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Mr. Brent J. Fields
Secretary, U.S. Securities & Exchange Commission
100 F Street, NE
Washington DC 20549-1090

Reference: File Number S7-07-16

Dear Mr. Fields:

This letter is in response to the request by the Office of the Comptroller of the Currency, Treasury (OCC); Board of Governors of the Federal Reserve System (Board); Federal Deposit Insurance Corporation (FDIC); Federal Housing Finance Agency (FHFA); National Credit Union Administration (NCUA); and U.S. Securities and Exchange Commission (SEC) for comments on their joint proposed release entitled "Incentive-based Compensation Arrangements" published on April 21, 2016 (the proposed rule; https://www.sec.gov/rules/proposed/2016/34-77776.pdf). These comments are based on my research published in several papers in scholarly journals with Professor Roberta Romano (Yale Law School). These published papers are cited and discussed in the attached book, "Financial Crisis, Corporate Governance, and Bank Capital" (Cambridge University Press, forthcoming 2016).

The new proposed rule takes a tiered approach; more stringent regulations for banks with assets more than $250 billion, somewhat less stringent regulations for banks with assets between $50 billion and $250 billion, and even less stringent regulations for banks with assets

in the $1 billion to $50 billion range. The proposed rule covers bonuses; specifically, *it does not cover compensation derived from the sale of stock*.[1] Besides the senior bank executives, the new proposed rule covers "significant risk-takers in the bank" defined as employees with a third of their compensation based on incentive-compensation and among the top 5% salary-earners in the bank, or those who can commit 0.5% or more of the net worth or bank assets. The proposed rule requires deferral of at least 60% of the incentive-compensation for a period of at least four years, and forfeiture of all unvested deferred incentive-based compensation. The deferral and forfeiture can be triggered by poor financial or non-financial performance due to "inappropriate" risk taking, among other events.[2] The April 2016 regulations also require clawback provisions that allow a bank to recover incentive-based compensation from the manager for a period of seven years following the incentive compensation vesting date. The clawback can be triggered by (i) misconduct that resulted in significant financial or reputational harm to the bank; (ii) fraud; or (iii) intentional misrepresentation of information used to determine the manager's incentive-based compensation.

We support the essence of the April 2016 "Incentive-based Compensation Arrangements," proposed by the six U.S. agencies. These agencies have done an impressive amount of analysis and used the theoretical and empirical financial economics literature to motivate their proposed regulations. The deferral, forfeiture, and clawback provisions are focused on discouraging "inappropriate" risk taking by banks. A critical question: What is "inappropriate" risk taking by banks? From a financial viewpoint the risk of a project or trading

[1] Page 136 in (https://www.sec.gov/rules/proposed/2016/34-77776.pdf).: "Neither would the proposed definition include dividends paid and appreciation realized on stock or other equity-like instruments that are owned outright by a covered person."

[2] Page 49 in (https://www.sec.gov/rules/proposed/2016/34-77776.pdf).

strategy would be inappropriate if the net present value of the project or trading strategy is negative. However, the measurement of such risk (and associated cash flows) are subject to both manager biases and estimation errors as discussed in chapter 3 of the attached book. Enforcing deferral, forfeiture, and clawback provisions can lead to very large potential losses on managers (see Table 5.3, Panels A, B, and C in the attached book). Given the potential losses of tens or hundreds of millions of dollars, affected managers are likely to *litigate* the occurrence of a particular trigger event or the measurement of the "inappropriate" risk. Given the inherent uncertain outcome of any litigation, the disciplining effect of the April 2016 proposed rule on bank manager inappropriate risk-taking behavior would be muted.

We suggest an alternative executive incentive compensation reform proposal that addresses the concerns with and drawbacks of the proposed rule. We suggest three criteria for evaluating executive compensation reform policies : i) simplicity, ii) transparency, and iii) focus on creating and sustaining long-term shareholder value. A simple and transparent incentive compensation structure is desirable for at least three reasons. First, the financial sector is particularly fast-moving, rendering it difficult to predict what risks may emerge as products and markets develop, and how individuals respond to regulatory and contractual incentives can alter risk in unanticipated ways that can evolve in complicated ways. Moreover, in today's context of large and interconnected financial institutions and complex financial instruments, banks must grapple with unknown and unknowable risks. As a consequence, the more complicated and opaque incentive package, the more difficult it will be to determine how individuals will respond, and what risks will or will not be incurred. Second, as shareholders are now required to vote on CEO compensation packages, a simple incentive structure is easier for them to understand and evaluate, reducing the need to rely on third-party vendors of proxy

voting advice, the value of which has been the subject of considerable controversy. Third, simplicity and transparency in incentive compensation packages mitigate public skepticism toward high levels of executive pay in conjunction with poor performance, particularly when a firm's failure implicates the public fisc. Finally, the focus on creating and sustaining long-term shareholder value would channel management's attention to the longer term profitability of an investment or trading strategy. Business and legal scholars posit that managers should act in the best interest of long-term shareholders – what better way to do this than tie management incentive compensation to long-term share price!

We propose that the incentive compensation of bank executives should consist only of restricted equity (restricted stock and restricted stock option) – restricted in the sense that the individual cannot sell the shares or exercise the options for one to three years after their last day in office. We refer to this as the *Restricted Equity proposal*.

If a bank CEO is offered incentive compensation contracts consistent with the Restricted Equity proposal, then she would have more high-powered incentives not to invest in the high-risk but unprofitable (over the long-term) projects and trading strategies. Not only would the CEO be required to hold these shares and options for the duration of her employment in the bank, but for one to three years subsequent to her retirement or resignation. If the trading strategy resulted in an unexpected positive cash flow in a certain year prior to their retirement or resignation, the bank's share price would go up, the CEO's net worth would go up on paper, but the CEO would not be able to liquidate her stockholdings. The CEO would have to make an assessment of the likelihood of the large negative cash flow outcome during the years she continued to be employed at the bank, plus one to three additional years. After making such an

assessment, a CEO would presumably be less likely to authorize or encourage the high-risk but unprofitable (over the long-term) projects and trading strategies in the first place. The long-term feature of the Restricted Equity proposal's compensation package would operate to curb optimistic estimates of a project's long-term profitability by using high-powered financial incentives to prod the executive to attend to, and hence estimate more assiduously, all of a project's cash flows, rather than solely those in the near term. If a bank does not engage in the long-term unprofitable investment project or trading strategy, then this would, of course, also serve the interests of the long-term shareholders.

We have suggested that the time frame extend one to three years after retirement, but we would leave the specific horizon to the board compensation committee, to whom the proposal is addressed. The rationale for this extended time frame is to maintain incentives for an executive in an "end-game" situation, i.e., an individual making decisions when he or she is reaching retirement. At the shorter end of our proposal, management's discretionary authority to manage earnings under current U.S. accounting conventions unravels within a one-to-two year period, while at the longer end we think three years is a reasonable period in which at least the intermediate-term results of executives' decisions will be realized.

We note three important caveats to the Restricted Equity proposal . First, if executives are required to hold restricted shares and options, they would most likely be under-diversified. Second, if executives are required to hold restricted shares and options post-retirement, they may be concerned with lack of liquidity. Third, the proposal could lead to early management departures, as executives seek to convert illiquid shares and options into more liquid assets (after the one to three year waiting period). We address these caveats by recommending to the

board of directors a best practice that allows executives to annually liquidate a small amount to meet legitimate cash flow needs; please see pages 56-80 in the attached book. Such a best practice will provide managers stronger incentives to work in the interests of long-term shareholders, and avoid excessive risk-taking. Importantly, the above compensation structure is simple, transparent, and focused on creating and sustaining long-term shareholder value.

The clawback triggers in the proposed rule (noted above) are subjective, hence, will entail significant litigation costs which will limit their effectiveness. The Restricted Equity proposal has an inherent *clawback* (and, deferral and forfeiture) feature that renders unnecessary intricate mechanisms requiring repayments (forfeiture) of bonuses on income from transactions whose value proved illusory. Because executives are compensated in equity that is not received until years after it is earned – one to three years after they leave the firm – they cannot capture short-lived share price gains from transactions whose value is not long-lasting. The compensation will be dissipated as the value of the firm's shares decline upon the realization of the project's or investment strategy's losses. In other words, executives will receive less in value than the originally granted incentive stock compensation if the stock price drops thereafter. This automatic clawback is, accordingly, simpler to administer than the specified regulatory clawbacks, avoiding definitional, and consequently litigation, pitfalls.

We note a second concern with the April 2016 proposed rule which cover bonuses, but do not cover compensation derived from the sale of stock. Big bank executive compensation derived from sale of their bank's stock is usually *twice* as large, or greater, than their compensation from salary and bonus; see Table 5.3, Panels A, B, and C in the attached book. Hence, even if the April 2016 proposed rule is successful in discouraging some inappropriate

risk taking by banks, the adverse incentives from compensation derived from the sale of stock remains a potent problem. Our Restricted Equity proposal would address this problem as well.

Who will implement the Restricted Equity Proposal? Our proposal is directed at bank compensation committees, who, we urge, should voluntarily adopt a Restricted Equity plan as the preferred mechanism for aligning management's incentives to long-term shareholder wealth creation and to mitigate the taking of excessive risk. In implementing the proposal, we think corporate boards should be the principal decision-makers regarding:

a) The mix of restricted stock and restricted stock options a manager is awarded.
b) The amount of restricted stock and restricted stock options the manager is awarded.
c) The maximum percentage of holdings the manager can liquidate annually.
d) Number of years post retirement/resignation for the stock and options to vest.

Director compensation typically consists of a cash component (called the retainer), smaller cash amounts paid for attendance at board and committee meetings, and incentive compensation in the form of stock and stock option grants which vest over a period of time of a few years. While the theoretical and empirical literature on executive compensation is extensive, the literature on director compensation is relatively modest. We think that it is plausible to assume that incentives operate similarly in both employment positions. If, for example, directors can liquidate their vested stock and options, and a director feels the need to liquidate the position in the near future, then the director may focus on short-term performance that may be to the detriment of long-term shareholder value and the public fisc.

We propose that director compensation for banks (and non-financial companies) be structured along the lines of the Restricted Equity proposal. Our proposal is based on the following empirical findings:

- Companies in which directors own more stock performed better in the future years.

• Directors who own more stock are more likely to discipline or fire the CEO when the stock price performance of their company has been sub-par in the previous two years.

We propose that all compensation (including incentive compensation) of corporate directors should consist only of restricted equity (restricted stock and restricted stock option) – restricted in the sense that the director cannot sell the shares or exercise the options for one to three years after their last board meeting. With regard to cash compensation – we are recommending corporate directors not be paid any retainer fees or other cash compensation. We discuss and address several important caveats of this director compensation policy in the attached book (pages 81-90).

We appreciate this opportunity to comment on the proposed rule.

Yours sincerely,

Sanjai Bhagat

Cambridge University Press, forthcoming

Financial Crisis, Corporate Governance, and Bank Capital

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July 2016

Book Theme

In spite of the honorable intentions of the Dodd-Frank Act to make "too-big-to-fail" banks a thing of the past, investors and policy-makers believe that many big banks are still too-big-to-fail. This issue has come up repeatedly in the 2016 U.S. presidential primary debates. We propose a solution to the too-big-to-fail problem that can be implemented with minimal or no additional regulations, only the intervention of corporate board members and institutional investors in these big banks.

In the wake of the global financial crisis, attention has often focused on whether incentives generated by bank executives' compensation programs led to excessive risk-taking. We recommend the following compensation structure for bank executives: incentive compensation should consist only of restricted stock and restricted stock options – restricted in the sense that the executive cannot sell the shares or exercise the options for one to three years after his or her last day in office. We contend that this incentive compensation package will focus bank managers' attention on the long-run and discourage them from investing in high-risk, value-destroying projects. We discuss and provide solutions to many of the caveats that arise; specifically regarding under-diversification and loss of liquidity.

Also, we suggest that director incentive compensation be constructed along the lines noted above. Specifically, all incentive compensation for directors should only consist of restricted equity (restricted stock and restricted stock option) – restricted in the sense that directors cannot sell the shares or exercise the options for one to three years after their last board meeting.

Our recommendation for executive and director compensation is based on our analysis of compensation structure in banks. However, our recommendation for executive and director compensation is fully applicable to other industries in the non-financial sector.

The above equity based incentive programs lose their effectiveness in motivating managers (and directors) to enhance shareholder value as a bank's equity value approaches zero (as they did for the too-big-to-fail banks in 2008). Additionally, our evidence suggests that bank CEOs sell significantly greater amounts of their stock as the bank's equity capital (tangible common stock to total assets ratio) decreases. Hence, for equity based incentive structures to be effective, banks should be financed with considerable more equity than they are being financed currently. Greater equity financing of banks coupled with the above compensation structure for bank managers and directors will drastically diminish the likelihood of a bank falling into financial distress; this will effectively address the too-big-to-fail problem and the Volcker Rule implementation that are two of the more significant challenges facing the implementation of the Dodd-Frank Act.

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Acknowledgments

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This book partly draws upon our prior research, which stress different aspects of the restricted equity executive incentive compensation proposal: Bhagat, S. and B. Bolton, 2014, Financial Crisis And Bank Executive Incentive Compensation, Journal of Corporate Finance 25, 313-341. Bhagat, S. and H. Tookes, 2012, Voluntary and Mandatory Skin in the Game: Understanding Outside Directors' Stock Holdings, European Journal of Finance 18, 191. Bhagat, S., Bolton, B., Romano, R., 2014, Getting Incentives Right: Is Deferred Bank Executive Compensation Sufficient? Yale Journal of Regulation 31, 523-564. Bhagat, S., Bolton, B., Lu, J., 2015, "Size, Leverage, and Risk-Taking of Financial Institutions," Journal of Banking and Finance 59, 520-537. Passages from the articles are reused with permission.

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Chapter 1: Introduction

The financial crisis that started in 2008 has inflicted a large cost on the U.S. economy and an even larger cost on U.S. workers and families. Hall (2014) estimates the shortfall of output at the end of 2013 as 13.3% or $2.2 trillion. The labor force participation rate is currently at 62.9% - the lowest it has been for more than three decades. Hall (2014) estimates the labor force participation rate in 2013 was 1.9% below the 1990-2007 trend. This 1.9% figure translates to 4.4 million *additional* U.S. adults who are unemployed as of 2013.

We write this book for in spite of the honorable intentions of the Dodd-Frank Act to make "too-big-to-fail" (TBTF) banks a thing of the past, investors and policy-makers believe that many big banks are still too-big-to-fail.[1] This issue has come up repeatedly in both the Republican and Democratic 2015/2016 presidential debates. Perhaps, the only issue that the presidential candidates across the entire spectrum, both Republican and Democratic, agree on is that the big banks are still too-big-to-fail. We propose a solution to the too-big-to-fail problem that can be implemented with minimal or no additional regulations, only the intervention of corporate board members and institutional investors in these big banks.

In the wake of the global financial crisis, attention has often focused on whether incentives generated by bank executives' compensation programs led to excessive risk-taking. Broadly speaking, post-crisis compensation reform proposals have taken one of three approaches: long-term deferred equity incentive compensation, mandatory bonus clawbacks upon accounting restatements or financial losses, and debt-based compensation. Governments worldwide have, in particular, regulated bank executives' compensation by requiring deferral

of incentive compensation, mandating clawbacks, and in some instances, even restricting compensation amounts.[2] In earlier work we recommended the following compensation structure for bank executives, with which these government initiatives are only partially consistent: incentive compensation should consist only of restricted stock and restricted stock options – restricted in the sense that the executive cannot sell the shares or exercise the options for one to three years after his or her last day in office; we refer to this as the Restricted Equity proposal.[3] We contend that such an incentive compensation package will focus bank management's attention on the long-run and discourage investment in high-risk, value-destroying projects.

Equity-based incentive programs such as our proposal may lose effectiveness in motivating managers to reduce excessive risk-taking as a bank's equity value approaches zero. There is a moral hazard or agency cost of debt in this context arising from shareholders' potential preference to take extreme risks when close to insolvency. This is because shareholders gain from the upside of a positive outcome, albeit low in probability, while limited liability leaves the losses, should the gamble fail, on creditors. The moral hazard problem when equity value approaches zero may well be more severe for banks, as their creditors have less interest in monitoring against risk-taking activity because the government not only stands behind retail depositors, but also often bails out other creditors as well.[4] Properly aligning management's incentives in this context therefore calls for focus on the interaction among bank capital structure, bank capital requirements and bank executive incentive compensation – whereas, the extant literature analyzes compensation reform in isolation.[5]

Incentive compensation reform proposals that advocate linking bank executives' compensation to debt are directed at this moral hazard concern, although the tendency for broad–based creditor bailouts complicates the efficacy of such an approach, compared to using debt-based compensation to address the phenomenon in nonfinancial firms. We contend that equity-based incentive pay is still decisively preferable to debt-based pay in motivating managers to maximize bank value. In our judgment, the appropriate approach to mitigate the insolvency-related moral hazard problem is to combine a properly structured equity incentive scheme with a capital structure that contains considerably more equity than currently required.

Our focus is incentive compensation not because we believe that was the most important contributing factor to the crisis. We doubt that to be the case. We believe that public policies regarding home mortgage, whose goal was to increase home ownership by those who could not otherwise afford it, as the primary cause of the financial crisis; we discuss this in detail in chapter 2. Our focus is on bank executive incentive compensation because it is an area in which legislators and banking regulators worldwide have implemented regulatory reforms, though the appropriateness of pay structures is still a matter of contentious debate. It is also the factor most within the control of bank corporate boards and shareholders, so that the private sector could undertake further beneficial changes without the need for coordinated government action.

Although we believe that the Restricted Equity proposal is superior to the approach regulators have taken to compensation, our proposal is directed to boards of directors because we recognize that it is unrealistic to expect regulators to substitute it for their recently-adopted initiatives, especially at an international level, given the arduous process of obtaining

multinational consensus. The complementary proposal for increased equity capital could also be implemented by financial institutions without regulatory action. But because deposit insurance and creditor bailouts have resulted in the market not requiring banks to hold substantially higher equity capital than current levels, short of the market believing that post-crisis resolution initiatives will be effective at limiting future bailouts, we think it improbable that our proposal would be voluntarily adopted given the sustained and strong opposition by bank managers with regard to increasing equity capital. Although the Restricted Equity proposal's effectiveness would be further optimized when combined with an increase in equity capital requirements, it does not require such a regulatory change. It would, we assert, reduce the probability that a bank will near insolvency, the zone in which the need for increased capital requirements is most critical.

Greater equity financing of banks coupled with the above compensation structure for bank managers and directors will drastically diminish the likelihood of a bank falling into financial distress. This will effectively address two of the more significant challenges facing the implementation of the Dodd-Frank Act: (1) The too-big-to-fail problem. Regulators and their critics have observed that implementation of the Dodd-Frank Act may have institutionalized the too-big-to-fail aspect of the largest U.S. banks.[6] Policymakers note that too-big-to-fail banks are here to stay and are proposing explicit or implicit taxes on banks above a certain threshold size. The major problem with the too-big-to-fail banks is exactly that – they are "too big to fail." Under our proposal (of greater equity financing of banks coupled with the compensation structure for bank managers and directors that discourages managers from undertaking high-

risk investments that are value destroying, instead focuses their attention on creating and sustaining long-term shareholder value), managers (and directors) would not want to grow the bank to a size (or, manage a bank of a size) that jeopardizes the solvency/financial viability of the bank for that would also jeopardize the value of their restricted stock and restricted stock options that they own and cannot sell until some years after they leave the bank. Furthermore, greater equity capitalization of the banks would provide a cushion against investments that ex ante were value-enhancing, but, ex post, were value-reducing. (2) The Volcker Rule essentially prohibits/discourages proprietary trading by too-big-to-fail banks. The problem in implementing the Volcker Rule is in defining and identifying trades that are proprietary (where profits/losses accrue to the bank) versus trades a bank makes in its normal course of business to serve a particular client. Under our proposal (of greater equity financing of banks coupled with the above compensation structure for bank managers and directors), managers (and directors) would not want to engage in proprietary trades that jeopardizes the solvency/financial viability of the bank for that would also jeopardize the value of their restricted stock and restricted stock options that they own and cannot sell until some years after they leave the bank. Furthermore, greater equity capitalization of the bank would provide a cushion against proprietary trades that do not turn out well for the bank.

Professor Anat Admati of Stanford University is waging a heroic campaign to get the banks to significantly increase their equity capital; see her co-authored book, Admati and Hellwig (2013, *The Bankers New Clothes*), and her website

http://www.gsb.stanford.edu/news/research/Admati.etal.html. We view this book as complementary to the efforts of Professor Admati and her colleagues.

Also, we study the effect of size on the risk-taking of U.S.-based financial institutions. Using data on the size and risk-taking of financial institutions from 2002 to 2012, we investigate whether cross-sectional variation in the size of banks is related to risk-taking. Our measures of risk-taking are comprehensive. They include two model-based measures (namely, the Z-score, and Merton's Distance to Default (Merton DD)), a market-based measure (volatility of stock returns), and an accounting-based measure (write-downs). We document four important facts. First, bank size is positively correlated with risk-taking, even when controlling for endogeneity between size and risk-taking. Our second finding: the decomposition of Z-score reveals that bank size has a consistent and significant negative impact on the bank common stock to total assets ratio; we do not find a consistent relation between bank size and return on assets or earnings volatility. *These findings suggest that banks engage in excessive risk-taking mainly through increased leverage.* They also suggest that economies of scale do not exist for banks. Regressions with volatility of stock return as the dependent variable indicate that size-related diversification benefits may not exist in the financial sector since size is positively associated with return volatility. Third, we find that our recently developed corporate governance measure (Bhagat and Bolton (2008)), calculated as median director dollar stockholding, is negatively associated with risk-taking. This has important policy implications, to wit, policy-makers interested in discouraging banks from engaging in excessive risk should focus on bank director compensation and stock ownership. Finally, we document that the positive relation between

bank size and risk is present in the pre-crisis period (2002-2006) and the crisis period (2007-2009), but not in the post-crisis period (2010-2012). Perhaps the intense scrutiny put on bank risk-taking by the bank regulators, senior policy-makers, and the media in the post-crisis period may have curbed the appetite and ability of large banks to engage in high-risk investments.

The book is organized as follows. The next chapter highlights how public policies regarding home mortgage "caused" the financial crisis. Chapter three briefly overviews pre-crisis compensation packages and how they might have led to misaligned incentives. The next two chapters present the evidence of such misalignment of executive compensation incentives. We find that too-big-to-fail bank CEOs were able to realize a substantial amount on their common stock sales in the pre-crisis period (2000-2007), compared to the large losses the executives experienced on their equity stake during the crisis (2008). Additionally, stock sales by too-big-to-fail bank CEOs was significantly greater than stock sales by other (defined in chapter 5) bank CEOs in the pre-crisis period. Finally, several different bank risk-taking measures suggest that TBTF banks were significantly riskier than other banks. Our results are mostly consistent with the argument that incentives generated by executive compensation programs in the too-big-to-fail banks are positively correlated with excessive risk-taking by these banks in high-risk but value decreasing investment and trading strategies. Also, our results are inconsistent with the argument that the poor performance of the too-big-to-fail banks during the crisis was the result of unforeseen risk.

Chapter 6 states and discusses our Restricted Equity proposal, which we maintain will mitigate bank managers' excess risk-taking incentives (but maintain their incentives to invest

in value increasing strategies), and explain why it is preferable to both compensation reforms governments have implemented, and debt-based compensation proposals. An aspect of our Restricted Equity proposal needs emphasis: This proposal, unlike most other executive compensation reform proposals, does *not* place a ceiling on executive compensation. The proposal only limits the annual *cash* payouts an executive can realize. The *present value* of all salary and stock compensation can be higher than bank managers have received historically, as the amount of restricted stock and restricted stock options that can be awarded to a bank manager is essentially unlimited per our proposal; though, in practice, the award amounts should and needs to be anchored to the current practices in the particular company. Of course, the higher value would only be realized were they to invest in projects that lead to value creation that persists in the long-term, in which case we have a win for long-term investors and a win for managers. Also, a focus on creating and sustaining long-term shareholder value would minimize the likelihood of a bailout which would be a win for taxpayers.

Chapter 7 outlines our proposal for director compensation; this would be complementary to the Restricted Equity proposal for managers. Chapter 8 focuses on the relation between bank size, bank risk taking, and bank leverage. In chapter 9 we present our approach to bank equity capitalization reform, which is complementary to the Restricted Equity incentive compensation proposal. We advocate that banks hold significantly higher equity capital (tangible common stock to total assets ratio) than presently required, specifically, bank equity capital should be, at least, 20% of bank total assets. In our judgment, combining the Restricted Equity proposal with bank equity capitalization reform is a better mechanism for reducing the probability of

banks taking on excessive risk, and contributing to another financial crisis. We note that the Restricted Equity proposal and the bank equity capitalization proposal rely only on the private incentives and actions of bank managers, bank directors, and bank institutional investors. More specifically, our proposals do *not* rely on additional regulations. The final chapter notes our conclusions.

Chapter 2: Mortgage Public Policies and the Financial Crisis

Government policies promoting subprime risk-taking, by government-sponsored enterprises, GSEs (Fannie Mae and Freddie Mac), dominating the residential mortgage market, so as to increase home ownership by those who could not otherwise afford it is the most likely "cause" of the financial crisis of 2008.[7] We note cause in quotation marks because causation has always been, and is likely to be, notoriously hard to prove in a strict statistical sense. We highlight the careful and detailed evidence presented in Peter Wallison's recent book (2015; *Hidden in Plain Sight: What Really Caused the World's Worst Financial Crisis and Why it Could Happen Again*). Wallison's (2015) evidence is consistent with the hypothesis that mortgage public policies intended to increase home ownership by those who could not otherwise afford it is the most likely "cause" of the financial crisis of 2008.

Figures 2.1A and 2.1B highlight the dramatic increase in inflation-adjusted real estate prices (measured by Real Case Shiller Home Price Index) during 1995-2005. Prior to this period, for more than a century, namely, 1890-1995, inflation-adjusted real estate prices while exhibiting volatility from year to year were basically unchanged.

Figures 2.1A and 2.1B about here

Figures 2.2A, 2.2B, 2.3A, and 2.3B highlight the growing and important role of GSEs in the U.S. residential mortgage debt market during 1992-2008. Why did the GSE's role in the U.S. residential mortgage debt market increase so significantly during 1992-2008?

Figures 2.2A, 2.2B, 2.3A, and 2.3B about here

The U.S. Congress passed the Federal Housing Enterprises Financial Safety and Soundness Act in 1992 (the GSE Act) with the worthy goal of helping low-income families buy homes. The GSE Act initially established a goal for Fannie Mae and Freddie Mac – that at least 30 percent of all mortgages they bought needed to be from borrowers/home-owners who were at or below the median income level of the area where they lived. The thinking was the liquidity provided banks and other mortgage originators would enable and encourage them to extend mortgage loans to low-and moderate income homebuyers (whose income was below the median income for the area).

Prior to 1992 most mortgages were prime mortgages, that is, mortgages offered to homebuyers who had good credit history, were able to put 10 to 20 percent as down-payment on the house, and whose loan payments to income was below 33 percent (after the mortgage was closed). Families/individuals unable to meet the above underwriting criteria were usually unable to buy a home. The above underwriting criteria had been developed by mortgage originators over several decades and reflected the payment and default experience they had with

their borrowers. In other words, the above underwriting standards would lead to a sustainable mortgage market and had done so at that time. Government policies that required Fannie Mae and Freddie Mac to ensure that a certain percent of all mortgages they bought were from borrowers/home-owners who were at or below the median income level of the area would eventually put pressure on mortgage originators to lower these underwriting standards. If these mortgage originators could readily sell these subprime mortgages (that did not meet the above underwriting standards) to Fannie or Freddie, then the mortgage originators would not be concerned with lowering the underwriting standards. Of course, Freddie and Fannie owned the credit risk of these mortgages to the extent they decided to retain these mortgages in their portfolios. Finally, if the U.S. Treasury had to bail out Freddie and Fannie from insolvency (due to losses from these subprime mortgages) – then the credit risk of these subprime mortgages would ultimately be borne by U.S. taxpayers.

Figure 2.4 illustrates GSE housing goals for low and moderate-income borrowers during 1996-2008, and the performance of Fannie Mae and Freddie Mac with respect to these goals. GSE housing goals for low and moderate-income borrowers was 40% in 1996, and was rapidly increased to 56% by 2008. Fannie and Freddie were able to meet or exceed these goals for every year except for 2008. Figure 2.5 illustrates subprime mortgage originations during 1996-2008, and subprime's share of the entire mortgage market. The years 2000-2006 witnessed a rapid increase in subprime mortgage originations. Coincidentally, GSE housing goals for low and moderate-income borrowers was 42% in 2000, and was rapidly increased to 53% by 2006. The increase in GSE housing goals for low and moderate-income borrowers, and the increase in

subprime mortgage originations during 2000-2006 is consistent with the following argument: *Government housing policies reflected in GSE housing goals for low and moderate-income borrowers likely fueled the subprime mortgage originations during 2000-2006.* [8]

Figures 2.4 and 2.5 about here

Subprime mortgage products were initially intended for low and moderate-income borrowers who did not have good credit history, and/or were unable to put 10 to 20 percent as down-payment on the house, and/or whose loan payments to income was above 33%. However, over time, prospective homebuyers who were *not* in the low and moderate-income category and who could qualify for a prime mortgage for a (less expensive) home started using subprime mortgage products in order to purchase a more expensive home or put less money down. Consider a prospective homebuyer who had $30,000 as down payment. They could purchase a home valued up to $300, 000 and still qualify for a prime mortgage since their down-payment was more than 10%. However, if they chose to put down only 5% as down-payment, then they could purchase a home valued at $600,000. Of course, the mortgage for their $600, 000 house would be subprime. According to U.S. Department of Housing and Urban Development, 37% of mortgage loans bought by Fannie in 2007, and 32% of mortgage loans bought by Freddie in 2007 were made to borrowers *above* the median income who put down less than 5% as down-payment; see HUD (2008). Also, in 2007 the National Association of Realtors reported that 45%

of first-time buyers put no money down; furthermore, of those who did put down a down-payment, the median amount was 2% of the purchase price; see USA Today, July 17, 2007. Additionally, Barth et al (2008) document that "…during the period January 1999 through July 2007, prime borrowers obtained thirty-one of the thirty-two types of mortgage products… obtained by subprime borrowers." The above evidence suggests that GSE housing goals for low and moderate-income borrowers led to lowering of mortgage underwriting standards for not just low and moderate-income borrowers but for *all* borrowers.

Role of Big Banks in the Financial Crisis

The big banks played two important roles related to the financial crisis. First, was their large and growing role in the issuance of mortgage backed securities (MBS) especially during 2004-2006; please see Figure 2.6 from Office of Federal Enterprise Housing Oversight (2008). MBS issued mostly by big banks were known as Private Label Securities (PLS). As Figure 2.6 notes, PLS were more than 50% of the MBS issuance for each of the years 2004, 2005 and 2006. More important, PLS for each of the years 2005 and 2006 was more than $1 trillion. The ability of the big banks to issue such a large volume of securities enabled them to earn significant fees. However, more important than these fees was the phenomenon of these big banks investing massively for their own portfolio in the top-rated (AAA) tranches of the mortgage backed securities they were issuing. A questions arises.

- Why were these big banks investing in the (top-rated AAA tranches of the) mortgage backed securities they were issuing?

Figure 2.6 about here

Historically, banks were intermediaries between depositors and borrowers. However, the process of securitization changed the role of banks to intermediaries between investors. Banks would pool mortgages into mortgage backed securities. MBS owners would receive the principal and interest from the underlying mortgages. MBS were structured into tranches based on risk. The most risky tranche offered the highest return, but would be the first to have its promised payments defaulted if the principal and interest payments from the underlying mortgages were insufficient. The least risky tranche offered the lowest return, but, correspondingly, would be the last to have its promised payments defaulted if the principal and interest payments from the underlying mortgages were insufficient. These tranches would be rated, and the least risky tranche would almost always receive the AAA rating. These tranches would be sold to institutional investors in the U.S. and abroad. Figure 2.7 illustrates the growing importance of securitizations during 2004-2006, and the increasingly dominant role of subprime mortgages in these securitizations.

Figure 2.7 about here

During 2004-2007, most of the large banks started investing (holding as asset in their balance sheet) heavily in the AAA rated tranches of the MBS securities they (or other big banks) had securitized. These banks would borrow short-term, often overnight, at close to the Libor rate and use the funds to invest in the AAA rated tranches. The banks would invest mostly in the AAA rated tranches, since per regulatory guidelines/requirements they did not have to hold additional (equity or retained earnings) capital if the additional investment was in safe AAA securities. The yield on the AAA rated tranches was more than the Libor interest rate; *the banks would book the difference as profit*. Just because the banks booked it as "profit" did not make it so! These "profits" were not profits in the traditional net present value sense, but were merely an accounting artifact of the difference between the AAA tranch yield and the Libor rate. As is taught in any Finance 101 class in the country, and across the globe, if security A offers a higher expected return than security B, then A is riskier than B. Borrowing at the Libor rate and investing it in AAA rated tranches did not mean the risk of the AAA rated tranches had been eliminated (or reduced to the level implied by the Libor rate). Somebody had to bear the risk of these AAA rated tranches – they were the bank's bondholders and stockholders, and, ultimately, the U.S. taxpayers. Indeed, this risk was not notional.

As the U.S. real estate market stalled and then real estate prices started heading downwards during 2005-2008, homeowners (who had little or no equity in their homes) began defaulting on their mortgages. Table 2.1 documents that subprime loans were defaulting at extremely high rates: 35% and 34% default rate 18 months after origination during 2006 and 2007, respectively; more important, a very high percentage of subprime mortgages originated

during 2004-2007 were sold to the big banks (private securitizer) for securitization purposes. Ultimately these defaults by homeowners led to defaults of the AAA rated tranches leading to substantial losses by the big banks that had invested in these tranches. In many cases these losses were large enough to potentially lead to bank insolvency. Banks and their allies publicly argued that their insolvency would severely and adversely impact the U.S. financial system and the economy. Whether or not insolvency of some of these big banks would have been catastrophic for the country is debatable; regardless, the banks and their allies were able to convince the key policy-makers in the U.S. Hence, the "need" for U.S. taxpayer bailout of these banks. Tsesmelidakis and Merton (2012) estimate the value of the implicit guarantees that led to massive wealth transfer (via the taxpayer funded bailout) from U.S. taxpayers to bank shareholders and debtholders as $365 billion during October 2008 – June 2009. Acharya, Anginer, and Warburton (2015) estimate that these implicit guarantees afforded the big banks a funding advantage of 30 basis points during 1990-2012. More recently, Gandhi, Lustig, and Plazzi (2016) provide evidence of the implicit guarantees provided by U.S. taxpayers to the big banks. The above documented large wealth transfer from U.S. taxpayers to the big bank investors makes this an important issue in the ongoing national debate on the economy.

Regarding the "profits" (difference between the AAA tranche yield and the Libor rate) the banks were booking – this was the source of substantial compensation to the bank employees (and their managers) involved in the securitization process and related transactions. Some of this compensation was cash bonus. Perhaps more important – to the extent bank analysts were unable to discern the source of the bank's higher earnings (via the "profits"), bank

stocks would be overvalued.[9] Bank managers could sell these overvalued shares, and/or exercise their options, to take money off the table before the analysts and other market participants realized the source of these "profits". As we will see in the following chapters, most managers of the big banks did just that.

Chapter 3: Pre-crisis Executive Compensation and Misaligned Incentives

Pre-crisis executive incentive compensation packages often did consist of an equity portion that was deferred, typically with a 2-5 year vesting requirement, most often granted for meeting annual performance targets.[10] But many lower-level employees, whose activities could nonetheless cause disastrous losses and who were highly paid, did not receive such incentive compensation. For example, individuals trading for the bank's proprietary account often received straight cash bonuses at year-end, pegged to the booked profits of their trades (even though the trades were open and initial profits could, as it turned out in the crisis, generate crushing losses).[11] Further, banks' risk officers were often paid low or flat salaries compared to other executives and their authority and ability to control risk-taking varied considerably across institutions.[12] These organizational incentives no doubt worked at cross purposes with senior executives' ability to manage their firms' risk and performance as the global crisis unfolded.

How might the incentives generated by incentive compensation programs in banks lead to excessive risk-taking and benefit executives and traders at the expense of long-term shareholders? Consider the stylized example in Bhagat, Bolton, and Romano (2014). An investment project or trading strategy that in any given year can lead to six cash flow outcomes with equal probability. One could think of the six outcomes of this investment project as the outcome from rolling a fair dice. Five of these which are a positive $500 million and the sixth is a random loss that increases over time (until a certain future period) denoted by the following time-varying random variable:

Sixth outcome = -$(0.5 + ε)*(t) billion; for t between years t_1 and t_2, and

Sixth outcome = -$(0.5 + ε)*($t_2$) billion; for t greater than t_2 years, (3.1)

where, ε is an error term with mean zero and standard deviation σ.

Given the above payoffs, the expected cash flow from the investment project or trading strategy is positive for the first few years. However, after these initial years the expected cash flow from the investment project or trading strategy turns negative. Additionally, the life of the project is such that its net present value ("NPV") is negative.[13] The probability, the magnitude of the cash flows of the six outcomes, and the life of the project are known only to the bank executives. Given the information available to or processed by the investing public, were the project or strategy announced in advance, they would not perceive that the sixth outcome's loss as increasing over time, and therefore the stock market would have a different – positive – valuation of the trading strategy from bank management, as indicated in Example 1.

Example 1: Expected Cash Flows (Executives Know True Probabilities)

	Expected Cash Flows:	
	Belief of Bank Executives	**Belief of Investing Public**
Outcome 1:	+ $500 million	+ $500 million
Outcome 2:	+ $500 million	+ $500 million
Outcome 3:	+ $500 million	+ $500 million
Outcome 4:	+ $500 million	+ $500 million
Outcome 5:	+ $500 million	+ $500 million
Outcome 6:	- $(0.5 + ε)*(t) billion for t between years t_1 and t_2; - $(0.5 + ε)*(t_2) billion for t greater than t_2 years	- $500 million
NPV	**Negative**	**Positive**
Investment Decision	**Do Not Invest**	**Invest**

How should the individual decision-maker - a bank executive or trader - respond to the above investment project or trading strategy if he or she were acting in the interest of the long-term shareholders? As indicated in Example 1, because the NPV of the investment project/trading strategy is negative, this investment project or trading strategy should be rejected.[14]

But will the individual undertake the investment project or trading strategy? To answer this question, we have to consider the compensation structure. For convenience, we will refer to the decision-maker in the example as the bank CEO. Assume the CEO owns a significant number of bank shares. Furthermore, these shares are unrestricted, that is, they have either vested or have no vesting requirements. If the bank adopts the above trading strategy, and given the belief of the stock market about this investment project or trading strategy, the bank's share price will increase. In any given year there is a very high probability (5/6 = 83%) that the trading strategy will generate a very large positive cash flow of $500 million. If the realization from the trading strategy is one of the positive cash flow outcomes (and there is an 83% probability of this), the bank share price will rise, the bank in response will award incentive compensation to key employees, including the CEO, and the CEO can then liquidate a significant part of her equity holdings at a profit.[15]

To be sure, in this stylized example, the bank CEO knows that the expected cash flow from this trading strategy will be negative in the later years. There is also some probability

(17% in this example) that in any given year the trading strategy will lead to a negative cash flow outcome. Additionally, the magnitude of the negative outcome increases over time. What then? In the textbook corporate finance paradigm, the bank's share price will decline, and, depending on the bank's equity capitalization, the bank will be insolvent or close to insolvent, and subject to corrective action or government takeover.[16] This insolvency or close-to-insolvency scenario will certainly have a significantly negative impact on the value of the CEO's bank stockholdings. However, if during the first few years of this trading strategy the cash flow outcomes have been positive and the CEO has liquidated a significant amount of shares, then despite the CEO's experiencing large losses on her remaining holdings as the bank faces large losses or possibly insolvency in a future year, the CEO's net payoff from employment in the bank (salary, bonus, plus proceeds from sale of stock) in the earlier years, may well still be positive and even possibly substantial. In addition, during the global financial crisis, governments did not permit the largest banks to fail, and so a rational CEO may have a further impetus to take on the risk: if it is a too-big-to-fail bank, even her equity may be preserved when the bank is bailed out.

It is not necessary to assume, as does our stylized example, that bank CEOs intentionally undertook or encouraged employees to undertake, negative NPV projects or trading strategies, to suggest that pre-crisis compensation packages could have produced misaligned incentives. An alternative scenario that could produce a similarly distorted investment outcome would occur if a CEO misperceives the probabilities of a project's negative cash flows, such that a value-destroying project appears to be value creating. If, for instance, executives have a rosier

picture of a project's outcomes than warranted because, say, they are over-confident in their abilities to manage it, or they are overly optimistic about the future, then we do not have to posit managers who intentionally seek to rip off shareholders. We would only be acknowledging human nature "as we know it," that individuals quite often believe they are more talented than most and therefore are overly confident and more optimistic regarding the success of their endeavors than the objective situation would warrant (in this instance, the executive is overconfident with regard to project selection or trading ability and hence overly optimistic about projected cash flows).[17] Pre-crisis compensation packages could again produce misaligned incentives as they could exacerbate the impact of optimism by not inducing executives to focus diligently on estimating more accurately all of a project's cash flows or the risks associated with those cash flows. A similar misalignment could occur without behavioral assumptions of overconfidence and optimism if the CEO miscalculates a project's expected outcomes due to inadequate internal organization information flows or simply sloppiness (e.g., lack of effort).

Consider the following emendation of our earlier stylized example, in which the probabilities of the six possible outcomes are not equal. In addition, the bank executives do not know the true cash flows and probabilities. Because the executives' expected probabilities will differ from the actual probabilities, some investment decisions will be made that should not have been made.[18] As indicated in Example 2, this occurs in the example because the executives perceive the project to have a positive NPV, when it actually has a negative NPV. This is because the managers' calculation perceives the possible loss as more remote, as well as

occurring much further in the future (when they would expect, no doubt, either that the project would no longer be pursued or they would no longer be at the firm) than is actually the case.[19]

Example 2: Expected Cash Flows (Executives Do Not Know True Probabilities)

		Expected Probability	**Actual Probability**
Outcome 1:	+ $500 million	18%	15%
Outcome 2:	+ $500 million	18%	15%
Outcome 3:	+ $500 million	18%	15%
Outcome 4:	+ $500 million	18%	15%
Outcome 5:	+ $500 million	18%	15%
Outcome 6:	- $(0.5 + ε)*(t) billion for t between years t_1 and t_2; - $(0.5 + ε)*(t_2) billion; for t greater than t_2 years	10%	25%
	Project NPV **Investment Decision**	**Positive** **Invest**	**Negative** **Do Not Invest**

Of course, these cash flows and probabilities are hypothetical; the key is that there can be non-trivial differences between expected and actual future outcomes. These differences can drive the investment decisions of the bank, which can be problematic if the incentives of bank executives and the shareholders are not properly aligned. If, as in the earlier example, the executives' stock and stock options (awarded via their incentive compensation contract) can be liquidated in the near term, they might be able to benefit more on their stock sales than they lose on their equity holdings when the project's negative value are realized after the initial successes. The point of this second stylized example is that even if executives do not seek intentionally to mislead shareholders, but for a variety of reasons, including overconfidence, optimism, poor internal organization, or sloppy thinking, they misjudge the outcome, they

could be rewarded for doing so because of their short-term incentive compensation. Because their compensation depends solely on the current (realized) year's cash flow, they will have little incentive to estimate more diligently the probabilities of the project's continuing cash flows. A longer-horizon incentive compensation structure should focus their attention on obtaining more accurate estimates of a project's expected future cash flows. Moreover, they could no longer benefit at the shareholders' expense from a project whose short- and long-term cash flows were so disparate, because not being able to sell their shares or receive cash bonuses in the early years of the project's life, they will bear the same ultimate net loss on their holdings as the outside long-term investors.

Chapter 4: Managerial Incentives Hypothesis versus the Unforeseen Risk Hypothesis

The *Managerial Incentives Hypothesis* posits that *incentives generated by executive compensation programs led to excessive bank risk-taking*. As we argue in Bhagat and Bolton (2014), the excessive risk-taking would benefit bank executives at the expense of the long-term shareholders; that is, projects that led to the excessive risk-taking were ex ante value-diminishing (negative net present value). As highlighted in Example 1 in chapter 3, managers would engage in such behavior *if their compensation is heavily weighted towards short-term incentive compensation*. Also, as we illustrate in Example 2 in chapter 3, even if executives do not seek intentionally to mislead shareholders (but for a variety of reasons, whether out of overconfidence, optimism, poor internal organization, or simply sloppy thinking, they misjudge the outcome) they could be rewarded for doing so if their compensation is heavily weighted towards short-term incentive compensation.

Fahlenbrach and Stulz (2011) document the significant value losses from holdings of stock and vested unexercised options in their companies of bank CEOs during 2008. The authors point to this wealth loss in 2008 as evidence "…inconsistent with the view that CEOs took exposures that were not in the interests of shareholders. Rather, this evidence suggests that CEOs took exposures that they felt were profitable for their shareholders *ex ante* but that these exposures performed very poorly *ex post*." This is the essence of the *Unforeseen Risk Hypothesis*. Note that, under the *Unforeseen Risk Hypothesis*, the bank executives only invest in projects that, ex ante, have a positive net present. In this case, we should not see the executives engage in insider trading that suggests that they are aware of the possibility of an

extreme negative outcome especially in the later years of the project. The CEO does not liquidate an abnormally large portion of her holdings because she does not anticipate large future losses from the bank's investment strategy. If the bank does suffer from the negative outcome due to risks associated with the investment that the executives could not anticipate, they will suffer as much or more than the long-term shareholder.

The predictions of the *Unforeseen Risk Hypothesis* are in contrast to the risk-taking incentives of bank executives - as per the *Managerial Incentives Hypothesis* noted above. The *Managerial Incentives Hypothesis* posits that incentives generated by executive compensation programs led to excessive risk-taking by banks that benefited bank executives at the expense of the long-term shareholders. Bank executives receive significant amounts of stock and stock options as incentive compensation. If the vesting period for these stock and option grants is "long," managers will identify more closely with creating long-term shareholder value. If the vesting period for these stock and option grants is "short," managers will identify more closely with generating short term earnings, even at the expense of long-term value.[20]

Managers that own significant amounts of *vested* stock and options have a strong incentive to focus on short term earnings. If these short term earnings are generated by value-enhancing projects, there would be no conflict vis-a-vis serving long-term shareholder interests. What if managers invest in value-decreasing (negative net present value) projects that generate positive earnings in the current year (and perhaps a few subsequent years) but lead to a large negative earnings outcome after a few years? If managers and outside investors have similar understanding of the magnitude and probability of the large negative outcome, managers will

be discouraged from investing in such value-decreasing projects, because stock market participants will impound the negative impact of such projects on share prices of these banks. (The negative impact on share prices will have a similar, or greater, negative effect on the value of the managers' stock and option holdings.) However, managers have discretion over the amount, substance and timing of the information about a project they release to outside investors.[21] Hence, given the information provided the outside investors, the stock market may underweight the probability (and timing) of a very negative outcome – and view a value-decreasing project as value-enhancing.

How might managers behave if they were presented with a value-decreasing (negative net present value) project that generated positive earnings in the current year (and perhaps a few subsequent years) but leads to a large negative earnings outcome after a few years? If these managers were acting in the interests of long-term shareholders, they would not invest the bank's funds in such a project. If the managers were not necessarily acting in the interests of long-term shareholders but in their own self-interest only, and if they owned sufficient (vested) stock and options, they would have an incentive to invest in such a value-decreasing project. If the earnings from the project are positive in the current and the next few years, the company's share price rises giving managers the opportunity to liquidate their (vested) stock and option holdings at a higher price. In other words, managers can take a significant amount of money "off the table" during the early years of the project. If the large negative earnings outcome occurs after a few years, the firm's share price will decline and the managers will incur a wealth loss via their stock and option ownership. While these wealth losses can be large, they

can be less than the money the managers have taken off the table in the earlier years. The end result is – Managers make positive profits in spite of investing in a value-decreasing project; long-term shareholders, of course, experience a negative return because they did not have the knowledge to opportunistically liquidate their holdings as the CEO did.

The above discussion suggests a way to empirically distinguish whether the *Unforeseen Risk Hypothesis* or the *Managerial Incentives Hypothesis* leads to a better understanding of bank manager incentives and behavior during 2000-2008. The *Managerial Incentive Hypothesis* predicts that manager payoffs (including cash compensation, sale of shares, and exercise of options and subsequent sale of shares) would be positive over a period of years whereas long-term shareholders will experience a negative return over this same period. The *Unforeseen Risk Hypothesis* predicts that *both* manager payoffs and long-term shareholder returns would be negative during this period. Table 4.1, Panel A, outlines the testable implications from these two hypotheses.

Table 4.1 about here

However, there are other important reasons why CEOs might liquidate portions of their vested stock and option holdings. Theories of optimal diversification and liquidity (for example, see Hall and Murphy (2002)) predict that risk-averse and undiversified executives would exercise options and sell stock during 2000-2007, regardless of whether they believed

stock prices would fall in 2008. The *Manager Incentive Hypothesis* suggests that manager trades of the shares of their bank's stock (sale of shares, and exercise of options and subsequent sale of shares) are "abnormally large" during the financial crisis and the prior period. In contrast, the *Unforeseen Risk Hypothesis* holds that some manager trades (reflecting the "normal" liquidity and diversification needs) are expected and "normal" during the financial crisis and the prior period. What is "normal" for manager trades of the shares of their bank's stock? We consider two benchmarks for normal managerial trading. First, trades of managers of other banks (that did not seek government bailout funds) would reflect the normal liquidity and diversification needs of bank managers. Hence, we benchmark normal manager trades with reference to managers of banks that did not seek government bailout funds. Trades similar to this normal level would be consistent with the *Unforeseen Risk Hypothesis*. In contrast, trades greater than this normal level would be consistent with the *Managerial Incentives Hypothesis*; see Table 4.1, Panel B. Second, we construct a Tobit model of expected CEO trading based on the extant literature on insider and CEO trading; we detail these results in chapter 5.

Chapter 5: Bank CEOs' buys and sells during 2000-2008

5.1. Sample selection

The starting point for our sample is the list of 100 financial institutions studied in Fahlenbrach and Stulz (2011). From this list, as we detail in Bhagat and Bolton (2014), we identify the 14 firms studied in this analysis that were chosen due to their role in the U.S. financial crisis prior to and during 2008. Nine firms are included because the U.S. Treasury required them to be the first participants in the Troubled Assets Relief Program (TARP) in October 2008. These firms are Bank of America, Bank of New York Mellon, Citigroup, Goldman Sachs, JP Morgan Chase, Morgan Stanley, State Street, Wells Fargo, and Merrill Lynch, which was subsequently acquired by Bank of America.[22] Bear Stearns and Lehman Brothers are included because we suspect they would have been included in this first round of TARP funding had they been independent going concerns in October 2008. Bear Stearns was acquired by JP Morgan Chase in May 2008 and Lehman Brothers declared bankruptcy in September 2008. Mellon Financial merged with Bank of New York in July 2007; it is included to allow for consistency throughout the period under study. Countrywide Financial is also included for consistency and because it was one of the largest originators of subprime mortgages prior to the crisis. Countrywide was acquired by Bank of America in July 2008, so all of its investments and liabilities became Bank of America's investments and liabilities at that time. Finally, American International Group, or AIG, is included because of its central role in the crisis. While not a depository institution or investment bank, AIG was a trading partner with most of the other institutions in this study, and was involved in the real estate market by selling credit default swaps and other mortgage-related products to these institutions

and other investors. AIG was also one of the largest recipients of TARP funds and was one of the last firms in the sample to repay the Treasury's TARP investment. In our discussion below we refer to AIG and the 13 other banks noted above as Too-Big-To-Fail (TBTF) "banks."

Besides the 14 TBTF banks, for comparison purposes we consider two additional samples of lending institutions, comprised of the remaining 86 institutions listed in the appendix in Fahlenbrach and Stulz (2011). The first comparative sample includes 49 lending institutions that received TARP funds several months after the TBTF banks received their TARP funds; we refer to these 49 lending institutions as later-TARP banks or L-TARP. The second comparative sample includes 37 lending institutions that did not receive TARP funds; we refer to these 37 lending institutions as No-TARP. Appendices A and B note details of the L-TARP and No-TARP banks. Table 5.1 provides summary data on the size (total assets and market capitalization) of the TBTF, L-TARP and No-TARP banks. As expected, TBTF banks are much larger than L-TARP and No-TARP banks. L-TARP and No-TARP banks are of similar size.

Table 5.1 about here

5.2. Data

The insider trading data comes from the Thomson Insiders database. We rely on Form 4 data filed with the Securities and Exchange Commission for this study. In addition to direct

acquisitions and dispositions of common stock, we also consider acquisitions of stock through the exercise of stock options.[23] Many individual Form 4 filings are manually reviewed on the SEC website to ensure the consistency of the data.

