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Financial crisis and bank executive incentive compensation ☆

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ABSTRACT

We study the executive compensation structure in 14 of the largest U.S. financial institutions during 2000–2008. We focus on the CEO's purchases and sales of their bank's stock, their salary and bonus, and the capital losses these CEOs incur due to the dramatic share price declines in 2008. We consider three measures of risk-taking by these 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 correlated with excessive risk-taking by banks. 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. We recommend that bank 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 two to four years after their last day in office. The above incentive compensation proposal logically leads to a complementary proposal regarding a bank's capital structure, namely, banks should be financed with considerably more equity than they are being financed currently.

1. Introduction

Policymakers at the highest levels continue to be engaged with the ongoing global financial crisis. Factors that have been identified as contributing to this crisis include misguided government policies to an absence of market discipline of financial institutions that had inadequate or flawed risk-monitoring and incentive systems.[1] Such misguided government policies include low interest rates by the Federal Reserve and 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 include ineffective prudential regulation including global capital requirements in the Basel Accords that favored securitized subprime loans over more conventional assets. Internal organizational factors contributing to the crisis include 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 was, as can readily be observed with the benefit of hindsight, excessive risk-taking.

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[1] See, for example, French et al. (2010), Diamond and Rajan (2009) and Calomiris (2009).

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However, of the items on the extensive list of factors contributing to the crisis only one issue has consistently been a focal point of the reform agenda across nations: executive compensation. In the United States, for example, multiple legislative and regulatory initiatives have regulated the compensation of executives of financial institutions receiving government assistance.[2] The governments of many European nations have followed a similar regulatory strategy, while the European Union's Competition Commissioner has announced that it will be examining banks' compensation in light of government support received during the crisis.[3] An important assumption behind these regulatory reform efforts is the supposition that incentives generated by executive compensation programs led to excessive risk-taking. In an insightful recent paper, Bebchuk et al. (2010) study the compensation structure of the top executives in Bear Stearns and Lehman Brothers and conclude, "…given the structure of executives' payoffs, the possibility that risk-taking decisions were influenced by incentives should not be dismissed but rather taken seriously." We refer to this as the *Managerial Incentives Hypothesis*: *Incentives generated by executive compensation programs led to excessive risk-taking by banks contributing to the current financial crisis; the excessive risk-taking would benefit bank executives at the expense of the long-term shareholders.*

Fahlenbrach and Stulz (2011) focus on the large losses experienced by CEOs of financial institutions via the declines in the value of their ownership in their company's stock and stock option during the crisis and conclude, "Bank CEO incentives cannot be blamed for the credit crisis or for the performance of banks during that crisis." They argue that bank CEOs and senior executives could not nor did not foresee the extreme high risk nature of some of the bank's investment and trading strategies. The poor performance of these banks during the crisis is attributable to an extremely negative realization of the high risk nature of their investment and trading strategy. We refer to this as the *Unforeseen Risk Hypothesis*: *Bank executives were faithfully working in the interests of their long-term shareholders; the poor performance of their banks during the crisis was the result of unforeseen risk of the bank's investment and trading strategy.*

The *Unforeseen Risk Hypothesis* is supported by the Culture of Ownership that many banks publicly revere and espouse.[4] Per this Culture of Ownership, bank employees – especially senior executives – are supposed to have significant stock ownership in their bank such that their incentives are aligned with that of the long-term shareholders.

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 Trouble Asset Relief Program (TARP) funds from the U.S. Treasury. We refer to the above 14 banks as the "Too-Big-To-Fail" TBTF banks, and the other 37 banks as No-TARP banks.[5] We focus on the CEO's purchases and sales 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: (a) the bank's Z-score (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), (b) the bank's asset write-downs, and (c) 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, even after controlling for bank and CEO characteristics (including bank size), CEOs in the TBTF banks engaged in significantly more discretionary stock sales than CEOs in the No-TARP banks. Our results are mostly consistent with and supportive of the findings of Bebchuk et al. (2010), that is, managerial incentives matter: incentives generated by executive compensation programs are correlated with excessive risk-taking by banks. 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.

On the basis of our analysis, 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 two to four 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 detailed in Bhagat and Romano (2010) and Bhagat et al. (2014), and logically leads to a complementary proposal regarding a bank's capital structure, namely, banks should be financed with considerably more equity than they are being financed currently — in the order of 25% of total capital.

The remainder of the paper is organized as follows. The next section develops the *Managerial Incentives Hypothesis*, the *Unforeseen Risk Hypothesis*, and their testable implications. Section 3 details the sample selection and data sources. Section 4 highlights bank managers' payoffs during 2000–2008, and interprets this data in the context of the *Managerial Incentives Hypothesis* and the *Unforeseen Risk Hypothesis*. Also, this section details a battery of robustness checks to confirm whether or not

[2] Moreover, the Dodd–Frank Act of 2010 explicitly addressed the structure and responsibilities of compensation committees at firms in a similar way to how the Sarbanes–Oxley Act of 2002 addressed audit committees.

[3] Regulating bank executives' compensation took a prominent place on the agenda of the October 2009 G-20 summit, which produced a set of principles as a guideline for nations' regulation of financial executives' pay. Jonathan Weisman, *Obama Retakes Global Stage, but With Diminished Momentum*, Wall Street Journal, Sept. 19–20, 2009, (noting that French President Nicolas Sarkozy threatened to walk out of the G-20 summit if leaders did not adopt strict compensation limits for financial executives).

[4] See, for example, Goldman Sachs 2002 Annual Report: "Retaining the Strengths of an Owner Culture: The core of the Goldman Sachs partnership was shared long-term ownership." Lehman Brothers 2005 Annual Report states: "The Lehman Brothers Standard means…Fostering a culture of ownership, one full of opportunity, initiative and responsibility, where exceptional people want to build their careers…"

[5] We also include a sample of 49 other financial institutions that serves as an intermediate benchmark. These 49 firms did receive TARP assistance in 2008–2009, but are smaller and less systemically important than the 14 TBTF firms. We classify these 49 firms as the Later TARP, or L-TARP, sample.

manager incentive compensation in large banks encouraged long-term shareholder value-creation and avoidance of excessive risk-taking. The final section concludes with a summary and policy recommendations.

