14 years of the sample. In contrast, most cross-sectional studies can only classify directors based on current employee status or business relationships.

Each BHC, on average, has 18 directors. As Adams and Mehran (2003) and Hayes, Mehran, and Schaefer (2005) also document, financial firms in this time period have on average larger boards than manufacturing firms. Both papers document a board size of roughly 12 in their sample of manufacturing firms. In addition, BHCs have a higher percentage of outsiders on the board than is found in studies of non-financial firms: 69% as compared to 61% in Adams and Mehran (2003) and 54% in Yermack (1999). Both of these findings are consistent with our arguments in Section 2 that BHCs might optimally have large boards and many outsiders because they are large and complex organizations. On the other hand, as we noted earlier, because these are banking firms, the proportion of outsiders may overstate the board's true independence if lending relationships with directors or directors' employers exist but are not individually disclosed, as a typical proxy statement, such as that of United Jersey Banks (1988, p. 4), illustrates:

Some officers, Directors, and nominees for election as Director of UJB and their associates may also have transactions with one or more subsidiaries, including loans, in the ordinary course of business. All loans in excess of \$60,000 to executive officers and Directors and their associates were made on substantially the same terms, including interest rates and collateral, as those prevailing at the time for comparable transactions with other persons and did not involve more than the normal risk of collectibility or present other unfavorable features.

Such lending relationships may be large enough to matter for independence. For example, Riggs National Corporation's proxy for 1988 (p. 8) discloses that: "the aggregate principal amount of indebtedness to banking subsidiaries of the Corporation owed by directors and executive officers of Riggs Bank and Riggs Corporation and their associates represented approximately 78.9% of total stockholder's equity and 7.7% of total loans." Similarly, First Union Corporation's proxy for 2000 (p. 36) states that: "the aggregate monthly outstanding principal balances of loans made by our bank to such directors and officers, including certain of their related interests, ranged from a high of approximately \$3.6 billion to a low of approximately \$2.9 billion." Unfortunately, it is difficult to get more detailed data on these lending relationships. This means that traditional proxies for board independence in banking are always measured with error. For this reason, and consistent with Coles, Daniel and Naveen (2008) and Graham, Hazarika and Narasimhan (2008), we also examine the fraction of non-insiders on the board, i.e. the fraction of outside and affiliated directors. On average, our sample BHCs have 80% non-insiders on the board.

Because we use firm fixed-effects in our empirical specifications, we rely on within-firm variation in board composition and size for identification. Thus, it is useful to document variation in these variables over the 1986-1999 period. In only 120 (25.59%) of firm-years, there is no change in board size; in only 71 (16.36%) of firm-years there are no changes in the fraction of outsiders and in only 87 (20.05%) of firm-years there is no change in the fraction of non-insiders. In Table 1B, we document additional information regarding the changes. On average, each BHC experiences changes in board size and composition in roughly 10 years during our sample period. The average change in board size is -0.33. While this appears small, the standard deviation is 3.2. Thus, there is a fair amount of variation in board size changes. As expected, the fraction of non-insiders changes less than the fraction of outsiders.

On average, each board in the 1986-99 period has 4.42 committees and each committee member sits on 1.87 committees. Outsiders chair 62% of the committees and the chair of each committee also is a chair of another committee. The average number of board meetings per year is 8.45, which is close to the 7.45 meetings a year reported by Vafeas (1999), and the average board meeting fee is \$994. Nearly 95% of the firms have deferred compensation plans for their directors. Interlocks exist in 39% of the sample. We define an interlock to be a situation where the chairman or the CEO of a BHC is a director in another company whose top management is on the board of the BHC. Excluding the BHC, each outside director is on the board of 1.76 firms and each insider is on the board of 1.49 firms. CEOs of BHCs hold on average 2.27% of the stock of their own companies.

We should note here that the internal governance characteristics we describe are those of the board at the bank holding company level. Because of the holding company structure, some of these characteristics may not be strictly comparable to the characteristics of boards in non-financial firms. For example, directors of BHCs who sit on subsidiary bank boards may be compensated separately for such service, which means their compensation for service at the BHC level understates the total compensation they receive from the BHC. For example, First Empire State's 1988 proxy states that directors of First Empire State who also sit

<sup>&</sup>lt;sup>9</sup>Because our sample consists of BHCs, we do not define interlocks within-sample, as many studies of non-financial firms do (e.g. Hallock, 1997). Instead, we check the proxies for reported interlocks, as well as checking reported directorships of the CEO and chaiman in the proxy statements for potential interlocks. Of course, our measure of interlocks may still be measured with error to the extent that directorships are not fully disclosed or interlocks are not truthfully reported despite SEC disclosure rules. The same is true for our other governance measures. To the extent that this measurement error is not systematic, then our estimates of the coefficients on our governance measures will be biased towards zero.

on the board of its subsidiary, M&T Bank, receive the same meeting fees for attending meetings of both boards. This also means that the number of meetings of the BHC board may understate total interactions among BHC directors. However, it is important to note that the holding company structure does not affect the measurement of board size and composition, our primary variables of interest in this paper.

#### 3.2 Representativeness of our sample

In this Section, we examine to what extent our sample selection procedure calls the representativeness of our primary sample into question. We believe there are two main concerns one might have in this respect. First, because we focus on large BHCs, the question is to what extent our findings will apply to the banking industry as a whole. Second, because we will relate governance to performance, it is natural to ask whether our sample selection procedure generates a sample with biased performance and/or governance characteristics. We address these issues in turn.

#### 3.2.1 Representativeness of our sample in terms of the industry

In terms of number of banks, our sample is not representative of the banking industry. Between 1986 and 1999, the number of FDIC-insured commercial banks ranged from 14,199 to 8,580. Moreover, our sample firms are all BHCs. As we describe in Section 2.1, different regulations exist concerning the governance of BHCs, national banks and state banks. Thus, our findings may not be generalizable to banks that are neither BHCs, nor publicly traded. The findings may also not be generalizable to smaller BHCs. However, we believe the findings are still relevant to the industry as a whole because the assets of our sample BHCs constitute a large portion of industry assets: 32.3% of total top-tiered BHC assets in 1990. Reflecting increasing consolidation in the industry, this number rose to 50.75% in 1998. As the financial crisis has illustrated, potential governance failures at the largest banks can have serious consequences for the industry as a whole, as well as the economy (see e.g. Kirkpatrick, 2009). Thus, even though our sample is not a random sample from the entire population of banks, it does represent a sample of interest for the industry as a whole.

#### 3.2.2 Representativeness of our sample in terms of performance and governance

To examine whether our sample of banks is representative in terms of performance and governance characteristics we undertook two steps. First, we examined the stock price performance of our sample firms relative to benchmark portfolios of all other publicly traded commercial banks (SIC codes 6020-6029 and 6199) available in the CRSP database during 1986-1999. In each case, we excluded the sample firms from the benchmarks. We found that over the sample period the monthly raw stock returns of our sample of bank holding companies very closely matched the returns of the benchmark portfolios, both on an equal-and value-weighted return basis (the t-tests for the difference between portfolio returns on the sample and the benchmarks were not statistically significant).

Second, we searched for a dataset containing governance data on banks that we could compare our sample to. We chose the Riskmetrics director database for this purpose. This database consists of an unbalanced panel of director-level data for Standard & Poor's (S&P) 1500 firms from 1996 to 2007. Although it overlaps with our sample for only 4 years, we believe it is a useful sample for our purposes since it is a widely used dataset in the governance literature. It also contains a comparable classification of outside directors. We merged this data to Compustat to obtain financial information and SIC codes, which we used to identify banks in conjunction with Riskmetrics' industry classifications. We then constructed a data set which contains assets, Tobin's Q, ROA, board size and the proportion of outsiders for our sample BHCs and the banks in the Riskmetrics dataset from 1996 to 1999. The number of Riskmetrics banks in this sample varies from a minimum of 91 in 1998 to a maximum of 105 in 1999.

To examine whether our BHCs are comparable to the larger banks in the Riskmetrics data, we defined a large Riskmetrics bank to be a bank whose assets were greater than the median assets of all Riskmetrics banks over the period 1996 to 1999. We end with a sample of large Riskmetrics banks that varies in size from 39 to 42 over the years. Although this procedure of defining a large Riskmetrics bank is ad hoc, the assets of our sample banks are not statistically different from the assets of these large Riskmetrics banks. Thus, this method generates a set of comparable banks in terms of size.

When we examine differences in performance and governance characteristics for our BHCs and the large Riskmetrics banks, we find that there are no statistically significant differences in Tobin's Q (a difference of -0.0054 for our banks with a t-statistic of -0.46), ROA (a difference of 0.0029 for our banks with a t-statistic of 0.05) or proportion of outsiders (a

difference of 0.0002 for our banks with a t-statistic of 0.01). On the other hand, our sample BHCs' boards are larger (a difference of 0.9959, essentially one director, with a t-statistic of 1.86). However, it is not clear whether a difference in one director should be considered economically significant compared to the average of 16 directors for large Riskmetrics banks. Furthermore, when we compare our sample banks to the 26 to 28 Riskmetrics banks with assets in the top tercile over the 1996-1999 period, we find that the difference in board size is no longer statistically significant (a difference of 0.4055, with a t-statistic of 0.68) and the differences in performance and proportion of outsiders remain statistically insignificant.

Although this analysis does not cover our entire primary sample period, we believe it is at least suggestive that our sample is not systematically biased in terms of performance. While one could argue that the boards of our sample banks are slightly larger than in other samples of large banks, it is not clear that our results are biased as a result because our banks do not out-perform other banks.

## 4 The relation between board structure and performance-OLS

In this Section, we investigate the relation between firm performance as measured by Tobin's Q and board size and composition using OLS regressions. We discuss our specification of the relationship between performance and board size and composition in Section 4.1. In Section 4.2, we present the results. We address potential endogeneity problems due to reverse causality in Section 5.

#### 4.1 Empirical specification

In our basic specification, we follow previous studies and regress our proxy for Tobin's Q on the natural logarithm of board size and the proportion of outside directors plus financial controls. The financial control variables consist of the natural logarithm of the book value of assets as a proxy for firm size, the capital ratio as a proxy for capital structure, the volatility of stock prices as a measure of uncertainty and lagged ROA. All regressions include year dummies and firm fixed effects. By including firm fixed effects, we limit both omitted variable bias and the effect of potential outliers caused by the fact that the number of cross-sectional units in our sample is small. In all specifications, the standard errors are adjusted

for potential heteroskedasticity.

Since we have detailed data on other internal governance characteristics of the BHCs in our sample, in expanded specifications we include these variables as governance controls. Since internal governance mechanisms are likely to be ultimately simultaneously chosen, performance regressions that only include board size and composition may suffer from omitted variable bias if other internal governance characteristics are also correlated with performance. For example, Klein (1998) shows that the proportion of insiders on the finance committee is positively related to firm value and Vafeas (1999) finds a negative correlation between the number of board meetings and performance. Since both the committee structure of the board and the number of board meetings are plausibly related to board size and composition, we cannot be sure that we are not picking up spurious correlations between board size, composition and performance if we do not include these additional governance characteristics in our performance regressions.

Since there is little theory to guide us in the selection of the most important internal governance characteristics from the large set of possible characteristics, we make an ad hoc selection of groups of variables that we believe may proxy for the aspects of governance that the literature has emphasized most. Our first group of variables consists of committee characteristics: the natural logarithm of the number of committees, the average number of committee seats per committee member, the proportion of committee chairs that are outsiders and the average number of committee seats per committee chair. Our second group of variables includes additional proxies for board/director activity: the natural logarithm of the number of board meetings, the fee directors get paid for attending board meetings and the average number of other directorships outside and inside directors have.

Our last group of variables consists of variables related to director interlocks and CEO and director compensation. Hallock (1997) argues that interlocks may be representative of a dual agency problem. On the other hand, authors in the organizational literature argue that interlocks are beneficial since they may reduce the information uncertainty created by resource dependence amongst firms (e.g. Pettigrew, 1992). While the predicted sign of the correlation between performance and interlocks is unclear, it is plausible that a correlation exists. There is also a vast literature that argues that the percentage of CEO ownership is correlated with Tobin's Q (e.g. Morck, Shleifer, Vishny, 1988; McConnell and Servaes, 1990). Some studies have found a positive relation between CEO shareholdings and both Tobin's Q and ROA (e.g. Mehran, 1995). Others have argued that director compensation

should also affect performance (e.g. Brick, Palmon and Wald, 2005). Thus, our final set of internal governance controls consists of a dummy indicating whether a board interlock exists, the proportion of shares held by the CEO and dummies indicating whether the BHC pays the directors deferred compensation or deferred stock.

#### 4.2 Empirical results

Table 2 presents OLS regression estimates of the relation between Tobin's Q and board size and composition plus controls using our sample of BHCs during 1986-1999. In column I, we present the basic regression using only financial controls. In columns II, III and IV we sequentially add the committee characteristics, the board activity controls and the interlock and compensation variables to the regression. In column V, we replicate the specification in column III using the fraction of non-insiders instead of the fraction of outsiders. <sup>10</sup> In column VI, we use Board size instead of Ln(Board size) because we will use it as a benchmark when analyzing additions to the board following M&A activity in Section 6. As is evident from Table 2, board size, regardless of how it is measured, has a positive and statistically significant (at greater than the 10% level) correlation with Tobin's Q in five of the specifications. Board composition, on the other hand, has no significant relation with Tobin's Q, regardless of how it is measured. <sup>11</sup>

-Insert Table 2 about here-

The latter finding is consistent with previous studies of board composition. For example, Hermalin and Weisbach (2003, abstract) summarize the findings of the board structure literature as follows: "Across these studies, a number of regularities have emerged-notably, the fact that board composition does not seem to predict corporate performance, while board size has a negative relationship to performance." The explanation for this finding may be different than in prior literature given the measurement error problem we point out above. However, the fact that there also appears to be no relationship between the fraction of non-insiders and performance suggests that measurement error is not the only reason for the insignificant coefficient on the fraction of outside directors. It is possible that regulatory restrictions on subsidiary boards that also influence board composition of the parent board counteract beneficial effects of independent boards. Regardless, there appears to be little

<sup>&</sup>lt;sup>10</sup>The results of replicating the other specifications using the fraction of non-insiders are also similar to those in Table 2.

<sup>&</sup>lt;sup>11</sup>Our results are similar if we use the natural logarithm of Tobin's Q as the dependent variable.

evidence that banks systematically make board composition choices that are detrimental to shareholder value.

