THREE ESSAYS ON THE TROUBLED ASSET RELIEF PROGRAM

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ABSTRACT

Three Essays on the Troubled Asset Relief Program

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This dissertation focuses on the Capital Purchase Program (CPP) of the Troubled Asset Relief Program (TARP) and consists of a historical overview of TARP and three empirical studies of the CPP. In the first empirical analysis, presented in chapter 2, I use an event study approach to examine the impact of firm announcements of CPP approval on their stock price. I find that the average firm in my sample enjoyed a 1.31% abnormal return on their stock price in the trading days surrounding this news event. In a multivariate regression that examines cross-firm variation in abnormal returns, I find evidence that legislative action in February 2009 to increase the restrictions on executive compensation at CPP-funded firms may have played an important role in dulling market enthusiasm for a firm qualifying for CPP capital. In chapter 3, I propose a model of TARP funding with numerous financial, structure, economic and regulatory explanatory variables to determine which factors were most influential in directing CPP capital to specific firms in the banking system. I find a clear pattern that CPP capital flowed most prominently to both larger, systematically important firms and firms that, while not on the verge of failure, were experiencing greater financial stress. In chapter 4, I study whether CPP funding altered bank behavior. Modifying established models from the economic literature on bank lending, loss recognition and CEO pay, I investigate whether CPP recipients behaved differently than non-recipient firms in lending activities, acknowledging portfolio losses or altering CEO compensation. Controlling for firm condition, I find that CPP recipients were significantly less likely to lend, but significantly more likely to acknowledge losses and curb CEO pay. Collectively, these results suggest that the government's decision to inject capital into the banking system primarily led to greater transparency about the health of recipient financial institutions.

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The Troubled Asset Relief Program

1.1 A Brief History of the Troubled Asset Relief Program

The Troubled Asset Relief Program, initially called the Troubled Asset Rescue Plan, was first proposed to Congress by Treasury Secretary Henry Paulson on September 18, 2008 (Baker 2008). In the discussion that follows, I outline the history of this program, from the initial considerations of how the program would be executed to the changing public perceptions of the institutions that were beneficiaries of government support.

1.1.1 Debate about the design of the program

Under Paulson's original TARP plan, supported by Federal Reserve Chairman Benjamin Bernanke, the government would use $700 billion to purchase troubled mortgage-backed securities from financial institutions. This would give banks an infusion of capital and, by removing these toxic assets, reduce the uncertainty about the firms' continued viability. The government, meanwhile, would hold the assets until their market value improved, reducing the potential losses to taxpayers.

Paulson's plan was criticized on several fronts. First of all, it would be difficult for the government to properly value the assets being purchased. If the government overpaid, taxpayers would be left liable; if the government underpaid, it would mean less capital support for the troubled financial institutions. There was also concern about concentrating so much power and money in the hands of the Treasury Department. Some

also argued that the government should instead take an equity stake in assisted firms, as had been done when Sweden rescued its financial system in the early 1990s (Goodman 2008).

Legislation to create the $700 billion fund was originally rejected by the House of Representatives on September 29, 2008. However, with financial markets in continued turmoil—the Dow Jones Industrial Average fell 7% on the day the House rejected the initial legislation—a modified bill passed the Senate on October 1, 2008 and was approved by the House of Representatives and signed into law by President George W. Bush on October 3, 2008. The legislation initially allocated $350 billion to the Treasury Department, with an additional $350 billion available only by Congressional approval (Herszenhorn 2008). Addressing previous criticisms, the final bill created two boards for oversight of the program, included a provision that the government would take an ownership stake in assisted institutions, and enacted some limits on executive compensation.

The Treasury Department soon reversed course on its initial plan to buy troubled assets directly from financial institutions. On October 14, 2008, Secretary Paulson announced that the Treasury Department would buy $125 billion in preferred stock[1] in nine of the largest banks and planned to offer an additional $250 billion in capital to thousands of other institutions (Landler and Dash 2008). On November 12, 2008, Secretary Paulson formally abandoned the initial strategy of buying troubled mortgage-backed securities (Andrews and Dash, Bailout Effort Shifting Focus to Consumers 2008).

[1] Preferred stock is similar to common stock except that: 1) the dividend on preferred stock is fixed over time, 2) preferred stock holders have a higher claim to the assets of the firm than common shareholders in the event of a liquidation, and 3) preferred stock holders do not have the voting rights of common shareholders.

1.1.2 The application process

The first phase of the Capital Purchase Program (CPP), the initiative to inject capital directly into financial institutions, was announced on October 14, 2008. At that time, the program was only available to publicly-owned U.S.-controlled[2] banks, savings associations, and financial activity-focused bank and savings and loan holding companies. Interested institutions had one month to apply, with an application deadline of November 14, 2008 (The U.S. Department of the Treasury 2008). The program was later broadened to privately-held financial institutions, S corporations, and mutual banks.[3]

According to the February 6, 2009 *Initial Report to the Congress* by the Office of the Special Inspector General for the Troubled Asset Relief Program (SIGTARP), qualifying CPP applicants had to submit a six-page application to their primary regulator with basic details about the institution and the amount of preferred shares that the institution wished to sell to the government. The institution could request a capital infusion of between 1% and 3% of risk-weighted assets. The preferred shares would pay a dividend of 5% annually, which reset to 9% annually after five years (Office of the Special Inspector General for the Troubled Asset Relief Program 2009).

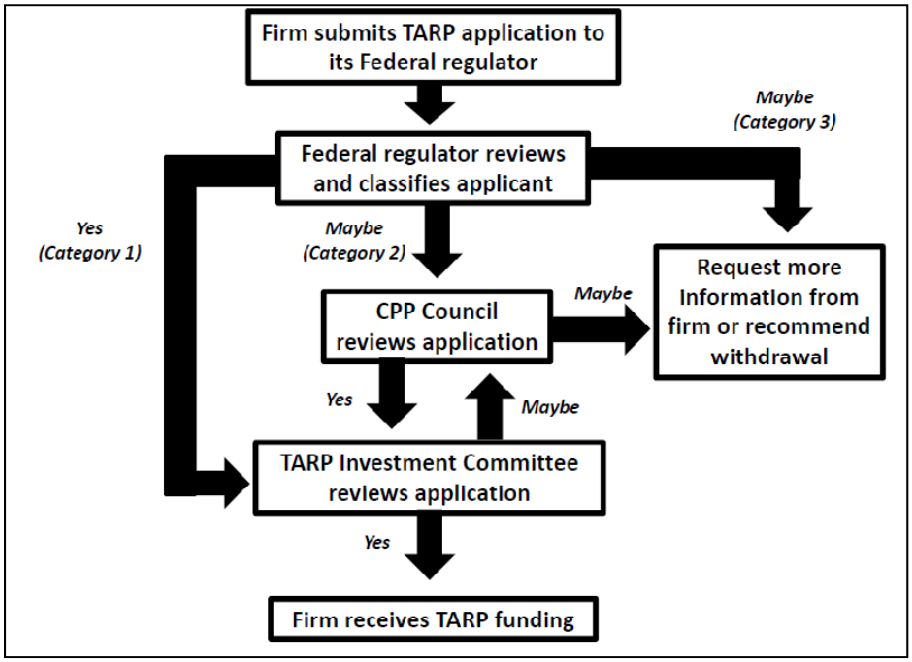
Figure 1.1 illustrates the CPP application process. Applicants were classified by their primary federal regulator into one of three categories based on their most recent composite exam rating, how long ago the bank exam had been conducted, and whether

[2] A U.S.-controlled institution is one that is not controlled by a foreign entity. An institution is considered to be U.S.-based if it is organized under the laws of the U.S., the District of Columbia, or any state, territory, or possession of the United States (The U.S. Department of the Treasury 2008).

[3] The program opened to privately-held institutions on November 17, 2008 with an application deadline of December 8, 2008. The program opened to S corporations on January 14, 2009 with an application deadline of February 13, 2009. The program opened to mutual banks on April 14, 2009 with an application deadline of May 14, 2009.

the institution had acceptable performance metrics. The composite exam rating represents the regulator's view of the safety and soundness of the institution. The composite exam rating ranges from 1 (best) to 5 (worst). As Figure 1.1 shows, Category 1 institutions were forwarded directly to the Treasury Department's TARP Investment Committee for approval; Category 2 institutions were first vetted by the CPP Council, with representation from the major banking regulators, before moving forward to the TARP Investment Committee; and Category 3 institutions were asked to send more information or withdraw.

Figure 1.1: The Capital Purchase Program Process



Source: Special Inspector General for the Troubled Asset Relief Program's Initial Report to the Congress, February 6, 2009

As Figure 1.2 illustrates, whether a qualifying institution was classified as a Category 1 or a Category 2 institution was largely dependent on the date of the most recent exam and the key performance metrics (to be described in greater detail in chapter

3). All banks with a composite exam rating of 4 or 5 were classified as Category 3 and asked to withdraw their application (Office of Inspector General, Department of the Treasury 2010).

Figure 1.2: Categorizing Qualifying Institutions

Category 1:

- Qualifying institutions with a composite exam rating of "1"
- Qualifying institutions with a composite exam rating of "2" and for which the most recent exam rating is not more than 6 months old
- Qualifying institutions with a composite exam rating of "2" or "3" and acceptable performance ratios

Category 2:

- Qualifying institutions with a composite exam rating of "2" and for which the most recent exam rating is more than 6 months old and overall unacceptable performance ratios
- Qualifying institutions with a composite exam rating of "3" with overall unacceptable performance ratios

Category 3:

- Qualifying institutions with a composite exam rating of "4" or "5"

Source: Special Inspector General for the Troubled Asset Relief Program's Initial Report to the Congress, February 6, 2009

1.1.3 Initial strong demand for TARP

Financial institutions initially saw it as desirable to be a participant in TARP. As Mark Calvey wrote in the *San Francisco Business Times* on November 25, 2008, "One of the initial concerns was that applying for TARP money would carry a stigma. But that concern was laid to rest with so many healthy banks seeking to participate in the TARP

program" (Calvey 2008). Overall, a survey in late November 2008 by Banc Investment Group found that 56% of community bank respondents intended to apply for the program, with 3% already having received approval (Rosta 2008).

The initial interest in TARP had several causes. First of all, banks saw it as a means to support their own strategic goals, whether that was acquisitions, expanding into new areas, or simply weathering the downturn to emerge a stronger player in the economic recovery. The prominent failure of several large banks had also illustrated the importance of a strong capital cushion. TARP approval was seen as necessary to demonstrate to the financial markets both financial viability and capital adequacy. The perceived need for capital for some institutions that did not qualify under TARP was so great that they converted to bank holding companies (BHCs) to meet the qualification standards. Some prominent examples of institutions converting into BHCs were Goldman Sachs, Morgan Stanley, American Express, Discover Financial Services, GMAC, and the CIT Group (Reuters 2008).

Competitive pressures also encouraged institutions to apply. With rivals applying for TARP money, institutions felt it necessary to seek capital as well to avoid being at a competitive disadvantage (Calvey 2008). Finally, with the economy expected to worsen, it was seen as patriotic to apply for government funds that could help support bank lending during the downturn. In an October 2008 interview with CBS's *60 Minutes*, Bank of America CEO Ken Lewis said that he believed that the government's capital infusion in nine of the largest U.S. banks was the right thing for the U.S. financial system and the country (CBS 2008). Similarly, JPMorgan Chase & Co.'s annual report stated that the company was taking a "leadership role in helping to stabilize the financial

markets" by accepting $25 billion from the Treasury Department (J.P. Morgan Chase & Co. 2009).

1.1.4 Increased restrictions on executive pay

When the Capital Purchase Program was first announced, it included four provisions on executive compensation. Participating firms were asked to: 1) ensure senior executive compensation did not encourage excessive risk taking; 2) institute clawback provisions that could be used to recapture performance compensation that had been paid out to executives that were later found to have given inaccurate financial statements; 3) cease issuing golden parachute payments; and 4) refrain from deducting executive pay in excess of $500,000 (The U.S. Department of the Treasury 2009).

On January 16, 2009, Congress granted access to the remaining $350 billion in the TARP funding, but only after the Obama administration promised to have the Treasury Department draft more stringent limits on executive compensation for firms requiring exceptional government assistance. On February 4, 2009, President Obama outlined his proposals for executive compensation limits. The President's plan included 1) limiting executive salaries to $500,000 excluding restricted stock; 2) requiring clawback provisions for the top 25 executives; 3) prohibiting golden parachutes for the 10 most senior executives; and 4) requiring board of director approval for nonessential services such as corporate jets, corporate retreats, etc. An important characteristic of the President's proposals was that they applied only to institutions seeking assistance *in the future*, not to the institutions that had already received TARP capital (Labaton and Bajaj 2009).

However, as part of the $787 billion economic stimulus bill, which passed both the Senate and House on February 13, 2009, Congress approved executive pay restrictions that far exceeded the Obama administration's proposals. The legislation, inserted by Senate Banking Committee Chairman Christopher Dodd, added two major restrictions. First, it prohibited bonuses that exceeded one-third of total compensation for the highest paid personnel.[4] At the largest companies, that limit applied to the 25 highest paid employees, regardless of whether they were traders, fund managers, etc. (Maremont and Lublin 2009). Bonuses also had to be designed as long-term incentives, unable to be cashed out until after the TARP capital was repaid. Second, in contrast to the Obama administration's plan, the new executive compensation rules applied *retroactively* to institutions that had already received government capital (Andrews and Dash, Stimulus Plan Places New Limits on Wall St. Bonuses 2009).[5]

1.1.5 The stigma of TARP

Whereas at the start of the Capital Purchase Program banks were eager to take advantage of the promise of government assistance, institutions that had accepted TARP capital began to feel stigmatized and sought to return the capital. On March 4, 2009, German American Bancorp announced that it would not accept the $25 million for which it had been approved in November 2008 (Boyd 2009). On March 31, 2009, four small community banks became the first TARP institutions to repay the government (Sorkin, 4

[4] For example, an employee under the pay restrictions receiving $1 million in base pay could receive a bonus of no more than $500,000 under the new law because a $500,000 bonus would represent one-third of the $1.5 million total compensation package (Solomon and Maremont, Bankers Face Strict New Pay Cap 2009).

[5] The Obama administration's proposal to limit executive salaries to $500,000 was not included in the final bill.

Banks Become First to Repay TARP Money 2009). On April 16, 2009, JP Morgan Chase & Co. CEO Jamie Dimon called the TARP capital "a scarlet letter" and said that he regretted accepting the money (Appelbaum 2009).

The reversal in the industry's perceptions of the Troubled Asset Relief Program had several causes. First, institutions felt the program's restrictions had become too onerous, hampering their ability to act successfully as financial intermediaries. The CEO of Bank of Marin, one of the first banks to return the government money, stated that "Given the operating restrictions we experienced as a participant, we believe this decision [to repay the money] is in the best interest of our customers, shareholders and employees" (Sorkin, 4 Banks Become First to Repay TARP Money 2009). Along with the restraints on executive pay, the economic stimulus bill also made it more difficult for TARP participants to hire foreign workers, a policy aimed at protecting American jobs. This rule posed the greatest threat to larger banks, which historically hired employees from a global labor pool. According to the Associated Press, the 12 largest banks that received TARP capital sought visas for more than 21,800 workers from 2003 to 2008 (Barr 2009).