Director ownership data are from RiskMetrics, formerly Investor Responsibility Research Center, or IRRC. The compensation data are from Compustat's ExecuComp. Individual proxy statements are reviewed to corroborate director ownership and compensation data. In some cases, for example, the ownership data used is slightly different than the RiskMetrics data because of disclosures about the nature of the ownership provided in the footnotes of the proxy statement. For example, in the 2001 Bear Stearns' proxy statement, 45,669 shares of common stock owned by CEO James Cayne's wife are not included in his beneficial ownership; in the 2002 proxy, these same 45,669 shares (presumably) are included in his beneficial ownership. Manually reviewing the proxy statements and the relevant footnotes allow us to be more consistent across time and across firms. Further, manually reviewing the proxy statements allows us to distinguish and appropriately characterize securities such as unexercised options or restricted stock.[24]

Finally, stock price data are from Center for Research in Securities Prices, CRSP, and financial statement data are from Compustat. Again, individual financial statements are reviewed to better characterize the information in some cases.

5.3. Variables

The primary variable used in this study is *Net Trades*. This variable subtracts the dollar value of all of an insider's purchases of common stock during a fiscal year from the dollar value of all of that insider's sales of common stock during the year. Exercising options to acquire stock is considered a purchase of common stock in the calculation of Net $\text{Trades}_{i,t}$, net trades of bank executive i in year t. This variable is calculated as follows:

$$\text{Net Trades}_{i,t} = \text{Stock Sales}_{i,t} - \text{Stock Purchases}_{i,t} - \text{Option Exercises}_{i,t} \quad (5.1)$$

We consider the post-trade ownership after each transaction. One information item disclosed on the Form 4 is "amount of securities beneficially owned following reported transaction." We multiply the number of shares disclosed on the Form 4 with the transaction price of the stock from the Form 4 to get the dollar value of ownership following the transaction. We also add back the value of shares sold or subtract off the value of shares purchased to determine the pre-trade ownership stake.

We consider *Salary* and *Bonus* for compensation data, which represent current cash consideration. We do not directly consider stock or option grants. We analyze any stock or option compensation only when the insider converts that into cash through selling the stock or exercising the option, which is captured in the *Net Trades* variable defined above.

We also calculate the *Estimated Value Lost*, or the change in beneficial ownership for each CEO in 2008. This amount is estimated by subtracting *Net Trades* from *Beginning Beneficial Ownership* in number of shares to get estimated shares at end of 2008. This is multiplied by the ending stock price change and then subtracted from the *Beginning Beneficial Ownership* in dollars to get the estimated value lost. We calculate the *Estimated Value*

Remaining at the end of 2008 using the above estimate of shares owned at end of 2008, multiplied by ending stock price. Note that this is not necessarily the same as Beneficial Ownership at the beginning of 2009 disclosed in a firm's proxy because it does not include stock gifts or compensation received during 2008. We do not include these values because doing so would not directly capture the effects of the financial crisis on the CEO's ownership stake during 2008.

5.4. Net payoff to bank CEOs during 2000-2008

Table 5.2 provides details on the CEOs' buys and sells of their own company stock during 2000-2008. During this period the 14 CEOs as a group bought stock in their companies 73 times and sold shares of their companies 2,048 times. During 2000-2008 the 14 bank CEOs bought stock in their banks worth $36 million, but sold shares worth $3,467 million.[25] In addition, CEOs acquired stock by exercising options at a total cost of $1,660 million.

Table 5.2 about here

Table 5.2 also notes the *Value of Net Trades* for these CEOs in the shares of their own company; *Value of Net Trades* subtracts the dollar value of all purchases of common stock from the dollar value of all sales of common stock. There is significant cross-sectional variation in the net trades of the CEOs during 2000-2008. Lehman Brothers' CEO engaged in the largest dollar value of net trades of about $428 million, followed by Countrywide's CEO at $402

million, and Bear Stearns' CEOs at $243 million. On the low end, AIG CEOs engaged in net acquisitions of $7 million, while Mellon Financial and Bank of America CEOs engaged in net trades worth $17 million and $24 million, respectively.

Observers of U.S. capital markets know that investors in these 14 banks fared poorly during 2008; see Figure 5.1. Since these CEOs owned significant blocks of stock in their companies, they also suffered significant declines in the value of their stockholdings. As a group these CEOs suffered value losses (from stockholdings in their companies) in 2008 of about $2,013 million. Individually these losses range from a low of about $3 million (Wells Fargo) to about $796 million (Lehman Brothers).[26]

Figure 5.1 about here

Both bank CEOs and their shareholders experienced negative returns during 2008. This evidence is consistent with both the Manager Interests Hypothesis and the Unforeseen Risk Hypothesis. To distinguish between the Unforeseen Risk Hypothesis and the Managerial Incentives we would need to consider their returns during a period prior to 2008. The Manager Incentive Hypothesis predicts that manager payoffs would be positive during the period whereas long-term shareholders will experience a negative return over this same period. The Unforeseen Risk Hypothesis predicts that both manager payoffs and long-term shareholder returns would be negative during this period.

To distinguish between the *Unforeseen Risk Hypothesis* and the *Managerial Incentives Hypothesis* we need to consider manager payoffs for a period of years prior to 2008. What time period is implied by this "period of years prior to 2008?" Conceptually this period would include the years when bank managers initiated or started emphasizing excessively risky investments or trading strategies. Chesney, Stromberg, and Wagner (2010) consider bank CEO incentives during 2002-2005 arguing that, "…the vast majority of deals related to the subprime and mortgage backed security market originated in the early part of the decade…" Figure 2.5 supports their contention. Bebchuk, Cohen and Spamann (2010) consider the period 2000-2008 in their case study of manager compensation in Bear Stearns and Lehmann. Consistent with this literature, we consider 2000-2008 as our period for analysis. We include the longer period because we want our analysis to capture both the cash compensation and any liquidation of the CEO's personal holdings during this period. As a robustness check we consider two additional

Table 5.3, Panel A, notes that as a group these 14 CEOs experienced a cash inflow of $1,771 million from their net trades during 2000-2008. In addition, these 14 CEOs received cash compensation worth $891 million during this period. Combining these two numbers – as a group, CEOs of the 14 banks experienced cash inflow worth $2,662 million; we refer to this as *CEO Payoff*. Compare this with their estimated combined losses from beneficial stock holdings in 2008 of $2,013 million.[27] The *CEO Payoff* sum of $2,662 million for the 14 CEOs as a group can be considered as money these CEOs took "off the table" as their banks continued with the high risk but negative net present value trading/investment strategies during 2000-2008. However, the high risk but negative net present value trading/investment strategy would

ultimately lead to a large negative outcome – namely, the large loss of $2,013 million in 2008. The sum of net trades and cash compensation for 2000-2008 is greater than the value lost in 2008 (from beneficial stock holdings) by $649 million for these 14 CEOs as a group – we refer to this as the *Net CEO Payoff*. The data for the CEOs of the 14 companies as a group are consistent with the *Managerial Incentives Hypothesis* and inconsistent with the *Unforeseen Risk Hypothesis*, based on the predictions in Table 4.1.

Table 5.3 about here

Table 5.3, Panel A, also provides data on the net trades, cash compensation, and value losses in 2008 for CEOs of each of the 14 companies. The *Net CEO Payoff* is positive for CEOs in 10 of the 14 sample firms; Bank of America, Goldman Sachs, Lehman Brothers and State Street are the exception. The *Net CEO Payoff* ranges from $221 million for Citigroup and $377 million for Countrywide to losses of $126 million for Goldman Sachs and $311 million for Lehman Brothers. However, even for Goldman Sachs and Lehman Brothers, *CEO Payoffs* for 2000-2008 are quite substantial at $132 million and $485 million, respectively. In other words, the CEOs of Goldman Sachs and Lehman Brothers enjoyed *realized* cash gains of $132 million and $485 million, respectively, during 2000-2008, but suffered *unrealized* paper losses that exceeded these amounts. Overall, the evidence from individual *Net CEO Payoffs* is

consistent with the *Managerial Incentives Hypothesis* and inconsistent with the *Unforeseen Risk Hypothesis*.

5.5 Robustness check: Different sample periods

Table 5.3, Panel B, notes that as a group these 14 CEOs experienced a cash inflow of $1,398 million from their net trades during 2002-2008. In addition, these 14 CEOs received cash compensation worth $667 million during this period. Combining these two numbers – as a group CEOs of the 14 banks experienced *CEO Payoff* worth $2,065 million, including costs associated with exercising options. As noted earlier, these CEOs suffered combined losses from beneficial stock holdings in 2008 of $2,013 million. Consistent with our findings for the 2000-2008 period, the data for the CEOs of the 14 companies as a group are consistent with the *Managerial Incentives Hypothesis* and inconsistent with the *Unforeseen Risk Hypothesis*.

The sum of net trades and cash compensation for 2002-2008 is greater than the value lost in 2008 (from beneficial stock holdings) for CEOs at half of the 14 sample firms. Even for the CEOs of the banks with *Net CEO Payoff* losses, the realized *CEO Payoff* for 2002-2008 is quite substantial, ranging from $35 million up to $391 million. Notice that the above *CEO Payoff* amounts were taken off the table by the CEOs of these seven banks during 2002-2008 before they incurred the large 2008 losses from the drop in the value of their stockholdings. Similar to our conclusion for 2000-2008, we interpret this evidence as consistent with the *Managerial Incentives Hypothesis* and inconsistent with the *Unforeseen Risk Hypothesis*.

Table 5.3, Panel C, focuses on the period 2004-2008. As a group these 14 CEOs experienced a cash inflow of $1,132 million from their net trades. In addition, these 14 CEOs received cash compensation worth $469 million during this period. As noted earlier, these CEOs suffered combined losses from beneficial stock holdings in 2008 of $2,013 million. The *Net CEO Payoff* for the 14 CEOs as a group is negative $412 million for 2004-2008. This evidence is inconsistent with the *Managerial Incentives Hypothesis* and consistent with the *Unforeseen Risk Hypothesis*. It is worth noting that the *Net CEO Payoff* for the 14 CEOs as a group would be positive were it not for the large negative *Net CEO Payoff* of $486 million for Lehman Brothers (which declared bankruptcy in September 2008). Even for Lehman Brothers, the realized cash from *CEO Payoff* during 2000-2008 is $310 million – this amount was taken off the table; of course, the unrealized paper losses during this period are $796 million.

The sum of net trades and cash compensation for 2004-2008 is greater than the value lost in 2008 (from beneficial stock holdings) for CEOs in half of the 14 sample firms. Even for the CEOs of the seven banks with negative *Net CEO Payoffs*, the realized cash from *CEO Payoffs* for 2004-2008 ranges from $15 million to $310 million. We note that the abovementioned sums of money were taken off the table by the CEOs of these banks during 2004-2008 before they incurred the large unrealized paper losses in 2008 from the drop in the value of their stockholdings.

5.6 Comparing TBTF, L-TARP and No-TARP banks

The dollar value of the net trades of the 14 TBTF bank CEOs during 2000-2008 provides an important perspective on the payoff these executives received from working in

their banks. As noted earlier, theories of optimal diversification and liquidity (for example, see Hall and Murphy (2002)) predict that risk-averse and undiversified executives would exercise options and sell stock during 2000-2008, regardless of whether they believed stock prices would fall in 2008. An important question is whether the net trades of the 14 TBTF bank CEOs are normal or abnormal. We compare the net trades of the 14 TBTF bank CEOs to the net trades of the 49 L-TARP bank CEOs and the 37 No-TARP bank CEOs. Since TBTF banks are considerably larger than L-TARP and No-TARP banks, we consider the ratio of the CEO's net trades during the sample period to the CEO's holdings at the beginning of the period. We consider three sample periods: 2000-2008, 2002-2008, and 2004-2008.

To the extent that diversification and liquidity needs of the TBTF CEOs are similar to the diversification and liquidity needs of the L-TARP CEOs and No-TARP CEOs, the ratio of the CEO's net trades during the sample period to the CEO's holdings at the beginning of the period would be equal for these three sub-groups of CEOs. If the ratio of the CEO's net trades during the sample period to the CEO's holdings at the beginning of the period are significantly greater for TBTF CEOs compared to No-TARP CEOs, this would suggest that TBTF CEOs sold significantly more stock during 2000-2008 even after controlling for diversification and liquidity concerns.

As detailed in Table 5.4, the median ratio of the CEO's net trades during 2000-2008 to the CEO's holdings in 2000 is 59.7% for the TBTF banks, compared to 17.6% for L-TARP banks and 4.0% for the No-TARP banks.[28] We find consistent results for the two other sample periods. The median ratio of the CEO's net trades during 2002-2008 to the CEO's holdings in

2002 is 21.9% for the TBTF banks, compared to 8.4% for L-TARP banks and 2.6% for the No-TARP banks. The median ratio of the CEO's net trades during 2004-2008 to the CEO's holdings in 2004 is 11.8% for the TBTF banks, compared to 3.5% for L-TARP banks and 0.1% for the No-TARP banks.[29] This provides strong evidence that net trades of the 14 TBTF bank CEOs during 2000-2008 was abnormally high even after controlling for diversification and liquidity needs of TBTF CEOs. This evidence is consistent with the Managerial Incentives Hypothesis and inconsistent with the Unforeseen Risk Hypothesis.

Table 5.4 about here

Figure 5.2 illustrates the stark difference in the median total Net Trades of the 14 TBTF CEOs compared to the 37 No-TARP CEOs during 2000-2008, 2002-2008, and 2004-2008. Figure 5.2, Panel A, highlights the dollar values of the Net Trades. To address the liquidity and diversification needs of these CEOs, we consider the ratio of the Net Trades to their respective stock holdings in the beginning of the period; see Figure 5.2, Panel B. For each of the periods 2000-2008, 2002-2008, and 2004-2008, the median ratio of total Net Trades to stock holdings in the beginning of the particular period of the 37 No-TARP CEOs is significantly less than for the 14 TBTF CEOs.

Figure 5.2, Panels A & B, about here

5.7. Robustness check: Net trades of officers and directors

In the analysis above we have focused on the trades and incentives of the CEO since he is the most significant decision maker. However, other officers and directors can have significant impact on the bank's trading/investment strategies. Table 5.5 provides data on the net trades of the officers and directors of these 14 banks. Data on the compensation and beneficial holdings are less readily available or unavailable for the officers and directors. We note the data on net trades to provide as complete a perspective as possible regarding the incentives of decision makers in these banks. Officers and directors of these 14 banks were involved in 14,687 sales during 2000-2008, but only 1,671 buys during this period. Officers and directors acquired stock via option exercises in 3,454 separate transactions. Net trades, including the costs of exercising options, of officers and directors of these 14 banks sums to almost $127 billion. On the high side, net trades of officers and directors of Goldman Sachs was $32 billion, followed by AIG at $28 billion and Citigroup at $19 billion. Notice that the above figures do not include the value of any cash compensation received by these officers and directors from their banks.

Table 5.5 about here

Figure 5.3, Panels A and B, illustrate the annual Net Trades of all 14 TBTF CEOs and insiders, respectively. The intertemporal profile of the annual Net Trades is quite revealing. The years with the two largest amounts of annual Net Trades for the CEOs was just prior to the 2008 crash, namely, 2007 and 2005. Similarly, the year with the largest amount of annual Net Trades for the insiders was also just prior to the 2008 crash, namely, 2007.

Figure 5.3, Panels A & B, about here

5.8. Shareholder returns to TBTF, L-TARP and No-TARP banks

Table 5.6 summarizes abnormal shareholder returns for the TBTF, L-TARP and No-TARP banks for 2000-2008, 2002-2008, and 2004-2008. We use the Fama-French Carhart (1997) four-factor model to compute these abnormal returns. Shareholders of the No-TARP banks enjoyed significantly more positive returns than the TARP banks for 2000-2008, 2002-2008 and 2004-2008. Shareholders of the No-TARP banks also enjoyed significantly more positive returns than the L-TARP banks for these periods. This evidence coupled with the evidence in 5.4, 5.5, 5.6 and 5.7 above is consistent with the notion of a positive correlation between bank CEOs retaining more of the stock they receive as incentive compensation, and their shareholders' return. We urge caution in interpreting this evidence because of selection bias; specifically, banks that were performing well are unlikely to have requested for or received TARP funds.[30]

Table 5.6 about here

5.9. Risk-taking by TBTF banks, L-TARP and No-TARP banks

In the model developed above we suggest that TBTF managers engaged in high-risk (and negative net present value) investment strategies during 2000-2008. As noted above, the annual stock sales by TBTF CEOs (compared to L-TARP CEOs and No-TARP CEOs) and their stock return during 2000-2008 provide evidence consistent with this argument. In this section, we provide more direct evidence on the risk-taking characteristics of the TBTF banks.

The banking literature has used Z-score as a measure of bank risk; for example, see Boyd and Runkle (1993), Laeven and Levine (2009), and Houston et al (2010). Z-score measures a bank's distance from insolvency. More specifically, Z-score is the number of standard deviations below the mean bank profit by which the profit would have to fall before the bank's equity loses all value. A higher Z-score suggests a more stable bank. The evidence in columns (1) and (2) in Table 5.7 suggests that Z-score of TBTF banks is significantly less than the Z-score of No-TARP banks and that Z-score of L-TARP banks is also significantly less than the Z-score of No-TARP banks.

Table 5.7 about here

More recently, Chesney, Stromberg and Wagner (2010) have suggested that asset write-downs are a good indicator of bank risk-taking. The evidence in columns (3), (4) and (5) in Table 5.7 suggests that write-downs (as a percentage of total assets) of TBTF banks are significantly greater than the write-downs (as a percentage of total assets) of No-TARP banks, as are the write-downs of L-TARP banks relative to No-TARP banks.

Finally, Gande and Kalpathy (2011) consider whether or not a bank borrows capital from various Fed bailout programs, and the amount of such capital, as a measure of bank risk-taking. We find that the TBTF banks borrowed significantly more than L-TARP and No-TARP banks in terms of both absolute dollars and as a percentage of their assets.

5.10. Robustness check: Abnormal trading activity

What is the appropriate amount of insider trading? How much should CEOs be selling? We partially addressed these questions previously in section 5.6., comparing the nominal amount of trading across the three sub-samples of banks. We investigate this question further here. The primary variable in our study – Net Trades – compares the buys, the sales, and the option exercises made by CEOs at the 100 financial institutions from 2000-2008.

In Table 5.2 we consider the absolute amount of Net Trades and the Net Trades as a proportion of the CEO's stock ownership for each of the 14 TBTF firms. We suggest that higher amounts of Net Trades are consistent with the Managerial Incentives Hypothesis, that CEOs sell stock to avoid the future negative repercussions of excessive risk-taking. But CEOs may decide to sell stock for many reasons other than to cash out, such as for liquidity and diversification

purposes. In Table 5.4, we compare the Net Trades for the TBTF CEOs with the Net Trades of the L-TARP and No-TARP CEOs. There we see that the TBTF CEOs sold more stock than the other CEOs did, both in absolute terms and as a proportion of their stock ownership.

What this analysis possibly ignores is the heterogeneity of our three sub-samples. Large TBTF banks like Citigroup and Goldman Sachs are very different from many smaller L-TARP and No-TARP banks, in terms of size, operations, structure, and markets. Analyzing differences in Net Trades without accounting for these differences may produce inappropriate inferences; hence, we rely on the CEO and insider trading literature to control for this heterogeneity.

We estimate a Tobit model based on Aggarwal and Semwick (1999), Jenter (2005), Rozeff and Zaman (1998) and Seyhun (1986). The above literature suggests the following determinants of CEO trading (in the shares of their firm's stock): firm size; book-to-market ratio, annual stock return for the prior year, stock volatility for the current year, CEO total compensation, % CEO equity compensation (amount of equity compensation divided by total compensation for the prior year), and CEO stock holdings (value of the CEO's beneficial stock ownership at the end of the prior year).

Table 5.8 results highlight that, even after controlling for bank and CEO characteristics, the CEOs at the TBTF firms engaged in significantly more discretionary stock sales than the No-TARP CEOs. More precisely, the Tobit model implies, after controlling for bank and CEO characteristics (including bank size), the CEOs at the TBTF banks sold stock annually on average worth $36.9 million more than the No-TARP CEOs.

Table 5.8 about here

5.11. Related papers

Fahlenbrach and Stulz (2011) study the performance of 98 U.S. banks over July 2007-December 2008, and find no evidence that banks with higher CEO option pay performed worse, and no evidence that those with higher CEO equity ownership performed better, during the crisis, using both stock and accounting measures of performance. They measure CEOs' alignment with shareholder interests by how sensitive the CEO's stock and option portfolio is to changes in the bank's stock value. The findings were the same for banks that received government assistance under the TARP and those that did not. They further report that bank CEOs suffered substantial losses on their equity holdings and stock sales during the crisis, in support of their view that bank executives were acting in shareholders' interest regarding pre-crisis risk-taking.[31] In contrast, and as detailed above, we find that the pre-crisis level of risk of TBTF banks was much higher than that of No-TARP banks, and that executives of the TBTF banks sold much more of their common stock holdings pre-crisis (2000-2007) than executives of the No-TARP banks. Because those bank executives were able to realize a substantial amount on their equity by sales in the pre-crisis period, compared to the large losses the executives experienced on their equity stake during the crisis (2008), we suggest that compensation incentives led to excessive risk-taking (in value-reducing investment and trading strategies).[32]

Balachandran, Kogut and Harnal (2010) study management risk-taking incentives in financial firms during the crisis. They document that financial firms whose executives had a higher proportion of equity compensation had higher risk, measured by the probability of default, during the crisis. They conclude, "managers were over-incentivized to take on excessive risk." Bhattacharyya and Purnanandam (2011) find that banks whose CEOs' compensation had higher sensitivity to short-term earnings experienced higher mortgage default rates in the crisis, and interpret their findings as consistent with bank CEOs assuming excessive risk to boost short term earnings.

Cziraki (2015) focuses on the insider trading of CEOs and independent directors for a sample of 100 banks during 1996-2009. He documents that insider trading prior to the crisis (mid-2006 thru mid-2007) is correlated with the performance of these banks during the crisis period (July 2007 – December 2008). Specifically, banks whose insiders sold more stock prior to the crisis performed worse during the crisis. Furthermore, this relation is stronger for banks with a greater exposure to the residential real estate market. He concludes, "that bank executives understood the exposures of their bank to housing prices and reduced their stockholdings during 2006." Note that Cziraki's evidence and conclusions are consistent with ours noted above, to wit, bank executives were able to realize a substantial amount on their stock holdings (received as part of their incentive compensation) by sales in the pre-crisis period (2000-2007), compared to the large losses the executives experienced on their equity stake during the crisis (2008); and bank executive compensation incentives led to excessive risk-taking (in value-reducing investment and trading strategies). We also note that our and Cziraki's evidence and conclusions

are at odds with Fahlenbrach and Stulz who do not consider the *years prior to* July 2007 when bank executives sold substantial amounts of their stock holdings (received as part of their incentive compensation) - possibly in anticipation of significant future declines in their banks' share price as the excessively risky investment and trading strategies soured.

Rather than study executive compensation incentives, Viral Acharya, et al., investigate bank holding company performance and non-executive compensation. They find that firms whose non-executives' pre-crisis compensation was sensitive only to increases in revenue, took higher (excessive) risk and consequently performed worse during the financial crisis.[33] As they interpret the data, "the more sensitive non-executive compensation policies to short-term bank performance, the higher the incentives of middle-level managers to increase the volume of bank activities at the expense of the quality of the acquired positions," and this risk-taking in the crisis resulted in significant declines in firm value. Their finding is consistent with anecdotal instances of lower-level employees' trading activities producing staggering losses, such as J.P.Morgan's "London whale" in 2012 or Barings Bank's Nick Leeson in the early 1990s.

5.12. Summary of evidence on bank executive compensation and risk-taking

We study the executive compensation structure in the largest 14 U.S. financial institutions during 2000-2008, and compare it with that of CEOs of 37 U.S. banks that neither sought nor received TARP funds. We focus on the CEO's buys and sells of their bank's stock, purchase of stock via option exercise, and their salary and bonus during 2000-2008. We consider the capital losses these CEOs incur due to the dramatic share price declines in 2008. We compare the shareholder returns for these 14 TBTF banks and the 37 No-TARP banks. We consider three

measures of risk-taking by these banks: the bank's Z-score, the bank's asset write-downs, and whether or not a bank borrows capital from various Fed bailout programs, and the amount of such capital. Finally, we implement a battery of robustness checks including construction of a Tobit model of expected CEO trading based on the extant literature on insider and CEO trading; we estimate abnormal CEO trading based on the above Tobit model.

We find that TBTF bank CEOs were able to realize a significantly greater amount on their common stock sales in the pre-crisis period (2000-2007), compared to the large losses the executives experienced on their equity stake during the crisis (2008). Additionally, stock sales by TBTF bank CEOs was significantly greater than stock sales by No-TARP bank CEOs in the pre-crisis period in both absolute and relative (compared to their beginning of period holdings) terms. Finally, several different bank risk-taking measures suggest that TBTF banks were significantly riskier than No-TARP banks. Our results are mostly consistent with the argument that incentives generated by executive compensation programs are positively correlated with excessive risk-taking by banks. Also, our results are not consistent with the argument that the poor performance of the TBTF banks during the crisis was the result of unforeseen risk.

Chapter 6: Executive compensation reform

This chapter introduces our proposal to refashion bank incentive compensation to motivate bank managers to focus on creating and sustaining long-term shareholder value, and to reduce the possibility that executives will undertake excessively risky and value-destroying trading or operating strategies. We then compare our proposal to the approach taken by legislatures and bank regulators and to the class of proposals advocating debt-based, rather than equity-based compensation.

6.1. Criteria for evaluating executive compensation policies

We suggest three criteria for evaluating executive compensation reform policies[34]:

i) simplicity,

ii) transparency, and

iii) focus on creating and sustaining long-term shareholder value.

A simple and transparent incentive compensation structure is desirable for at least three reasons. First, the financial sector is particularly fast-moving, rendering it difficult to predict what risks may emerge as products and markets develop, and how individuals respond to regulatory and contractual incentives can alter risk in unanticipated ways that can evolve in complicated ways. Moreover, in today's context of large and interconnected financial institutions and complex financial instruments, banks must grapple with unknown and unknowable risks.[35] As a consequence, the more complicated and opaque incentive package, the more difficult it will be to determine how individuals will respond, and what risks will or

will not be incurred. Second, as shareholders are now required to vote on CEO compensation packages, a simple incentive structure is easier for them to understand and evaluate, reducing the need to rely on third-party vendors of proxy voting advice, the value of which has been the subject of considerable controversy.[36] [37] Third, simplicity and transparency in incentive compensation packages mitigate public skepticism toward high levels of executive pay in conjunction with poor performance, particularly when a firm's failure implicates the public fisc. Finally, the focus on creating and sustaining long-term shareholder value would channel management's attention to the longer term profitability of an investment or trading strategy. Business and legal scholars posit that managers should act in the best interest of long-term shareholders – what better way to do this than tie management incentive compensation to long-term share price!

6.2. The Restricted Equity Proposal

> *We propose that the incentive compensation of bank executives should consist only of restricted equity (restricted stock and restricted stock option) – restricted in the sense that the individual cannot sell the shares or exercise the options for one to three years after their last day in office.* We refer to this as the Restricted Equity proposal. Many current compensation contracts require the forfeiture of restricted shares when an executive leaves the firm. Quite to the contrary, we are suggesting that restricted shares (under our Restricted Equity proposal) *not* be forfeited when the executive departs. In fact, we are advocating that, in general, restricted shares *only vest* after the executive leaves the bank.

If a bank CEO is offered incentive compensation contracts consistent with the Restricted Equity proposal, then she would have more high-powered incentives not to invest in the high-risk but unprofitable (over the long-term) projects and trading strategies.[38] Not only would the CEO be required to hold these shares and options for the duration of her employment in the bank, but for one to three years subsequent to her retirement or resignation. If the trading strategy resulted in an unexpected positive cash flow in a certain year prior to their retirement or resignation, the bank's share price would go up, the CEO's net worth would go up on paper, but the CEO would not be able to liquidate her stockholdings. The CEO would have to make an assessment of the likelihood of the large negative cash flow outcome during the years she continued to be employed at the bank, plus one to three additional years. After making such an assessment, a CEO would presumably be less likely to authorize or encourage the high-risk but unprofitable (over the long-term) projects and trading strategies in the first place. The long-term feature of the Restricted Equity proposal's compensation package would operate to curb optimistic estimates of a project's long-term profitability by using high-powered financial incentives to prod the executive to attend to, and hence estimate more assiduously, all of a project's cash flows, rather than solely those in the near term. If a bank does not engage in the long-term unprofitable investment project or trading strategy, then this would, of course, also serve the interests of the long-term shareholders.

Under the Restricted Equity proposal all incentive compensation would be driven by total shareholder return. Specifically, we are recommending that none of the manager executive compensation be directly related to accounting based measures of performance, such as, return

on capital, return on equity, earnings per share. Accounting based measures of performance tend to mostly focus on short term performance. As we saw in chapter 5 above, a focus on short-term performance by TBTF bank managers led to a serious misalignment of interest between bank managers and long term shareholders. Our focus on total shareholder return is consistent with a recent survey of Fortune 500 directors conducted by Rock Center for Corporate Governance at Stanford University.[39] The survey found that 51% Fortune 500 directors consider total shareholder return to be the best measure of company performance compared to accounting based measures, such as, return on capital and earnings per share.

We have suggested that the time frame extend one to three years after retirement, but we would leave the specific horizon to the board compensation committee, to whom the proposal is addressed.[40] The rationale for this extended time frame is to maintain incentives for an executive in an "end-game" situation, i.e., an individual making decisions when he or she is reaching retirement. At the shorter end of our proposal, management's discretionary authority to manage earnings under current U.S. accounting conventions unravels within a one-to-two year period, while at the longer end we think three years is a reasonable period in which at least the intermediate-term results of executives' decisions will be realized.

How long would the Restricted Equity vesting period last in practice? Studies report that the median tenure for bank CEOs is between five and seven years.[41] Hence, on average, a CEO can expect to wait six to ten years before being allowed to sell shares or exercise options.[42] In the non-public corporation setting, it is quite common for top executives to wait for six to ten years before receiving a substantial portion of their compensation for work performed earlier.

For instance, the general partners of private equity partnerships typically receive their compensation in two parts, the more substantial of which, carried interest (usually, 20% of the lifetime profits generated by the partnership), are realized towards the end of the life of the partnerships, usually seven to ten years.[43] The widespread use of such a deferred compensation structure in a real world setting where manager-owner conflicts of interest are thought to be better-managed suggests that our proposal could substantially improve bank managers' incentives, despite well-known differences between the private equity and public company operating environments. A further benefit of the proposal's vesting period is that because a CEO would be exposed to the impact of decisions made by his or her successor, the executive will focus more attentively on succession planning.[44] [45]

How long would the vesting period last in the event of a change in control? We suggest the same process be followed regarding the acceleration (or the lack thereof) of the vesting period for unvested stock and unvested stock options as is the case currently for the particular company. This would ensure that under the Restricted Equity proposal there is no additional incentive or disincentive for the CEO to seek out or accept a takeover or merger bid.

6.3. Caveats to the Restricted Equity Proposal

We note three important caveats. First, if executives are required to hold restricted shares and options, they would most likely be under-diversified.[46] Second, if executives are required to hold restricted shares and options post-retirement, they may be concerned with lack of liquidity. Third, the proposal could lead to early management departures, as executives seek to

convert illiquid shares and options into more liquid assets (after the one to three year waiting period).

The deliberate under-diversification brought about by being subject to a Restricted Equity plan – more of the individual's wealth will be tied to the firm, as she cannot liquidate accumulated incentive equity payments beyond annual earnings – would lower the risk-adjusted expected return for the executive. One means of bringing an executive's risk-adjusted expected return back up to the previous level would be to increase the expected return by granting additional restricted shares and options to the executive. We would therefore expect that the amount of equity awarded under the Restricted Equity proposal will be *higher* than that awarded under a short-term incentive plan.

Executives might be expected to seek to reduce the under-diversification effect by entering into swap contracts that transform their restricted positions into liquid investments. To ensure that the incentive effects of restricted stock and options are not undone by self-help efforts at diversification, executives participating in such compensation plans should be prohibited from engaging in transactions, such as equity swaps, or borrowing arrangements, that hedge the firm-specific risk from their having to hold restricted stock and options (where not already restricted by law).[47]

Of course, derivative transactions based on other securities, such as a financial industry stock index, could be used to undo the executives' interest in the restricted shares. To address this possibility, approval of the compensation committee or board of directors should be required for other (non-firm-specific) derivative transactions, such as a put option on a broader

basket of securities. In addition, to ensure that under-diversification does not result in managers taking on a suboptimal level of risk compared to the risk preferences of shareholders (behavior that may be of particular concern as an aging executive nears retirement and may wish to protect the value of accrued shares), the incentive plan can be fine-tuned to provide a higher proportion in restricted options than restricted shares to increase the individual's incentive to take risk.

Concerns regarding lack of liquidity and early departure are also valid. To address these concerns, we recommended that managers be allowed to liquidate annually a modest fraction of their awarded incentive restricted shares and options of between 5 - 10%. The requirement that they must retain the great bulk of the shares several years until after retirement or departure will provide a sufficient incentive to advance long-term shareholder interests. We further propose, to mitigate liquidity and early departure concerns, that the annual corporate tax deduction for non-incentive-based compensation for individuals whose incentive compensation consists solely of a Restricted Equity plan be raised to $2 million.[48] Permitting 5-10% of each year's incentive compensation to vest and be sold will mitigate an early departure concern, particularly for lower-level managers whose bonuses may not be as large as, and whose employment horizons would likely be longer than, those of CEOs. We are also skeptical that the Restricted Equity plan will induce an onslaught of early departures by younger executives seeking to lock-in stock gains: executives who develop a reputation for early departures from firms are likely to impact negatively their future career opportunities.

We are also sensitive to potential tax liabilities that the Restricted Equity proposal might generate for an executive. To the extent an individual incurs tax liability from receiving restricted shares and options that is greater than the amount permitted to be liquidated in the current year, then under our proposal that individual would be allowed to sell enough additional shares (and/or exercise enough additional options) to pay the additional taxes.

Figure 6.1 provides an empirical perspective on the recommendation concerning the appropriate percentage of annual liquidations. It shows the percentage of firm-years during 2000-2008 in which U.S. bank CEOs sold more than 5%, 10% or 15% of the beginning holdings in any particular year during 2000-2008. TARP recipient bank CEOs sold more than 5% of beginning holdings in 41% of the firm-years, compared to 16% of firm-years for the CEOs of non-TARP recipients. They also sold more than 15% of beginning holdings in 17% of the firm-years, compared to 6% of firm-years for the non-TARP recipient firm CEOs. These data provide the empirical rationale for allowing bank CEOs to liquidate 5% to 10% of their stock and option holdings in a particular year. More specifically, the experience of non-TARP recipient bank CEOs suggests it is rare for CEOs (whose banks did not need bail-out funds) to liquidate more than 10% of their holdings in any given year.

Figure 6.1 about here.

Given above data, the more limited equity shares that we would permit to be annually liquidated may seem low compared to the amounts that bank executives have been able to realize in the past (i.e., pre-crisis years). However, that is not necessarily the case when a longer time frame is considered. The proposal only limits the annual *cash* payoffs the executives can realize. *The present value of all salary and stock compensation can be higher than bank managers have received historically, as the amount of restricted stock that can be awarded to a bank manager is essentially unlimited per our proposal.* Of course, the higher value would only be realized were they to invest in projects that lead to value creation that persists in the long-term. In addition, concern over the proposal's impact on liquidity needs or early departures, when contrasting it to the bank CEOs' past stock sales, can stand a bit of perspective. Consider as a reference point the fact that the adjusted gross income (AGI) of the top 0.1 % in 2004 had a threshold of $1.4 million,[49] while in 2011 the AGI cutoff for the top 0.1% was $1.7 million.[50] Accordingly, permitting executives a cash salary of $2 million, and the ability to liquidate 5-10% of annual incentive compensation, is far from financially punitive.

The Restricted Equity proposal will, no doubt, encourage managers to seek a considerably higher proportion of fixed cash salaries to compensate for the restricted ability to realize the value of equity incentive awards. But we posit that the higher deductible cash base ($2 million), along with the modest amount of realizable equity gains, should mitigate both such efforts by management and decrease the probability that the members of compensation committees will perceive a need to succumb to such efforts. Indeed, there is evidence that bank

directors are not potted plants when it comes to executive compensation, as they adjust executives' incentive compensation in response to the level of prior risk-taking, although the feedback loop was not present at a subset of the very largest institutions.[51]

There are other potential concerns with our Restricted Equity proposal. For example, some have suggested that our proposal would dis-incentivize the banks' use of various derivative contracts for corporate business purposes. If these derivative contracts are value-increasing investment strategies, then these strategies should not be discouraged – nor does our proposal discourages such value-increasing strategies. On the other hand, if these derivative contracts are value-decreasing investment strategies, then these strategies should be discouraged – our Restricted Equity proposal discourages such value-decreasing strategies by negatively impacting the stock and stock option holdings of bank managers. Recall that our Restricted Equity proposal requires the bank manager to hold the shares and options for one to three years after their last day in office; hence, they have to carefully evaluate the long-term value impact of a particular derivative contract, and in so doing, they will serve the interests of long-term shareholders.

Another concern: How would the Restricted Equity proposal address stock-market downturns that are not the CEOs' faults and occur after they leave office? In an Efficient Market, stock market downturns are unpredictable. To be fair, it is possible that a stock market downturn occurs immediately after the manager leaves office. To address this concern, we have suggested above that the manager be allowed to sell 5% to 10% of their shares and options every year. Additionally, to compensate the manager for the additional risk of the long holding

period, we have suggested that the manager's stock and stock option incentive package be larger (than the current situation where they are not required to hold the shares and options for such long periods).

6.4. Restricted Equity proposal and Net CEO Payoff

One way to evaluate the effectiveness of the Restricted Equity proposal is to analyze the impact on the Net CEO Payoff to the CEOs of the TBTF banks *if* the Restricted Equity proposal had been adopted by these banks (rather, their corporate boards) prior to 2000. In Table 6.1., Panel A, no adjustment has been made to the cash compensation of the TBTF CEOs, but we consider scenarios where their annual stock sales are limited to 5%, 10%, and 15%, respectively, of the amount of stock they owned at the start of that year. Without any cash compensation restriction or annual stock sales restriction, the mean Net CEO Payoff for the TBTF CEOs during 2000-2008 was $46.3 million (the median was $19.5 million); with a 5% sales restriction, the mean Net CEO Payoff for the TBTF CEOs during 2000-2008 would have been a *loss* of $114.1 million (the median a *loss* of $11.1 million). Also, with a 10% sales restriction, the mean Net CEO Payoff for the TBTF CEOs during 2000-2008 would have been a *loss* of $85.2 million (the median a *loss* of $1.0 million). Hence, an annual stock sale restriction of about 5% would have imposed a negative compensation impact (negative Net CEO Payoff) on the TBTF bank CEOs – *this is the disciplining effect of the Restricted Equity proposal, and correspondingly, would have served to discourage the TBTF bank CEOs from engaging in high risk but negative NPV projects during 2000-2008.* The above disciplining

effect is much stronger when we restrict cash compensation to $2 million annually (and paying the remainder of the cash compensation in stock); see Table 6.1., Panel B.

Table 6.1 about here

Figure 6.2. Panel A, illustrates the median Net CEO Payoff for the TBTF bank CEOs during 2000-2008 with no restriction on cash compensation, and scenarios where their annual stock sales are limited to 5%, 10%, and 15%, respectively, of the amount of stock they owned at the start of that year. Figure 6.2. Panel B, illustrates the median Net CEO Payoff for the TBTF bank CEOs during 2000-2008 with $2 million annual restriction on cash compensation (and paying the remainder of the cash compensation in stock), and scenarios where their annual stock sales are limited to 5%, 10%, and 15%, respectively, of the amount of stock they owned at the start of that year. These figures highlight the empirical fact that if, per our Restricted Equity proposal, the TBTF CEOs' stock sales were limited to about 5% of the amount they owned in the beginning of that year, this would have imposed a negative compensation impact (negative Net CEO Payoff) when considering the entire 2000-2008 period. The negative compensation impact would have discouraged the TBTF CEOs from investing in high risk but value-destroying investment projects and trading strategies.

Figure 6.2, Panels A & B about here

6.5. Who will implement the Restricted Equity Proposal?

Given the amount of government regulation already directed at banks' incentive compensation plans, which may well have perverse effects, we are not advocating adopting our proposal solely as additional regulation, although in our judgment, its adoption would be much more efficacious than existing regulations. Rather, our proposal is directed at bank compensation committees, who, we urge, should voluntarily adopt a Restricted Equity plan as the preferred mechanism for aligning management's incentives to long-term shareholder wealth creation and to mitigate the taking of excessive risk. In implementing the proposal, we think corporate boards should be the principal decision-makers regarding:

a) The *mix* of restricted stock and restricted stock options a manager is awarded.

b) The *amount* of restricted stock and restricted stock options the manager is awarded.

c) The maximum percentage of holdings the manager can liquidate annually.

d) Number of years post retirement/resignation for the stock and options to vest.

6.6. Comparison to regulatory initiatives including clawbacks

Regulatory initiatives regarding bankers' incentive compensation have emphasized the use of equity (as opposed to cash) bonuses, deferral, and clawbacks, to achieve compensation that does not encourage untoward risk-taking. These are features of worldwide regulation because the approach – reducing incentives for excessive risk-taking – was incorporated into the Basel Committee's supervisory principles at the direction of the G-20, and all nations in

which globally important banks are located.[52] The G-20 incentive compensation principles did not mandate any particular design or structure, but by requiring that incentive compensation be adjusted for risk, be symmetric with risk outcomes and be sensitive to the time horizon of risks, they were universally interpreted to require deferred equity compensation and clawbacks.

The G-20 incentive compensation principles were subsequently clarified and operationalized into implementation standards.[53] The standards suggest that a "substantial portion of incentive compensation be variable, of which "a substantial proportion, such as more than 50%" should be equity-based, and of which "a substantial proportion… such as 40 to 60%" should be deferred for at least three years. Deferred equity compensation is, of course, at the heart of our proposal. But as this guidance makes clear, regulators have not gone so far as to require banks to adopt all equity based incentive compensation, or long-term vesting periods that extend beyond retirement or resignation, as we recommend. Hence, in our judgment, bank compensation committees should not settle for mere compliance with the suggested standards, as they fall well short of adequately guarding against excessive risk-taking, nor should banking regulators shrink from further scrutinizing bank activities where incentive compensation packages merely meet the implementation standards.

The implementation standards address the symmetric risk principle by requiring that a substantial proportion of the variable equity compensation be subject to a share retention policy, with the unvested component of that deferred compensation to be subject to clawback upon "negative contributions" (i.e., poor realized performance) of the firm and business line.[54] Congress codified clawbacks for all firms in the 2002 Sarbanes Oxley Act, with further

elaboration in Dodd-Frank, laying out as a specific trigger an accounting restatement.[55] Dodd-Frank, for instance, mandates SEC rulemaking to require issuers with accounting restatements to recover from any executive officer incentive compensation amounts erroneously paid in excess of what they would have received had the accounting statements been correct, within a three-year window prior to the restatement. On July 1, 2015, the SEC proposed a new rule implementing provisions of the Dodd-Frank Act that requires listed companies to adopt policies to clawback incentive-based compensation from its executives in the event of an accounting restatement that has been paid in the three years prior to the restatement.[56] Recently, the Wall Street Journal (March 24, 2016, p C1) reports that, "Wall Street bonuses are about to get locked up for even longer…regulators plan to require banks to hold back much of an executive's bonus beyond the three years already adopted by many firms…" Besides the problems with clawbacks detailed below, bonuses have an additional problem, namely, TBTF managers' compensation derived from sale of their bank's stock is usually twice as large, or greater, than their compensation from salary and bonus; see Table 5.3, Panels A, B, and C above.

Clawback provisions such as those in Dodd-Frank are not, in our judgment, as effective an incentive mechanism as the Restricted Equity proposal. They are inherently difficult to compute (e.g., it is unclear how to calculate the Dodd-Frank clawback measure when the award was not based on an accounting target), and entail litigation costs of uncertain dimension at present.[57] Further, specific triggers for clawbacks are blunt instruments: excessive risk-taking causing firm losses need not produce a restatement (the decline in value of large financial institutions during the financial crisis of 2008 was not accompanied by, or in response to,

accounting restatements), nor might a three-year (or, five-year) horizon be enough time for a flawed investment or trading strategy to negatively impact accounting earnings.[58]

By contrast, the Restricted Equity proposal has an inherent "clawback" feature that renders unnecessary intricate mechanisms requiring repayments of bonuses on income from transactions whose value proved illusory. Because executives are compensated in equity that is not received until years after it is earned – one to three years after they leave the firm – they cannot capture short-lived share price gains from transactions whose value is not long-lasting. The compensation will be dissipated as the value of the firm's shares decline upon the realization of the project's or investment strategy's losses. In other words, executives will receive less in value than the originally granted incentive stock compensation if the stock price drops thereafter. This automatic "clawback" is, accordingly, simpler to administer than the specified regulatory clawbacks, avoiding definitional, and consequently litigation, pitfalls.

The EU has gone further than the G-20 and Basel-endorsed approach and capped banks' incentive pay to no more than the individual's fixed salary. In our judgment, a proposal could not be more wrong-headed than that legislation if the objective is to incentivize bank executives to maximize firm value and reduce excessive risk. It is, of course, quite possible that the motivation of members of the European Parliament adopting the cap was to punish bank employees and express moral outrage at their outsized pay packages and not to affect banks' risk-taking incentives. In our judgment, if that was the motivation, then the solution is misplaced, as it undermines the fashioning of an effective compensation system for banks. Concerns over income inequality are best addressed via a national debate on whether the

concern should be about income inequality, per se, or the relation among income equality, economic growth, and the economic well-being of the citizens.

There is a well-developed and widely accepted economics literature on the fashioning of incentives to achieve consonance between managers' actions and shareholders' interest through the use of stock and option compensation.[59] The less the executive receives in incentive compensation, the less she will be motivated to act so as to maximize share value. The core problem of excessive risk-taking is not one of compensation levels, but of compensation structure. Moreover, the likely result of any restriction capping one component of compensation is to increase another component. As the original package proportions would have reflected a package maximizing manager utility, the new package will require a compensating adjustment that costs the bank more than before.[60] In short, such a restriction will make pay even less sensitive to performance than it was before the crisis, which is the precise opposite of what is desirable in an incentive compensation plan.

6.6.1. April 21, 2016, incentive compensation regulatory initiative

Section 956 of the Dodd-Frank Act requires six U. S. agencies (Federal Reserve System, Federal Deposit Insurance Corporation, Federal Housing Finance Agency, Office of the Comptroller of the Currency, National Credit Union Administration, and the SEC) to jointly propose regulation to prohibit incentive-based compensation that would encourage "excessive" risk-taking by banks. On April 21, 2016, these six U.S. agencies proposed new regulations, "Incentive-based Compensation Arrangements."[61] These new regulations took a tiered approach; more stringent regulations for banks with assets more than $250 billion, somewhat

less stringent regulations for banks with assets between $50 billion and $250 billion, and even less stringent regulations for banks with assets in the $1 billion to $50 billion range. Given our focus on TBTF banks the discussion below pertains to new regulations for banks with assets more than $250 billion. These April 2016 regulations cover bonuses; specifically, *they do not cover compensation derived from the sale of stock*.[62] Besides the senior bank executives, the new April 2016 regulations cover "significant risk-takers in the bank" defined as employees with a third of their compensation based on incentive-compensation and among the top 5% salary-earners in the bank, or those who can commit 0.5% or more of the net worth or bank assets. The April 2016 regulations require deferral of at least 60% of the incentive-compensation for a period of at least four years, and forfeiture of all unvested deferred incentive-based compensation. The deferral and forfeiture can be triggered by poor financial or non-financial performance due to "inappropriate" risk taking, among other events. The April 2016 regulations also require clawback provisions that allow a bank to recover incentive-based compensation from the manager for a period of seven years following the incentive compensation vesting date. The clawback can be triggered by "(i) misconduct that resulted in significant financial or reputational harm to the bank; (ii) fraud; or (iii) intentional misrepresentation of information used to determine the manager's incentive-based compensation."

We support the essence of the April 2016 "Incentive-based Compensation Arrangements," regulations proposed by the six U.S. agencies. These agencies have done an impressive amount of analysis and used the theoretical and empirical financial economics

literature to motivate their proposed regulations. The deferral, forfeiture, and clawback provisions are focused on discouraging "inappropriate" risk taking by banks. A critical question: What is "inappropriate" risk taking by banks? From a financial viewpoint the risk of a project or trading strategy would be inappropriate if the net present value of the project or trading strategy is negative. However, the measurement of such risk (and associated cash flows) are subject to both manager biases and estimation errors as we discussed in chapter 3. Enforcing deferral, forfeiture, and clawback provisions can lead to very large potential losses on managers (see Table 5.3, Panels A, B, and C). Given the potential losses of tens or hundreds of millions of dollars, affected managers are likely to *litigate* the occurrence of a particular trigger event or the measurement of the "inappropriate" risk. Given the inherent uncertain outcome of any litigation, the disciplining effect of the April 2016 regulations on bank manager inappropriate risk-taking behavior would be muted.

The Restricted Equity proposal has an inherent clawback (and, deferral and forfeiture) feature that renders unnecessary intricate mechanisms requiring repayments (forfeiture) of bonuses on income from transactions whose value proved illusory. Because executives are compensated in equity that is not received until years after it is earned – one to three years after they leave the firm – they cannot capture short-lived share price gains from transactions whose value is not long-lasting. The compensation will be dissipated as the value of the firm's shares decline upon the realization of the project's or investment strategy's losses. In other words, executives will receive less in value than the originally granted incentive stock compensation if the stock price drops thereafter. This automatic clawback is, accordingly, simpler to administer

than the specified regulatory clawbacks, avoiding definitional, and consequently litigation, pitfalls.

We note a second concern with the April 2016 regulations which cover bonuses, but do not cover compensation derived from the sale of stock. TBTF managers' compensation derived from sale of their bank's stock is usually *twice* as large, or greater, than their compensation from salary and bonus; see Table 5.3, Panels A, B, and C above. Hence, even if the April 2016 regulations are successful in discouraging some inappropriate risk taking by banks, the adverse incentives from compensation derived from the sale of stock remains a potent problem. Our Restricted Equity proposal would address this problem as well.

6.7. Comparison to debt-based compensation proposals

As earlier noted, a number of recent reform proposals have advocated compensating bank managers with some of the bank's debt securities, rather than (or in addition to) equity-based incentive pay.[63] Although specifics of the proposed debt or debt-like compensation differ, the rationale is the same: to address the moral hazard of debt. Shareholders, in a levered firm, have an incentive to take on very high-risk projects even if these high-risk projects do not increase the company's long-term value. The reason is, given limited liability, the shareholders obtain the entire upside but do not have to pay creditors in full on the downside.[64] Deposit insurance only exacerbates the moral hazard problem because the government stands behind the deposit, and it reduces creditors' incentives to monitor managers' risk-taking or otherwise seek contractual protections against risk-taking. Of course,

this moral hazard problem resulting in a threat to the fisc is universally recognized: banks are for this very reason subject to extensive supervision, regulation and examination.

All of the debt-based proposals are, in our judgment, inferior to our restricted stock proposal, particularly given the earlier noted desirable criteria that compensation plans be simple to understand and implement, be transparent to monitor, as well as be aligned with long-term firm value. First, reform proposals advocating a package of equity and debt or debt-like securities are far more complex and opaque than the Restricted Equity proposal. For example, most senior securities of financial institutions are either not publicly traded or trade very infrequently; the absence of market prices renders it difficult to value debt-based compensation packages. In addition, given that banks' capital structures are changing over time, executives' portfolios will require frequent rebalancing to maintain proportionate holdings, which will require a complicated, and therefore costly, administration.[65]

Second, government bail-outs of banks, particularly in the 2008 global financial crisis, have by and large focused on bailing out creditors, not shareholders. Given that experience, providing a portion of bank executives' compensation in debt would not lead the executives to take a socially optimal level of lower risk, as they could quite plausibly conclude that they need not expect to lose the value of debt securities on the downside while they will still expect to obtain the upside on the equity portion. If the executives' debt is written so as to not be able to participate in a government bailout, then those securities would be of lesser value than those sold to investors, whose prices and terms incorporate the reasonable expectation of a bailout should the institution fail, rendering market prices, such as exist for the debt,

inapposite for valuing the executive's compensation. Yet that is the linchpin of such proposals, in which price signals of the riskiness of the debt, such as proportionate values of debt and equity securities, determine the executive's compensation.

Third, although in theory a manager holding a mix of debt and equity securities might not take on inappropriate risk, it might well be otherwise. The gain on an equity position from following a high risk strategy might well exceed the loss on the position attributable to senior securities in the executive's portfolio. Moreover, if the value of the equity position is quite low compared to the senior securities in a compensation package, a manager would still have an incentive to take on risky projects, given the upside made possible by the equity position.[66] Furthermore, the incentive to undertake riskier projects would be greater than the incentive to take on such projects created by our Restricted Equity proposal because with restricted stock, the upside cannot be realized until years after the manager is no longer with the firm. Indeed, as we discussed earlier, incentive compensation paid in the form of restricted stock is more likely to decrease than increase managers' risk-taking, as it increases the under-diversification of executive portfolios, in addition to the long-term holding period for the stock.