Our finding of a positive relation between the logarithm of board size and Tobin's Q is more interesting. It is consistent with the findings in both Coles, Daniel and Naveen (2008) and Graham, Hazarika and Narasimhan (2008) that performance increases in board size for complex firms. Thus, on average the costs associated with free-riding behavior of directors on large BHC boards (e.g. Adams and Ferreira, 2008) do not seem to outweigh the beneficial effects of large boards in BHCs. This does not mean they do not matter at all. Because we use the logarithm of board size in columns I-V, our findings suggest that the beneficial effect of board size declines as boards get larger. The marginal effect of an increase in board size is given by the regression coefficient on Ln(Board size) times divided by board size. Since the coefficient is constant, the effect of board size decreases as board size increases. For example, using the coefficient on Ln(Board size) of 0.019 from column III of Table 2, we estimate the effect of an increase from 5 to 6 board members to be 0.38% and the effect of an increase from 20 to 21 members to be 0.095%.

The coefficients on the financial control variables are generally consistent with the results found in other papers. Since there is little theory that would guide our predictions for the signs of the coefficients on most of the internal governance controls, we merely state the results that are consistent across specifications. In Table 2, there is a positive and significant relationship between performance and the size of the board meeting fee. This is consistent with Adams and Ferreira (2008), who document that the attendance behavior of BHC directors improves as board meeting fees increase even though average board meeting fees in their sample are only \$1,128 (in 2000 dollars). Since the meeting fee is on average \$994 in our sample, it is of similar magnitude as in their study. There is a negative and significant relationship between performance and the natural logarithm of the number of committees, the average number of external directorships held by officers of the BHC as well as by outside directors, interlocks, the deferred stock dummy and CEO ownership.

The negative and significant coefficient on CEO ownership is somewhat surprising given that previous papers find no relation between ownership and Tobin's Q in fixed effect regressions (see Himmelberg, Hubbard and Palia, 1999). However, since the length of our panel is fairly long, there may be sufficient variation in CEO ownership in our sample to enable us to find a relation between ownership and performance even after including firm fixed effects (see Zhou, 2001). The negative coefficient on ownership is not inconsistent with

the non-linear relationship between Tobin's Q and inside ownership described by Morck, Shleifer and Vishny (1988) and others. Thus, we reran the specifications in columns I and IV after including squared CEO ownership (results not shown). We find a non-linear (but not highly significant) concave relationship between Tobin's Q and CEO ownership in the first specification, but we do not find it in the second specification. This suggests that interdependencies between ownership and internal governance mechanisms may be important factors to consider when evaluating the effect of ownership on performance.

While we find the results for the other governance controls suggestive, we caution against interpreting them as consistent with a particular theory that does not concern board structure in BHCs. As we note in Section 3.1.2, some governance characteristics may have a different meaning for BHCs than they do for non-financial firms. For example, Vafeas (1999) uses board meetings as a measure of total board activity. But, because the board of the BHC may overlap with the boards of subsidiary banks or subsidiary BHCs, the number of BHC meetings only measures the activity of the BHC board, but not total BHC director activity. Thus, the coefficient on the number of BHC meetings should be interpreted based on a hypothesis that specifically concerns the activity of the BHC board.

## 5 The relation between board structure and performance-IV

The most interesting finding from the previous Section is the positive relationship between board size and Tobin's Q. While it is consistent with arguments concerning the benefits of large banks in complex firms, we cannot give this finding a causal interpretation without first investigating whether endogeneity due to reverse causality is driving our results. It is possible, for example, that CEOs of BHCs like to increase board size because this increases their personal business networks. It may also help them increase their control as Jensen (1993) argues. Since potential directors presumably prefer to join boards of firms that are performing well, we would observe board size increasing when BHCs perform well. Thus, the positive coefficient on board size in our performance regressions may be picking up a causal relationship from performance to board size rather than the other way around. In order to address this endogeneity problem, we need an instrumental variable that is correlated with board size but uncorrelated with performance except through variables already included in our regression. In the context of governance regressions it is usually difficult to come

up with valid instruments, because the factors that are arguably most correlated with the endogenous variable are other governance or firm characteristics that are already (or should be) included in performance regressions. For example, Eisenberg, Sundgren and Wells (1998) use firm age and group membership as instruments for board size in performance regressions in a sample of Finnish firms, but they originally argued that both firm age and group membership should be control variables in their performance regressions, which means their instruments are invalid by construction. Coles, Daniel and Naveen (2008) also address the endogeneity of board size in their performance regressions using three-stage least squares, but they do not discuss the validity of their instruments for board size, which are firm age and CEO characteristics, such as tenure. Lehn, Patro and Zhao (2008) use 5-year lagged performance as an instrument for board size, but lagged performance is potentially correlated with performance. Thus, our approach to finding an instrument is to consider only variables that, to our knowledge, previous literature has not yet considered as explanatory variables in performance regressions. Finding an instrument is further complicated in the context of fixed-effect regressions, because we require a variable with sufficient variation over time.

As our instrument for board size, we propose a measure of flight availability to airports in the cities in which BHC headquarters are located. Our reasoning is as follows. Board size is a measure of the advice available to CEOs (Boone, Fields, Karpoff and Raheja, 2007; Coles, Daniel and Naveen, 2008; Graham, Hazarika and Narasimhan, 2008; Lehn, Patro and Zhao, 2008; Linck, Netter and Yang, 2008). As such, board size should vary with the cost of recruiting advisors. As flight availability increases, it will be easier for directors to attend board meetings at BHC headquarters making them more willing to accept directorships at the BHC. Thus, the cost of recruiting suitable advisors should go down as flight availability increases.

Flight availability could lead to either increases or decreases in board size. On the one hand, as flight availability increases, the BHC can recruit more advisors at lower cost. This suggests that board size should increase as flight availability increases. On the other hand, there may be a substitution effect because it is easier to recruit better directors as

<sup>&</sup>lt;sup>12</sup>Many authors have used 2SLS or instrumental variable analysis to address the endogeneity of board structure in regressions, but not all of these focus on performance, e.g. Mak and Li (2001) or board size (e.g. Bhagat and Black, 2001). Thus, we do not discuss these other papers in more detail here. Graham, Hazarika and Narasimham (2008) address endogeneity of board structure by essentially using the Great Depression as a natural experiment.

<sup>&</sup>lt;sup>13</sup>Similar arguments can be made about the cost of recruiting monitors.

flight availability increases. Thus the board need not be so large when it consists of better directors. However, for our purposes, the sign of the correlation between flight availability and board size does not matter. It is sufficient that they are correlated, which we will test below.

To be a good instrument, it is not sufficient for flight availability to be correlated with board size. We require that flight availability is also uncorrelated with Tobin's Q. We believe it is plausible that flight availability is uncorrelated with performance. One could argue that flight availability is a measure of location and that location matters for performance. However, since we use firm fixed-effects in our specifications, we already control for location. It is difficult to imagine other reasons why flight availability to the BHC headquarter city might be correlated with Tobin's Q.

To measure flight availability in a given year, we use the total number of passengers flying in and out of all airports in the BHC's headquarter city during that year. We argue that the more passengers fly in and out of local airports, the easier it must be for BHC directors to find flights to attend board meetings. We obtain data on the number of passengers traveling through airports from the Air Carrier Statistics database, also known as the T-100 database, which contains domestic and international airline traffic information. This data is compiled by the Bureau of Transportation Statistics from monthly traffic reports (T-100 forms) filed by domestic and international airlines. Unfortunately, this data is only available from 1990 onward. Thus, while we believe our instrument has many advantages in terms of its uniqueness in the literature and its arguable exogeneity, the disadvantage of using it in our context is that our sample size is reduced in our instrumental variable (IV) regressions. Nevertheless, we believe the results in our reduced sample are still informative.

To address the fact that reverse-causality may be driving the results in Table 2, we reestimate our specifications in Table 2 using IV techniques. For simplicity of exposition, we report results only for column III of Table 2. This specification is rich in terms of control variables while relying on more observations than the specification in column IV. To assess whether the reduction in sample size affects our results, we first report fixed-effect estimates of the specification in column III of Table 2 restricted to the 1990-1999 time period in column I of Table 3. The coefficient on Ln(Board size) is still positive, although, not surprisingly

<sup>&</sup>lt;sup>14</sup>Our results are similar if we use only the total number of passengers flying in or the total number of passengers flying out as instruments. On average mean passengers flying in and out of BHC headquarter cities is 18,838,964 with a standard deviation of 14,685,263.

given the reduction in the number of observations, less significant. In column II of Table 3, we report the first stage regressions of Ln(Board size) on all the explanatory variables from the first column, including year dummies and firm fixed-effects, and our instrument Total Passengers. The coefficient on Total Passengers is positive and significant at greater than the 5% level. Thus, it satisfies the necessary condition for an instrument that it is highly correlated with Ln(Board size). The positive coefficient indicates that boards increase in size when it is easier for directors to attend meetings, i.e. BHCs appear to recruit more advisors.

-Insert Table 3 about here-

In column III, we report the second stage of our IV estimation. In column IV, we report the second stage of our IV estimation using the fraction of non-insiders instead of the fraction of outsiders. The coefficient on Ln(Board size) is not significantly different from zero in either column. This is a common problem with IV estimation (e.g. Wooldridge, 2002). If endogeneity of Ln(Board size) is a serious problem in performance regressions for our sample, then we would have to rely on our IV-estimates, from which we would have to conclude that there is no relationship between Tobin's Q and Ln(Board size). On the other hand, if endogeneity is not a serious problem, then we can safely rely on the OLS estimates. To test whether Ln(Board size) is correlated with the error term of our performance regression, we perform a Hausman test. The test statistic for the null that Ln(Board size) is uncorrelated with the error term is -0.31 in column III and -0.32 in column IV. Thus, we cannot reject the null. This suggests that once we control for the governance and firm characteristics in our regressions, as well as firm fixed-effects, endogeneity of board size due to reverse causality is not a serious concern in our performance regression, at least for the 1990-1999 period. Thus, the fixed-effect specification in column I suggests that there is a positive causal effect of board size on performance for this period.

Our conclusions in this Section depend critically on the quality of our instrument. Although we believe that our instrument is plausibly exogenous, we try to increase confidence

<sup>&</sup>lt;sup>15</sup>The headquarters for Wachovia Corporation are in Winston-Salem, North Carolina. While Winston-Salem has an airport, it is very small. In some years, the T-100 database reports no numbers for Winston-Salem and on average Total Passengers is equal to 43.3. To account for this, we examine two variations of our instrument. The first sets the missing observations for Winston-Salem equal to 43.3, the average over our time period. The second sets Total Passengers equal to the sum of passengers for Charlotte/Douglas International Airport, located 73 miles away in Charlotte, North Carolina, and Raleigh-Durham International Airport, located 83 miles away in Raleigh-Durham, North Carolina. Our results are similar using these two variations of our instrument.

that board size may have a beneficial effect on performance by investigating possible sources of this positive effect in the next Section.

# 6 What drives the positive relation between board size and performance?

The fact that board size appears to have a positive causal effect on board size in our sample is consistent with findings in Coles, Daniel and Naveen (2008), Graham, Hazarika and Narasimhan (2008), Lehn, Patro and Zhao (2008) and Linck, Netter and Yang (2008). These papers argue that large boards play an important role in large and/or complex firms and the BHCs in our sample are all large and arguably complex. Nevertheless, it is notable that on average board size is negatively related to firm performance in Coles, Daniel and Naveen (2008), whereas in our sample this relationship is positive. Thus, it is worth investigating our findings in more detail to see if the factors driving the relationship between board size and performance are plausible. If so, we can have more confidence that it is causal. The two factors we investigate in more detail are merger and acquisition activity and complexity. We investigate complexity both because previous literature has examined it, but also because banks distinguish themselves from many non-financial firms because of the complexity of the holding company organizational form.

We investigate M&A activity because the time period of our sample was a period of active consolidation in the banking industry as a consequence of the deregulation of interstate banking restrictions. It is common to add directors of target firms to the board of the acquirer in friendly acquisitions (e.g. Lehn, Patro and Zhao, 2008), as most banking M&As are. It is possible that such M&A directors serve both a valuable advisory and monitoring role. Thus, the addition of these directors could lead to an increase in board size that is value-enhancing. The existence of an active market for corporate control may also lead to general improvements in board effectiveness, which may explain the positive effect of board size.

#### 6.1 Does M&A activity explain the positive effect of board size?

As is evident from Figure 1, the number of banks per year in the U.S. has declined sharply since 1986, about the beginning of our sample period. This suggests that M&A activity

could explain the positive effect of board size on performance during our sample period.

-Insert Figure 1 about here-

It was common for our sample firms to disclose which directors were added to the board following an M&A transaction in their proxy statements. Thus, we examined all proxy statements in order to identify instances in which target directors were added to the board following M&A transactions. Table 1C provides descriptive statistics for these events. On average, each BHC engaged in 2 transactions following which it incorporated target directors. The average number of target directors added to the board was 3.61 and target directors comprised 17% of the merged firm's board at the time of the transaction. In any given year, the proportion of directors who joined the board as the result of a prior M&A transaction is 13% (roughly 3 directors). The proportion of target directors on the acquirer's board at the time of transaction is similar to the 16.5% reported in Wulf (2003) for a sample of 40 mergers-of-equals. Since 15 of her mergers-of-equals involved banks or financial firms, our numbers appear reasonable.

From the summary statistics it seems clear that M&A activity may lead to increases in board size. Although the number of target directors added seems high, it is plausible that these target directors serve a valuable advisory role in the transition to a larger corporation. If so, we would expect variables related to the addition of target directors to the board to have positive coefficients in performance regressions.

#### -Insert Table 4 about here-

In columns I and II of Table 4, we replicate the performance regression in column III of Table 2 after including two different variables which proxy for instances in which target directors were added to the board. The first variable is a dummy variable, "Addition to Board following M&A", which is equal to 1 if the proxy statement indicated that directors joined the board following an M&A transaction in that year. Although we were careful to examine directors' biographies for all years to see whether they were identified as former target directors, it is possible that some proxy statements did not disclose this information. Thus, we also define a dummy variable "Potential M&A additions", which is equal to 1 if board size increased by 3 or more directors in a given year, but the proxy did not identify these directors as target directors. There were 21 such events. For the sake of brevity, we suppress the coefficients on all but the coefficients of interest in Table 4.

<sup>&</sup>lt;sup>16</sup>We chose 3 directors as the cutoff because it is approximately equal to the average number of target directors who joined the board in events identified in proxy statements.