The February 2009 economic stimulus bill also rescinded a TARP provision that stipulated that banks had to raise private capital in order to pay back the government. This rule had made it very difficult for banks to return TARP money because, with government involvement in the banking sector, it had become exceedingly difficult for banks to raise private capital. The relaxation of this rule, however, created a new opportunity for banks to extricate themselves from the restrictions of TARP. Banks began to focus on exiting TARP, even while still relying on other emergency government

programs for financial support. One reason for this strategy was that TARP was the only government program with additional restrictions such as the limits on executive pay (Appelbaum 2009). Additionally, paying back the government was seen as a key way to demonstrate financial strength. By the end of 2009, 64 institutions had repaid the government in part or in full, including ten of the nation's largest banks in a coordinated and symbolic action on June 17, 2009.

1.2 TARP Research Topics

Given the scope and far reaching consequences of the recent financial crisis, the Troubled Asset Relief Program is likely to be an area of intense academic research for years to come. This section discusses the breadth of TARP subject areas for future scholarly work and puts into context how the empirical work in this dissertation fits into the nascent academic literature on this subject.

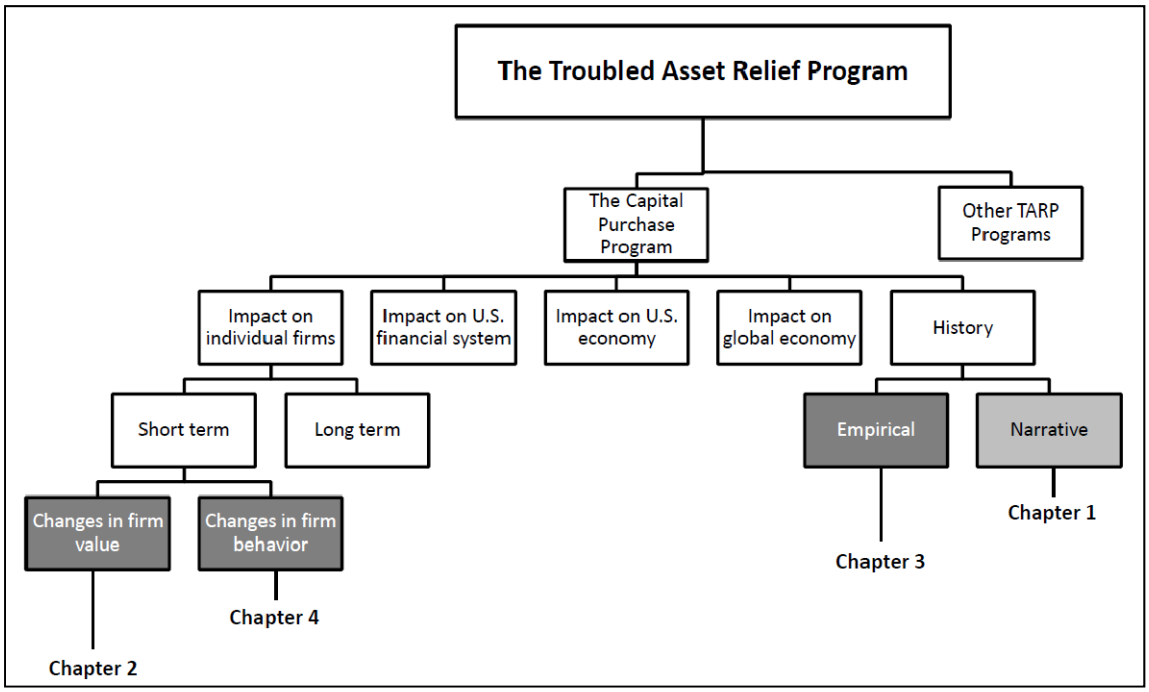
1.2.1 The universe of potential TARP subject areas

Figure 1.3 offers a simple depiction of potential areas for future research on TARP. This figure is not intended to be exhaustive of all avenues for future study and indeed is intentionally vague about subject areas that are not a principal focus of this dissertation. For example, my studies concentrate only on TARP's Capital Purchase Program, the effort to allocate capital to qualified financial institutions, so the branches of research for this initiative are much more fully defined in Figure 1.3 than other TARP programs. Other researchers, conversely, will surely take greater interest in other TARP

initiatives such as the Automotive Industry Financing Program or the Home Affordable Modification Program.

Within TARP's Capital Purchase Program (CPP), I list five main branches for potential research: the impact of the CPP on individual firms, the impact on the U.S. financial system, the impact on the U.S. economy, the impact on the global economy and a history of the CPP. The first four categories are different approaches to evaluating the effectiveness of the CPP—whether it helped individual banks or stabilized the U.S. economy, for example—whereas the final category, the history of CPP, is meant as a more retrospective look back on how the program functioned and what decisions were made.

Figure 1.3: Areas of TARP Research



1.2.2 Areas of TARP research examined in this dissertation

The branches of TARP research topics that are explored in greater detail in this dissertation are shaded in gray. Among the five main branches of CPP research, I focus exclusively on two topics: the impact of the CPP on individual firms and the program's history. As Figure 1.3 illustrates, the CPP's history can be described either empirically or in narrative form. The narrative approach, providing background information on the program's inception and changes in public perceptions of the CPP over time, has already been undertaken earlier in this chapter. In Figure 1.3, I shade this category a light gray to indicate that while I review the program's history, my narrative is in no way exhaustive, instead serving to give the reader a useful primer on the topic before analyzing the program more deeply in later chapters.

The other branch of the history of the CPP, the empirical approach, is conducted in Chapter 3 of this dissertation. While the Treasury Department provides a public updated list of CPP recipients, my analysis goes further by examining the *characteristics* of which firms received government capital. Thus, my contribution to the historical record on the CPP is to catalogue how the public money was spent. Chapter 3 answers important questions such as whether large institutions were more likely to receive capital than small banks, whether the government favored stronger or weaker banks for capital injections, and whether there are indications that influential government officials were able to steer capital to banks located in their political district. A working paper by Duchin and Sosyura (2010) is the closest to the work in chapter 3. In that chapter, I provide greater detail on Duchin and Sosyura's analysis and explain why my dissertation extends and improves upon their work in several important ways.

The other main branch of CPP research that I focus on in this dissertation is the program's short term impact on individual firms. I explore this question in two different ways. In chapter 2, I use an event study approach to examine how firm announcements of CPP funding impacted shareholder value. I then use the cumulative abnormal changes in firm value around the announcement date calculated from the event study in a multivariate regression to analyze the cross-sectional variation in returns. Veronesi & Zingales (2009) also examine changes in enterprise value due to TARP announcements, but there are important distinctions between my work and theirs. These differences are explained in greater detail in chapter 2.

I also examine, in chapter 4 of this dissertation, the short term impact of the CPP on individual firms through an analysis of changes in firm behavior upon accepting government support. I specifically examine whether the additional CPP capital affected firm behavior regarding lending, acknowledgement of losses, or CEO compensation. Chapter 4 both closely parallels and extends the work in chapter 3 of my dissertation. Like in chapter 3, the models in chapter 4 examine the same universe of commercial bank and bank holding companies that *could* have received TARP funding. By modifying existing models of bank lending, losses and CEO compensation from the economic literature to include a TARP indicator variable, I study whether the institutions that *actually* received TARP funding differed in any significant way from non-TARP recipients in lending practices, writedowns or CEO pay. If TARP capital is found to have increased lending and/or encouraged firms to be more transparent about losses (writedowns), then one could argue that the government aid was successful in furthering policymakers' aim of stabilizing financial institutions and minimizing the

macroeconomic impact of the financial crisis. Given the public anger over bonuses awarded to executives who had accepted government aid, CEO compensation appears to be another critical area where TARP recipient behavior may differ from banks that did not receive government support.

1.2.3 Areas of TARP research not explored in this dissertation

As acknowledged earlier, the potential TARP research opportunities are vast and there are a number of interesting areas that are not explored in this dissertation. It is instructive to outline these other branches of work both to draw a clear distinction between what is analyzed in this dissertation vs. what is left unexplored as well as to discuss prospects for future research.

Although I examine CPP's impact on individual banks, the CPP as of this writing is still relatively new (initiated in October 2008) so my focus is limited to just short term impacts. With the perspective of time, it will be fruitful to examine how TARP recipients performed compared to banks that did not receive funding. This research could explore questions such as whether, controlling for firm conditions, the incidence of failure was significantly higher or lower among TARP institutions.

Similarly, although my dissertation offers some history of the CPP program, an important gap is how the CPP compared to similar programs set up in other countries during the financial crisis. It would be interesting to understand whether the U.S. response to the crisis was similar to that of other foreign countries. It would also be worth investigating how the CPP's design compares to past efforts by foreign

governments to resolve previous financial crisis. How much, for example, did the U.S. program draw from the past experiences of other nations?

My dissertation does not examine the CPP's impact on the U.S. financial system but this is a subject with many potential areas for future research. Looking at just the short term, for example, one could examine how the CPP's injections of capital affected financial system risk premiums and how the public cost of the capital injections compares to the savings from reducing those risk premiums. The government's extraordinary intervention into the financial system also clearly demonstrated the lengths—and limits—to how far policymakers were willing to go to restore financial stability. For example, we now know that firms like Bear Stearns and Lehman Brothers were initially viewed as acceptable failures while AIG, Bank of America and Citigroup were too big to fail. Taking a long term view then, it would be worth examining whether those decisions by policymakers have increased moral hazard and/or the perception that the government will ultimately provide a backstop to the largest firms. For example, has the relative cost of funding decreased now for the largest banks because the market believes that the government is implicitly backing their debt issuance? Is the financial system more stable now not because of any careful rewriting of financial regulations but because the markets have a clearer idea of how far the U.S. government is willing to go to stabilize financial conditions? And if so, what future liability does that implied support place on the U.S. government in the next financial crisis?

The CPP's impact on the U.S. economy is also not explored in this dissertation, but the program clearly had several short run consequences for U.S. growth. By distributing capital into the financial system, the CPP altered the level of financial

intermediation with clear consequences for employment and output. It would be instructive to measure, for example, how many jobs were saved because the CPP provided a brake on the collapsing financial system. This area of research could also explore the fiscal consequences of this intervention. In the short run, the U.S. committed to deep fiscal deficits to stabilize macroeconomic activity. Taking a longer view, one could examine the ramifications for national debt. An important research question is whether U.S. debt levels will be lower or higher in the long run because of the swift but expensive policy response to the financial crisis. For example, would it have been better in a purely fiscal sense to have simply endured a much deeper recession (or depression) starting in 2008 instead of undertaking a massive financial intervention to stabilize economic conditions?

Finally, this dissertation does not focus on how the CPP affected the global economy. For example, how did the injection of U.S. government capital affect the competitive dynamics between U.S. and foreign banking institutions? Was, for example, the CPP more or less generous than programs in other countries, affecting the ability of American firms to take market share during the financial turmoil? This subject area also allows for further study into the potential linkages among financial markets. Did the announcement and administration of the CPP, for example, have a positive spillover impact on European and Asian markets? Was the CPP's effectiveness bolstered or hindered by the concurrent efforts of foreign supervisors to stabilize their own banking problems? Finally, the financial interventions in recent years have dramatically increased global sovereign debt loads. Taking a longer view, how has the increased indebtedness

of the developed world as a consequence of the financial crisis affected global economic activity?

As is clear, TARP offers many exciting opportunities for future research. However, because the extraordinary financial events of 2008 happened so recently, little has yet been published on this topic. In the chapters that follow, I thus take some of the first steps towards lifting the veil on this influential financial rescue program.

Chapter 2

The Market Reaction to Bank Announcements of TARP Approval

2.1 Introduction

Under the Capital Purchase Program (CPP), the Treasury Department spent nearly $205 billion to purchase senior preferred shares in 707 public and private financial institutions (The U.S. Department of the Treasury 2010). This chapter analyzes the market impact of those capital injections. Specifically, I employ the well established event study approach to examine the impact on public institutions' stock prices around the announcement date of TARP CPP approval.[6]

The predicted market reaction to a firm announcing it had qualified for government capital is not necessarily obvious. On the one hand, investors could have been dismayed by the potential for dilution of common shares and the increased role of the government in the operations of these institutions. Although firms issued senior preferred shares—not common stock— to the U.S. Treasury in exchange for TARP capital, there were two main reasons for common shareholders to be concerned about dilution. First, for firms to pay back the government money and leave the TARP program, they would need to raise private capital, most likely through a large common stock offering. Second, under the terms of TARP, Treasury was granted warrants to purchase shares of common stock with an aggregate market price equal to 15% of the

[6] Going forward in this dissertation, I will refer to these capital injections as coming from TARP when in fact it is more precise to say that the capital came from the *Capital Purchase Program* of TARP. I have elected to refer to the capital outlays as *TARP* funding because the cash is ultimately coming from TARP and because referring to these investments as TARP funding is the more common convention in the public domain.

TARP investment, increasing the prospect that the firm would need to issue additional common shares, to the detriment of existing shareholders (TARP Capital Purchase Program Summary of Senior Preferred Terms 2008).

Firms also had to pay a 5% dividend on the senior preferred shares issued to Treasury. This preferred dividend had to be paid before dividends could be declared on other company stock, including common shares. This hierarchy of payments meant that once a firm became a TARP recipient, a notable portion of its future earnings would have to be set aside to pay dividends to Treasury, leaving a smaller pool of profits available for dividend-seeking common shareholders. Finally, common shareholders in TARP-aided institutions had to accept increased government involvement. The TARP injections came with specific mandates concerning firm executive compensation. Although the government's stake did not include voting rights, Treasury was also permitted to appoint two directors if the firm missed six dividend payments (Landler and Dash 2008).

While these factors suggest an unfavorable market reaction, investors could also have reacted positively to a firm announcing that it would receive government assistance, especially if the market perception was that the firm was in danger of failure. For example, the adjusted stock price of Huntington Bancshares Inc., a large regional bank holding company headquartered in Columbus, OH, had fallen 62% from a peak on July 3, 2007 to its close on Friday, October 24, 2008. However, following the announcement on Monday, October 27, 2008 that it would be receiving TARP capital, Huntington's stock soared more than 35% over two trading days. Another important factor in the market reaction to TARP announcements is that the additional capital could give a competitive advantage to recipients. The infusion of additional capital, for example, could be

deployed to start new businesses or acquire weakened rivals. Finally, TARP approval could have been perceived by the financial markets as a government signal of the firm's overall financial health, setting it apart from other institutions in the banking sector.

This is the first known study to comprehensively analyze the market returns for a broad sample of TARP announcements. Duchin & Sosyura (2010) report their own estimates of stock market returns from TARP announcements, but they do not, as this chapter does, also examine returns for subsets of TARP recipients. Veronesi & Zingales (2009) examine changes in enterprise value due to TARP announcements, but only for the ten largest financial firms. Neither Duchin & Sosyura nor Veronesi & Zingales attempt to explain excess returns in a multivariate regression, as this study does.

Studying market reactions to TARP announcements is important for two reasons. First, it establishes an early measure of the government's return on investment. Through TARP, Treasury injected billions of dollars into the financial system. The aggregate change in market capitalization from these investments, as measured by the stock market return in the trading days around announcement dates, indicates the market's early assessment of the change in firm values due to the government intervention. Secondly, evaluating the determinants of excess returns—for example, the capital ratio of TARP recipients, the timing of the announcement, firm leverage, or the public perceptions of firm viability—provides useful insights into which capital injections were most useful in enhancing firm value and stabilizing the financial sector.

The remainder of this chapter is organized as follows. Section 2.2 provides an overview of the event study methodology. Section 2.3 examines the empirical results of

the event study analysis. Section 2.4 employs a multivariate approach to analyze the determinants of the market returns. Section 2.5 concludes.

2.2 The Event Study Approach

The event study approach has become the standard method used to evaluate a stock market reaction to an announcement by a public firm. The use of event studies stretches back decades, with "The Adjustment of Stock Prices to New Information" (Fama, et al. 1969) often considered the seminal work in this field.