2. Managerial Incentives Hypothesis versus the Unforeseen Risk Hypothesis

The *Managerial Incentives Hypothesis* posits that incentives generated by executive compensation programs led to excessive risk-taking by banks. 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).

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 a stylized example, an investment project or trading strategy that in any given year can lead to six cash flow outcomes with equal probability, five of 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:

$$\begin{aligned}\text{Sixth outcome} &= -\$(0.5+\varepsilon)(t)\,\text{billion; for t between years } t_1 \text{ and } t_2, \text{ and}\\ &= -\$(0.5+\varepsilon)(t_2)\,\text{billion; for t greater than } t_2 \text{ years}\end{aligned}$$

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

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 is negative.[6] 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 the investing public, they do not perceive that the sixth outcome's loss is increasing over time, and therefore the stock market has a different – positive – valuation of the trading strategy from the bank executives, as indicated in Example 1:

Example 1. Expected annual cash flows (Only executives know true probabilities)

Expected annual cash flows		
By bank executives		By 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 respond to the above investment project or trading strategy if he 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.

But will the individual (bank CEO) undertake the investment project or trading strategy? To answer this question, we have to consider the compensation structure. 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 share price will increase. In any given year there is a very high probability (5/6 = 83%) that the trading strategy will generate 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, and the CEO can liquidate a significant part of his equity holdings at a profit.

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 if the negative outcome occurs? In the textbook corporate finance paradigm, the bank's share price will decline, and, depending on the bank's equity capitalization, the bank may have to declare bankruptcy.[7] This bankruptcy or close-to-bankruptcy scenario will

[6] Simplified cash flows and probabilities have been used for illustrative purposes to clarify the intuition of the argument. 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.

[7] We use the term loosely because, of course, 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.

certainly have a collateral significant 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 his 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) 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 his equity may be preserved when the bank is bailed out.[8]

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, rendering a value-destroying project appear 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. As the behavioral finance literature suggests, some individuals 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).[9] 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.[10] 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 might no longer be at the firm) than is actually the case.

Example 2. Expected annual cash flows (executives do not know true probabilities)

		Expected probability by bank executives	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:	$-\$(0.5+\varepsilon)(t)$ billion; for t between years t_1 and t_2 $-\$(0.5+\varepsilon)(t_2)$ billion; for t greater than t_2 years	10%	25%
	Project NPV	Positive	Negative
	Investment decision	Invest	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 become problematic if the incentives of bank executives and the shareholders are not properly aligned. If, as in the earlier example, the executives' incentive compensation, dependent on the current outcome, can be liquidated in the near term, then again they might be able to benefit more on their stock sales than they lose on their equity holdings should the project's ultimate negative value be realized after a string of early 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, 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 these bank CEOs during 2008. The authors point to this wealth loss in 2008 as evidence "…inconsistent with

[8] We think that it is unlikely that post-crisis reforms have eliminated "too big to fail," as ex post it is typically more efficient to bail out an institution than let it fail, see, for example, Rochet (2008).

[9] The behavioral finance literature finds that some individuals are overly self-confident and optimistic, often referred to as the "better than average effect." For an 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), see Heaton (2002), and Malmendier and Tate (2005).

[10] As with the original example, simplified cash flows and probabilities have been used for illustrative purposes to clarify the intuition of the argument. The project's expected cash flows need only have the characteristic that there is a difference between the expected and actual NPV. In this example, this is caused by the differences between the expected and actual probabilities of outcomes. But it could be caused by other errors in expectation, such as the executives not accurately forecasting the cash flows or how much the sixth outcome loss increases 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.

Table 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 TARP funds and whose shareholders fared well during financial crisis and period prior to the crisis. Additionally, we construct a Tobit model of expected CEO trading based on the extant literature on insider and CEO trading.

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* noted earlier. 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 his holdings because he does not anticipate large losses from the bank's investment strategy. If the firm 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.[11]

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.[12] 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

[11] Of the 14 firms in our primary 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.

[12] 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).

Table 2
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.

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 the past decade. The *Managerial Incentives 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 1, Panel A, outlines the testable implications from these two hypotheses.

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 *Managerial Incentives 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 during the financial crisis and the prior period. What is "normal" for manager trades of the shares of their bank's stock? Trades of managers of other banks (that did not seek TARP 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 TARP funds.[13] 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 1, Panel B.

3. Sample, data, and variable construction

3.1. Sample selection

Our starting point is the list of 100 financial institutions studied in Fahlenbrach and Stulz (2011). From this list, 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 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.[14] 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.[15] 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

[13] Also, please see Section 4.10. Robustness check: Abnormal trading activity; where we construct a Tobit model of expected CEO trading based on the extant literature on insider and CEO trading.
[14] 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.
[15] Also, please see Section 4.11. Robustness check: Alternative TBTF sample.

Table 3
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.

Panel A: trades by CEOs during 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	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	2048	$36,400,641	$1,659,607,191	$3,467,411,569	$1,771,403,737	15.3%

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	$4671	$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	2048	$36,400,641	$1,659,607,191	$3,467,411,569	$1,771,403,737	15.3%

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 firms 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 2 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.

3.2. 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

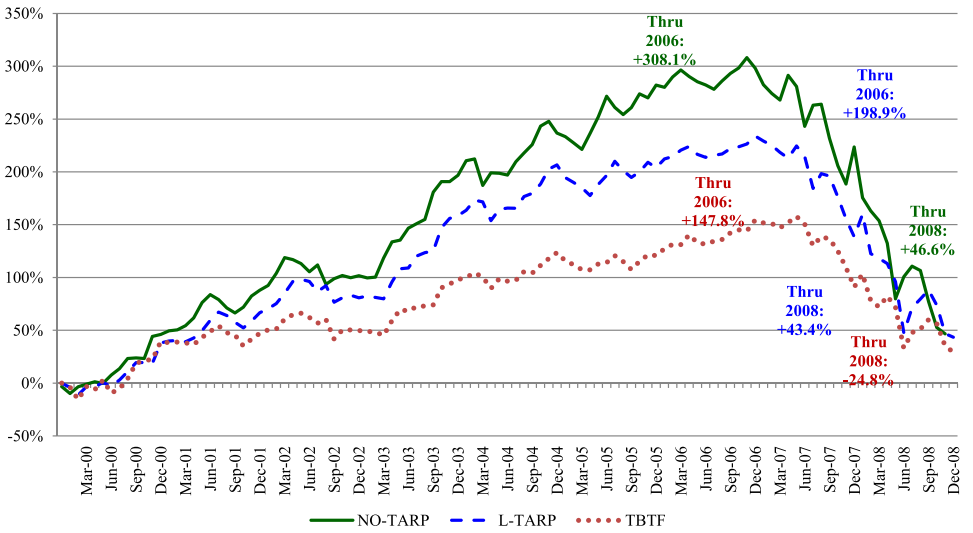

Fig. 1. Relative portfolio returns of bank portfolios, 2000–2008. This figure presents the relative cumulative portfolio returns from 2000 to 2008 of three different bank portfolios. The solid green line on top represents the cumulative portfolio returns of the 37 *No-TARP* institutions, or those that never received TARP funding. The dashed blue 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 dotted red 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. Cumulative portfolio returns are noted for each of the three portfolios as of the end of both 2006 and 2008. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