The coefficient on "Addition to Board following M&A" in column I is not significant and the coefficient on "Potential M&A additions" in column II is significant at the 10% level, but negative. In addition, the coefficients on Ln(Board size) are very similar to those in Table 2, both in magnitude and significance. This suggests that the addition of target directors to the board is neither value-enhancing on average, nor the main reason why board size is positively related to performance. To examine this issue in more detail we replicate the specification in column VI of Table 2 in which we use Board size instead of Ln(Board size) after dividing Board size into the number of non M&A directors and the number of M&A directors. In column IV, we report the same regression using the fraction of non-insiders instead of the fraction of outsiders. As is evident from both columns, the relationship between performance and "Number non M&A directors" is positive and significant in both specifications, while the coefficient on "Number M&A directors" is not significant. Moreover, the coefficient on "Number non M&A directors" is 0.001, which is exactly the same as the coefficient on board size in column VI of Table 2. Thus, it appears as if the positive coefficient on board size is not driven by the addition of target directors who perform a valuable advisory and monitoring role.

These regressions also suggest that our board size finding is not a spurious relationship driven by omitted variables relating to M&A activity. It is plausible that M&A activity is correlated with performance if firms only undertake M&A activity when their Q is high or merge with high Q firms, so that post-merger Q increases. Since M&A activity is also correlated with board size, the omission of variables related to M&A activity could lead to a spurious positive coefficient on board size in performance regressions. Since we control for M&A additions to boards in these regressions, our findings do not appear to be the result of omitted M&A activity.

While the addition of M&A directors to boards does not appear to be value-enhancing, the existence of an active market for corporate control could lead boards to become more effective. It is also possible that there are other interdependencies between M&A activity, board size and performance that we have not controlled for. To address these issues, we examine whether our results are different in a period in which there was less M&A activity in the banking industry because of more stringent regulatory restrictions.<sup>17</sup> In particular, we collected additional data on our sample firms from 1965, which was the first year stock

<sup>&</sup>lt;sup>17</sup>Rhoades (1996) documents that M&A activity among large banking organizations was very limited in the early 1980s. This was also the case prior to 1980.

price data for our sample firms was available in CRSP,<sup>18</sup> to 1985. For much of this time period the ability of banks to undertake mergers was limited by the Bank Holding Company Act of 1956, which limited the acquisition of control in commercial banks to BHCs, as well as by additional restrictions imposed by state law.

We collected data on our firms for as many years as we could to ensure that our results are not sensitive to our choice of time frame. This is important because the banking industry has undergone several major changes over time. The period from 1965 to 1999 captures times when banking firms were heavily regulated, as well as periods of regulatory change and deregulation. Many banks also changed their organizational structure to the holding company form during this period.

About 97% of the banking firms in our sample underwent precisely this change in organizational form. While by 1982 all of our firms were BHCs, only 1 of our publicly traded firms was a BHC by 1969. Thus, in order to follow most of our institutions back in time, we had to determine their predecessor banks. To do this, we used Moody's Bank and Finance Manuals. When the predecessor bank was not clearly identified in the Moody's Manuals, we chose as the BHC's predecessor bank its banking subsidiary which either had the same permno in CRSP or the same CEO as the BHC the year prior to conversion to the BHC form, or the largest banking subsidiary.

We collected information on board size and composition for our sample firms for the years 1965-1985 from Moody's Bank and Finance Manuals. Moody's Manuals only list the board members and the officers of each firm. Thus, it is not possible to characterize non-inside directors as affiliated or outside directors. As a result, we use the fraction of non-insiders as our measure of board composition, as we also do for our 1986-1999 sample. As before, we supplement the board structure data with balance sheet information from either the fourth quarter Consolidated Financial Statements for Bank Holding Companies (Form FR Y-9C) or Report on Condition and Income (Call Report) data for banks from the Federal Reserve Board. Stock return data is from CRSP.

Table 1D provides descriptive statistics for financial variables and board structure for our sample firms for the period 1965-1985. Mean Tobin's Q and ROA for our sample firms is 1.00 and 1%, respectively. Average total assets of our sample firms amount to \$9.03 billion and the mean equity to asset ratio is 6%. An average board consists of 20 directors, of which 85% are non-inside directors.

 $<sup>^{18}\</sup>mathrm{By}\ 1975$  all of our firms show up in CRSP.

#### -Insert Figure 2 about here-

Before turning to our performance regressions, it is instructive to examine the broad patterns in board size and composition over the 34 years for which we have data. Figure 2 shows average board size from 1965-1999. Clearly, it has been declining. This is the case despite the arguably increasing complexity of the sample banks over time. The trend is consistent with the decline in board size for large manufacturing firms documented by Linck, Netter and Yang (2008), which they suggest may be due to institutional activism. However, it is fair to say that the drop in banking firm board size started before the publicized pressure on boards by institutional shareholders. The difference in board size pre- and post-1986 is also significant. In the earlier period, our sample firms had on average 2.6 more directors, a difference that is significant at less than the 1% level. Because the market for corporate control was more active post-1986, this is additional evidence suggesting that M&A activity does not lead to increases in board size that are value-enhancing.

#### -Insert Figure 3 about here-

In Figure 3, we plot the average ratio of non-inside directors. The downward trend in board size does not seem to be accompanied by any major changes in board composition. Confirming the visual evidence, the proportion of non-inside directors is by any standard not significantly different pre- and post-1986.

#### -Insert Table 5 about here-

In Table 5 we examine whether the relationship between Tobin's Q and board size and composition and performance is different pre- and post-1986. All regressions include the same set of financial controls we used in the previous tables, although not the same governance controls because it is difficult to obtain proxy statements or annual reports prior to 1986. Because data on all components of primary capital are not available prior to 1986, we use the ratio of the book value of equity to the book value of assets as a proxy for the capital ratio for each banking firm. All regressions include firm fixed effects and the standard errors are adjusted for heteroskedasticity. Since only 9 firms were listed in CRSP by 1972, we include year dummies only for all years after 1973. In column I of Table 5, we present the results using the full sample of data from 1965-1999. In column II, we also include the ratio of non-insiders. We replicate these specifications using only the data prior to 1986 in columns III and IV.

Across both columns II and IV, the coefficient on the fraction of non-insiders is not significantly different from zero, as was the case for the fraction of non-insiders in column V

of Table 2. Also, as in Table 2, in all regressions the coefficient on the natural logarithm of board size is positive and significant at greater than the 5% level. Moreover, the magnitude of the coefficients are similar to those in Table 2. To examine whether large boards appear to be becoming more effective over time due to an increasingly active market for corporate control, in columns V and VI we omit the year dummies but include the year as a control variable along with the interaction of the year with Ln(Board size). The coefficient on the interaction term is negative and significant at the 5% level, which suggests that large boards may be becoming less effective over time, rather than more effective. In unreported specifications we also find that the interaction of Ln(Board size) with a dummy indicating the time period after 1986 is not significant.<sup>19</sup>

We conclude from the investigation in this Section that although M&A activity appears to have a significant influence on bank board composition, M&A activity does not appear to be the main explanation for our performance result. The non-negative relation between board size and Tobin's Q appears to exist even prior to the increase in consolidation in the banking sector. We turn to the possible role of complexity in explaining the positive effect of bank board size next.

## 6.2 The role of BHC complexity in explaining the positive effect of board size on performance

Our results from the previous Section do not seem consistent with the idea that complexity matters for board size. Over time, banks are becoming larger and arguably more complex, yet Figure 2 shows that board size is decreasing over time. Moreover, larger boards are not more valuable over time. Nevertheless, there are several reasons why we believe that complexity may still have a role in explaining the positive effect of board size on performance. First, banks will learn to deal with complexity over time, which means that the value of a large board need not be uniformly increasing in complexity. Second, examples of statements made in BHC proxy statements suggest to us that BHC structure, or organizational complexity, affects board structure. For example, U.S. Bancorp's proxy statement in 1988 (p. 4) states:

Since the formation of Bancorp in 1968, Bancorp and USNB [United State Na-

<sup>&</sup>lt;sup>19</sup>Our results may seem contradictory to Shranz (1993) who finds that bank board effectiveness improves with an active market for corporate control, however, her results are cross-sectional, while our results focus on within-firm changes over time.

tional Bank of Oregon] have shared a common board of directors. With the evolution of Bancorp into a regional multi-bank holding company and the creation of U.S. Bank of Washington, National Association, it is no longer practical to have common board membership. Therefore, certain members of the common board have been nominated to serve on the smaller Bancorp Board. The remaining board members of the common board will continue to serve as members of the board of USNB. A strong representative board is also in place at U.S. Washington. This structure provides the broad geographic representation and diversity that is desirable at the bank board level while a smaller group can address the more strategic role of a holding company board. Mr. Breezley will continue to serve on all three boards to facilitate cooperation and communication among them.<sup>20</sup>

As this quote suggests, the need to coordinate activities amongst separate subsidiaries in a holding company may affect board structure. If boards are relatively large because they include directors, such as Mr Breezley in the quote above, who fulfill specific functions in dealing with organizational complexity, then this may explain why large boards add value in banks.

To examine the role of complexity, we first follow previous literature in examining whether large boards are generally more valuable as BHCs become more complex. We then explicitly analyze the role of directors such as Mr. Breezley in dealing with complexity.

#### 6.2.1 Are large boards more valuable in more complex banks?

Coles, Daniel and Naveen (2008) and Graham, Hazarika and Narasimhan (2008) examine whether larger boards are more valuable in more complex firms by adding interaction terms between proxies for complexity and board size to their performance regressions. The main dimensions of complexity stressed in prior examinations of board size (e.g. Coles, Daniel and Naveen, 2008, Graham, Hazarika and Narasimhan (2008) and Linck, Netter and Yang, 2008) are complexity of operations, as proxied primarily by firm size, business and geographic diversification, as proxied by number of segments, and complexity of financial structures, as proxied by leverage.

<sup>&</sup>lt;sup>20</sup> "Bancorp" here refers to the top level BHC. USNB was its primary subsidiary bank until the creation of U.S. Bank of Washington, N.A.

We proxy for operational complexity using firm size and the number of Tier 1 subsidiaries of the bank. We argue that the larger the number of subsidiaries in the first tier, the more operationally complex the BHC as a whole, since many Tier 1 subsidiaries will themselves own further subsidiaries. We also use total bank deposits as a proxy for operational complexity since attracting deposits is a decentralized activity for which banks need branches and operations in many states. As a result they need to deal with markets and regulations across multiple jurisdictions. Because banks do not operate in several industries, we proxy for diversification using the number of states the Tier 1 subsidiaries are located in.

Because banks are all highly levered, we do not believe it makes sense to use leverage as a measure of complexity of the financial structure. Instead, we use the ratio of subordinated debt to total assets as a measure of financial complexity. Prior literature argues that firms need larger boards when they are more levered because of the necessity of dealing with the suppliers of external finance. As John, Mehran and Qian (2009) describe, the holders of subordinated bank debt tend to be institutional investors. It is more plausible that banks need directors to deal with institutions than with depositors, who are the main suppliers of external bank capital.

We obtain data on Tier 1 subsidiaries of our sample firms from the Federal Reserve's National Information Center (NIC), which contains historical structure information for financial institutions. Data on deposits and subordinated debt are from FR Y-9C reports. Table 1E contains summary statistics for all complexity measures other than firm size.

-Insert Table 6 about here-

In Table 6, we show the results of estimating our performance regressions after including the interaction between Ln(Board size) with our measures of complexity. For all but column IIII our baseline regression is the regression in column III of Table 2. For the sake of brevity, we suppress the coefficients on all but the variables of interest. Column I of Table 6 shows that the interaction between Ln(Board size) and firm size, Ln(Assets) is insignificant. Both Coles, Daniel and Naveen (2008) and Graham, Hazarika and Narasimhan (2008) argue that the positive effect of board size is driven by the effect of non-insiders (outsiders in their terminology). To examine whether our results change when we restrict ourselves to non-insiders, we reestimate the regression in column I after replacing Ln(Board size) with Ln(Non-insiders) and the fraction of outsiders with the fraction of non-insiders. From column II, we see that the results are similar.

Because we are using firm fixed-effects in our regressions, it is possible there is not

enough within-firm variation in firm size to identify an effect of the interaction terms. Thus, in column III, we examine what happens when we add an interaction term to the regression in column II of Table 5 which uses the full sample of data from 1965-1999. The results are similar to those in the previous two columns. In columns III-VII, we examine the interactions between board size and "Number Tier 1 subsidiaries", Total deposits, Number of states and Subordinated debt/Assets, respectively. The interaction terms in all columns but the last are insignificant.

In general, Table 6 does not provide much support for the idea that large boards add value in banks because they help the bank's management deal with complexity. It is possible that our results differ from those in Coles, Daniel and Naveen (2008) and Graham, Hazarika and Narasimhan (2008) because we control for firm fixed-effects and there is not enough within-firm variation in complexity to identify an effect on the interaction terms. It is also possible that not all directors help management deal with complexity. The quote at the beginning of this Subsection suggests that directors who sit on subsidiary boards may play a special role in dealing with organizational complexity in particular. They may also play a role in dealing with other kinds of complexity. If these directors add value in more complex banks and large bank boards have more of these directors, then this could be one reason why large boards add value in banks. We examine this issue next.

#### 6.2.2 The role of directors sitting on subsidiary boards

We collect additional information on subsidiary directorships of parent BHC directors from proxy statements which we summarize in Table 1E. On average 51.1% of the parent BHC's board also sits on the board of the BHC's lead bank. In some cases, e.g. J. P. Morgan, the entire board of the parent sits on the board of the lead bank. For 83.82% of firm years we are able to determine that at least some parent directors sit on the board of the lead bank or another subsidiary. However, it is not clear that subsidiary directorships other than lead bank directorships are consistently disclosed. We believe it is more likely that directors will have subsidiary directorships if the proxy discloses that at least some of them have lead bank directorships. Thus, we use lead bank directorships as a general proxy for subsidiary directorships. On average the number of directors sitting on the board of the lead bank is 7.8, of which on average 5.98 are non-insiders.

The fact that subsidiary directorships are so common in BHCs suggests that they play an important role in their management. In Table 7, we examine the role of subsidiary directorships. In columns I-V, we decompose board size into directors who do and do not sit on the lead bank board, thus our baseline specification is as in column VI of Table 2. In all specifications we also control for the number of Tier 1 subsidiaries because subsidiary directorships are likely to be highly correlated with the number of subsidiaries. We suppress the coefficients on all but the variables of interest for the sake of brevity.

In column I, we test whether directors with subsidiary directorships fulfill a special role in dealing with organizational complexity of the BHC. We separate board size into the number of directors sitting on the board of the lead bank and the number who do not and include the interaction between the former and the number of Tier 1 subsidiaries. In this specification we consider the number of directors sitting on the board of the lead bank to be a proxy for the number of directors sitting on subsidiary boards. The coefficient on the interaction term is positive and significant at the 5% level. This suggest that additions to board size of directors who also sit on subsidiary boards are more value-enhancing the more complex the organizational structure of the BHC.<sup>21</sup> To examine whether directors with subsidiary directorships also add value as other measures of complexity increase, we replace the interaction term in column I with the interactions between the number of parent directors with lead bank directorships and Ln(Assets), Total deposits, Number of states and Subordinated debt/Assets in columns II-V. All the interaction terms are positive and significant at greater than the 5% level. This is in marked contrast to Table 7, where none of the interactions between Ln(Board size) and our complexity measures was significant. To ensure the differences between Table 7 and Table 8 are not just driven by changes in functional form for board size and the addition of the number of subsidiaries to the regression, we replicated Table 7 using Board size instead of Ln(Board size) and including the number of subsidiaries and the results were similar, i.e. the interaction terms were not significant.