The concern over moral hazard in relation to bank risk-taking induced by deposit insurance which motivates the proposals to use debt for bank executives' incentive compensation, is, of course, as we have noted, well-recognized, and we do not wish to dismiss its seriousness. But we think it is daunting to determine, no less effectively implement, an optimal incentive compensation structure combining debt and equity. It would in fact be extraordinarily difficult to determine how the incentives would work, i.e., how managers

would react, to such compensation.[67] Moreover, the problem becomes more acute if the manager's loyalty is divided across firm stakeholders, as would be the case in these complicated multi-security structured compensation packages. If we move out of the realm of decisions regarding a specific investment, such as selling a particular structured product, to higher level firm decision issues, the manager may not make decisions to maximize firm value, as the conflicts of interest across the classes of securities may make it difficult, if not impossible, to determine the appropriate course to follow.[68]

Finally, the empirical research on which some debt-based compensation advocates offer in support of their proposals – that firms whose executives receive higher deferred compensation and pension benefits, which are considered to be debt-like as they are unsecured future claims, are less risky – when evaluated more closely, we believe, cuts against the position. [69] That research also finds that as the level of deferred compensation and pension benefits rises, total enterprise value falls (i.e., increases in debt values are swamped by decreases in equity value). The compensation package must mirror exactly the firm's total security package, which, as we have already discussed, is practically impossible to implement.

There is a further problem with debt-based incentive compensation from a social welfare point of view: it is not desirable from society's' perspective to run banks in debtholders' rather than shareholders' interest because banks that seek to minimize risk-taking might be induced to restrict their lending, and lend only to the safest borrowers, a business strategy, which is not conducive to economic growth. As elaborated later in the book, we

think instead that the moral hazard of debt problem is best addressed directly by raising bank equity capital requirements. By revising the capital structure to make the probability of insolvency less probable, the Restricted Equity proposal would operate in the range in which bank managers' incentives, aligned with long-term share price value-maximization, will also be aligned with long-term firm value-maximization. Indeed, in most circumstances, banks operate far from insolvency, in which equity rather than debt-based compensation provides superior incentives for firm value-maximization.

6.8. Non-financial companies and the Restricted Equity Proposal

While our focus here is on banks, the incentives generated by the above compensation structure would be relevant for maximizing long-term shareholder value in other industries. For example, consider the cases of Enron, WorldCom and Qwest whose senior executives have been convicted of criminal violation of insider trading laws.[70] [71] Senior executives in these companies made misleading public statements regarding the earnings of their respective companies. These misleading statements led to a temporary rise in the share prices of these companies. These executives liquidated significant amounts of their equity positions during the period while their companies' share price was temporarily inflated. If these executives' incentive compensation had consisted of only restricted stock and restricted stock option that they could not liquidate for one to three years after their last day in office, they would not have had the financial incentive to make the abovementioned misleading statements. Hence, corporate board compensation committees in companies in non-financial industries should also

give the above Restricted Equity executive incentive compensation structure serious consideration.

Chapter 7: Director Compensation Policy

Director compensation typically consists of a cash component (called the retainer), smaller cash amounts paid for attendance at board and committee meetings, and incentive compensation in the form of stock and stock option grants which vest over a period of time of a few years. While the theoretical and empirical literature on executive compensation is extensive, the literature on director compensation is relatively modest. We think that it is plausible to assume that incentives operate similarly in both employment positions. If, for example, directors can liquidate their vested stock and options, and a director feels the need to liquidate the position in the near future, then the director may focus on short-term performance that may be to the detriment of long-term shareholder value and the public fisc. It would therefore be prudent for bank director incentive compensation to be structured along the lines of the Restricted Equity proposal advanced for bank executives in the previous chapter.

7.1. Director compensation - Prelude

The early twentieth century witnessed not only the phenomenal growth of the U.S. economy, but also the growth of those corporate entities whose activities comprised that economy. Corporations were no longer local ventures owned, controlled, and managed by a handful of local entrepreneurs, but instead had become national in size and scope. Concomitant with the rise of the large-scale corporation came the development of the professional management class, whose skills were needed to run such far-flung enterprises. And as the capitalization required to maintain such entities grew, so did the number of

individuals required to contribute the funds to create such capital. Thus, we saw the rise of the large-scale public corporation — owned not by a few, but literally thousands of investors located throughout the nation and indeed the globe. And with this growth in the size and ownership levels of the modern corporation, individual shareholdings in these ventures became proportionally smaller and smaller, with no shareholder or shareholding group owning enough stock to dominate the entity. Consequently, the professional managers moved in to fill this control vacuum. Through control of the proxy process, incumbent management nominated its own candidates for board membership. The board of directors, theoretically composed of the representatives of various shareholding groups, instead was comprised of individuals selected by management. The directors' connection with the enterprise generally resulted from a prior relationship with management, not the stockholding owners, and they often had little or no shareholding stake in the company.

Adolf Berle and Gardiner Means, in their path-breaking book *The Modern Corporation and Private Property,* described this phenomenon of the domination of the large public corporation by professional management as the separation of ownership and control. The firm's nominal owners, the shareholders, in such companies exercised virtually no control over either day-to-day operations or long-term policy. Instead control was vested in the professional managers who typically owned only a very small portion of the firm's shares.

One consequence of this phenomenon identified by Berle and Means was the filling of board seats with individuals selected not from the shareholding ranks, but chosen instead because of some prior relationship with management. Boards were now comprised either of

the managers themselves (the *inside directors*) or associates of the managers, not otherwise employed by or affiliated with the enterprise (the *outside* or *non-management directors*). This new breed of outside director often had little or no shareholding interest in the enterprise and, as such, no longer represented their own personal financial stakes or those of the other shareholders in rendering board service. However, as the shareholders' legal fiduciaries, the outside directors were still expected to expend independent time and effort in their roles, and, consequently, it began to be recognized that they must now be compensated directly for their activities.

The consequences of this shift in the composition of the board was to exacerbate the manager-shareholder conflict of interest inherent in the corporate form. Without the direct economic incentive of substantial stock ownership, directors, given a natural loyalty to their appointing party and the substantial reputation enhancement and monetary compensation board service came to entail, had little incentive other than their legal fiduciary duties to engage in active managerial oversight. It may also be argued that the large compensation received for board service may have actually acted as a disincentive for active management monitoring, given management control over the director appointment and retention process.

Since the identification of this phenomenon, both legal and finance theorists have struggled to formulate effective solutions. Numerous legal reforms have been proposed, often involving such acts as the creation of the professional "independent director,"[72] the development of strengthened board fiduciary duties,[73] or the stimulation of effective institutional shareholder activism.[74] All, it seems have proven ineffective, as the passive

board still flourishes. Shareholders, mindful of disasters at Archer-Daniels-Midland, W.R. Grace, Morrison Knudsen, and more recently Enron, WorldCom and Qwest are keenly aware of this problem.[75] Yet the solution may be simple and obvious. Traditionally, directors, as large shareholders, had a powerful personal incentive to exercise effective oversight. It was the equity ownership that created an effective incentive. To recreate this powerful monitoring incentive, directors must become substantial shareholders once again. This is the theoretical underpinning behind the argument for equity-based compensation for corporate directors. The idea is to reunite ownership and control through meaningful director stock ownership leading to better management monitoring resulting in superior company performance.[76]

7. 2. Director ownership and company performance

In a recent study, we focus on director stock ownership and director stock ownership requirements for the S&P 500 companies during 2003 and 2005.[77] Directors in an increasing number of S&P 500 companies are mandating a stock requirement on themselves. In 2003 about 35% of S&P 500 companies had director stock ownership requirements. In 2005 about 62% of S&P 500 companies had director stock ownership requirements – typically directors were required to own stock worth about 4.1 times the cash retainer; this is detailed in Table 7.1.[78] Tables 7.1 and 7.2 highlight the diversity in director stock ownership requirements across the S&P 500 companies – this also highlights that one director ownership policy is unlikely to "fit all" or be optimal for all companies. Additionally, and more interestingly, we document that *companies in which directors owned more stock performed better in the future years*; see Table 7.3.

Tables 7.1, 7.2, 7.3 about here.

In another recent study, we focus on the relation between director stock ownership and company performance for the largest 1,500 U.S. companies during 1998 and 2007.[79] Consistent with the findings of the study noted above, we also find that *companies in which directors owned more stock performed better in the future years*; these results are illustrated in Figure 7.1 below.

Figure 7.1 about here.

7.3. Director ownership and the firing of underperforming CEOs

The primary responsibility of the corporate board of directors is to engage, monitor, and, when necessary, replace company management. The central criticism of many modern public company boards has been their failure to engage in the kind of active management oversight that results in more effective corporate performance. It has been suggested that substantial equity ownership by the outside directors creates a personally-based incentive to actively monitor. An integral part of the monitoring process is the replacement of the CEO when circumstances warrant. An active, non-management obligated board will presumably

make the necessary change sooner rather than later, as a poorly performing management team creates more harm to the overall enterprise the longer it is in place. On the other hand, a management dominated board, because of its loyalty to the company executives, will take much longer to replace a poor performing management team because of strong loyalty ties. Consequently, it may be argued that companies where the CEO is replaced expeditiously in times of poor performance may have more active and effective monitoring boards than those companies where ineffective CEO's remain in office for longer periods of time. An examination, therefore, of the equity-holding positions of the outside directors of the companies where CEO succession occurs more expeditiously and those where it does not, should provide some evidence of the effect of equity ownership on management monitoring by outside directors.

In a recent study, we focus on about 2,000 CEO changes during 1998 to 2007 for the 1,500 largest U.S. companies.[80] The study considers company press releases and media articles to determine whether the CEO departure was disciplinary or not. CEO turnover is classified as "non-disciplinary" if the CEO died, if the CEO was older than 63, if the change was the result of an announced transition plan, or if the CEO stayed on as chairman of the board for more than a year. CEO turnover is classified as "disciplinary" if the CEO resigned to pursue other interests, if the CEO was terminated, or if no specific reason is given. The study documents (see Figure 7.2) that *directors who own more stock are more likely to discipline or fire the CEO when the stock price performance of their company has been sub-par in the previous two years.*

Figure 7.2 about here

Table 7.4 documents the director ownership and CEO stock sales in the TBTF banks and the No-TARP banks. Ironically, while the No-TARP banks are much smaller than the TBTF banks, the median value of director ownership in the No-TARP banks is greater than for the TBTF banks ($2.0 million to $1.6 million). However, as detailed, in chapter 5, median value of CEO NET Trades (= stock sales – stock purchases – option exercises) is much greater for the TBTF bank CEOs ($66.8 million) compared to the No-TARP bank CEOs ($1.2 million). This is consistent with the argument that director ownership serves as a disciplining corporate governance mechanism that serves to discourage CEO stock sales.

Table 7.4 about here

7.4. Director Compensation Policy Proposal

We propose that director compensation for banks *and* non-financial companies should be structured along the lines of the Restricted Equity proposal. Our proposal is based on the empirical findings noted above, specifically:

- Companies in which directors own more stock performed better in the future years.

- Directors who own more stock are more likely to discipline or fire the CEO when the stock price performance of their company has been sub-par in the previous two years.

We propose that all compensation (including incentive compensation) of corporate directors should consist only of restricted equity (restricted stock and restricted stock option) – restricted in the sense that the director cannot sell the shares or exercise the options for one to three years after their last board meeting. With regard to cash compensation – we are recommending corporate directors not be paid any retainer fees or other cash compensation.[81]

We note three caveats to our proposal for director compensation policy; these are similar to the caveats we noted in the previous chapter for executive compensation policy: First, if directors are required to hold restricted shares and options, they would most likely be under-diversified. Second, if directors are required to hold restricted shares and options post-retirement, they may be concerned with lack of liquidity. Third, the proposal could lead to early director departures, as directors seek to convert illiquid shares and options into more liquid assets (after the one to three year waiting period).

The deliberate under-diversification brought about by being subject to a Restricted Equity plan – more of the individual's wealth will be tied to the firm, as he or she cannot liquidate accumulated incentive equity payments beyond annual earnings – would lower the risk-adjusted expected return for the executive. One means of bringing a director's risk-adjusted expected return back up to the previous level would be to increase the expected return by granting additional restricted shares and options to the director. We would therefore expect that

the amount of equity and options awarded under the Restricted Equity proposal will be *higher* than that awarded under a short-term incentive plan.

Concerns regarding lack of liquidity and early departure are also valid. To address these concerns, we recommended (consistent with our earlier recommendation for executives) that directors be allowed to liquidate annually a modest fraction of their awarded incentive restricted shares and options of between 5 - 10%. The requirement that they must retain the great bulk of the shares several years until after their last board meeting will provide a sufficient incentive to advance shareholder long-term interests.

We are also sensitive to potential tax liabilities that the Restricted Equity proposal might generate for a director. To the extent a director incurs tax liability from receiving restricted shares and options that is greater than the amount permitted to be liquidated in the current year, then under our proposed that individual would be allowed to sell enough additional shares (and/or exercise enough additional options) to pay the additional taxes.

7.5. Who will implement the Restricted Equity Proposal for corporate directors?

Our proposal is directed at corporate board compensation committees, who, we urge, should voluntarily adopt a Restricted Equity plan as the preferred mechanism for aligning their incentives with that of long-term shareholders. In implementing the proposal, we think corporate boards should be the principal decision-makers regarding:

a) The *mix* of restricted stock and restricted stock options a director is awarded.

b) The *amount* of restricted stock and restricted stock options the director is awarded.

c) The maximum percentage of holdings the director can liquidate annually.

d) Number of years for the stock and options to vest subsequent to their last board meeting.

We recommend the board compensation committees use the Restricted Equity plan as a *starting point* for their discussion on board compensation. However, as Tables 7.1 and 7.2 above highlight – one size does not fit all. Corporate boards need to use their understanding of their company's unique set of opportunities and challenges to design a director compensation plan that would serve the interests of long-term shareholders.

7.6. Mid-level managers

The Restricted Equity incentive compensation proposal noted above is appropriate for only the senior-most executives and directors in a company. The Restricted Equity incentive compensation proposal is *not* appropriate for mid-level managers, and even less appropriate for rank and file employees; the under-diversification problem would be a particularly serious problem for rank and file employees. Once the incentives of senior executives are aligned with that of long-term shareholders, the senior executives should be entrusted with the task of constructing incentive programs for the mid-level managers.

Chapter 8: Are Large Banks Riskier?

"[T]he risk of failure of 'large, interconnected firms' must be reduced, whether by reducing their size, curtailing their interconnections, or limiting their activities." – Paul Volcker, former Chairman of the Federal Reserve in statement to the Senate Banking Committee on May 9, 2012.

"An often heard statement by many policymakers and financial market experts over the past couple of years has been that if a financial firm is too big to fail, then it is too big. I couldn't agree more." – Thomas Hoenig, member of the Board of the FDIC and former President and CEO of the Federal Reserve Bank of Kansas City, in speech to U.S. Chamber of Commerce on March 24, 2010.

"But giant banks, operating on the belief that they are backed by government, turn these otherwise manageable episodes into catastrophes. Is there a better alternative? Yes, reducing the size and complexity of the largest banks." – Richard Fisher, President and CEO of the Federal Reserve Bank of Dallas.

"The [Dodd-Frank] law hasn't ended the problem of banks so big that their collapse would endanger the financial system and economy, forcing the government to rescue them in a crisis… policy makers must give serious consideration to a range of options, including, breaking up large banks into smaller, less connected, less important entities," Neel Kashkari, President, Federal Reserve Bank of Minneapolis. (Wall Street Journal, February 16, 2016)

Are large banks riskier? Some argue that governments have to bail out a large failing financial institution because its failure may present a threat to the proper functioning of the financial intermediation process and cause severe disruption to the economy.[82] When firms are perceived to be too big to fail (TBTF), they have a propensity to assume excessive risks to profit in the short term. Indeed, TBTF policy has been blamed by many as one of the main factors causing distortion in financial firms' risk-taking incentives; for example, see Boyd, Jagannathan and Kwak (2009).

In turn, researchers and policymakers have proposed an array of regulations. Limiting the size of financial institutions is a frequent suggestion.[83] On the other hand, many concerns

are associated with this proposed reform to limit bank size. First, it is difficult to determine the correct size threshold. Second, this simple size metric will miss many small firms that perform critical payment processing and pose significant systemic risk, even if the first issue can be solved (see, Stern and Feldman (2009)). In addition, opponents of such a proposal often cite the literature on scale economies; they are concerned such restraint could weaken the global competitiveness of the U.S. financial firms and cause loss of market share. Further, Dermine and Schoenmaker (2010) argue that capping the size is not the best tool, based on the finding that countries with relatively small banks faced large bailout costs; in addition, they caution that capping the size can have unintended effects, such as lack of credit risk diversification.

Is size the problem? We draw on our recent work, Bhagat, Bolton, and Lu (2015), to shed light on the issue by studying the size effect on the risk-taking of U.S.-based financial institutions, including commercial banks, investment banks and life insurance companies. Using data on the size and risk-taking of financial institutions from 2002 to 2012, we investigate whether cross-sectional variation in the size of firms is related to risk-taking. Our measures of risk-taking are comprehensive. They include two model-based measures (namely, the Z-score, and Merton's Distance to Default (Merton DD)), a market-based measure (volatility of stock returns), and an accounting-based measure (write-downs). We focus primarily on Z-score and Merton DD; the other risk measures serve as robustness checks.

If size does affect risk-taking as measured by Z-score, then an interesting question is how does size affect the components of Z-score? Focusing on the components of Z-score –

namely, leverage, return on assets, and volatility of earnings – allows policymakers to target the risk-taking problem of financial institutions more directly.

We establish the following findings. First, firm size is positively correlated with risk-taking, even when controlling for observable firm characteristics such as market-to-book ratio and corporate governance structure. The relationship between bank size and risk is plagued by endogeneity concerns. Banks are more likely to pursue riskier activities (even if they are negative net present value) as they get bigger because of TBTF regulatory bias and the increasing likelihood of a government bailout if things go bad; however, it is also possible that risky banks strive to grow in size to obtain TBTF status; for example, see Brewer III and Jagtiani, (2009), and Molyneux, Schaeck, and Zhou (2010). It is unclear whether large banks undertake riskier activities, or whether an omitted variable impacts both risk and size. To account for this, we adopt an instrumental variables approach. We consider three instruments for bank size: the bank's number of employees, the bank's net plant, property and equipment (PP&E), and an indicator variable for whether a firm is incorporated in Delaware. We utilize a battery of robustness tests to verify the validity and strength of our instruments.

Our second finding: the decomposition of Z-score reveals that firm size has a consistent and significant negative impact on the equity capital to total assets ratio; we do not find a consistent relation between firm size and return on assets or earnings volatility. These findings suggest that financial firms engage in excessive risk-taking mainly through increased leverage. On the other hand, they also suggest that economies of scale do not exist for banks. Regressions

with volatility of stock return as the dependent variable indicate that size-related diversification may not exist in the financial sector since size is positively associated with return volatility.

Third, we find that our earlier developed corporate governance measure (Bhagat and Bolton's (2008)), calculated as median director dollar stockholding, is negatively associated with risk-taking. This has important policy implications, to wit, policy-makers interested in discouraging banks from engaging in excessive risk should focus on bank director compensation and stock ownership.

Fourth, we find that investment banks, but not insurance companies, engage in more risk-taking compared to commercial banks. Finally, we document that the positive relation between bank size and risk is present in the pre-crisis period (2002-2006) and the crisis period (2007-2009), but not in the post-crisis period (2010-2012). Perhaps the intense scrutiny put on bank risk-taking by the bank regulators, senior policy-makers, and the media in the post-crisis period may have curbed the appetite and ability of large banks to engage in high-risk investments.

Our analysis is critical from a public policy perspective because the risk-taking behavior of financial institutions affects financial and economic fragility, as well as economic growth – see Bernanke (1983), Calomiris and Mason (1997, 2003a, 2003b), and Keely (1990). Our findings have important policy implications that are particularly relevant today, as the calls for tougher restrictions and reinforcement of corporate governance on the financial sector accelerate. First, they suggest that instead of just limiting firm size, it may be more effective for regulators to strengthen and enhance regulations on equity capital requirements for all

financial institutions. This suggestion regarding increased bank equity capital requirements is consistent with the recent recommendations of Admati and Hellwig (2013), Bhagat and Bolton (2014), and Fama (2010). Also, in recent op-eds, the *Wall Street Journal* has recommended significantly higher equity capital requirements for banks. Second, our finding on corporate governance indicates that median director dollar stockholding can be used as an effective internal corporate risk control mechanism.

8.1. Background

While there is a substantial literature that examines the risk-taking behavior of financial institutions (see Saunders, Strock and Travlos (1990), Demsetz and Strahan (1997), Stiroh (2006), Laeven and Levine (2009); Houston et al, (2010), and Demirguc-Kunt and Huizinga (2011)), to our knowledge, we are the first to focus exclusively on the relation between size and risk-taking of financial institutions. While Boyd and Runkle (1993) is the closest to this study, there are significant differences. First, the scope of their study is limited by focusing on only large bank holding companies (BHCs), while our sample includes commercial banks, investment banks and insurance companies which have a larger variation in size. We argue that, since the recent financial crisis was not caused by BHCs alone, excluding non-BHCs will not provide a complete picture about risk-taking in the financial industry. Second, Boyd and Runkle (1993) is a univariate analysis between size and risk. We consider covariates which, in theory, might affect bank risk-taking. Another paper which is close to ours is Demsetz and Strahan (1997) who focus on BHC diversification and size. They conclude that BHC size-related diversification does not translate into reductions in risk since size is uncorrelated or positively correlated with stock return variance in many years of their sample period. In their regression

analysis, however, they find that firm size has a significant effect in reducing firm-specific risk for their sample period (1980-1993).

The recent financial crisis has generated tremendous interest in the study of risk-taking of financial institutions. Laeven and Levine (2009) consider a sample of the largest 270 banks in 48 countries. They find a significant positive relation between the cash flow rights of the largest shareholder of the bank and bank risk measured as Z-score. They also document a positive relation between bank size and bank risk. Beltratti and Stulz (2012) exploit variation in the cross-section of performance of 164 large banks (defined as banks with total assets greater than $50 billion) across the world during the period of the financial turmoil (2007-2008). They document that smaller banks with concentrated ownership and more non-interest income are associated with higher idiosyncratic risk. Consistent with our results, they document a negative relation between bank size and Z-score. However, their relation is statistically not significant – possibly due to the limited cross-sectional variation in their bank size measure since they only consider banks greater than $50 billion in assets. Berger and Bouwman (2013) consider a comprehensive sample of U.S. banks during 1984-2010 and document a positive relation between bank size and bank credit risk (defined as the bank's Basel I risk-weighted assets divided by total assets). Based on a U.S. sample of financial institutions, Cheng, Hong and Scheinkman (2010) investigate whether compensation structure contributes to excessive risk-taking. They find that risk-taking, measured as firm beta and return volatility, is correlated with short-term pay such as options and bonuses. Bolton, Mehran, and Shapiro (2010) propose addressing the excessive risk-taking by tying executive compensation to both stock and debt

prices. Baker and McArthur (2009) estimate that the gap of funding costs between small and TBTF firms averaged 0.29 percentage points in the period 2000 through 2007, and that this gap widened to an average of 0.78 percentage points from 2008 through 2009. Rime (2005) finds that the TBTF status has a significant positive impact on bank issuer ratings. Lastly, using an international sample of banks, Demirguc-Kunt and Huizinga (2011) find that systemically large banks achieve lower profitability and without a clear impact on risk. Their results suggest that it is not in the bank shareholders' interests but that it is in managers' interests (via higher pay and status) for a bank to become large relative to its national economy.

The role of corporate governance in coping with risk is not obvious. Standard theory on corporate governance predicts that firms with better governance increase firm value by adopting projects with positive net present value (NPV). However, it does not preclude the possibility of the firm investing in projects with risky cash flows. Therefore, it might be in the interest of shareholders to take risky projects as long as they are value-enhancing. In addition, option theory (Black and Scholes (1973), and Merton (1974)) suggests that, all else being equal, the value of an option increases with volatility of the underlying asset.[84] Since a company's shareholders are essentially holding a call option with the total value of the company as the underlying asset, and the face value of debt as the exercise price, it follows that the more volatile the company's cash flow is, the more valuable the call option. Thus, the value of common stock increases with the volatility of the company's cash flow. Based on these arguments, we might expect a positive association between effective corporate governance and risk-taking.

This relation, however, can go in the opposite direction. As Rajan (2006) and Diamond and Rajan (2009) point out, the compensation structure is different in the finance industry in that the performance of CEOs is evaluated based in part on the earnings the CEOs generate relative to their peers. With this pressure, executives have incentives to take excessive risk to profit in the short run even if they are not truly value-maximizing; this is identical to the situation we discussed in chapter 3. As noted in Diamond and Rajan (2009), "even if managers recognize that this type of strategy is not truly value-creating, a desire to pump up their stock prices and their personal reputations may nevertheless make it the most attractive option for them" (p.607). If this argument is correct, we would expect financial institutions with better governance to set incentives and controls to avoid taking risks that do not benefit shareholders. Thus, we should see a negative relation between effective corporate governance and risk-taking. Because of these two countervailing arguments, the impact of corporate governance on risk-taking in the financial industry remains an empirical question. To the extent there is a negative relation between good corporate governance and bank-risk, this would be an important tool for policy-makers to focus on.

8.2. Sample and variable construction

Our main sources of data are Compustat, the Center for Research in Security Prices (CRSP), RiskMetrics, and Bloomberg, supplemented by hand-collected data from companies' SEC filings on EDGAR. We define the financial industry as all financial institutions consisting of commercial banks, investment banks, and life insurance companies, as classified by their 4-digit standard industrial classification (SIC). Specifically, firms with the 4-digit SIC codes of

6020, 6211 and 6311 are identified as commercial banks, investment banks and life insurance companies, respectively; this classification is similar to Cheng, Hong and Scheinkman (2010). We use this narrower classification on the grounds that it greatly reduces unobservable heterogeneity among firms within each category, thus it alleviates omitted variable bias and enhances comparability.

The starting point for the sample selection is Compustat, where we collect annual accounting data on all U.S. commercial banks, investment banks and life insurance companies. Our sample spans the period 2002 to 2012. Following Boyd and Runkle (1993) and John, Litov and Yeung (2008), we require that firms have at least five consecutive years of data on key accounting variables over the period to be included in the sample. This process yields an initial sample of 702 unique financial institutions or an unbalanced panel of 6,277 firm-year observations, comprising 599 commercial banks, 60 investment banks, and 43 life insurance companies. In our sample, insurance companies include firms such as AIG, Prudential Financial, and Lincoln National Corp, while investment banks include firms such as Bear Stearns, Lehman Brothers, and Goldman Sachs.

We utilize a stratified sampling process to avoid selection bias when dealing with governance and CEO ownership data. The governance data are available through RiskMetrics and the CEO ownership data are available through RiskMetrics and Compustat's Execucomp. However, RiskMetrics only provides data for S&P 1500 companies, which includes around 10% of financial firms; Execucomp covers slightly more, but still not nearly all of our sample financial institutions. Due to this, we took a random sample of 250 commercial banks (from the

full sample of 599 commercial banks), plus all of the 60 investment banks and 43 life insurance companies from those available in Compustat. From this sample, we hand-collected data on governance and ownership from companies' proxy statement for firms that are not covered by RiskMetrics and Execucomp. The advantage of this stratified sampling process is that it avoids the problem of selection bias on observables (specifically, firm size) since firms in the S&P 1500 are, by definition, relatively large, whereas the Compustat database that we begin with includes financial institutions of all sizes.

8.2.1. Risk-taking

One of our two primary measures for firm risk-taking is the Z-score, which equals the average return on assets (ROA) plus the equity capital to total assets ratio (EAR), divided by the standard deviation of asset returns (σ(ROA)):

$$Z\text{-}score = \frac{(ROA + EAR)}{\sigma(ROA)}$$

Following Laeven and Levine (2009), and Houston et al (2010), we calculate EAR as total assets minus total liabilities, divided by total assets. Z-score has been widely used in the recent literature as a measure of bank risk. The Z-score measures the distance from insolvency. A higher value of Z-score indicates less risk-taking. Since the Z-score is highly skewed, we follow Laeven and Levine (2009) and Houston et al (2010), and use the natural logarithm of the Z-score as the risk measure. In calculating Z-score, annual values of ROA and EAR are used and σ(ROA) is the standard deviation of annual ROA calculated over the preceding five year period

for each firm-year observation. For more on Z-score as a measure of risk-taking, see Boyd and Runkle (1993), Boyd, De Nicolo, and Jalal (2006) or Beltratti and Stulz (2010).

Our second measure of risk-taking is Merton distance to default (Merton DD) with a high value indicating less risk-taking. Merton DD has been used in the literature to forecast bankruptcy. Merton DD builds on Merton (1974) where firm equity is modeled as a call option on the underlying value of the firm with an exercise price equal to the face value of the firm's liabilities.[85] Similar to Z-score as a measure of risk-taking, the Merton DD measure also attempts to gauge the probability that a firm will go bankrupt over the forecasting horizon. Unlike Z-score, which is based solely on accounting information, the Merton DD measure is based on market and accounting data. We follow the iterative procedure described in Bharath and Shumway (2008) to calculate the value of the monthly distance to default for each firm in our sample and then aggregate them into yearly DD by taking a simple average of the monthly DD value. For more on Merton DD as a measure of risk-taking, see Duffie, Saita and Wang (2007), and Bharath and Shumway (2008).

While Merton DD has been used as a measure of risk-taking in general, there is a growing literature that successfully employs Merton-like models, or more generally structural credit risk models, in quantifying bank risk. There are a number of examples of this approach in the recent literature. Anginer and Demirguc-Kunt (2014) apply the Merton (1974) contingent claim model to measure default risk and credit-risk co-dependence for a sample of banks in over 65 countries. Calice et al (2012) use the Merton model in examining the relationship between the volatility in the credit default swap markets and valuation of the assets of 16 large

complex financial instituions. Chen et al (2014) incorporate Merton's idea to construct a lattice-based multi-period structural credit risk model to analyze default risk. Lastly, Jessen and Lando (2014) demonstrate the robustness of Merton distance-to-default (as a measure of default risk) to model misspecifications.

As a robustness check, we consider additional risk-taking measures including standard deviation of stock returns and accounting write-downs.[86] The standard deviation of stock returns indicates the market's perception about firms' risk-taking and the accounting write-downs reflect ex-post realization of the firms' tail risk. For equity volatility, we use the standard deviation of daily stock returns within each sample year. For write-downs for each firm, we follow Vyas (2011) and define write-downs as the net credit losses recognized by financial institutions through accounting treatments, which include fair value adjustments, impairment charges, loan loss provisions, and charge-offs during 2007 and 2008.

8.2.2. Firm size

The potential candidates for measuring firm size include accounting-based measures such as total assets and total revenue, and market based measures such as market capitalization. Following the existing literature, we focus primarily on total assets and use total revenue as a robustness check. We consider bank size as a continuous variable. We considered a binary dummy variable for too big to fail banks. However, correctly identifying the size threshold when a financial institution becomes too big to fail is not obvious especially over our entire sample period that includes an expansion and a recession. More importantly, as we show later in the paper, although we do observe a positive association between firm size and risk-taking,

this relation is driven not only by size per-se but also by the unusually high leverage of the larger banks. This suggests that regulations designed to rein in the risk-taking of financial firms should focus more on equity capital requirements, rather than on bank size alone.

8.2.3. Corporate governance

We employ a new measure of corporate governance, the median director dollar stockholding, developed in our earlier work, Bhagat and Bolton (2008). This variable is motivated by the idea that directors, as economic agents, will be more likely to fulfill their monitoring and advising duties when they have 'skin in the game' (that is, holding substantial amount of common stock of the companies where they serve on the board). This is consistent with the industry practice that many firms either require or encourage directors to own certain number of shares in the company (for example, non-employee directors at Nike are required to own Nike stock valued at five times their annual cash retainer – which was around $100,000 in 2013 – or more while they are on the Nike board[87]). Therefore, the functioning of corporate boards will be affected by directors' stock ownership. This variable could potentially be a measure of overall good governance because it is the corporate boards that ultimately make, or at least, approve all important corporate decisions, which ultimately affect firm performance. The most significant advantage of this governance measure over other commonly used governance measures such as the G-index (Gompers, Ishii, and Metrick (2003)) comes from its simplicity, and, thus, it is less susceptible to measurement errors. Constructing governance indices inevitably involves measuring and summing up a multitude of governance attributes such as governance processes, compensation structure, and charter provisions – and thereby

ascribing weights to the various governance factors in the index. If the weights assigned to each of these attributes are not consistent with those used by informed market participants, then incorrect inferences would be drawn regarding the relationship between governance and performance.

In our earlier work, Bhagat and Bolton (2008), we consider the dollar value of stock ownership of the median director as the measure of stock ownership of (non-employee) board members. Our focus on the median director's ownership, instead of the average ownership, is motivated by the political economy literature on the median voter; see Shleifer and Murphy (2004), and Milavonic (2004). Also, directors, as economic agents, are more likely to focus on the impact on the dollar value of their holdings in the company rather than on the percentage ownership. As mentioned earlier, RiskMetrics provides limited data on financial firms (177 out of 702 firms), so we supplement it by hand-collecting director ownership information from proxy statements.[88]

8.2.4. CEO ownership

Risk-averse managers are inclined to take on less than optimal firm risk in order to protect their firm-specific human capital because their employment income is usually tied to changes in firm value. This is an agency problem, in essence, as described in Jensen and Meckling (1976), Amihud and Lev (1981), and Smith and Stulz (1985). However, stock-ownership by managers may be used to induce them to act in a manner that is consistent with the interest of shareholders. Thus, we expect to see a positive relation between CEO ownership and risk-taking. Researchers have documented the impact of ownership structure on firm risk-taking.

For instance, in analyzing nonfinancial firms, Agrawal and Mandelker (1987) find a positive relation between stock holdings of managers and the changes in firm variance, while John, Litov, and Yeung (2008) find that managers enjoying large private benefits of control select suboptimally conservative investment strategies. Saunders, Strock, and Travlos (1990) find that stockholder controlled banks exhibit higher risk-taking behavior than manager controlled banks. Demsetz, Saidenberg and Strahan (1997) document that the significant relationship between ownership structure and risk-taking exists only at low franchise value banks. Laeven and Levine (2009) find that bank risk is generally higher in banks that have controlling shareholders. We use CEO ownership percentage as our measure for bank ownership structure. Like the governance variable, we hand-collect CEO ownership data from companies' proxy statements in addition to the data provided by RiskMetrics and Execucomp for firms that are not covered by those two sources.

8.2.5. Market-to-book ratio and age

Market-to-book value ratio, has been identified as an important risk factor in the asset pricing literature. For instance, Fama and French (1992) point out that firms with high ratios of book-to-market value (or low market-to-book) are more likely to be in financial distress. We compute this variable by dividing the market value of equity by the book value of equity for each firm and year.

In the banking literature, market-to-book value ratio has often been used as a proxy for bank charter value; see Demsetz, Saidenberg and Strahan (1997) and Goyal (2005). A charter has value because of barriers to entry into the industry and usually it is defined as the discounted

stream of future profits that a bank is expected to earn from its access to protected markets. Since loss of charter imposes substantial costs, it is argued that charter value can incentivize banks to adopt prudent decision-making; see Keeley (1990) and Carletti and Hartmann (2003). Empirical models of bank risk have focused on this disciplinary role of charter value. Based on a sample of 367 bank holding companies from 1991-1995, Demsetz, Saidenberg and Strahan (1997) found that charter value is negatively associated with bank risk-taking. Galloway, Lee and Roden (1997) also found that banks with low charter value assumed significantly more risk.

Finally, we use firm age to control for firm experience, and we expect that more experienced firms are better at handling risk than less experienced firms.

8.2.6. Financial institution and financial crisis specific variables

We include three indicator variables to capture the unique characteristics of both different types of financial institutions and the unique characteristics of our 2002-2012 time period. We use an Investment Bank indicator if the firm is an investment bank to capture how a non-depository institution might differ from a commercial bank. We use an Insurance Company indicator if the firm is an insurance company to capture the restrictions imposed by insurance regulations. And, we use a Financial Crisis indicator if the observation occurred during 2007-2009 to capture the uniqueness of this three-year period.

8.2.7. Summary statistics

Table 8.1 presents the summary statistics for all key variables. The variable definitions and the data sources are described in Appendix D. The Z-score has a mean of 46.4 and a standard

deviation of 49.7. This fairly high standard deviation and the wide range in Z-scores suggest a considerable cross-sectional variation in the level of firm risk. Consistent with Laeven and Levine (2009) and Houston et al (2010), our Z-score measure is right-skewed and we use the log of Z-score in our analysis which is more normally distributed. Our sample statistics of the Probability-of-Default (Merton) are consistent with reported sample statistics in Bharath and Shumway (2008). Table 8.2 presents the correlation among the key variables. As expected, all three risk measures (Z-score, Merton DD, and equity volatility) are highly correlated.

Table 8.1 and 8.2 about here

8.3. Bank size and bank risk

Our primary measures of risk-taking (*Bank Risk*) are Z-score and Merton DD with a higher Z-score and a higher Merton DD associated with less risk-taking. We begin by examining whether larger size is associated with greater risk. For brevity, we use the label 'size' in referring to the natural logarithm of size in the remainder of the paper; in our primary analyses we measure size by the firm's Total Assets.

Our baseline model is as follows:

$$\textit{Bank Risk}_i = \alpha + \beta_1 \textit{Total Assets}_i + \beta_2 \textit{Market-to-Book}_i + \beta_3 \textit{Director Ownership}_i + \beta_4 \textit{CEO Ownership}_i + \beta_5 \textit{Firm Age}_i + \beta_6 \textit{Investment Bank}_i + \beta_7 \textit{Insurance Company}_i + \beta_8 \textit{Financial Crisis dummy}_i + \varepsilon_i \quad (8.1)$$

Table 8.3, Panel A, presents the results of the regression analysis with log Z-score as the dependent variable. Table 8.3, Panel B, presents the results of the regression analysis with Merton Distance to Default as the dependent variable. They are estimated using robust regressions to minimize the influence of outliers in the data. To control for unobserved differences among individual banks, we also use the fixed effects (FE) estimator. Size enters negatively and is significant at conventional levels in most models: larger firms are riskier.

Table 8.3 about here

The governance variable enters positively and is significant at the 1% level in most regressions, meaning better governance as measured by median director dollar stockholding is associated with less risk-taking. This result provides evidence that the conjecture based on Diamond and Rajan (2009) is correct.[89] Investment banks are significantly riskier than commercial banks; coefficients on the Investment Bank dummy are negative and significant at the 1% level. Also, as expected, the crisis period dummy variable indicates that bank risk was high during 2007-2009. CEO ownership has a positive correlation with bank risk, but enters insignificantly in the fixed effects model. As expected, the sign of firm age is positive.

To summarize our results so far: bank size is positively correlated with risk-taking. Better governance is associated with reduced risk-taking.

8.3.1. Endogeneity of firm size

Empirical corporate finance research is plagued by the problem of endogeneity, and this research is no exception. Specifically, we are concerned about the joint determination of risk-taking and firm size. Previous research has identified that banks are willing to pay a large premium to make acquisitions that will make them sufficiently large and TBTF (Brewer III and Jagtiani (2009)). Therefore, although firms are more likely to pursue risk-taking activities when they become larger, it is also likely that high-risk firms have the incentives to increase their sizes to achieve TBTF status. To address this issue, we use the identification strategy of instrumental variables (IV). In particular, we use three different instrumental variables: whether or not the firm is incorporated in Delaware, the natural logarithm of the number of employees at the firm, and the natural logarithm of the net plant, property and equipment.

We make use of variation in whether or not a firm incorporates in Delaware as an instrument for firm size because when a company decides to go public, the decision where to incorporate, while not random, should be exogenous to the unobservable factors that affect firms' risk-taking as induced by moral hazard of TBTF. The validity of an instrument critically hinges on this exclusion restriction. Empirical legal and financial studies have investigated extensively why a firm would choose Delaware as its domicile. For example, Daines (2001) finds there is a wealth effect associated with Delaware incorporation, due to the fact that Delaware corporate law encourages takeover bids and facilitates the sale of public firms by reducing the cost of acquiring a Delaware firm. Conceptually, this wealth effect should have nothing to do with a firm's risk-taking. Bebchuck and Cohen (2003) identify that favorable anti-

takeover protections are important for a state to attract out-of-state incorporation. Romano (1985) argues that Delaware's large store of legal precedent reduces transaction costs and uncertainty about legal liability. Lastly, Fisch (2000) notes the peculiar role of the Delaware judiciary in corporate lawmaking, arguing that Delaware lawmaking offers Delaware corporations a variety of benefits, including flexibility, responsiveness, insulation from undue political influence, and transparency. While these factors affect a firm's domicile decision, all of them appear centered around the legal environment of Delaware. In addition, other researchers have argued that a firm's choice of domicile is unimportant and trivial (Black (1990)). This literature suggests that our instrumental variable, dummy for Delaware incorporation, does not belong to the structural equation; we thus expect that it is a valid instrument.

The other two instrument variables, number of employees at the firm and net plant, property and equipment, are likely correlated with bank size. However, given the recent banking literature (for example, see Berger and Bouwman (2013), Laeven and Levine (2009), and Vallascas and Keasey (2012)), it is not obvious why these two variables would be systematically related to the bank's risk taking.

While the three instrument variables have ex ante theoretical plausibility, we conduct a battery of specification tests to validate the strength and relevance of these instrument variables. We consider Hausman's endogeneity test, and the following instrument strength and validity tests: Stock and Yogo weak instrument test (2005), Hahn and Hausman instrument validity test (2002), Hansen-Sargan overidentification test, and Anderson-Rubin joint significance test.

The Two-Stage Least Squares IV approach involves estimating the following second-stage structural model using the predicted values from the first-stage instrumental variables equation:

$$Bank\ Risk_i = \alpha + \beta_1 Total\ Assets_i + \beta_2 Market\text{-}to\text{-}Book_i + \beta_3 Director\ Ownership_i + \beta_4 CEO\ Ownership_i + \beta_5 Firm\ Age_i + \beta_6 Investment\ Bank_i + \beta_7 Insurance\ Company_i + \beta_8 Financial\ Crisis\ dummy_i + \varepsilon_i \quad (8.2)$$

First-stage instrumental variables model:

$$Total\ Assets_i = \alpha + \beta_1 Delaware_i + \beta_2 Employees_i + \beta_3 PP\&E_i + \beta_4 Director\ Ownership_i + \beta_5 CEO\ Ownership_i + \beta_6 Firm\ Age_i + \beta_7 Investment\ Bank_i + \beta_8 Insurance\ Company_i + \beta_9 Financial\ Crisis\ dummy_i + \varepsilon_i \quad (8.3)$$

where $Delaware_i$ is a dummy variable which equals one if firm i is Delaware incorporated, $Employees_i$ is the natural logarithm of employees at the firm, and $PP\&E_i$ is the natural logarithm of net plant, property and equipment at the firm; the rest of the variables are defined as in equation (1).

Identification of the IV model requires a strong correlation between the instruments (Delaware dummy, Employees, and PP&E) and firm size. Results from the first-stage regression on size (ln (Assets)) are presented in Table 8.4, Panel A. We perform a weak instrument test as proposed by Stock and Yogo (2005); if the *F*-statistic from the first-stage regression exceeds the critical value (using 5% bias), the instrument is deemed to be valid. The critical value is 16.38, which is less than the *F*-statistic; hence we conclude that the instruments are not weak.

Table 8.4 about here

Results from IV estimates for risk-taking, as measured by Z-score and Merton DD are reported in Table 8.4, Panel B. After controlling for the endogeneity between firm size and risk, we find that larger firms are associated with greater risk-taking, as measured by Z-score and Merton DD; specifically, a 1% increase in total assets decreases Z-score by 0.042% (Column 2), and decreases Merton DD by 0.072% (Column 4). Well-governed financial institutions, as measured by director ownership, are correlated with less risk-taking. The size of the coefficient on director ownership is also economically consequential. A 1% increase in director ownership is associated with a 0.279% (Column 2) increase in Z-score, and a 0.187% (Column 4) increase in Merton DD. Investment banks and the crisis period (2007-2009) are associated with greater risk-taking.

Results from IV estimates for risk-taking, as measured by probability of default are, perhaps, more intuitive to interpret and are reported in Table 8.4, Panel C. After controlling for the endogeneity between firm size and risk, we find that larger firms are associated with greater risk-taking, as measured by probability of default; specifically, a 1% increase in total assets increases probability of default by 2.4% (in Fixed Effects estimation). Well-governed financial institutions, as measured by director ownership, are correlated with less risk-taking. The size of the coefficient on director ownership is also economically consequential. A 1% increase in

director ownership is associated with a 2.5% decrease in probability of default (in Fixed Effects estimation).

8.5. Financial crisis time period effects

The 2002-2012 time period is unique in that it contains data before, during and after the largest financial crisis in recent history. As such, it is possible that different sub-periods within our sample may have different relationships between bank size and risk-taking. For example, the intense scrutiny put on bank risk-taking by the bank regulators, senior policy-makers, and the media in the post-crisis period may have curbed the appetite and ability of large banks to engage in high-risk investments. To address this, we consider three sub-periods: the pre-crisis period of 2002-2006, the crisis period of 2007-2009 and the post-crisis period of 2010-2012. We estimate equation (2) using 2SLS during each of these periods, with both Z-score and Merton Distance to Default as our measures of risk-taking. The results are presented in Table 8.5. The strong relationships we observed earlier between firm size-and risk-taking are most pronounced in the pre-crisis and crisis periods for both measures of risk-taking. In the post-crisis period, there is no consistent significant relation between bank size and risk-taking; this is consistent with the argument that the intense public scrutiny put on bank risk-taking in the post-crisis period may have curbed the appetite and ability of large banks to engage in high-risk investments.

Table 8.5 about here

8.6. Decomposition of Z-score

Z-score has three components – ROA, EAR, and σ(ROA). A higher level of ROA and higher equity capital asset ratios (EAR) translate into higher Z-scores, while a larger standard deviation of ROA translates into lower Z-scores. Thus, when we find a positive relation between size and risk-taking, it may be attributable to a lower ROA, a lower equity capital ratio (EAR), and/or a higher standard deviation. Therefore, it is possible that size may not necessarily increase the risk of assets, but rather the drop in Z-score may instead be attributed to a decline in the average bank capital ratio or return on assets. To further explore how the various components of Z-score are correlated with size, we run regressions treating each of these Z-score components as a separate dependent variable. The empirical results are reported in Table 8.6.

Table 8.6 about here

We see that an increase in size is associated with a decrease in equity capital asset ratio at the 1% significance level. As for the economic effect, on average, a 1% percent increase in size translates into a 0.012% to 0.054% reduction in equity capital asset ratio. We do not find a consistent significant relation between size and ROA or earnings volatility. These results indicate that the lower Z-score for large banks is driven primarily by a reduction in capital asset

ratio. This is consistent, with some of the conclusions drawn by the aforementioned studies that use structural credit risk models to analyze financial institution risk. For instance, Calice et. al. (2012), Flannery (2014), and Chen et. al. (2014) find, within the context of Merton-like models, that the financial system was undercapitalized and required massive capital infusions to stabilize the financial system during the crisis. Specifically, on the basis of simulation results, Calice et al (2012) document that, even under favorable asset volatility scenarios, there is a substantial need for capital injections for a sample of 16 large complex financial institutions from around the world. Applying a lattice-based multi-period credit risk model to the case of Lehman Brothers, Chen et al (2014) show that there is a substantial increase in default probability during the first few months of 2008; and, in a hypothetical exercise, they also show that Lehman would have needed an equity capital infusion of $15 billion in order to reduce probability of default below 5%, given the market conditions of March 2008. Flannery (2014) documents substantial market value of the government guarantees against bank insolvency – in the order of 30% of bank capitalization for the largest 25 U.S. bank holding companies during 2007-2011.

Corporate governance (director ownership) is positively associated with ROA and negatively associated with earnings volatility. These results suggest better governance enhances firm performance (ROA), consistent with Bhagat and Bolton (2008) who note a significant and positive relationship between director ownership and contemporaneous and next year's ROA. The risk-reducing mechanism of corporate governance appears to work its way through an increase in ROA and a reduction in earnings volatility.

8.7. Summary

In this chapter we detail our analysis of the effect of size on the risk-taking of U.S.-based financial institutions. Using data on the size and risk-taking of financial institutions from 2002 to 2012, we investigate whether cross-sectional variation in the size of banks is related to risk-taking. Our measures of risk-taking are comprehensive. They include two model-based measures (namely, the Z-score, and Merton's Distance to Default (Merton DD)), a market-based measure (volatility of stock returns), and an accounting-based measure (write-downs). We document four important facts. First, bank size is positively correlated with risk-taking, even when controlling for endogeneity between size and risk-taking. Our second finding: the decomposition of Z-score reveals that bank size has a consistent and significant negative impact on the bank equity capital to total assets ratio; we do not find a consistent relation between bank size and return on assets or earnings volatility. *These findings suggest that banks engage in excessive risk-taking mainly through increased leverage.* They also suggest that economies of scale do not exist for banks. Regressions with volatility of stock return as the dependent variable indicate that size-related diversification benefits may not exist in the financial sector since size is positively associated with return volatility. Third, we find that our recently developed corporate governance measure, calculated as median director dollar stockholding, is negatively associated with risk-taking. This has important policy implications, to wit, policy-makers interested in discouraging banks from engaging in excessive risk should focus on bank director compensation and stock ownership. Finally, we document that the positive relation between bank size and risk is present in the pre-crisis period (2002-2006) and the crisis period (2007-

2009), but not in the post-crisis period (2010-2012). Perhaps the intense scrutiny put on bank risk-taking by the bank regulators, senior policy-makers, and the media in the post-crisis period may have curbed the appetite and ability of large banks to engage in high-risk investments.

Chapter 9: Bank Capital Structure and Executive Compensation

We advocate meaningful higher and simpler capital requirements to bank capital structure reform that, coupled with the Restricted Equity proposal, should incentivize bank executives not to take on projects of excessive risk that diminish shareholder value. We think the evidence is compelling that not only pre-crisis but also post-crisis regulatory capital requirements were and are too low.

The strongest form of bank capital is common equity that can absorb losses without disrupting the bank's ongoing business activities. There are three ways that bank capital can impact bank risk. First, with more bank capital, bank owners and managers will have more skin-in-the-game, hence, will focus more carefully on risk management (borrower screening and ongoing monitoring) and avoid excessive risk-taking that arises as a consequence of limited liability and taxpayer-funded bailout. This is the essence of the argument we made in chapters 3, 4 and 5 above, and the arguments in the extant literature, notably, Holmstrom and Tirole (1997), Allen, Carletti and Marquez (2011), and Mehran and Thakor (2011). Second, greater bank capital discourages risk-shifting in a bank leading to safer bank investment and trading strategies; Smith and Warner (1979), Calomiris and Kahn (1991), Acharya, Mehran, and Thakor (2011). Finally, greater bank capital increases the bank's ability to absorb negative earnings shocks and survive; Repullo (2004).

9.1. Simplifying bank capital requirements, and bank transparency

Similar to our recommendation for executive compensation reform, we suggest three criteria for evaluating bank capital reform programs:

i) simplicity,

ii) transparency, and

iii) focus on creating and sustaining long-term shareholder value without any expectation of taxpayer-funded bailouts.

Large international banks' capital requirements have been globally harmonized, under the Basel accords, since 1988. Basel capital calculations take into account an asset's risk, that is, banks are required to hold more capital for riskier assets, such as corporate loans, than they are required to hold for what are considered safer assets, such as government debt. The initial accord has been revised several times, with each succeeding revision resulting in more complex calculations of risk, and layered on top of existing provisions. Under Basel I, regulators established standardized risk weights for broad categories of assets. Banks were then required to hold a minimum of 8% capital against those assets.[90] The standardized approach was emended under Basel II for the largest banks to apply a methodology by which regulators enlist banks' own more sophisticated internal risk management models to determine their risk-based capital requirements ("Internal Ratings Based" or "IRB").[91]

We recommend pegging bank capital to the ratio of *tangible common equity to total assets* (i.e., to total assets independent of risk) rather than the risk-weighted capital approach that is at the core of Basel.[92] [93] In this we endorse the position advocated by two experienced bank regulators, Thomas Hoenig, Vice Chairman of the FDIC, and Andrew Haldane,

Executive Director, Financial Stability of the Bank of England. They have both called for abandoning Basel III's complicated risk-weighted approach in favor of leverage ratios.[94] Similarly, we contend that Basel III's approach to capital needs to be recalibrated to emphasize the *leverage ratio* (ratio of tangible common equity to total assets) over the risk-weighted minimum, which would require a ratio far higher than its present 3%, which has been set as a backstop to the risk-weighted ratio, rather than the mainstay of capital requirements.

Hoenig's and Haldane's emphasis on the leverage ratio over risk-weighted capital measurements is, in part, a reaction to Basel III's daunting complexity and obscurity.[95] As Haldane has remarked, Basel III's multiple requirements, and definitions of capital and risk-weight computations are so exceedingly complicated that they now reach over 600 pages, compared to Basel I's 30 page text, and for a large bank to comply it now requires several million calculations, as opposed to Basel I's single figures.[96] These data suggest that it is, at present, all but impossible for any individual – investor, regulator, or bank executive – to get a good handle on the risk that such institutions are bearing.