acquisitions of stock through the exercise of stock options.[16] 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.[17]

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.

3.3. 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 Trades*. This variable is calculated as follows:

$$Net\,Trades_{i,t} = Stock\,Sales_{i,t} - Stock\,Purchases_{i,t} - Option\,Exercises_{i,t}.$$

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.

[16] 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 4 s 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 4 s 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.

[17] 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.

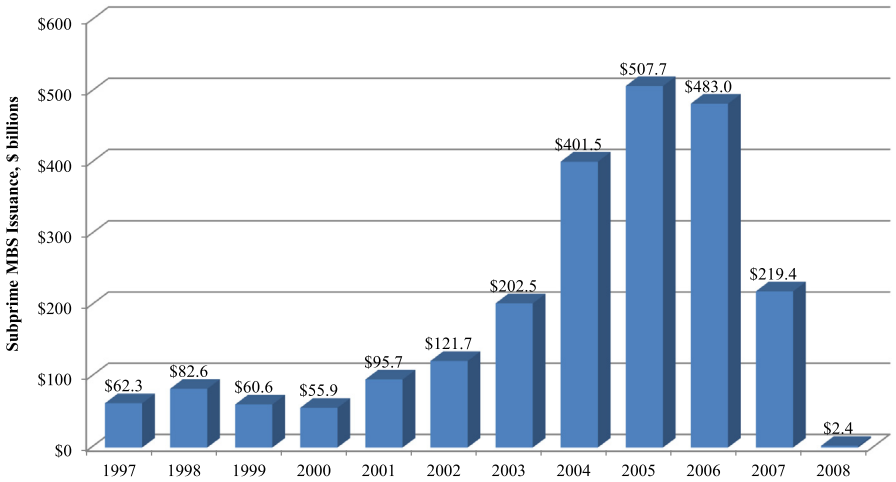

Fig. 2. Subprime mortgage backed security issuance. This figure presents the total amounts of subprime mortgage backed securities that were issued annually from 1997 to 2008. Dollar amounts of security issuance are provided in billions.
Source: inside mortgage finance.

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.

4. Bank CEOs' buys and sells during 2000–2008

4.1. Net payoff to bank CEOs during 2000–2008

Table 3 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 2048 times. During 2000–2008 the 14 bank CEOs bought stock in their banks worth $36 million, but sold shares worth $3467 million.[18] In addition, CEOs acquired stock by exercising options at a total cost of $1660 million.

Table 3 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 Fig. 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 $2013 million. Individually these losses range from a low of about $3 million (Wells Fargo) to about $796 million (Lehman Brothers).[19]

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

[18] 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.

[19] 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.

Table 4
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.

Panel A: 2000–2008 CEO payoff

Company	Value of stock holdings: beginning of 2000	Total net trades: 2000–2008	Total cash compensation: 2000–2008	CEO payoff (realized cash gains): 2000–2008	Estimated value lost (unrealized paper loss):2008	Net CEO payoff: 2000–2008	Estimated value remaining: end of 2008
		(A)	(B)	(A) + (B)	(C)	(A) + (B) + (C)	
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

Panel B: 2002–2008 CEO payoff

Company	Value of stock holdings: beginning of 2002	Total net trades: 2002–2008	Total cash compensation: 2002–2008	CEO payoff (realized cash gains): 2002–2008	Estimated value lost (unrealized paper loss): 2008	Net CEO payoff: 2002–2008	Estimated value remaining: end of 2008
		(A)	(B)	(A) + (B)	(C)	(A) + (B) + (C)	
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

Panel C: 2004–2008 CEO payoff

Company	Value of stock holdings: beginning of 2004	Total net trades: 2004–2008	Total cash compensation: 2004–2008	CEO payoff (realized cash gains): 2004–2008	Estimated value lost (unrealized paper loss):2008	Net CEO payoff: 2004–2008	Estimated value remaining: end of 2008
		(A)	(B)	(A) + (B)	(C)	(A) + (B) + (C)	
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

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 et al. (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…" Bebchuk et al. (2010) consider the period 2000–2008 in their case study of manager compensation in Bear Stearns and Lehman.[20] Consistent with this literature, we consider 2000–2008 as our period for analysis.[21] As a robustness check, in the next section, we consider two additional overlapping time-periods in our analysis: 2002–2008, and 2004–2008.

Table 4, Panel A, notes that as a group these 14 CEOs experienced a cash inflow of $1771 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 $2662 million; we refer to this as *CEO Payoff*. Compare this with their estimated combined losses from beneficial stock holdings in 2008 of $2013 million.[22] The *CEO Payoff* sum of $2662 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 $2013 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 1.

Table 4, 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*.

4.2. Robustness check: different sample periods

Table 4, Panel B, notes that as a group these 14 CEOs experienced a cash inflow of $1398 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 $2065 million, including costs associated with exercising options. As noted earlier, these CEOs suffered combined losses from beneficial stock holdings in 2008 of $2013 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 4, Panel C, focuses on the period 2004–2008. As a group these 14 CEOs experienced a cash inflow of $1132 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 $2013 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.

[20] Inside Mortgage Finance (2010) provides data on issuance of subprime mortgage backed securities; these data illustrate the dramatic increase in issuance of subprime mortgage backed securities around 2000 — see Fig. 2.

[21] We include the longer period because we want our analysis to capture both the investment and any subsequent liquidation of the CEO's personal holdings.