Our conclusion is that in BHCs larger boards do not necessarily increase value because they help deal with complexity. However, they may increase value when they contain a larger number of directors who also sit on subsidiary boards, as these directors appear to play an important role in dealing with complexity. Consistent with this idea, we find in column VI of Table 6 that if we replace Ln(Board size) with Ln(Number lead bank directorships) and add the number of subsidiaries to the specification in column III of Table 2, the coefficient on

<sup>&</sup>lt;sup>21</sup>If we add a dummy variable indicating directors sit on subsidiary boards and the interaction between this dummy and the number of subsidiaries to the specification in column VI of Table 2, the results are similar, i.e. as BHCs become more organizationally complex, their value increases if parent directors sit on subsidiary boards, not necessarily just the board of the lead bank.

Ln(Number lead bank directorships) is positive and significant at greater than the 5% level. Thus, at least part of the positive effect of Ln(Board size) seems to be driven by directors with subsidiary directorships.

The quote at the beginning of this Section suggests that these directors with subsidiary directorships add value because they facilitate cooperation and communication among the various banks in the holding company. As an additional test of this idea, we reexamine the role of M&A directors. Coordinating the activities of subsidiaries may be particularly difficult when these subsidiaries are newly acquired banks or BHCs because they may have had different management and operational styles from those of the acquirer. Because M&A directors are familiar with the operating style of the acquired bank, we expect them to be particularly valuable in helping coordinate subsidiary activities. We examine this by decomposing board size into the number of non M&A directors and the number of M&A directors who do not sit and those who do sit on the board of the lead bank. We then replicate the regression in column VI of Table 2 using this decomposition and including the interaction between the number M&A directors who sit on the board of the lead bank with the number of Tier 1 subsidiaries. In this specification we consider directorships on the lead bank board to be a proxy for subsidiary directorships. We find that the coefficient on the interaction term is significant in column VII. Thus, although Table 4 suggests that M&A directors do not add value in general, M&A directors with subsidiary directorships appear to add value as organizational complexity increases. This is consistent with the idea that subsidiary directorships serve a coordinating role.

#### 7 Board structure and ROA

In this section, we investigate the relation between an accounting measure of performance (ROA) and board size and composition as a final robustness check of our previous results. However, we are not as confident that governance characteristics will have the same relation with ROA in our sample of BHCs as they have with ROA in non-financial firms. Boyd and Runkle (1993) advocate using market-based measures of performance for banking firms and point out that "With banking firms, accounting profitability measures are notoriously poor since gains and losses need not be realized in a timely manner." (p. 55).

Nevertheless, in Table 8, we examine the relationship between ROA and board size and composition. In column I, we replicate the regression from column I of Table 7 excluding

Lagged ROA. In column II, we decompose Board size into the number of directors who sit and those who do not sit on the lead bank board. In column III, we decompose board size into the number of non M&A directors and the number of M&A directors who sit and those who do not sit on the board of the lead bank. The results are consistent with the results in Table 7. In particular, it appears as if board additions of directors with subsidiary directorships enhance firm performance.

#### 8 Conclusions

Recent proposals for improving bank governance (e.g. the Walker Review, 2009) suggest that bank governance structures are ineffective because they differ from those of non-financial firms. Because there is relatively little research on the governance of banking firms, such comparisons may be inevitable. This paper adds to the bank governance literature by examining the relationship between bank performance and two features of board governance in which banks consistently differ from non-financial firms, board composition and size. Using 34 years of data, we find that banks do not appear to be systematically choosing ineffective governance structures. Board composition has little relationship with performance, consistent with findings for non-financial firms. However, we caution that measurement error due to unobserved lending relationships may confound the interpretation of this result. Board size and performance are positively related. This result does not appear to be entirely driven by reverse causality or omitted variables related to M&A activity. We provide evidence suggesting that one possible explanation for this results is that larger boards have more directors with subsidiary directorships. These directors may be particularly suited to deal with organizational complexity.

We are unaware of any prior literature on the role of subsidiary directorships. One reason for this may be that they are less important in non-financial firms. Bank holding companies often have complicated hierarchical structures through their ownership or control of banks, lower level BHCs and other subsidiaries. Each of these subsidiaries is separately chartered with its own board. Thus, it is plausible that the coordination of activities across subsidiaries occurs through memberships on these boards. In contrast, non-financial firms are often organized along functional or divisional lines, none of which need have a separate legal identity. In these firms, the coordination of activities between functions may occur through means other than through boards. Although more research needs to be done on the

role of subsidiary directorships and lending relationships, our analysis suggests that banks may have special governance features that need to be taken into account when designing governance reform proposals.

### References

- Adams, Renée B., 2009a., "Governance and the Financial Crisis," ECGI Finance Working Paper No. 248/2009.
- [2] Adams, Renée B., 2009b, "Chapter 23 Governance of Banking Institutions" forthcoming in *Corporate Governance*, R. Anderson and H.K. Baker (eds.), Wiley & Sons.
- [3] Adams, R. and Ferreira, D., 2008, "Do Directors Perform for Pay?" *Journal of Accounting and Economics*, 46(1), pp. 154-171.
- [4] Adams, Renée B. and Daniel Ferreira, 2008, "Does Regulatory Pressure Provide Sufficient Incentives for Bank Directors? Evidence from Directors' Attendance Records" ECGI Finance Working Paper No. 203/2008.
- [5] Adams, Renée B., and Daniel Ferreira, 2007, "A Theory of Friendly Boards," *Journal of Finance* 62(1), 217-250.
- [6] Adams, R. and Mehran, H., 2003, "Is Corporate Governance Different for Bank Holding Companies?" *Economic Policy Review* 9, pp. 123-142.
- [7] Barth, James R., Gerard Caprio, Jr. and Ross Levine, 2004, "Bank Regulation and Supervision: What Works Best?" *Journal of Financial Intermediation* vol. 13(2), pages 205-248.
- [8] Bhagat, Sanjai and Bernard Black, 2001, "The Non-Correlation Between Board Independence and Long Term Firm Performance," *Journal of Corporation Law* 27, 231-274.
- [9] Bliss, Richard T., and Richard J. Rosen, 2001, "CEO Compensation and Bank Mergers." Journal of Financial Economics 61:1,107–138.
- [10] Booth, James R., Marcia Millon Cornett and Hassan Tehranian, 2002, "Boards of directors, ownership, and regulation," *Journal of Banking and Finance* 26, pp. 1973-1996.

- [11] Boyd, J. and Runkle, D., 1993, "Size and performance of banking firms." *Journal of Monetary Economics* 31, pp. 47-67.
- [12] Brewer III, E., Jackson III, W. and Jagtiani, J., 2000, "Impact of Independent Directors and the Regulatory Environment on Bank Merger Prices: Evidence from Takeover Activity in the 1990s." Federal Reserve Bank of Chicago Emerging Issues, December Issue.
- [13] Brick, I., Palmon, O. and Wald, J., 2006 "CEO Compensation, Director Compensation, and Firm Performance: Evidence of Cronyism?" *Journal of Corporate Finance*, Volume 12, Issue 3, pp. 403-423.
- [14] Brickley, J. and James, C., 1987, "The Takeover Market, Corporate Board Composition and Ownership Structure." *Journal of Law and Economics* 30, pp. 161-180.
- [15] Byrd, J., Fraser, D., Lee, D. and Williams, T., 2001, "Financial crises, natural selection and governance structure: evidence from the thrift crisis." Working paper, Texas A&M University.
- [16] Caprio, Jr., Gerard, Luc Laeven and Ross Levine "Governance and Bank Valuation" Journal of Financial Intermediation 16 (2007) 584–617.
- [17] Coles, L. Jeffrey, Naveen D. Daniel and Lalitha Naveen, "Boards: Does one size fit all?" Journal of Financial Economics, 2008, 87, 329–356.
- [18] Dalton, D., Daily, C., Johnson, J. and Ellstrand, A. "Number of Directors and Financial Performance: A Meta-Analysis." Academy of Management Journal, 1999, 42, pp. 674-686.
- [19] Eisenberg, T., S. Sundgren and Wells, M. "Larger Board Size and Decreasing Firm Value in Small Firms." *Journal of Financial Economics*, 1998, 48, pp. 35-54.
- [20] Federal Reserve Bank of Atlanta, The Director's Primer, 2002, Third Edition.
- [21] Felsenthal, Mark, 2009, "Fed to meet bank execs on pay reviews" Reuters, Oct 30, http://www.reuters.com/article/newsOne/idUSTRE59U04I20091031.
- [22] Hallock, K., 1997, "Reciprocally Interlocking Boards of Directors and Executive Compensation." *Journal of Financial and Quantitative Analysis* 32, pp. 331-344.

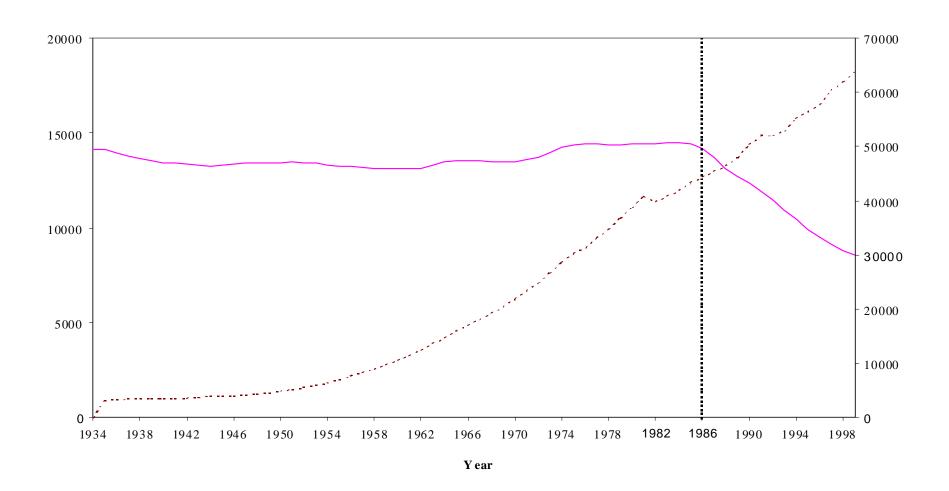
- [23] Harris, Milton and Artur Raviv, 2008, "A Theory of Board Control and Size," Review of Financial Studies 21, 1797-1832.
- [24] Hayes, R., Mehran, H., Schaefer, S., 2005, "Board Committee Structures, Ownership and Firm Performance." Working Paper, Federal Reserve Bank of New York.
- [25] Hermalin, B. and Weisbach, M., 2003, "Boards of Directors as an Endogenously-Determined Institution: A Survey of the Economic Literature." *Economic Policy Review* 9, pp. 7-26.
- [26] Himmelberg, C., Hubbard, R. and Palia, D., 1999, "Understanding the determinants of managerial ownership and the link between ownership and performance." *Journal of Financial Economics* 53, pp. 353-384.
- [27] Jensen, M., 1993, "The modern industrial revolution, exit, and the failure of internal control systems." *Journal of Finance* 48, pp. 831-880.
- [28] Jones, Kenneth D., and Tim Critchfield, 2005, "Consolidation in the U.S. Banking Industry: Is the "Long, Strange Trip" About to End?" FDIC Banking Review 17:4, 31-61.
- [29] Kirkpatrick, Grant, 2009, "The Corporate Governance Lessons from the Financial Crisis." Financial Markets Trends 96:1, 52-81.
- [30] Klein, A., 1998, "Firm Performance and Board Committee Structure." *Journal of Law and Economics* 41, pp. 275-303.
- [31] Kole, S. and Lehn, K., 1999, "Deregulation and the Adaptation of Governance Structure: The Case of the U.S. Airline Industry." *Journal of Financial Economics* 52, pp. 79-117.
- [32] Kroszner, Randall, and Philip E. Strahan, 2001, "Throwing Good Money after Bad?: Board Connections and Conflicts in Bank Lending." NBER Working Paper Series No. 8694.
- [33] Laeven, Luc and Ross Levine, 2009, "Bank regulation, governance and risk-taking" Journal of Financial Economics, Volume 93, Issue 2, August, pp. 259-275.
- [34] Lehn, Kenneth, Sukesh Patro and Mengxin Zhao, 2008, "Determinants of the Size and Structure of Corporate Boards: 1935-2000," forthcoming, *Financial Management*.

- [35] Linck, James S., Jeffry M. Netter and Tina Yang, 2008, "The Determinants of Board Structure," *Journal of Financial Economics* 87, 308–328.
- [36] Mak, Y. T. and Yuan Li, 2001, "Determinants of corporate ownership and board structure: evidence from Singapore," *Journal of Corporate Finance* 7, pp. 235–256.
- [37] McConnell, J. and Servaes, H., 1990, "Additional evidence on equity ownership and corporate value." *Journal of Financial Economics* 27, pp. 595-612.
- [38] Mehran, H., 1995, "Executive compensation structure, ownership and firm performance." *Journal of Financial Economics* 38, pp. 163-184.
- [39] Morck, R., Shleifer, A. and Vishny, R., 1988, "Management Ownership and Market Valuation: An Empirical Analysis." *Journal of Financial Economics* 20, pp. 293-315.
- [40] XXMoyer, L. 2008, "Off with their heads", April 4, Forbes.com, available at <a href="http://www.forbes.com/2008/04/11/shareholders-banking-iss-biz-wall-cx">http://www.forbes.com/2008/04/11/shareholders-banking-iss-biz-wall-cx</a> lm 0411proxy.html.
- [41] Penas, María Fabianam, and Haluk Unal, 2004, "Gains in Bank Mergers: Evidence from the Bond Markets." Journal of Financial Economics 74:1, 149–79.
- [42] Pettigrew, A. "On studying managerial elites." *Strategic Management Journal*, 1992, 13, pp. 163-182.
- [43] Rhoades, S. "Bank Mergers and Industrywide Structure, 1980-1994." Staff Study, Board of Governors of the Federal Reserve System, Washington, D.C., 1996.
- [44] Raheja, Charu G., 2005, "Determinants of board size and composition: A theory of corporate boards," *Journal of Financial and Quantitative Analysis* 40, 307–329.
- [45] Schranz, Mary, 1993, "Takeovers Improve Firm Performance: Evidence from the Banking Industry." Journal of Political Economy 101:2, 299-326.
- [46] Stiroh, K. "How did bank holding companies prosper in the 1990s?" *Journal of Banking and Finance*, 2000, 24, pp. 1703-1745.
- [47] Vafeas, N. "Board meeting frequency and firm performance." *Journal of Financial Economics*, 1999, 53, pp. 113-142.