2.2.1 The estimation period

Given its long history, the approach to event studies has now been well established. The first step is to estimate a market model for each firm in the event study over an estimation period that pre-dates the actual announcement event. The market model is of the general form:

$$Return_{it} = \alpha_i + \beta_i Return_{mt} + \varepsilon_{it} \quad (1)$$

In this equation, $Return_{it}$ represents the return for firm i at time t, α_i is a constant term for firm i, β_i is the market beta of firm i, $Return_{mt}$ represents the market return at time t, and ε_{it} is the residual for firm i at time t.[7]

[7] It should be acknowledged that this market model, despite its popularity in the literature, may be too simplistic for this analysis, lacking some important omitted variables. The average $\hat{\alpha}_i$ in my sample, however, is 0.0012, suggesting that the intercepts are indeed close to zero and thus giving some comfort that there are not important omitted variables.

In their review of event study methodology in Using SAS in Financial Research, Boehmer, Broussard, & Kallunki (2002) emphasize that returns generated during the estimation period should not be affected by the actual event in any way. Effectively, the estimation period establishes a baseline estimate of the co-movement of firm returns relative to market returns. This baseline is then compared to firm returns during the event period, thus establishing if the event generated significantly abnormal returns. Among banking event studies, the estimation period is generally 120 to 200 days (see, for example, James (1987); Lummer & McConnell (1989); Billett, Flannery & Garfinkel (1995); Slovin, Sushka, & Polonchek (1999); and Billett, Flannery & Garfinkel (2006)). The financial crisis had already begun to have a significant effect on market returns prior to the implementation of TARP. In estimating the market model, I thus chose a longer estimation window (200 trading days) to have a larger sample of returns (including a large number of daily returns prior to the onset of the crisis) and ideally sharpen the parameter estimates.

2.2.2 The event period

The second step of the event study is to examine the stock price performance in the trading days around the announcement date, also called the event period. Abnormal or excess returns are defined as actual returns less expected returns. That is,

$$Abnormal\ Return_{it} = Actual\ Return_{it} - E(Return_{it}) \qquad (2)$$

The expected return is the predicted return from the first stage market model. Thus, equation (2) can be modified as follows:

$$Abnormal\ Return_{it} = Actual\ Return_{it} - (\widehat{\alpha_i} + \widehat{\beta_i} Return_{mt}) \quad (3)$$

In equation (3), the parameter estimates $\widehat{\alpha_i}$ and $\widehat{\beta_i}$ are derived from the market model results from equation (1).

The market impact of an event may be realized over multiple trading days. This could occur, for example, if there was a public leak of information prior to the actual announcement, if insider trading occurred, or if the announcement occurred late in the trading day, causing the market reaction to unfold over multiple days. However, it is also desirable to minimize the size of the event window to avoid contaminating the analysis with other events (such as earnings announcements or other corporate news). Keeping in mind these two competing criteria, I will study three event windows, spanning from two to five days, around the TARP announcement date. In each case, the cumulative abnormal return is simply defined as the sum of the daily abnormal returns over the event window. For example, for the event window (-1, 1), which sums abnormal returns from the day before the announcement date through the day after the announcement date, the cumulative abnormal return is:

$$Cumulative\ Abnormal\ Return_i = \sum_{t=-1}^{1} Abnormal\ Return_{it} \quad (4)$$

The null hypothesis in an event study is that the event does not result in unexpected returns, or, more precisely, that average cumulative abnormal returns equal zero. A standard cross-sectional t-statistic to test the null hypothesis is not typically considered appropriate in this context because stocks with large return standard deviations can affect the test results. I thus use a test statistic first proposed by Patell (1976) and widely adopted by the event study literature (see, for example, Lee and Sharpe (2009)) that standardizes event period abnormal returns for each firm by the standard deviation of returns obtained from the estimation period market model.

2.3 Event Study Results

2.3.1 Dataset scope

I obtained daily share price returns for the firms in my survey as well as daily returns on the CRSP equal-weighted market index from the Center for Research in Security Prices (CRSP) database.[8] I used SNL Financial, a subscription database on the financial sector, to obtain the dates that public firms announced TARP approval. Dates were selectively confirmed by checking public filings or news reports to verify the quality of the SNL Financial information.

To qualify for my event study, a firm had to be a publicly traded financial institution connected to the banking industry that was both a TARP recipient and listed on a major stock exchange[9] over both the estimation and event periods of the study.

[8] For robustness, I also tested the CRSP value-weighted market index, another popular choice in the event study literature, in the estimation period model. The results were quantitatively similar to those reported below.

[9] CRSP only provides stock price data for firms listed on the NYSE, AMEX and NASDAQ stock markets.

These criteria thus excluded insurance firms that were TARP recipients[10], public TARP recipients that were listed on the Over-the-Counter Bulletin Board or Pink Sheets, and institutions that were approved for TARP but chose not to accept the government capital.[11] These filters result in a sample of 255 TARP participants.

Even if a firm is listed on a major exchange, it still could be very lightly traded. This is a potential problem in that it could cause distortions in the statistical tests I employ. Indeed, Campbell and Wasley (1993) find that in samples of NASDAQ stock market data where some stocks are thinly traded, the popular Patell test statistic employed in this chapter rejects the null hypothesis too frequently. Cowan and Sergeant (1996) similarly find that the Patell test is poorly specified when studying low volume stocks listed on NYSE and AMEX.

One solution to this problem is to simply eliminate all lightly traded stocks from my sample. This would preserve the reliability of the Patell test statistic. It would also serve to eliminate the potential noise in the sample, such as an appreciable change in the share price of a thinly traded firm simply because the bid/ask spread was very wide. The risk to this blunt approach, however, is that even thinly traded stocks may contain useful information about the overall market reaction to TARP announcements.

Balancing these concerns, I focused on share turnover[12] as a measure of stock illiquidity. Unfortunately there is no established definition of stock illiquidity using share turnover in the event study literature. The TARP announcement was an arguably very

[10] The reason that insurance companies are specifically excluded is that these firms' financial data are not directly comparable to the banks in my sample. The three insurance companies excluded from my sample that received TARP funding were AIG, Lincoln National Corp and Hartford Financial Services Group.
[11] SNL Financial, except in very limited cases, did not provide announcement dates for firms that were approved for TARP funding but did not actually accept the government capital.
[12] Share turnover is defined as share volume divided by shares outstanding.

significant event for many firms, especially given the heighted concerns about bank failures at the peak of the financial crisis. Thus, one would expect the news to result in significant trading volume. The average firm in my sample had 0.8% of its shares turn over on the TARP announcement date, including a turnover rate high of 12.5% of total shares outstanding for Morgan Stanley. To be sufficiently conservative, I elected to exclude firms that had less than 0.05% of its shares turn over on both the announcement date and the trading day following the announcement date. I believe that this minimum share turnover threshold properly separates legitimate market reaction to TARP announcements from the white noise of a thinly traded stock.[13] This liquidity filter eliminated 39 firms, including 5 firms that had no shares traded on either the announcement date or the day following the TARP announcement.

My final sample contains 216 institutions that announced TARP acceptance between October 14, 2008 and May 15, 2009. Descriptive statistics for my sample are presented in Table 2.1. By several measures, the public institutions that received TARP funding were a diverse group, from smaller banks to the largest financial institutions. The amount of TARP capital received, for example, ranges from $4 million (Carolina Trust Bank) to $45 billion (Citigroup Inc. and Bank of America Corporation). Similarly, firm size varies from total assets of $160.4 million to more than $2.25 trillion. The risk profile of institutions also differs notably. For example, the sample's Moody's Expected Default Frequency (EDF), which measures the probability that an institution will default within one year, ranges from a default probability of 0.01% to nearly 18%.

[13] This white noise could include, for example, a stock that had no trades on the announcement date. In this case, the 0% stock price return is more a reflection of stock illiquidity than investors assessing that news of TARP approval had no material impact on the firm's outlook.

Table 2.1: Event Study Descriptive Statistics

All financial variables are for the quarter prior to announcing Treasury approval to receive TARP funding. Moody's EDF measures the probability that the firm will default within one year. Data on 1-4 Family Loans/Total Loans was only available for 171 of 216 institutions. Data on Nonperforming Loans/Total Loans was only available for 206 of 216 institutions.

Variable	Mean	Min	Max	Standard Deviation
Total assets (Mil. $)	55,390.3	160.4	2,251,469.0	263,261.7
Market Capitalization (Mil. $)	5,007.3	7.2	174,048.4	20,996.1
Net Income/Total Assets (%)	-0.1%	-4.5%	1.1%	0.7%
Total Equity/Total Assets (%)	8.7%	2.7%	21.6%	2.4%
Price to Book Ratio (%)	113.93	13.88	360.47	61.43
Total Liabilities/Total Equity (%)	11.4%	3.6%	36.7%	4.0%
TARP Amount Received (Mil. $)	1,074.8	4.0	45,000.0	5,045.8
Moody's EDF (%)	1.2%	0.0%	17.8%	2.1%
1-4 Family Loans/Total Loans (%)	19.1%	0.0%	71.7%	14.9%
Nonperforming Loans/Total Loans (%)	1.8%	0.0%	11.6%	1.5%

2.3.2 Event study returns

Table 2.2 shows average cumulative abnormal returns following TARP announcements for the publicly traded financial institutions in my sample, calculated using the estimation period and event period methodology discussed previously and employing Patell's t-statistic to determine significance. I used three event windows. The first specification, (0, 1), measures the return on the announcement date and the trading day following the announcement, which would be important if the firm made its announcement after market hours. The second event window, (-1, 1), also includes the trading day prior to the TARP announcement to capture any news leak. Finally, my third event window (-2, 2) takes a broader five-day view surrounding the announcement to capture both information leaks and post-announcement reaction.

Table 2.2: Event Study Results

Cumulative abnormal returns for TARP announcements by publicly traded financial institutions. Two-day returns are calculated for the period (-1, 0), three-day returns are for the period (-1, 1) and five-day returns are for the period (-2, 2). Cumulative abnormal returns are calculated as the difference between realized returns and expected returns obtained from a least squares regression estimated over the estimation period -220 to -20, where day 0 is the date of the public TARP announcement. Patell's t-statistic, which standardizes event period abnormal returns for each firm by the standard deviation of returns obtained from the estimation period market model, are in parentheses. *, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively. The proportion of firms in the sample with a positive cumulative abnormal return is indicated in brackets and N is the sample size.

	Two-day returns (0, 1)	Three-day returns (-1,1)	Five-day returns (-2,2)
Full sample (N=216)	1.93% (4.88)*** [0.57]	1.31% (2.91)*** [0.54]	1.23% (1.73)* [0.50]
Large Banks: Gt $50 bn. in assets (N=23)	12.90% (14.44)*** [0.87]	12.61% (11.44)*** [0.87]	8.91% (6.48)*** [0.83]
Regional Banks: $1bn-$50 bn. in assets (N=143)	0.45% (-0.53) [0.51]	-0.29% (-1.40) [0.48]	0.24% (-0.86) [0.46]
Small Banks: Lt $1bn in assets (N=50)	1.13% (1.24) [0.62]	0.68% (0.66) [0.56]	0.55% (0.66) [0.48]
Price to book ratio<100% (N=103)	3.63% (5.03)*** [0.66]	2.31% (2.71)*** [0.55]	3.09% (2.51)** [0.56]
Price to book ratio>100% (N=113)	3.84% (1.94)* [0.50]	0.39% (1.44) [0.52]	-0.46% (0.01) [0.45]
TARP Announced in 4th Qtr 2008 (N=179)	2.45% (5.92)*** [0.57]	1.82% (3.87)*** [0.55]	1.82% (2.74)*** [0.53]
TARP Announced in 1st Qtr 2009 (N=34)	-0.94% (-1.51) [0.56]	-2.22% (-2.02)** [0.44]	-2.78% (-2.31)** [0.41]
TARP Announced in 2nd Qtr 2009 (N=3)	3.59% (0.71) [1.00]	10.66% (1.60) [0.67]	12.03% (1.35) [0.33]
Equity to assets: Gt 10% (N=62)	0.99% (-1.31) [0.53]	2.40% (2.88)*** [0.52]	1.75% (1.79)* [0.56]
Equity to assets: 8% to 10% (N=62)	2.23% (2.94)*** [0.60]	0.27% (0.04) [0.56]	-1.84% (-1.73)* [0.44]
Equity to assets: Lt 8% (N=92)	2.37% (3.98)*** [0.59]	1.27% (2.07)** [0.53]	2.96% (2.61)*** [0.51]
Banks only (N=182)	1.95% (4.60)*** [0.58]	1.11% (1.82)* [0.54]	0.95% (1.04) [0.51]
Thrifts, Broker/Dealers and Specialty Lenders (N=34)	1.86% (1.66)*** [0.56]	2.36% (3.14)*** [0.50]	2.74% (1.98)* [0.50]

Like Duchin & Sosyura (2010), I find that TARP announcements resulted in a significantly positive average cumulative abnormal return. My preferred event window specification is the three-day return window (-1, 1), which allows for both a pre-announcement market reaction and a reaction on the day following the announcement, the latter of which is important if the firm made its announcement after market hours. Under this specification, my full sample realized a non-trivial 1.31% average cumulative abnormal return, which is significant at the 1% level. This implies that investor concerns about share dilution or government interference were more than outweighed by the improved outlook for firm solvency and the recipient's capacity to deploy the additional capital to potentially gain future market share.

In Table 2.2, I also disaggregated the sample into three sub-groups based on firm size. The three-day abnormal returns for institutions with $50 billion or more in assets was a significant 12.6%. This contrasts with insignificant returns under all three event window specifications for regional banks ($1 billion to $50 billion in assets) and small banks (under $1 billion in assets). The especially high returns for the nation's largest TARP recipients is primarily due to the eight banks that the Treasury Department announced on October 14, 2008 would be the first institutions to receive TARP funding.[14] This announcement, which delegated $115 billion to these eight firms and was seen as a sign of commitment by policymakers to stabilize the financial industry, effectively signaled that these firms were too big to fail. Collectively, these eight institutions averaged a 14.9% cumulative abnormal return using my preferred three-day

[14] The eight institutions were Bank of America Corporation, Bank of New York Mellon Corporation, Citigroup Inc., The Goldman Sachs Group, Inc., JPMorgan Chase & Co., Morgan Stanley, Wells Fargo & Company, and State Street Corporation. Merrill Lynch was also initially included in this group, but is not included in my analysis because the institution was subsequently acquired by Bank of America and never actually received TARP funding directly.

event window, led by an 83% excess return at Morgan Stanley, at the time the most troubled institution in the group.[15]

I also divided the sample into firms with a price-to-book ratio above and below 100%. This ratio compares a firm's market value with its book value. When a firm has a price-to-book ratio below 100%, it indicates that the market believes that the firm is worth *less* than its publicly declared value, calculated as booked assets less booked liabilities. This might be the case if the value of the firm's assets is in question, a common concern during the financial crisis with institutions saddled with deteriorating investment and loan portfolios. Indeed, 103 of the 216 firms in my sample had a price-to-book ratio of less than 100% in the quarter prior to their TARP announcement. As shown in Table 2.2, firms with a price-to-book ratio of less than 100% realized a significant 2.3% cumulative abnormal return when announcing TARP acceptance, compared to an insignificant 0.39% excess return for firms with a healthy price-to-book ratio above 100%. This finding suggests that firms that were perceived to have asset quality problems realized much greater gains than firms that were perceived to be sound, an indication that investors saw it as especially critical when a weaker firm announced it was going to receive government support.