[22] 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 $2013 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.

4.3. 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.

As detailed in Table 5 Panel A, 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.[23] 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.[24] This provides strong evidence that net trades of the 14 TBTF bank CEOs during 2000–2008 was abnormally high.[25] This evidence is consistent with the *Managerial Incentives Hypothesis* and inconsistent with the *Unforeseen Risk Hypothesis*.

4.4. 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 6 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 1671 buys during this period. Officers and directors acquired stock via option exercises in 3454 separate transactions. Net trades, including the costs of exercising options, of officers and directors of these 14 banks sum 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.

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

Table 7 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 Sections 4.1, 4.2 and 4.3 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.[26]

4.6. 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 managers and their stock return during

[23] 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.

[24] 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.

[25] Table 5, Panel C, provides evidence consistent with the joint hypothesis that net trades of the 14 TBTF bank CEOs during 2000–2008 was abnormally high and the shareholders of these banks fared poorly — compared to the No-TARP banks. Direct evidence on shareholder returns is provided below in Table 7.

[26] 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.”

Table 5
CEO trading and CEO holdings. This table compares the total CEO trading activity (Total Net Trades from Table 4) 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. Panel A presents the mean and median dollar amount of Total Net Trades for each sample and time period, as well as the mean and median ratio of Total Net Trades to Beginning of Period Holdings (2000, 2002 and 2008). Panel B presents the calculation of the mean and median values of Net CEO Payoff: 2000–2008 for each of the three samples. Net CEO Payoff is calculated as in Table 4. Panel C presents the estimated value remaining at the end of three periods and the ratio of value remaining at the end of the period to the value at the beginning of the period for each sample.

Panel A: total net trades and beginning holdings

	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%

Panel B: 2000–2008 CEO payoff, by sample

	Value of stock holdings: beginning of 2000	Total net trades: 2000–2008	Total cash compensation: 2000–2008	CEO payoff: 2000–2008	Estimated value lost: 2008	Net CEO payoff: 2000–2008
		(A)	(B)	(A) + (B)	(C)	(A) + (B) + (C)
TBTF firms (n = 14)						
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
L-TARP firms (n = 49)						
Mean values	$29,803,554	$5,724,901	$11,778,980	$17,503,880	($13,506,398)	$3,997,482
Median values	$14,322,737	$1,090,134	$10,437,874	$12,256,013	($3,985,288)	$5,208,903
No-TARP firms (n = 37)						
Mean values	$25,390,421	$11,826,280	$10,707,257	$22,533,537	($18,131,515)	$9,792,473
Median values	$11,278,785	$1,226,977	$8,400,500	$9,279,892	($5,397,493)	$5,728,988

Panel C: CEO estimated value remaining, by date

	Estimated value remaining: end of 2002	Estimated value remaining: end of 2004	Estimated value remaining: end of 2008	Ratio of estimated value remaining 2008 to estimated value remaining 2000	Ratio of estimated value remaining 2008 to estimated value remaining 2002	Ratio of estimated value remaining 2008 to estimated value remaining 2004
TBTF firms (n = 14)						
Mean values	$563,362,577	$461,261,912	$67,094,870	75.8% ***	45.8% ***	31.0% **
Median values	$213,160,088	$256,703,817	$43,394,772	49.1% ***	30.3% **	20.4% **
L-TARP firms (n = 49)						
Mean values	$48,243,797	$61,721,262	$33,536,667	232.5%	94.1% ***	67.4% **
Median values	$25,912,886	$31,371,055	$12,054,871	115.8% *	69.6% **	50.7% **
No-TARP firms (n = 37)						
Mean values	$47,335,631	$79,895,581	$40,859,879	302.3%	608.0%	146.3%
Median values	$29,914,936	$42,666,290	$17,983,848	247.1%	121.1%	101.0%

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.

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 8 suggests that Z-score of TBTF

Table 6
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. The Value of Net Trades is the Value of Buys 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.

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	1929	622,740,251	491,762,285	2,599,516,805	1,485,014,269	17.5%
Bank of New York	1018	254	2926	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	1268	3,197,466,366	1,528,122,839	23,688,319,446	18,962,730,241	11.7%
Countrywide Financial	20	1077	1241	1,155,309,803	324,718,206	8,427,583,600	6,947,555,591	11.9%
Goldman Sachs	12	7	1950	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	1166	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	1671	3454	14,687	$17,145,007,908	$4,354,792,675	$148,480,771,771	$126,980,971,188	9.7%

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	1344	$4,717,183,583	$1,157,085,399	$17,019,980,683	$11,145,711,701	19.7%
2001	230	323	1167	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	1305	1,180,185,242	347,236,054	14,316,327,557	12,788,906,261	6.6%
2004	193	468	1853	1,281,017,607	481,009,313	18,373,207,366	16,611,180,446	5.9%
2005	192	529	1816	1,108,591,232	405,368,091	15,342,500,464	13,828,541,141	6.1%
2006	168	504	2417	2,612,637,201	853,471,050	20,348,529,583	16,882,421,332	10.8%
2007	95	324	2522	1,606,875,211	397,003,384	26,880,668,526	24,876,789,931	5.1%
2008	123	83	1444	278,403,398	153,503,703	7,094,363,180	6,662,456,079	3.5%
All years	1671	3454	14,687	$17,145,007,908	$4,354,792,675	$148,480,771,771	$126,980,971,188	9.7%

Table 7
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:

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

where $(R_{Mkt} - R_f)$ 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: $\alpha_{No\text{-}TARP\text{–}TBTF}$ is the abnormal return for a portfolio long the 37 No-TARP firms and short the 14 TBTF firms, and $\alpha_{No\text{-}TARP\text{–}L\text{-}TARP}$ 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. * indicates statistical significance at the 10% level, ** indicates statistical significance at the 5% level and *** indicates statistical significance at the 1% level.