- [48] Walker, Sir David, 2009, "A review of corporate governance in UK banks and other financial industry entities, Final recommendations," 26 November, http://www.hmtreasury.gov.uk/d/walker review 261109.pdf.
- [49] Wooldridge, Jeffrey, 2002, Econometric Analysis of Cross Section and Panel Data, MIT Press, Cambridge, Massachussetts.
- [50] Wulf, J., 2004, "Do CEOs of Target Firms Trade Power for Premium? Evidence from "Mergers of Equals." *Journal of Law, Economics and Organization*, 2004, 20, pp. 60-101.
- [51] Yermack, D., 1996, "Higher market valuation of companies with a small board of directors." *Journal of Financial Economics* 40, pp. 185-211.
- [52] Zhou, X., 2001, "Understanding the determination of managerial ownership and its relationship to firm performance: comment." *Journal of Financial Economics* 62, pp. 559-571.

Figure 1: Number of FDIC-Insured Commercial Banks, 1934-99

Data on number of institutions is from the FDIC historical statistics on banking. The number of banks is indicated by the solid line and measured on the left axis. The number of branches is indicated by the dotted line and measured on the right axis. The dotted vertical line at year=1986 indicates the first year of our primary data set on BHCs described in Table 1.



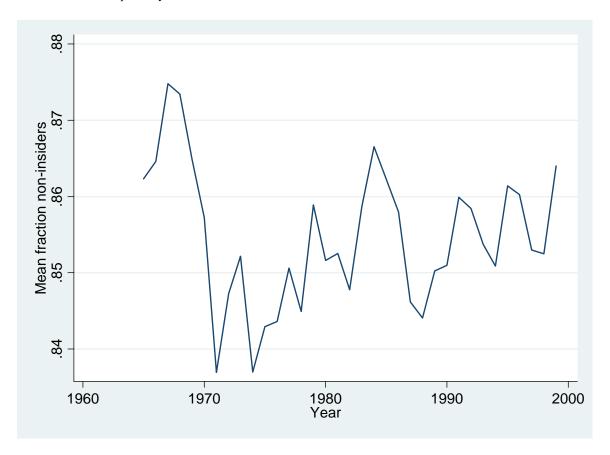
### Figure 2: Plot of Average Board Size Over the Years 1965-1999

Tables 1A and D describe the sample firms. From 1982-1999 all sample firms are BHCs. Prior to 1982, the sample firms consist of a mixture of BHCs and banks. We determine the predecessor banks to the BHCs in our primary data set from Moody's Bank and Finance Manuals. Data prior to 1986 is from Moody's Bank and Finance Manuals. Data post-1986 is from bank proxy statements. The average is taken over the number of institutions in a given year. In 1965, there were 34 institutions; during 1966-1996 there were 35 institutions. In 1997, 1998 and 1999, there were 34, 33 and 32 institutions, respectively.



# Figure 3: Plot of the Average Fraction of Non-Insiders Over the Years 1965-1999

Tables 1A and D describe the sample firms. From 1982-1999 all sample firms are BHCs. Prior to 1982, the sample firms consist of a mixture of BHCs and banks. We determine the predecessor banks to the BHCs in our primary data set from Moody's Bank and Finance Manuals. The figure shows the ratio of non-insiders to board size from 1965 to 1999. A non-insider is defined to be any director who is not currently an officer of the banking firm's headquarters. By headquarters we mean the top layer of the organizational hierarchy of the banking firm. Data prior to 1986 is from Moody's Bank and Finance Manuals. Data post-1986 is from bank proxy statements. The number of non-insiders may not necessarily be comparable across banks and BHCs, since it is not always possible to identify officers of the BHC whose primary position is with a subsidiary of the BHC from Moody's Bank and Finance Manuals. In contrast, it may be easier to identify all officers of a bank who sit on the board of the bank. Thus, banks may appear to have more insiders than BHCs. 1982 is first year all sample firms were BHCs. The average is taken over the number of institutions in a given year. In 1965, there were 34 institutions; during 1966-1996 there were 35 institutions. In 1997, 1998 and 1999, there were 34, 33 and 32 institutions, respectively.



#### Table 1A Summary Statistics for Sample of BHCs from 1986-1999

Table 1A shows summary statistics for select financial variables, board size and board composition and control variables for our sample of 35 BHCs from 1986-1999. All financial variables were collected from the fourth quarter Consolidated Financial Statements for Bank Holding Companies (Form FR Y-9C) from the Federal Reserve Board, except monthly stock returns which were collected from CRSP. Sample data is not available for all firms for all years because of missing data (primarily due to missing proxy statements) and because of acquisitions of sample banks in 1997-1999. Our measure of Q is the ratio of the firm's market value to book value of its assets. The firm's market value is calculated as book value of assets minus book value of equity plus market value of equity. Return on assets (ROA) is calculated as the ratio of net income to book value of assets. We calculate a measure of bank capital, its primary capital ratio, which we define as the sum of the book value of common stock, perpetual preferred stock, surplus, undivided profits, capital reserves, mandatory convertible debt, loan and lease loss reserves, and minority interests in consolidated subsidiaries minus intangible assets. Volatility of stock price is measured as the standard deviation of the monthly returns on the stock price for the given year. Data on the governance characteristics, including CEO ownership, is collected from proxy statements filed with the SEC. We consider a director to be an insider if he works for the firm and affiliated if he has had any previous business relationship with the firm or family relationship with its officers. All other directors are outsiders. We classify boards as being interlocked if any inside director sits on the board of an affiliated or outside director. Meeting fees is the amount directors get paid to attend board meetings.

|  | Observations                            | Mean  | Std. Deviation | Minimum | Maximum |
|--|---|-------|----------------|---------|---------|
| Financial Variables                      | 0 |       |                |         |         |
| Tobin's Q                                | 480                                     | 1.05  | 0.08           | 0.95    | 1.55    |
| Return on assets                         | 480                                     | 0.01  | 0.01           | -0.03   | 0.02    |
| Total assets (in millions of \$)         | 480                                     | 40900 | 59200          | 3007    | 633000  |
| Capital ratio                            | 480                                     | 0.08  | 0.02           | 0.03    | 0.15    |
| Volatility                               | 484                                     | 0.08  | 0.03           | 0.01    | 0.22    |
| Board Size and Composition               |   |       |                |         |         |
| Board size                               | 472                                     | 17.97 | 5.33           | 8       | 36      |
| Fraction of outside directors            | 472                                     | 0.69  | 0.15           | 0.10    | 0.95    |
| Fraction of non-inside directors         | 472                                     | 0.80  | 0.08           | 0.44    | 0.95    |
| Other Governance Characteristics         |   |       |                |         |         |
| Number of committees                     | 472                                     | 4.42  | 1.64           | 1       | 9       |
| Committee members / Number committees    | 446                                     | 1.87  | 0.92           | 0.14    | 5       |
| % committees chaired by outsiders        | 472                                     | 62.43 | 30.23          | 0       | 100     |
| Average number of committees per chair   | 446                                     | 2.03  | 0.83           | 1       | 5.33    |
| Meetings per year                        | 472                                     | 8.48  | 3.30           | 2       | 24      |
| Meeting fee                              | 471                                     | 994   | 617            | 0       | 9000    |
| Average other directorship for outsiders | 472                                     | 1.76  | 0.88           | 0       | 5.29    |
| Average other directorship for insiders  | 471                                     | 1.49  | 1.31           | 0       | 7       |
| Dummy if board interlock exists          | 482                                     | 0.39  | 0.49           | 0       | 1       |
| % CEO ownership                          | 463                                     | 2.27  | 6.83           | 0       | 49.44   |
| Dummy if pay directors deferred comp.    | 482                                     | 0.95  | 0.23           | 0       | 1       |
| Dummy if pay directors deferred stock    | 482                                     | 0.31  | 0.46           | 0       | 1       |

Table 1B Summary Statistics for Changes in Board Size and Composition

Table 1B shows summary statistics for data on changes in board size and composition for our sample firms during the period 1986-1999. The top panel shows summary statistics for the number of years in which there were changes in board size, the fraction of outsiders and the fraction of non-insiders. The middle panel shows summary statistics for these changes. The bottom panel shows summary statistics for the proportional changes these changes represent. The proportional change is calculated as the change from the previous year divided by the amount in the current year. We consider a director to be an insider if he works for the firm and affiliated if he has had any previous business relationship with the firm or family relationship with its officers. All other directors are outsiders.

|                               | Observations | Mean    | Std. Deviation | Minimum | Maximum |
|-------------------------------|--------------|---------|----------------|---------|---------|
| Number of Years with Changes  |              |         |                |         |         |
| Board size                    | 35           | 9.97    | 2.07           | 5       | 14      |
| Fraction of outside directors | 35           | 10.37   | 1.37           | 8       | 13      |
| Fraction of non-insiders      | 35           | 9.91    | 1.81           | 5       | 13      |
| Changes                       |              |         |                |         |         |
| Board size                    | 349          | -0.33   | 3.20           | -18     | 14      |
| Fraction of outside directors | 363          | 1.36e-3 | 0.08           | -0.37   | 0.30    |
| Fraction of non-insiders      | 347          | 3.82e-4 | 0.06           | -0.19   | 0.18    |
| Proportional Changes in %     |              |         |                |         |         |
| Board size                    | 349          | -3.02   | 18.34          | -133.33 | 53.85   |
| Fraction of outside directors | 363          | -1.48   | 19.49          | -223.08 | 46.15   |
| Fraction of non-insiders      | 347          | -0.20   | 7.40           | -39.29  | 21.43   |

#### Table 1C Summary Statistics for Board Additions Following Mergers and Acquisitions

Table 1C shows summary statistics for data on additions to the board following mergers and acquisitions for our sample firms during the period 1986-1999. Directors who were added to the board following an M&A transaction are identified from proxy statements. Number of M&A with additions is the number of M&A transactions which involved additions to the board for each firm during 1986-1999. Number M&A directors in a given year is the sum of all directors on the board in that year who joined the board as the result of an M&A transaction. Ratio of M&A directors to board size is the fraction of directors who joined the board as the result of an M&A transaction.

|  | Observations | Mean  | Std. Deviation | Minimum | Maximum |
|--|--------------|-------|----------------|---------|---------|
| Transaction Data                             |              |       |                |         |         |
| Number of M&A with additions                 | 35           | 2.03  | 1.79           | 0       | 6       |
| Number of directors added in M&A transaction | 71           | 3.61  | 3.03           | 1       | 14      |
| Fraction of acquirer's board added in M&A    | 70           | 0.17  | 0.14           | 0.03    | 0.56    |
| transaction                                  |              |       |                |         |         |
| <b>Board Composition</b>                     |              |       |                |         |         |
| Number M&A directors                         | 482          | 2.52  | 3.58           | 0       | 16      |
| Number non M&A directors                     | 472          | 15.45 | 5.09           | 4       | 36      |
| Ratio of M&A directors to board size         | 472          | 0.13  | 0.18           | 0       | 0.68    |

#### Table 1D Summary Statistics for Banking Firms 1965-1985

Table 1D shows summary statistics for select financial variables, board size and composition of the predecessors of the BHCs in our 1986-1999 data over the period of 1965-1985. 1965 is the first year we can obtain stock price data in CRSP for at least one of our sample BHCs. From 1982-1999, all sample firms are BHCs. Prior to 1982, the sample firms consist of a mixture of BHCs and banks. We determine the predecessor banks to the BHCs in our primary data set from Moody's Bank and Finance Manuals. Balance sheet data for BHCs was collected from the fourth quarter *Consolidated Financial Statements for Bank Holding Companies* (Form FR Y-9C) from the Federal Reserve Board. Balance sheet data for banks was collected from *Reports of Condition and Income (Call Reports)*. Monthly stock returns are from CRSP. Our measure of Tobin's Q is the ratio of the firm's market value to book value of its assets. Our proxy for market value is the book value of assets minus the book value of equity plus the market value of equity. Return on assets (ROA) is calculated as the ratio of net income to book value of assets. Capital/assets=Book value equity/Book value assets. Volatility of stock price is measured as the standard deviation of the monthly returns on the stock price for the given year. Data on board characteristics is from Moody's Bank and Finance Manuals. A non-insider is defined to be any director who is not currently an officer of the banking firm's headquarters.

|                                  | Observations | Mean  | Std. Deviation | Minimum | Maximum |
|----------------------------------|--------------|-------|----------------|---------|---------|
| Financial Variables              |              |       |                |         |         |
| Tobin's Q                        | 473          | 1.00  | 0.03           | 0.94    | 1.14    |
| Return on assets                 | 473          | 0.01  | 2.7e-3         | 3.98e-4 | 0.02    |
| Total assets (in millions of \$) | 473          | 9030  | 13900          | 707     | 87700   |
| Capital/assets                   | 473          | 0.06  | 0.01           | 0.03    | 0.11    |
| Volatility                       | 459          | 0.07  | 0.03           | 0.02    | 0.18    |
| Board Size and Composition       |              |       |                |         |         |
| Board size                       | 473          | 20.35 | 5.77           | 5       | 43      |
| Fraction of non-insiders         | 473          | 0.85  | 0.07           | 0.40    | 0.97    |

Table 1E Summary Statistics for Additional Complexity Measures and Subsidiary Board Seats

The top panel of Table 1E shows summary statistics of complexity measures for our BHCs over the 1986-1990 period. Number Tier 1 subsidiaries is the number of subsidiaries that are directly controlled by the parent BHC. Number of states is the number of states that domestic Tier 1 subsidiary headquarters are located in. Organizational structure data is from the Federal Reserve's National Income Center (NIC). Total deposits and subordinated debt data are from Form FR Y-9Cs. The bottom panel of Table E shows data on the extent to which the parent BHC board overlaps with the board of the lead bank. Data on subsidiary directorships are obtained from proxy statements. Overlap with lead bank board is the fraction of parent BHC directors who also sit on the board of the BHC's lead bank. Directors sit on subsidiary boards is a dummy variable equal to 1 if any BHC director sits on the board of a subsidiary bank in a given year. Number lead bank directorships is the number of parent BHC directors sitting on the board of the lead bank. Number M&A directors with lead bank directorships is the number of parent BHC directors who joined the board as a result of an M&A transaction who also sit on the board of the lead bank.