Moreover, in our judgment, as the complexity of the risk-weight calculation has increased with each regulatory permutation, it magnifies what is a behavioral constant in the financial regulatory landscape: banks will game regulatory requirements to minimize the capital they must hold. It is axiomatic that the more complicated the system, the more leeway banks will have to engage in such activity, termed "regulatory arbitrage," reconfiguring their portfolios to achieve the maximum risk with the minimum amount of capital. In turn, the

more room banks have to engage in such activity, the more difficult it becomes for regulators and investors to evaluate bank capital and monitor compliance.[97]

The far simpler capital measure presented by a leverage ratio would cabin banks' ability to engage in complex manipulation across risk weights and assets to minimize their cost of capital. Importantly and relatedly, although it does not prevent gaming by increasing the risk of assets held, a leverage ratio requirement is easier for regulators and investors to monitor compliance with, as well as to evaluate banks' relative risk, as it will increase the comparability of banks' risk and performance compared to the IRB approach. This would have a beneficial feedback effect on bank managers' incentives to take risks, as better informed investors and regulators better convey their preferences regarding risk.

Demirguc-Kunt, Detragiache and Merrouche (2013) analyze whether better capitalized banks performed better (in terms of stock returns) during the 2007-2008 crisis. They consider a sample of 381 banks in 12 countries. In the financial crisis, they found a positive relation between capital and stock returns. Additionally, this positive relation was stronger when capital was measured by leverage ratios, and not Basel risk-weighted capital, suggesting that the stock market did not view Basel risk-adjustments as informative. Finally, they document that the positive relation between capital and stock returns was mostly driven by higher quality capital, such as, common stock.

9.2. Restricted-Equity-More-Equity-Capital proposal

Following the global financial crisis, the Basel accord was further amended, first (Basel 2.5) to increase the capital requirements for securitized and off-balance-sheet assets at the core of the global crisis that had had preferential treatment, and then (Basel III) to add a further capital conservation buffer equal to 2.5% of risk-weighted assets to the existing 8% minimum capital requirement (which is not expected to impose a new minimum, as a breach imposes a restriction on paying out dividends and bonuses, rather than corrective regulatory action), along with a 3% leverage ratio and requirements to hold a specified amount of liquid assets.[98] A leverage ratio calculates the amount of capital in proportion to total assets independent of risk. Although new to international regulation, U.S. banking regulators had long imposed a 4% leverage ratio on domestic banks in addition to the Basel risk-weighted minimum capital requirement.[99]

The post-crisis refinements to Basel II also expanded the assets against which capital must be held, increased the risk weights allocated to specific assets, and restricted the definition of bank capital, such that even without the additional capital buffer (which has a long phase-in period) and despite retaining the Basel II capital minimum, banks would have to hold more capital than previously if they were not to alter the composition of their portfolios in response. The final piece of Basel III is an agreement by the Basel Committee that the largest, globally systemically important banks ("G-SIBs") should be subject to enhanced capital requirements. G-SIBs will be classified into different "buckets' according to the institution's systemic importance, with the surcharge of additional risk-weighted capital ranging from 1 to 2.5% (as no banks will be placed into the highest bucket calling for 3.5%).[100] As with the capital

conservation buffer, if a G-SIB's capital falls below the required surcharge, it will be penalized by restrictions on payouts to shareholders and employees, along with development of a remediation plan to increase its capital, rather than be subjected to more stringent corrective action, as could occur on a breach of minimum capital requirements.[101]

Although the increase in capital requirements is a move in the right direction, to our minds the Basel III level is still too low to be consistent with our third criterion for evaluating bank capital reform programs, that is, focus on creating and sustaining long-term shareholder value without any expectation of taxpayer-funded bailouts. We come to this understanding by reference, as a benchmark, to the level of capital held by banks pre-crisis, and the level that markets required of banks before governments stepped in to insure depositors. Consider pre-crisis capital levels: a comprehensive study of leverage across banks and countries indicates that at the start of the financial crisis, U.S. banks' average capital was approximately 10-12% (that is, around 90% of their capital structure consisted of debt securities).[102] At a debt level of 90%, a market shock adversely affecting asset value of slightly over 2% could push a firm below the minimum capital requirement, subjecting it to corrective regulatory action, and such firms' executives would therefore be operating in what is analogous to the insolvency zone for nonfinancial firms, in which managers' incentives and shareholders' interest align in taking extraordinarily high risk gambles on firm value due to limited liability.

Moreover, although from the perspective of capital regulation pre-crisis banks might have appeared to be well capitalized, as they were operating above the regulatory minimum threshold, the financial crisis demonstrated that assumption was mistaken.[103] Yet Basel III will

raise the amount of required equity only to 4.5% (the minimum Tier 1 equity capital requirement). Such a requirement would hardly appear to be sufficient to withstand a repeat of the recent near catastrophic collapse of short-term financing markets and the banking sector, in which the shock to asset values was as large as the amount of bank's capital (that is, some large banks' equity declined from 10% to near zero).[104]

Consider also historical capital levels. Prior to the introduction of deposit insurance, U.S. banks routinely held capital over 20%.[105] This level would appear to have been market-driven, as it exceeded (indeed was unrelated to) the amount required by regulation at the time. For instance, some states during this period required banks to hold a capital to deposit ratio of 10%, and national banks were subject to a similar requirement as of 1914.[106] U.K. banks similarly had much higher capital, with leverage into the 1960s equal to half the rate of recent decades.[107] The higher level of capital held in the pre-deposit insurance world suggests that is the level at which creditors expected bank management's risk-taking to be controlled. In our judgment, this is probative evidence that Basel requirements are too low, for it suggests that creditors are willing to invest in banks with today's lower level of equity because of the modern phenomenon of government bailouts, in which all creditors, not just insured depositors, are covered.[108] We should note that a number of commentators have similarly advocated capital requirements significantly higher than 10%.[109]

Our bank capital proposal has two components:

- Bank capital should be calibrated to the ratio of *tangible common equity to total assets* (i.e., to total assets independent of risk) *not* the risk-weighted capital approach

that is at the core of Basel. Tangible common equity includes common stock plus retained earnings (both via the income statement and unrealized value changes on cash flow hedges).

- Bank capital should be *at least 20%* of total assets.

We refer to our bank capital proposal as *Restricted-Equity-More-Equity-Capital* proposal to highlight the complementary nature of our bank capital proposal and the Restricted Equity proposal (that is at the core of our proposal to reform bank manager and director incentive compensation as discussed in chapters 6 and 7 above).

On June 2, 2016, two Federal Reserve Board governors signaled that big banks will be required to hold more equity.[110] We applaud the efforts of these Federal Reserve Board governors. We hope the Federal Reserve requires bank capital to be calibrated to the ratio of tangible common equity to total assets (i.e., to total assets independent of risk) not the risk-weighted capital. Second, and more important, bank capital should be at least 20% of total assets.

Some might consider bank capital of 20% as "excessive," "too much," or "too costly." We note two responses. First, the economic costs on a bank's shareholders of having 20% or greater bank capital are never carefully reasoned or stated. In the next chapter we discuss flaws in the arguments that banks should be financed mostly with debt. Second, the "costs" of 20% bank capital should be considered in the context of the economic and social costs that are imposed on the country by thinly–capitalized banks undertaking high risk (but, value-destroying) projects. Recall, the financial crisis that started in 2007 has cost the economy a shortfall of $2.2 trillion, and, more importantly, 4.4 million fewer jobs in the U.S.; see Hall (2014).

9.3. Regulatory hybrid security ("gone concern" capita): CoCo bonds and TLACs

Earlier we noted that the strongest form of bank capital is common equity that can absorb losses without disrupting the bank's ongoing business activities; hence, common equity can be thought of as "going concern" capital. Recently, other forms of capital, referred to as regulatory hybrid securities, that can absorb losses after conversion to equity have been proposed. We can think of these regulatory hybrid securities as "gone concern" capital since they convert to equity only when the existing amount of common stock is insufficient to cover losses. The "gone concern" capital comes in various flavors, such as, CoCo bonds, TLACs; these are discussed below.

French et al (2010) in *The Squam Lake Report* propose a thoughtful solution to the current thin equity capitalization of large banks, "The government should promote a long term debt instrument that converts to equity under specific conditions. Banks would issue these bonds before a crisis and, if triggered, the automatic conversion of debt into equity would transform an undercapitalized or insolvent bank into a well-capitalized bank at no cost to taxpayers." These contingent convertible bonds are popularly known as CoCos. Subsequent to the financial crisis of 2008, European banks have issued CoCos worth about $450 billion; see Avdjiev et al (2015). In the U.S., banks issued a somewhat different security – senior debt whose face value could be reduced in the event of imminent bank failure; these securities are called TLACs (total-loss-absorbing-capacity).

Figure 9.1 provides a stylized depiction of a large bank's capital structure under three scenarios: the current situation, The Regulatory Hybrid Security proposal, and the Restricted-Equity-More-Equity-Capital proposal noted in 9.2 above.

Figure 9.1 about here

A potential advantage of the Regulatory Hybrid Security proposal is it requires less equity capital upfront. However, several authors have raised concerns about the incentive and legal problems the triggering mechanism (that would lead to the conversion of the hybrid capital to equity) would generate; for example, see Flannery (2014), Duffie (2010) and McDonald (2010). The recent experience of Deutsche Bank, UniCredit SpA, Barclays Plc, and Royal Bank of Scotland suggests that the security-design concerns raised about CoCos are quite real.[111] The illiquidity of bond markets raises concerns about the effectiveness of TLACs.[112] In a recent speech, Tom Hoenig, Vice Chairman of the FDIC, has noted his skepticism with TLACs.[113]

Taylor and Kapur (2015) suggest a thoughtful and innovative reform to the bankruptcy process; they refer to it as Chapter 14.[114] In essence, a specialized panel of bankruptcy judges would recapitalize the financially troubled big bank by requiring the bank's long-term unsecured debtholders to bear the losses such that the new bank would not be in bankruptcy. If the bank's long-term unsecured debtholders agree to bear the losses, the process appears to be

viable. However, given the large dollar figures involved, for example, the long-term unsecured debtholders would have to agree to losses over tens of billions of dollars, litigation is a real possibility. Prior agreements can make such litigation difficult, but not impossible. The very threat of such litigation would cause uncertainty in the minds of investors leading to potential disruption in the bank's financial market transactions.

As noted above, a potential advantage of the Regulatory Hybrid Security proposal and the Chapter 14 proposal is it requires less equity capital upfront. If the banks had significantly more equity capital upfront, this would preclude the need for the Regulatory Hybrid Security or the Chapter 14 bankruptcy reform. A question that arises: *Why are banks not capitalized with significantly more equity capital than the current norm?*

The next chapter discusses the flaws in the current received wisdom that large banks should be mostly financed with debt; in other words, we question the potential advantage of the Regulatory Hybrid Security and Chapter 14 proposals' requirement of less equity capital *upfront*. Besides providing the correct incentives to managers to create and sustain long-term shareholder value, the Restricted-Equity-More-Equity-Capital proposal has the advantage of being simple and transparent. Capital market participants, especially bondholders, will value simplicity and transparency in a bank's capital structure - in light of their recent experience with large banks.

9.4. Bank CEO stock trading and bank capital

In chapters 6 and 7 we documented that misaligned bank CEO incentive compensation and misaligned bank CEO incentives led to abnormally large bank CEO stock sales during 2000-2008, and the CEO stock sales (more precisely, CEO Net Trades which is stock sales minus stock purchases minus option exercise price) were related to the excessive risk-taking behavior of the TBTF banks. In this section we investigate the relation between CEO Net Trades and bank capital.

As noted earlier, large TBTF banks like Citigroup and Goldman Sachs are very different from many smaller L-TARP and No-TARP banks, in terms of size, operations, structure, and markets. Analyzing differences in CEO Net Trades without accounting for these differences may produce inappropriate inferences; hence, we rely on the CEO and insider trading literature to control for this heterogeneity.

We estimate a Tobit model based on Aggarwal and Semwick (1999), Jenter (2005), Rozeff and Zaman (1998) and Seyhun (1986). The above literature suggests the following determinants of CEO trading (in the shares of their firm's stock): firm size; book-to-market ratio, annual stock return for the prior year, stock volatility for the current year, CEO total compensation, % CEO equity compensation (amount of equity compensation divided by total compensation for the prior year), and CEO stock holdings (value of the CEO's beneficial stock ownership at the end of the prior year).

Table 9.1 results highlight that, even after controlling for bank and CEO characteristics, banks that have more equity in their capital structure are associated with smaller CEO stock sales during 2000-2008. The Tobit model estimate implies that bank CEOs at the 25th percentile of

bank capital-to-assets ratio sold $54.9 million more of their bank stock than CEOs at the 75th percentile of bank capital-to-assets ratio.

Table 9.1 about here

9.5. Manager incentives and risk-shifting

There is a consensus in corporate finance that with risky debt outstanding, managers acting in the interest of shareholders have an incentive to invest in high-risk projects even if they are value-decreasing (negative net present value); for example, see Smith and Warner (1979). Consistent with this argument, several authors have argued that bank CEO compensation should be restructured so as to maximize the value of bank equity *and* debt. For example, Bolton, Mehran and Shapiro (2010) (BMS) suggest that bank managers' compensation should be tied to the bank's default probability as reflected in their default spread (CDS).

Conceptually, we are supportive of the BMS suggestion and think it has considerable merit. However, we note two concerns with this recommendation. First, the above shareholder-bondholder conflict of interest becomes relevant when the bank has risky debt outstanding. If a bank's debt is relatively "safe" the relevance of this recommendation is less critical. On the other hand, if the bank debt is quite risky, the recommendation is quite relevant. At what point does a bank's debt transition from being relatively safe to quite risky? Second, and related to

the first point, Bhagat and Romano (2009, 2010) emphasize that executive compensation structures should be transparent and simple; the transparency and simplicity criteria would enhance investor confidence in the company's compensation and governance structure. Tying managers' compensation to the bank's CDS would make managers' compensation both less transparent and less simple. Furthermore, managers will have an incentive to misrepresent financial/accounting numbers (which may be partially under their control) that outside analysts use to compute the CDS.

Chapter 10: Why Banks Should be Mostly Debt Financed: Parade of Non Sequiturs

The Restricted Equity incentive compensation proposal for bank managers logically leads to a complementary proposal regarding a bank's capital structure: The high leverage implied by debt ratios in the order of 95% (as was the case for many large banks in 2008) will magnify the impact of losses on equity value. As banks' equity values approach zero (as they did for some banks in 2008), equity based incentive programs lose their effectiveness in motivating managers to enhance shareholder value. Additionally, our evidence suggests that bank CEOs sell significantly greater amounts of their stock as the bank's equity-to-capital ratio decreases. Hence, for equity based incentive structures to be effective, banks should be financed with considerably more equity than they are being financed currently. Our recommendation for significantly greater equity in a bank's capital structure is consistent with the recent recommendations of Admati and Hellwig (2013) and Fama (2010).

In contrast, proponents of high bank leverage (these proponents include some finance academics, big bank managers, and paid lobbyists of the big banks) have offered a parade of horribles that would befall the economy if big banks were required to hold significantly more equity capital.[115] For example, bankers and their allies argue that if they were required to hold more equity, they would be forced to curtail their lending. To the extent this lending would have been to individuals for mortgages, and corporations for plant, equipment and working capital, reduction in such lending would dampen economic growth and employment. This argument is a classic confusion between a bank's investment and financing decisions. Lending activities are a part of a bank's *investment* decision. Financing this lending with debt

or equity is a *financing* decision. In general, if a bank is engaged in value-enhancing investment activities, its investment activities should not impact how the funds are obtained (through debt or equity). As an illustrative example consider an auto company that is financed with 45% debt, and produces SUVs and sedans in quantities that the auto company managers think maximizes their profits. If the auto company were to decrease its financial leverage to 35% debt, would it start producing more SUVs? Probably not. In other words, if a bank were to lower its financial leverage (debt ratio), its lending activities would not be impacted.

Another fallacy that is promoted by bank managers and their allies is that a bank's cost of capital will increase leading to higher lending costs if the banks are financed with less debt and more equity. Since cost of debt is less than cost of equity, bank managers and their allies incorrectly argue that greater financing with equity will increase the bank's cost of capital. The reason this argument is incorrect is based on the Noble prize winning work of Merton Miller and Franco Modigliani – essentially as the bank is financed with more equity, the equity becomes less risky, hence, the cost of equity decreases. In general, the increase in equity financing by itself neither increases or decreases the bank's cost of capital. This argument is not just a fine theoretical construct. Kisin and Manela (2014) consider the impact of a 10% increase in bank equity capital and find and estimate an upper bound of 3 basis points (.03%) in the increase in the bank's cost of capital. Similarly, Kashyap, Stein and Hanson (2010) consider the impact of a 10% increase in bank capital and estimate a range of 25-45 basis points in the increase in the bank's cost of capital. Miles, Yang and Marcheggiano (2013) estimate that even if bank equity capital was doubled, bank cost of capital would

increase by 10-40 basis points. These rather modest increase in the bank cost of capital should be viewed in the context of the economic and social cost imposed on society by the financial crisis precipitated by the financial distress of the big banks.[116]

A third fallacy is that debt provides a discipline on bank managers; if the bank's debt ratio decreases this discipline effect would be diluted. Some finance academics have constructed theoretical models to illustrate the above argument. However, there is not a single empirical study which documents that debt provides discipline on bank managers in large *publicly-held* banks. Indeed, the financial collapse of the too-big-to-fail banks (that had debt ratio upwards of 95%) in 2008 is prima facie evidence inconsistent with the argument that debt provides discipline on bank managers. If debtholders in banks with 95% debt ratio could not or would not impose discipline on bank managers, when would debtholders impose such discipline?[117] Kaplan and Stromberg (2008) and Gompers, Kaplan and Mukharlyamov (2014) document the discipline effect of debt in *privately-held* companies (subsequent to a going-private transaction sponsored by a private equity investor). The equity ownership structure in these newly privately-held companies is significantly different from that in large publicly-held banks; specifically, subsequent to a going-private transaction, equity is extremely concentrated in the newly privately-held company.

The fourth fallacy: The return on equity (ROE) decreases as a bank is financed with more equity capital. A bank's return on assets (ROA) is a value-weighted average of the return on equity and the return on debt. Most introductory corporate finance textbooks have a simple proof and illustration of the fact that ROE has a linear relationship with ROA. The

linear relationship becomes steeper as the company (bank) is financed with less equity; please see Figure 10.1. As the figure illustrates, during good times when ROA is on the high side: for a given ROA, ROE is higher for banks financed with more debt. However, during not-so-good times, when ROA is on the low side: for a given ROA, ROE is *lower* for banks financed with more debt. From the shareholder viewpoint it is ROA that matters, not ROE.[118] Why would banks care about ROE? While bank shareholders might not care, bank managers whose incentive compensation was dependent on ROE would care. The Restricted Equity proposal noted above would focus the manager's attention on creating long-term shareholder value, and not on ROE that reflects short-term performance.

A fifth fallacy is that more banking activities would move to the shadow banking system if banks have to adhere to high equity capital ratio requirements.[119] The shadow banking system consists of financial intermediaries that performed functions similar to traditional banks – maturity, credit, and liquidity transformation; money market mutual funds, and special purpose vehicles (used for securitization) are examples of such intermediaries. They borrowed short-term and invested in long-term illiquid assets; they were also highly leveraged. However, unlike the traditional banks, they did not have access to deposit insurance or central bank liquidity guarantees until 2008. Most of the shadow banks were off-balance sheet vehicles of the traditional big banks. If the traditional big banks were to bring these off-balance sheet vehicles on their balance sheet, they would need additional equity capital to meet their equity capital ratio requirements. Big bank managers whose incentive compensation had a significant return on equity component would prefer the high leverage of

the off-balance sheet vehicles since this would magnify the impact of these vehicles' earnings (at the time these vehicles were created and subsequently) on the return on equity of the traditional bank. While the big bank managers could benefit significantly from the off-balance sheet vehicles, it is unclear how the big bank shareholders might benefit from these off-balance sheet vehicles; shareholders care about projects/strategies that create and sustain long-term shareholder value, not return on equity. Ultimately, as we saw in 2008, these off-balance sheet vehicles imposed a significant cost on the big bank shareholders and the U.S. taxpayers. Under our Restricted Equity bank manager incentive compensation proposal, and Restricted-Equity-More-Equity-Capital proposal, bank managers can create off-balance sheet vehicles *if they so choose*, however; they will not have the incentive to create such off-balance sheet vehicles unless these vehicles are value-enhancing (in the positive NPV sense) investment projects that sustain their value in the long-run. Our Restricted Equity bank manager incentive compensation proposal, coupled with the Restricted-Equity-More-Equity-Capital proposal, provides a powerful disincentive to bank managers from creating off-balance sheet vehicles that may generate some short-term profits but are value-destroying (in the negative NPV sense) in the long-run.

In essence, the parade of horribles is the parade of non sequiturs.

Chapter 11: Conclusion

Before stating our conclusions, it is important to note that executive compensation reform and bank capital reform are not a panacea. While some have argued that incentives generated by executive compensation programs led to excessive risk-taking by banks contributing to the 2008 financial crisis, there are more important causes of the financial and economic crisis that started in 2008. For example, as detailed in chapter 2, public policies regarding home mortgage, whose goal was to increase home ownership by those who could not otherwise afford it is perhaps the single most important cause of the financial and economic crisis of 2008; see Wallison (2015).

Our focus in this paper, however, is on the executive compensation structure at the largest U.S. financial institutions during the 2000s. We study the executive compensation structure in the largest 14 U.S. financial institutions during 2000-2008, and compare it with that of CEOs of 37 U.S. banks that neither sought nor received TARP funds. We focus on the CEO's buys and sells of their bank's stock, purchase of stock via option exercise, and their salary and bonus during 2000-2008. We consider the capital losses these CEOs incur due to the dramatic share price declines in 2008. We compare the shareholder returns for these 14 TBTF banks and the 37 No-TARP banks. We consider three measures of risk-taking by these banks: the bank's Z-score, the bank's asset write-downs, and whether or not a bank borrows capital from various Fed bailout programs, and the amount of such capital. Finally, we implement a battery of robustness checks including construction of a Tobit model of expected CEO trading based on

the extant literature on insider and CEO trading; we estimate abnormal CEO trading based on the above Tobit model.

We find that TBTF bank CEOs were able to realize a significantly larger amount on their equity by sales in the pre-crisis period (2000-2007), compared to the large losses the executives experienced on their equity stake during the crisis (2008). Additionally, stock sales by TBTF bank CEOs was significantly greater than stock sales of No-TARP banks in the pre-crisis period in both an absolute and relative sense (controlling for beginning of period holdings). Finally, several different bank risk-taking measures suggest that TBTF banks were significantly riskier than No-TARP banks. Our results are mostly consistent with and supportive of the findings of Bebchuk, Cohen and Spamann (2010), that is, managerial incentives matter - incentives generated by executive compensation programs are positively correlated with excessive risk-taking by banks in high-risk but value reducing investment and trading strategies. Also, our results are generally not supportive of the conclusions of Fahlenbrach and Stulz (2011) that the poor performance of banks during the crisis was the result of unforeseen risk.

Based on our empirical analysis of the compensation structures at 100 of the largest U.S. financial institutions, we recommend the following compensation structure for senior bank executives: Executive incentive compensation should only consist of restricted stock and restricted stock options – restricted in the sense that the executive cannot sell the shares or exercise the options for one to three years after their last day in office. This will more appropriately align the long-term incentives of the senior executives with the interests of the

stockholders. The above incentive compensation proposal is developed and detailed in Bhagat and Romano (2009, 2010) and Bhagat, Bolton and Romano (2014), and is consistent with several recent theoretical papers which suggest that a significant component of incentive compensation should consist of stock and stock options with long vesting periods; for example, see Edmans et al (2010), and Peng and Roell (2009). If these vesting periods were "sufficiently long" they would be similar to the above proposal.

The above incentive compensation proposal logically leads to a complementary proposal regarding a bank's capital structure: The high leverage implied by debt ratios in the order of 95% (as was the case for many large banks in 2008) will magnify the impact of losses on equity value. As banks' equity values approach zero (as they did for some banks in 2008), equity based incentive programs lose their effectiveness in motivating managers to enhance shareholder value. Additionally, our evidence suggests that bank CEOs sell significantly greater amounts of their stock as the bank's equity-to-capital ratio decreases. Hence, for equity based incentive structures to be effective, banks should be financed with considerably more equity than they are being financed currently.

Specifically, our bank capital proposal has two components: First, bank capital should be calibrated to the ratio of tangible common equity to total assets (i.e., to total assets independent of risk). Second, bank capital should be at least 20% of total assets. Our recommendation for significantly greater equity in a bank's capital structure is consistent with the recent recommendations of Admati and Hellwig (2013) and Fama (2010).[120]

Greater equity financing of banks coupled with the above compensation structure for bank managers and directors will drastically diminish the likelihood of a bank falling into financial distress. This will effectively address two of the more significant challenges facing the implementation of the Dodd-Frank Act: (1) The too-big-to-fail problem. Regulators and their critics have observed that implementation of the Dodd-Frank Act may have institutionalized the too-big-to-fail aspect of the largest U.S. banks. Policymakers note that too-big-to-fail banks are here to stay and are proposing explicit or implicit taxes on banks above a certain threshold size. The major problem with the too-big-to-fail banks is exactly that – they are "too big to fail." Under our proposal (of greater equity financing of banks coupled with the compensation structure for bank managers and directors that discourages managers from undertaking high-risk investments that are value destroying, instead focuses their attention on creating and sustaining long-term shareholder value), managers (and directors) would not want to grow the bank to a size (or, manage a bank of a size) that jeopardizes the solvency/financial viability of the bank for that would also jeopardize the value of their restricted stock and restricted stock options that they own and cannot sell until some years after they leave the bank. Furthermore, greater equity capitalization of the banks would provide a cushion against investments that ex ante were value-enhancing, but, ex post, were value-reducing. (2) The Volcker Rule essentially prohibits/discourages proprietary trading by too-big-to-fail banks. The problem in implementing the Volcker Rule is in defining and identifying trades that are proprietary (where profits/losses accrue to the bank) versus trades a bank makes in its normal course of business to serve a particular client. Under our proposal (of greater equity financing of banks coupled with the above compensation structure for bank managers and directors), managers (and directors)

would not want to engage in proprietary trades that jeopardizes the solvency/financial viability of the bank for that would also jeopardize the value of their restricted stock and restricted stock options that they own and cannot sell until some years after they leave the bank. Furthermore, greater equity capitalization of the bank would provide a cushion against proprietary trades that do not turn out well for the bank.

Two aspects of our incentive compensation proposal need emphasis: This proposal, unlike most other executive compensation reform proposals, does *not* place a ceiling on executive compensation. The proposal only limits the annual *cash* payouts an executive can realize. The *present value* of all salary and stock compensation can be higher than bank managers have received historically, as the amount of restricted stock and restricted stock options that can be awarded to a bank manager is essentially unlimited per our proposal; though, in practice, the award amounts should and needs to be anchored to the current practices in the particular company. Of course, the higher value would only be realized were they to invest in projects that lead to value creation that persists in the long-term, in which case we have a win for long-term investors and a win for managers. Also, a focus on creating and sustaining long-term shareholder value would minimize the likelihood of a bailout which would be a win for taxpayers. Finally, we note that the incentive compensation proposal and the bank equity capitalization proposal rely only on the private incentives and actions of bank managers, bank directors, and bank institutional investors. More specifically, our proposals do *not* rely on additional regulations.

While our focus here is on banks, the incentives generated by the above compensation structure would be relevant for maximizing long-term shareholder value in other industries. Hence, corporate board compensation committees and institutional investors in firms in other *non-financial* industries should also give the above executive incentive compensation structure serious consideration. Finally, we suggest that *directors* in both financial and non-financial companies should adopt a similar incentive compensation structure with regard to their own incentive compensation.

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Table 2.1: Loan characteristics at origination

	Prime Loans				Subprime Loans			
	2004	**2005**	**2006**	**2007**	**2004**	**2005**	**2006**	**2007**
% default in first 12 months	2%	2%	4%	5%	11%	16%	24%	25%
% default in first 18 months	4%	8%	8%	7%	16%	24%	35%	34%
				At 12 months since origin				
Loan sold to GSE	74%	71%	72%	83%	4%	6%	9%	40%
Loan sold to private securitizer	19%	24%	23%	11%	91%	92%	89%	55%
Loan held on portfolio	7%	6%	5%	6%	5%	2%	3%	5%

Source: Federal Reserve Bank of Chicago (2010)

Table 4.1: Testable implications of the Managerial Incentives Hypothesis and Unforeseen Risk Hypothesis

Panel A: Testable implication regarding *Net CEO Payoff*

	Manager Incentives	***Net CEO Payoff* during financial crisis *and* period prior to the crisis**
Managerial Incentives Hypothesis	Acting in own self-interest sometimes dissipating long-term shareholder value	+
Unforeseen Risk Hypothesis	Manager consistently acting to enhance long-term shareholder value	-

Net CEO Payoff during 2000-2008 is (A) + (B) + (C)

(A) *CEO Payoff* during 2000-2008 from *Net Trades* in their own company's stock.

(B) Total cash compensation (salary plus bonus) during 2000-2008.

(C) Estimated value lost by the manager from the decrease in the value of their beneficial holding during 2008.

Panel B: Testable implication regarding CEO's *Net Trades*

	Manager Incentives	**CEO's *Net Trades* during financial crisis *and* period prior to the crisis**
Managerial Incentives Hypothesis	Acting in own self-interest sometimes dissipating long-term shareholder value	Abnormally large
Unforeseen Risk Hypothesis	Manager consistently acting to enhance long-term shareholder value	Normal

"Normal" CEO's *Net Trades* are with reference to CEOs of banks that did not seek government bailout funds. Additionally, we construct a Tobit model of expected CEO trading based on the extant literature on insider and CEO trading.

Table 5.1: Selected descriptive statistics

This table presents the mean and median dollar amount of Assets and Market Capitalization as of the end of 2000, 2006 and 2008 for each of the three primary samples: the 14 TBTF firms, the 49 L-TARP firms, and the 37 No-TARP firms.

	END OF 2000		END OF 2006		END OF 2008	
	Assets (000s)	Market Capitalization (000s)	Assets (000s)	Market Capitalization (000s)	Assets (000s)	Market Capitalization (000s)
TBTF Sample (n=14)						
Mean	$326,499,343	$73,627,243	$733,089,630	$98,809,110	$1,072,356,700	$47,368,914
Median	281,093,000	48,122,194	670,873,000	80,444,709	872,482,500	33,746,034
L-TARP Sample (n=49)						
Mean	$23,088,619	$4,996,060	$48,612,142	$9,146,771	$43,454,635	$3,570,823
Median	5,919,657	1,472,203	11,157,000	1,959,887	13,552,842	1,413,087
No-TARP Sample (n=37)						
Mean	$16,803,982	$2,776,577	$32,386,871	$5,117,365	$23,498,223	$1,694,581
Median	5,162,983	1,136,433	11,558,206	2,021,643	8,353,488	1,166,516

TBTF refers to the 14 too-big-to-fail financial institutions including Bank of America, Bank of New York Mellon, Citigroup, Goldman Sachs, JP Morgan Chase, Morgan Stanley, State Street, Wells Fargo, Merrill Lynch, Bear Stearns, Lehman Brothers and AIG. L-TARP includes 49 lending institutions that received TARP funds several months after many of the TBTF banks received the TARP funds. No-TARP sample includes 37 lending institutions that did not receive TARP funds.

Table 5.2: Trades by CEOs during 2000-2008. This table presents the stock ownership, trading, and compensation information for the CEOs of the 14 identified firms during 2000-2008. Panel A presents the trades by firm. Panel B presents the trades by year, summing all 14 firms' trades. The Value of Buys and Value of Sales represent the cumulative cash flows realized through stock acquisitions or dispositions during the period. The Value of Option Exercises represents the cost of acquiring stock through exercising options, and is calculated as number of options acquired multiplied by exercise price. The Value of Net Trades is the Value of Buys and Value of Option Exercises, subtracted from the Value of Sales. The Ratio of Net Trading to Post Trade Form 4 Holdings represents the ratio of stock traded to the amount of stock owned following each trade, based on the information disclosed on the Form 4 filing with the SEC.

Table 5.2, Panel A: Trades by CEOs during 2000-20008, by firm

Company	# of Buys	# of Option Exercises	# of Sales	Value of Buys	Value of Option Exercises	Value of Sales	Value of Net Trades: (Sales - Buys) 2000-2008	Ratio of Net Trading to Post-Trade Form 4 Holdings (Average Across Years)
AIG	1	14	0	$10,568	$7,392,620	$0	($7,403,188)	0.0%
Bank of America	11	17	292	2,129,776	197,404,497	223,725,511	24,191,238	27.8%
Bank of New York	29	26	566	128,480	21,877,806	77,786,666	55,780,380	15.1%
Bear Stearns	0	0	15	0	0	243,053,692	243,053,692	4.2%
Citigroup	9	43	99	8,430,672	763,368,027	947,325,315	175,526,616	18.4%
Countrywide Financial	0	267	274	0	128,199,209	530,143,206	401,943,997	55.1%
Goldman Sachs	0	0	15	0	0	40,475,735	40,475,735	1.4%
JP Morgan Chase	8	12	24	11,069,195	60,518,375	101,074,462	29,486,892	11.9%
Lehman Brothers	1	15	304	19,272	150,274,172	578,502,379	428,208,935	24.2%
Mellon Financial	11	32	65	3,311,837	10,308,283	30,287,267	16,667,147	8.5%
Merrill Lynch	1	8	69	11,250,000	6,323,804	95,478,463	77,904,659	16.0%
Morgan Stanley	0	15	46	0	62,173,905	150,980,730	88,806,825	6.8%
State Street	0	6	178	0	13,500,127	37,995,090	24,494,963	18.3%
Wells Fargo	2	15	101	50,841	238,266,366	410,583,053	172,265,846	32.4%
ALL FIRMS	**73**	**470**	**2,048**	**$36,400,641**	**$1,659,607,191**	**$3,467,411,569**	**$1,771,403,737**	**15.3%**

Table 5.2, Panel B: Trades by CEOs during 2000-2008, by year

YEAR	# of Buys	# of Option Exercises	# of Sales	Value of Buys	Value of Option Exercises	Value of Sales	Value of Net Trades: (Sales - Buys) 2000-2008	Ratio of Net Trading to Post-Trade Form 4 Holdings (Average Across Years)
2000	2	45	81	$4,671	$707,882,633	$962,970,443	$255,083,139	38.6%
2001	2	22	43	14,968	35,859,131	153,851,211	117,977,112	9.2%
2002	6	20	83	585,334	60,407,064	124,253,270	63,260,872	4.3%
2003	5	42	213	23,361	92,537,722	295,147,013	202,585,930	8.6%
2004	5	41	240	22,674	98,441,507	265,625,885	167,161,704	11.0%
2005	9	110	529	187,256	102,993,845	577,315,758	474,134,657	15.3%
2006	11	84	430	2,912,955	428,598,544	575,492,859	143,981,360	14.3%
2007	9	100	399	485,323	119,857,907	428,158,406	307,815,176	14.1%
2008	24	6	30	32,164,099	13,028,838	84,596,724	39,403,787	31.2%
ALL YEARS	**73**	**470**	**2,048**	**$36,400,641**	**$1,659,607,191**	**$3,467,411,569**	**$1,771,403,737**	**15.3%**

Table 5.3: CEO Payoff, TBTF institutions

This table presents the cash flows realized by each firm's CEO during the relevant period through stock trades and cash compensation, as well as the Estimated Value Lost in 2008 and the Estimated Value Remaining in 2008. Panel A presents cash flows for 2000-2008. Panel B presents cash flows for 2002-2008. Panel C presents cash flows for 2004-2008. The Value of Stock Holdings at the beginning of each period represents the dollar value of stock beneficially owned by the CEO at that time. Note that this value only pertains to the owner who was CEO at that time; no adjustments are made to this number for subsequent CEO changes. This number is presented for perspective only, and is not included in any calculations performed within this table. Column (A) shows the dollar value of Total Net Trades made by each CEO during the period. Total Net Trades are Sales less Buys and Option Exercises. Column (B) shows the dollar value of cash compensation the CEO received through Salary and Bonus payments. The *CEO Payoff* Column is the sum of Columns (A) and (B), and represents the realized cash gains to the CEO. The *Estimated Value Lost*: 2008 is shown in Column (C). This column estimates the dollar value of beneficial ownership each CEO lost during 2008. It is calculated by subtracting the net shares sold during the year from the number of shares beneficially owned at the beginning of the year to estimate the number of shares owned at the end of the year. This number is then adjusted by the decrease (or increase) in the firm's stock price during 2008. The *Net CEO Payoff* Column sums Columns (A), (B) and (C), or CEO Payoff less Estimated Value Lost: 2008. The final column shows the Estimated Value Remaining: End of 2008, which is calculated by multiplying the estimated number of shares owned at the end of the year (based on the Column (C) calculation) by the stock price at the end of the year. This number is based off of the beginning of 2008 beneficial ownership, adjusted by intra-year transactions, and does not include stock gifts or compensation grants received during the year.

Because not all 14 firms were independent going-concerns throughout 2008, several assumptions are necessary. The following notes relate to unique situations concerning Estimated Value Lost during 2008 and Estimated Value Remaining at the end of 2008 at four firms:

(1) For purposes of calculating Estimated Value Lost and Estimated Value Remaining, Bear Stearns' ending 2008 stock price is assumed to be $9.35, or the estimated price JP Morgan Chase paid per share on June 2, 2008.
(2) Countrywide Financial was acquired by Bank of America in July 2008. Countrywide did not file a 2008 10-K or proxy statement. No information is available about Cash Compensation for CEO Angelo Mozilo for 2008, so it is set at $0 for the year. Estimated Value Lost is based on Mozilo's estimated stock holdings at the beginning of the year and the change in Countrywide Financial stock price through June 30, 2008. Estimated Value Remaining is based on Mozilo's estimated holdings in Countrywide as of June 30, 2008.
(3) Lehman Brothers filed for bankruptcy on September 15, 2008. For purposes of calculating Estimated Value Lost and Estimated Value Remaining, Lehman Brothers' ending 2008 stock price is assumed to be $0.
(4) Mellon Financial was acquired by Bank of New York in July 2007. Mellon did not file a 2007 10-K or proxy statement. No information is available about Cash Compensation for CEO Robert Kelly for 2007, so it is set at $0 for the year. Estimated Value Lost is based on Kelly's estimated stock holdings at the beginning of the year and the change in Mellon Financial stock price through June 30, 2007. Estimated Value Remaining is based on Kelly's estimated holdings in Mellon as of June 30, 2007.

Table 5.3, Panel A: 2000-2008 CEO Payoff

Company	Value of Stock Holdings: Beginning of 2000	Total Net Trades: 2000-2008 (A)	Total Cash Compensation: 2000-2008 (B)	CEO Payoff (Realized Cash Gains): 2000-2008 (A)+(B)	Estimated Value Lost (Unrealized Paper Loss):2008 (C)	Net CEO Payoff: 2000-2008 (A)+(B)+(C)	Estimated Value Remaining: End of 2008
AIG	$3,288,184,509	($7,403,188)	$53,000,338	$45,597,150	($20,052,183)	$25,544,967	$554,943
Bank of America	42,931,341	24,191,238	41,645,833	65,837,071	(124,620,911)	(58,783,840)	64,557,116
Bank of New York	35,277,000	55,780,380	62,187,998	117,968,378	(13,609,007)	104,359,371	18,871,423
Bear Stearns (1)	299,219,861	243,053,692	83,528,081	326,581,773	(324,691,895)	1,889,878	38,385,395
Citigroup	1,217,275,401	175,526,616	85,156,839	260,683,455	(38,914,762)	221,768,693	11,487,816
Countrywide Financial (2)	66,775,746	401,943,997	90,211,728	492,155,725	(114,773,127)	377,382,598	104,005,498
Goldman Sachs	371,469,755	40,475,735	91,489,574	131,965,309	(257,534,257)	(125,568,948)	166,334,884
JP Morgan Chase	107,767,012	29,486,892	83,361,250	112,848,142	(105,420,736)	7,427,406	274,250,479
Lehman Brothers (3)	263,173,216	428,208,935	56,700,000	484,908,935	(796,322,784)	(311,413,849)	0
Mellon Financial (4)	26,402,150	16,667,147	19,208,205	35,875,352	1,212,310	37,087,662	28,833,326
Merrill Lynch	199,120,374	77,904,659	89,407,692	167,312,351	(20,192,048)	147,120,303	6,583,385
Morgan Stanley	840,975,081	88,806,825	69,103,887	157,910,712	(144,474,839)	13,435,873	62,513,526
State Street	26,501,303	24,494,963	20,767,340	45,262,303	(51,530,173)	(6,267,870)	48,404,149
Wells Fargo	133,412,007	172,265,846	45,468,535	217,734,381	(2,758,746)	214,975,635	114,546,238
ALL FIRMS	**$6,846,638,948**	**$1,771,403,737**	**$891,237,300**	**$2,662,641,037**	**-$2,013,683,157**	**$648,957,880**	**$939,328,179**

Table 5.3, Panel B: 2002-2008 CEO Payoff

Company	Value of Stock Holdings: Beginning of 2002	Total Net Trades: 2002-2008 (A)	Total Cash Compensation: 2002-2008 (B)	CEO Payoff (Realized Cash Gains): 2002-2008 (A)+(B)	Estimated Value Lost (Unrealized Paper Loss): 2008 (C)	Net CEO Payoff: 2002-2008 (A)+(B)+(C)	Estimated Value Remaining: End of 2008
AIG	$3,594,451,657	($5,382,707)	$46,000,338	$40,617,631	($20,052,183)	$20,565,448	$554,943
Bank of America	91,786,388	23,366,558	32,612,500	55,979,058	(124,620,911)	(68,641,853)	64,557,116
Bank of New York	142,638,677	52,035,882	41,392,260	93,428,142	(13,609,007)	79,819,135	18,871,423
Bear Stearns (1)	430,959,258	217,312,893	62,189,373	279,502,266	(324,691,895)	(45,189,629)	38,385,395
Citigroup	1,644,100,384	11,947,821	47,685,677	59,633,498	(38,914,762)	20,718,736	11,487,816
Countrywide Financial (2)	113,447,815	399,466,126	78,693,417	478,159,543	(114,773,127)	363,386,416	104,005,498
Goldman Sachs	370,810,790	40,475,735	64,682,474	105,158,209	(257,534,257)	(152,376,048)	166,334,884
JP Morgan Chase	127,334,850	25,590,073	66,080,000	91,670,073	(105,420,736)	(13,750,663)	274,250,479
Lehman Brothers (3)	447,312,706	349,144,912	42,450,000	391,594,912	(796,322,784)	(404,727,872)	0
Mellon Financial (4)	39,351,461	8,367,088	14,833,205	23,200,293	1,212,310	24,412,603	28,833,326
Merrill Lynch	232,105,475	52,421,714	71,457,692	123,879,406	(20,192,048)	103,687,358	6,583,385
Morgan Stanley	344,463,808	43,321,434	47,328,887	90,650,321	(144,474,839)	(53,824,518)	62,513,526
State Street	114,098,116	19,329,608	16,106,995	35,436,603	(51,530,173)	(16,093,570)	48,404,149
Wells Fargo	194,214,701	160,946,349	35,603,535	196,549,884	-(,758,746)	193,791,138	114,546,238
ALL FIRMS	**$7,887,076,084**	**$1,398,343,486**	**$667,116,353**	**$2,065,459,839**	**-$2,013,683,157**	**$51,776,682**	**$939,328,179**

Table 5.3, Panel C: 2004-2008 CEO Payoff

Company	Value of Stock Holdings: Beginning of 2004	Total Net Trades: 2004-2008 (A)	Total Cash Compensation: 2004-2008 (B)	CEO Payoff (Realized Cash Gains): 2004-2008 (A)+(B)	Estimated Value Lost (Unrealized Paper Loss):2008 (C)	Net CEO Payoff: 2004-2008 (A)+(B)+(C)	Estimated Value Remaining: End of 2008
AIG	$3,002,954,389	($3,064,736)	$32,500,338	$29,435,602	($20,052,183)	$9,383,419	$554,943
Bank of America	145,346,983	(3,429,732)	18,862,500	15,432,768	(124,620,911)	(109,188,143)	64,557,116
Bank of New York	164,790,978	44,119,270	28,898,240	73,017,510	(13,609,007)	59,408,503	18,871,423
Bear Stearns (1)	551,226,148	140,090,185	40,773,191	180,863,376	(324,691,895)	(143,828,519)	38,385,395
Citigroup	84,295,049	1,889,769	39,081,666	40,971,435	(38,914,762)	2,056,673	11,487,816
Countrywide Financial (2)	465,597,033	376,914,498	46,730,652	423,645,150	(114,773,127)	308,872,023	104,005,498
Goldman Sachs	407,201,420	40,475,735	57,228,974	97,704,709	(257,534,257)	(159,829,548)	166,334,884
JP Morgan Chase	173,500,840	21,587,849	48,400,000	69,987,849	(105,420,736)	(35,432,887)	274,250,479
Lehman Brothers (3)	434,592,614	276,359,002	33,250,000	309,609,002	(796,322,784)	(486,713,782)	0
Mellon Financial (4)	63,387,356	7,115,917	10,708,205	17,824,122	1,212,310	19,036,432	28,833,326
Merrill Lynch	127,231,556	52,400,569	49,757,692	102,158,261	(20,192,048)	81,966,213	6,583,385
Morgan Stanley	339,906,794	24,729,360	33,053,887	57,783,247	(144,474,839)	(86,691,592)	62,513,526
State Street	136,857,334	14,441,482	11,053,079	25,494,561	(51,530,173)	(26,035,612)	48,404,149
Wells Fargo	360,778,278	138,867,516	19,113,535	157,981,051	(2,758,746)	155,222,305	114,546,238
ALL FIRMS	**$6,457,666,773**	**$1,132,496,684**	**$469,411,959**	**$1,601,908,643**	**-$2,013,683,157**	**-$411,774,514**	**$939,328,179**

Table 5.4: CEO trading and CEO holdings

This table compares the total CEO trading activity and CEO stock ownership by period and by sample. The three time periods are 2000-2008, 2002-2008 and 2004-2008. The three samples are the 14 TBTF firms, the 49 L-TARP firms and the 37 No-TARP firms. Net trades: calculated as all open market sales of stock less open market purchases and cost of exercising options**.**

	Total Net Trades: 2000-2008	Total Net Trades: 2002-2008	Total Net Trades: 2004-2008	Ratio of Trades to Beginning Holdings: 2000-2008	Ratio of Trades to Beginning Holdings: 2002-2008	Ratio of Trades to Beginning Holdings: 2004-2008
TBTF Firms (n=14)						
Mean	$126,528,838	$99,881,678	$80,892,620	103.4% ***	52.2% ***	23.4% **
Median	$66,842,520	$41,898,585	$32,602,548	59.7% ***	21.9% **	11.8%**
L-TARP Firms (n=49)						
Mean	$5,724,901	$4,893,079	$3,158,121	100.4% ***	19.1% *	10.2% *
Median	$1,090,134	$878,228	$561,761	17.6% *	8.4% *	3.5%*
No-TARP Firms (n=37)						
Mean	$11,826,280	$11,239,377	$9,107,443	43.9%	12.1%	-1.3%
Median	$1,226,977	$599,057	$32,818	4.0%	2.6%	0.1%

Statistical significant for difference of ratios:

* Indicates significantly different from No-TARP sample at the 10% level

** Indicates significantly different from No-TARP sample at the 5% level

*** Indicates significantly different from No-TARP sample at the 1% level

Table 5.5: Trades by All Insiders, including officers and directors, 2000-2008

This table presents the stock ownership, trading, and compensation information for the CEOs of the 14 identified firms during 2000-2008. Panel A presents the trades by firm. Panel B presents the trades by year, summing all 14 firms' trades. The Value of Buys and Value of Sales represent the cumulative cash flows realized through stock acquisitions or dispositions during the period. The Value of Option Exercises represents the cost of exercising options, calculated as number of options exercised multiplied by exercise price. Net trades: calculated as all open market sales of stock less open market purchases and cost of exercising options**.** The Ratio of Net Trading to Post Trade Form 4 Holdings represents the ratio of stock traded to the amount of stock owned following each trade, based on the information disclosed on the Form 4 filing with the SEC.

Table 5.5, Panel A: Trades by All Insiders, 2000-2008, by firm

Company	# of Buys	# of Option Exercises	# of Sales	Value of Buys	Value of Option Exercises	Value of Sales	Value of Net Trades (Sales - Buys): 2000-2008	Ratio of Net Trading to Post-Trade Form 4 Holdings (Average Across Years)
AIG	213	343	356	$845,336,054	$99,348,973	$28,607,422,695	$27,662,737,668	2.6%
Bank of America	101	179	1,929	622,740,251	491,762,285	2,599,516,805	1,485,014,269	17.5%
Bank of New York	1,018	254	2,926	577,717,648	112,548,478	5,940,553,101	5,250,286,975	8.3%
Bear Stearns	57	14	267	767,736,009	27,640,980	12,272,990,704	11,477,613,715	5.7%
Citigroup	77	520	1,268	3,197,466,366	1,528,122,839	23,688,319,446	18,962,730,241	11.7%
Countrywide Financial	20	1,077	1,241	1,155,309,803	324,718,206	8,427,583,600	6,947,555,591	11.9%
Goldman Sachs	12	7	1,950	5,547,803,152	10,090,836	37,725,387,806	32,167,493,818	12.2%
JP Morgan Chase	43	135	378	523,367,697	267,793,650	4,838,519,988	4,047,358,641	9.2%
Lehman Brothers	8	96	1,166	1,375,487,324	423,175,832	4,638,292,995	2,839,629,839	21.1%
Mellon Financial	26	207	574	145,818,377	44,642,852	1,666,696,004	1,476,234,775	7.7%
Merrill Lynch	14	75	692	519,773,797	70,775,414	2,804,184,934	2,213,635,723	14.2%
Morgan Stanley	32	114	485	615,610,159	197,124,169	9,661,073,884	8,848,339,556	5.7%
State Street	6	82	808	164,101,279	58,954,559	552,267,889	329,212,051	21.6%
Wells Fargo	44	351	647	1,086,739,992	698,093,602	5,057,961,919	3,273,128,325	16.7%
ALL FIRMS	**1,671**	**3,454**	**14,687**	**$17,145,007,908**	**$4,354,792,675**	**$148,480,771,771**	**$126,980,971,188**	**9.7%**

Table 5.5, Panel B: Trades by All Insiders, 2000-2008, by year

YEAR	# of Buys	# of Option Exercises	# of Sales	Value of Buys	Value of Option Exercises	Value of Sales	Value of Net Trades (Sales - Buys): 2000-2008	Ratio of Net Trading to Post-Trade Form 4 Holdings (Average Across Years)
2000	246	579	1,344	$4,717,183,583	$1,157,085,399	$17,019,980,683	$11,145,711,701	19.7%
2001	230	323	1,167	2,270,309,993	252,859,783	20,829,849,138	18,306,679,362	9.3%
2002	242	273	819	2,089,804,441	307,255,898	8,275,345,275	5,878,284,936	19.5%
2003	182	371	1,305	1,180,185,242	347,236,054	14,316,327,557	12,788,906,261	6.6%
2004	193	468	1,853	1,281,017,607	481,009,313	18,373,207,366	16,611,180,446	5.9%
2005	192	529	1,816	1,108,591,232	405,368,091	15,342,500,464	13,828,541,141	6.1%
2006	168	504	2,417	2,612,637,201	853,471,050	20,348,529,583	16,882,421,332	10.8%
2007	95	324	2,522	1,606,875,211	397,003,384	26,880,668,526	24,876,789,931	5.1%
2008	123	83	1,444	278,403,398	153,503,703	7,094,363,180	6,662,456,079	3.5%
ALL YEARS	**1,671**	**3,454**	**14,687**	**$17,145,007,908**	**$4,354,792,675**	**$148,480,771,771**	**$126,980,971,188**	**9.7%**

Table 5.6: Fama-French / Carhart 4-Factor Abnormal Return regressions

This table presents the summary results from Carhart (1997) 4-factor regressions performed on each of the three samples – No-TARP, L-TARP, and TBTF – as well as on arbitrage portfolios comparing the No-TARP sample to each of the others. Equally weighted portfolios are formed using daily returns for all firms within each sample. These daily portfolio returns are then regressed in the model:

$$R_{Portfolio\text{-}t} = \alpha + \beta_1(R_{Mkt}\text{-}R_f)_t + \beta_2(SMB)_t + \beta_3(HML)_t + \beta_4(UMD)_t + \varepsilon_t,$$

where $(R_{Mkt}\text{-}R_f)$ is the market factor, or the excess return on the market portfolio, SMB is the size factor, or the excess return on a portfolio long small company stocks and short large company stocks, HML is the value factor, or the excess return on a portfolio long high book-to-market stocks and short low book-to-market stocks and UMD is the momentum factor, or the excess return on a portfolio long recent winners and short recent losers. Each of these four factors is obtained from Ken French's website. Therefore, α represents the abnormal return on each of the bank portfolios after controlling for each of these four factors. $\alpha_{No\text{-}TARP}$ is the abnormal return for the 37 No-TARP firms, $\alpha_{L\text{-}TARP}$ is the abnormal return for the 49 L-TARP firms, and α_{TBTF} is the abnormal return for the 14 TBTF. Two arbitrage portfolios are formed using the bank portfolios: $\alpha_{No\text{-}TARP\ -\ TBTF}$ is the abnormal return for a portfolio long the 37 No-TARP firms and short the 14 TBTF firms, and $\alpha_{No\text{-}TARP\ -\ L\text{-}TARP}$ is the abnormal return for a portfolio long the 37 No-TARP firms and short the 49 L-TARP firms. Abnormal returns are provided for each of the three portfolios over each of three time periods: All Years, or 2000-2008, 2002-2008, and, 2004-2008. Abnormal returns are provided with robust t-statistics below in parentheses.