		Abnormal returns: *No-TARP–TBTF*		
		$\alpha_{No\text{-}TARP}$	α_{TBTF}	$\alpha_{No\text{-}TARP\text{–}TBTF}$
(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*		
		$\alpha_{No\text{-}TARP}$	$\alpha_{L\text{-}TARP}$	$\alpha_{No\ TARP\text{–}L\text{-}TARP}$
(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 8
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		$6039.0	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	**	$3240.4	5.635%	***
25th percentile	10.862	**	$158.9	1.992%	***
Median	20.972		$410.2	3.425%	***
75th percentile	39.146	***	$1143.0	6.334%	***
No-TARP firms (n = 37)					
# total amount ($M)	–		$64,016.2	–	
Average	31.359		$2207.5	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 9
Ratio of Net Trades to concluding holdings. This table presents the ratio of Net Trades to Concluding Holdings for three different time periods: 2000–2008, 2002–2008 and 2004–2008. It compares the "money taken off the table" to the "money left on the table." The three samples are the 14 TBTF firms, the 49 L-TARP firms and the 37 No-TARP firms. Net Trades are calculated as all open market sales of stock less open market purchases and costs of exercising options. Concluding Holdings are calculated as the beneficial ownership, including vested stock and exercisable options, as of the end of 2008. Difference tests are performed to determine if the TBTF and L-TARP values are statistically different from the No-TARP values; significance is indicated by *, ** and *** for differences at the 10%, 5% and 1% levels, respectively.

	Ratio of net trades to concluding holdings:	Ratio of net trades to concluding holdings:	Ratio of net trades to concluding holdings:
	2000–2008	2002–2008	2004–2008
TBTF firms (n = 14)			
Mean values	243.5%***	115.8%***	112.6%***
Median values	142.1%***	69.3%***	29.8%***
L-TARP firms (n = 49)			
Mean values	39.6%**	39.1%**	31.8%**
Median values	13.7%	15.2%*	8.5%*
No-TARP firms (n = 37)			
Mean values	15.5%	19.8%	14.4%
Median values	12.2%	3.8%	1.4%

Statistical significant for difference of means/medians 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.

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.

More recently, Chesney et al. (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 8 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; details are noted in Appendix D.

4.7. Robustness check: CEO trades as a fraction of the amount "left on the table"

Table 5, Panel A, compares CEO trades as a fraction of beginning holdings for TBTF and No-TARP CEOs for the periods 2000–2008, 2002–2008, and 2004–2008. In Table 9 we consider CEO trades as a fraction of the amount they "left on the table" for 2000–2008, 2002–2008, and 2004–2008. Results for each of these three periods suggest that TBTF CEOs took significantly more money off the table (as a ratio of money left on the table) compared to the No-TARP CEOs.

4.8. Robustness check: exclusion of 2000 from the sample period

It is important to examine the robustness of our results and conclusions to inclusion and exclusion of 2000 from the sample period to address the concern that the 2000 data are driven largely by option exercises made at the height of the internet bubble. Table 10, Panel A (Panel B), is similar to Table 3, Panel A (Panel B) — except the sample period is 2001–2008. Table 11, Panel A (Panel B, Panel C), is similar to Table 5, Panel A (Panel B, Panel C) — except the sample period is 2001–2008.

The mean Net CEO Payoff for a TBTF CEO during 2001–2008 is $18.6 million (see Table 10, Panel B). The $18.6 million is the sum of CEO cash compensation, net trades, and estimated value loss in 2008. This evidence is consistent with the *Managerial Incentives Hypothesis.*

Table 11, Panel A, reports CEO trades to beginning holdings for the period 2001–2008 for the TBTF CEOs and the No-TARP CEOs. We find that CEO trades to beginning holdings for the period 2001–2008 are significantly greater for the TBTF CEOs compared to the No-TARP CEOs. This evidence is consistent with the *Managerial Incentives Hypothesis.*

4.9. Robustness check: different individuals as CEO during 2000–2008

Our hypothesis development in Section 2 above assumes that the same individual serves as CEO in the bank for the period under consideration (2000–2008). If the same individual does not serve as the CEO for the entire period 2000–2008, it can complicate the interpretation of our findings. As noted in Appendix B — only 4 of the TBTF CEOs were CEOs throughout the sample

Table 10
Trades by CEOs during 2001–2008 (Rather than 2000–2008 in Table 3). This table is similar to Table 3, except the sample period is 2001–2008 rather than 2000–2008. This table presents the stock ownership, trading, and compensation information for the CEOs of the 14 identified firms during 2001–2008. 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.

Panel A: trades by CEOs during 2001–2008, 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	1	13	0	$10,568	$5,472,036	$0	−$5,482,604	0.0%
Bank of America	11	17	292	$2,129,776	$197,404,497	$223,725,511	$24,191,238	31.3%
Bank of New York	27	26	566	$123,809	$21,877,806	$77,786,666	$55,785,051	17.0%
Bear Stearns	0	0	14	$0	$0	$235,560,483	$235,560,483	4.4%
Citigroup	9	17	46	$8,430,672	$74,903,376	$104,585,238	$21,251,190	12.0%
Countrywide Financial	0	265	273	$0	$127,899,288	$529,843,282	$401,943,994	62.0%
Goldman Sachs	0	0	15	$0	$0	$40,475,735	$40,475,735	1.6%
JP Morgan Chase	8	11	23	$11,069,195	$60,490,949	$100,283,179	$28,723,035	13.3%
Lehman Brothers	1	14	300	$19,272	$141,922,172	$523,401,269	$381,459,825	24.6%
Mellon Financial	11	20	54	$3,311,837	$5,391,802	$20,403,086	$11,699,447	4.9%
Merrill Lynch	1	8	69	$11,250,000	$6,323,804	$95,478,463	$77,904,659	18.0%
Morgan Stanley	0	15	42	$0	$62,173,905	$113,828,436	$51,654,531	7.1%
State Street	0	4	175	$0	$9,598,557	$28,928,165	$19,329,608	16.4%
Wells Fargo	2	15	98	$50,841	$238,266,366	$410,141,613	$171,824,406	36.4%
All firms	71	425	1967	$36,395,970	$951,724,558	$2,504,441,126	$1,516,320,598	15.1%

Panel B: trades by CEOs during 2001–2008, 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) 2001–2008	Ratio of net trading to post-trade form 4 holdings (average across years)
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	71	425	1967	$36,395,970	$951,724,558	$2,504,441,126	$1,516,320,598	15.1%

Table 11
CEO trading and CEO holdings, 2001–2008. This table compares the total CEO trading activity (Total Net Trades from Table 4) and CEO stock ownership by period and by sample. The three time periods are 2001–2008, 2002–2008 and 2004–2008. The three samples are the 14 TBTF firms, the 49 L-TARP firms and the 37 No-TARP firms. Panel A presents the mean and median dollar amount of Total Net Trades for each sample and time period, as well as the mean and median ratio of Total Net Trades to Beginning of Period Holdings (2001, 2002 and 2008). Panel B presents the calculation of the mean and median values of Net CEO Payoff: 2001–2008 for each of the three samples. Net CEO Payoff is calculated as in Table 4. Panel C presents the estimated value remaining at the end of three periods and the ratio of value remaining at the end of the period to the value at the beginning of the period for each sample.