|   | Observations | Mean     | Std.      | Minimum  | Maximum  |
|---|--------------|----------|-----------|----------|----------|
| Parel A. Complanity magazine                        |              |          | Deviation |          |          |
| Panel A: Complexity measures                        |              |          |           |          |          |
| Total deposits (in millions)                        | 478          | 25069.33 | 32028.63  | 2416.958 | 357260   |
| Number Tier 1 subsidiaries                          | 478          | 18.23013 | 13.25343  | 1        | 75       |
| Number of states                                    | 478          | 4.566946 | 3.0937    | 1        | 18       |
| Subordinated debt/Assets                            | 478          | 0.012455 | 0.010882  | 0        | 0.050765 |
| Panel B: Subsidiary directorships                   |              |          |           |          |          |
| Overlap with lead bank board                        | 476          | 0.510891 | 0.424332  | 0        | 1        |
| Directors sit on subsidiary boards                  | 482          | 0.838174 | 0.368674  | 0        | 1        |
| Number lead bank directorships                      | 482          | 7.798755 | 7.402517  | 0        | 29       |
| Number directors w/o lead bank directorships        | 482          | 7.993776 | 8.265222  | 0        | 31       |
| Number lead bank directorships held by non-insiders | 482          | 5.983402 | 6.636989  | 0        | 25       |
| Number M&A directors with lead bank directorships   | 482          | 0.417012 | 1.279277  | 0        | 8        |
| Number M&A directors w/o lead bank directorships    | 482          | 2.103734 | 3.421472  | 0        | 16       |

# Table 2 (continued on next page) Fixed Effect Regressions of Tobin's Q on Board Structure plus Controls

Table 2 shows fixed effect regressions of Tobin's Q on the natural logarithm of board size, the fraction of outside directors and financial and governance controls using the sample of BHCs from 1986-1999. Tobin's Q=(book value of assets+market value of equity-book value of equity)/book value of assets. We consider a director to be an insider if he works for the firm and affiliated if he has had any previous business relationship with the firm or family relationship with its officers. All other directors are outsiders. The specification in column VI uses board size instead of the natural logarithm of board size. Table 1A describes the sample and the control variables further. Columns vary by the regressors they include. All specifications include year dummies and firm fixed-effects. Absolute values of robust t-statistics are in brackets. Significance levels: (\*\*\*)-1% (\*\*\*)-5% (\*)-10%.

|  |          | D               | ependent Vari   | iable: Tobin's     | Q                   |                 |
|--|----------|-----------------|-----------------|--------------------|---------------------|-----------------|
| •                                      | I        | II              | III             | IV                 | V                   | VI              |
| Ln (Board size)                        | 0.018*   | 0.021**         | 0.019*          | 0.01               | 0.017*              |                 |
|  | [1.82]   | [2.16]          | [1.88]          | [0.97]             | [1.67]              |                 |
| Board size                             |          |                 |                 |                    |                     | 0.001**         |
|  |          |                 |                 |                    |                     | [2.01]          |
| Fraction of outside directors          | 0.025    | 2.24e-4         | 0.01            | 9.6e-5             |                     | 0.011           |
| T 6                                    | [1.12]   | [0.01]          | [0.45]          | [0.00]             | 0.041               | [0.53]          |
| Fraction of non-insiders               |          |                 |                 |                    | 0.041               |                 |
| In (Number committees)                 |          | 0.020***        | 0.042***        | 0.021**            | [1.48]<br>-0.043*** | 0.041**         |
| Ln (Number committees)                 |          | -0.039***       | -0.042***       | -0.031**           |                     | -0.041**        |
| Committee members / Number             |          | [2.94]<br>0.009 | [3.20]<br>0.011 | [2.59]<br>-0.002   | [3.23]<br>0.01      | [3.16]<br>0.011 |
| committees                             |          | 0.009           | 0.011           | -0.002             | 0.01                | 0.011           |
| COMMISSION OF                          |          | [1.21]          | [1.29]          | [0.23]             | [1.29]              | [1.30]          |
| % Outside chair                        |          | 3.83e-5         | -6.63e-6        | 1.31e-5            | 5.69e-6             | -1.97e-5        |
|  |          | [0.31]          | [0.05]          | [0.11]             | [0.05]              | [0.16]          |
| Avg. number committees per chair       |          | -0.001          | -0.001          | 0.009              | -0.001              | -0.001          |
|  |          | [0.12]          | [0.12]          | [1.22]             | [0.12]              | [0.15]          |
| Ln (Number board meetings)             |          |                 | -0.007          | -0.005             | -0.01               | -0.007          |
|  |          |                 | [0.82]          | [0.61]             | [1.07]              | [0.77]          |
| Meeting fee                            |          |                 | 0.000**         | 0.000**            | 0.000**             | 0.000*          |
|  |          |                 | [2.56]          | [2.37]             | [2.37]              | [2.50]          |
| Avg. other directorships for outsiders |          |                 | -0.007*         | -0.006             | -0.006*             | -0.007*         |
|  |          |                 | [1.71]          | [1.58]             | [1.67]              | [1.76]          |
| Avg. other directorships for insiders  |          |                 | -0.007***       | -0.006***          | -0.008***           | -0.007**        |
|  |          |                 | [3.47]          | [2.96]             | [3.72]              | [3.54]          |
| Dummy if board interlock exists        |          |                 |                 | -0.011**           |                     |                 |
| 0/ GDO 11:                             |          |                 |                 | [2.50]             |                     |                 |
| % CEO ownership                        |          |                 |                 | -0.008***          |                     |                 |
| D                                      |          |                 |                 | [3.46]             |                     |                 |
| Dummy if pay directors deferred stock  |          |                 |                 | -0.016***          |                     |                 |
| Dummy if may dimentant defermed        |          |                 |                 | [2.74]<br>-1.74e-4 |                     |                 |
| Dummy if pay directors deferred comp.  |          |                 |                 | -1./46-4           |                     |                 |
| comp.                                  |          |                 |                 | [0.02]             |                     |                 |
| Ln (Assets)                            | 0.001    | -0.007          | -0.007          | -0.009             | -0.007              | -0.007          |
| ,                                      | [0.17]   | [1.05]          | [1.05]          | [1.42]             | [1.08]              | [1.00]          |
| Capital ratio                          | 0.545**  | 0.713**         | 0.736**         | 0.922***           | 0.736**             | 0.747*          |
| -                                      | [2.17]   | [2.33]          | [2.42]          | [2.98]             | [2.42]              | [2.45]          |
| Volatility                             | -0.008   | -0.067          | -0.067          | -0.109             | -0.068              | -0.067          |
|  | [0.08]   | [0.80]          | [0.80]          | [1.31]             | [0.83]              | [0.80]          |
| Lagged ROA                             | 1.707*** | 1.497***        | 1.416***        | 1.689***           | 1.438***            | 1.415**         |
|  | [3.58]   | [3.13]          | [2.91]          | [3.58]             | [2.92]              | [2.90]          |
| Constant                               | 0.955*** | 1.148***        | 1.083***        | 1.143***           | 1.074***            | 1.111**         |
|  | [5.54]   | [8.21]          | [9.03]          | [9.44]             | [8.99]              | [9.30]          |
| Observations                           | 472      | 446             | 444             | 436                | 444                 | 444             |
| R-squared                              | 0.776    | 0.788           | 0.799           | 0.813              | 0.8                 | 0.799           |

Table 3
Instrumental Variable Regressions of Tobin's Q on Board Structure plus Controls

Column I of Table 3 replicates the regression in column III of Table 2 after restricting our sample to the years for which our instrument is available: 1990-1999. Column II shows the first stage regression of Ln (Board size) on all explanatory variables from column I, including year dummies and firm fixed effects, and our instrument: Total passengers. Column III shows the second stage of our firm fixed-effect IV regressions of Tobin's Q on Ln (Board size) with Total passengers as the instrument for Ln (Board size). Total passengers is the sum of all passengers flying in and out of all local airports in the city of the BHC's headquarters according to data we obtain from the Air Carrier Statistics database compiled by the Bureau of Transportation Statistics. This data is only available from 1990 onward. Table 1A describes the sample and the control variables further. All specifications include year dummies and firm fixed-effects. The Hausman test statistic for the hypothesis that Ln (Board size) is uncorrelated with the error term of the performance regression is reported in the last row. The number of observations is 305 in all columns. Absolute values of robust t/z-statistics are in brackets. Significance levels: (\*\*\*)-1% (\*\*)-5% (\*)-10%.

|  | Dependent Variable:                     | Dependent Variable:     | Dependent Variable: | Dependent Variable: |
|--|---|-------------------------|---------------------|---------------------|
|  | Tobin's Q                               | Ln (Board size)<br>II   | Tobin's Q<br>III    | Tobin's Q<br>IV     |
| In (Decade:)                           | 0.024*                                  |                         |                     |                     |
| Ln (Board size)                        | 0.024*                                  |                         | -0.005              | -0.006              |
| Enotion of outside diseases            | [1.70]                                  | 0.422***                | [0.05]              | [0.06]              |
| Fraction of outside directors          | 0.03                                    | 0.433***                | 0.042               |                     |
| F 6                                    | [0.85]                                  | [2.81]                  | [0.79]              | 0.077               |
| Fraction of non-insiders               |   |                         |                     | 0.077               |
| I OI I                                 | 0.041 dede                              | 0.04.1 deshale          | 0.022               | [0.90]              |
| Ln (Number committees)                 | -0.041**                                | 0.241***                | -0.033              | -0.034              |
|  | [2.46]                                  | [2.94]                  | [1.07]              | [1.10]              |
| Committee members / Number committees  | 0.014                                   | 0.100**                 | 0.017               | 0.016               |
|  | [1.24]                                  | [2.08]                  | [1.16]              | [1.13]              |
| % Outside chair                        | 7.41e-6                                 | -0.002***               | -5.01e-5            | -8.34e-6            |
|  | [0.04]                                  | [3.10]                  | [0.20]              | [0.04]              |
| Avg. number committees per chair       | -0.008                                  | -0.187***               | -0.014              | -0.013              |
|  | [0.75]                                  | [3.57]                  | [0.64]              | [0.62]              |
| Ln (Number board meetings)             | -0.007                                  | 0.043                   | -0.005              | -0.008              |
|  | [0.59]                                  | -0.82                   | [0.41]              | [0.64]              |
| Meeting fee                            | 0.000*                                  | -4.76E-05               | 7.04e-6             | 5.99e-6             |
|  | [1.68]                                  | [1.45]                  | [0.74]              | [0.58]              |
| Avg. other directorships for outsiders | -0.004                                  | -0.04                   | -0.005              | -0.004              |
|  | [0.70]                                  | [1.64]                  | [0.79]              | [0.69]              |
| Avg. other directorships for insiders  | -0.006**                                | -0.014                  | -0.007*             | -0.008*             |
|  | [2.09]                                  | [0.91]                  | [1.80]              | [1.81]              |
| Ln (Assets)                            | -0.014                                  | -0.052                  | -0.015              | -0.014              |
|  | [0.99]                                  | [0.86]                  | [1.07]              | [1.05]              |
| Capital ratio                          | 0.936**                                 | -2.025*                 | 0.880***            | 0.913***            |
|  | [2.56]                                  | [1.87]                  | [2.89]              | [3.17]              |
| Volatility                             | -0.014                                  | 0.189                   | -0.009              | -0.005              |
| •                                      | [0.12]                                  | [0.37]                  | [0.07]              | [0.04]              |
| Lagged ROA                             | 0.987                                   | 0.922                   | 1.004*              | 1.073**             |
|  | [1.50]                                  | [0.39]                  | [1.88]              | [1.97]              |
| Total passengers                       |   | 5.730E-09**             |                     | . ,                 |
| 1 0                                    |   | [2.39]                  |                     |                     |
| Constant                               | 1.248***                                | 3.481***                | 1.340***            | 1.304***            |
| •                                      | [4.70]                                  | [3.14]                  | [3.43]              | [3.56]              |
| R-squared                              | 0.806                                   | [1]                     | []                  | [2.6.0]             |
| Regression Type                        | Firm fixed-effect,                      | First-stage regression  | Fixed-effect IV     | Fixed-effect IV     |
| regression type                        | 1990-1999                               | i iist stage regression | regression          | regression          |
| Hausman test statistic                 | 1,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |                         | -0.31               | -0.32               |

Table 4
Fixed Effect Regressions of Tobin's Q on M&A Board Additions plus Controls

Table 4 replicates the fixed effect Tobin's Q regressions in column III of Table 2 after including controls for M&A board additions. Tobin's Q=(book value of assets+market value of equity-book value of equity)/book value of assets. Addition to Board following M&A is a dummy which is equal to 1 if an M&A transaction occurred in a given year in which directors from the target were added to the BHC board. Potential M&A additions is a dummy which is equal to 1 if 3 or more directors were added to the board in a given year, but the proxy did not indicate whether this was due to an M&A transaction. Tables 1A and 1C describe the sample and the control variables further. All regressions control for the set of controls Ln (Number committees)-Lagged ROA included in the specification in column III of Table 2, however these coefficients are not reported for the sake of brevity. All specifications include year dummies and firm fixed-effects. The number of observations is 444 in all columns. Absolute values of robust t-statistics are in parentheses. Significance levels: (\*\*\*)-1% (\*\*)-5% (\*)-10%.

|                                 |          | Dependent Variable: Tobin's Q |                |          |  |  |  |
|---------------------------------|----------|-------------------------------|----------------|----------|--|--|--|
|                                 | I        | II                            | III            | IV       |  |  |  |
| Ln (Board size)                 | 0.019*   | 0.024**                       |                |          |  |  |  |
|                                 | [1.77]   | [2.12]                        |                |          |  |  |  |
| Addition to Board following M&A | 0.002    | 0.001                         |                |          |  |  |  |
|                                 | [0.56]   | [0.16]                        |                |          |  |  |  |
| Potential M&A additions         |          | -0.011*                       |                |          |  |  |  |
|                                 |          | [1.69]                        |                |          |  |  |  |
| Number non M&A directors        |          |                               | 0.001**        | 0.001*   |  |  |  |
|                                 |          |                               | [1.99]         | [1.78]   |  |  |  |
| Number M&A directors            |          |                               | 0.001          | 0.001    |  |  |  |
|                                 |          |                               | [1.17]         | [1.14]   |  |  |  |
| Fraction of outside directors   | 0.01     | 0.011                         | 0.012          |          |  |  |  |
|                                 | [0.47]   | [0.52]                        | [0.53]         |          |  |  |  |
| Fraction of non-insiders        |          |                               |                | 0.044    |  |  |  |
|                                 |          |                               |                | [1.52]   |  |  |  |
| Constant                        | 1.092*** | 1.085***                      | 1.117***       | 1.108*** |  |  |  |
|                                 | [9.05]   | [9.02]                        | [8.40]         | [8.32]   |  |  |  |
| Additional controls             |          | As in column                  | n III, Table 2 |          |  |  |  |
| R-squared                       | 0.799    | 0.8                           | 0.799          | 0.8      |  |  |  |