On February 13, 2009, both houses of Congress approved new executive pay restrictions for TARP recipients. By dividing my sample by the quarter of the TARP announcement, I can test whether Congress's actions had an impact on stock price performance. Investors, for example, may have been concerned that the new restrictions would make it difficult for firms to retain top talent and put TARP recipients at a

[15] Morgan Stanley's stock price also benefited from news on October 13, 2008 that it had completed a critical deal with Mitsubishi UFJ Financial Group Inc., with Mitsubishi investing $9 billion in Morgan Stanley in return for a 21% stake in the company (Story and Sorkin 2008).

competitive disadvantage relative to institutions that didn't accept government aid. As Table 2.2 shows, firms with a TARP announcement in the fourth quarter of 2008—prior to Congressional action—recorded a significant 1.8% excess return. The 34 firms that announced TARP acceptance in the first quarter of 2009 as Congress was debating and passing the executive pay rules, conversely, experienced an average *negative* 2.2% excess return, significant at the 5% level in my preferred (-1, 1) event window specification. This result indicates that the additional restrictions on executive pay may have caused investors to discount the future earnings prospects of these TARP recipients. Of course, the negative stock price reaction for first quarter TARP announcements could also be due to other factors, such as an improved outlook for the financial sector, negating the need for TARP capital. With the stock market bottoming in March 2009, however, the argument that investors were any less fearful about the survivability of individual institutions is less persuasive.

I also divided my sample into sub-groups based on the firm's level of capital, measured as total equity to total assets. Like Duchin & Sosyura (2010), I find that a firm's capital position did not markedly influence market returns. Duchin & Sosyura find that even well-capitalized firms, as defined by regulators, realized positive returns. Similarly, I find that firms with an equity to asset ratio in excess of 10% had a significant 2.4% cumulative abnormal return, which is similar to the significant 1.3% excess return for firms in my lowest capitalized group, institutions with an equity to asset ratio under 8%. Duchin & Sosyura suggest that TARP capital was relatively cheap, especially since the private capital market was shuttered at the time. By this argument, investors may have

simply rewarded firms for seeking out a cheap source of financing, even if these institutions were already well capitalized.

Finally, I divided my sample using SNL Financial industry definitions into 1) banks and 2) non-banks. The non-banks category includes thrifts such as Flagstar Bancorp, broker/dealers Morgan Stanley and Goldman Sachs, and specialty lenders Discover Financial Services and American Express. This segmentation tests whether non-banks enjoyed a greater excess return from a TARP announcement because these firms, with greater concentration risk, were seen as more vulnerable during the financial crisis. Indeed, Table 2.2 shows that non-banks enjoyed a strongly significant 2.4% cumulative abnormal return compared to a weakly significant 1.1% excess return for banks.

2.3.3 Cross-firm variation in returns

While the event study results show that on average publicly traded TARP recipients realized positive and significant returns upon announcing that they would receive government aid, this obscures the significant variation across the sample. Using the approach of Veronesi & Zingales (2009), I calculate the firm-specific change in market value from a TARP announcement as the product of the market capitalization of the firm prior to the event window and the cumulative abnormal return for that firm in my preferred (-1, 1) event window. By using cumulative abnormal returns, the result of this calculation is the change in market capitalization excluding any changes that are due simply to market-wide movements.

Employing this approach, Table 2.3 lists the firms in my sample with the largest increases and decreases in market value as a result of their TARP announcements. Like Veronesi & Zingales, I find that JP Morgan incurred by far the biggest decline in market value (a loss of $26 billion). At the time of the crisis, JP Morgan was seen as perhaps the strongest large bank, so the decline in shareholder value may reflect market disappointment that the firm was included in the Treasury's initial capital infusion plan. The government's announcement on October 14, 2008 that it would inject capital into the largest banks also effectively reduced JP Morgan's competitive advantage relative to its rivals.

The list of firms with the largest gains in shareholder value due to TARP announcements includes a number of institutions that at the early stage of the crisis were in perilous condition, reflecting investor relief that these firms would be stabilized by government funds. The two largest gainers—Morgan Stanley and Goldman Sachs—were investment banks that had decided several weeks earlier to convert to bank holding companies. The decision to convert to bank holding companies exemplifies the stress that these two firms were under as they effectively decided that access to all Federal Reserve lending facilities was more than worth the cost of greater regulation as bank holding companies (Sorkin and Bajaj, Shift for Goldman and Morgan Marks the End of an Era 2008). The other three firms to see the largest gains in market capitalization—Wells Fargo, Citigroup and Bank of America—had either recently acquired large failed institutions (Wells Fargo purchased Wachovia Corporation, Bank of America acquired Countrywide Financial) or were burdened by troubled balance sheets (Citigroup and

Bank of America, both of which would subsequently require additional government bailouts).

Table 2.3: Abnormal Dollar Gains/Declines in Market Value from TARP Announcements

The dollar market value gain or decline from TARP announcements is the product of the market capitalization of each firm prior to the (-1, 1) event window and the cumulative abnormal return for that firm in the (-1, 1) event window.

Institutions with the Largest Abnormal Gains in Market Value

Institution	Abnormal Change in Market Value ($)	Tarp Announcement Date
Morgan Stanley	$8,949,253,772	October 14, 2008
Goldman Sachs Group, Inc.	$7,332,208,793	October 14, 2008
Wells Fargo & Company	$6,996,462,318	October 14, 2008
Citigroup Inc.	$5,672,166,417	October 14, 2008
Bank of America Corporation	$4,716,347,661	October 14, 2008
PNC Financial Services Group, Inc.	$3,768,772,145	October 24, 2008
BB&T Corporation	$3,526,015,989	October 27, 2008
Capital One Financial Corporation	$2,442,389,249	October 27, 2008
Bank of New York Mellon Corporation	$1,875,604,252	October 14, 2008
SunTrust Banks, Inc.	$1,846,084,946	October 27, 2008

Institutions with the Largest Abnormal Declines in Market Value

Institution	Abnormal Change in Market Value ($)	Tarp Announcement Date
JPMorgan Chase & Co.	-$26,033,130,021	October 14, 2008
American Express Company	-$1,252,249,244	December 23, 2008
Discover Financial Services	-$365,662,696	January 14, 2009
TCF Financial Corporation	-$218,648,864	November 3, 2008
F.N.B. Corporation	-$190,421,533	January 13, 2009
PrivateBancorp, Inc.	-$178,076,162	January 26, 2009
U.S. Bancorp	-$172,258,180	November 3, 2008
Fulton Financial Corporation	-$160,122,866	December 10, 2008
FirstMerit Corporation	-$134,206,353	November 4, 2008
National Penn Bancshares, Inc.	-$106,084,791	November 26, 2008

Table 2.3 expresses the change in market value in dollar terms, which inevitably means that it is dominated by large institutions, where even a small change in share price can mean a large dollar swing in firm valuation. Table 2.4 lists the firms in my sample

with the largest *percentage* cumulative abnormal gains or declines as a result of their TARP announcements. Like Table 2.3, I use my preferred event window (-1, 1) to measure returns.

Table 2.4: Abnormal Percentage Gains/Declines in Market Value from TARP Announcements

Cumulative abnormal returns are calculated as the difference between realized returns and expected returns obtained from a least squares regression estimated over the estimation period -220 to -20, where day 0 is the date of the public TARP announcement. Returns are based on the three-day event window (-1, 1).

Institutions with the Largest Cumulative Abnormal Gains

Institution	% Abnormal Change in Market Value ($)	Tarp Announcement Date
Morgan Stanley	83.4%	October 14, 2008
Flagstar Bancorp, Inc.	39.1%	December 31, 2008
Huntington Bancshares Incorporated	34.6%	October 27, 2008
First Capital Bancorp, Inc.	32.3%	April 6, 2009
Citizens Republic Bancorp, Inc.	32.1%	November 14, 2008
1st Constitution Bancorp	31.3%	December 23, 2008
Northern States Financial Corporation	28.1%	February 23, 2009
South Financial Group, Inc.	27.2%	November 14, 2008
Central Bancorp, Inc.	25.0%	December 5, 2008
UCBH Holdings, Inc.	24.4%	October 27, 2008

Institutions with the Largest Cumulative Abnormal Declines

Institution	% Abnormal Change in Market Value ($)	Tarp Announcement Date
First Federal Bancshares of Arkansas	-33.5%	March 6, 2009
Wilshire Bancorp	-26.9%	November 20, 2008
First Defiance Financial Corp.	-26.8%	November 24, 2008
PrivateBancorp, Inc.	-26.7%	January 26, 2009
First Community Bancshares, Inc.	-24.1%	October 30, 2008
Broadway Financial Corporation	-24.0%	November 14, 2008
Central Pacific Financial Corp.	-19.7%	December 9, 2008
Integra Bank Corporation	-18.9%	February 19, 2009
C&F Financial Corporation	-18.3%	December 12, 2008
F.N.B. Corporation	-17.6%	January 13, 2009

Even in percentage terms, Morgan Stanley is once again the top performer in the sample. It is also noteworthy that all but one of the institutions to experience the largest

cumulative abnormal gains made its TARP announcement in 2008. Conversely, four of the biggest decliners made their TARP announcements in the first quarter of 2009. This compliments the earlier finding that the market was especially favorable to firms announcing TARP acceptance in 2008, but returns turned negative in the first quarter of 2009, as Congress was debating and approving new executive pay restrictions for TARP recipients.

2.4 Multivariate Results

2.4.1 Model specification

The event study results suggest that firm size, the price-to-book ratio, the type of financial institution, and the announcement date could all help explain firm excess returns from TARP announcements. In order to explore these factors further and better assess their relative role in equity returns, I estimated a cross-sectional regression for the full sample of 216 public TARP firms in which the dependent variable is the cumulative abnormal return from my preferred event window (-1, 1). Because cross-sectional stock returns exhibit heteroskedasticity, I employ the common convention (see, for example, Slovin et al. (1999)) of dividing both the dependent and independent variables in the regression by the standard deviation of the estimation period residuals.

The variables chosen for the cross-sectional regression can be generalized into three broad categories: external factors (*External*), firm-determined factors (*Firm*), and time dummies (*Time*). Thus, the basic model is:

$$Excess\ Return_i = \beta_0 + \sum_{j=1}^{m} \beta_j\,(External_i) + \sum_{k=m+1}^{n} \beta_k\,(Firm_i) + \sum_{l=n+1}^{q} \beta_l\,(Time_i) + \varepsilon_i \qquad (5)$$

where *Excess Return* is the cumulative abnormal return over the three-day event window for firm *i*, *External, Firm,* and *Time* represent vectors of related explanatory variables, and ε_i is the disturbance term. The full list of variables to be considered is listed in Table 2.5 and will be described in greater detail in the next subsection.

Table 2.5: Full List of Model Variables for Event Study Multivariate Analysis

External Factors:	Firm-Determined Factors:	Time Dummies:
Stock Run-up	Total Assets	Oct '08 Dummy
Price/Book	Equity/Total Assets	Nov '08 Dummy
TARP/Total Assets	Leverage Ratio	Dec '08 Dummy
Bad Veribanc Score	Net Income/Total Assets	Feb '09 Dummy
or	Bank Dummy	Mar '09 Dummy
Bad Moody's Score		Apr '09 Dummy
		May '09 Dummy

2.4.2 Variable selection

Since this is a study of the market reaction to TARP announcements, the variables selected should represent the breadth of information publicly known to investors at the time of the news event. Consequently, I intentionally do not include private information about the firm's condition known only to regulators. Furthermore, all time series variables are for the quarter prior to the TARP announcement for each firm since this is the last data point that would have been known to investors at the time of the announcement.

The external variables in my model—those factors that are outside the firm's control—are *PRICE_TO_BOOK, STOCK_RUNUP, TARP_TO_TOTAL_ASSETS, BAD_VERIBANC_SCORE* and *BAD_MOODYS_EDF*. I include *PRICE_TO_BOOK*

because the event study results indicated that firms with a price to book ratio below 100%, indicating that the firm's market value was less than its book value, saw a greater excess return than firms with a high price to book. *STOCK_RUNUP* is the cumulative abnormal return on the firm's stock in the 15 trading days prior to the event window.[16] Like the event window returns, *STOCK_RUNUP* was calculated using the coefficients derived from the estimation period market model. A variable like *STOCK_RUNUP* representing prior excess returns has been used by others in this field[17] to control for information leaks or the fact that firms may time their announcements to closely follow other significant news. *TARP_TO_TOTAL_ASSETS* represents the total capital received from the government, normalized by the firm's total assets.[18] This variable controls for the fact that firms that announced a proportionately higher investment of government capital could have seen a greater stock price reaction.

There are several bank rating services that use publicly available information to rank the overall riskiness of financial institutions. This information could play a role in informing investors about the relative performance of a given institution. Veribanc's estimated CAMELS score is a prediction of the current regulatory rating for an institution, taking into account capital, asset quality, management, earnings, liquidity, and sensitivity to market risk. The composite CAMELS rating of an institution ranges from 1 (best) to 5 (worst). *BAD_VERIBANC_SCORE* is a dummy variable equaling one if Veribanc estimates that the CAMELS rating of the institution is 3 or greater and zero

[16] Specifically, *STOCK_RUNUP* is the cumulative abnormal return over the event window (-17, -3).
[17] See, for example, Billett, Flannery and Garfinkel's 1995 study of the influence of lender identity on loan announcements.
[18] I also explored TARP/Risk Weighted Assets since firms could apply for a capital infusion of between 1% and 3% of risk-weighted assets. However, since information on risk-weighted assets was not available for all firms and the majority of the firms in my sample where data was available received capital equal to 3% of risk-weight assets, I elected to use *TARP_TO_TOTAL_ASSETS* as my preferred specification.

otherwise.[19] I use Moody's Expected Default Frequency as an alternative measure of a bank rating that uses publicly available information. *BAD_MOODYS_EDF* is a dummy variable equaling one if Moody's Expected Default Frequency measure for the quarter end before the TARP announcement indicated that the probability of a default over the following year exceeded 1%.[20]

My firm-determined variables—those financial factors that the firm is able to control— are *TOTAL_ASSETS, EQUITY_TO_TOTAL_ASSETS, LEVERAGE_RATIO, NET_INCOME_TO_TOTAL_ASSETS,* and *BANK_DUMMY*.[21] *TOTAL_ASSETS* is the log of the firm's total assets to proxy for firm size.[22] *EQUITY_TO_TOTAL_ASSETS* measures the capital adequacy of the firm prior to its announcement that it would get a TARP capital infusion.[23] *LEVERAGE_RATIO* is calculated as the firm's total liabilities divided by total equity, indicating the leverage of the firm at the time of the financial crisis. *NET_INCOME_TO_TOTAL_ASSETS* measures the firm's profitability in the quarter prior to its TARP announcement. Finally, *BANK_DUMMY* indicates whether the firm is a bank (*BANK_DUMMY*=1) or some other financial institution such as a thrift, broker/dealer or specialty lender (*BANK_DUMMY*=0). This final variable is meant to further explore the event study finding that non-banks enjoyed greater excess returns following TARP announcements.

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[19] Of the 185 institutions in my sample where Veribanc data was available, 58 firms had an estimated CAMELS rating of 3 or greater, constituting 31% of the sample.
[20] There were 68 institutions in my sample with a Moody's EDF greater than 1% prior to their TARP announcement, representing 31% of the total sample.
[21] I also explored using a measure of a firm's loan concentration in single-family mortgages since the mortgage market was a key cause of the financial crisis. I also tested the firm's proportion of nonperforming loans since investors could have been sensitive to firms with asset quality problems. Neither of these variables, however, proved to be significant.
[22] I also tested the log of a firm's market capitalization as a proxy for firm size. The results were quantitatively similar.
[23] I also tested the Tier 1 risk-based capital ratio and the Tangible Common Equity/Tangible Assets ratio, two other popular measures of capital adequacy. The results were quantitatively similar.