Panel A: total net trades and beginning holdings

	Total net trades: 2001–2008	Total net trades: 2002–2008	Total net trades: 2004–2008	Ratio of trades to beginning holdings: 2001–2008	Ratio of trades to beginning holdings: 2002–2008	Ratio of trades to beginning holdings: 2004–2008
TBTF firms (n = 14)						
Mean	$108,308,614	$99,881,678	$80,892,620	52.1% **	52.2% ***	23.4% **
Median	$46,065,133	$41,898,585	$32,602,548	26.8% ***	21.9% **	11.8%
L-TARP firms (n = 49)						
Mean	$5,442,383	$4,893,079	$3,158,121	48.1% **	19.1% *	10.2% *
Median	$1,010,485	$878,228	$561,761	13.4% *	8.4% *	3.5%
No-TARP institutions (n = 37)						
Mean	$11,968,963	$11,239,377	$9,107,443	29.2%	12.1%	−1.3%
Median	$789,767	$599,057	$32,818	4.8%	2.6%	0.1%

Panel B: 2001–2008 CEO payoff, by sample

	Value of stock holdings: beginning of 2001	Total net trades: 2001–2008	Total cash compensation: 2001–2008	CEO payoff: 2001–2008	Estimated value lost: 2008	Net CEO payoff: 2001–2008
		(A)	(B)	(A) + (B)	(C)	(A) + (B) + (C)
TBTF firms (n = 14)						
Mean values	$662,793,913	$108,308,614	$54,131,371	$162,439,985	($143,834,511)	$18,605,473
Median values	$279,049,270	$46,065,133	$52,449,224	$106,586,977	($78,475,455)	$10,923,925
L-TARP firms (n = 49)						
Mean values	$40,845,437	$5,442,383	$10,790,891	$16,233,275	($13,506,398)	$2,726,877
Median values	$19,166,320	$1,010,485	$9,389,157	$11,284,252	($3,985,288)	$4,525,557
No-TARP firms (n = 37)						
Mean values	$38,934,555	$11,968,963	$9,649,985	$21,618,947	($18,131,515)	$8,877,883
Median values	$16,359,674	$789,767	$7,554,538	$8,525,246	($5,397,493)	$5,618,299

Panel C: CEO estimated value remaining, by date, 2001–2008

	Estimated value remaining: end of 2002	Estimated value remaining: end of 2004	Estimated value remaining: end of 2008	Ratio of estimated value remaining 2008 to estimated value remaining 2001	Ratio of estimated value remaining 2008 to estimated value remaining 2002	Ratio of estimated value remaining 2008 to estimated value remaining 2004
TBTF firms (n = 14)						
Mean values	$563,362,577	$461,261,912	$67,094,870	47.6%***	45.8% ***	31.0% **
Median values	$213,160,088	$256,703,817	$43,394,772	26.2%***	30.3% **	20.4% **
L-TARP firms (n = 49)						
Mean values	$48,243,797	$61,721,262	$33,536,667	137.9%***	94.1% ***	67.4% **
Median values	$25,912,886	$31,371,055	$12,054,871	89.3%*	69.6% **	50.7% **
No-TARP firms (n = 37)						
Mean values	$47,335,631	$79,895,581	$40,859,879	778.5%	608.0%	146.3%
Median values	$29,914,936	$42,666,290	$17,983,848	112.8%	121.1%	101.0%

Statistical significant for difference of means/medians 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.

period. 22 of the 49 L-TARP firms had the same CEO throughout the 2000–2008 period. 17 of the 36 No-TARP firms had the same CEO throughout the 2000–2008 period.

Table 12 summarizes the Net CEO Payoff, and the Ratio of Trades to Beginning Holdings, for only those banks where the same individual served as CEO during 2000–2008. The results are consistent with those reported for the full samples in Table 5 in the

Table 12
CEO trading and CEO holdings: Firms with only one CEO throughout 2000–2008. This table compares the total CEO trading activity (Total Net Trades from Table 4) 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 include only those firms that had only one CEO throughout the 2000–2008 period; this results in 4 TBTF firms, the 22 L-TARP firms and the 17 No-TARP firms. Panel A presents the mean and median dollar amount of Total Net Trades for each sample and time period, as well as the mean and median ratio of Total Net Trades to Beginning of Period Holdings (2000, 2002 and 2008). Panel B presents the calculation of the mean and median values of Net CEO Payoff: 2000–2008 for each of the three samples. Net CEO Payoff is calculated as in Table 4. In panel A, difference tests are performed to determine if the TBTF and L-TARP values are statistically different from the No-TARP values.

Panel A: total net trades and beginning holdings: firms with only one CEO throughout 2000–2008

	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 = 4)						
Mean	$274,349,466	$247,322,622	$197,483,488	225.6% ***	133.6% ***	42.8% ***
Median	$322,498,845	$283,228,903	$208,224,594	382.3% ***	78.4% ***	46.2% ***
L-TARP firms (n = 22)						
Mean	$8,574,947	$6,350,842	$3,454,588	28.9% *	24.8% ***	11.7% ***
Median	$2,646,993	$10,547,342	$7,810,286	19.4% **	13.1% **	7.9% *
No-TARP institutions (n = 17)						
Mean	$8,902,081	$8,122,942	$5,100,979	18.5%	6.7%	−2.0%
Median	$25,713	$0	−$118,367	0.0%	0.0%	−0.5%