Table 5
Fixed Effect Regressions of Tobin's Q on Board Structure using data from 1965-1999

Table 6 compares fixed effect regressions of Tobin's Q on the natural logarithm of board size, the proportion of non-inside directors and financial controls using the full sample of data from 1965-1999 (columns I and II) to the same regressions restricted to data prior to 1986 (columns III and IV). Columns V and VI examine whether the effect of board size is changing over time. Tobin's Q=(book value of assets+market value of equity-book value of equity)/book value of assets. Data on board size and composition prior to 1986 is from Moody's Bank and Finance Manuals. Data on board size and composition post-1986 is from bank proxy statements. A non-insider is defined to be any director who is not currently an officer of the banking firm's headquarters. Tables 1A and 1D describe the sample and the control variables further. All specifications include year dummies for all years beginning in 1973 and firm fixed-effects. Absolute values of robust t-statistics are in parentheses. Significance levels: (\*\*\*)-1% (\*\*)-5% (\*)-10%.

|                          |           | D         | ependent Var | riable: Tobin' | s Q        |            |
|--------------------------|-----------|-----------|--------------|----------------|------------|------------|
|                          | I         | II        | III          | IV             | V          | VI         |
| Ln (Board size)          | 0.012**   | 0.011**   | 0.017***     | 0.018**        | 3.639**    | 3.564**    |
|                          | [2.39]    | [1.98]    | [2.69]       | [2.38]         | [2.48]     | [2.35]     |
| Fraction of non-insiders |           | 0.015     |              | -0.003         |            | 0.015      |
|                          |           | [0.83]    |              | [0.17]         |            | [0.58]     |
| Ln (Board size)*Year     |           |           |              |                | -0.002**   | -0.002**   |
|                          |           |           |              |                | [2.48]     | [2.35]     |
| Year                     |           |           |              |                | 0.007***   | 0.007***   |
|                          |           |           |              |                | [3.33]     | [3.15]     |
| Ln (Assets)              | -0.001    | -0.001    | -0.009       | -0.009         | 0.014***   | 0.014***   |
|                          | [0.26]    | [0.23]    | [1.59]       | [1.56]         | [2.83]     | [2.84]     |
| Volatility               | 0.064     | 0.065     | 0.03         | 0.03           | 0.151**    | 0.151**    |
|                          | [1.03]    | [1.04]    | [0.84]       | [0.85]         | [2.07]     | [2.07]     |
| Capital ratio            | -0.226    | -0.229    | -0.761***    | -0.757***      | 0.659***   | 0.656***   |
|                          | [1.50]    | [1.52]    | [3.78]       | [3.69]         | [4.26]     | [4.24]     |
| Lagged ROA               | 2.546***  | 2.560***  | 3.929***     | 3.927***       | 3.631***   | 3.642***   |
|                          | [5.23]    | [5.24]    | [6.06]       | [6.06]         | [6.28]     | [6.27]     |
| Constant                 | 1.000***  | 0.990***  | 1.125***     | 1.127***       | -13.587*** | -13.337*** |
|                          | [15.63]   | [14.95]   | [13.75]      | [13.31]        | [3.19]     | [3.01]     |
| Sample years             | 1965-1999 | 1965-1999 | 1965-1985    | 1965-1985      | 1965-1999  | 1965-1999  |
| Observations             | 930       | 929       | 458          | 458            | 930        | 929        |
| R-squared                | 0.746     | 0.746     | 0.638        | 0.638          | 0.537      | 0.537      |

# Table 6 Board size and complexity

Table 6 examines whether larger boards add more value as complexity increases. Column I replicates the fixed effect Tobin's Q regressions in column III of Table 2 after including the interaction between Ln(Board size) and Ln(Assets). Column II replicates the specification in column I after replacing Board size with the Number of non-insiders. Column III replicates the fixed effect specification in column II of Table 5 after including the interaction between Ln(Board size) and Ln(Assets). All other columns replicates the fixed effect Tobin's Q regressions in column III of Table 2 after including the interaction between Ln(Board size) and different measures of complexity, as well as the complexity measures. Tobin's Q=(book value of assets+market value of equity-book value of equity)/book value of assets. Tables 1A, 1D and 1E describe the samples and the control variables further. All regressions control for the corresponding additional controls in either column III of Table 2 (Ln (Number committees)-Lagged ROA) or column II of Table 5 (LN(Assets)-Lagged ROA) that are not reported here for the sake of brevity. All specifications include year dummies and firm fixed-effects. The number of observations is 444 in all columns. The coefficient on the constant term is omitted for the sake of brevity. Absolute values of robust t-statistics are in parentheses. Significance levels: (\*\*\*)-1% (\*\*)-5% (\*)-10%.

|  | Dependent Variable: Tobin's Q |                     |              |          |                 |             |                  |  |
|--|-------------------------------|---------------------|--------------|----------|-----------------|-------------|------------------|--|
|  | I                             | II                  | III          | IV       | V               | VI          | VII              |  |
| Ln (Board size)                              | 0.208                         |                     | -0.024       | 0.017    | 0.016           | 0.017       | -0.003           |  |
|  | [1.29]                        |                     | [0.48]       | [1.06]   | [1.21]          | [1.07]      | [0.26]           |  |
| Ln (Number of non-insiders)                  |                               | 0.204               |              |          |                 |             |                  |  |
|  |                               | [1.50]              |              |          |                 |             |                  |  |
| Ln (Board size)*Ln (Assets)                  | -0.011                        |                     | 0.002        |          |                 |             |                  |  |
|  | [1.18]                        | 0.011               | [0.68]       |          |                 |             |                  |  |
| Ln (Number of non-insiders)* Ln (Assets)     |                               | -0.011              |              |          |                 |             |                  |  |
| Ln (Board size)*Number Tier 1 subsidiaries   |                               | [1.39]              |              | -1.73e-4 |                 |             |                  |  |
| Lii (Board size). Number Tier i subsidiaries |                               |                     |              | [0.30]   |                 |             |                  |  |
| Ln (Board size)*Total deposits               |                               |                     |              | [0.30]   | 11.21e-10       |             |                  |  |
| Eli (Board Size) Total deposits              |                               |                     |              |          | [0.40]          |             |                  |  |
| Ln (Board size)*Number of states             |                               |                     |              |          | [0.10]          | -0.002      |                  |  |
| Zii (Zould sille) Trumoer er sumes           |                               |                     |              |          |                 | [0.90]      |                  |  |
| Ln (Board size)*Subordinated debt/Assets     |                               |                     |              |          |                 | [ · · · · ] | 1.431*           |  |
| ,  |                               |                     |              |          |                 |             | [1.82]           |  |
| Fraction of outside directors                | 0.006                         |                     |              | 0.009    | 0.01            | 0.009       | 0.008            |  |
|  | [0.28]                        |                     |              | [0.43]   | [0.46]          | [0.43]      | [0.40]           |  |
| Fraction of non-insiders                     |                               | 0.017               | 0.017        |          |                 |             |                  |  |
|  |                               | [0.56]              | [0.90]       |          |                 |             |                  |  |
| Number Tier 1 subsidiaries                   |                               |                     |              | 3.721e-4 |                 |             |                  |  |
|  |                               |                     |              | [0.22]   |                 |             |                  |  |
| Total deposits                               |                               |                     |              |          | 2.79e-10        |             |                  |  |
| N. J. C.                                     |                               |                     |              |          | [0.33]          | 0.000       |                  |  |
| Number of states                             |                               |                     |              |          |                 | 0.008       |                  |  |
| Subardinated daht/Accepta                    |                               |                     |              |          |                 | [1.13]      | 2 449            |  |
| Subordinated debt/Assets                     |                               |                     |              |          |                 |             | -3.448<br>[1.49] |  |
| Additional controls                          | Aging                         | olumn III           | As in column | Α        | o in column III | Toble 2     | [1.49]           |  |
| Auditional controls                          |                               | olumn III,<br>ble 2 | II, Table 5  | A        | s in column III | , rable 2   |                  |  |
| Observations                                 | 444                           | 444                 | 929          | 442      | 442             | 442         | 442              |  |
| R-squared                                    | 0.799                         | 0.801               | 0.746        | 0.796    | 0.796           | 0.798       | 0.803            |  |

Table 7

The value of subsidiary directorships

Table 7 examines whether additions to boards of directors with subsidiary directorships add more value as complexity increases. Tobin's Q=(book value of assets+market value of equity-book value of equity)/book value of assets. Tables 1A-1E describe the variables in more detail. All regressions control for the additional controls in column III of Table 2 (Ln (Number committees)-Lagged ROA) that are not reported here for the sake of brevity. All specifications include year dummies and firm fixed-effects. The coefficient on the constant term is omitted for the sake of brevity. Absolute values of robust t-statistics are in parentheses. Significance levels: (\*\*\*)-1% (\*\*)-5% (\*)-10%.

|  | Dependent Variable: Tobin's Q |               |           |                |           |          |           |
|--|-------------------------------|---------------|-----------|----------------|-----------|----------|-----------|
|  | I                             | II            | III       | IV             | V         | VI       | VII       |
| Number directors w/o lead bank directorships | -0.001                        | -4.634e-4     | -4.952e-4 | -4.89e-4       | -3.06e-4  |          |           |
|  | [1.33]                        | [1.13]        | [1.20]    | [1.23]         | [0.74]    |          |           |
| Number lead bank directorships               | -0.001                        | -0.018***     | -1.672e-4 | -0.002**       | -2.703e-4 |          |           |
|  | [0.98]                        | [2.67]        | [0.28]    | [2.49]         | [0.56]    |          |           |
| Num. lead bank dirs. * Num. Tier 1 subs.     | 0.000**                       |               |           |                |           |          |           |
|  | [2.53]                        | 0.004 distrib |           |                |           |          |           |
| Num. lead bank dirs.* Ln (Assets)            |                               | 0.001***      |           |                |           |          |           |
| None lead hould dies * Total democite        |                               | [2.74]        | 0.000**   |                |           |          |           |
| Num. lead bank dirs.* Total deposits         |                               |               | 0.000**   |                |           |          |           |
| Num. lead bank dirs.* Number of states       |                               |               | [2.49]    | 0.001***       |           |          |           |
| Num. lead bank dirs. Number of states        |                               |               |           | [3.27]         |           |          |           |
| Num. lead bank dirs.* Sub. debt/Assets       |                               |               |           | [3.27]         | 0.071**   |          |           |
| Trum feat same and bus, bus, described       |                               |               |           |                | [2.44]    |          |           |
| Ln (Number lead bank directorships)          |                               |               |           |                | []        | 0.008*   |           |
| 1 /  |                               |               |           |                |           | [1.96]   |           |
| Number non M&A directors                     |                               |               |           |                |           | L        | 0.001*    |
|  |                               |               |           |                |           |          | [1.73]    |
| Num. M&A directors w. lead bank directorsh.  |                               |               |           |                |           |          | -0.005    |
|  |                               |               |           |                |           |          | [1.20]    |
| Num. M&A dirs w/o lead bank directorsh.      |                               |               |           |                |           |          | 0.001     |
|  |                               |               |           |                |           |          | [0.65]    |
| Num. M&A w. lead bank directorships* Num.    |                               |               |           |                |           |          | 0.000**   |
| Tier 1 subs.                                 |                               |               |           |                |           |          | [2.11]    |
| Fraction of outside directors                | 0.01                          | 0.009         | 0.014     | 0.004          | 0.014     | 0.023    | 0.005     |
| Traction of outside directors                | [0.46]                        | [0.40]        | [0.66]    | [0.17]         | [0.66]    | [0.81]   | [0.24]    |
| Number Tier 1 subsidiaries                   | -2.801e-4                     | 7.61e-6       | 2.2e-5    | -3.414e-4      | -1.988e-4 | 1.863e-4 | -2.536e-4 |
|  | [1.38]                        | [0.04]        | [0.10]    | [1.21]         | [0.99]    | [0.55]   | [1.14]    |
| Total deposits                               | []                            | [ · · · · ]   | -1.17e-10 |                | [ ]       | [0.55]   |           |
| 1  |                               |               | [1.49]    |                |           |          |           |
| Number of states                             |                               |               |           | 0.001          |           |          |           |
|  |                               |               |           | [1.11]         |           |          |           |
| Subordinated debt/Assets                     |                               |               |           |                | 0.081     |          |           |
|  |                               |               |           |                | [0.25]    |          |           |
| Additional controls                          |                               |               |           | column III, Ta |           |          |           |
| Observations                                 | 442                           | 442           | 442       | 442            | 442       | 359      | 442       |
| R-squared                                    | 0.805                         | 0.804         | 0.803     | 0.811          | 0.807     | 0.791    | 0.8       |

Table 8
Fixed Effect Regressions of ROA on Board Structure and Controls

Table 8 presents fixed effect regressions of ROA on board size, board composition and controls. ROA=net income/book value assets. Number lead bank directorships is the number of parent BHC directors sitting on the board of the lead bank. Number M&A directors with lead bank directorships is the number of parent BHC directors who joined the board as a result of an M&A transaction who also sit on the board of the lead bank. A non-insider is defined to be any director who is not currently an officer of the banking firm headquarters. Tables 1A-1E describe the variables in more detail. All specifications include year dummies and firm fixed-effects. The number of observations in all columns is 442. The coefficients on the constant term are omitted for the sake of brevity. Absolute values of robust t-statistics are in parentheses. Significance levels: (\*\*\*)-1% (\*\*)-5% (\*)-10%.