		Abnormal Returns: *No-TARP - TBTF*		
		$\alpha_{No\text{-}TARP}$	α_{TBTF}	$\alpha_{No\text{-}TARP\ -\ TBTF}$
(1)	**All Years, Daily**	0.033	-0.002	0.035
		(1.90)	*(0.09)*	*(2.45)*
(2)	**2002-2008, Daily**	0.023	-0.021	0.043
		(2.20)	*(0.77)*	*(2.64)*
(3)	**2004-2008, Daily**	0.021	-0.030	0.051
		(1.91)	*(0.89)*	*(2.66)*

		Abnormal Returns: *No-TARP - L-TARP*		
		$\alpha_{No\text{-}TARP}$	$\alpha_{L\text{-}TARP}$	$\alpha_{No\ TARP\ -\ L\text{-}TARP}$
(1)	**All Years, Daily**	0.033	0.005	0.028
		(1.90)	*(0.24)*	*(2.48)*
(2)	**2002-2008, Daily**	0.023	-0.001	0.023
		(2.20)	*(0.04)*	*(1.89)*
(3)	**2004-2008, Daily**	0.021	-0.005	0.025
		(1.91)	*(0.17)*	*(1.62)*

Table 5.7: Risk factors, Z-score and write-downs

This table presents statistics on the Z-score for each subsample as of the end of 2007 in column (1). This table presents the statistics on the cumulative firm write-downs during 2007 and 2008 for each subsample in column (3) and the ratio of cumulative write-downs during 2007 and 2008 to end-of-2007 Total Assets in column (4). Column (2) shows the statistical significance of the differences of Z-score of the TBTF and L-TARP subsamples relative to the No-TARP subsample. Column (5) shows the statistical significance of the differences of write-downs-to-Assets of the TBTF and L-TARP subsamples relative to the No-TARP subsample. * indicates statistically different ratios at the 10% level, ** indicates statistically different ratios at the 5% level, and *** indicates statistically different ratios at the 1% level.

	(1)	(2)	(3)	(4)	(5)
	Z-Score	*vs. No-TARP sample*	**Write-down ($M)**	**Write-down-to-Assets**	*vs. No-TARP sample*
TBTF Firms (n=14)					
# Total Amount ($M)	-		$293,035.0	-	
Average	19.947	***	$22,541.2	3.760%	***
25th Percentile	8.919		$6,039.0	1.748%	***
Median	19.756	*	$19,872.0	3.264%	***
75th Percentile	24.446	***	$33,100.0	5.133%	***
L-TARP Firms (n=49)					
# Total Amount ($M)	-		$158,777.4	-	
Average	26.242	**	$3,240.4	5.635%	***
25th Percentile	10.862	**	$158.9	1.992%	***
Median	20.972		$410.2	3.425%	***
75th Percentile	39.146	***	$1,143.0	6.334%	***
No-TARP Firms (n=37)					
# Total Amount ($M)	-		$64,016.2	-	
Average	31.359		$2,207.5	14.829%	
25th Percentile	8.506		$44.1	0.473%	
Median	21.994		$81.2	1.444%	
75th Percentile	51.420		$794.1	2.608%	

Table 5.8: Determinants of CEO trading

This table presents the results from a Tobit estimation of the determinants of CEO *Net Trades* for 2000-2008. The dependent variable is *Net Trades*, or (stock sales – stock purchases – option exercises). *Assets* are the natural logarithm of current year assets. *Book-to-market* ratio is the book value of equity divided by market value of equity for the current year. *Return* is the annual stock return for the prior year. *Stock Volatility* is the standard deviation of daily stock returns for the current year. *CEO Total Compensation* is the natural logarithm of all cash and equity compensation in the prior year. *% CEO Equity Compensation* is the amount of equity compensation divided by total compensation for the prior year. *CEO Stock Holdings* is the natural logarithm of the dollar value of the CEO's beneficial stock ownership at the end of the prior year. *TBTF Dummy* is equal to 1 if the firm is one of the 14 TBTF firms and 0 otherwise. *L-TARP Dummy* is equal to 1 if the firm in one of the 49 Later-TARP firms and 0 otherwise. Model includes intercepts, year dummy variables and firm fixed effects, not tabulated for conciseness. Coefficients are presented with p-values in parentheses. Statistical significance is denoted by * for 10%, ** for 5% and *** for 1%.

$$Net\ Trades_{i,t} = Assets_{i,t} + Book\text{-}to\text{-}Market_{i,t} + Stock\ Return_{i,t-1} + Stock\ Volatility_{i,t} + CEO\ Total\ Compensation_{i,t-1} + \%\ CEO\ Equity\ Compensation_{i,t-1} + CEO\ StockHoldings_{i,t-1} + TBTF\ Dummy_i + L\text{-}TARP\ Dummy_i$$

	Dependent variable: ***Net Trades$_t$***
Assets (log) $_t$	-1.232***
	(0.003)
Book-to-Market $_t$	-4.154***
	(0.002)
Return $_{t-1}$	-0.179
	(0.904)
Stock Volatility $_t$	58.793*
	(0.086)
CEO Total Compensation $_{t-1}$	2.170***
	(0.001)
CEO % Equity Compensation $_{t-1}$	9.649***
	(0.000)
CEO Equity Holdings (log) $_{t-1}$	1.384***
	(0.000)
TBTF Dummy	**4.198****
	(0.019)
L-Tarp Dummy	1.547
	(0.117)
Number of Observations	883
Year controls	Yes
Firm fixed-effects	Yes

Table 6.1: Restricted Equity Proposal's impact on Net CEO Payoff
Panel A: No adjustment to compensation, Different (5%, 10%, 15%) limits on stock sales. Net trades: calculated as all open market sales of stock less open market purchases and cost of exercising options**.**

	Value of Stock Holdings: Beginning of 2000	Total Net Trades: 2000-2008 (A)	Total Cash Compensation: 2000-2008 (B)	CEO Payoff: 2000-2008 (A)+(B)	Estimated Value Lost: 2008 (C)	Net CEO Payoff: 2000-2008 (A)+(B)+(C)
TBTF Firms (n=14) no limit on compensation or sales						
Mean Values	$494,177,483	$126,528,838	$63,659,807	$190,188,646	($143,834,511)	$46,354,134
Median Values	$166,266,190	$66,842,520	$65,645,943	$144,938,011	($78,475,455)	$19,490,420
TBTF Firms - 5% limit on sales						
Mean Values	$494,177,483	$74,388,500	$63,659,807	$138,048,308	($252,191,109)	($114,142,802)
Median Values	$166,266,190	$43,950,140	$65,645,943	$127,101,247	($142,463,456)	($11,082,266)
TBTF Firms - 10% limit on sales						
Mean Values	$494,177,483	$91,236,910	$63,659,807	$154,896,717	($240,128,970)	($85,232,253)
Median Values	$166,266,190	$52,585,347	$65,645,943	$134,258,269	($134,639,108)	($1,003,982)
TBTF Firms - 15% limit on sales						
Mean Values	$494,177,483	$115,188,624	$63,659,807	$178,848,431	($226,036,842)	($47,188,411)
Median Values	$166,266,190	$64,050,260	$65,645,943	$141,392,724	($129,640,367)	$11,908,780

Table 6.1: Restricted Equity Proposal's impact on Net CEO Payoff Panel B: Annual compensation limited to $2 million (remaining cash compensation assumed as paid in stock), Different (5%, 10%, 15%) limits on stock sales. Net trades: calculated as all open market sales of stock less open market purchases and cost of exercising options**.**

	Value of Stock Holdings: Beginning of 2000	Total Net Trades: 2000-2008 (A)	Total Cash Compensation: 2000-2008 (B)	CEO Payoff: 2000-2008 (A)+(B)	Estimated Value Lost: 2008 (C)	Net CEO Payoff: 2000-2008 (A)+(B)+(C)
TBTF Firms (n=14) no limit on compensation or sales						
Mean Values	$494,177,483	$126,528,838	$63,659,807	$190,188,646	($143,834,511)	$46,354,134
Median Values	$166,266,190	$66,842,520	$65,645,943	$144,938,011	($78,475,455)	$19,490,420
TBTF Firms - 5% limit on sales & annual cash compensation limit of $2m						
Mean Values	$494,177,483	$77,169,748	$14,916,148	$92,085,896	($271,361,890)	($179,275,994)
Median Values	$166,266,190	$48,961,305	$14,586,768	$64,826,910	($150,349,823)	($99,085,632)
TBTF Firms - 10% limit on sales & annual cash compensation limit of $2m						
Mean Values	$494,177,483	$96,361,808	$14,916,148	$111,277,956	($255,361,804)	($144,083,848)
Median Values	$166,266,190	$55,316,891	$14,586,768	$71,036,125	($139,025,867)	($20,036,816)
TBTF Firms - 15% limit on sales & annual cash compensation limit of $2m						
Mean Values	$494,177,483	$117,028,234	$14,916,148	$131,944,382	($230,025,197)	($98,080,815)
Median Values	$166,266,190	$66,163,971	$14,586,768	$82,694,813	($132,158,964)	$6,254,813

Table 7.1: Director Stock Ownership Requirements for S&P 500 firms during 2003 and 2005.

	2003			2005		
	Number of Firms	Mean Req.	Median Req.	Number of Firms	Mean Req.	Median Req.
Multiple of Retainer Requirement	75	3.57	3	127	3.66	3
Multiple of Cash Retainer Requirement	14	4	5	50	4.08	5
Share Ownership Requirement (000 shares)	50	5.46	5	83	7.13	5
Dollar Value of Holdings Requirement ($000)	15	$131	$100	33	$200	$200
Multiple of Shares Received as Compensation	9	1.89	1	14	2.29	1
Multiple of Total Director Compensation	3	1	1	4	1	1
Other Policy	30			17		

Note: This table provides a summary of stock ownership requirements for the S&P500 firms that disclosed a policy during the years 2003 and 2005. Multiple of Retainer Requirement is defined as a policy requiring directors to hold a multiple of X times their annual retainer. Multiple of Cash Retainer Requirement is a policy requiring directors to hold a multiple X times their annual cash retainer. Share Requirement is given in thousands of shares and indicates a policy requiring directors to own a fixed number of shares. Dollar Value of Holdings Requirement indicates a policy requiring directors to hold a fixed dollar value of shares in the firm. Multiple of Shares Received as Compensation requires directors to hold a multiple of shares that they receive as compensation. Multiple of Total Director Compensation requires directors to hold a multiple of their total annual compensation. Other Policy relates to options holdings, caps on holding requirements and requirements that govern accumulated holdings (over multiple years). The sum of the "number of firms" column, indicating the number of firms with each type of policy, is greater than the total number of firms with ownership policies due to cases in which there exist multiple policies for a single firm.

Table 7.2 Examples of Ten S&P 500 Firms with Director Ownership Guidelines (2005)

Company	Guideline	Time Horizon	Notes
3M	2x annual retainer	within 3 years	
Abbott Labs	5000 Shares	within 5 years	Includes restricted units
ADC Telecommunications	"Directors are encouraged to own stock of the Company to align more closely their interest with those of the shareholders in general"		Does not fall under ownership requirement definition used in this paper because ownership is "encouraged" (not required).
Adobe Systems	5000 Shares	Within two years: Requirement is "25% of net shares acquired from Adobe for 2 years unless, following the sale of such shares, his/her total shares exceeds 5000"	
AES Corp	10000 Units		Includes options, stock, or restricted units. Dollar value calculated is based on stock ownership.
Aetna	Value equal to $400,000	Met within 5 years of appointment	
Affiliated Computer	Class A stocks with value equal to min 3x annual retainer	Met within 3 years for all directors; new directors within 5 years.	
Agilent Techonolgies	Value of 3x annual cash retainer		
Alberto Culver	At least $100,000 in common stock		
Alcoa	At least 10,000 shares		

Table 7.3 Firm Performance, and Director Dollar Value of Holdings

	Dependent Variable: ROA_{t+1}		**Dependent Variable: Q_{t+1}**	
	Coeff	t-stat	Coeff	t-stat
$ Median Director Holdings$_t$	0.005***	2.68	0.135***	5.04
Sales$_t$	-0.089*	-1.77	-3.561***	-4.83
Leverage$_t$	-0.062***	-3.05	-1.858***	-6.44
Retainer$_t$	0.012**	1.98	0.045	0.50
CEO Pay Slice$_t$	0.020	1.17	0.011	0.04
G-Index$_t$	0.000	0.44	-0.046***	-2.99
R&D$_t$	-0.190***	-6.06	-0.821*	-1.77
Year_2005	0.010*	1.89	-0.102	-1.36
No. Obs.	798		808	
Adj. R-Square	0.386		0.386	

This table presents results of OLS regressions in which the dependent variables are firm performance measures. ROA is year-ahead return on assets, defined as earnings before interest, depreciation and taxes, divided by total assets. Q is defined as equity market capitalization, plus book value of assets, minus book value of common equity and divided by book value of assets. Explanatory variables are: Median Director Holdings, the natural log dollar value of director equity holdings; Sales, defined as natural log of total revenue in millions of dollars; Leverage, defined as the ratio of total debt to the book value of assets; Retainer, the annual cash retainer, as reported in ExecuComp; CEO Pay Slice, defined as the ratio of CEO pay to the pay of the firm's top 5 executives; G-Index (see Gompers, Ishii and Metrick (2003)); R&D, the reported research and development expenditures, divided by sales; and Industry ROA, defined as the median earnings before interest, depreciation and taxes, divided by total assets for all COMPUSTAT firms in the industry (2-digit SIC code), which is used as a control in the ROA regression only. Year_2005 is a dummy variable equal to 1 for the 2005 data. Industry fixed effects based on the Fama-French 49 industries and an intercept are also included in the regression but are not reported. * indicates statistical significance at the 10% level; ** indicates significance at the 5% level; and *** indicates significance at the 1% level.

Table 7.4 Bank CEO Net Trades, and bank director ownership during 2000-2008

	TBTF Firms (n = 14)	No TARP Firms (n = 37)
SAMPLE PERIOD: All years, 2000-2008		
Median Value of CEO Net Trades	$66,842,520	$1,226,977
Median Value of Director Ownership	$1,557,749	$2,039,645

TBTF refers to the 14 too-big-to-fail financial institutions including Bank of America, Bank of New York Mellon, Citigroup, Goldman Sachs, JP Morgan Chase, Morgan Stanley, State Street, Wells Fargo, Merrill Lynch, Bear Stearns, Lehman Brothers and AIG. No-TARP sample includes 37 lending institutions that did not receive TARP funds.

CEO Net Trades = stock sales – stock purchases – option exercises.

Table 8.1: Summary statistics

This table reports summary statistics of the main variables for U.S. financial institutions during the period 2002-2012. *Z-score* is firm's return on assets plus the capital asset ratio divided by the standard deviation of return on assets. *Merton Distance-to-Default* is the Merton-KMV Distance-to-Default measure of credit risk. *Naïve Distance-to-Default* is the distance to default measure from Bharath and Shumway (2008). *Probability-of-Default (Merton)* is the estimated probability of default using the *Merton Distance-to-Default* variable and a cumulative normal distribution. *σ(RET)* is the standard deviation of daily stock returns for each firm-year. *Total Assets* is the book value of total assets in millions. *ROA* is the return on assets, or net income divided by total assets. *EAR* is the equity capital to asset ratio, or total equity divided by total assets. *σ(ROA)* is the volatility of the firm's return on assets (net income divided by total assets), calculated over the previous 5 years. *Tier 1 Capital Ratio* is the ratio of tier 1 capital to assets. *Director Ownership* is the median dollar value of stock owned by the members of the board of directors, in thousands of dollars. *CEO ownership* is percentage of stock owned by the CEO in each firm-year. *Firm Age* is the calculated based on when the firm first appears in the CRSP monthly stock returns database. Mean and median values are given, along with the standard deviations of each variable.

	Number of Observations	*Mean*	*Median*	*Standard Deviation*
Z-score	7,095	46.36	32.98	49.73
Merton Distance-to-Default	4,756	4.46	3.59	3.81
Naïve Distance-to-Default	4,756	3.72	3.86	4.41
Probability-of-Default (Merton)	4,756	10.98%	0.01%	26.47%
σ(RET)	5,599	0.48	0.35	0.31
Total Assets	7,095	33,605	1,572	174,486
Total Revenue	7,095	3,531	101	13,268
ROA	7,095	1.07%	0.79%	3.07%
EAR	7,095	13.81%	10.57%	14.05%
σ(ROA)	7,095	1.15%	0.37%	1.95%
Tier 1 Capital Ratio	5,344	11.94%	11.18%	3.59%
Market-to-Book	7,002	1.08	1.00	0.29
Director Ownership ($000)	1,622	1,759	841	3,317
CEO Ownership (%)	2,205	2.30%	1.01%	3.56%
Firm Age	7,095	16.61	13.00	10.44

Table 8.2: This table reports the correlation coefficients for the main regression variables; Pearson correlation coefficients are below the diagonal and Spearman non-parametric correlation coefficients are above the diagonal. The sample consists of U.S. financial institutions during the period 2002-2012. All variables are as defined in Table 8.1 and Appendix D.

	Z-score	*Merton Distance-to-Default*	*Naïve Distance-to-Default*	*Probability-of-Default (Merton)*	*σ(RET)*	*Total Assets*	*Total Revenue*	*ROA*	*EAR*	*σ(ROA)*	*Tier 1 Capital Ratio*	*Market-to-Book*	*Director Ownership ($000)*	*CEO Ownership (%)*	*Firm Age*
Z-score	-	0.500	0.554	-0.320	0.567	0.061	0.050	-0.256	0.005	0.553	0.107	0.012	-0.214	0.033	0.064
Merton Distance-to-Default	0.542	-	0.873	-0.914	0.680	-0.044	-0.034	-0.485	-0.329	0.087	0.241	-0.334	-0.081	-0.083	-0.053
Naïve Distance-to-Default	0.424	0.950	-	-0.806	0.773	-0.051	-0.046	-0.583	-0.334	0.080	0.223	-0.326	-0.070	-0.086	-0.042
Probability-of-Default (Merton)	-0.260	-0.945	-0.844	-	-0.768	0.042	0.037	0.629	0.382	-0.059	-0.197	0.174	0.083	0.058	0.050
σ(RET)	0.554	0.702	0.703	-0.371	-	-0.112	-0.087	-0.378	-0.137	0.211	0.036	-0.150	-0.057	-0.019	-0.052
Total Assets	0.071	-0.051	-0.060	0.066	-0.113	-	0.772	0.004	-0.033	-0.031	0.241	-0.052	0.087	-0.247	0.599
Total Revenue	0.054	-0.054	-0.043	0.029	-0.092	0.789	-	0.004	-0.027	-0.034	0.187	-0.056	0.094	-0.252	0.526
ROA	-0.220	-0.507	-0.502	0.620	-0.384	0.004	0.004	-	0.618	0.188	-0.016	0.796	0.139	0.160	0.075
EAR	0.006	-0.377	-0.389	0.373	-0.126	-0.028	-0.022	0.721	-	0.523	-0.084	0.566	0.001	0.077	0.053
σ(ROA)	0.538	0.082	0.066	-0.076	0.247	-0.030	-0.035	0.190	0.499	-	0.038	0.356	-0.104	0.047	0.014
Tier 1 Capital Ratio	0.087	0.270	0.317	-0.367	0.033	0.280	0.229	-0.016	-0.096	0.043	-	0.011	0.246	-0.005	0.110
Market-to-Book	0.015	-0.302	-0.227	0.247	-0.140	-0.048	-0.059	0.768	0.560	0.397	0.010	-	0.210	0.156	0.054
Director Ownership ($000)	-0.211	-0.092	-0.092	0.078	-0.047	0.081	0.069	0.139	0.001	-0.123	0.207	0.210	-	0.098	-0.070
CEO Ownership (%)	0.038	-0.079	-0.098	0.116	-0.019	-0.254	-0.194	0.154	0.091	0.053	-0.005	0.191	0.112	-	-0.105
Firm Age	0.057	-0.061	-0.067	0.035	-0.053	0.592	0.639	0.071	0.051	0.015	0.103	0.048	-0.067	-0.112	-

Table 8.3: Firm size (total assets) and risk-taking

This table presents the regression results analyzing equation (1) on the relationship between firm size and risk-taking. Robust regressions are estimated. In Panel A the dependent variable is natural logarithm of *Z-score*; in Panel B the dependent variable is the natural logarithm of *Merton Distance to Default*. The sample consists of U.S. financial institutions during the period 2002-2012. The measure of firm size is the natural log of Total Assets. Robust regressions (Robust) estimation is used in models (1) - (2) and Fixed Effects (FE) estimation is used in model (3). *Z-score* is defined in Appendix D; *Merton Distance to Default,* are as described in Appendix D. *Market-to-Book* is the market-to-book ratio. *Director Ownership* is the dollar value of the median director stock ownership in natural logarithm form. *CEO Ownership* is the percent of stock owned by the CEO. *Firm Age* is the age of the firm in each year. *Investment Bank* is an indicator variable equal to 1 if the firm is an investment bank and 0 otherwise. *Insurance Company* is an indicator variable equal to 1 if the firm is an insurance company and 0 otherwise. *Crisis Period dummy* is an indicator variable equal to 1 if the observation occurs during 2007-2009 and 0 otherwise. Coefficients are provided with standard errors below in parenthesis. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Panel A: Z-score as measure of risk-taking, Assets as measure of size

	Dependent Variable: *ln (Z-score)*		
	Robust	Robust	FE
	(1)	(2)	(3)
Assets (ln)	**-0.027***	**-0.033***	**-0.613*****
	(-0.018)	***(-0.017)***	***(-0.211)***
Market-to-Book	0.112*	0.118*	0.248
	(-0.066)	*(-0.07)*	*(-0.216)*
Director Ownership (ln)	**0.158*****	**0.187*****	**0.213*****
	(-0.052)	***(-0.056)***	***(-0.057)***
CEO Ownership	-1.918***	-1.986**	-1.044
	(-0.617)	*(-0.816)*	*(-0.873)*
Firm Age	0.025**	0.028**	-
	(-0.01)	*(-0.01)*	-
Investment Bank	-	-0.144***	-
	-	*(-0.033)*	-
Insurance Company	-	0.088	-
	-	*(-0.143)*	-
Crisis Period dummy	-1.025**	-1.588***	-0.833***
	(-0.437)	*(-0.04)*	*(-0.111)*
Constant	2.758***	2.869***	7.631***
	(-0.378)	*(-0.391)*	*(-1.813)*
Year Controls	Yes	Yes	Yes
Sample Period	2002-2012	2002-2012	2002-2012
# of Observations	1,427	1,427	1,427
R-Squared	0.267	0.298	0.291

Panel B: Merton Distance to Default as measure of risk-taking, Assets as measure of size

	Dependent Variable: *ln (Merton Distance to Default)*		
	Robust	Robust	FE
	(1)	(2)	(3)
Assets (ln)	**-0.079****	**-0.081****	**-0.277*****
	(-0.035)	***(-0.036)***	***(-0.078)***
Market-to-Book	0.341*	0.355*	0.156
	(-0.18)	*(-0.19)*	*(-0.114)*
Director Ownership (ln)	**0.103*****	**0.101*****	**0.020***
	(-0.025)	***(-0.021)***	***(-0.013)***
CEO Ownership	-1.106*	-1.007	-0.243
	(-0.573)	*(-0.661)*	*(-0.855)*
Firm Age	0.055**	0.059**	-
	(-0.027)	*(-0.024)*	-
Investment Bank	-	-1.758***	-
	-	*(-0.151)*	-
Insurance Company	-	0.994	-
	-	*(-0.826)*	-
Crisis Period dummy	-1.252**	-1.296***	-0.576***
	(-0.501)	*(-0.486)*	*(-0.168)*
Constant	1.448***	1.401***	4.008***
	(-0.2)	*(-0.207)*	*(-0.089)*
Year Controls	Yes	Yes	Yes
Sample Period	2002-2012	2002-2012	2002-2012
# of Observations	1,219	1,219	1,219
R-Squared	0.367	0.578	0.477

Table 8.4: Two-Stage Least Square (2SLS) IV regression of firm size on risk-taking

This table presents the two-stage least squares (2SLS) regression analysis estimating equations (2) and (3) on the relationship between firm size and risk-taking. The sample consists of U.S. financial institutions during the period 2002-2012. All variables are as defined in Table 8.1 and Appendix D. In Panel A, the first-stage estimation of equation (3) is presented, using the first-stage instruments to obtain the predicted value of firm size using *Total Assets*. In the estimation of the first-stage equation (3), three different instrumental variables for firm size are considered: *Delaware,* an indicator variable equal to 1 if the firm is incorporated in Delaware and 0 otherwise, *Number of Employees,* the natural logarithm of the total number of employees at the institution in each year, and *PP & E*, the natural logarithm of net plant, property and equipment at the institution in each year. Model (4) includes all three instrumental variables. In Panels B, C and D the estimation of the structural equation (2) is presented, using the predicted values of size from the first-stage to estimate the relationship between firm size and risk-taking. Robust regressions (Robust) and Fixed-Effects (FE) estimation are used. The natural logarithm of *Total Assets* is the measure of size based on the first-stage analysis in Panel A. In Panel B the dependent variables are *Z-score* and *Merton Distance to Default;* in Panel C the dependent variables are the standard deviation of daily stock returns in each year, the natural logarithm of the cumulative accounting write-downs during 2007-2008 and the ratio of cumulative accounting write-downs to total assets; and, in Panel D, the dependent variables are *Naïve Distance to Default* and *Probability of Default (Merton). Market-to-Book* is the market-to-book for the year. *Director Ownership* is the dollar value of the median director stock ownership in natural logarithm form. *CEO Ownership* is the percentage of stock owned by the CEO. *Firm Age* is the age of the firm in each year. *Investment Bank* is an indicator variable equal to 1 if the firm is an investment bank and 0 otherwise. *Insurance Company* is an indicator variable equal to 1 if the firm is an insurance company and 0 otherwise. *Financial Crisis dummy* is an indicator variable equal to 1 if the observation occurs during 2007-2009 and 0 otherwise. In Panel A, the partial *F*-statistic on the instrument is provided along with the relevant critical value from the Stock and Yogo (2005) weak instruments test using 5% relative bias tolerance. Appendix D presents and explains more thorough tests of endogeneity. Coefficients are provided with standard errors below in parenthesis. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Panel A: First-stage regression, predicting firm size using Total Assets

	Dependent Variable: *ln (Assets)*			
	(1)	(2)	(3)	(4)
Delaware	1.418***	-	-	1.055***
	(0.284)	-	-	*(0.020)*
Number of Employees	-	1.026***	-	1.001***
	-	*(0.014)*	-	*(0.017)*
PP & E	-	-	2.367***	2.349***
	-	-	*(0.028)*	*(0.026)*
Market-to-Book	-0.277*	-0.258	-0.269*	-0.255*
	(0.154)	*(0.219)*	*(0.151)*	*(0.014)*
Director Ownership (ln)	0.481***	0.479***	0.466***	0.477***
	(0.102)	*(0.094)*	*(0.087)*	*(0.091)*
CEO Ownership	-2.553**	-2.310**	-2.448**	-2.471**
	(1.094)	*(0.938)*	*(1.020)*	*(1.031)*
Firm Age	0.071***	0.066***	0.072***	0.074***
	(0.007)	*(0.007)*	*(0.008)*	*(0.008)*
Investment Bank	1.561***	1.546***	1.618***	1.627***
	(0.043)	*(0.040)*	*(0.044)*	*(0.043)*
Insurance Company	1.857***	1.951***	2.003***	1.918***
	(0.055)	*(0.051)*	*(0.056)*	*(0.054)*
Crisis Period dummy	1.387*	1.366*	1.391*	1.388*
	(0.077)	*(0.074)*	*(0.074)*	*(0.072)*
	-	-	-	
Constant	3.279***	3.010***	3.155***	-3.338***
	(0.081)	*(0.089)*	*(0.087)*	*(0.084)*
Year Controls	Yes	Yes	Yes	Yes
Sample Period	2002-2012	2002-2012	2002-2012	2002-2012
# of Observations	1,483	1,483	1,483	1,483
R-Squared	0.682	0.863	0.857	0.893
First-Stage *F*-statistic	19.34	18.76	20.07	34.61
Stock & Yogo (2005) Weak Instrument Test Critical Value	16.38	16.38	16.38	22.30
Instruments Strong?	Yes	Yes	Yes	Yes

Panel B: Second-stage regression, predicting risk-taking, Assets as measure of size

	Dependent Variable:			
	ln (Z-Score)	*ln (Z-Score)*	*ln (Merton Distance to Default)*	*ln (Merton Distance to Default)*
	Robust	FE	Robust	FE
	(1)	(2)	(3)	(4)
Assets (ln)	**-0.025*** **	**-0.042***	**-0.055** **	**-0.072** **
	(0.008)	***(0.026)***	***(0.024)***	***(0.036)***
Market-to-Book	0.153*	0.217	0.595*	0.448*
	(0.086)	*(1.035)*	*(0.366)*	*(0.261)*
Director Ownership (ln)	**0.078*** **	**0.279*** **	**0.158** **	**0.187***
	(0.015)	***(0.092)***	***(0.071)***	***(0.118)***
CEO Ownership	-1.001	-1.307	-1.769	-1.639
	(0.955)	*(1.128)*	*(1.800)*	*(1.299)*
Firm Age	0.012*	-	0.054**	-
	(0.006)	-	*(0.021)*	-
Investment Bank	-0.082***	-	-0.066***	-
	(0.014)	-	*(0.061)*	-
Insurance Company	0.088	-	0.311	-
	(0.076)	-	*(0.901)*	-
Crisis Period dummy	-1.366***	-0.701***	-1.854***	-2.244***
	(0.351)	*(0.069)*	*(0.218)*	*(0.315)*
Constant	3.681***	5.873***	6.251***	9.021***
	(0.269)	*(1.066)*	*(0.856)*	*(1.344)*
Year Controls	Yes	Yes	Yes	Yes
Sample Period	2002-2012	2002-2012	2002-2012	2002-2012
# of Observations	1,421	1,421	1,202	1,202
R-Squared	0.354	0.328	0.618	0.663

Panel C: Second-stage regression, alternate measure of risk-taking, Assets as measure of size

	Dependent Variable	
	Probability of Default (Merton)	*Probability of Default (Merton)*
	Robust	FE
	(3)	(4)
Assets (ln)	**0.015****	**0.024*****
	(0.007)	***(0.007)***
Market-to-Book	-0.043**	-0.049
	(0.020)	*(0.047)*
Director Ownership (ln)	**-0.031*****	**-0.025***
	(0.009)	***(0.013)***
CEO Ownership	0.096*	0.167
	(0.052)	*(0.130)*
Firm Age	-0.007***	-
	(0.002)	-
Investment Bank	-0.013***	-
	(0.004)	-
Insurance Company	-0.029	-
	(0.055)	-
Crisis Period dummy	0.306***	0.298***
	(0.042)	*(0.051)*
Constant	-0.302***	-0.573***
	(0.051)	*(0.103)*
Year Controls	Yes	Yes
Sample Period	2002-2012	2002-2012
# of Observations	1,202	1,202
R-Squared	0.237	0.327

A 1% increase in total assets increases probability of default by 2.4% (in Fixed Effects estimation). Well-governed financial institutions, as measured by director ownership, are correlated with less risk-taking. A 1% increase in director ownership is associated with a 2.5% decrease in probability of default (in Fixed Effects estimation).

Table 8.5: Size and risk-taking across financial crisis periods

This table shows the relationship between firm size and risk-taking before, during and after the 2007-2009 financial crisis. The sample consists of U.S. financial institutions during the period 2002-2012. All variables are as defined in Table 8.1 and Appendix D. The 2SLS results from estimating equation (3) are presented; the first-stage regression includes all three instrumental variables. Panel A presents the results using *Z-score* as the dependent variable measure of risk-taking; Panel B presents the results using *Merton Distance to Default* as the dependent variable measure of risk-taking; Panels C and D present the results using *Naïve (Distance to Default)* and *Probability of Default* as the dependent variable measure of risk-taking. Panels A, B, C and D present the results using *Total Assets* as the measure of firm size. Model (1) considers only the observations from 2002-2006; Model (2) considers only the observations during 2007-2009; and Model (3) considers only the observations during 2010-2012. The predicted value of firm size obtained in the first-stage regression is the measure of firm size. *Market-to-Book* is the market-to-book for the year. *Director Ownership* is the natural logarithm of the dollar value of median director stock ownership. *CEO Ownership* is the percentage of stock owned by the CEO. *Firm Age* is the age of the firm in each year. *Investment Bank* is an indicator variable equal to 1 if the firm is an investment bank and 0 otherwise. *Insurance Company* is an indicator variable equal to 1 if the firm is an insurance company and 0 otherwise. Robust regressions estimation is used in the second-stage regressions. Coefficients are provided with standard errors below in parenthesis. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Panel A: Size and risk-taking across financial crisis periods, Second-stage regression predicting risk-taking, Z-score as measure of risk-taking, Assets as measure of size

	Dependent Variable: *ln (Z-score)*		
	Pre-Crisis 2002-2006	Crisis 2007-2009	Post-Crisis 2010-2012
	(1)	(2)	(3)
Assets (ln)	**-0.021****	**-0.035***	**-0.012**
	(0.009)	***(0.021)***	***(0.016)***
Market-to-Book	0.156*	0.166*	0.143
	(0.087)	*(0.094)*	*(0.186)*
Director Ownership (ln)	**0.059*****	**0.093*****	**0.085***
	(0.011)	***(0.014)***	***(0.055)***
CEO Ownership	-1.055	-1.036	-0.641*
	(0.863)	*(0.710)*	*(0.397)*
Firm Age	0.019*	0.010*	0.004
	(0.011)	*(0.006)*	*(0.008)*
Investment Bank	-0.097***	-0.080**	-0.054
	(0.018)	*(0.034)*	*(0.049)*
Insurance Company	0.054	0.087	0.099*
	(0.061)	*(0.073)*	*(0.061)*
Constant	2.369***	3.774***	4.427***
	(0.355)	*(0.366)*	*(0.856)*
Year Controls	Yes	Yes	Yes
Sample Period	2002-2006	2007-2009	2010-2012
# of Observations	625	409	387
R-Squared	0.511	0.298	0.183

Panel B: Size and risk-taking across financial crisis periods, Second-stage regression predicting risk-taking, Merton Distance to Default as measure of risk-taking. Assets as measure of size

	Dependent Variable: *ln (Merton Distance to Default)*		
	Pre-Crisis 2002-2006	Crisis 2007-2009	Post-Crisis 2010-2012
	(1)	(2)	(3)
Assets (ln)	**-0.068*** **	**-0.077*** **	**-0.029***
	(0.012)	***(0.019)***	***(0.180)***
Market-to-Book	0.663*	0.563*	0.488
	(0.385)	*(0.311)*	*(0.401)*
Director Ownership (ln)	**0.144***	**0.169** **	**0.153** **
	(0.092)	***(0.081)***	***(0.073)***
CEO Ownership	-1.257*	-1.965	-2.066
	(0.696)	*(1.660)*	*(1.364)*
Firm Age	0.043**	0.061*	0.064*
	(0.019)	*(0.381)*	*(0.388)*
Investment Bank	-0.063***	-0.074**	-0.055***
	(0.013)	*(0.034)*	*(0.019)*
Insurance Company	0.363	0.300	0.245
	(0.436)	*(0.499)*	*(0.277)*
Constant	5.239**	7.144***	7.003***
	(2.193)	*(1.364)*	*(1.554)*
Year Controls	Yes	Yes	Yes
Sample Period	2002-2006	2007-2009	2010-2012
# of Observations	536	344	322
R-Squared	0.628	0.476	0.287

Table 8.6: Decomposition of Z-score

This table presents the 2SLS results from estimating equation (1) using the components of *Z-score* as the dependent variables. The sample consists of U.S. financial institutions during the period 2002-2012. All three instruments are used to predict *Assets* in the first-stage. Panel A presents the results using Robust Regressions estimation in the second-stage structural regression; Panel B presents the results using Fixed Effects estimation in the second-stage structural regression. In model (1), the dependent variable is *EAR*, or equity capital to assets ratio, measured as the ratio of total equity to total assets. In model (2), the dependent variable is *ROA*, or return on assets, measured as net income divided by total assets. In model (3), the dependent variable is the standard deviation of annual *ROA*. *Assets(ln)* is the predicted value of Total Assets for the firm-year. *Market-to-Book* is the market-to-book ratio. *Director Ownership* is the natural logarithm of the dollar value of median director stock ownership. *CEO Ownership* is the percentage of stock owned by the CEO. *Firm Age* is the age of the firm. *Investment Bank* is an indicator variable equal to 1 if the firm is an investment bank and 0 otherwise. *Insurance Company* is an indicator variable equal to 1 if the firm is an insurance company and 0 otherwise. Coefficients are provided with standard errors below in parenthesis. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Panel A: Robust regressions in 2nd stage regression

	EAR	ROA	σ(ROA)
	(1)	(2)	(3)
Assets (ln), predicted	**-0.012*** **	**0.002**	**-0.005*** **
	(0.002)	***(0.002)***	***(0.000)***
Market-to-Book	0.044**	0.024*	0.009*
	(0.021)	*(0.015)*	*(0.005)*
Director Ownership (ln)	**0.023****	**0.148*** **	**-0.003*** **
	(0.011)	***(0.023)***	***(0.000)***
CEO Ownership	-0.445*	0.087*	-0.008*
	(0.271)	*(0.050)*	*(0.004)*
Firm Age	-0.766*	-0.002	0.015
	(0.408)	*(0.041)*	*(0.056)*
Investment Bank	-1.244*	-0.694	1.334**
	(0.689)	*(0.601)*	*(0.490)*
Insurance Company	0.033	0.048	0.431
	(0.478)	*(0.079)*	*(0.407)*
Constant	1.329**	-0.108**	0.058**
	(0.526)	*(0.042)*	*(0.025)*
Year Controls	Yes	Yes	Yes

Sample Period	2002-2012	2002-2012	2002-2012
# of Observations	1,421	1,421	1,421
R-Squared	0.623	0.745	0.316

Panel B: Fixed effects in 2nd stage regression

	EAR	ROA	σ(ROA)
	(1)	(2)	(3)
Assets (ln), predicted	**-0.054*** **	**-0.024*** **	**-0.005***
	(0.015)	***(0.005)***	***(0.003)***
Market-to-Book	0.034	0.077*	0.000
	(0.084)	*(0.040)*	*(0.015)*
Director Ownership (ln)	**0.055***	**0.099*** **	**-0.002*** **
	(0.034)	***(0.015)***	***(0.000)***
CEO Ownership	-0.331	0.144**	-0.115*
	(0.752)	*(0.054)*	*(0.607)*
Firm Age	-0.441	0.344	0.881
	(0.369)	*(0.869)*	*(0.977)*
Investment Bank	-1.880*	-1.075	-0.446
	(1.035)	*(0.866)*	*(0.894)*
Insurance Company	0.077*	0.166	0.330
	(0.046)	*(0.244)*	*(0.476)*
Constant	1.004***	0.344***	0.099***
	(0.301)	*(0.092)*	*(0.016)*
Year Controls	Yes	Yes	Yes
Sample Period	2002-2012	2002-2012	2002-2012
# of Observations	1,421	1,421	1,421
R-Squared	0.194	0.366	0.201

Table 9.1: CEO trading and bank capital

This table presents the results from a Tobit estimation of the determinants of CEO *Net Trades* for 2000-2008. The dependent variable is *Net Trades*, or (stock sales – stock purchases – option exercises). *Assets* are the natural logarithm of current year assets. *Book-to-market* ratio is the book value of equity divided by market value of equity for the current year. *Return* is the annual stock return for the prior year. *Stock Volatility* is the standard deviation of daily stock returns for the current year. *CEO Total Compensation* is the natural logarithm of all cash and equity compensation in the prior year. *% CEO Equity Compensation* is the amount of equity compensation divided by total compensation for the prior year. *CEO Stock Holdings* is the natural logarithm of the dollar value of the CEO's beneficial stock ownership at the end of the prior year. *Capital-to-Assets* is the book value of stockholders' equity divided by total assets in the current year. *TBTF Dummy* is equal to 1 if the firm is one of the 14 TBTF firms and 0 otherwise. *L-TARP Dummy* is equal to 1 if the firm in one of the 49 Later-TARP firms and 0 otherwise. Model include intercepts, year dummy variables and firm fixed effects, not tabulated for conciseness. Coefficients are presented with p-values in parentheses. Statistical significance is denoted by * for 10%, ** for 5% and *** for 1%.

	Dependent variable: ***Net Trades$_t$***
Assets (log) $_t$	-1.344***
	(0.001)
Book-to-Market $_t$	-3.404***
	(0.007)
Return $_{t-1}$	-0.365
	(0.805)
Stock Volatility $_t$	36.806
	(0.289)
CEO Total Compensation $_{t-1}$	2.004***
	(0.003)
CEO % Equity Compensation $_{t-1}$	10.152***
	(0.000)
CEO Equity Holdings (log) $_{t-1}$	1.325***
	(0.000)
Capital-to-Assets $_t$	**-43.147*** **
	(0.006)
TBTF Dummy	4.247**
	(0.016)
L-Tarp Dummy	1.673*
	(0.088)
Number of Observations	883
Year controls	Yes
Firm fixed-effects	Yes

Appendix A: TARP recipient information. This appendix shows how much TARP money each of the 49 L-TARP firms received and when they first received TARP funding.

		TARP Amount Received ($000s)	Date Received Initial TARP Funding			TARP Amount Received ($000s)	Date Received Initial TARP Funding
(1)	Anchor Bancorp Inc./WI	$110,000	January 30, 2009	(27)	Provident Bankshares Corp.	$151,500	November 14, 2008
(2)	Associated Banc-Corp.	525,000	November 21, 2008	(28)	Regions Financial Corp.	3,500,000	November 14, 2008
(3)	BB&T Corp.	3,133,640	November 14, 2008	(29)	South Financial Group Inc.	347,000	December 5, 2008
(4)	Boston Private Financial Holdings	154,000	November 21, 2008	(30)	Sterling Bancorp/NY	42,000	December 23, 2008
(5)	Cascade Bancorp	38,970	November 21, 2008	(31)	Sterling Bancshares/TX	125,198	December 12, 2008
(6)	Cathay General Bancorp	258,000	December 5, 2008	(32)	Sterling Financial Corp./WA	303,000	December 5, 2008
(7)	Central Pacific Financial Corp.	135,000	January 9, 2009	(33)	Suntrust Banks Inc.	4,850,000	November 14, 2008
(8)	City National Corp.	400,000	November 21, 2008	(34)	Susquehanna Bancshares Inc.	300,000	December 12, 2008
(9)	Comerica Inc.	2,250,000	November 14, 2008	(35)	SVB Financial Group	235,000	December 12, 2008
(10)	East West Bancorp Inc.	306,546	December 5, 2008	(36)	Synovus Financial Corp.	967,870	December 19, 2008
(11)	Fifth Third Bancorp	3,408,000	December 31, 2008	(37)	TCF Financial Corp.	361,172	November 14, 2008
(12)	First Bancorp	424,174	January 16, 2009	(38)	U S Bancorp	6,599,000	November 14, 2008
(13)	First Financial Bancorp Inc./OH	80,000	December 23, 2008	(39)	UCBH Holdings Inc.	298,737	November 14, 2008
(14)	First Horizon National Corp.	866,540	November 14, 2008	(40)	Umpqua Holdings Corp.	214,181	November 14, 2008
(15)	First Midwest Bancorp Inc.	193,000	December 5, 2008	(41)	United Community Banks Inc.	180,000	December 5, 2008
(16)	First Niagara Financial Group	184,011	November 21, 2008	(42)	Wachovia Corp.	239	July 1, 2009
(17)	Firstmerit Corp.	125,000	January 9, 2009	(43)	Washington Fed Inc.	200,000	November 14, 2008
(18)	Flagstar Bancorp Inc.	266,657	January 30, 2009	(44)	Webster Financial Corp.	400,000	November 21, 2008
(19)	Huntington Bancshares	1,398,071	November 14, 2008	(45)	Westamerica Bancorporation	83,726	February 13, 2009
(20)	Independent Bank Corp./MI	74,426	December 12, 2008	(46)	Wilmington Trust Corp.	330,000	December 12, 2008
(21)	Keycorp	2,500,000	November 14, 2008	(47)	Wilshire Bancorp. Inc.	62,158	December 12, 2008
(22)	M&T Bank Corp.	600,000	December 23, 2008	(48)	Wintrust Financial Corp.	250,000	December 19, 2008
(23)	Marshall & Ilsley Corp.	1,715,000	November 14, 2008	(49)	Zions Bancorporation	1,400,000	November 14, 2008
(24)	Northern Trust Corp.	1,576,000	November 14, 2008				
(25)	PNC Financial Services Group Inc.	7,579,200	December 31, 2008		**TOTAL**	**$50,437,016**	
(26)	Popular Inc.	935,000	December 5, 2008				

Appendix B: CEOs by firm

	Company	2000 CEO	2008 CEO
TBTF Sample:			
(1)	AIG	Maurice Greenberg	Edward Liddy
(2)	Bank of America	Ken Lewis	Ken Lewis
(3)	Bank of New York	Thomas Renyi	Robert Kelly
(4)	Bear Stearns	James Cayne	Alan Schwartz
(5)	Citigroup	Sandy Weill	Vikram Pandit
(6)	Countrywide Financial	Angelo Mozilo	Angelo Mozilo
(7)	Goldman Sachs	Henry Paulson	Lloyd Blankfein
(8)	JP Morgan	William Harrison	James Dimon
(9)	Lehman Brothers	Richard Fuld	Richard Fuld
(10)	Mellon Financial	Martin McGuinn	Robert Kelly (2007)
(11)	Merrill Lynch	David Komansky	John Thain
(12)	Morgan Stanley	Philip Purcell	John Mack
(13)	State Street	Marshall Carter	Ronald Logue
(14)	Wells Fargo	Richard Kovacevich	John Stumpf
L-TARP Sample:			
(1)	Anchor Bancorp Inc./WI	Douglas J. Timmerman	Douglas J. Timmerman
(2)	Associated Banc-Corp.	Robert C. Gallagher	Paul S. Beideman
(3)	BB&T Corp.	John A. Allison, IV	John A. Allison, IV
(4)	Boston Private Financial Holdings	Timothy Landon Vaill	Timothy Landon Vaill
(5)	Cascade Bancorp	Patricia L. Moss	Patricia L. Moss
(6)	Cathay General Bancorp	Dunson K. Cheng, Ph.D.	Dunson K. Cheng, Ph.D.
(7)	Central Pacific Financial Corp.	Joichi Saito	Clint Arnoldus
(8)	City National Corp.	Russell Goldsmith	Russell Goldsmith
(9)	Comerica Inc.	Eugene A. Miller	Ralph W. Babb, Jr.
(10)	East West Bancorp Inc.	Dominic Ng	Dominic Ng
(11)	Fifth Third Bancorp	George A. Schaefer, Jr.	Kevin T. Kabat
(12)	First Bancorp	Angel Alvarez-Perez	Luis M. Beauchamp
(13)	First Financial Bancorp Inc./OH	Stanley Pontius	Claude Davis
(14)	First Horizon National Corp.	Ralph Horn	Gerald L. Baker
(15)	First Midwest Bancorp Inc.	Robert P. O'Meara	John M. O'Meara
(16)	First Niagara Financial Group	William Swan	John R. Koelmel
(17)	Firstmerit Corp.	John R. Cochran	Paul Greig
(18)	Flagstar Bancorp Inc.	Thomas J. Hammond	Mark T. Hammond
(19)	Huntington Bancshares	Frank G. Wobst	Thomas E. Hoaglin
(20)	Independent Bank Corp./MI	Charles van Loan	Michael M. Magee, Jr.
(21)	Keycorp	Robert W. Gillespie	Henry L. Meyer, III
(22)	M&T Bank Corp.	Robert G. Wilmers	Robert G. Wilmers
(23)	Marshall & Ilsley Corp.	James B. Wigdale	Mark F. Furlong
(24)	Northern Trust Corp.	William A. Osborn	Frederick H. Waddell
(25)	PNC Financial Services Group Inc.	James E. Rohr	James E. Rohr
(26)	Popular Inc.	Richard L. Carrion	Richard L. Carrion
(27)	Provident Bankshares Corp.	Peter M. Martin	Gary N. Geisel
(28)	Regions Financial Corp.	Carl E. Jones, Jr.	C. Dowd Ritter
(29)	South Financial Group Inc.	Mack I. Whittle, Jr.	Mack I. Whittle, Jr.
(30)	Sterling Bancorp/NY	Louis J. Cappelli	Louis J. Cappelli
(31)	Sterling Bancshares/TX	George Martinez	J. Downey Bridgwater
(32)	Sterling Financial Corp./WA	Harold B. Gilkey	Harold B. Gilkey
(33)	Suntrust Banks Inc.	L. Phillip Humann	James M. Wells, III

(34)	Susquehanna Bancshares Inc.	Robert S. Bolinger	William John Reuter
(35)	SVB Financial Group	John C. Dean	Kenneth Parmalee Wilcox
(36)	Synovus Financial Corp.	James H. Blanchard	Richard E. Anthony

Appendix B, continued:

	Company	2000 CEO	2008 CEO
L-TARP Sample (continued):			
(37)	TCF Financial Corp.	Bill Cooper	Lynn A. Nagorske
(38)	U S Bancorp	Jerry A. Grundhofer	Richard K. Davis
(39)	UCBH Holdings Inc.	Thomas S. Wu	Thomas S. Wu
(40)	Umpqua Holdings Corp.	Raymond P. Davis	Raymond P. Davis
(41)	United Community Banks Inc.	Jimmy Tallent	Jimmy Tallent
(42)	Wachovia Corp.	G. Kennedy Thompson	G. Kennedy Thompson
(43)	Washington Fed Inc.	Guy C. Pinkerton	Roy Whitehead
(44)	Webster Financial Corp.	James C. Smith	James C. Smith
(45)	Westamerica Bancorporation	David L. Payne	David L. Payne
(46)	Wilmington Trust Corp.	Ted Thomas Cecala	Ted Thomas Cecala
(47)	Wilshire Bancorp. Inc.	Soo Bong Min	Joanne Kim
(48)	Wintrust Financial Corp.	Edward Joseph Wehmer	Edward Joseph Wehmer
(49)	Zions Bancorporation	Harris H. Simmons	Harris H. Simmons
No-TARP Sample:			
(1)	Astoria Financial Corp.	George L. Engelke, Jr.	George L. Engelke, Jr.
(2)	Bank Mutual Corp.	Michael T. Crowley, Jr.	Michael T. Crowley, Jr.
(3)	Bank of Hawaii Corp.	Lawrence M. Johnson	Al Landon
(4)	Brookline Bancorp Inc.	Richard P. Chapman, Jr.	Richard P. Chapman, Jr.
(5)	Chittenden Corp.	Paul A. Perrault	Paul A. Perrault (2007)
(6)	Colonial Bancgroup	Robert E. Lowder	Robert E. Lowder
(7)	Commerce Bancorp Inc./NJ	Vernon W. Hill, II	Vernon W. Hill, II (2007)
(8)	Compass Bancshares Inc.	D. Paul Jones Jr.	D. Paul Jones Jr. (2006)
(9)	Corus Bankshares Inc.	Robert J. Glickman	Robert J. Glickman
(10)	Cullen/Frost Bankers Inc.	Richard W. Evans, Jr.	Richard W. Evans, Jr.
(11)	Dime Community Bancshares	Vincent F. Palagiano	Vincent F. Palagiano
(12)	Downey Financial Corp.	Daniel D. Rosenthal	Daniel D. Rosenthal
(13)	First Commonwealth Financial Corp./PA	Joseph E. O'Dell	John J. Dolan
(14)	First Indiana Corp.	Marni McKinney	Robert H. Warrington (2007)
(15)	Firstfed Financial Corp./CA	Babette E. Heimbuch	Babette E. Heimbuch
(16)	Franklin Bank Corp.	Anthony J. Nocella	Anthony J. Nocella (2006)
(17)	Fremont General Corp.	James A. McIntyre	James A. McIntyre (2007)
(18)	Glacier Bancorp Inc.	Michael J. Blodnick	Michael J. Blodnick
(19)	Greater Bay Bancorp	David L. Kalkbrenner	Byron A. Scordelis (2007)
(20)	Hanmi Financial Corp.	Chung Hoon Youk	Jay Seung Yoo
(21)	Hudson City Bancorp Inc.	Leonard Gudelski	Ronald E. Hermance, Jr.
(22)	Indymac Bancorp Inc.	Michael W. Perry	Michael W. Perry
(23)	Investors Financial Services Corp.	Kevin J. Sheehan	Kevin J. Sheehan (2007)
(24)	Irwin Financial Corp.	William I. Miller	William I. Miller
(25)	Jefferies Group Inc.	Frank E. Baxter	Richard B. Handler
(26)	MAF Bancorp Inc.	Allen H. Koranda	Allen H. Koranda (2007)
(27)	Mercantile Bankshares Corp.	H. Furlong Baldwin	Edward J. Kelly, III (2007)
(28)	National City Corp	David A. Daberko	Peter E. Raskind
(29)	New York Community Bancorp Inc.	Joseph R. Ficalora	Joseph R. Ficalora