My event study results had indicated that firms that had a TARP announcement in the fourth quarter of 2008 had a positive and significant average cumulative abnormal return, while firms that made their TARP announcements in the first quarter of 2009 endured negative and significant excess returns. To explore this issue of announcement timing in more detail, I created monthly time dummies that correspond to the month of each firm's TARP announcement. My sample contains TARP announcements from October 2008 through May 2009 so I established eight time dummies representing each month in this time horizon.

2.4.3 Model results

The results of the cross-sectional regressions are reported in Table 2.6. Model 1 and 2 employ only the external factors as explanatory variables, with Model 1 including the *BAD_VERIBANC_SCORE* dummy variable to represent a publicly-determined overall firm risk rating while Model 2 uses the *BAD_MOODYS_EDF* dummy variable to fulfill the same role. *STOCK_RUNUP* is positive and significant at the 1% level in both models, indicating that firms that recently enjoyed a positive increase in their stock price were more likely to see further gains with their TARP announcement. This suggests that either investors were adept at anticipating the firms most likely to benefit from receiving TARP capital or that there were leaks about TARP approval prior to the formal announcement. *TARP_TO_TOTAL_ASSETS* is significant in Model 1 but not Model 2. The positive sign in both models indicates that firms that received relatively more government capital saw greater excess returns. Finally, neither the *BAD_VERIBANC_SCORE* dummy nor the *BAD_MOODYS_EDF* dummy is significant,

suggesting that the information conveyed by these public bank ratings did not materially affect the market reaction to TARP announcements.

Model 3, which includes only the firm-determined explanatory variables, explores the impact of a firm's characteristics on its equity returns. The two significant variables in Model 3 are *TOTAL_ASSETS* and *BANK_DUMMY*, with both variables significant at the 5% level. The positive coefficient on *TOTAL_ASSETS* indicates that large banks realized greater excess returns, complimenting the finding from the event study that firms with more than $50 billion in assets saw a much larger cumulative abnormal return. Similarly, the negative sign on *BANK_DUMMY* confirms the event study result that non-banks such as thrifts, broker/dealers, and specialty lenders enjoyed higher excess returns than banks.

The timing of TARP announcements is explored in Model 4, which includes only the monthly time dummies. What is most striking about the Model 4 results is that the adjusted R^2 (0.155) is higher than in any of the three previous models (Model 1's 0.077 adjusted R^2 is the highest among this group). This suggests the importance of the date of the TARP announcement on realized excess returns. As in the event study, firms announcing TARP acceptance in the fourth quarter of 2008 saw the best excess returns. The *OCTOBER_2008* dummy in particular is positive and significant at the 1% level. Conversely, firms with announcement dates in the first quarter of 2009 had notably worse equity price performance. Indeed, the coefficient estimate on the *MARCH_2009* dummy is negative and significant at the 5% level, indicating a decline in shareholder value upon announcing TARP acceptance.

Table 2.6: Event Study Multivariate Results

Cross-sectional regression results where the dependent variable is the cumulative abnormal return from the three day (-1, 1) event study for the full sample of public TARP recipients. To address heteroskedasticity, the regression's dependent and independent variables are divided by the standard deviation of the estimation period residuals. T-statistics are in brackets and *, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Stock_Runup	0.098 ***	0.163 ***			0.052
	[3.12]	[4.37]			[1.04]
Price_To_Book	0.000 *	0.000			0.000
	[-1.67]	[0.12]			[-1.06]
TARP_to_Total_Assets	2.473 ***	0.730			0.527
	[2.59]	[0.63]			[0.40]
Bad_Veribanc_Score	0.025				
	[1.46]				
Bad_Moodys_EDF		0.025			0.012
		[0.96]			[0.46]
Total_Assets			0.009 **		-0.003
			[2.46]		[-0.55]
Equity_to_Total_Assets			-0.006		0.001
			[-1.33]		[0.12]
Leverage_Ratio			-0.001		0.005 *
			[-0.10]		[1.74]
Net_Income_to_Total_Assets			-2.023		-0.898
			[-1.16]		[-0.53]
Bank_Dummy			-0.050 **		-0.039 *
			[-2.34]		[-1.81]
October_2008				0.104 ***	0.120 ***
				[4.71]	[3.29]
November_2008				-0.009	0.025
				[-0.38]	[0.87]
December_2008				-0.016	0.011
				[-0.7]	[0.39]
February_2009				0.015	0.061
				[0.28]	[1.09]
March_2009				-0.228 **	-0.250 **
				[-2.06]	[-2.28]
April_2009				0.117	0.135
				[0.9]	[1.06]
May_2009				-0.018	0.011
				[-0.09]	[0.05]
Intercept	-1.008 *	-0.444	-0.941	0.064	-0.263
	[-1.82]	[-0.63]	[-1.19]	[0.12]	[-0.29]
Adjusted_R2	0.077	0.068	0.073	0.155	0.184
F	4.86 ***	4.94 ***	4.37 ***	6.63 ***	4.04 ***
Number_of_obs.	185	216	216	216	216

Model 5 incorporates the external factors, firm-determined characteristics, and time dummies into a single model. Of the five models tested, I consider Model 5 to be the preferred specification for two reasons. First, the adjusted R^2 is highest for Model 5, indicating the best goodness of fit. Noting that Model 2, Model 3 and Model 4 are restricted versions of Model 5, I also conducted partial F-tests of Model 5 to evaluate whether any of the more parsimonious models were superior. In each case, I rejected the null that the additional variables in Model 5 were insignificant, providing additional evidence that Model 5 is the best specification.

Evaluating Model 5, the most striking result is that the pattern in the time dummies is preserved from Model 4, even after controlling for external and firm-determined characteristics. Specifically, in Model 5 the *OCTOBER_2008* dummy is positive and significant at the 1% level while the *MARCH_2009* dummy is negative and significant at the 5% level. In this model (as in Model 4), the *JANUARY_2009* dummy is the omitted variable among the time dummies. These results indicate that TARP announcements had the greatest benefit to shareholder value at the start of the TARP program (October 2008) and that the market reaction grew increasingly hostile over time, with the most significantly negative returns to TARP announcements in March 2009. This pattern strongly reinforces the notion that the rescue program was at first perceived as a savior to financial institutions, but its reputation was harmed over time by concerns about government interference and dilution of shareholders. It may not be a coincidence that the firms enduring negative excess returns in March 2009 were some of the first to test investor reaction after the additional executive pay restrictions for TARP recipients had been signed into law the previous month.

The other two significant variables in Model 5—*LEVERAGE_RATIO* and *BANK_DUMMY*—both reflect investor concerns about firm vulnerabilities. The positive and significant sign on *LEVERAGE_RATIO* indicates that firms with greater leverage were more likely to see higher excess returns, as investors expressed relief that these overexposed firms were less likely to be casualties of the financial crisis. Similarly (and like the result in Model 3), the negative sign on *BANK_DUMMY* suggests that investors were especially pleased when the less diversified specialty banks, broker/dealers, and thrifts qualified for government capital.

2.5 Conclusions

This event study has shown that TARP announcements had an overall positive effect on the market value of publicly traded financial institutions. To use my preferred event window, the average firm in my sample enjoyed a 1.31% abnormal return on its stock price in the trading days surrounding this news event.

Segmenting the sample into various subgroups, I find that the greatest excess returns were realized by large institutions, firms with a low price-to-book ratio, institutions that made their TARP announcement in the fourth quarter of 2008 and non-banks. This univariate analysis of the data, however, does not explain which of these factors was the most meaningful in generating excess stock price returns. In a cross-sectional regression of cumulative abnormal returns that controls for these and other factors, I find that highly leveraged firms and nonbanks in particular enjoyed significantly higher returns. These results suggest that investors felt that leveraged

institutions and those firms with a less diversified business model such as broker/dealers, thrifts, and specialty lenders were especially vulnerable during the financial crisis.

Perhaps the most striking finding from the multivariate analysis, however, is that the timing of the TARP announcement was especially important. Firms that announced that they had qualified for government capital at the start of the financial crisis in October 2008 enjoyed especially strong excess returns. Conversely, those institutions that did not make a TARP announcement until the first quarter of 2009 saw much weaker returns and in some instances a loss of shareholder value. This suggests that legislative action in February 2009 to increase restrictions on executive compensation at TARP-aided firms may have played an important role in dulling market enthusiasm for a firm qualifying for TARP capital.

In terms of policy implications, one conclusion of this analysis is that in times of acute financial stress, the market appears to be receptive to direct government intervention in the financial system. That was arguably not obvious at the start of the Troubled Asset Relief Program, with warnings from some that investors would have an adverse reaction to government injections of capital into specific institutions. Instead, the event study results suggest that on average firms saw an immediate benefit, at least in terms of increased shareholder value, from participating in TARP.

There are two important caveats to this conclusion, however. The first is that while firm value improved as a result of being a TARP recipient, it is still not clear that the approach by policymakers was optimal. The initial government outlay in this policy intervention—an aggregate $232 billion in the case of my sample—was sizable and it

remains unknown whether this large amount of capital could have been better deployed elsewhere. That will probably become an important research question for years to come.

The second important point is that my results suggest that market support for this government intervention was quite sensitive to the terms of the policy action. Both the univariate and multivariate results suggest that share price returns to TARP announcements were weaker in spring 2009, around the time when Congress approved additional executive compensation restrictions. It is possible that investors felt that these new rules posed an additional cost on TARP recipients and discounted share prices accordingly.

Chapter 3

Analyzing Participation in the Troubled Asset Relief Program

3.1 Introduction

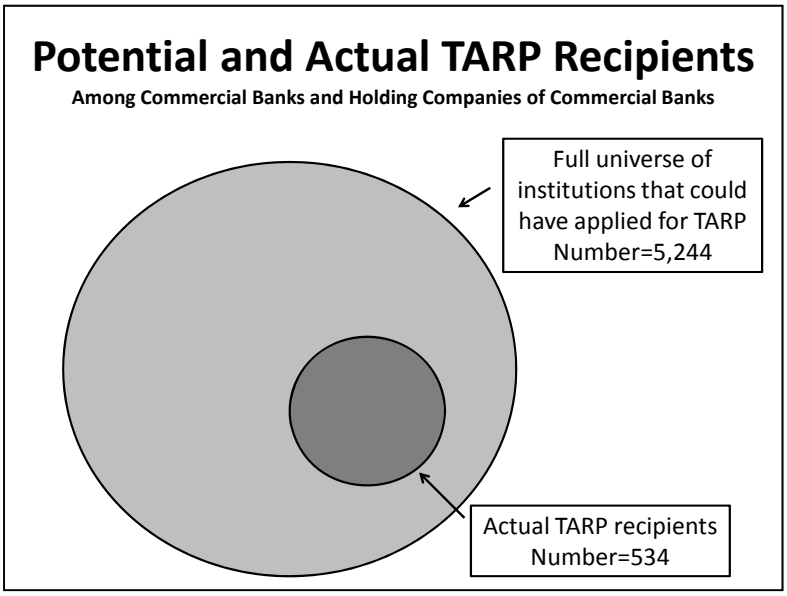
On October 14, 2008, the U.S. Treasury Department announced its Capital Purchase Program (CPP), financed under the Emergency Economic Stabilization Act's Troubled Asset Relief Program (TARP). By December 2009, when the final investment was made under the Capital Purchase Program, the Treasury had spent nearly $205 billion to purchase senior preferred shares in 707 public and private financial institutions (The U.S. Department of the Treasury 2010).[24] This chapter analyzes the key factors that resulted in U.S. institutions receiving capital from TARP's Capital Purchase Program.

The motivation behind modeling capital infusions from TARP is to better characterize the key factors that influenced how the money was distributed. The Obama administration stressed that transparency was important in fostering trust in a $700 billion rescue program for the financial industry that was funded with taxpayer money (Barstow and McIntire 2009). As a key facet of that transparency, the Treasury Department created a website listing recipients of TARP money. While the Treasury website provides a simple list of which banks received money, my model focuses on the broader question of *how* the public money was allocated.

[24] These figures are only for the Capital Purchase Program. By the end of 2009, the Troubled Asset Relief Program had spent an additional $274.9 billion to provide further support to Citigroup and Bank of America ($45 billion), stabilize AIG ($70 billion), revive the consumer securitization market ($20 billion), assist the automotive industry ($82.5 billion), finance the purchase of toxic assets from bank balance sheets ($30 billion), and subsidize mortgage loan modifications ($27.4 billion) (The U.S. Department of the Treasury 2010).

Data on which institutions applied for TARP funding is not publicly available. However, using the TARP guidelines for which institutions were eligible to apply, it is possible to construct the universe of potential TARP applicants. Furthermore, the Treasury Department data provides details on which institutions ultimately received TARP funding. My sample, to be described in greater detail below, consists of 5,244 institutions that were eligible for TARP funding, with 534 of those institutions actually receiving government assistance in my sample period. Figure 3.1 provides an illustration of my full sample, with TARP recipients a subsample of that universe. Comparing the universe of all eligible institutions with those that actually received TARP funding, I can effectively examine what unique characteristics defined the institutions that ultimately received government funding.

Figure 3.1: Potential and Actual TARP Recipients



Note: Treasury's count of TARP recipients will be higher than this chart because my dataset filters out certain recipients such as the nine largest U.S. institutions that were asked to receive TARP capital as well as thrifts, thrift holding companies, S corporations and mutual banks.

There are some important questions that can be explored with my proposed modeling approach. For example, if the key of TARP was to stabilize the banking sector, how did this affect the distribution of capital? Specifically, under the belief that larger banks are more systematically important, were larger institutions more likely to receive capital than smaller banks? Similarly, the program was designed to specifically help healthy banks (Congressional Oversight Panel 2009). Does the distribution of capital indicate that indeed the government targeted funding to stronger institutions while avoiding weaker banks? Was capital directed to merger candidates to facilitate the acquisition of a troubled institution by a stronger competitor? Was there consistency across the regulatory agencies in the TARP approval process or was one regulator more generous than others with taxpayer money? Were banks heavily exposed to housing (either because of their geographic footprint, loan concentration or even exposure to the government sponsored entities Fannie Mae and Freddie Mac) more likely to receive government capital? Was there political interference in TARP allocations, with more capital allocated to banks in states with influential government officials?

In the public sphere, the Special Inspector General of the Troubled Asset Relief Program (SIGTARP) was established by the Emergency Economic Stabilization Act with a mandate to audit the administration of TARP. Among the nascent academic literature on TARP, a study by Duchin and Sosyura (2010) is the closest to the work in this chapter. Duchin and Sosyura investigate the key determinants of TARP capital allocation from the program's inception in October 2008 through late September 2009, finding that political connections played a key role in which institutions received TARP funding (Duchin and Sosyura February 2010). This finding of political influence received

widespread attention in the press in December 2009 (for example, *The Wall Street Journal* and *The New York Times*).

My paper extends Duchin and Sosyura's work in several important ways. First of all, this is the first known study that uses confidential examination data—for example, the actual regulatory bank ratings that were used in the application process— to analyze the TARP capital allocation process. In contrast, Duchin and Sosyura used several financial variables to approximate for the potential regulatory ratings of each institution.