Panel B: 2000–2008 CEO payoff: firms with only one CEO throughout 2000–2008

	Value of stock holdings: 2000	Total net trades: 2000–2008	Total cash compensation: 2000–2008	CEO payoff: 2000–2008	Estimated value lost: 2008	Net CEO payoff: 2000–2008
	(A)	(B)	(A) + (B)	(C)	(A) + (B) + (C)	
TBTF firms with same CEO (n = 4)						
Mean values	$168,025,041	$274,349,466	$68,021,411	$342,370,876	($340,102,179)	$2,268,697
Median values	164,974,481	322,498,845	70,114,041	405,745,354	(224,656,403)	(28,446,981)
L-TARP firms with same CEO (n = 22)						
Mean values	$33,826,025	$8,574,947	$11,755,137	$20,330,084	($18,616,842)	$1,713,242
Median values	11,360,464	2,646,993	10,011,392	14,473,111	(3,849,074)	6,501,678
No-TARP firms with same CEO (n = 17)						
Mean values	$29,887,185	$8,902,081	$10,530,252	$19,432,333	($25,247,278)	($5,814,945)
Median values	8,257,405	25,713	8,375,000	8,624,674	(12,944,373)	2,329,394

Statistical significant for difference of means/medians 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 13
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. *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. Both models include intercepts, year dummy variables and firm fixed effects, not tabulated for conciseness.

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

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

	Dependent variable: *Net Trades*$_t$	
	(1)	(2)
Assets (log) $_t$	−1.232***	−1.344***
	(0.003)	*(0.001)*
Book-to-market $_t$	−4.154***	−3.404***
	(0.002)	*(0.007)*
Return $_{t-1}$	−0.179	−0.365
	(0.904)	*(0.805)*
Stock volatility $_t$	58.793*	36.806
	(0.086)	*(0.289)*
CEO total compensation $_{t-1}$	2.170***	2.004***
	(0.001)	*(0.003)*
CEO % equity compensation $_{t-1}$	9.649***	10.152***
	(0.000)	*(0.000)*
CEO equity holdings (log) $_{t-1}$	1.384***	1.325***
	(0.000)	*(0.000)*
Capital-to-assets $_t$	–	−43.147***
		(0.006)
TBTF dummy	4.198**	4.247**
	(0.019)	*(0.016)*
L-Tarp dummy	1.547	1.673*
	(0.117)	*(0.088)*
Number of observations	883	883
Year controls	Yes	Yes
Firm fixed-effects	Yes	Yes

Coefficients are presented with p-values in parentheses. Statistical significance is denoted by * for 10%, ** for 5% and *** for 1%.

paper. The mean Net CEO Payoff is positive for the 4 CEOs who served as CEOs for the TBTF banks for the entire period 2000–2008. The Ratio of Trades to Beginning Holdings, for only those banks where the same individual served as CEO during 2000–2008, is significantly greater for the TBTF banks compared to the No-TARP banks for each of the periods: 2000–2008, 2002–2008 and 2004–2008. These results are consistent with the *Managerial Incentives Hypothesis*.

4.10. 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 4.3., comparing the nominal amount of trading across the three samples. 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 to 2008. This variable is calculated as follows:

$$Net\ Trades_{i,t} = Stock\ Sales_{i,t} - Stock\ Purchases_{i,t} - Option\ Exercises_{i,t}.$$

In Table 3 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 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 or diversification purposes. In Table 5, 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.

Table 14
CEO trading and CEO holdings, excluding Bear Stearns and Lehman Brothers. This table compares the total CEO trading activity (Total Net Trades from Table 4) 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 12 of the 14 TBTF firms with Bear Stearns and Lehman Brothers excluded, the 49 L-TARP firms and the 37 No-TARP firms. The rest of the tables are identical in nature to Table 5.

Panel A: Similar to Table 5, Panel A with Bear Stearns and Lehman Brothers excluded

	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 = 12)						
Lehman Brothers & Bear Stearns Excluded						
Mean	$91,678,426	$69,323,807	$59,670,625	71.7% ***	41.5% ***	19.9% **
Median	$48,128,058	$33,032,904	$23,158,605	41.5% ***	17.3% **	10.1%
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 institutions (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%

Panel B: Similar to Table 5, Panel B with Bear Stearns and Lehman Brothers excluded

	Value of stock holdings: beginning of 2000	Total net trades: 2000–2008	Total cash compensation: 2000–2008	CEO payoff: 2000–2008	Estimated value lost: 2008	Net CEO payoff: 2000–2008
		(A)	(B)	(A) + (B)	(C)	(A) + (B) + (C)
TBTF firms (n = 12)						
Lehman Brothers & Bear Stearns Excluded						
Mean values	$529,674,307	$91,678,426	$62,584,102	$154,262,527	($74,389,040)	$79,873,488
Median values	$120,589,509	$48,128,058	$65,645,943	$124,966,844	($45,222,468)	$31,316,315
L-TARP firms (n = 49)						
Mean values	$29,803,554	$5,724,901	$11,778,980	$17,503,880	($13,506,398)	$3,997,482
Median values	$14,322,737	$1,090,134	$10,437,874	$12,256,013	($3,985,288)	$5,208,903
No-TARP firms (n = 37)						
Mean values	$25,390,421	$11,826,280	$10,707,257	$22,533,537	($18,131,515)	$9,792,473
Median values	$11,278,785	$1,226,977	$8,400,500	$9,279,892	($5,397,493)	$5,728,988

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 Samwick (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 13 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 on average worth $36.9 million more than the No-TARP CEOs.

Table 13 also documents that 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.

4.11. Robustness check: alternative TBTF sample

The 14 TBTF banks we consider include Bear Stearns and Lehman Brothers because we suspect they would have been included in this first round of TARP funding had they been independent going concerns in October 2008; see Section 3 above on sample selection. Clearly, Bear Stearns and Lehman Brothers were not independent going concerns in October 2008 and never received TARP funds. In Table 14, Panels A, and B, we replicate some of our main findings for just the 12 TBTF banks (not including Bear Stearns and Lehman Brothers). The results for the 12 TBTF banks are consistent with that of the 14 TBTF banks.

5. Summary and recommendations

Before stating our conclusions, it is important to note that executive compensation reform is not a panacea. While some have argued that incentives generated by executive compensation programs led to excessive risk-taking by banks contributing to the current financial crisis, there are more important causes of the recent financial and economic crisis. For example, the perverse incentives created by Fannie Mae and Freddie Mac encouraged individuals to purchase residential real estate — ultimately at considerable public taxpayers' expense; this is perhaps the single most important cause of the financial and economic crisis of 2008; see Wallison (2013).