(30)	Prosperity Bancshares Inc.	David Zalman	David Zalman
(31)	SLM Corp.	Albert L. Lord	Albert L. Lord
(32)	Sovereign Bancorp Inc.	Jay S. Sidhu	James Campanelli
(33)	TD Banknorth Inc.	William J. Ryan	William J. Ryan (2007)
(34)	Trustco Bank Corp/NY	Robert A. McCormick	Robert J. McCormick
(35)	Unionbancal Corp.	Takahiro Moriguchi	Masaaki Tanaka
(36)	United Bankshares Inc./WV	Richard M. Adams	Richard M. Adams
(37)	Washington Mutual Inc.	Kerry K. Killinger	Kerry K. Killinger

Appendix C: Net CEO Payoff, 2000-2008, L-TARP and No-TARP firms

	L-TARP Sample	Value of Stock Holdings: First Available year	Total Net Trades: 2000-2008 (A)	Total Cash Compensation: 2000-2008 (B)	CEO Payoff: 2000-2008 (A)+(B)	Estimated Value Lost: 2008 (C)	Net CEO Payoff: 2000-2008 (A)+(B)+(C)	Estimated Value Remaining: Last Available Year
(1)	Anchor Bancorp Inc./WI	$26,883,312	$3,798,047	$5,192,086	$8,990,133	($23,352,645)	($14,362,512)	$4,023,879
(2)	Associated Banc-Corp.	8,874,040	(30,001,135)	10,036,279	(19,964,856)	(2,514,926)	(22,479,782)	10,651,717
(3)	BB&T Corp.	21,728,513	(192,218)	19,920,237	19,728,019	(9,082,332)	10,645,687	69,856,043
(4)	Boston Private Financial Holdings	2,967,297	5,267,959	9,584,909	14,852,868	(1,786,159)	13,066,709	3,043,417
(5)	Cascade Bancorp	954,474	2,306,853	4,382,294	6,689,147	(871,749)	5,817,398	1,658,455
(6)	Cathay General Bancorp	7,674,180	(980,910)	12,863,900	11,882,990	5,729,173	17,612,163	51,744,861
(7)	Central Pacific Financial Corp.	945,087	(301,657)	6,214,516	5,912,859	(2,520,893)	3,391,966	2,872,846
(8)	City National Corp.	156,887,269	(37,714,990)	16,117,173	(21,597,817)	(3,985,288)	(25,583,105)	242,211,301
(9)	Comerica Inc.	37,008,078	3,280,726	18,839,384	22,120,110	(15,280,838)	6,839,272	24,624,024
(10)	East West Bancorp Inc.	1,418,168	56,001,460	14,864,316	70,865,776	(2,120,623)	68,745,153	18,937,545
(11)	Fifth Third Bancorp	94,954,671	16,004,385	18,070,201	34,074,586	(7,763,859)	26,310,727	7,031,606
(12)	First Bancorp	45,775,262	(2,501,250)	15,018,008	12,516,758	2,187,039	14,703,797	23,368,066
(13)	First Financial Bancorp Inc./OH	2,873,880	(413,182)	4,816,840	4,403,658	(244,623)	4,159,035	6,270,294
(14)	First Horizon National Corp.	23,241,420	375,598	11,880,415	12,256,013	(501,156)	11,754,857	2,948,692
(15)	First Midwest Bancorp Inc.	14,742,812	(862,537)	8,189,626	7,327,089	(5,912,611)	1,414,478	3,319,214
(16)	First Niagara Financial Group	1,327,892	514,706	7,965,734	8,480,440	683,777	9,164,217	5,739,089
(17)	Firstmerit Corp.	17,860,203	(6,003,165)	8,860,208	2,857,043	(9,467)	2,847,576	6,337,911
(18)	Flagstar Bancorp Inc.	45,270,316	11,201,395	19,186,296	30,387,691	(43,717,085)	(13,329,394)	6,764,771
(19)	Huntington Bancshares	52,930,054	(1,083,970)	10,556,604	9,472,634	(5,627,131)	3,845,503	10,083,762
(20)	Independent Bank Corp./MI	1,465,205	1,090,134	3,786,875	4,877,009	(1,625,078)	3,251,931	452,215
(21)	Keycorp	24,300,354	4,695,583	20,237,912	24,933,495	(36,317,124)	(11,383,629)	24,788,625
(22)	M&T Bank Corp.	265,037,489	90,350,005	9,085,770	99,435,775	(113,182,135)	(13,746,360)	268,105,332
(23)	Marshall & Ilsley Corp.	45,209,703	15,672,931	15,648,886	31,321,817	(8,294,696)	23,027,121	15,274,236
(24)	Northern Trust Corp.	70,233,651	14,326,627	24,018,750	38,345,377	(9,471,342)	28,874,035	38,157,929
(25)	PNC Financial Services Group Inc.	23,326,198	27,578,906	25,155,677	52,734,583	(34,503,496)	18,231,087	121,397,696
(26)	Popular Inc.	24,550,247	(2,617,270)	8,197,988	5,580,718	(21,051,901)	(15,471,183)	16,843,164
(27)	Provident Bankshares Corp.	5,652,313	993,635	5,673,032	6,666,667	(279,756)	6,386,911	2,782,014
(28)	Regions Financial Corp.	12,396,381	(565,296)	17,301,072	16,735,776	(43,953,037)	(27,217,261)	34,317,749
(29)	South Financial Group Inc.	2,191,101	452,030	10,437,874	10,889,904	(3,703,946)	7,185,958	3,913,017
(30)	Sterling Bancorp/NY	5,879,775	2,575,267	11,518,086	14,093,353	(1,681,301)	12,412,053	12,935,239

(31)	Sterling Bancshares/TX	7,054,247	838,199	4,590,931	5,429,130	(564,560)	4,864,570	1,126,229
(32)	Sterling Financial Corp./WA	1,567,650	803,276	6,372,000	7,175,276	(3,712,860)	3,462,416	5,864,179
(33)	Suntrust Banks Inc.	34,081,567	(8,221,733)	15,774,785	7,553,052	(18,290,432)	(10,737,380)	23,110,708
(34)	Susquehanna Bancshares Inc.	334,207	547,821	5,346,337	5,894,158	(467,600)	5,426,558	2,053,472

Appendix C, continued:

	L-TARP Sample (Cont.	Value of Stock Holdings: First Available year	Total Net Trades: 2000-2008 (A)	Total Cash Compensation: 2000-2008 (B)	CEO Payoff: 2000-2008 (A)+(B)	Estimated Value Lost: 2008 (C)	Net CEO Payoff: 2000-2008 (A)+(B)+(C)	Estimated Value Remaining: Last Available Year
(35)	SVB Financial Group	4,622,784	12,635,192	8,174,164	20,809,356	(4,567,862)	16,241,494	6,498,273
(36)	Synovus Financial Corp.	54,912,811	(117,344)	11,148,955	11,031,611	(6,262,324)	4,769,287	19,362,713
(37)	TCF Financial Corp.	49,462,373	10,610,158	14,014,293	24,624,451	(15,840,669)	8,783,782	57,282,527
(38)	U S Bancorp	52,502,559	48,810,074	27,831,430	76,641,504	(23,469,447)	53,172,057	86,149,221
(39)	UCBH Holdings Inc.	2,883,021	3,589,388	13,110,000	16,699,388	(3,450,231)	13,249,157	27,597,035
(40)	Umpqua Holdings Corp.	1,978,915	2,718,719	5,515,478	8,234,197	(490,928)	7,743,269	7,758,148
(41)	United Community Banks Inc.	11,171,789	(2,653,737)	6,006,000	3,352,263	(2,806,476)	545,787	12,054,871
(42)	Wachovia Corp.	11,549,139	(2,665,951)	36,960,000	34,294,049	(96,106,292)	(61,812,243)	120,916,584
(43)	Washington Fed Inc.	453,935	(2,906,287)	3,529,059	622,772	(1,728,100)	(1,105,328)	3,488,208
(44)	Webster Financial Corp.	22,512,768	4,112,804	10,912,779	15,025,583	(19,151,297)	(4,125,714)	14,699,167
(45)	Westamerica Bancorporation	32,713,282	12,314,172	7,093,024	19,407,196	(3,391,607)	16,015,589	113,824,504
(46)	Wilmington Trust Corp.	14,322,737	2,028,626	10,462,281	12,490,907	(8,649,788)	3,841,119	23,807,253
(47)	Wilshire Bancorp. Inc.	7,715,768	3,251,684	1,846,397	5,098,081	110,822	5,208,903	1,116,477
(48)	Wintrust Financial Corp.	4,561,083	11,834,959	5,931,149	17,766,108	(6,792,709)	10,973,399	9,959,418
(49)	Zions Bancorporation	101,414,151	9,741,440	8,930,000	18,671,440	(55,425,946)	(36,754,506)	66,172,980
	No-TARP Sample	**Value of Stock Holdings: First Available year**	**Total Net Trades: 2000-2008 (A)**	**Total Cash Compensation: 2000-2008 (B)**	**CEO Payoff: 2000-2008 (A)+(B)**	**Estimated Value Lost: 2008 (C)**	**Net CEO Payoff: 2000-2008 (A)+(B)+(C)**	**Estimated Value Remaining: Last Available Year**
(1)	Astoria Financial Corp.	$27,725,496	$15,733,993	$14,191,675	$29,925,668	($41,424,965)	($11,499,297)	$68,517,281
(2)	Bank Mutual Corp.	1,646,859	(5,266,976)	6,316,900	1,049,924	1,864,654	2,914,578	28,731,969
(3)	Bank of Hawaii Corp.	20,187,172	25,347,162	7,835,004	33,182,166	(1,811,046)	31,371,120	17,983,848
(4)	Brookline Bancorp Inc.	1,779,179	(1,160,977)	5,533,125	4,372,148	(1,393,151)	2,978,997	17,888,741
(5)	Chittenden Corp.	7,233,448	233,727	5,495,261	5,728,988	-	5,728,988	24,840,332

(6)	Colonial Bancgroup	64,473,910	(9,627,753)	13,072,593	3,444,840	(54,926,318)	(51,481,478)	17,154,148
(7)	Commerce Bancorp Inc./NJ	55,200,152	54,401,611	16,040,000	70,441,611	-	70,441,611	206,000,731
(8)	Compass Bancshares Inc.	23,469,767	20,771,960	14,913,707	35,685,667	-	35,685,667	101,927,174
(9)	Corus Bankshares Inc.	116,412,613	194,701	8,375,000	8,569,701	(107,251,980)	(98,682,279)	14,057,012
(10)	Cullen/Frost Bankers Inc.	9,887,202	11,471,908	9,224,000	20,695,908	(1,459,412)	19,236,496	34,520,378
(11)	Dime Community Bancshares	5,404,096	10,720,836	7,688,600	18,409,436	(6,197,389)	12,212,047	19,427,150
(12)	Downey Financial Corp.	2,163,080	(40,631)	6,955,575	6,914,944	(1,820,244)	5,094,700	1,993,807
(13)	First Commonwealth Financial Corp./PA	735,782	(317,201)	3,871,755	3,554,554	46,832	3,601,386	768,179
(14)	First Indiana Corp.	64,066,536	646,975	2,673,667	3,320,642	-	3,320,642	4,115,535

Appendix C, continued:

	No-TARP Sample (Cont.)	Value of Stock Holdings: First Available year	Total Net Trades: 2000-2008 (A)	Total Cash Compensation: 2000-2008 (B)	CEO Payoff: 2000-2008 (A)+(B)	Estimated Value Lost: 2008 (C)	Net CEO Payoff: 2000-2008 (A)+(B)+(C)	Estimated Value Remaining: Last Available Year
(15)	Firstfed Financial Corp./CA	4,890,072	(472,417)	7,065,740	6,593,323	(12,944,373)	(6,351,050)	922,131
(16)	Franklin Bank Corp.	3,535,558	(997,565)	1,970,624	973,059	-	973,059	8,530,947
(17)	Fremont General Corp.	50,683,705	68,189,404	8,400,500	76,589,904	-	76,589,904	200,727,074
(18)	Glacier Bancorp Inc.	1,757,644	(841,617)	3,234,718	2,393,101	(63,707)	2,329,394	8,355,277
(19)	Greater Bay Bancorp	4,937,347	1,344,217	6,465,697	7,809,914	-	7,809,914	5,129,375
(20)	Hanmi Financial Corp.	642,744	(454,846)	4,110,290	3,655,444	(533,000)	3,122,444	739,000
(21)	Hudson City Bancorp Inc.	8,052,291	37,915,698	19,819,233	57,734,931	(10,918,115)	46,816,816	80,729,111
(22)	Indymac Bancorp Inc.	8,257,405	(3,640,208)	12,920,100	9,279,892	(13,700,529)	(4,420,637)	15,657,748
(23)	Investors Financial Services Corp.	33,339,912	65,389,925	18,442,898	83,832,823	-	83,832,823	99,301,219
(24)	Irwin Financial Corp.	161,347,080	25,713	8,598,961	8,624,674	(45,732,991)	(37,108,317)	14,639,366
(25)	Jefferies Group Inc.	37,132,782	(7,065,004)	42,246,707	35,181,703	(19,092,724)	16,088,979	154,881,740
(26)	MAF Bancorp Inc.	17,555,668	5,856,942	4,065,879	9,922,821	-	9,922,821	48,126,603
(27)	Mercantile Bankshares Corp.	11,278,785	(5,307,271)	9,099,300	3,792,029	-	3,792,029	15,079,013
(28)	National City Corp	30,274,819	10,491,812	16,753,095	27,244,907	(6,026,823)	21,218,084	7,366,940
(29)	New York Community Bancorp Inc.	16,142,005	22,282,297	9,240,000	31,522,297	(36,516,665)	(4,994,368)	71,064,299
(30)	Prosperity Bancshares Inc.	6,083,402	3,742,015	5,378,094	9,120,109	602,724	9,722,833	19,925,077
(31)	SLM Corp.	16,556,546	79,675,704	24,466,057	104,141,761	(36,440,126)	67,701,635	52,049,817
(32)	Sovereign Bancorp Inc.	22,092,853	1,708,739	10,053,423	11,762,162	(4,768,162)	6,994,000	7,009,348
(33)	TD Banknorth Inc.	9,990,045	6,898,869	8,994,186	15,893,055	-	15,893,055	28,212,482
(34)	Trustco Bank Corp/NY	30,788,697	1,226,977	12,199,558	13,426,535	838,685	14,265,220	10,817,321
(35)	Unionbancal Corp.	165,375	(45,144)	3,703,454	3,658,310	48,680	3,706,990	98,160

(36)	United Bankshares Inc./WV	4,022,832	(1,266,544)	8,301,138	7,034,594	5,399,778	12,434,372	27,328,167
(37)	Washington Mutual Inc.	59,532,727	29,805,336	28,452,000	58,257,336	(77,199,025)	(18,941,689)	77,199,025

Appendix D: Variable definitions and data sources

Variable	Definition	Original sources
Risk measures		
Z-score	Equals (ROA+CAR)/σ(ROA), where ROA=π/A is return on assets and CAR = E/A where E equals (Total Assets – Total Liabilities) divided by Total Assets. Higher Z-score implies more stability.	Compustat
Merton Distance to Default	The market value of the firm minus the face value of the firm's debt divided by the volatility of the firm value. The estimates of firm value and volatility are obtained by applying the Merton (1974) option valuation model (see Appendix B for details). Higher Merton DD implied more stability.	
ROA	Return on assets, Net Income divided by Total Assets. Higher value implies more stability.	Compustat
CAR	Capital asset ratio, Equity divided by Total Assets. Higher value implies more stability.	Compustat
σ(ROA)	Equals standard deviation of ROA, rolling five-year periods.	Compustat
σ(RET)	Equals standard deviation of daily stock returns.	CRSP
Write-Down	Equals the sum of accounting write-down for 2007 and 2008	Bloomberg and 10-K, 10-Q
Controls		
Size	Equals the natural logarithm of Total Assets.	Compustat
Revenue	Equals the natural logarithm of Total Revenue.	Compustat
Market-to-Book	Equals the market value of equity divided by the book value of equity.	Compustat
Director Ownership	Equals the natural logarithm of the median director dollar stockholding as of the beginning of the year.	RiskMetrics and proxy statement
CEO Ownership	Equals the percentage of CEO stock ownership as of the beginning of the year.	RiskMetrics and proxy statement
Firm Age	Firm age, calculated as the difference between the sample year and the year that firm's first appearance in the CRSP monthly stock return database.	CRSP, Compustat
Leverage	Equal Total Liabilities divided by Total Assets.	Compustat
Investment Bank	A dummy variable that equals 1 if investment bank and 0 otherwise	Compustat
Insurance Company	A dummy variable that equals 1 if insurance company and 0 otherwise	Compustat
Crisis Period dummy	A dummy variable that equals 1 if the observation occurs during the financial crisis years of 2007, 2008 or 2009 and 0 otherwise.	Compustat

Appendix Chapter 1

Credit Rating Agencies and the Subprime Mortgage Securitization Process

Until the turn of the millennium, most mortgage loans were made to borrowers with good credit histories conforming to underwriting standards set by government sponsored agencies; these loans are referred to as conforming loans. However, during 2000-2008, subprime loans and Alt-A rapidly increased their market share. Subprime mortgages refer to borrowers that have poor credit histories. Alt-A loans are made to borrowers with good credit histories but with aggressive underwriting, such as, no documentation of income.

Most lending institutions that issue mortgages to homeowners do not carry these mortgages on their balance sheets, but sell these mortgages to issuers who in turn sell them (eventually) to investors as fixed-income securities. Both subprime loans and Alt-A loans experienced significant increases in the securitization of the loans as a percentage of loans originated. The process of conversion of mortgages to risky fixed-income securities is known as securitization. A simplified version of the securitization process is illustrated in Figure A1.1.

The securitization process starts when a homeowner/mortgagor finances the purchase of a home or refinances the home. The originator/lender sells the mortgage to a government backed agency (like Fannie Mae, Freddie Mac) or an investment bank acting as a mortgage-backed security (MBS) sponsor. The MBS sponsor keeps only a small percentage of the mortgages, and pools the rest with similar mortgages and sells them to a bankruptcy-remote trust. The trust issues bonds to institutional investors (like pension funds, hedge funds). The issuer is bankruptcy-remote in the sense that if the MBS sponsor goes bankrupt, the assets of

the trust/issuer will not be distributed to the creditors of the MBS sponsor. Marketability of the bonds is enhanced by the credit ratings from bond rating agencies (like Moodys, S&P, Fitch).

Conflict of interest between the Credit Rating Agencies and the MBS Sponsor

The trust/issuer of the mortgage-backed bonds can be viewed as an investment company as defined in the Investment Company Act of 1940, hence would be subject to the extensive requirements of the Act; see Bethel, Ferrell, and Hu (2008). However, the trust/issuer can claim exemption from the Act if it issues only fixed-income securities that, at issue, received one of the four highest ratings from a nationally recognized rating agency (like, S&P, Moodys, and Fitch).

The above situation has the potential to create a conflict of interest between the credit rating agencies and MBS sponsors that set up the trust/issuer, since the trust's ability to claim exemption from the 1940 Act depends on the ratings provided by the rating agencies. Figure A1.2 notes Moodys revenues from rating various securities. While in the first quarter of 2001 Moodys quarterly revenue from rating structured securities (including MBS securities) was slightly greater than from rating corporate securities, by the fourth quarter of 2006 Moodys quarterly revenue from rating structured securities (including MBS securities) was about three times than from rating corporate securities. To the extent there was a conflict between the credit rating agencies and MBS sponsors, this was severely exacerbated by 2006.

The above-mentioned conflict is similar to the conflict of interest noted in the accounting literature between the auditors and the shareholders of firms they were auditing,

driven by the large non-audit fees the auditors were earning from the companies they were auditing in the pre-Sarbanes-Oxley era; see Dhaliwal, Gleason, Heizman, and Melendrez (2008), and Hoitash, Markelevich, and Barragato (2008).

Conflict of interest between the Credit Rating Agencies and the Investment Manager

Until now credit rating agencies have used the same rating system to rate mortgage-backed bonds as they do to rate corporate bonds. The methodology to rate corporate bonds is well-understood and has been validated by empirical data going back to almost a century. Credit rating agencies are required to and do disclose their criteria and methodology for rating mortgage-backed bonds. However, there are concerns about the complexity and transparency of the models used by the rating agencies; see Mason and Rosner (2007). Perhaps, even more importantly, given the brief existence (less than a decade in some cases) of the ever more complex mortgage-based securities, we do not have the empirical validity of these models to the same level of statistical confidence as for corporate debt.

In 2007, Moodys downgraded several AAA mortgage-backed bonds to junk status within a matter of weeks; see Crouhy and Turnbull (2008). Such a significant drop in rating in such a short period is almost unheard of for corporate bonds; see Hirsch and Bannier (2008). This suggests that AAA mortgage-backed bonds implied higher credit risk than AAA corporate bonds.

Pension funds, hedge funds and other institutional investors that invest in mortgage-backed bonds usually do so via an investment manager(s) who has discretion on which and how much of various mortgage-backed securities to hold. Part of the incentive compensation

of these fund managers depends on the extent to which their portfolio's return exceeds a benchmark. A mortgage-backed bond portfolio invested in AAA bonds would usually have the AAA return (from investing in a representative basket of AAA corporate and mortgage-backed bonds) as the benchmark. However, as noted above, AAA mortgage-bonds are riskier than AAA corporate bonds. Hence, a portfolio of AAA mortgage-backed bonds would have a higher expected return than a representative basket of AAA corporate and mortgage-backed bonds.

Appendix Chapter 2

Online Databases

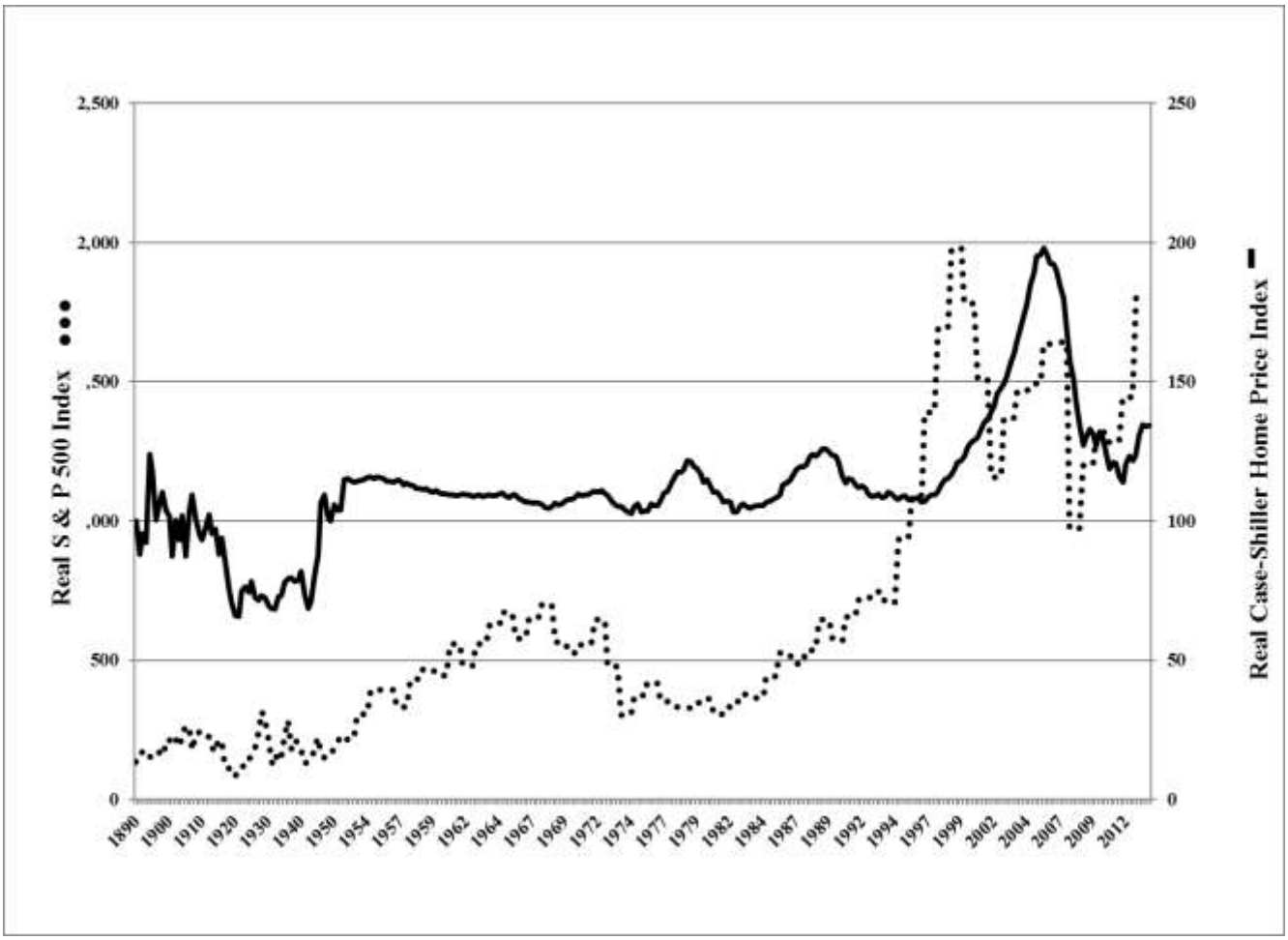
We provide the following three databases used in the empirical analysis in this book. These are available online.

1. Database provides Insider trading by TBTF CEOs and No-TARP CEOs during 2000-2008, and motivates our recommendation for executive compensation reform.
   http://leeds-faculty.colorado.edu/bhagat/Bhagat-JCF-2014.xlsx

2. Database provides corporate governance and director ownership – motivates our recommendation for director compensation policy.
   http://leeds-faculty.colorado.edu/bhagat/Bhagat-DirectorOwnershipData.xlsx

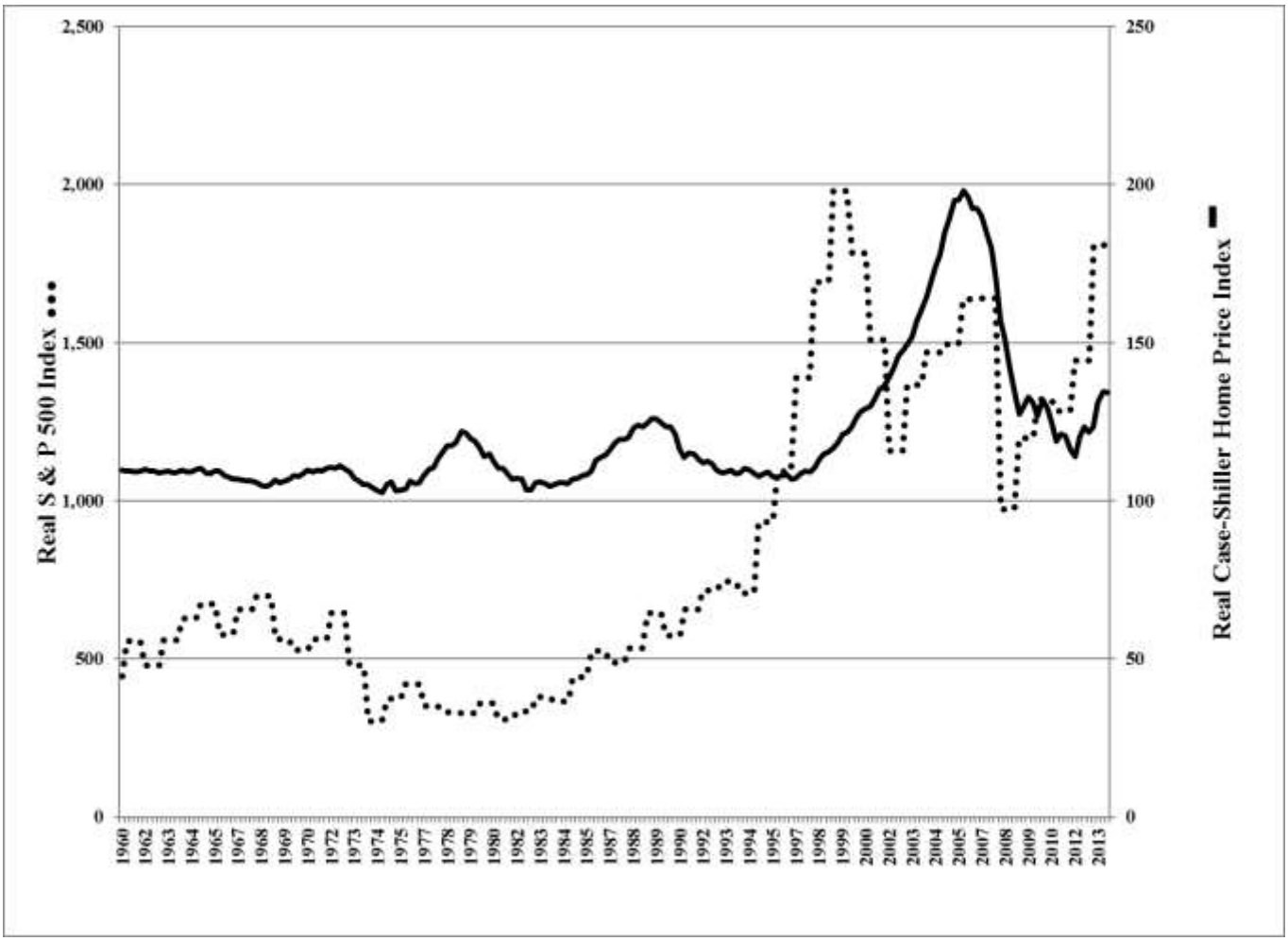
3. Data on the analysis of bank risk and bank size.
   http://leeds-faculty.colorado.edu/bhagat/Bhagat-BankRiskSize.xlsx

Figure 2.1A: Real S&P 500 Index and Real Case-Shiller Home Price Index, 1890-2013



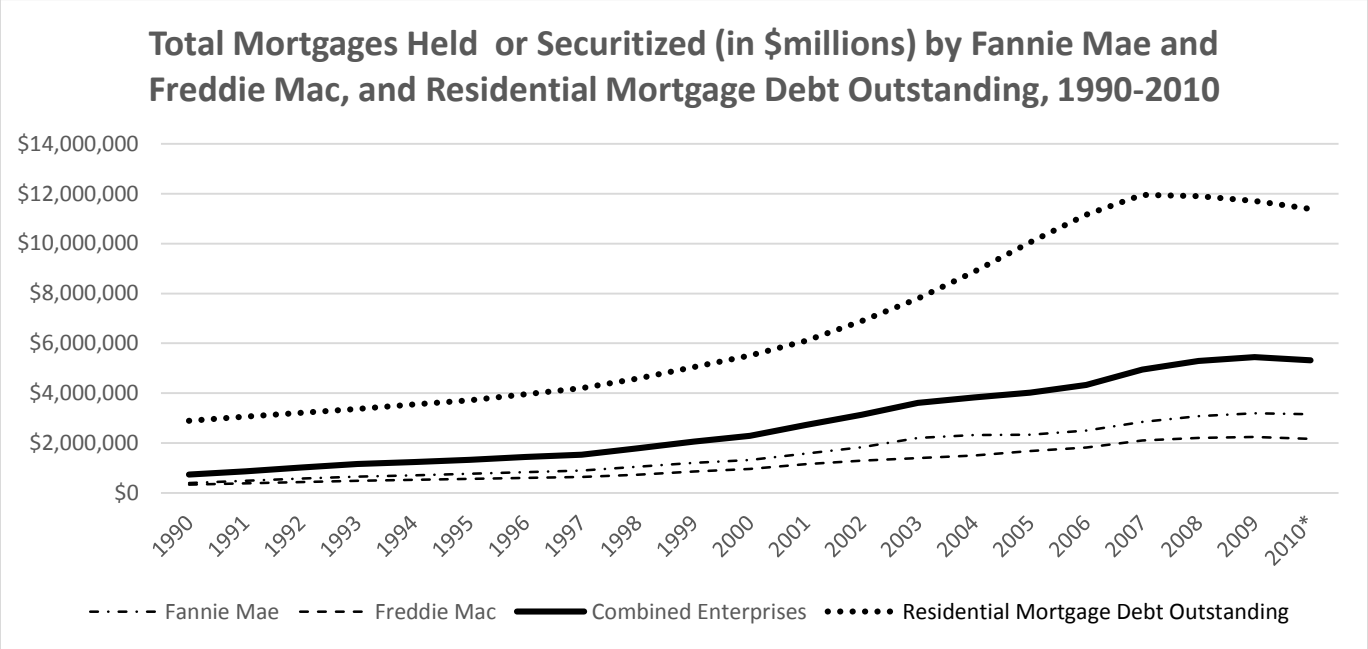
Source: Robert Shiller (http://www.econ.yale.edu/~shiller/data.htm)
This figure highlights the dramatic increase in inflation-adjusted real estate prices (measured by Real Case Shiller Home Price Index) during 1995-2005. Prior to this period, for more than a century, namely, 1890-1995, inflation-adjusted real estate prices while exhibiting volatility from year to year were basically unchanged.

Figure 2.1B: Real S&P 500 Index and Real Case-Shiller Home Price Index, 1960-2013



Source: Robert Shiller (http://www.econ.yale.edu/~shiller/data.htm)

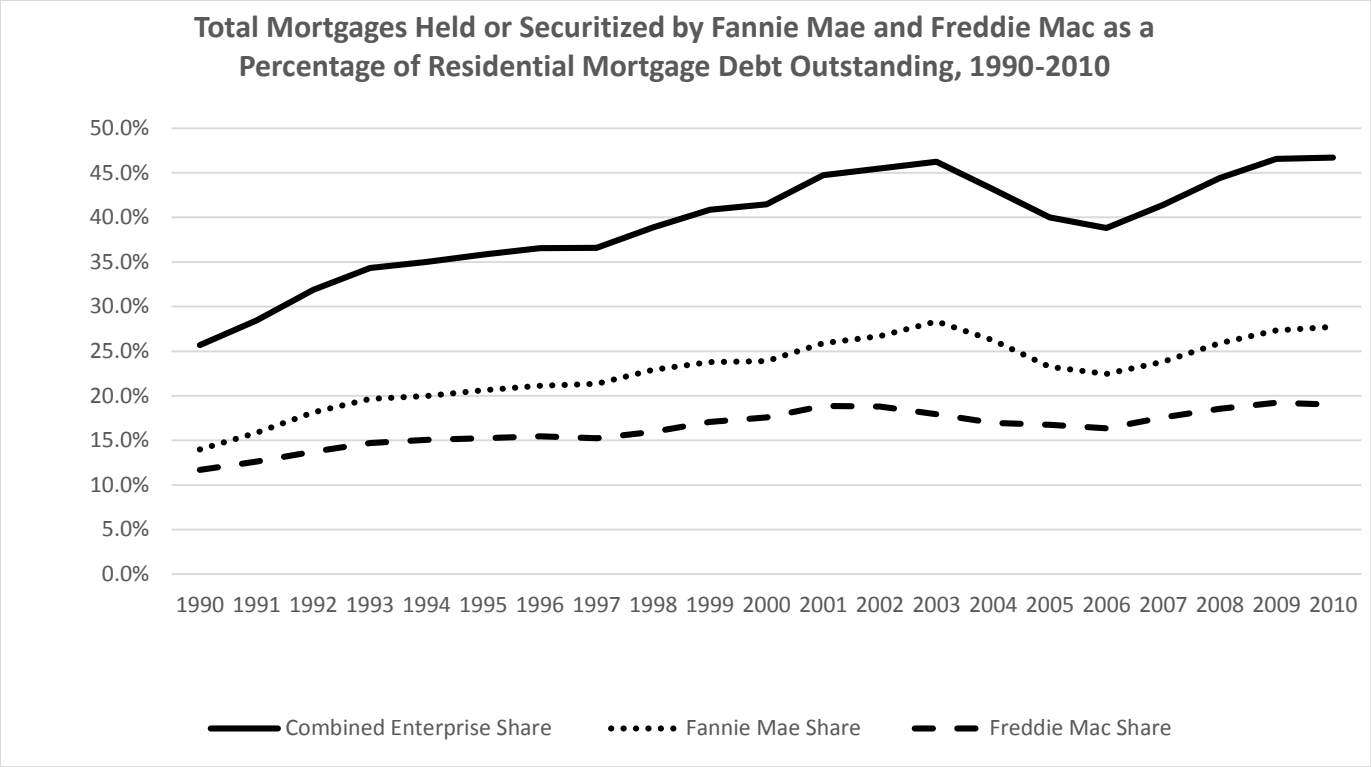
Figure 2.2A



Sources: Enterprise financial statements, 1994-2010; Mortgage Debt Outstanding: Federal Reserve Board's Flow of Funds Accounts of the United States, Annual Flows and Outstandings, March 11, 2010

This figure highlights the growing and important role of Fannie Mae and Freddie Mac in the U.S. residential mortgage debt market during 1992-2008.

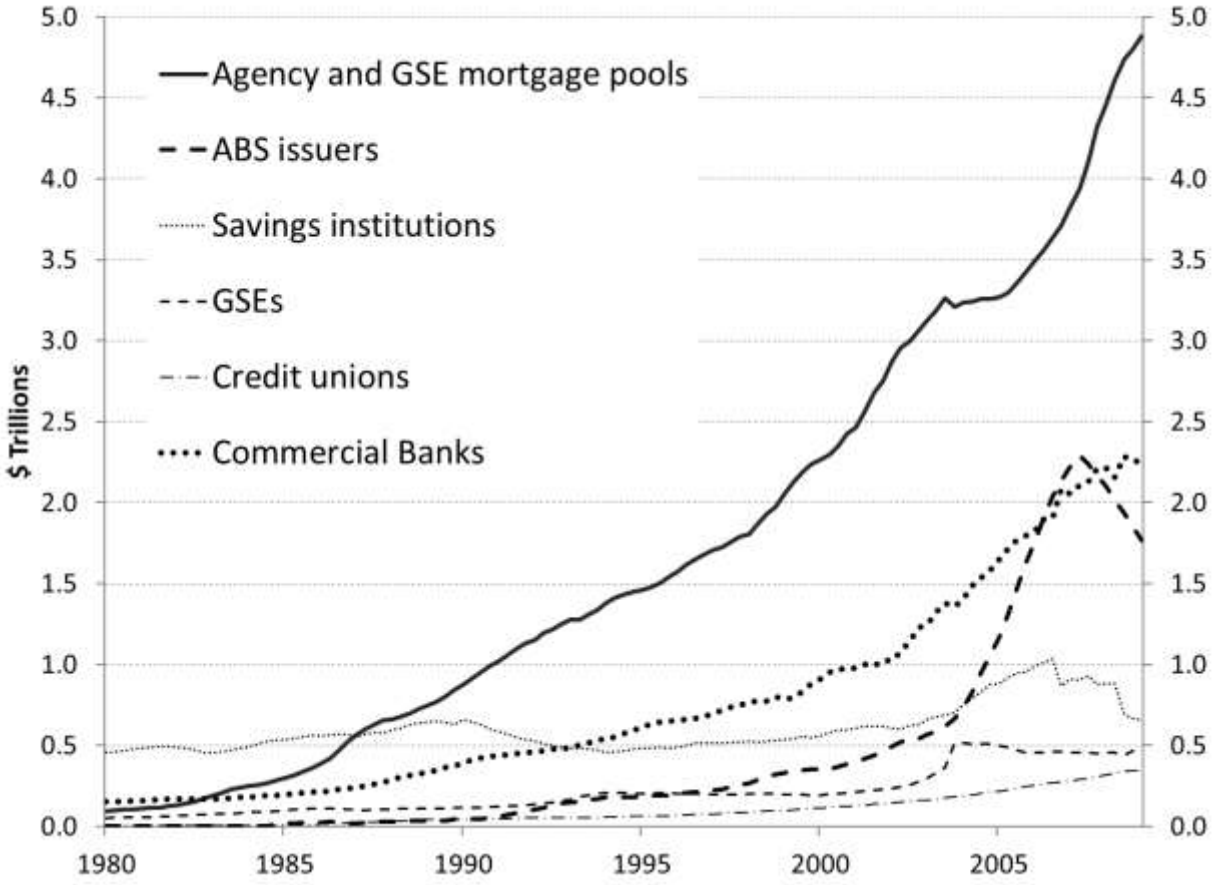
Figure 2.2B



Sources: Enterprise financial statements, 1994-2010; Mortgage Debt Outstanding: Federal Reserve Board's Flow of Funds Accounts of the United States, Annual Flows and Outstandings, March 11, 2010

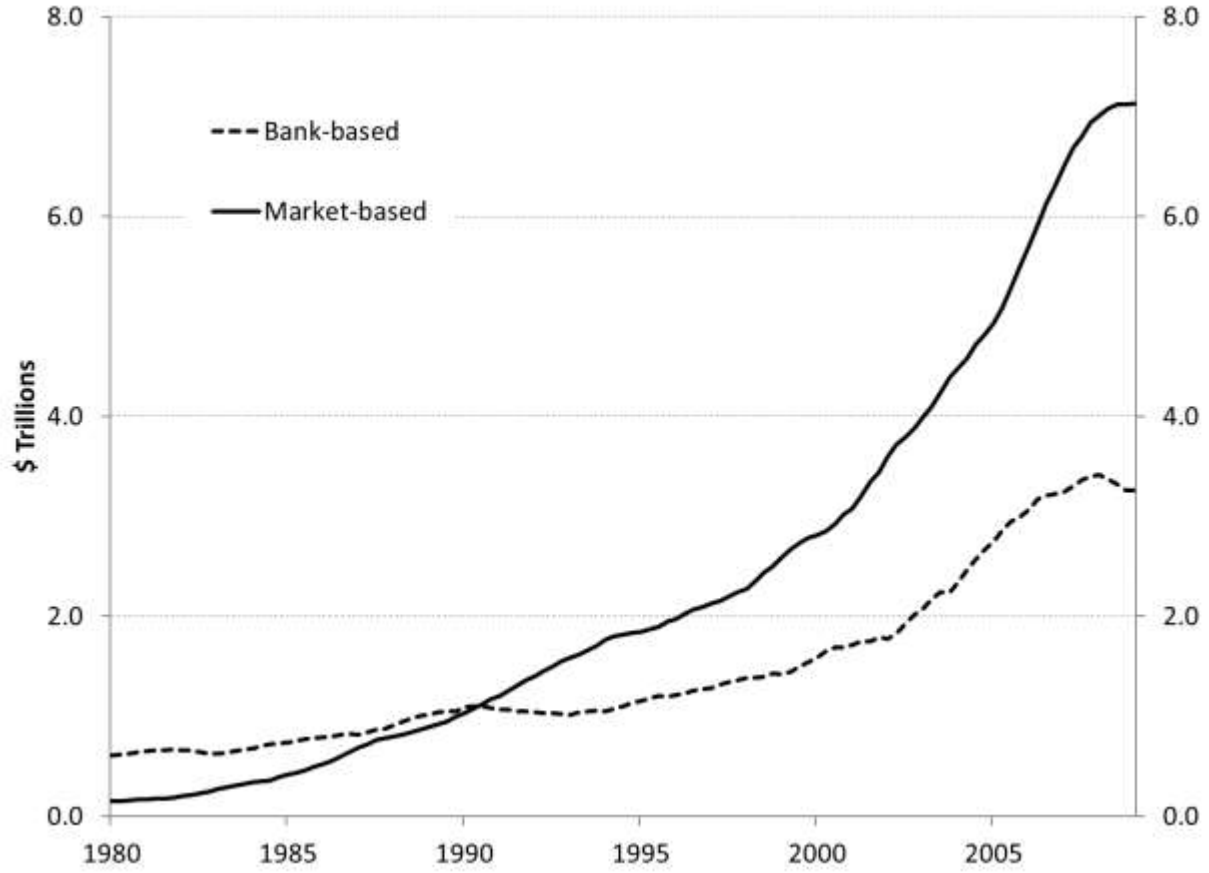
This figure highlights the growing and important role of Fannie Mae and Freddie Mac in the U.S. residential mortgage debt market during 1992-2008.

Figure 2.3A Total Holdings of US Mortgages by Type of Financial Institution



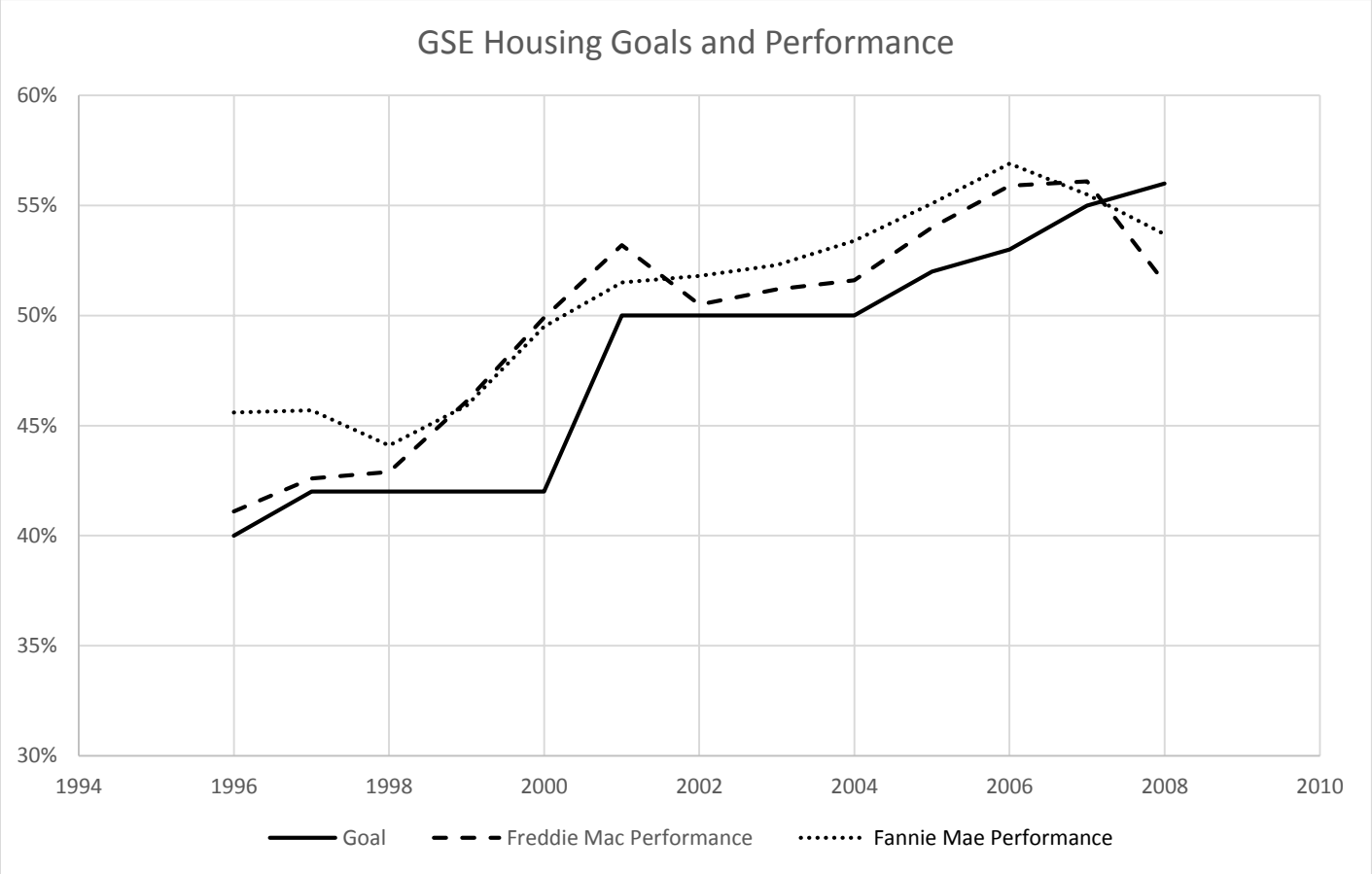
Source: Adrian and Shinn (2009)

Figure 2.3B: Market Based and Bank Based Holding of Home Mortgages



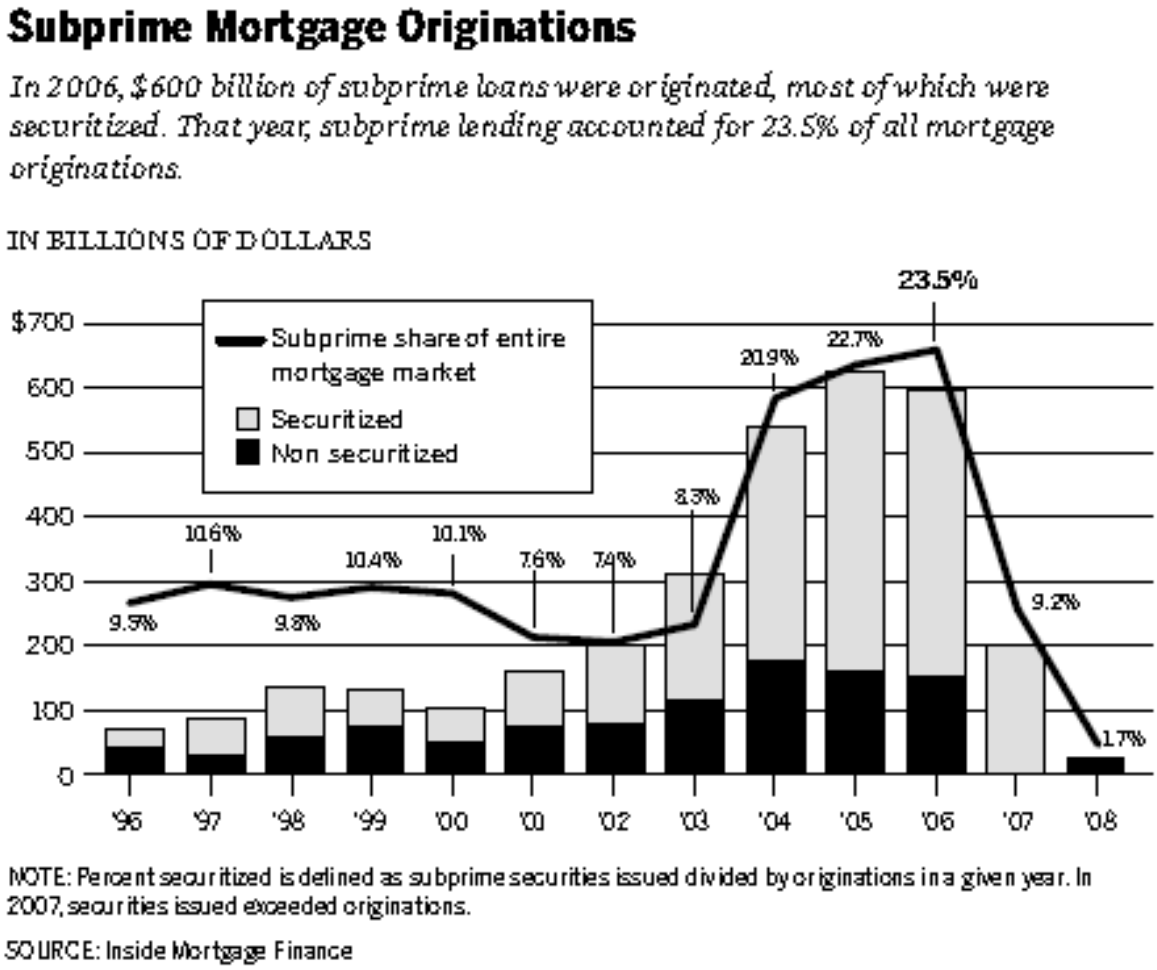
Source: Adrian and Shinn (2009)
Market-based holdings refer to the holdings of GSE mortgage pools, private label mortgage pools, and GSE holdings.
Bank-based holdings refer to holdings of commercial banks, savings institutions, and credit unions.
Market-based suppliers of credit have become increasingly important during 1995-2008.

Figure 2.4: Enterprise Housing Goals and Performance



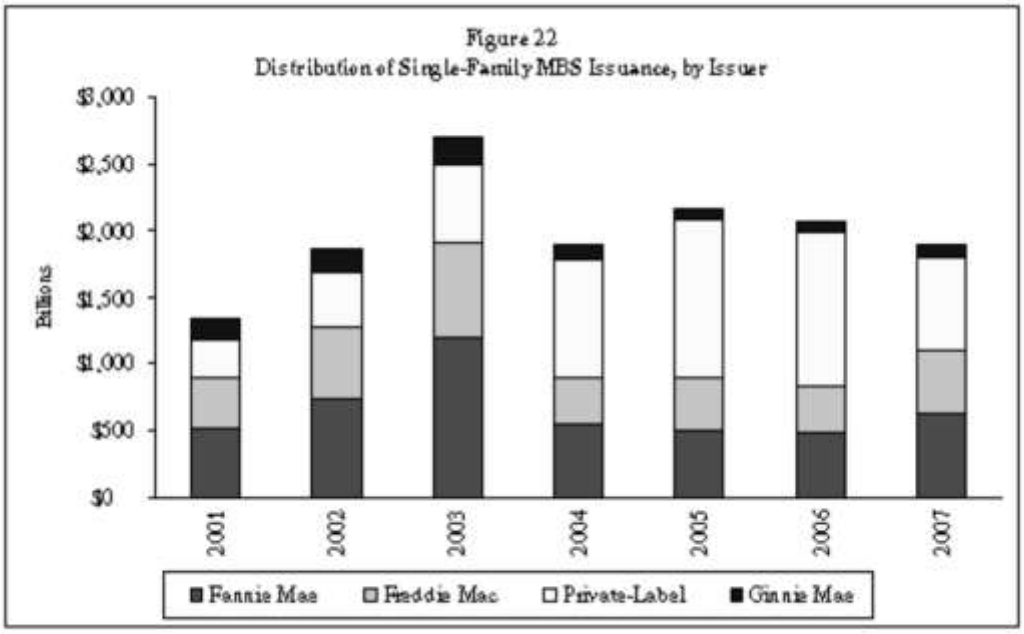
Source: FHFA (2010)
GSE housing goals for low and moderate-income borrowers during 1996-2008, and the performance of Fannie Mae and Freddie Mac with respect to these goals. GSE housing goals for low and moderate-income borrowers was 40% in 1996, and was rapidly increased to 56% by 2008. Fannie and Freddie were able to meet or exceed these goals for every year except for 2008.