Second, my analysis includes a number of key variables not found in the Duchin and Sosyura analysis which have been disclosed as being influential to regulators when assessing potential TARP candidates. These factors include the possible adverse effect of write-downs on government-sponsored entities, pending mergers, regional factors regarding loan concentrations, and three financial variables that regulators specifically used to gauge firm performance. Duchin and Sosyura's comprehensive analysis of political connectedness—in banks' lobbying efforts, ties to the Federal Reserve, connections to politicians on influential finance committees, and political contributions—is admittedly not duplicated here. However, when I control for the myriad factors specifically relied on by regulators, as well as bank-specific macroeconomic information not included in the Duchin and Sosyura paper, I find little evidence of political interference in the TARP process.

Finally, my analysis corrects for some errors in Duchin and Sosyura's approach. For example, like my analysis, their paper uses financial data from the third quarter of 2008 to evaluate firm condition. This is appropriate for public and private banks and savings institutions or their holding companies because TARP applications for these

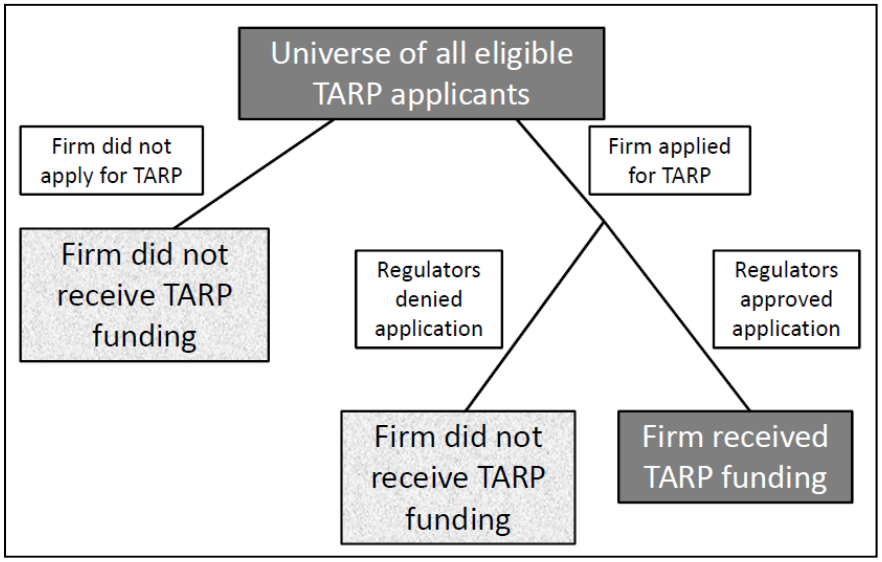
eligible entities were due in the fourth quarter of 2008 and thus third quarter 2008 financial data would have been the latest data available to regulators. However, third quarter 2008 data is not relevant for S corporations and mutual banks, which were not eligible to apply for TARP until early 2009. I resolve this inconsistency by excluding S corporations and mutual banks to narrow my sample to just those institutions that were applying at a particular point in time when the same quarter of financial data would have been used. Duchin and Sosyura do not make such an important distinction, so that a mutual bank that couldn't apply for TARP until April 2009 is incorrectly paired with third quarter 2008 financial data.

The Duchin and Sosyura paper also assumes that since the Federal Reserve is the regulator of bank holding companies, it would have been the primary regulator to review any bank holding company TARP application. Since bank holding companies dominate the sample of eligible TARP institutions, Duchin and Sosyura conclude that more than 90% of potential applicants would have been reviewed by the Federal Reserve. This assumption is critical to their study of institutions' ties to the boards of directors at the various Federal Reserve Banks. It is true that the Federal Reserve was the primary regulator under TARP for larger bank holding companies. However, in the case of the myriad shell bank holding companies, the Federal Reserve deferred decisions to the regulator of the lead bank in the organization (BankBryanCave 2008). Thus, according to my sample, the Federal Reserve would have completed the primary application review for only 22% of potential TARP applicants.

Finally, my paper improves on Duchin and Sosyura's work by allowing for the relationship between the determining variables and TARP allocation probabilities to be

nonlinear. This is a necessary step in the analysis because it helps to overcome the fact that the sample of actual TARP applicants is not observable. As Figure 3.2 illustrates, there were three possible outcomes for a potential TARP applicant: 1) the firm could choose not to apply for TARP funding, 2) the firm could apply and be rejected by regulators or 3) the firm could apply and be approved by regulators, receiving TARP funding.

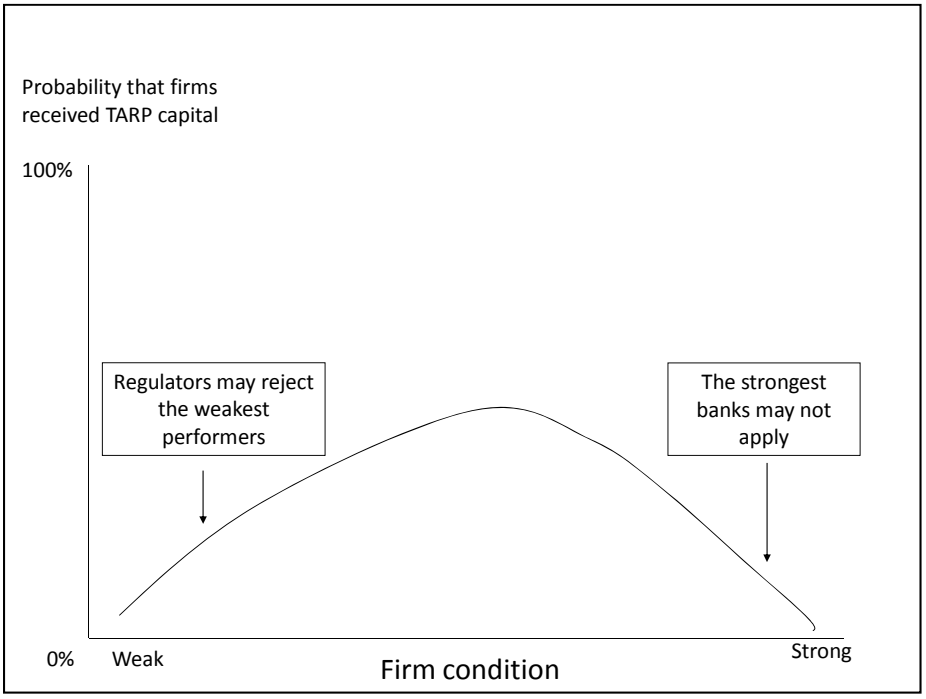
Figure 3.2: Possible Outcomes in the TARP Process



Because data on which firms actually applied for TARP funding is not available, the only observable fact is whether the firm did or did not receive TARP capital. But as Figure 3.2 shows, firms that did not receive TARP funding fell into two very distinct groups: those that elected not to apply for TARP funding in the first place and those that did actually apply but were rejected by regulators. The former group likely includes a high share of strong banks that felt that additional TARP capital was unnecessary while

the latter group—those that were rejected—presumably contains a number of very weak banks. Thus, the probability that firms received TARP capital may first increase with firm strength and then decrease for the strongest banks. A simple depiction of this potential nonlinear relationship is presented in Figure 3.3.[25] In general, it is not likely that the pool of non-TARP recipients is homogenous. Unlike the Duchin and Sosyura paper, which in effect treats all institutions that did not receive TARP funding similarly, my paper introduces several squared financial variables to allow for non-linear relationships in the data.

Figure 3.3: The Potential Non-Linear Relationship Between Firm Condition and the Likelihood of Receiving TARP Capital



[25] The relationship presented in Figure 3.3 is just one possible non-linear relationship between firm fundamentals and the probability that the firm received TARP capital. It is possible, for example, that all firms desired TARP and thus even the strongest banks applied. The shape of the relationship would thus simply be a function of how regulators elected to allocate the capital. It is also possible that the weakest banks assumed that they would be denied and thus never submitted applications. Consequently, the probability of TARP acceptance would fall to zero after a certain threshold of weaker firm condition.

The rest of this chapter is organized as follows. Section 3.2 discusses the modeling approach and variable selection process. Section 3.3 examines the empirical results. Section 3.4 concludes.

3.2 Dataset Construction and Model Design

3.2.1 Dataset construction

The variables in my dataset that I use to analyze TARP allocations come from four primary sources. The Federal Reserve System's internal database was used to gather confidential examination information, structure data, and most of the financial variables. When consolidated financial information was not available for a bank holding company (especially in the case of small shell holding companies, which have less stringent reporting requirements), I used the financial data for the lead bank in the holding company organization. SNL Financial, a subscription database on the financial sector, provided information on enforcement actions, merger activity, the public or private status of the institution, some additional financial data and information on which institutions received TARP capital. I validated my list of TARP recipients by comparing it to the list provided on the Treasury Department's FinancialStability.gov website. Although the two lists contained the same set of institutions, there was some small disagreement on the receipt date of TARP funding. For these cases, I deferred to the Treasury Department's date as the official date. Finally, macroeconomic variables on employment growth and house prices, to proxy for institution-specific economic conditions, were obtained from Haver Analytics, a database of economic time series data.

All financial and macroeconomic variables are for the third quarter of 2008. There is some obvious appeal to using a single quarter of data for all institutions. Given that economic conditions were changing rapidly late in 2008, focusing on just third quarter data captures conditions for every firm at the same point in time in the economic cycle. Furthermore, given that banks did not begin receiving capital infusions until November 14, 2008, it is unlikely that regulators used second quarter 2008 data to evaluate a firm.

It is possible that more recent financial data was used by regulators for firms that received TARP funding in the first half of 2009. However, in some cases firms received TARP at a later date because they had received approval several months earlier but sought shareholder approval before accepting the capital. First Northern Community Bancorp is an example of an institution where regulators would have used third quarter financials even though the institution received TARP capital in March 2009. First Northern announced that it had been approved for TARP funding on January 8, 2009 when fourth quarter financials would not yet have been available. The institution then held a special meeting of shareholders to vote on accepting TARP on February 26, 2009 and actually received the Treasury capital on March 13, 2009 (First Northern Community Bancorp 2009).

According to the TARP term sheet, an institution was eligible to apply if it was either 1) a U.S. bank or savings association that was not controlled by a holding company or 2) a top tier U.S. bank holding company or thrift holding company (The U.S. Department of the Treasury 2008). Because of inconsistencies in financial reporting between commercial banks and thrifts and limitations on procuring comprehensive thrift

examination data, I restrict my sample to the commercial bank system. Thus, my dataset does not contain any institutions regulated by the Office of Thrift Supervision. My universe of institutions is 1) U.S.-based commercial banks and 2) top tier consolidated bank holding companies of commercial banks.[26]

Two important conditions of my dataset are that it 1) contain only institutions that could freely choose whether or not to submit a TARP application and that it 2) include only those firms that regulators would not have faced any special pressure to approve or deny. Put another way, the probability of applying for TARP and the probability of regulatory approval should both be some value between zero and one and an individual firm's expected probabilities should equal the sample probability means. Mathematically, these four conditions for any firm *i* and total sample *n* are:

$$(1) \qquad 0 < P_i(FIRM\ APPLY) < 1$$

$$(2) \qquad 0 < P_i(REG.APPROVE|APPLY) < 1$$

$$(3) \qquad \mathrm{E}[P_i(APPLY)] = \sum_{i=1}^{n} \frac{P_i(APPLY)}{n}$$

$$(4) \qquad \mathrm{E}[P_i(REG.APPROVE|APPLY)] = \sum_{i=1}^{n} \frac{P_i(REG.APPROVE|APPLY)}{n}$$

From media accounts of the circumstances that led to the nine largest banks accepting $125 billion from the government in October 2008, it is evident that these institutions did not have a choice in whether to accept TARP capital (Landler and Dash

[26] As noted earlier, I also exclude S corporations and mutual banks. The appeal of studying public and private commercial banks and bank holding companies of commercial banks is that the public and private application deadlines were less than one month apart and both fell in the fourth quarter of 2008. I elected to exclude S corporations and mutual banks, conversely, because these firms had notably later TARP application deadlines. S corporations represented 7% of TARP recipients through year end 2009.

2008). Thus, these nine institutions effectively had a certain probability of one of both applying for TARP and receiving regulatory approval, violating conditions 1 and 2 above. I thus exclude these nine institutions from the dataset. The nine institutions were Bank of America Corporation, Bank of New York Mellon Corporation, Citigroup Inc., The Goldman Sachs Group, Inc., JPMorgan Chase & Co., Morgan Stanley, State Street Corporation, Wells Fargo & Co, and Merrill Lynch.[27] I also excluded any subsidiaries of American Express, Discover Financial Services, GMAC and the CIT Group because market pressures compelled these companies to convert to bank holding companies and apply for TARP assistance. Thus, including these firms would violate conditions 3 and 4 above: the probability of these firms applying for TARP and receiving regulatory approval is greater than the sample mean. Finally, given that institutions with exam ratings of 4 or 5 were always denied, violating condition 2 above, I excluded these institutions from the dataset.[28] As noted earlier, following these filters my sample contains 5,244 potential TARP applicants, including 534 firms that received TARP funding over my designated time horizon.

3.2.2 Model design

My aim is to design a dataset to analyze which institutions received TARP capital. My model will study the outcome of up to two interrelated decisions: 1) whether the

[27] Merrill Lynch was subsequently acquired by Bank of America and thus never actually received government capital directly.

[28] I made three other small filters to the dataset. Since this is a study of capital infusions, I eliminated institutions that had negative capital. I also eliminated any institution with no loans. Finally, to be consistent with the decision to eliminate 4 and 5 rated banks, I also eliminated banks with a Management rating of 4 or 5. Presumably, for banks with a very poor management rating, the probability of regulatory acceptance is quite low, violating condition 4 above.

institution elected to apply and, conditional on an application, 2) whether the regulators approved the application.

Public statements by institutions suggest that TARP capital was initially seen as desirable by the banking industry at the program's inception in the fall of 2008, but then became stigmatized over time. Consequently, the characteristics of applicants could have changed over the sample period, with both strong and weak firms applying in the early stage of the program, but only the weaker institutions applying and accepting TARP funding once more stringent executive compensation limits and other conditions were enacted.

As a test of this sample selection problem, I divide the sample of TARP recipients into those that received TARP before and after February 13, 2009, the day that retroactive executive pay restrictions for TARP recipients were approved by Congress.[29] Table 3.1 lists the results of a difference in means test for these two sub-samples based on different measures of bank condition. The only significant evidence that firms that received TARP capital after February 13, 2009 were financially weaker than early stage TARP recipients is that these firms had a statistically higher proportion of noncurrent loans. However, post-February 13 TARP recipients actually had significantly *higher* capital than earlier TARP recipients and experienced a *smaller* average decline in house price in their geographic footprint. The other measures of bank condition were not significantly different between the two samples.

[29] An institution had the right to refuse to take TARP funds even if it had submitted an application and been approved by Treasury. Thus, the sample of TARP recipients after February 13, 2009 includes all banks that were approved *and accepted* the TARP funds.

Table 3.1: Tests for Significant Changes in TARP Recipient Characteristics Before/After February 13, 2009

*, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively. Significance determined by first testing equality of variance and then utilizing the appropriate t-value to determine significance. The statistics *one-rated institutions*, *two-rated institutions*, and *three-rated institutions* indicate the proportion of firms that were given those respective exam ratings on the exam preceding the inception of TARP. For example, the variable *one-rated institutions* shows the share of firms that were rated one (best) by regulators at that time.