Our focus in this paper, however, is on the executive compensation activities 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. Our results are mostly consistent with and supportive of the findings of Bebchuk et al. (2010), that is, managerial incentives matter — incentives generated by executive compensation programs are positively correlated with excessive risk-taking by banks. 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 two to four 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 (2010) and Bhagat et al. (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 — in the order of 25% of total capital. 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).

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

(continued on next page)

Appendix A *(continued)*

		TARP amount received ($000s)	Date received initial TARP funding			TARP amount received ($000s)	Date Received Initial TARP Funding
(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	TOTAL		$50,437,016	
(25)	PNC Financial Services Group Inc.	7,579,200	December 31, 2008				
(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

Appendix B *(continued)*

	Company	2000 CEO	2008 CEO
L-TARP sample:			
(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
(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 CNet 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	Total cash compensation: 2000–2008	CEO payoff: 2000–2008	Estimated value lost: 2008	Net CEO payoff: 2000–2008	Estimated value remaining: last available year
			(A)	(B)	(A) + (B)	(C)	(A) + (B) + (C)	
(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	(9467)	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
(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	Total cash compensation: 2000–2008	CEO payoff: 2000–2008	Estimated value lost: 2008	Net CEO payoff: 2000–2008	Estimated value remaining: last available year
			(A)	(B)	(A) + (B)	(C)	(A) + (B) + (C)	
(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
(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. *Brief discussion of Federal Reserve Emergency Lending Programs*

During the financial crisis of 2007–2009, the Federal Reserve recognized the need for expanded borrowing by many financial institutions. Traditionally, the Fed had only granted loans to depository institutions that were members of the Federal Reserve system. However, as the crisis gained momentum, the Fed realized that many of the financial institutions which needed short- or long-term emergency help were not members of the Fed. The Fed faced a decision: allow these firms to suffer and possibly go bankrupt, which would mean that they would be unable to pay their debts to many other institutions (likely including institutions that were members of the Federal Reserve system), or offer expanded borrowing facilities. The Fed decided that if it did not expand its lending facilities to non-member institutions, it would likely have to eventually rescue many of its members that lost investments with those institutions. Rather than wait for that, the Fed reacted to the crisis by introducing new programs from which these non-member institutions could borrow to potentially stave off their own individual credit crises, and thereby stave off broader and more serious systemic funding problems. In this analysis, we focus on five new credit programs to help out both member and non-member institutions in this effort.

The first program the Fed launched was the Term Auction Facility (TAF) in December 2007. All depository institutions that were eligible to borrow through the primary discount window of the Fed were able to take advantage of this program. TAF differed from the primary discount window in that the loans were longer term: 28-days or 84-days — compared to the standard overnight loans available at the discount window. Funds were available to borrow through an auction process, and all borrowings were collateralized with the same standards as other Fed loans. In 2+ years, financial institutions borrowed more than $3.8 trillion through TAF.

In March 2008, as Bear Stearns was collapsing, the Fed introduced the Primary Dealer Credit Facility (PDCF). This was a major departure from Fed practices as it allowed primary dealers – investment banks and other non-depository institutions – to ability to borrow from the Fed. Previously, only depository institutions which were members of the Federal Reserve system were eligible to borrow from the Fed. Primary dealers were allowed to borrow on an overnight basis. At first, these loans had to be collateralized with investment grade securities; later, the Fed expanded the types of acceptable collateral to provide more flexibility to these institutions. In 14+ months, financial institutions borrowed more than $8.9 trillion through PDCF.

Also in March 2008, the Fed introduced the Term Securities Lending Facility (TSLF). This was essentially a companion facility to the PDCF as it allowed primary dealers the opportunity to borrow funds from the Fed over a one-month term. Funds were available through an auction process through competitive auctions, and all loans were collateralized with securities similar to those eligible in PDCF. In 16+ months, financial institutions borrowed more than $2 trillion through TSLF.

In September 2008, the Fed introduced the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF). This facility allowed depository institutions and bank holding companies to finance their purchases of high-quality asset-backed commercial paper from money market mutual funds under certain conditions. The program was intended to assist money funds that held such paper in meeting demands for redemptions by investors and to foster liquidity. Loans through this program were collateralized by highly-rated short-term ABCP. In 8+ months, financial institutions borrowed more than $200 through AMLF.

In March 2009 the Federal Reserve launched the Term Asset-Backed Securities Loan Facility (TALF). This facility was available to all entities that own asset-backed securities, such as auto, credit, student or small business loans. As this collateral was highly specific and large financial institutions had other credit facilities to utilize, most did not take advantage of TALF. In 12 months, entities borrowed $71 billion through TALF.

In summary, the three most significant programs were the TAF, PDCF and TSLF. The TAF allowed depository institutions longer-term loans, rather than the standard overnight loans. And the PDCF and TSLF allowed non-depository institutions, such as investment banks, to borrow from the Fed for the first time, using both overnight and longer-term loans. In total, financial institutions borrowed more than $14.5 trillion through these 3 programs in attempts to mitigate their own specific credit crises.

Summary specific to our sample

The 100 firms in our sample were among the most significant borrowers from these emergency programs. Of the 14 firms in the TBTF subsample, 12 of the 13 firms that were independent in 2008 borrowed a combined $10.2 trillion from these 5 programs (AIG did not borrow, and Mellon Financial had previously been acquired by Bank of New York). Most of this borrowing – $8.4 trillion – was done from the PDCF and about $1 trillion was done from the TSLF. In all, these 12 firms borrowed amounts equivalent to 92.2% of their 2008 Assets.

Of the 49 firms in the L-TARP subsample, 27 firms borrowed a combined $408 billion from these 5 programs. Nearly all of this borrowing was done through the TAF. Nearly all of the L-TARP subsample firms were depository institutions that already had access to the overnight borrowing window at the Federal Reserve, and the TAF gave them the opportunity to borrow for longer periods. In all, these 27 institutions borrowed amounts equivalent to 23.3% of their 2008 Assets.

Of the 37 firms in the No-TARP subsample, 10 firms borrowed a combined $82.5 billion from these 5 programs. All of this was done through the TAF. Again, most of these firms were depository institutions that already had overnight borrowing capabilities. In all, these 10 institutions borrowed amounts equivalent to 8.0% of their 2008 Assets.

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