Figure 2.5: Subprime Mortgage Originations



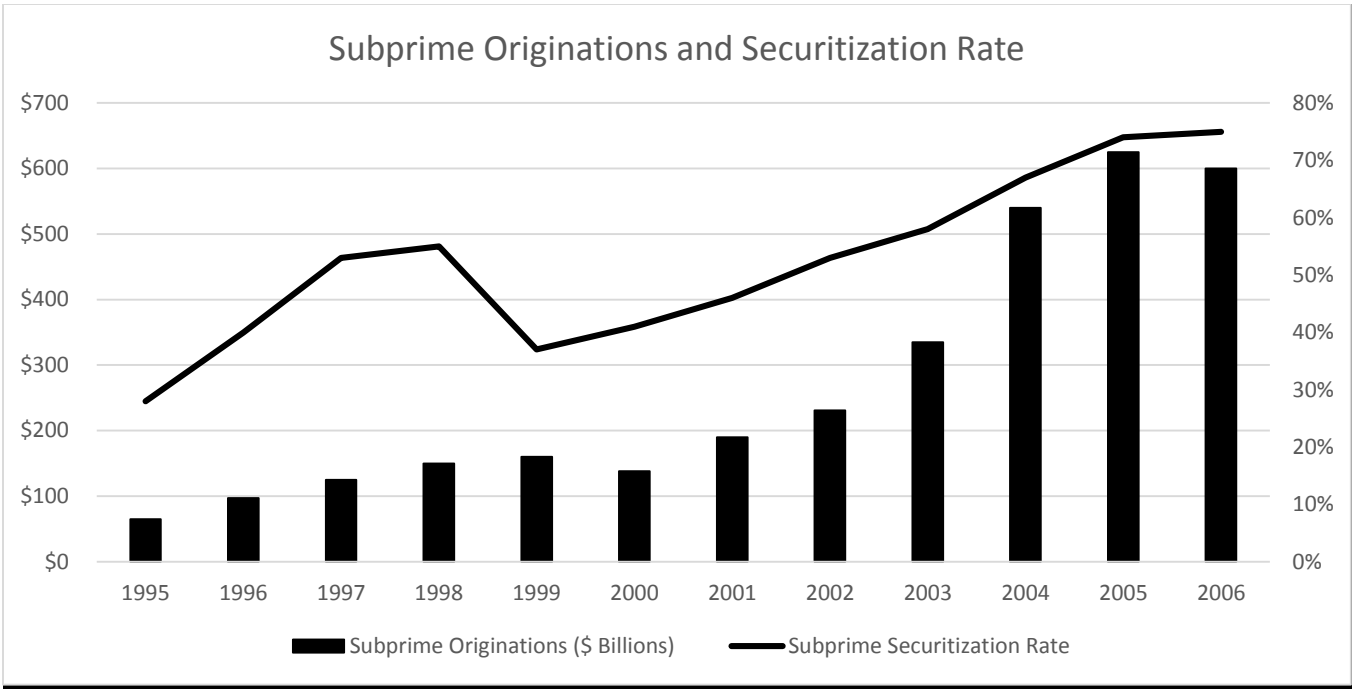
Source: FCIC (2011)
The years 2000-2006 witnessed a rapid increase in subprime mortgage originations, and the securitization of these mortgages.

Figure 2.6: Distribution of MBS Issuances, by Issuer



Source: OFHEO (2008)
Private-Label Securities (mortgage backed securities, MBS, issued by mostly big banks) were more than 50% of the MBS issuance for each of the years 2004, 2005 and 2006. Private-Label Securities are denoted by the unshaded part in each vertical bar in the figure above.

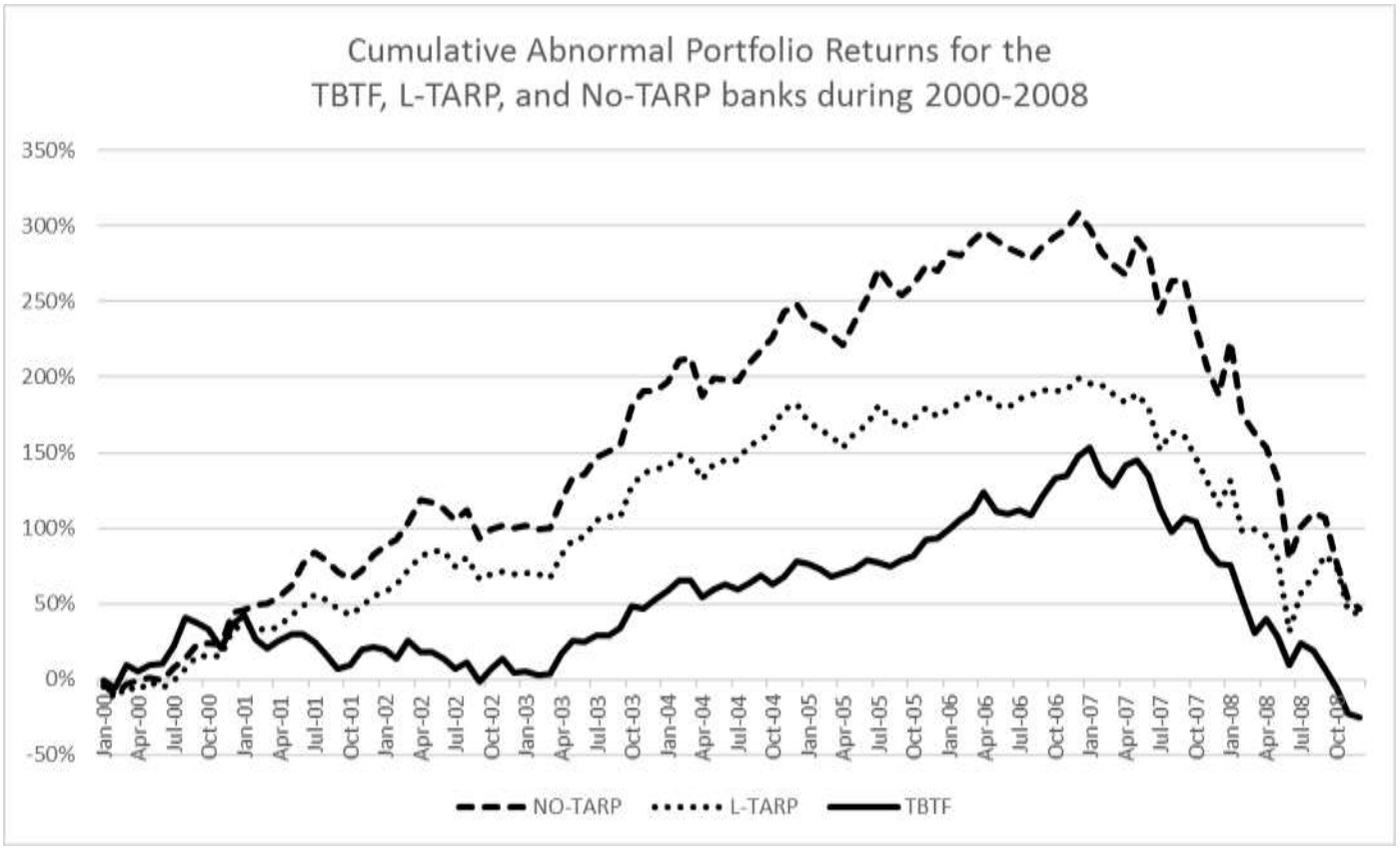
Figure 2.7: Subprime Originations and Securitization Rate



Source: Raboy (2009)
Subprime Originations and Securitization Rate of the subprime mortgages was growing in importance during 2004-2006.

Figure 5.1: Relative Portfolio Returns of Bank Portfolios, 2000-2008

This figure presents the relative cumulative portfolio returns from 2000-2008 of three different bank portfolios. The dashed on top represents the cumulative portfolio returns of the 37 *No-TARP* institutions, or those that never received TARP funding. The dotted line in the middle represents the cumulative portfolio returns of the 49 *L-TARP* institutions, or those that did receive TARP funding, but only after October 2008. The solid line represents the cumulative portfolio returns of the 14 *TBTF* firms, or those designated as Too Big to Fail. Monthly returns are used to form equally weighted portfolios.

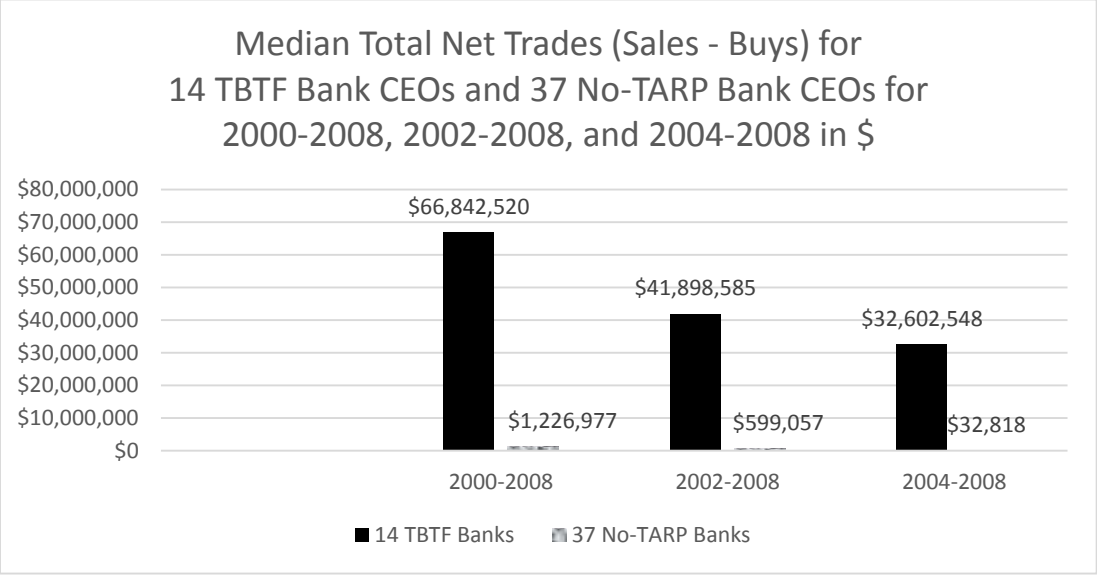


Source: Authors' calculations

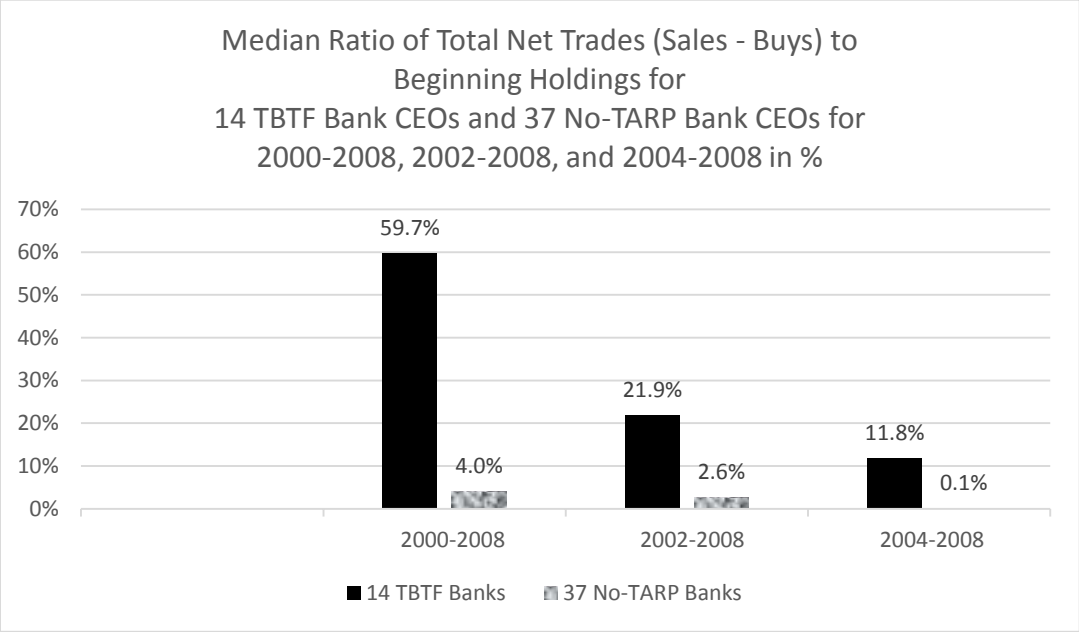
Shareholders in the TBTF (too big to fail) banks fared significantly worse than shareholders in the No-TARP banks (smaller banks that did not receive taxpayer-funded bailout funds) during 2000-2008. Shareholders in the TBTF (too big to fail) banks also fared significantly worse than shareholders in the L-TARP banks (banks, smaller than the TBTF banks, that did receive taxpayer-funded bailout funds after October 2008) during 2000-2008.

Figure 5.2: CEO Net Trades for 14 TBTF Banks and 37 No-TARP Banks

Panel A: In Dollars



Panel B: In %

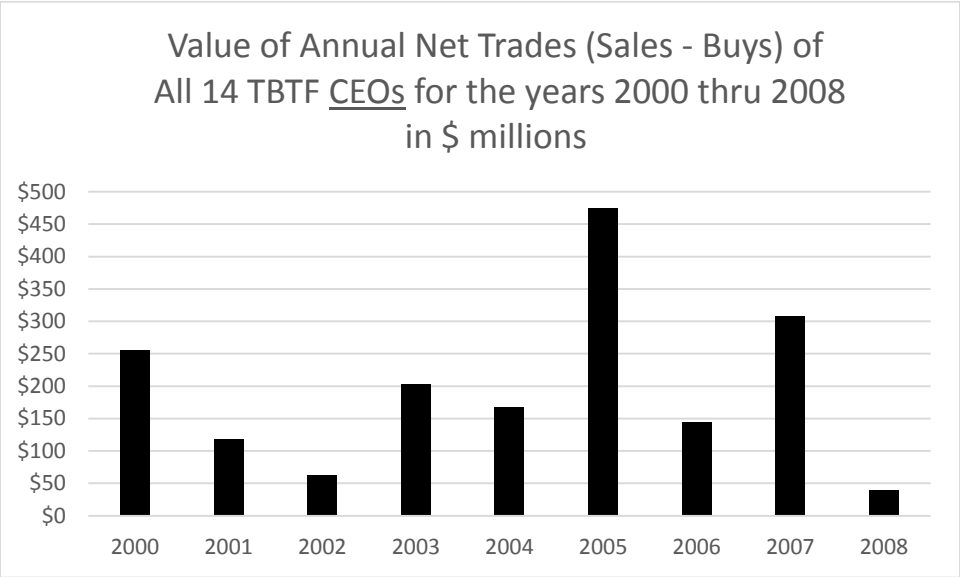


Source: Authors' calculations

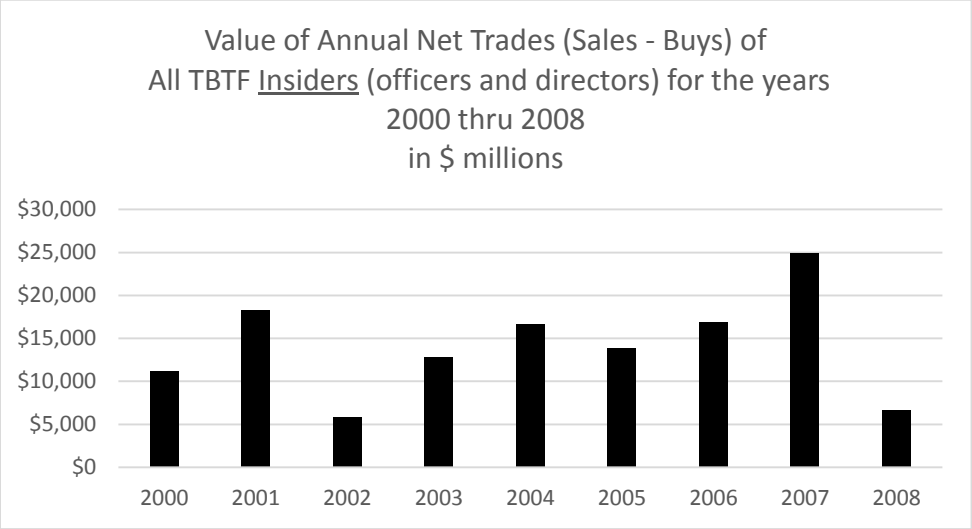
Net trades: calculated as all open market sales of stock less open market purchases and cost of exercising options**.** TBTF (too big to fail) bank CEOs sold significantly more of their stock holdings than No-TARP bank (smaller banks that did not receive taxpayer-funded bailout funds) CEOs in both an absolute and relative sense during 2000-2008, 2002-2008, and 2004-2008.

Figure 5.3: Value of CEO and Insider Net Trades for 14 TBTF Banks

Panel A: CEO Net Trades



Panel B: Insider Net Trades



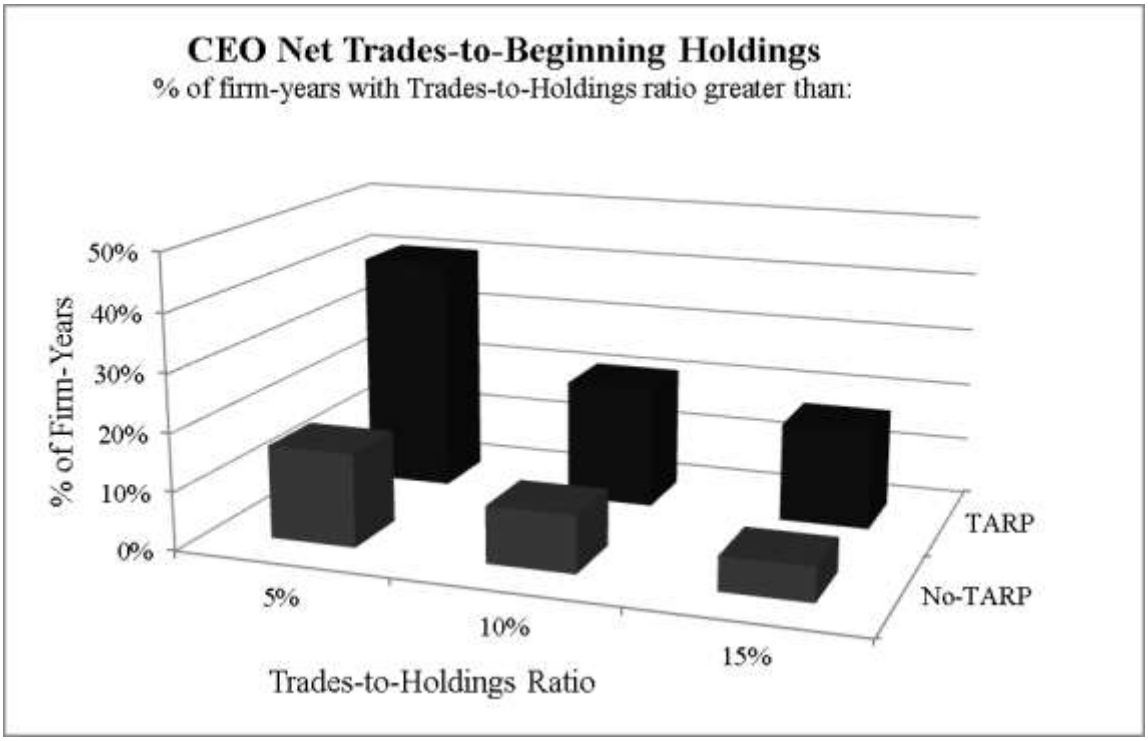
Source: Authors' calculations

TBTF (too big to fail) bank CEOs and insiders sold significantly large sums of their stock holdings in the years just prior to the 2008 financial crash.

Net trades: calculated as all open market sales of stock less open market purchases and cost of exercising options**.**

Figure 6.1: Ratio of Bank CEOs' Net Trades-to-Beginning Holdings 2000-2008

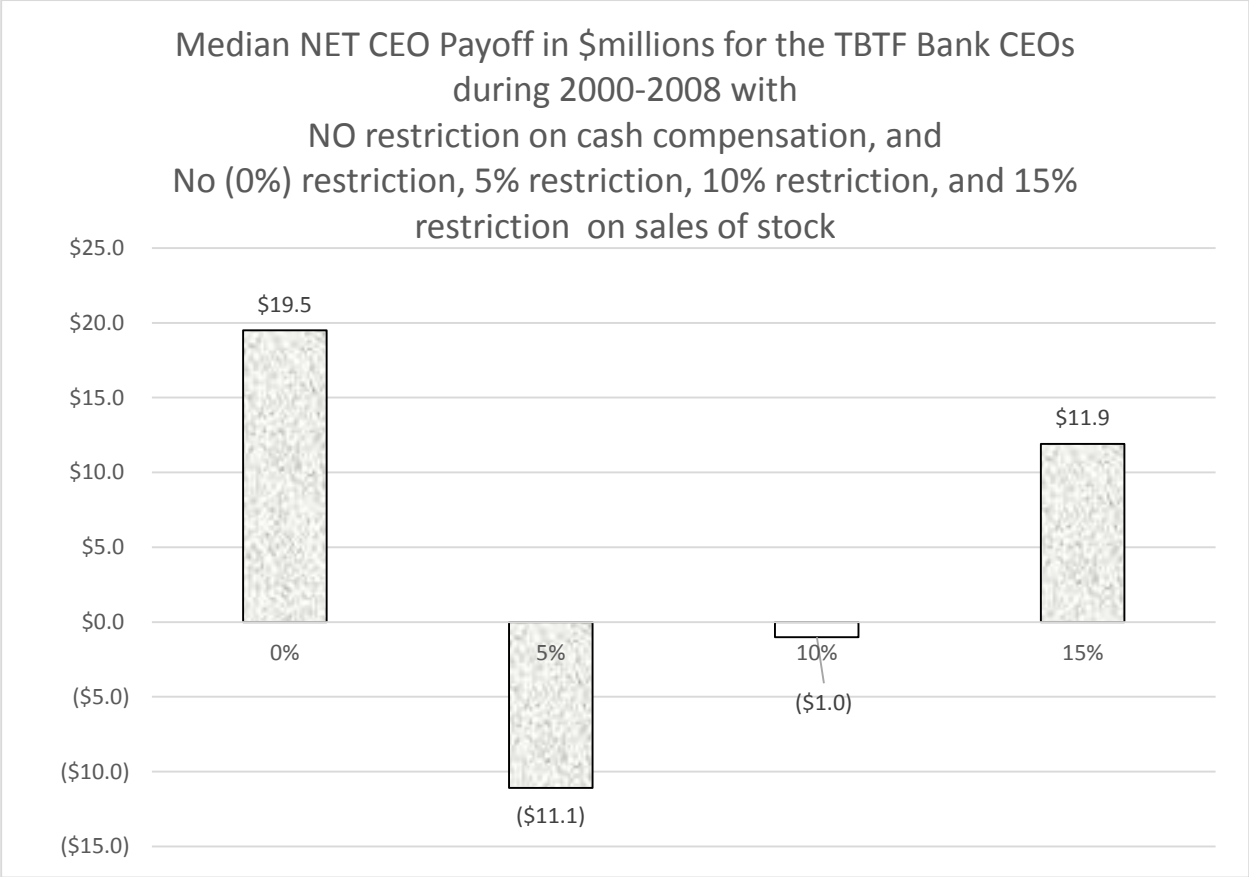
The figure shows the distribution of the percentage of firm years, over the time period 2000-2008, within two samples of bank CEOs, those of 14 firms that received TARP funds ("TARP," also denoted in the text as TBTF banks) and those of 37 banks which were not TARP recipients ("No-TARP," banks that did not need taxpayer-funded bailout funds), when the ratio of the CEOs' net trades, calculated as all open market sales of stock less open market purchases and cost of exercising options, to the CEOs' stock holdings, including beneficial ownership and vested stock and exercisable options, at the beginning of the year, exceeded 5%, 10% or 15%.



Source: Authors' calculations

The above figure highlights the fact that it is rare for CEOs of banks that did not need taxpayer-funded bailout funds to liquidate more than 10% of their holdings in any given year.

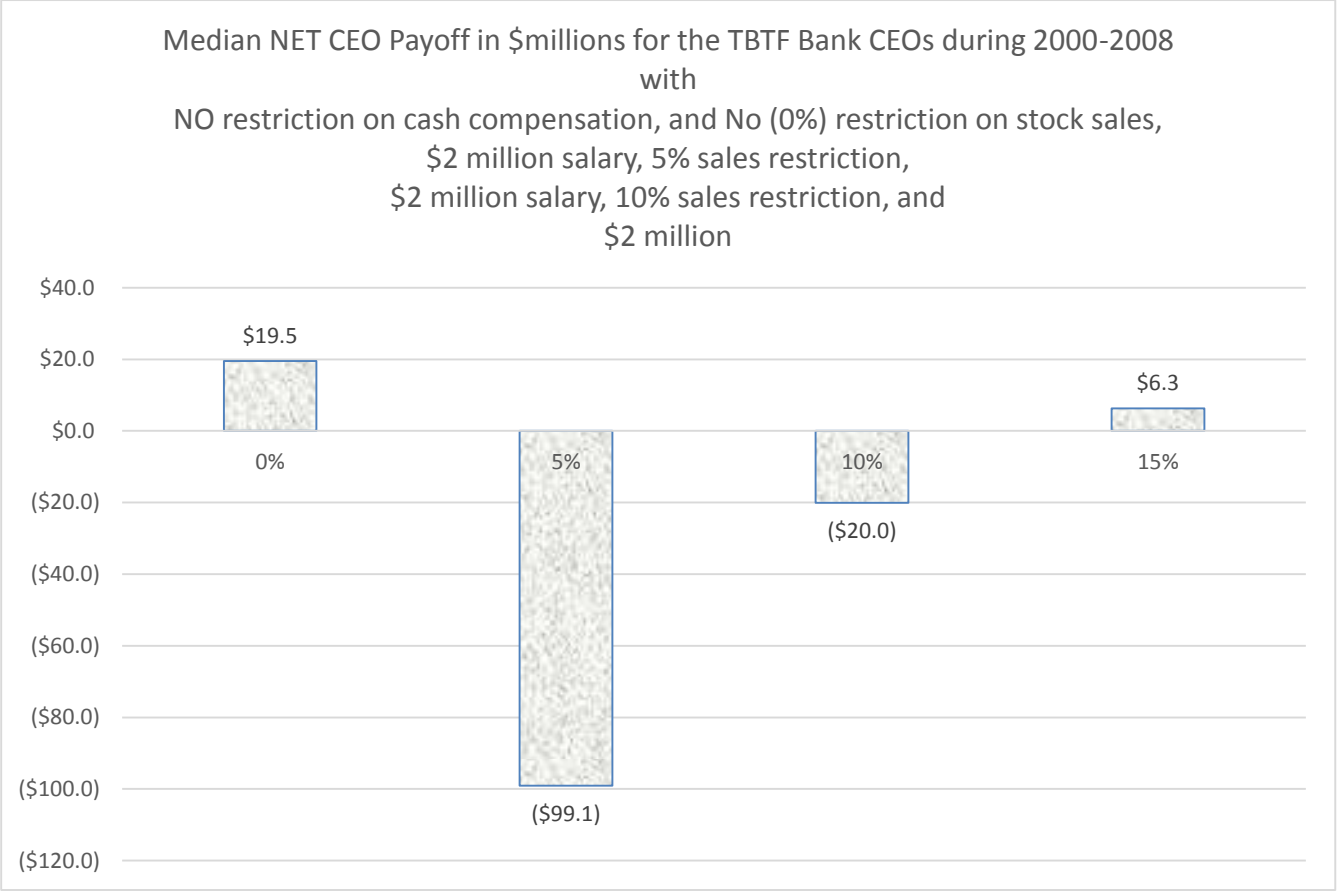
Figure 6.2, Panel A: Impact of stock sales restrictions on Net CEO payoff



Source: Authors' calculations

This figure highlight that if, per our Restricted Equity proposal, the TBTF CEOs' stock sales were limited to about 5% of the amount they owned in the beginning of that year, this would have imposed a negative compensation impact (negative Net CEO Payoff) when considering the entire 2000-2008 period. The negative compensation impact would have discouraged the TBTF CEOs from investing in high risk but value-destroying investment projects and trading strategies.

Figure 6.2, Panel B: Impact of stock sales and salary restrictions on Net CEO payoff

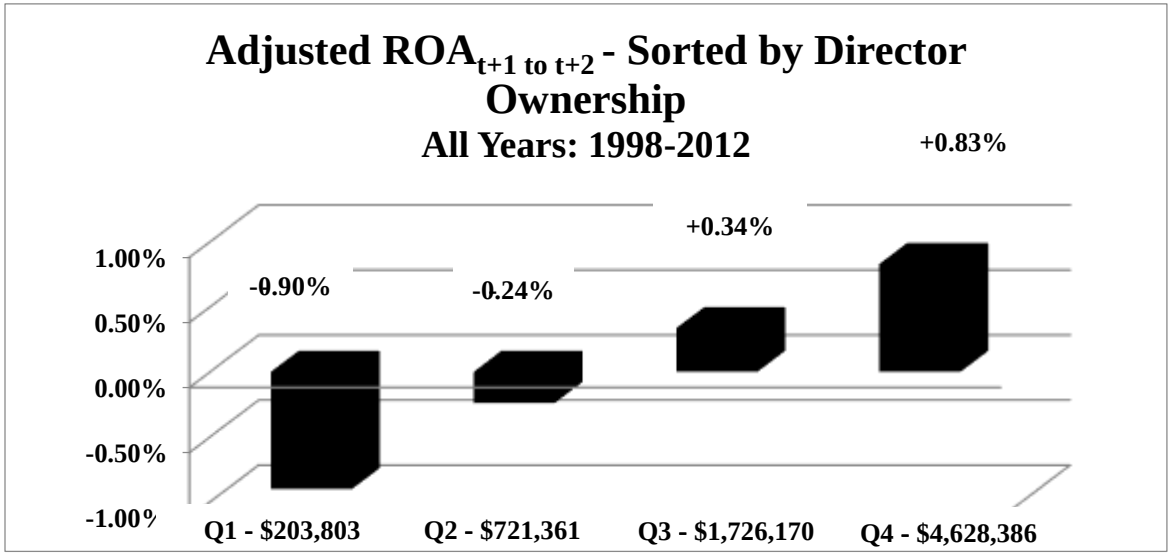


Source: Authors' calculations

This figure highlight that if, per our Restricted Equity proposal, the TBTF CEOs' stock sales were limited to about 5% of the amount they owned in the beginning of that year and a $2 million restriction on cash compensation (with the remainder of the cash compensation paid in stock), this would have imposed a significant negative compensation impact (negative Net CEO Payoff) when considering the entire 2000-2008 period. The negative compensation impact would have discouraged the TBTF CEOs from investing in high risk but value-destroying investment projects and trading strategies.

Figure 7.1: Relationship Between Dollar Board Ownership By Quartiles And Industry-Adjusted Return on Assets for the Subsequent Two Years for the 1,500 largest U.S. companies

All Years: 1998 2012	All Firms	Q1 Low	Q2	Q3	Q4 High
Director Ownership	$1,296,013	$203,803	$721,361	$1,729,170	$4,628,386
ROA: t+1 to t+2	12.71%	10.42%	12.11%	13.74%	14.60%
Adjusted ROA: t+1 to t+2	0.06%	-0.90%	-0.24%	0.34%	0.83%

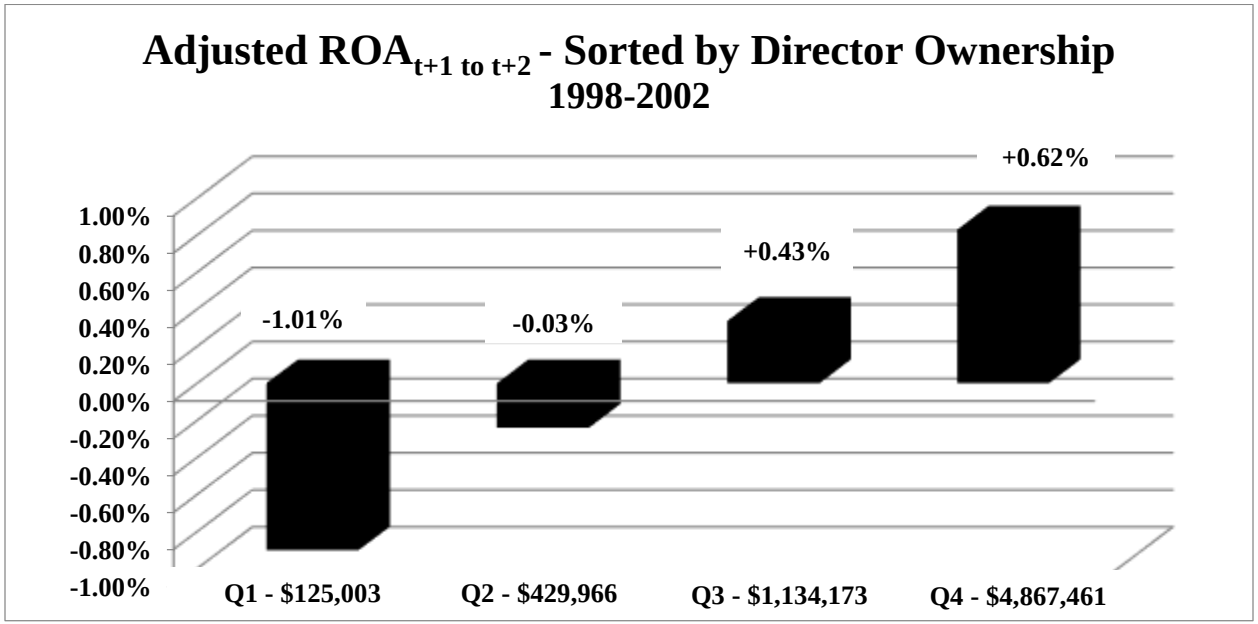


Source: Authors' calculations

Companies perform better as their directors own more stock in their companies. Performance is measured as industry-adjusted return on assets over the subsequent two years. Director ownership is measured in dollars (number of shares * share price) of the median director. Directors are rank-ordered by their stock ownership in the company, from high to low; the middle director in this rank-ordering is designated as the median director.

Figure 7.1continued: Relationship Between Dollar Board Ownership By Quartiles And Industry-Adjusted Return on Assets for the Subsequent Two Years for the 1,500 largest U.S. companies

1998 2002	All Firms	Q1 Low	Q2	Q3	Q4 High
Director Ownership	$678,278	$125,003	$429,966	$1,134,173	$4,867,461
ROA: t+1 to t+2	12.41%	10.05%	12.47%	13.33%	13.80%
Adjusted ROA: t+1 to t+2	0.10%	-1.01%	-0.03%	0.43%	0.62%



Source: Authors' calculations

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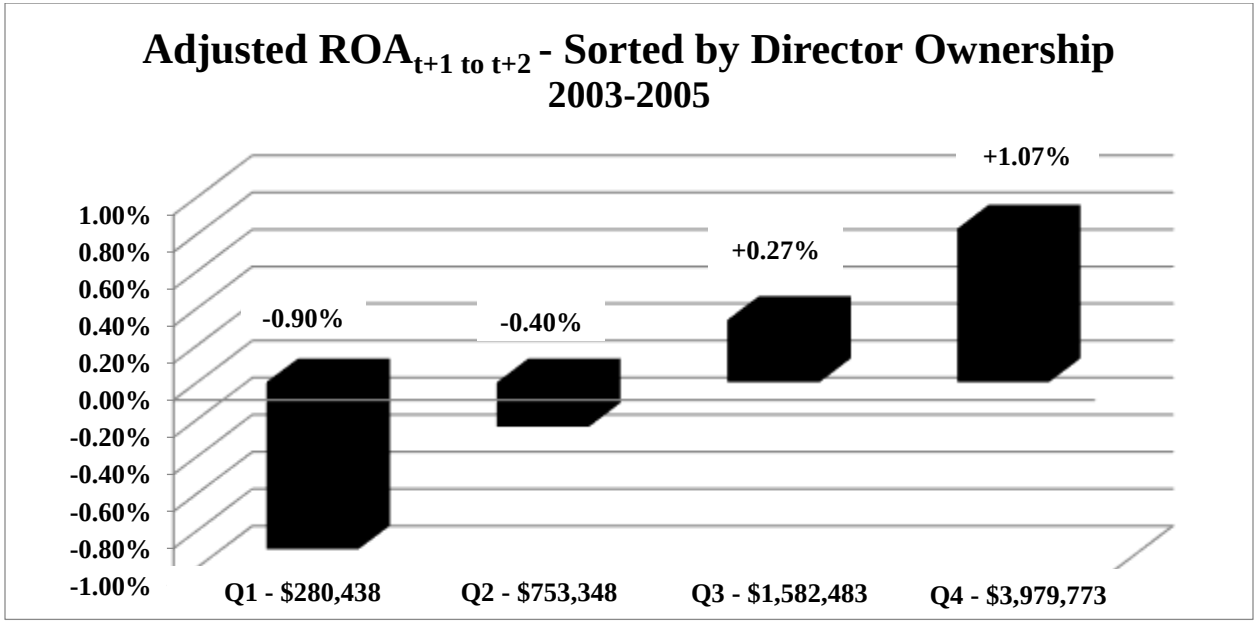
Figure 7.1continued: Relationship Between Dollar Board Ownership By Quartiles And Industry-Adjusted Return on Assets for the Subsequent Two Years for the 1,500 largest U.S. companies

2003 2005	All Firms	Q1 Low	Q2	Q3	Q4 High
Director Ownership	$1,063,340	$280,438	$753,348	$1,582,483	$3,979,773
ROA: t+1 to t+2	12.72%	10.35%	12.10%	13.61%	14.89%
Adjusted ROA: t+1 to t+2	0.05%	-0.90%	-0.40%	0.27%	1.07%

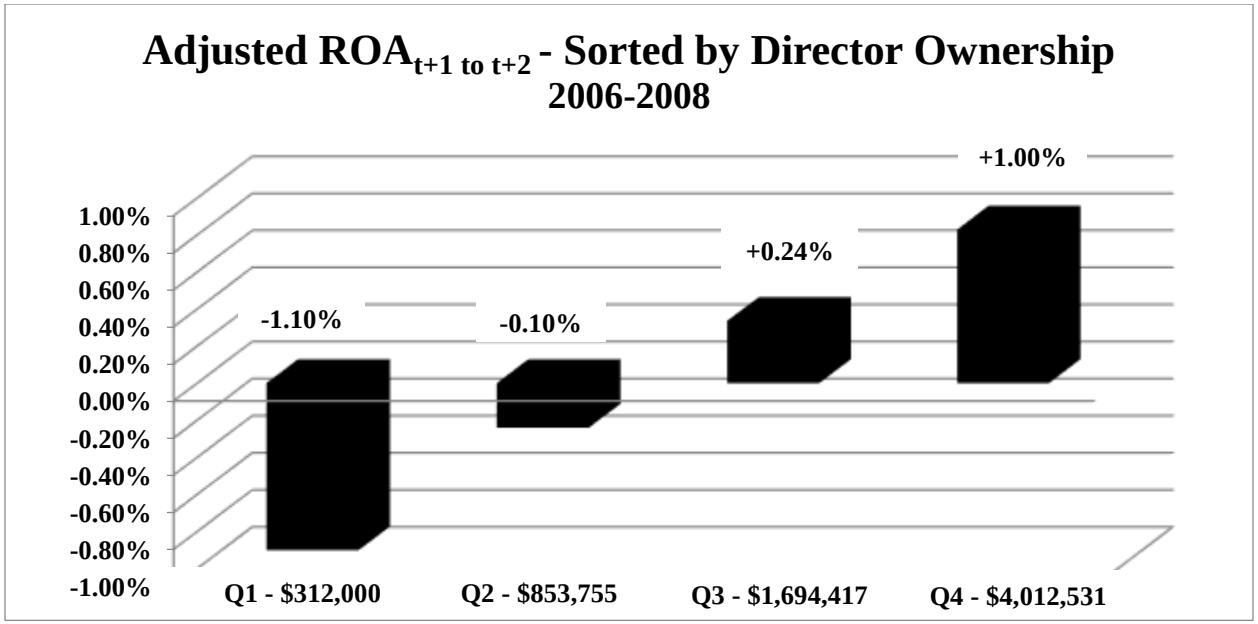


Source: Authors' calculations

Companies perform better as their directors own more stock in their companies. Performance is measured as industry-adjusted return on assets over the subsequent two years. Director ownership is measured in dollars (number of shares * share price) of the median director. Directors are rank-ordered by their stock ownership in the company, from high to low; the middle director in this rank-ordering is designated as the median director.

Figure 7.1continued: Relationship Between Dollar Board Ownership By Quartiles And Industry-Adjusted Return on Assets for the Subsequent Two Years for the 1,500 largest U.S. companies

2006 2008	All Firms	Q1 Low	Q2	Q3	Q4 High
Director Ownership	$1,252,203	$312,000	$853,755	$1,694,417	$4,012,531
ROA: t+1 to t+2	13.34%	10.36%	13.18%	14.21%	15.72%
Adjusted ROA: t+1 to t+2	0.04%	-1.10%	-0.10%	0.24%	1.00%



Source: Authors' calculations

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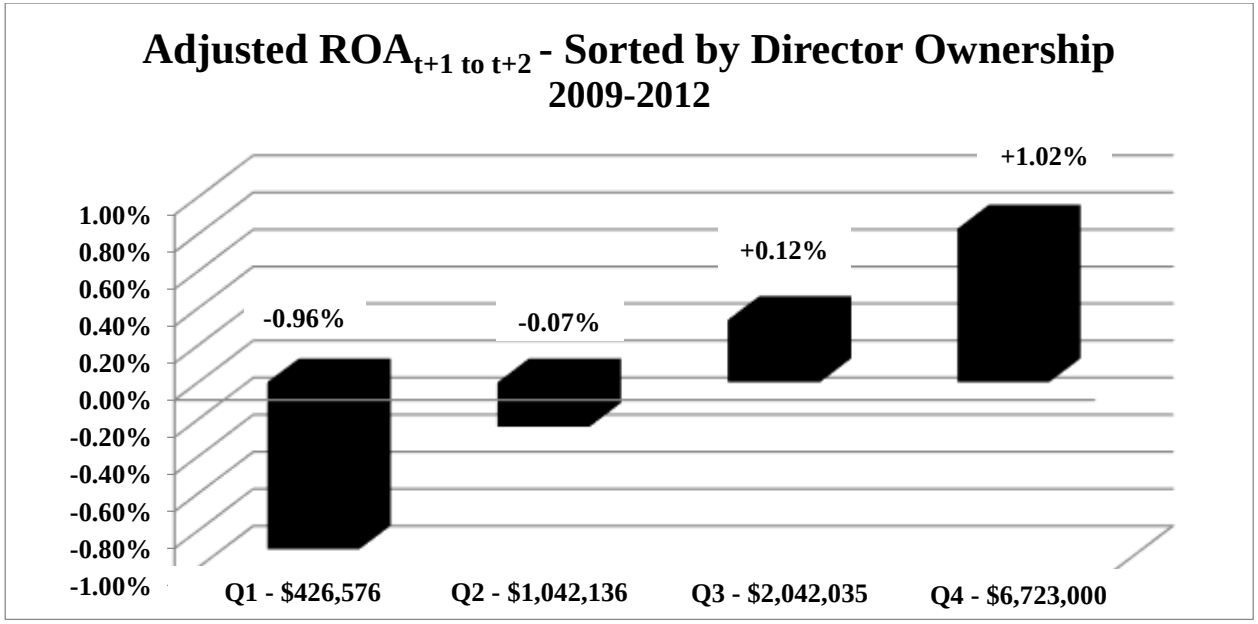
Figure 7.1continued: Relationship Between Dollar Board Ownership By Quartiles And Industry-Adjusted Return on Assets for the Subsequent Two Years for the 1,500 largest U.S. companies

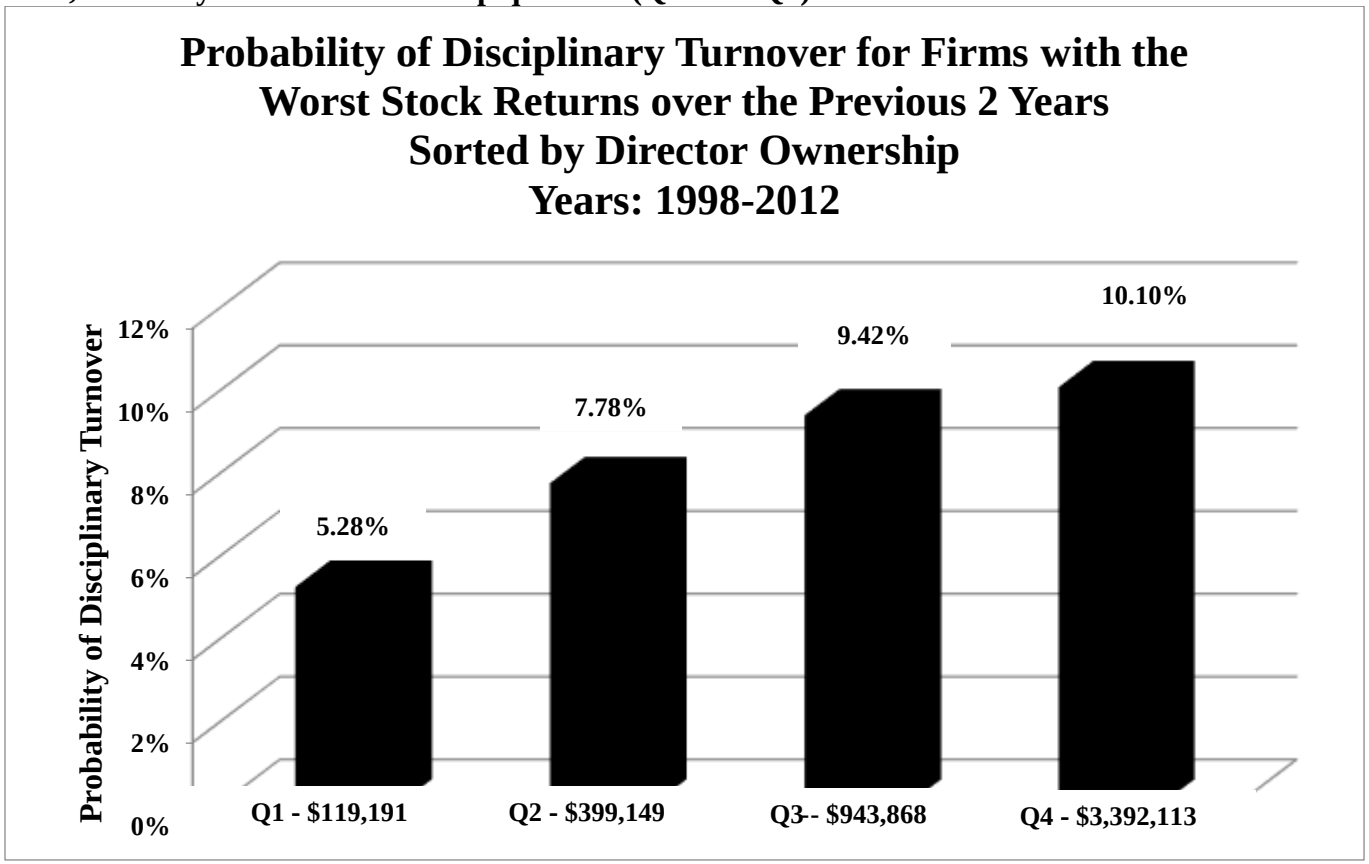
2009 2012	All Firms	Q1 Low	Q2	Q3	Q4 High
Director Ownership	$2,139,007	$426,576	$1,042,136	$2,042,035	$6,723,000
ROA: t+1 to t+2	12.61%	10.11%	12.44%	14.11%	14.80%
Adjusted ROA: t+1 to t+2	0.05%	-0.96%	-0.07%	0.12%	1.02%



Source: Authors' calculations

Companies perform better as their directors own more stock in their companies. Performance is measured as industry-adjusted return on assets over the subsequent two years. Director ownership is measured in dollars (number of shares * share price) of the median director. Directors are rank-ordered by their stock ownership in the company, from high to low; the middle director in this rank-ordering is designated as the median director.

Figure 7.2 Probability of disciplinary CEO turnover among the worst performing largest 1,500 U.S. companies during 1998-2012, sorted by Director Ownership quartiles (Q1 thru Q4)



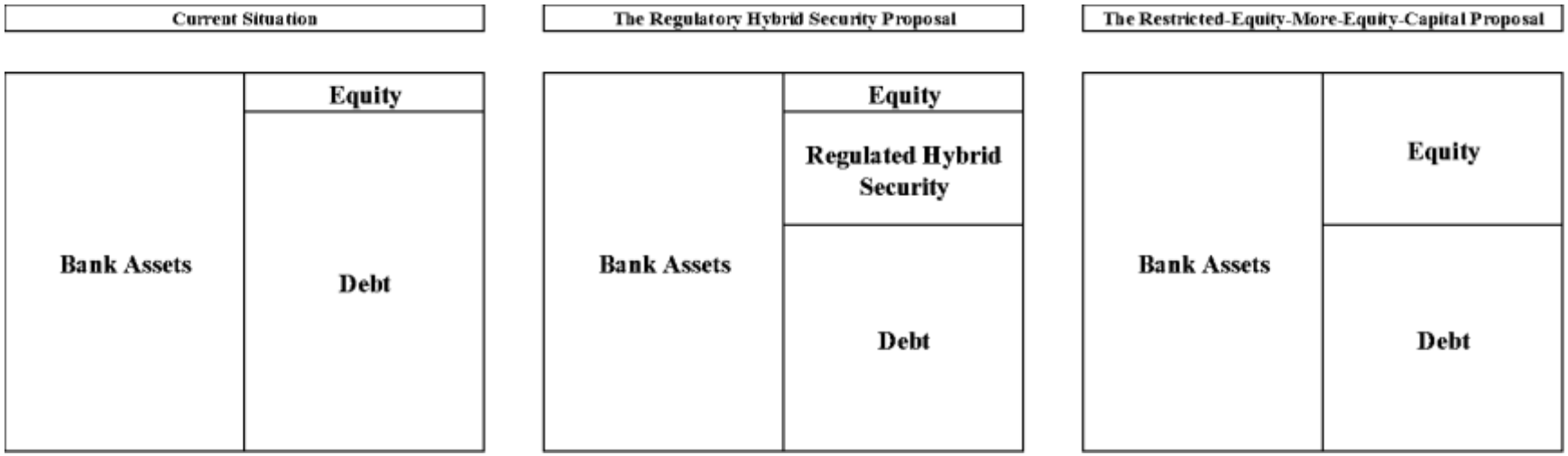
Source: Authors' calculations

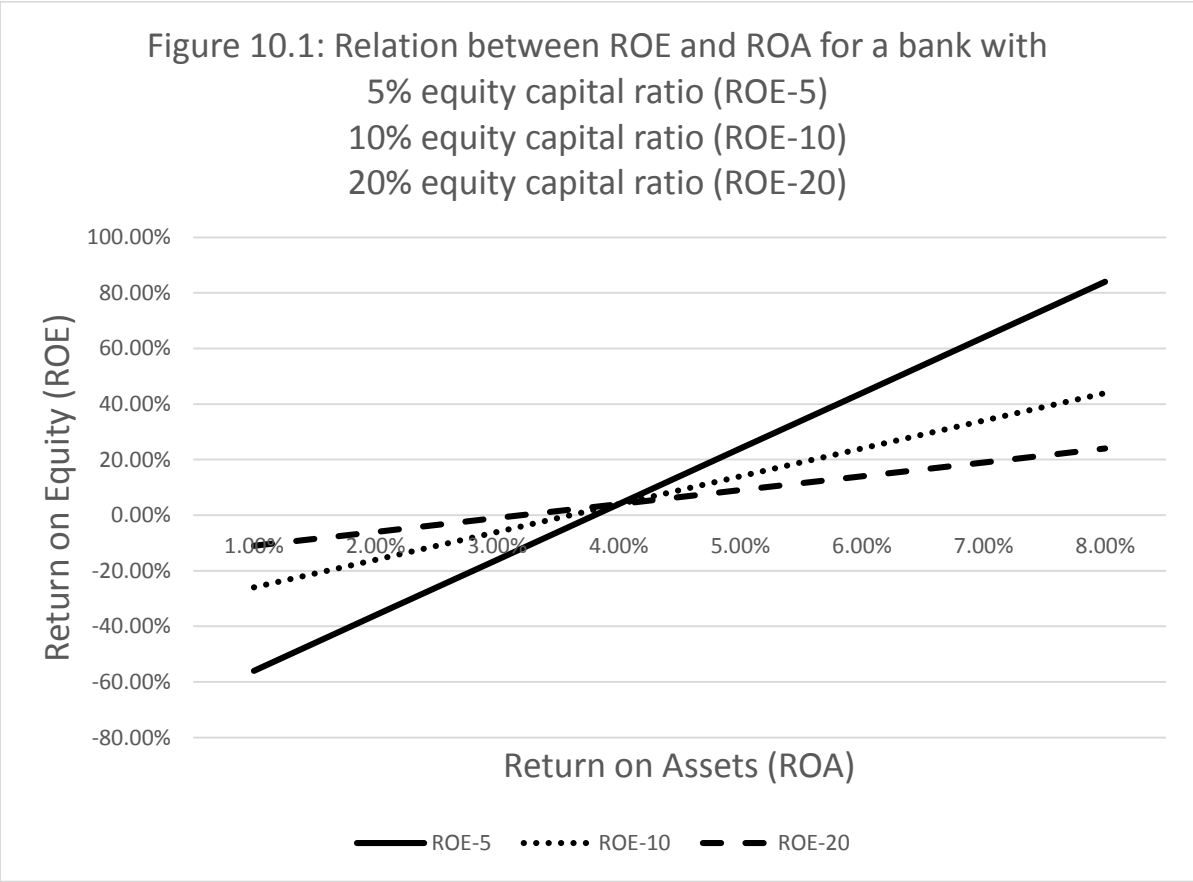
Director ownership is measured in dollars (number of shares * share price) of the median director. Directors are rank-ordered by their stock ownership in the company, from high to low; the middle director in this rank-ordering is designated as the median director.