Statistic	Institutions receiving TARP before Feb. 13, 2009 (345)	Institutions receiving TARP after Feb. 13, 2009 (231)	Difference
One-Rated Institutions	12.8%	13.4%	0.7%
Two-Rated Institutions	81.2%	77.1%	-4.1%
Three-Rated Institutions	6.1%	9.5%	3.4%
Return On Average Assets (2008Q3 Data)	-9.3%	5.1%	14.3%
Core Deposits/Total Deposits (2008Q3 Data)	78.8%	77.8%	-1.0%
Tier 1 Risk Based Capital Ratio (2008Q3 Data)	10.8%	11.4%	0.6%**
Pct Change In House Prices From Peak (2008Q3 Data)	-7.4%	-4.6%	2.8%***
Pct Change In Employment from Peak (2008Q3 Data)	-1.0%	-0.9%	0.1%
(Noncurrent Loans and OREO)/(Tier 1 Capital and ALLL) (2008Q3 Data)	14.6%	16.6%	2.0%**
Cons. & Land Dev. Loans/Total RBC (2008Q3 Data)	122.1%	126.8%	4.6%

As an alternative test for sub-sample variation, I also divided TARP recipients into those that received TARP funding in 2008 vs. those that received TARP funds in 2009. The results of the difference in means test for these two sub-samples are reported in Table 3.2. Here the evidence is even stronger that the later TARP recipients were not materially weaker than institutions that received funding at the program's inception. Indeed, later TARP recipients were significantly *more* likely to report stronger earnings performance, have higher capital and experience a smaller decline in house price than early TARP recipients. All other bank condition measures were not significantly different between the two groups. Collectively, the results in Table 3.1 and 3.2 suggest

that the passage of executive compensation restrictions did not result in a significant shift in the type of firms that received TARP funding.

Table 3.2: Tests for Significant Changes in TARP Recipient Characteristics in 2008 vs. 2009

*, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively. Significance determined by first testing equality of variance and then utilizing the appropriate t-value to determine significance. The statistics *one-rated institutions*, *two-rated institutions*, and *three-rated institutions* indicate the proportion of firms that were given those respective exam ratings on the exam preceding the inception of TARP. For example, the variable *one-rated institutions* shows the share of firms that were rated one (best) by regulators at that time.

Statistic	Institutions receiving TARP in 2008 (165)	Institutions receiving TARP in 2009 (411)	Difference
One-Rated Institutions	9.7%	14.4%	4.7%
Two-Rated Institutions	81.8%	78.6%	-3.2%
Three-Rated Institutions	8.5%	7.1%	-1.4%
Return On Average Assets (2008Q3 Data)	-26.8%	5.8%	32.6%*
Core Deposits/Total Deposits (2008Q3 Data)	79.0%	78.1%	-0.9%
Tier 1 Risk Based Capital Ratio (2008Q3 Data)	10.4%	11.3%	1.0%***
Pct Change In House Prices From Peak (2008Q3 Data)	-8.4%	-5.4%	3.0%***
Pct Change In Employment from Peak (2008Q3 Data)	-1.1%	-0.9%	0.1%
(Noncurrent Loans and OREO)/(Tier 1 Capital and ALLL) (2008Q3 Data)	16.6%	15.0%	-1.7%
Cons. & Land Dev. Loans/Total RBC (2008Q3 Data)	122.8%	124.5%	1.7%

According to SIGTARP, more than 2,700 institutions applied for TARP funds from the program's inception through July 30, 2009. Although this figure includes S corporations, mutual banks, thrifts and thrift holding companies that are outside my sample universe of 5,244 potential TARP applicants, the count of actual applications underscores the broad-based appeal of the TARP program in the banking industry. Of the more than 2,700 applications, SIGTARP reports that 1,300 applicants had been approved by the primary regulator and 660 of those 1,300 applicants had received TARP

funding from Treasury as of July 30, 2009 (Office of the Special Inspector General for the Troubled Asset Relief Program 2009). Thus, while the TARP application rate was quite high, regulators were selective in deciding which institutions to approve for TARP funding. Using these reported numbers, regulators had a 24% approval rate, although the final figure will be higher because some applications still had yet to be processed. I assume in my analysis that each regulatory agency was consistent in its decisions regarding applications over the lifetime of TARP. However, I will test whether *specific* regulatory agencies were any more lenient in evaluating applications.

Although I will enumerate my priors about why a model variable *may* have factored in the TARP decision-making process, I intentionally have no ex ante hypotheses about signs and significance of individual variables. This exercise is meant to uncover which factors actually had an impact on TARP allocations. Thus, I will employ the 'kitchen-sink' approach of including all variables in the model and then examine which of them are indeed significant.

I will analyze my dataset in three distinct ways. The first method is a simple difference in means test comparing the characteristics of the institutions that received TARP capital with those that did not. Then, in a probit regression model, I test the sign and significance of the variables discussed below.[30] Finally, in my preferred specification, I augment the probit regression model with additional squared terms for the financial and macro variables to allow for nonlinearities in the relationship between the determining variables and TARP allocation probabilities.

[30] I also tested a logistic regression model. The sign and significance of the model results were quantitatively similar to those reported below for the probit models and thus the logistic results are omitted here.

The variables chosen for the probit regression models can be generalized into three broad categories: regulatory factors (*REGULATORY*), financial/macro factors (*FINANCIAL and MACRO*), and other important firm characteristics (*ADDITIONAL FACTORS*). Thus, the linear probit regression model is:

$$P(TARP\ RECEIVED) =$$
$$\beta_0 + \sum_{i=1}^{m} \beta_i\ (REGULATORY) + \sum_{j=m+1}^{n} \beta_j\ (FINANCIAL_{08Q3}\ and\ MACRO_{08Q3}) +$$
$$\sum_{k=n+1}^{q} \beta_k\ (ADDITIONAL\ FACTORS) + \varepsilon$$

In the above specification, *TARP_RECEIVED* is a dummy variable indicating whether the firm is designated as a TARP recipient, *REGULATORY*, *FINANCIAL and MACRO*, and *ADDITIONAL FACTORS* represent vectors of related explanatory variables, and ε is the disturbance term. Table 3.3 contains the full list of variables. Each variable will also be described in full detail in the next subsection.

In the nonlinear probit regression model, a squared *FINANCIAL and MACRO* term is introduced to allow for nonlinear relationships in the financial and macroeconomic variables. The original model thus becomes:

$$P(TARP\ RECEIVED) =$$
$$\beta_0 + \sum_{i=1}^{m} \beta_i\ (REGULATORY) + \sum_{j=m+1}^{n} \beta_j\ (FINANCIAL_{08Q3}\ and\ MACRO_{08Q3}) +$$
$$\sum_{l=n+1}^{p} \beta_l\ (FINANCIAL_{08Q3}\ or\ MACRO_{08Q3})^2 +$$
$$\sum_{k=p+1}^{q} \beta_k\ (ADDITIONAL\ FACTORS) + \varepsilon$$

Table 3.3: Full List of Model Variables for TARP Distribution Analysis

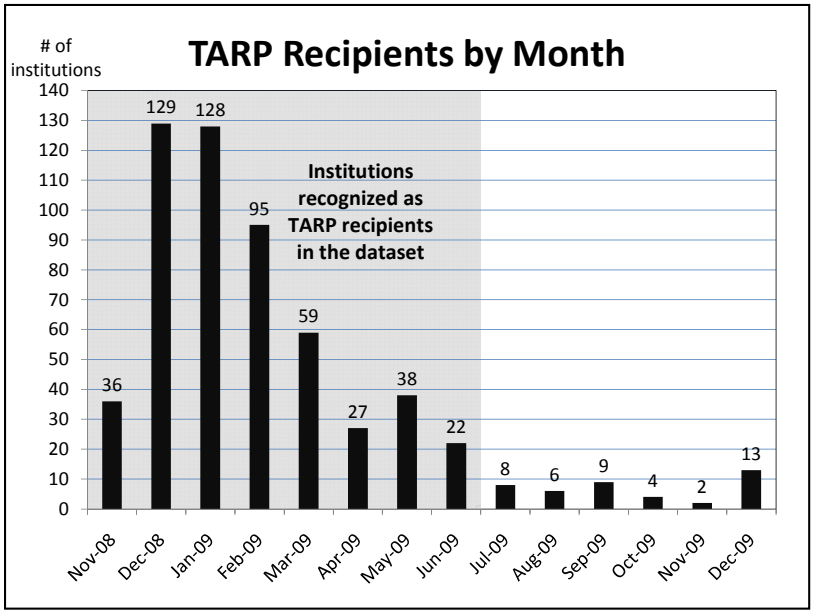
	Model variable	Description
	TARP_RECEIVED	A dummy for whether the institution received TARP funding through June 30, 2009
REGULATORY VARIABLES	*ONE_RATED*	A dummy for whether the institution was rated a composite one on its last exam
	TWO_RATED	A dummy for whether the institution was rated a composite two on its last exam
	THREE_RATED	A dummy for whether the institution was rated a composite three on its last exam
	MAN_ONE_RATED	A dummy for whether the institution was rated one for management/risk management
	MAN_TWO_RATED	A dummy for whether the institution was rated two for management/risk management
	MAN_THREE_RATED	A dummy for whether the institution was rated three for management/risk management
	ENFORCEMENT	A dummy for whether the institution had a publicly announced enforcement action in the past 5 years
	NUM_MONTH_SINCE_EXAM	The number of months since the last exam
	MORE_THAN_SIX_MO	A dummy variable indicating if it had been more than six months since the last exam
	INDEPENDENT_IND	A dummy variable indicating if the applicant was an independent bank (2008Q3 Data)
	SMALL_SHELL_IND	A dummy variable indicating if the applicant was a small shell holding company (2008Q3 Data)
	LARGE_BHC_IND	A dummy variable indicating if the applicant was a large bank holding company (2008Q3 Data)
	FED	A dummy for whether the institution's application would have been reviewed by the Federal Reserve
	OCC	A dummy for whether the institution's application would have been reviewed by the OCC
	FDIC	A dummy for whether the institution's application would have been reviewed by the FDIC
FINANCIAL/MACRO VARIABLES	*TOTAL_ASSETS*	Log of total assets (2008Q3 Data)
	ROAA	The ratio of net income to average assets (2008Q3 Data)
	TIER1_RATIO	The ratio of Tier 1 capital to risk-weighted assets (2008Q3 Data)
	SECURITIZED_IND	A dummy indicating the institution had off-balance sheet securitized loans as of 2008Q3
	FOREIGN_DEPOSIT_IND	A dummy indicating the institution had foreign deposits as of 2008Q3
	CORE_DEPOSIT_SHARE	The ratio of core deposits to total deposits (2008Q3 Data)
	CLASSIFIED	The ratio of classified assets to Tier 1 Capital and ALLL (2008Q3 Data)
	NONPERFORMING	The ratio of nonperforming loans and OREO to Tier 1 Capital and ALLL (2008Q3 Data)
	LAND_DEV	The ratio of construction development loans to Total risk-based capital (2008Q3 Data)
	NONPERFORMING_IND	A dummy for whether the institution's nonperforming ratio exceeded the regulatory threshold
	LAND_DEV_IND	A dummy for whether the institution's land development ratio exceeded the regulatory threshold
	GSE	A dummy for whether the institution had any amortized exposure to investments in equity securities (2008Q2 Data)
	HOUSE_PRICE_CHG	The peak-to-2008Q3 percentage change in house prices for the institution's geographic footprint (2008Q3 Data)
	EMPLOYMENT_CHG	The peak-to-2008Q3 percentage change in employment for the institution's geographic footprint (2008Q3 Data)
ADDITIONAL FACTORS	*MERGER*	A dummy for whether the institution announced a merger from January 2008 through November 14, 2009
	AGE	The age in years of the institution as of 2008Q3
	DE_NOVO	A dummy for whether the institution began operations from 2004-2008
	NASDAQ	A dummy for whether the institution is listed on Nasdaq
	AMEX	A dummy for whether the institution is listed on NYSE Amex
	NYSE	A dummy for whether the institution is listed on NYSE
	OTCBB	A dummy for whether the institution trades on the Over-the-Counter Bulletin Board
	PINK	A dummy for whether the institution trades on the Pink Sheets
	PRIVATE	A dummy for whether the institution is private (not publicly traded)
	FRANK	A dummy indicating the institution was headquartered in Massachusetts
	DODD	A dummy indicating the institution was headquartered in Connecticut
	BAUCUS	A dummy indicating the institution was headquartered in Montana
	HOUSE_FINANCE	A dummy indicating the institution's home state was represented on the House Financial Services Committee
	SENATE_BANKING	A dummy indicating the institution's home state was represented on the Senate Committee On Banking
	SENATE_FINANCE	A dummy indicating the institution's home state was represented on the Senate Committee On Finance
	HOUSE_FINANCE_CH	A dummy indicating the institution's home state was represented by a chair on the House Financial Services Committee
	SENATE_BANKING_CH	A dummy indicating the institution's home state was represented by a chair on the Senate Committee On Banking
	SENATE_FINANCE_CH	A dummy indicating the institution's home state was represented by a chair on the Senate Committee On Finance

3.2.3 Model variables

3.2.3.1 Dependent variable

Because Treasury Secretary Timothy Geithner reopened the TARP application window in mid-2009 for six months for banks with total assets under $500 million (Geithner 2009), the Treasury Department continued to fund new institutions with TARP capital through the end of 2009. The volume of new recipients slowed significantly after the first half of 2009, however, so in my sample I designate an institution as a TARP recipient (*TARP_RECEIVED*) if it had accepted TARP capital by June 30, 2009. This designation captures 93% of all TARP institutions in my dataset. Figure 3.4 charts actual TARP recipients by month and indicates which institutions are classified as a TARP recipient in my dataset.

Figure 3.4: TARP Recipients by Month



Note: The Treasury Department's count of TARP recipients will be higher than this chart because my dataset filters out certain recipients such as the nine largest institutions that were asked to receive TARP capital as well as thrifts, thrift holding companies, S corporations and mutual banks.

3.2.3.2 Regulatory variables

The variables that I consider in my model reflect potential factors that could have affected the institution's application decision or the approval decision by regulators. As noted earlier, the institution's exam composite rating was influential in determining the path of the approval process. The exam rating I use for each institution was the most recent full scope exam rating[31] as of October 14, 2008 or November 17, 2008, the dates that public and private institutions respectively could begin applying for TARP funding.[32] I create dummy variables (*ONE_RATED, TWO_RATED,* and *THREE_RATED*) for whether the institution was rated 1 (best), 2 or 3 on the bank exam that regulators would have reviewed.

The quality of bank management appears to have been a consideration of regulators. A March 2009 Office of Inspector General report found three cases where the applying institution had acceptable capital and performance metrics but was asked to withdraw its application primarily because of poor bank management (Office of Inspector General of the FDIC 2009). Weak management at an institution could raise regulatory concerns that the distributed capital would be poorly utilized. I considered two different proxies to measure the caliber of management. At every full scope bank exam, examiners give a rating for the institution's management. Similarly, each bank holding

[31] Commercial bank exams can be classified as either full scope or target. In a full scope exam, all aspects of a bank's condition are reviewed. In a target exam, regulators focus on a specific area of concern (such as asset quality). I assume that regulators reviewing an applicant would have primarily focused on the findings of the most recent full scope exam. It is possible, however, that the findings from a more recent target exam would have had an influence on the application process. This is an area for potential future research.

[32] I am making the assumption that regulators considering an institution's application were only able to review exams that began prior to the start of the Capital Purchase Program. Arguably, exams of applying institutions that began after October 14, 2008 could have been reviewed by regulators. However, this opportunity was likely only available in some cases. Furthermore, since it is not clear when the institution's application was reviewed, assigning exam ratings that are more recent than October 14, 2008 ignores the possibility that an application was considered prior to the exam commencing.

company is assessed a risk management rating. I thus use the most recent management (bank) or risk management (bank holding company) examination rating as a measure of the quality of bank management.[33] As with the overall bank rating, I create dummy variables *(MAN_ONE_RATED, MAN_TWO_RATED,* and *MAN_THREE_RATED*) for whether the institution was rated 1, 2 or 3 for management. As a separate measure of management, I also tested a dummy variable for whether a firm had a publicly-announced enforcement action (*ENFORCEMENT*) in the prior five years. With an enforcement action, the institution agrees to remedial steps to rectify problems uncovered by regulators. An enforcement action could be an indirect signal of poor bank management.