| Board size   |   | Depen  | dent Variable | : ROA    |
|--|---|--------|---------------|----------|
| Number lead bank directorships       [0.27]         Number directors w/o lead bank directorships       -1.156e-4         Number non M&A directors       [1.49]         Number M&A directors       -9.32e-6         Number M&A directors with lead bank directorships       - (1.19)         Number M&A directors w/o lead bank directorships       - (2.06)         Number M&A directors w/o lead bank directorships       - (2.01)         Fraction of outside directors       - (0.001)       - 3.775e-4       - (0.01)         In (Number committees)       - (0.01)       - (0.01)       - (0.01)         Ln (Number committees)       - (0.01)       - (0.01)       - (0.01)         Committee members / Number committees       0.001       - (0.01)       - (0.01)         % Outside chair       9.82e-6       1.42e-5       9.28e-6         Noutside chair       9.82e-6       1.42e-5       9.28e-6         Noutside chair       9.82e-6       1.42e-5       9.28e-6         Noutside chair       - (0.01)       - (0.01)       1.00-1         Avg. number committees per chair       - (0.01)       - (2.25e-4       - (0.01)         Ln (Number board meetings)       - (0.02)       - (0.02)       - (0.02)         Meeting fee       - (6.2e)       - (2  |   | I      | II            | III      |
| Number lead bank directorships       0.000**<br>[2.00]         Number directors w/o lead bank directorships       -1.1156-4<br>[1.49]         Number non M&A directors       [1.49]         Number M&A directors with lead bank directorships       - 0.000**         Number M&A directors w/o lead bank directorships       - 0.001       - 0.000**         Number M&A directors w/o lead bank directorships       - 0.001       - 3.775e-4       - 0.001         Praction of outside directors       - 0.001   | Board size  | 1.6e-5 |               |          |
| Number directors w/o lead bank directorships  Number non M&A directors  Number M&A directors with lead bank directorships  Number M&A directors with lead bank directorships  Number M&A directors w/o lead bank directorships  Number M&A directors w/o lead bank directorships  Number M&A directors w/o lead bank directorships  Fraction of outside directors  Praction of outside directors  10.43  |   | [0.27] |               |          |
| Number directors w/o lead bank directorships         -1.1156e-4 [1.49]           Number non M&A directors         -9.32e-6 [0.15]           Number M&A directors with lead bank directorships         -1.20 [0.15]           Number M&A directors w/o lead bank directorships         -1.20 [0.15]           Number M&A directors w/o lead bank directorships         -0.001         -3.775e-4 [0.11]           Fraction of outside directors         -0.001         -3.775e-4 [0.19]         -0.001           Ln (Number committees)         -0.001         -0.001         -0.001           Ln (Number committees)         -0.001         -0.001         -0.001           Committee members / Number committees         0.001         -0.001         -0.001           Moutside chair         9.82e-6         1.42e-5         -9.82e-6           Moutside chair         -0.001         -0.001         -0.001           Avg. number committees per chair         -0.01         -0.001         -0.001           Avg. number board meetings)         -0.003**         -0.003**         -0.001**           Meeting fee         -1.62e-7         -2.23e-7         -1.13e-7           Avg. other directorships for outsiders         -0.001         -0.001**         -0.001**           Avg. other directorships for insiders         -5.16e-5   | Number lead bank directorships                    |        | 0.000**       |          |
| Number non M&A directors   Number M&A directors with lead bank directorships   |   |        | [2.00]        |          |
| Number non M&A directors       -9.32e-6         Number M&A directors with lead bank directorships       -0.000**         Number M&A directors w/o lead bank directorships       -2.001         Number M&A directors w/o lead bank directorships       -0.001       -3.775e-4       -0.001         Fraction of outside directors       -0.001       -0.001       -0.001         Ln (Number committees)       -0.001       -0.001       -0.001         Ln (Number committees)       0.001       0.001       -0.001         Committee members / Number committees       0.001       0.001       0.001         Mediting chair       9.82e-6       1.42e-5       9.28e-6         10.781       11.11       10.741         Avg. number committees per chair       9.82e-6       1.42e-5       9.28e-6         10.781       11.11       10.741         Avg. number board meetings)       -0.03***       -0.003***       -0.001**         Ln (Number board meetings)       -0.03***       -0.003***       -0.003***         Meeting fee       -1.62e-7       -2.23e-7       -1.13e-7         Avg. other directorships for outsiders       10.56       10.45       10.27         Avg. other directorships for insiders       10.51       10.01       10.01     <   | Number directors w/o lead bank directorships      |        | -1.1156e-4    |          |
| Number M&A directors with lead bank directorships Number M&A directors w/o lead bank directorships Number M&A directors w/o lead bank directorships Number M&A directors w/o lead bank directorships Praction of outside directors Praction of outside outsides Number committees Praction of outside Practical Pr |   |        | [1.49]        |          |
| Number M&A directors with lead bank directorships Number M&A directors w/o lead bank directorships Number of this part of the part of  | Number non M&A directors                          |        |               | -9.32e-6 |
|  |   |        |               |          |
| Number M&A directors w/o lead bank directorships       1.535e-4         Fraction of outside directors       -0.001       -3.775e-4       -0.001         In (Number committees)       -0.001       -0.001       -0.001         In (Number committees)       -0.001       -0.001       -0.001         Committee members / Number committees       0.001       0.001       0.001         Committee members / Number committees       0.001       0.001       0.001         Moutside chair       9.82e-6       1.42e-5       9.28e-6         In (Number committees per chair       -0.001       -2.25e-4       -0.001         Avg. number committees per chair       -0.001       -2.25e-4       -0.001         In (Number board meetings)       -0.003***       -0.003***       -0.003***         In (Number board meetings)       -0.003***       -0.003***       -0.003***         Meeting fee       -1.62e-7       -2.23e-7       -1.13e-7         In (Assets)       -0.001       -0.001       -0.001*         Avg. other directorships for outsiders       -0.001       -0.001*       -0.001*         In (Assets)       -0.004***       -0.003***       -0.004***         In (Assets)       -0.004***       -0.003***       -0.004***      <  | Number M&A directors with lead bank directorships |        |               |          |
| Fraction of outside directors  -0.001 -3.775e-4 -0.001  Ln (Number committees) -0.001 -0.001 -0.001 -0.001  Committee members / Number committees 0.001 0.001 0.001 0.001  -0.001 0.001 0.001  -0.001 0.001 0.001  -0.001 0.001 0.001  -0.001 0.001  -0.001 0.001  -0.001 0.001  -0.001 0.001  -0.001  -0.001 0.001  -0.001  -0.001  -0.001  -0.001  -0.001  -0.001  -0.001  -0.001  -0.001  -0.001  -0.001  -0.001  -0.003*** -0.003*** -0.003*** -0.003*** -0.003*** -0.003*** -0.003*** -0.001  -0. |   |        |               |          |
| Fraction of outside directors         -0.001         -3.775e-4         -0.001           Ln (Number committees)         -0.001         -0.001         -0.001           Committee members / Number committees         0.001         0.001         0.001           Committee members / Number committees         0.001         0.001         0.001           % Outside chair         9.82e-6         1.42e-5         9.28e-6           [0.78]         [1.11]         [0.74]           Avg. number committees per chair         -0.001         -2.25e-4         -0.001           Ln (Number board meetings)         -0.003***         -0.003***         -0.003***           Ln (Number board meetings)         -0.003***         -0.003***         -0.003***           Meeting fee         -1.62e-7         -2.23e-7         -1.13e-7           Avg. other directorships for outsiders         -0.001         -0.001         -0.001*           Avg. other directorships for insiders         -5.16e-5         -1.597e-4         -6.87e-6           [0.15]         [0.50]         [0.02]           Ln (Assets)         -0.004***         -0.003***         -0.004***           Capital ratio         0.015         0.01         0.014           (1.60)         [0.38]         [0.   | Number M&A directors w/o lead bank directorships  |        |               |          |
| [0.43]   [0.14]   [0.19]   |   |        |               |          |
| Ln (Number committees)       -0.001       -0.001       -0.001         Committee members / Number committees       0.001       0.001       0.001         % Outside chair       9.82e-6       1.42e-5       9.28e-6         [0.78]       [1.11]       [0.74]         Avg. number committees per chair       -0.001       -2.25e-4       -0.001         Ln (Number board meetings)       -0.003***       -0.003***       -0.003***         Ln (Number board meetings)       -0.003***       -0.003***       -0.003***         Meeting fee       -1.62e-7       -2.23e-7       -1.13e-7         [0.36]       [0.45]       [0.27]         Avg. other directorships for outsiders       -0.001       -0.001       -0.001*         [1.56]       [1.40]       [1.77]         Avg. other directorships for insiders       -5.16e-5       -1.597e-4       -6.87e-6         [0.15]       [0.50]       [0.02]         Ln (Assets)       -0.004***       -0.003***       -0.004***         Capital ratio       0.015       0.01       0.014         [0.60]       [0.38]       [0.54]         Volatility       -0.060***       -0.056***       -0.058***         [4.80]       [4.90]       [4.58] </td <td>Fraction of outside directors</td> <td></td> <td></td> <td></td>  | Fraction of outside directors                     |        |               |          |
| [0.49]   |   |        |               |          |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | Ln (Number committees)                            |        |               |          |
| % Outside chair       [1.49]       [1.38]       [1.60]         % Outside chair       9.82e-6       1.42e-5       9.28e-6         [0.78]       [1.11]       [0.74]         Avg. number committees per chair       -0.001       -2.25e-4       -0.001         [0.76]       [0.29]       [0.70]         Ln (Number board meetings)       -0.003***       -0.003***       -0.003***         [2.78]       [3.00]       [2.97]         Meeting fee       -1.62e-7       -2.23e-7       -1.13e-7         Avg. other directorships for outsiders       -0.001       -0.001       -0.001*         Avg. other directorships for insiders       -5.16e-5       -1.597e-4       -6.87e-6         [0.15]       [0.50]       [0.02]         Ln (Assets)       -0.004***       -0.003***       -0.004***         Capital ratio       0.015       0.01       0.014         Capital ratio       0.015       0.01       0.014         Volatility       -0.060***       -0.056***       -0.058***         Value       [4.80]       [4.90]       [4.58]         Number Tier 1 subsidiaries       1.06e-5       1.33e-5       1.17e-5         [0.53]       [0.71]       [0.56]    <   |   |        |               |          |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | Committee members / Number committees             |        |               |          |
|  |   |        |               |          |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | % Outside chair                                   |        |               |          |
| [0.76] [0.29] [0.70]     Ln (Number board meetings)  |   |        |               |          |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | Avg. number committees per chair                  |        |               |          |
| Meeting fee $[2.78]$ $[3.00]$ $[2.97]$ Avg. other directorships for outsiders $-1.62e-7$ $-2.23e-7$ $-1.13e-7$ Avg. other directorships for insiders $-0.001$ $-0.001$ $-0.001*$ Avg. other directorships for insiders $-5.16e-5$ $-1.597e-4$ $-6.87e-6$ $[0.15]$ $[0.50]$ $[0.02]$ Ln (Assets) $-0.004***$ $-0.003***$ $-0.004***$ Capital ratio $0.015$ $0.01$ $0.014$ Capital ratio $0.015$ $0.01$ $0.014$ Volatility $-0.060***$ $-0.056***$ $-0.058***$ Volatility $-0.060***$ $-0.056***$ $-0.058***$ Number Tier 1 subsidiaries $1.06e-5$ $1.33e-5$ $1.17e-5$ $[0.53]$ $[0.71]$ $[0.56]$  | T (NT 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1       |        |               |          |
| Meeting fee       -1.62e-7       -2.23e-7       -1.13e-7         Avg. other directorships for outsiders       -0.001       -0.001       -0.001*         Avg. other directorships for insiders       -5.16e-5       -1.597e-4       -6.87e-6         In (Assets)       -0.004***       -0.003***       -0.004***         In (Assets)       -0.004***       -0.003***       -0.004***         In (Assets)       -0.015       0.01       0.014         In (Assets)       -0.060***       -0.056***       -0.058***         In (Assets)       -0.060***       -0.056***       -0.058***         In (Assets)       -0.056***       -0.058***       -0.058***         In (Assets)       -0.056***       -0.056***       -0.058***         In (Assets)       -0.056**       -0.056***       -0.056***         In (Assets)       -0.056***   | Ln (Number board meetings)                        |        |               |          |
| [0.36]   [0.45]   [0.27]     Avg. other directorships for outsiders   -0.001   -0.001   -0.001*     [1.56]   [1.40]   [1.77]     Avg. other directorships for insiders   -5.16e-5   -1.597e-4   -6.87e-6     [0.15]   [0.50]   [0.02]     Ln (Assets)   -0.004***   -0.003***   -0.004***     [3.63]   [2.92]   [3.60]     Capital ratio   0.015   0.01   0.014     [0.60]   [0.38]   [0.54]     Volatility   -0.060***   -0.056***   -0.058***     [4.80]   [4.90]   [4.58]     Number Tier 1 subsidiaries   1.06e-5   1.33e-5   1.17e-5     [0.56]   [0.56]  | Martine Co.                                       |        |               |          |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | Meeting fee                                       |        |               |          |
| The state of the content of the co   | A   |        |               |          |
| Avg. other directorships for insiders       -5.16e-5       -1.597e-4       -6.87e-6         [0.15]       [0.50]       [0.02]         Ln (Assets)       -0.004***       -0.003***       -0.004***         [3.63]       [2.92]       [3.60]         Capital ratio       0.015       0.01       0.014         [0.60]       [0.38]       [0.54]         Volatility       -0.060***       -0.056***       -0.058***         [4.80]       [4.90]       [4.58]         Number Tier 1 subsidiaries       1.06e-5       1.33e-5       1.17e-5         [0.53]       [0.71]       [0.56]  | Avg. other directorships for outsiders            |        |               |          |
| [0.15]   [0.50]   [0.02]     Ln (Assets)   | Ava other directorships for inciders              |        |               |          |
| Ln (Assets)       -0.004***       -0.003***       -0.004***         [3.63]       [2.92]       [3.60]         Capital ratio       0.015       0.01       0.014         [0.60]       [0.38]       [0.54]         Volatility       -0.060***       -0.056***       -0.058***         [4.80]       [4.90]       [4.58]         Number Tier 1 subsidiaries       1.06e-5       1.33e-5       1.17e-5         [0.53]       [0.71]       [0.56]   | Avg. other directorships for historis             |        |               |          |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | In (Accate)                                       |        |               |          |
| Capital ratio       0.015       0.01       0.014         [0.60]       [0.38]       [0.54]         Volatility       -0.060***       -0.056***       -0.058***         [4.80]       [4.90]       [4.58]         Number Tier 1 subsidiaries       1.06e-5       1.33e-5       1.17e-5         [0.53]       [0.71]       [0.56]  | Lii (Assets)                                      |        |               |          |
| [0.60]   [0.38]   [0.54]     Volatility   -0.060***   -0.056***   -0.058***     [4.80]   [4.90]   [4.58]     Number Tier 1 subsidiaries   1.06e-5   1.33e-5   1.17e-5     [0.53]   [0.71]   [0.56]   | Capital ratio                                     |        |               |          |
| Volatility       -0.060***       -0.056***       -0.058***         [4.80]       [4.90]       [4.58]         Number Tier 1 subsidiaries       1.06e-5       1.33e-5       1.17e-5         [0.53]       [0.71]       [0.56]  | Capital fatio                                     |        |               |          |
| [4.80] [4.90] [4.58]  Number Tier 1 subsidiaries   | Volatility  |        |               |          |
| Number Tier 1 subsidiaries       1.06e-5       1.33e-5       1.17e-5         [0.53]       [0.71]       [0.56]  | · Ommity  |        |               |          |
| [0.53] [0.71] [0.56]   | Number Tier 1 subsidiaries                        |        |               |          |
|  | T, MILOU I DUODIGIMI CO                           |        |               |          |
| R-squared () 508   | R-squared   | 0.508  | 0.523         | 0.514    |