Corporate boards in which the median director owns more stock are more likely to discipline/fire their CEO if the share price performance of their company has been particularly poor during the past two years.

Figure 9.1: Balance sheet of a large bank

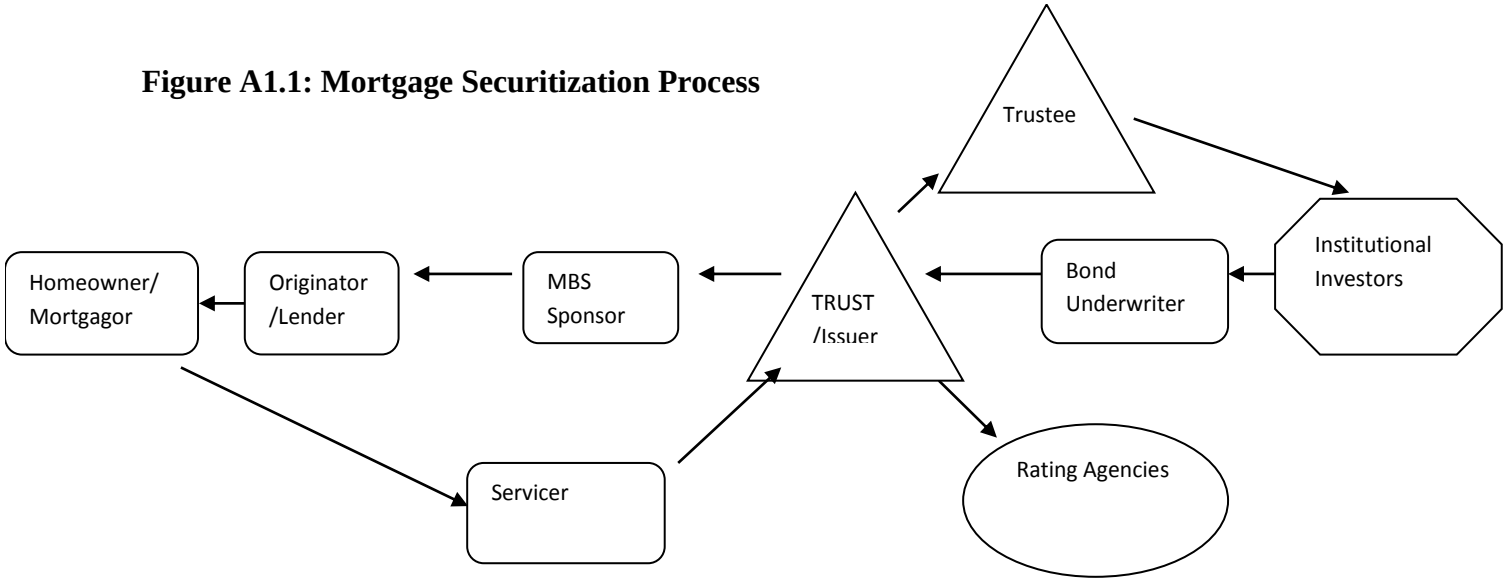
This figure presents stylized depictions of a large bank's capital structure under three scenarios: the current situation, The Regulatory Hybrid Security proposal, and the Restricted-Equity-More-Equity-Capital proposal noted in chapter 9.





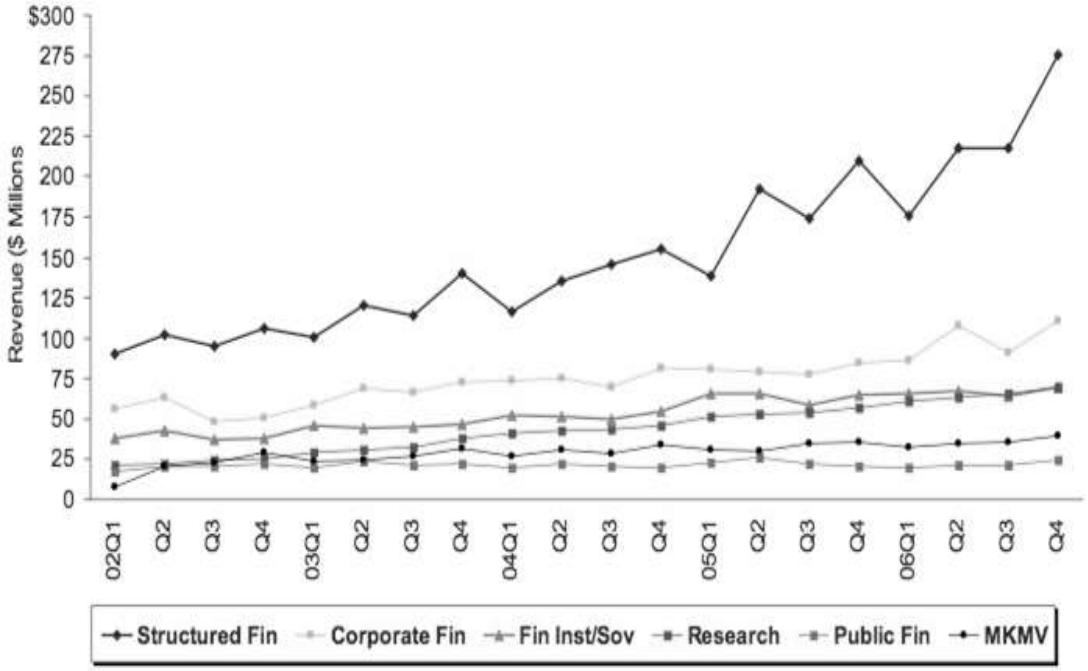
ROE has a linear relationship with ROA. The linear relationship becomes steeper as the company (bank) is financed with less equity.
During good times when ROA is on the high side: for a given ROA, ROE is higher for banks financed with more debt. However, during not-so-good times, when ROA is on the low side: for a given ROA, ROE is lower for banks financed with more debt.

Figure A1.1: Mortgage Securitization Process



represents flow of dollars.

Figure A1. 2: Moodys Quarterly Revenues From Rating Various Securities



Source: Moodys (http://ir.moodys.com/Mobile/file.aspx?IID=108462&FID=4597523)

In the first quarter of 2001, Moodys quarterly revenue from rating structured securities (including MBS securities) was slightly greater than from rating corporate securities. By the fourth quarter of 2006, Moodys quarterly revenue from rating structured securities (including MBS securities) was about three times than from rating corporate securities.

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[1] For example, see Charles Calomiris and Allan Meltzer, "How Dodd-Frank Doubles Down on 'Too Big to Fail,' Wall Street Journal, February 18, 2014, A13. More recently, on June 2, 2016, two Federal Reserve Board governors signaled that big banks will be required to hold more equity. "Mr. Powell said that the Fed's move would go beyond existing rules to make big banks "fully internalize the risk" they pose to the economy. While some critics want to break up these large banks, the Fed has instead sought to force them to tighten capital and other rules they must follow, effectively taxing their size. The rules have sent a clear message to big banks: Staying large will be costly." http://www.wsj.com/articles/feds-tarullo-warns-banks-of-significant-increase-in-capital-in-future-stress-tests-1464870270.

[2] In 2009, the Group of Twenty ("G-20") adopted principles on banks' incentive compensation emphasizing deferral and clawbacks, Financial Stability Forum, Principles for Sound Compensation Practices (Apr. 2, 2009), available at http://www.financialstabilityboard.org/list/fsb_publications/from_01012007/index.htm. These principles were incorporated into the supervisory guidelines of the Basel Committee on Banking Supervision and implemented in the United States and European Union ("EU"). The G-20 consists of the finance ministers and central bankers of 19 industrial and emerging market countries plus the European Union. The Basel Committee was created by the central bankers of the G-10 nations to coordinate supervisory standards, with membership expanded to the G-20 in 2009. Most recently, the EU has restricted bankers' incentive compensation to 100% of total fixed pay, with some exceptions for shareholder-approved packages. For a summary of the legislation, which is known as Capital Requirements Directive (CRD) IV, see Client Memorandum, DavisPolk, Recent European Compensation Developments: Financial Institutions and Beyond (Apr. 23, 2013), available at http://www.davispolk.com/sites/default/files/files/Publication/f3691634-6c28-4c9a-bbbd-bba7a8ad07e0/Preview/PublicationAttachment/2679f2aa-634f-4093-9a35-c44b9c147edb/04.23.12.European.Compensation.pdf. More recently, the SEC has announced plans to implement an expanded clawback provision regarding executive compensation: "SEC Eyes Broadened 'Clawback' Restrictions," June 2, 2015. http://www.wsj.com/articles/sec-eyes-broadened-clawback-restrictions-1433285178?

[3] Bhagat and Romano (2009, 2010).

[4] In the global financial crisis, for example, the U.S. government protected creditors and even shareholders in the largest financial institutions, such as the insolvent Citigroup, by bolstering firms with cash infusions for preferred stockholdings, although it did not bail out shareholders of other large institutions that failed, such as Washington Mutual. Gandhi, Lustig, and Plazzi (2016) provide evidence of the implicit guarantees provided by U.S. taxpayers to the big bank investors.

[5] For one of the few formal models considering the interaction of different regulatory tools – capital requirements, supervision, and market discipline – which provides counterintuitive results, such as supervision and market discipline are complements not supplements and that under restrictive conditions capital requirements can be reduced if subordinated debt is mandated, see Rochet (2008).

[6] See, for example, Wall Street Journal op-ed of August 7, 2014, "Dodd-Frank Goes 0 for 11."

[7] The causes of the global financial crisis of 2008 will, no doubt, be analyzed and debated by economists for generations. Factors that have been identified as contributing to this crisis range from misguided government policies to an absence of market discipline by financial institutions that had inadequate or flawed risk-monitoring and incentive systems; see, e.g., Calomiris (2009), Diamond and Rajan (2009); and French et al (2010). Such government policies included monetary policy (low interest rates by the Federal Reserve) and the promotion of subprime risk-taking by government-sponsored entities dominating the residential mortgage market so as to increase home ownership by those who could not otherwise afford it. Sources of inadequate market discipline

included ineffective prudential regulation, including bank equity capital requirements in the Basel Accords that favored securitized subprime loans over more conventional assets and that relied on inflated credit ratings of biased and possibly corrupt credit rating agencies as detailed in Appendix Chapter 1. Internal organizational factors contributing to the crisis included business strategies dependent on high leverage and short-term financing of long-term assets, reliance on risk and valuation models with grossly unrealistic assumptions, and poorly-designed incentive compensation. These factors, taken as a whole, encouraged what, with the benefit of hindsight, can be characterized as excessive risk-taking.

[8] The increase in GSE housing goals for low and moderate-income borrowers likely fueled the subprime mortgage originations during 2000-2006. The Community Reinvestment Act of 1977 (CRA) may have added to this. The CRA directed the federal banking regulatory agencies to use their supervisory authority to encourage insured depository institutions to meet the credit needs of low and moderate-income areas. Unlike the GSE housing goals, the CRA did not specify numerical goals. Agarwal et al (2012) document that the CRA did contribute to risky lending during 2004-2006 by banks undergoing CRA exams.

[9] As noted earlier, these "profits" were not profits in the traditional net present value sense, but were merely an accounting artifact of the difference between the AAA tranche yield and the Libor rate.

[10] Lehman Brothers, for example, in 2005, paid executive officers with both cash and equity incentive compensation under its "Short Term Executive Compensation Plan," as well as stock options, with base pay making up a small portion of total compensation. Lehman Bros. Holdings, Inc., Proxy Statement 16 (Feb. 27, 2006). The equity component was in the form of restricted stock units (RSU) of which 35% vested over 3 years and the remainder over 5 years, subject to certain forfeiture provisions. *Id.* at 17. The stock options could be exercised in two years if the stock price increased by 28%, otherwise they could not be exercised for 4-1/2 years, with an expiration date of 5 years. In addition to the annual incentive plan, there was also a long-term incentive plan that awarded performance stock units that convert to transferrable shares vesting on a staggered basis over three years. *Id.* That year its CEO received 58% of his total compensation in equity, but of the 42% in cash compensation, virtually all was a cash bonus that vested automatically, and that bonus, $13.75 million was roughly equal to the value of his awarded RSUs ($14.9 million). *Id.* at 19. In 2007, the CEO received a much larger percentage in equity than cash, with the cash bonus equal to only slightly more than 10% of his total compensation, and only about 1/10 of awarded RSUs. Lehman Bros. Holdings, Inc., Proxy Statement 26-27 (March 5, 2008). The firm also paid non-executive employees annual cash and equity bonuses, with the latter ranging from 1-50% of total compensation, the percentage increasing as total compensation increased. Lehman Bros. Holdings, Inc., Amendment To 2005 Stock Incentive Plan, in Proxy Statement Addendum (March 30, 2007) (describing company Equity Award Program because shareholders were asked to approve an amendment to the plan).

[11] See, e.g., Sepe and Whitehead (2013).

[12] Ellul and Yerramilli (2014) created a risk management index for bank holding companies, measuring the strength and independence of the risk management function, which includes both individual and organization features, such as whether the chief risk officer was an executive officer of the holding company or among the five highest compensated employees (true in only 20% of the firm-year observations, but with increasing frequency, e.g. 43.5% in 2009), and whether the board risk management committee had an independent director with banking or finance expertise or met more frequently than average over a year. The index measure varies considerably across firms, as do the individual components of the index. Firms that had a higher index (better risk management) pre-crisis had lower tail risk (performed better) during the financial crisis.

[13] Simplified cash flows and probabilities have been used for illustrative purposes to clarify the intuition of the analysis. The project's *expected* cash flows, as in the numerical illustration, need only have the pattern that early on there are positive expected cash flows and later on they turn negative, so that the net present value is negative. In this stylized example, the expected cash flows would be positive for the first four years, zero in year five, and

negative for all subsequent years. Because the six outcomes have equal probability, in years 1 and 2 the cash flows expected by both the bank executives and the investing public are ($500 million x 5/6) + (-$500 million x 1/6) = $333 million in each year. For the investing public, $333 million is the expected cash flow in every year because they are not aware of the risk of increasing losses over time associated with Outcome 6. However, the bank executives are aware that these potential losses increase over time, beginning in year 3. Therefore, for year 3, the bank executives' expected cash flow are ($500 million x 5/6) + (-$500 million x 3 x 1/6) = $167 million. For year 4, the bank executives' expected cash flows are ($500 million x 5/6) + (-$500 million x 4 x 1/6) = $83 million. By year 6, the expected cash flow is -$83 million; by year 12, the expected cash flow is -$583 million. Taking the present value of this series of 12 annual cash flows using a 10% discount rate yields an expected value of the project of -$152 million based on what the bank executives know. Because the investing public believes that the expected cash flows are $333 million each year, their expected project value over the same 12 years and with the same 10% discount rate is $2.27 billion. Under the assumption of a 10% discount rate, the NPV is negative if the cash flows last for twelve years or longer, which is not an unreasonable time horizon for bank investments.

[14] Griffin, Lowery and Saretto (2014) construct a model with similar implications.

[15] In an efficient market, the share price would rise by the expected value of the trading strategy were it announced in advance, because it is a positive NPV project according to the publicly available information. Accordingly, the stock price would not rise that much upon the subsequently realized positive cash flows, affecting the matching of the size of the payout of an incentive compensation system based on annual stock price increases. For the purpose of simplifying the example, we ignore that timing issue by making the plausible assumption that the trading strategy is not public information when adopted and the public valuation (stock price) depends only on the realized cash flow each year.

[16] Commercial banks are not permitted to go bankrupt in the United States: insolvent banks are taken over by banking regulators, and the assets and depositor liabilities sold to another bank or liquidated.

[17] The behavioral psychology literature finds that individuals are overly self-confident and optimistic, often referred to as the "better than average effect." For a corporate finance application in which optimistic managers perceive negative NPV projects as positive NPV projects (they overestimate the probability of positive cash flows and thereby underestimate the probability of losses), which fits with empirical patterns of corporate financing and free cash flow usage, see Heaton (2002). The literature provides empirical support for such posited behavior. E.g., Malmendier and Tate (2005). For the classic review of behavioral finance (the application of the psychological literature to financial decision-making), see DeBondt and Thaler (1996).

[18] As with the original example, simplified cash flows and probabilities have been used for illustrative purposes. The project's expected cash flows need only be different from actual NPV. In this example, this difference is caused by the differences between the expected and actual probabilities of outcomes. But the difference could be caused by other errors in expectation, such as the executives not accurately forecasting the cash flows or the growth of potential loss in the sixth outcome over time. In addition, as before, the public is not better informed than the bank insiders and also perceives the project's NPV as positive; for the purpose of the example, it does not matter whether or not the reason for the public's miscalculation is that it makes the same estimation error as the managers.

[19] Based on the above stylized cash flow and probability assumptions, the expected cash flows do not become negative until the tenth year of the project. In years 1 and 2 the bank managers expect the cash flows to be ($500 million x 90%) + (-$500 million x 10%) = $400 million each year. In year 3, when the loss in Outcome 6 increases, the managers' expected cash flows are ($500 million x 90%) + (-$500 million x 3 x 10%) = $300 million. For year 4, the expected cash flows are $250 million; by year 10 the expected cash flows are -$50 million and by year 30 the expected cash flows have decreased to -1,050 million. Taking the present value of these 30 years of cash flows, using a 10% discount rate, the expected present value becomes -$42 million in the

30th year. If the project lasts less than 30 years, it has a positive expected value. However, these expectations are much different from the actual probabilities. In years 1 and 2, the cash flows associated with the actual probabilities are ($500 million x 75%) + (-$500 million x 25%) = $250 million, considerably lower than the executives' expected value of $400 million. By year 10, the cash flows associated with the actual probability are -$875 million and they are -$3,375 million by year 30. Taking the present value of the cash flows over the 30 year period yields an actual value of -$7.2 billion. The actual value becomes negative much more quickly than the executives expect: after only seven years, the actual present value is -$275 million, while the executives expect the present value through seven years to be a positive $1,350 million. The actual cash flows become negative in the fourth year of the project, and, again assuming a 10% discount rate, the NPV becomes negative if the cash flows persist for seven years.

[20] Of the 14 firms in our "too big to fail" sample, the vesting period for long-term incentive compensation ranged from 0 to 5 years based on their 2006 compensation. The average vesting period was less than 2.5 years. Several CEOs only received fully vested shares. In all cases, any restricted stock holdings immediately vested upon the CEO's retirement; in some cases, the restricted stock was awarded as cash when the vesting period ended.

[21] There is substantial evidence in the finance literature that insiders have an informational advantage and use it to generate superior returns; for example, see Ben-David and Roulstone (2010).

[22] Bank of America reached an agreement to acquire Merrill Lynch on September 15, 2008; the acquisition was completed on January 1, 2009. As such, Merrill Lynch is analyzed as an independent institution in this study.

[23] It is common practice for insiders to exercise stock options only to immediately sell the stock in the open market. By making both trades simultaneously, the insider avoids using any cash to exercise the options. These two transactions are frequently disclosed on the same day. For example, in 2007, Angelo Mozilo of Countrywide filed more than 30 Form 4s in which he disclosed exercising exactly 70,000 options and then immediately selling exactly 70,000 shares of common stock. In the same year, he filed another 30 Form 4s in which he disclosed the same pair of trades on exactly 46,000 options and shares. By simultaneously exercising options and selling shares, he was able to minimize cash outlay.

[24] The beneficial ownership we consider includes common stock equivalents that the individuals have immediate access to. This generally includes common stock, in-the-money and vested options, and vested restricted stock received through incentive plans. It does not include options that are not exercisable and restricted stock that has not vested. Options may not be exercisable because the market price of the stock is below the option exercise price or because the option has not vested.

[25] Even the 24 CEO 'buys' in 2008 worth over $32 million can be misleading: only 2 of these trades, worth about $11.3 million, occurred prior to the mandatory TARP investments being announced on October 14, 2008. All others occurred after October 20, 2008.

[26] Mellon Financial CEOs actually gained just over $1 million; however, this does not include the 2008 crisis. Mellon Financial merged with Bank of New York in mid-2007, so this gain is for 2007, not 2008.

[27] This ignores the possibility that the CEOs were able to renegotiate and restructure stock and option holdings during 2008. Boards frequently re-issue new options with new exercises for stock options that are substantially out-of-the-money. See, for example, Chen (2004). In reality, the value lost after restructuring their beneficial ownership was likely less than $2,013 million.

[28] Statistical tests confirm that the median ratio of the CEO's net trades during 2000-2008 to the CEO's holdings in 2000 for the TBTF banks is significantly greater than the corresponding ratio for the No-TARP banks.

[29] Statistical tests confirm that the median ratio of the CEO's net trades during 2002-2008 (2004-2008) to the CEO's holdings in 2002 (2004) for the TBTF banks is significantly greater than the corresponding ratio for the No-TARP banks.

[30] This note of caution may not actually apply to the 9 original TARP firms. The U.S. Treasury essentially forced all 9 firms to accept TARP assistance, whether they were performing well or not, because the Treasury did not want the financial markets to identify some of these firms as "weak" and others as "strong."

[31] Fahlenbrach and Stulz (2011). The CEOs averaged sales of 2% of their holdings per quarter during 2007-08, except during the quarter of Lehman Brothers' bankruptcy, when they sold a much larger (approximately 10%) of their holdings. Combining the sales data with equity and option grants over the period, they state that CEO ownership stayed around the same throughout.

[32] This conclusion is therefore distinctly different from that of Fahlenbach and Stulz, (2011). In Fahlenbach and Stulz's view, bank CEOs and senior executives could not or did not foresee the extreme risk of some of the bank's investment and trading strategies and the poor performance of these banks during the crisis is attributable to an extreme negative realization of the high risk nature of their investment and trading strategy. Their perspective can be analogized to the bank executives' expected probabilities of cash flows in our second stylized example, summarized in Example 2, being equal to the actual probabilities. But even if Fahlenbach and Stulz's characterization of events – by disregarding pre-crisis stock transactions – is accurate, a proposition that we do not concede, it does not follow that the pre-crisis compensation structure was optimal and cannot be improved upon to reduce the probability of accepting investments with large negative tail events.

[33] Acharya, et al. (2013) (finding, in sample of 77 banks, that (i) in pre-crisis years 2003-06 non-executive compensation incentives are more sensitive to revenues than quality or sustainability of earnings; (ii) the more sensitive non-executive compensation policies are to short-term bank performance (proxied by how firms readjust total cash and stock compensation with variations in performance), the higher the risk taken by banks on a variety of measures – aggregate risk, tail risk, implied volatility of stock returns and Z-score – during the crisis years of 2007-09; and (iii) incentive-induced excessive risk-taking was associated with significant declines in firm value during the crisis.

[34] A recent Wall Street Journal article notes almost exactly the three criteria noted below. See "Activists' New Target: Executive Pay", Wall Street Journal, June 12, 2015, C1. "Some activists argue that ill-designed plans encourage the wrong kinds of growth – for example, boosting revenue at the expense of profitability… One factor teeing up the issue for activists is the complexity of compensation, experts say. "I've seen bonus plans that would take a Ph.D. in physics to figure out," said Kevin McManus, vice president at proxy advisor Egan-Jones Ratings Co."

[35] See Diebold (2010).

[36] Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Pub. L. No. 111-203, 124 Stat. 1376, § 951 (2010) (extending to all U.S. firms a requirement that shareholders vote, in an advisory capacity, on CEO compensation). Other countries, such as the U.K. and Australia, had already such a requirement in place, and additional ones, such as Germany, have adopted the requirement since then.

[37] See, Rose (2011).

[38] Unprofitable over the long-term trading strategy is a negative net present value (NPV) trading/investment strategy. Long-term profitability is synonymous with positive NPV trading/investment strategy.

[39] Rock Center for Corporate Governance (2016).

[40] We would also leave to the board whether the number of shares or options to be received under the plan should depend on a performance target, although we are wary of the efficacy of performance targets because managers focused on meeting a target may make decisions that negatively impact long-term value, such as decreasing margins to attain a sales target. While such an effect would be mitigated by the long-term horizon of restricted stock, if the number of performance-based shares is set too high, the immediate goal of receiving shares might offset attention to the long-term value effect of a decision.

[41] See Bhagat and Bolton (2013) and DeYoung, Peng and Meng (2013).

[42] Some have suggested that if bank managers were concerned about maintaining bank reputation, then such long-term vesting periods might not be necessary. The evidence in Griffin, Lowery and Saretto (2014) is inconsistent with the argument that investment banker actions during 2000-2010 reflected a serious concern for their bank's reputation.

[43] See Metrick and Yasuda (2011) and Litvak (2004).

[44] Currently (and historically), most restricted stock that is granted to officers and directors becomes completely vested when the individual leaves the firm, except for cause, or specific details of the employment agreement, such as non-compete requirements.

[45] The Restricted Equity proposal is further consistent with several recent theoretical papers which suggest that a significant component of incentive compensation should consist of stock and stock options with long vesting periods. If these vesting periods were "sufficiently long," they would be similar to our proposal. See Edmans et al. (2010); and Peng and Roell (2009).

[46] Hall and Murphy (2002).

[47] There are constraints on executives' ability to hedge stock and option positions under tax and securities laws. See, e.g., Schizer (2000).

[48] The Internal Revenue Code limits the current deduction to $1,000,000. 26 U.S.C. § 162(m) (1).

[49] Kaplan and Rauh (2010).

[50] Kaplan and Rauh (2013).

[51] DeYoung, et al. (2013).

[52] FSB (2009).

[53] The motivation for greater specification of the agreed-upon compensation principles was not solely to enhance the stability of the global financial system, but also to establish a "level playing field" across international banks' compensation practices. By limiting discretion regarding the principles' content, the expectation was that supervisory demands would be more uniform and international banks' compensation practices would more readily converge.

[54] The FSB principles, by contrast, simply stated that bonuses should diminish or disappear upon poor performance, without specifying amounts subject to specific clawback.

[55] American Recovery and Reinvestment Act of 2009, Pub. L. No. 11-5, 7001,123 Stat. 115 (2009); Sarbanes-Oxley Act of 2002, Pub. L. No. 107-204, § 304, 15 U.S.C. section 7243 (2006).

[56] http://www.sec.gov/rules/proposed/2015/33-9861.pdf

[57] See, e.g., Hughes (2013). For instance, companies adopting clawback policies to comply with Dodd-Frank face the prospect of uncertain litigation costs because under most states' law, wages "once earned" cannot be clawed back. Therefore, companies will not be able to exercise "self-help" and achieve a clawback by not paying part or all of a current salary or bonus, but will have to sue an individual who does not voluntarily repay the amount in question for the funds. Additionally, there is the prospect of costly litigation in the SEC's enforcement of the Sarbanes Oxley clawback provision. A few non-culpable executives, rather than settle, have challenged being subjected to a clawback without individual wrongdoing or knowledge. Although two district courts have rejected executives' motions to dismiss on that ground, SEC v. Baker, No. A-12-CA-285-SS (W.D. Tex., Nov. 13, 2012); SEC v. Jenkins, No. 2:09-CV-1510-GMS (D. Ariz. June 9, 2010), the issue is still unsettled. That is because one of the courts also found that the statute could raise constitutional issues of "severe and unjustified" deprivation but that such issues could not be decided on a motion to dismiss, SEC v. Jenkins. Finally, there are also tax complications with clawbacks: under the "claim of right" doctrine, an individual has to pay tax on compensation received in a given year, even if he may "later be required to repay it." None of these additional complications would arise under the Restricted Equity proposal, while the executive would also not be able to reap inapposite gains from incentive compensation.

[58] See, e.g., Hirsch, Reichert and Sohn (2013) advance a further objection to clawbacks, that they may have the unintended consequence of increasing risk-taking. They hypothesize that clawbacks will have a differential impact on decision-making depending on a firm's financial position, and that where the investment outcome only affects the size of a loss, the manager with a clawback will select the riskiest project, as with a higher variance, it offers a possibility of reducing the extent of the loss, and hence the amount of compensation clawed back. They provide findings from a laboratory experiment that support the hypothesis, as in the setting of a loss position, individuals with clawback compensation contracts opted more frequently for the riskier of two projects, than those without clawbacks.

[59] E.g., Holmstrom (1979, 1999).

[60] Evidence can be adduced of the perverse effects of government efforts to restrict the amount of executive compensation. For example, after U.S. corporate tax-deductible pay was limited to $1 million for fixed compensation but not for performance-based pay, firms altered the mix of compensation to reduce cash salaries and increase incentive compensation. See Perry and Zenner (2000). Some commentators attribute the mushrooming of equity incentive compensation and hence executive pay in the 1990s, along with the excessive risk-taking of the 2000s, to that reform. *E.g.*, Bruce Bartlett, Not so Suite: Clinton Tax Law is the Problem, Not Greedy Execs, http://www.nationalreview.com/nrof_barlett/bartlett092502.asp . A similar reaction appears to be occurring in Europe: 65% of UK financial services companies increased the base salary of their employees by over 20% in anticipation of the incoming cap. See, e.g., Daniel Schäfer, Salaries Lifted to Beat Bonus Cap, Financial Times (Aug. 20, 2013), http://www.ft.com/cms/s/0/0ff854c2-08e4-11e3-ad07-00144feabdc0.html. As earlier noted, we recognize that the Restricted Equity proposal may have this type of effect, and suggest means by which it can be mitigated- increasing award amounts to compensate for increased under-diversification and permitting modest liquidation of annual awards.

[61] https://www.sec.gov/rules/proposed/2016/34-77776.pdf

[62] Page 136 in (https://www.sec.gov/rules/proposed/2016/34-77776.pdf).: "Neither would the proposed definition include dividends paid and appreciation realized on stock or other equity-like instruments that are owned outright by a covered person."

[63] E.g., Bolton, Mehran and Shapiro (2010) (recommending tying compensation to changes in the spread on credit default swaps, which are contracts written on debt securities that insure the holder against the debt's default); Gordon (2012) (advocating conversion of financial institutions' senior management's equity-based

compensation into subordinated debt at a discount to the equity value, when a firm experiences financial difficulty); Bebchuk and Spamann (2010) (recommending compensation package of a proportionate mix of financial institutions' senior securities - debt and preferred stock - and equity); Tung (2011) (recommending compensation in the form of subordinated debt of the bank subsidiary).

[64] Option theory (Black and Scholes (1973), and Merton (1977)) suggests that, all else being equal, the value of an option increases with volatility of the underlying asset. Since a company's shareholders are essentially holding a call option with the total value of the company as the underlying asset, and the value of debt as the exercise price, it follows that the more volatile the company's cash flow is, the more valuable the call option. Thus, the value of common stock increases with the volatility of the company's cash flow.

[65] Some proposals advocate pegging compensation to a specific debt security, such as credit default swaps, rather than a proportionate package of the capital structure. This, while seemingly avoiding complexity, will not satisfactorily avoid the problem, as those securities are also typically not publicly traded. Besides the lack of transparency from the absence of market pricing, because credit default swap spreads are computed using accounting figures which are partially under managers' control, they may also be subject to manipulation, as managers will have increased incentives to misrepresent figures used in swap pricing when it immediately will impact their compensation. Although credit default swaps have historically traded in private over-the-counter markets, Dodd-Frank requires regulators to implement rules to establish the use of centralized clearing exchanges to trade these products, which could increase the transparency of prices, but will not eliminate the need for accounting data to calculate the spreads, as the underlying debt is infrequently traded. The convertible security proposed by Gordon (2012) has further valuation difficulties: because management's stock differs significantly from that of outside stockholders (i.e., their shares will become debt securities, which are senior to the outstanding shares of the stockholders, when the firm experiences financial difficulty), their stock will not be equivalent in value, nor will its value move in tandem with the value of, the outstanding common stock. Moreover, determining the value of management's equity will be complicated because it depends on the likelihood of conversion, and the rate that will be applicable (which under the proposal requires a further probability calculation of the value of the common stock at an unknown point in time that is prior to the moment at which conversion occurs). Finally, the possible conversion into debt at a discount reduces the value of stock compensation to an executive and consequently, the executive will require a higher amount of equity to offset the lower valuation (i.e., the increased risk).
Furthermore, credit default swaps are also issued by only the largest financial institutions, and therefore are not suitable for executive compensation in medium- and small-sized financial institutions. Finally, determining the appropriate formula with which to relate changes in default spreads to executive compensation bonuses or clawbacks would undoubtedly be challenging, for the calculation of swap prices is complex, as values do not change linearly with changes in other economic variables. For example, in discussing the formal model underlying their proposal to tie bank executives' compensation to credit default swap spreads, the optimal compensation contract consists of debt and equity in a ratio equal to the "rate of return promised to bondholders at the optimal risk level," which, as Bolton et al (2010) note, "may be difficult to calculate."

[66] Stock in a levered firm, from a finance perspective, is equivalent to an option on the firm, in which the equity holder obtains the upside of future risky projects but can walk away from the firm, without repaying creditors, if the firm's downside value is less than its liabilities. Lambert, Larcker and Verecchia (1991) model when stock option compensation results in managers taking less or more risk (which depends on how "in the money" – i.e., by how much the exercise price is below the stock price – the options are). The model indicates that managers are more likely to take on risk when the probability of the option finishing in the money is low, as in the scenario in the text, and thus of greatest concern to the fisc. With restricted stock, the longer horizon increases the probability that an option will finish in the money, which, in the Lambert, et al., model, increases the manager's aversion to risk.

[67] See Alces and Galle (2012) (critiquing debt-based bank executive incentive compensation proposals that emphasizes behavioral economic difficulties).

[68] See Hansmann (1988) (expositing the well-known difficulty of collective choice and the reason for corporate law's restriction of managers' fiduciary duty to shareholders).

[69] E.g., Wei and Yermack (2011). Deferred compensation and pension benefits are referred to in the literature as "inside debt." For a further critique of relying on research on "inside debt" to advocate debt-based compensation, see Alces and Galle (2012).

[70] See, for example, http://www.forbes.com/2005/03/15/cx_da_0315ebbersguilty.html; "Appeals Court Restores Qwest Insider Trading Conviction," at http://www.nytimes.com/2009/02/26/business/26qwest.html. Jeffrey Skilling's indictment in the Second District of Texas is particularly illustrative; United States of America v Jeffrey K. Skilling and Richard A. Causey, Cr. No. H-04-25.
Also, see http://www.accounting-degree.org/scandals/

[71] The case of Towers Watson provides a more recent example. "Towers CEO Sold Stock Ahead of Big Deal. As Towers Watson & Co was negotiating a merger earlier this year *that would later cause its stock to fall*, Chief Executive John Haley netted nearly $10 million from selling the consulting company's shares." Wall Street Journal (September 24, 2015; C1).

[72]See Gilson and Kraakman (1991) calling for institutional investors to organize a core of professional directors who would sit on corporate boards to ensure effective management.

[73]Cox (1984) has argued for the application of a stronger, more rigorous duty of care.

[74]See Black (1992) and Coffee (1991).

[75]See Archer-Daniels Faces Informal SEC Inquiry into Executive Pay, Wall Street Journal, Oct. 10, 1995, at C18; Bad Chemistry: W.R. Grace Is Roiled by Flap Over Spending and What to Disclose, Departed CEO Makes Issue of the Chairman's Perks, Son's Use of Grace Funds, Wall Street Journal, Mar. 10, 1995, William Agee Will Leave Morrison Knudsen, Wall Street Journal, Feb. 2, 1995, at B1;
http://www.forbes.com/2005/03/15/cx_da_0315ebbersguilty.html; "Appeals Court Restores Qwest Insider Trading Conviction," at http://www.nytimes.com/2009/02/26/business/26qwest.html.

[76]See Elson (1995, 1996), Bhagat, Carey and Elson (1999), Bhagat and Bolton (2008), and Bhagat, Bolton and Romano (2008).

[77] See Bhagat and Tookes (2012).

[78] See Bhagat and Tookes (2012). Table 7-2 indicates that industry practice varies considerably regarding mandatory director stock ownership in the largest U.S. corporations.

[79] See Bhagat and Bolton (2013).

[80] See Bhagat and Bolton (2013).

[81] Unlike for executives, we are not recommending any cash compensation for directors. Most directors are successful professionals who have other sources of income - other than serving on the board of the company in question. Conflict of interest between the director and long-term shareholders will become acute if a director is reliant on retainer fees for their livelihood.

[82] For example, see the recent book by former Treasury Secretary, Timothy Geithner (2014).

[83] For example, the SAFE Banking Act of 2012 was introduced in the U.S. Senate on May 9, 2012. Among other restrictions, it proposes a strict 10% cap on any bank's share of the total amount of deposits of all insured banks in the U.S., and a limit of 2% of the U.S. GDP of the non-deposit liabilities of a bank holding company. The SAFE Banking Act was not enacted, however.

[84] Flannery (2014) and Pennacchi (1987a, 1987b) argue that adequacy of bank capital depends on both portfolio risk and the period of time for which that bank capital must protect liability-holders from loss.

[85] Merton (1974) builds on the Black and Scholes (1973) option pricing model to value corporate bonds. Another area where Merton (1974) framework is widely applied is the pricing of deposit insurance; see Merton (1977), Pennacchi (1987a,b), and Ronn and Verma (1986).

[86] See Chesney, Stromberg and Wagner (2010) for a discussion of the rationale underlying this risk-taking variable.

[87] See Nike, Inc.'s 2013 DEF 14A proxy statement for details.

[88] As a robustness check, we consider alternative measures of corporate governance, such as the G-index (Gompers, Ishii, and Metrick (2003)) in our analysis. Governance, as measured by these indices, is not related to firm risk-taking; the relationships between all other explanatory variables and risk-taking are qualitatively similar to our main results.

[89] However, it is in sharp contrast to Cheng, Hong and Scheinkman (2010), who use alternative governance measures such as G-index and find that these governance indices have no effect on financial firms' risk-taking. We also find that governance measures such as G-index have no effect on financial firms' risk-taking (in untabulated results); a possible reason is that these indices are mostly measures of anti-takeover provisions. Theoretically, it is difficult to make a direct connection between anti-takeover provisions and bank risk-taking.

[90] For example, if a bank made a loan to a business of $1 million, given the 100% risk weight for such assets, the bank would need capital in the amount of 8% x 100% x $1 million = $80,000. By contrast, if it used the same $1 million to buy a U.S. treasury bond, given the 0% risk weight for sovereign debt, it would not need to hold any capital against that asset, despite total assets remaining unchanged.

[91] IRB was intended to address regulatory arbitrage opportunities created by the arbitrary requirements of the standardized approach, such as, for instance, banks cherry-picking assets within a category to increase their yield, i.e., the riskiest assets, without incurring an increased capital charge because the standardized risk categories were insensitive to the risk of specific borrowers or assets within the class. E.g., Tarullo (2008) (discussing regulatory arbitrage opportunities afforded by Basel I).

[92] Regulators refer to bank capital as the sum of Tier-1 capital and Tier-2 capital. Tier-1 capital includes common stock, retained earnings, capital surplus from sale of common or preferred stock above par, and disclosed capital reserves such as cash dividends not yet declared. Tier-2 capital includes loan loss provisions, preferred stock of maturity of at least 20 years, subordinated equity and debt obligations with maturity of at least 7 years, undisclosed capital reserves, and hybrid capital, such as, contingent convertible debt. Per Basel Accords, bank regulators consider Tier-1 capital or Tier-1 capital and Tier-2 capital as the numerator (in measuring bank capital). The denominator is risk-weighted total assets, which has been and continues to be under considerable controversy. The risk-weights are ad-hoc, and can be easily manipulated and gamed. For example, sovereign debt has a weight of 20% whereas corporate debt has a weight of 100%; this does not make sense when considering AAA rated corporate debt, and sovereign debt from countries like Greece and Italy.

[93] Tangible common equity includes common stock plus retained earnings (both via the income statement and unrealized value changes on cash flow hedges). We do not include intangible assets in common equity (for the purposes of measuring bank equity capital ratio) because when a bank's equity capital ratio becomes a binding

constraint, that is, when the bank is approaching financial distress, intangible assets lose a significant part of their value.
There is another reason for using tangible common equity when measuring bank capital. Anginer and Demirguc-Kunt (2014) study the relation between different types of bank capital and its impact on systemic-risk of the banking industry. They find that Tier-1 capital, especially tangible capital, was correlated with reductions in systemic risk. On the other hand, Tier-2 capital has the opposite, destabilizing effect. Furthermore, these effects are accentuated during the crisis years and for the larger banks.

[94] Vice Chairman Hoenig voted against the Basel III rule implementation as inadequate without a binding leverage constraint, Statement by Thomas Hoenig, Basel III Capital Interim Final Rule and Notice of Proposed Rulemaking, FDIC (July 9, 2013), https://www.fdic.gov/about/learn/board/hoenig/statement7-9-2013.html, and has advocated that the United States take the lead and abandon Basel III in favor of the ratio of tangible equity (i.e., excluding goodwill, tax assets and other accounting entries) to tangible assets (assets less intangibles), Alan Zibel, FDIC's Hoenig: U.S. Should Reject Basel Accord, Wall Street Journal, Sept. 14, 2012, http://online.wsj.com/news/articles/SB10000872396390443524904577651551643632924. Haldane has called for simplifying Basel's capital requirements to eliminate IRB and reemphasize standardized weights for broad asset classes and for a applying a stricter leverage ratio. Andrew G. Haldane, The Dog and the Frisbee (Aug. 31, 2012), http://www.bis.org/review/r120905a.pdf; see also Brooke Masters, Haldane Calls for Rethink of Basel III, Financial Times, Aug. 31, 2012. For a cogent summary of both regulators' positions, see Alex J. Pollock, Hoenig and Haldane are Right about Basel III, American Banker, Oct. 15, 2012, http://www.aei.org/article/economics/financial-services/banking/hoenig-and-haldane-are-right-about-basel-iii/ A recent Wall Street Journal article, "The Banker Who Cried "Simplicity"" December 21-22, 2013, A13, highlights Haldane's central arguments.

[95] For Hoenig's and Haldane's detailed critiques of Basel III, see Basel III Capital: A Well-Intended Illusion: Remarks by FDIC Vice Chairman Thomas M. Hoenig to the International Association of Deposit Insurers 2013 Research Conference in Basel, Switzerland, FDIC, (Apr. 9, 2013) http://www.fdic.gov/news/news/speeches/spapr0913.html.

[96] Haldane (2009).

[97] Wall Street Journal, November 13, 2012, p A20, "The FDIC's own Director Thomas Hoenig sees in Basel III the same complicated system for judging risk that failed in Basel II "but with more complexity." Using theoretical models that have failed in practice, the rules assign "risk-weights" to different assets, divined by an almost endless series of calculations. For the largest banks with the resources to spend on regulatory arbitrage, this is an opportunity to get risky assets officially designated as safe."
The Economist, September 19, 2015, "Whose model is it anyway?" "The models used to gauge the riskiness of a loan book were once provided by regulators, with fixed weightings for categories such as business credit or loans to other banks. But an update to the global regulatory guidelines, known as Basel II and adopted just before the crisis, encouraged banks to come up with their own risk models…The models are often fiendishly complicated, as well as being numerous…Repeated studies have found that putting the same pool of loans and securities through different banks' formulae lead to wildly different outcomes."
Belatedly, Basel has also realized there might be a problem in letting banks decide the risk-weights of the assets they own. Wall Street Journal (March 24, 2016; http://www.wsj.com/articles/basel-committee-proposes-curbs-on-bank-risk-models-1458833654?tesla=y). "Global regulators moved to further tighten the reins on banks, proposing limits on the discretion institutions have to measure how much risk they can take. The compromise plan reached Thursday by the Basel Committee on Banking Supervision wouldn't allow banks to calculate their own credit risk from exposure to other banks, large corporations and stocks… Regulators, especially those in the U.S., consider it problematic to allow banks to measure their own credit risk and determine how much capital they need to guard against a possible default by a counterparty and the individual firm's exposure if there is a loss."

[98] Basel III requires that 6% of the total 8% capital requirement be Tier 1 capital, and of that, 4.5% must be equity. The minimum capital requirements are to be phased in by 2015 while the phase in of the conservation buffer and leverage ratio requirements will not be completed until 2019 and 2018, respectively. Basel Committee on Banking Supervision, Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems 69 (June 2011), available at http://www.bis.org/publ/bcbs189.htm. The Basel III minimum capital and conservation buffer requirements are said to have been determined by the loss experience of large banks over the past decade and in the 2008 crisis, respectively. Daniel K. Tarullo, Member, Board of Governors of the Federal Reserve System, Remarks at the Peter G Peterson Institute for International Economics: Regulating Systemically Important Financial Firms 8 (June 3, 2011) (transcript available at http://www.federalreserve.gov/newsevents/speech/tarullo20110603a.htm).

[99] Continuing with the example, under the leverage ratio requirement, the bank must hold the same amount of capital against a $1 million asset, whether it is a corporate loan or a treasury bond, of 4% x $1 million = $40,000 (or under Basel III, 3% x $1 million = $30,000).

[100] Basel Committee on Banking Supervision (2013). The additional capital must be Tier 1 capital. The Basel Comm. document states that national regulators may impose higher requirements on their G-SIBs, which is the implicit understanding for all Basel requirements, and no doubt was an acknowledgement that members of the committee were intending to do so. U.S. banking regulators, for instance, have proposed a leverage ratio of 5% for the largest bank holding companies and 6% for their bank subsidiaries. U.S. Treasury Department, FDIC, Regulatory Capital Rules: Regulatory Capital, Enhanced Supplementary Leverage Ratio Standards for Certain Bank Holding Companies and their Subsidiary Insured Depository Institutions (July 2013). They were directed by Congress to impose an additional leverage requirement on such institutions. See Dodd-Frank §165.

[101] The G-SIB surcharge is subject to as long a phase-in as the capital buffer, by 2019. See Basel Comm. on Banking Supervision (2013).

[102] See Kalemli-Ozcan, Sorensen and Yesiltas (2012). Because they are derived from publicly disclosed information, these data are simple leverage ratios, not Basel risk-weighted ratios. They also do not include off-balance sheet assets (given the limitation of the data), but those assets were, for the most part, also not included in the Basel risk weight calculation. The average level of debt was considerably higher at the former investment banks and European banks (firms that were not subject to a leverage ratio). See Andrew G. Haldane, Executive Director, Financial Stability, Bank of England, remarks at the Federal Reserve Bank of Chicago twelfth annual International Banking Conference on "The International Financial Crisis: Have the Rules of Finance Changed": Banking on the State (Sept. 25, 2009) (transcript available at http://www.bis.org/review/r091111e.pdf) (connecting this discrepancy to leverage ratio requirements).

[103] Basel advocates could, no doubt, contend that the pre-crisis ratios were misleading as in retrospect it is clear that both banks and regulators inadequately measured the risk of assets, such as securitized mortgages, and that Basel III has sorted that out. But while that may be so, there is no reason to believe that the methodology is now sufficiently accurate such that some other asset's future risk will not prove to be greater than the weight that has been currently assigned, creating another crisis. It is true that banks will tend to hold more capital than the minimum requirement in order to avoid being pushed below the minimum by a minor market shock and thereby be subjected to regulatory corrective action, but the regulatory objective should be to establish a sufficient minimum against the tail risk, independent of whether banks might hold a cushion of capital above that minimum.

[104] Darrell Duffie (2010, p 48). Citigroup illustrates the problem. Its Tier 1 capital ratio never fell below 7% during the financial crisis yet its stock market capitalization declined to approximately 1% of its total accounting assets.

[105] See e.g., Haldane (2009, p 14); Tarullo (2008, p 31). There is striking suggestive evidence that the market priced the probability of the moral hazard problem caused by limited liability in relation to bank capital: In states where bank shareholders had liability for a proportion of a bank's debt beyond what they had invested (referred to as "double" liability), the average capital ratios were lower at 18.2% compared to 22.9% for banks in states where shareholders did not have such liability. Macey and Miller (1992).

[106] Tarullo (2008, p 29).

[107] Miles, et al. (2013, p 3-4); see also Haldane (2009, p 14) explaining that capital ratios for U.K. banks were over 10% until around WW I.

[108] It should also be noted that European banks, which have been more highly levered than U.S. banks, have issued large amounts of "covered" bonds, in which, creditors have claims upon specific collateral for repayment.

[109] Admati and Hellwig (2013) ("[E]quity capital ratios equivalent to 10% of unweighted assets, and possibly higher, should be seriously considered… ."); Miles, Yang and Marcheggiano (2013) (Results of a model empirically estimating the benefit of reducing financial crises against the cost of increasing borrowing costs, "suggest that the optimal amount of capital is likely to be around twice as great" as Basel III's capital requirements for largest banks of " just under 10% of risk-weighted assets," further specified as in the range of 16-20).

[110] http://www.wsj.com/articles/feds-tarullo-warns-banks-of-significant-increase-in-capital-in-future-stress-tests-1464870270.

[111] See The Economist (February 13, 2016; "Deutsche Bank's unappetizing cocos") and Bloomberg Business (February 9, 2016).

[112] See The Economist (November 14, 2015; Buttonwood, Born to run), and The Wall Street Journal (March 3, 2016; The Perverse Effects of Crisis-Prevention Bonds).

[113] "Adding leverage to the banking system in the hope that this will prove to be stabilizing is a gamble. There is considerable evidence that strategies that encourage increasing leverage within the banking industry have in past crises only exacerbated losses. The goal is resilience and, if necessary, resolution without government or taxpayer assistance. That is best achieved not by increasing leverage, but by requiring the right balance of debt and added equity for each firm and the industry as a whole." "The Relative Role of Debt in Bank Resiliency and Resolvability"– Remarks by FDIC Vice Chairman Thomas M. Hoenig. Presented to the Peterson Institute for International Economics, Washington, DC., January 20, 2016.
https://www.fdic.gov/news/news/speeches/spjan2016.html

[114] http://web.stanford.edu/~johntayl/2015_pdfs/Testimony_Senate_Banking-SCFICP-July-29-2015.pdf
"Chapter 14 would operate faster—ideally over a weekend—and with no less precision than Chapter 11. Unlike Chapter 11, it would leave all operating subsidiaries outside of bankruptcy entirely. It would do this by moving the original financial firm's operations to a new bridge company that is not in bankruptcy. This bridge company would be recapitalized by leaving behind long-term unsecured debt—called the "capital structure debt." The firm's long-term unsecured debt would bear the losses due to the firm's insolvency and any other costs associated with bankruptcy. If the amount of long-term debt and subordinated debt were sufficient, short-term lenders would not have an incentive to run, and the expectation of Chapter 14's use will reduce ex ante uncertainty about runs."

[115] Admati, DeMarzo, Hellwig, and Pfleiderer (2013) provide a very comprehensive and persuasive discussion of why banks should be financed with considerable more equity than they are being financed currently.

[116] As noted in chapter 1, the financial crisis that started in 2007 has inflicted a large cost on the U.S. economy and an even larger cost on U.S. workers and families. Hall (2014) estimates the shortfall of output at the end of 2013 as 13.3% or $2.2 trillion. The labor force participation rate is currently at 62.9% - the lowest it has been for more than three decades. Hall (2014) estimates the labor force participation rate in 2013 was 1.9% below the 1990-2007 trend. This 1.9% figure translates to 4.4 million additional U.S. adults who are unemployed as of 2013.

[117] Of course, if debtholders in these too-big-to-fail banks were fairly confident of being bailed out by public taxpayers, they would not have any incentive to monitor or impose discipline. The question is – Do debtholders in banks smaller than the too-big-to-fail banks provide monitoring and impose discipline on bank managers, and can they do it more effectively than *shareholders* in these smaller banks? We are not aware of any empirical evidence that directly addresses this question.

[118] For example, see Barber and Lyon (1996).

[119] Gorton and Metrick (2010) and Pozsar et al (2013) provide an excellent description of the institutional features of the shadow banking system.

[120]Also, in several op-eds (for example, October 24, 2011, and August 7, 2014), the Wall Street Journal has recommended significantly higher equity capital requirements for banks.