The date of the most recent bank exam also influenced whether an applying institution was slotted as a Category 1 institution, which expedited the application, or a Category 2 institution, which required an additional review. I address this issue in two ways. First, I include in my model the number of months since the last exam (*NUM_MONTH_SINCE_EXAM*) as a continuous variable to test whether the date of the exam had any impact on the application process. For institutions that did not receive TARP capital, I calculate the number of months since the last exam as the spread between the exam date and either October 14, 2008 or November 17, 2008, the start dates of the Capital Purchase Program for public and private institutions respectively. For institutions that did receive TARP capital, I used either the TARP transaction date from the Treasury Department, or, preferably, the date that the firm announced it had been approved as my

[33] In a limited number of cases, the risk management rating for the small shell holding company was not available so I instead used the management rating for the lead bank of the holding company. This situation could occur if the holding company structure was newly formed and examiners had yet to establish a holding company rating.

reference date.[34] A March 2009 report by the FDIC's Office of Inspector General indicates that the FDIC review process took an average of 33 days, with Treasury notifying the FDIC of approvals in an average of 7 days (Office of Inspector General of the FDIC 2009). Factoring in an additional five days for application submission and FDIC notification to applicants suggests successful applicants received approval approximately 45 days after they applied. Consequently, for those institutions that received capital, I calculate the number of months since the last exam as the spread between the exam date and the TARP reference date (announcement date or transaction date) less 45 days. For example, for a bank that announced that it had been approved for TARP capital on December 15th, 2008 and had its last exam on August 1st, 2008, my formula assumes that the application was submitted on October 31st, 2008 so that the number of months since the last exam would be roughly three months.

According to the application review process, regulators appear to have decided that six months was a critical threshold for whether a bank exam was still relevant. For example, 2-rated institutions with unacceptable performance ratios could still be slotted as Category 1, resulting in an expedited approval process, if the last exam was not more than six months old. To acknowledge this important threshold, I create a dummy variable indicating whether it had been more than six months since the last exam (*MORE_THAN_SIX_MO*).[35]

[34] The date that the firm announced TARP approval is preferred since it is presumably a more precise indicator of when the application was submitted and reviewed than the date that the transaction with the Treasury Department actually took place. My dataset contains TARP announcement dates for all publicly traded TARP recipients as collected by SNL Financial. Data on when private firms received approval from regulators, however, is not available since few private firms announced TARP acceptance prior to formally receiving money from the Treasury Department. For these private institutions, the TARP acceptance date is used as the reference date.

[35] I also tested a variable that interacted a dummy for two-rated banks with a dummy for the exam being more than six months old. This interaction term did not prove to be significant.

Institutions were instructed to apply at the top holder in the organization, which meant either the bank itself or, if applicable, its parent holding company. As noted earlier, small shell holding companies have less rigorous reporting requirements than large holding companies, which means that regulators likely relied on the financial data for the lead bank as the most relevant source of information for these entities. This fact, along with the TARP requirement to apply at the top holder, effectively created three distinct types of TARP applicants: individual banks, small shell holding companies, and large bank holding companies. I thus designated dummy variables indicating whether the applicant was an independent bank (*INDEPENDENT_IND*), a small shell holding company (*SMALL_SHELL_IND*), or a large bank holding company (*LARGE_BHC_IND*). These dummies test, for example, whether independent banks were any more likely to apply for TARP funding, perhaps because an independent institution would not be able to rely on a holding company parent or affiliates for financial support.

Regulators may have had different organizational philosophies regarding the TARP approval process that could have influenced the acceptance rate. Indeed, the U.S. Government Accountability Office (GAO) noted that because the Treasury Department provided limited guidance to regulators, there was real potential for inconsistencies in the approval process among the regulatory agencies (Government Accountability Office 2010). To test this possibility, I create dummy variables for whether the potential applicant had its application reviewed by the Federal Reserve (*FED*), Office of the Comptroller of the Currency (*OCC*) or the Federal Deposit Insurance Corporation (*FDIC*). In the case of shell bank holding company applicants, the application was reviewed by the regulator of the lead bank in the organization rather than the Federal

Reserve, the regulator of all bank holding companies (BankBryanCave 2008). Thus, for potential shell bank holding companies applicants, I used the regulator of the lead bank to construct these regulator dummy variables.

3.2.3.3 Financial/macro variables[36]

Given TARP's goal of stabilizing the banking sector, I include firm size in logs (*TOTAL_ASSETS*) as a variable. Additionally, I include the ratio of net income to average assets (*ROAA*), an industry measure of bank profitability, since firm losses deplete existing capital and thus indirectly increase the need for TARP capital. I also employ a capital ratio measure in my model given that it is a deficiency in capital that perhaps triggered institutions to apply for TARP. My main models use the Tier 1 capital ratio (*TIER1_RATIO*), both because this ratio was heavily emphasized by regulators during this period and because TARP capital qualifies as Tier 1 capital. However, I also tested the total risk based capital ratio and the leverage ratio, with similar results.

Given the collapse of the securitization market in the wake of the financial crisis, I test a dummy variable indicating whether the bank had off-balance sheet securitized loans (*SECURITIZED_IND*). The financial crisis was global in scope and regulators may have considered the deposits of foreigners when deliberating whether to rescue an institution, especially since hurting foreign depositors could result in a backlash against the international operations of large American banks. I designate a dummy variable (*FOREIGN_DEPOSIT_IND*) indicating whether the institution had any deposits from foreign banks, foreign governments or foreign institutions (such as central banks).

[36] Aside from the financial and macro variables discussed, I also tested banks' exposure to private asset-backed and mortgage-backed securities and exposure to unused commitments (such as unused home equity lines of credit). These variables were not significant.

Finally, I included a liquidity measure, the ratio of core deposits to total deposits (*CORE_DEPOSIT_SHARE*),[37] because liquidity concerns could have put pressure on firms to apply for TARP capital and/or regulators to approve or deny applicants.

To standardize the approval process, regulators adopted three performance ratios to evaluate the firm's financial condition. According to the TARP application process, if the firm was either 2 rated or 3 rated with an exam more than six months old and it exceeded a specified threshold on any of the three ratios, it would be slotted as a Category 2 institution and subject to additional review. An institution was deemed to have unacceptable performance ratios[38] if it exceeded any of the following thresholds (Office of Inspector General, Department of the Treasury 2010):

$$\frac{Classified\ assets}{Tier\ 1\ capital\ and\ allowance\ for\ loan\ and\ lease\ losses\ (ALLL)} \geq 100\%,$$

$$\frac{Nonperforming\ loans\ and\ other\ real\ estate\ owned\ (OREO)}{Tier\ 1\ capital\ and\ ALLL} \geq 40\%, \text{ or}$$

$$\frac{Construction\ development\ loans}{Total\ risk-based\ capital} \geq 300\%$$

In the case of the classified asset ratio, data was not available for all firms. Employing the method suggested in Kennedy (2003), I created predicted values when the data was missing by regressing this variable on all other independent variables in the main model. This allowed me to still include this variable in the model and maintain my

[37] I also tested the net noncore funding dependence ratio as a liquidity measure. The results were similar to the ratio of core deposits to total deposits variable.

[38] The institution also had to have a Community Reinvestment Act (CRA) rating of at least Satisfactory. However, a CRA rating below Satisfactory is a very rare event (less than 1% of my sample) so a dummy indicating a CRA rating below Satisfactory was not significant in the models.

sample size.[39] My model includes each of the three performance ratios in levels (*CLASSIFIED, NONPERFORMING*, and *LAND_DEV*). For the nonperforming loans and land development concentration variables, I also calculated dummies (*NONPERFORMING_IND* and *LAND_DEV_IND*) indicating whether the variable exceeded the specified regulatory threshold.[40] I did not include a similar dummy for classified assets because all firms that exceeded the classified asset regulatory threshold did not receive TARP funding and thus this variable perfectly predicted a particular outcome.

In the application process, regulators considered the possible adverse effect of write-downs on government-sponsored entity (GSE) stock (Office of the Special Inspector General for the Troubled Asset Relief Program 2009). In weighing this factor, supervisors acknowledged that applicants may have been significantly affected by the government takeover of Fannie Mae and Freddie Mac, which virtually wiped out shareholders. My model includes a dummy variable (*GSE*) indicating whether an institution had any amortized exposure to investments in equity securities (largely GSE stock) in the second quarter of 2008, the quarter prior to the government takeover of the GSEs.

SIGTARP also found that regulators considered regional factors regarding loan concentrations (Office of the Special Inspector General for the Troubled Asset Relief Program 2009). Banks in an economically depressed area may also have been more likely

[39] It is worth noting that nearly all OCC-regulated banks had a missing classified asset ratio whereas this information was almost always populated for FDIC and Federal Reserve-regulated banks. This means that nearly all the predicted values for the classified asset ratio are for OCC banks specifically. Including regulatory dummies (*FED, OCC,* and *FDIC*) in the model at least partially compensates for this issue.
[40] I also explored interactions of the performance threshold dummies with the performance ratio level variables. The interaction variables did not prove to be significant.

to seek government aid. To represent economic conditions, I included variables for both employment growth[41] and house prices using the Federal Housing Finance Agency's house price index (formerly the OFHEO house price index). To address the fact that states went into recession at different times, I first calculated the percentage change in house prices or employment from the state-specific peak for that variable to the third quarter of 2008. I then calculated institution-specific weighted values for the percentage change in house prices (*HOUSE_PRICE_CHG*) and employment (*EMPLOYMENT_CHG*) using the proportion of the institution's branches in each state as my weights.[42] The resulting variables thus reflect the peak change in house prices or employment for the specific geographic footprint of the organization.

3.2.3.4 Additional factors

Merger activity could have played an important role in TARP allocations for two reasons. First of all, a firm that had recently made an acquisition would have less capital and thus a greater need for government assistance. Secondly, the government may have wanted to encourage healthy firms to acquire troubled institutions. Thus, regulators may have looked more favorably on firms with plans to use the capital to purchase another firm. Indeed, the TARP application specifically asked firms to list any mergers or acquisitions that were pending or under negotiation. SIGTARP also found that the existence of a merger agreement involving the applicant was considered by regulators

[41] Although my main models include the growth in employment, I also considered the unemployment rate and the year-over-year growth in the unemployment rate as factors.

[42] For example, the market area house price decline for an institution with two branches in Vermont and three branches in New Hampshire would be calculated with a 40% weight on the Vermont house price decline and a 60% weight on the New Hampshire house price decline. Note that for states where employment or house prices did not fall (North Dakota, for example), the peak-to-2008Q3 change would be zero. Thus, all bank-specific values for the two macroeconomic variables are either negative or zero.

(Office of the Special Inspector General for the Troubled Asset Relief Program 2009). I obtained information on banking industry acquisition announcements from SNL Financial. In order to capture both recent deals that could have depleted capital and deals that may have been pending or planned during the TARP application process, I consider purchases from January 2008 through November 14, 2009, one year after the deadline for eligible public TARP candidates to apply for funding. My dummy variable indicating a merger (*MERGER*) includes both full mergers as well as purchases of specific branches since in either case precious capital was expended to finance the deal.

The age of the institution could have played a role in the TARP process. I address this issue in two ways. In both cases I use the opening date of the lead bank, rather than the holding company if applicable, to calculate bank age since the formation of a holding company structure would have come after the bank's founding. I first calculate a variable denoting the age of the institution in years as of the end of the third quarter of 2008 (*AGE*). This variable tests the possibility that more established institutions could have been treated differently by regulators. Secondly, I create a dummy variable for de novo institutions. The Federal Reserve defines de novo institutions as firms that have opened in the previous five years (Board of Governors of the Federal Reserve System 1991). De novo firms may have been more motivated to apply for aid because without established brand name loyalty in their market area, they could have been more vulnerable to the financial crisis. Regulators may also have been more sympathetic to applicants with weaker finances if they were de novo institutions, rationalizing that their poorer financial performance was due more to their start-up costs than mismanagement. Conforming to

the Federal Reserve's de novo definition, I designate an institution as a de novo bank (*DE_NOVO*) if it started operations between 2004 and 2008.

It may have been important whether applicants were highly traded, lightly traded, or private. Given that the financial markets appeared to be particularly sensitive in 2008 to the perceived low capital positions of Bear Stearns, Lehman Brothers, Fannie Mae, and Freddie Mac, firms on major exchanges may have been especially concerned about capital needs. In general, a highly traded stock exposes the institution to sophisticated investors that are more likely to uncover firm weaknesses. I create dummy variables for whether each institution in my sample was listed on Nasdaq (*NASDAQ*), NYSE Amex (*AMEX*), NYSE (*NYSE*); trading as Over-the-Counter Bulletin Board (*OTCBB*) or on the Pink Sheets (*PINK*); or private (*PRIVATE*). I chose to create six possible classifications to allow for any variation in listings on the exchanges. Data on the specific public or private status of each institution comes from SNL Financial. It is worth noting that public firms that traded using an Over-the-Counter Bulletin Board or Pink Sheets listing were considered private institutions by regulators and were asked to delay submitting their application until the TARP program opened to private institutions on November 17, 2008 (BankBryanCave 2008).

Finally, there have been concerns that politics and lobbying influenced the TARP process. The Center for Responsive Politics, for example, reported that members of the Senate Committee on Banking, Housing and Urban Affairs; the Senate Committee on Finance; and the House Committee on Financial Services collectively received $5.2 million from TARP recipients during the 2007-2008 election period (Starling 2009). Representative Barney Frank, chair of the House Committee on Financial Services, has

acknowledged that he spoke to regulators about a capital infusion for OneUnited, a troubled bank in his home state of Massachusetts. The institution later received $12 million from TARP (Paletta and Enrich 2009).

According to an August 2009 report, SIGTARP determined that the established TARP approval process had several important internal controls in place to guard against external influences and that those controls limited the opportunity for outsiders to influence TARP investment decisions (Office of the Special Inspector General for the Troubled Asset Relief Program 2009). However, Duchin and Sosyura (2010) find strong links between political connections and TARP funding. My model, which includes a number of additional control variables not found in the Duchin and Sosyura analysis, offers a new opportunity to test whether there was any political influence in the TARP approval process. I test for political influence in the TARP process by examining whether TARP recipients were any more likely to be headquartered in a state that had key representation on influential financial Congressional committees. I created dummy variables for Massachusetts (*FRANK*) (Representative Frank), Connecticut (*DODD*) (Senator Dodd, chair of the Senate Committee on Banking, Housing and Urban Affairs), and Montana (*BAUCUS*) (Senator Baucus, chair of the Senate Committee on Finance). I also tested separate dummy variables for all the states represented on each of the three financial-related Congressional committees (*HOUSE_FINANCE, SENATE_BANKING, SENATE_FINANCE*) and just the states represented by the chairs on the subcommittees of each of the three committees (*HOUSE_FINANCE_CH, SENATE_BANKING_CH, SENATE_FINANCE_CH*).

3.2.3.5 Descriptive statistics

Descriptive statistics for the variables considered in my model are presented in Table 3.4. My sample consists of 5,244 institutions, 534 of which received TARP capital in the designated period (10.2% of the sample). The amount of capital received ranged from $301,000 (Freeport State Bank) to $7.6 billion (PNC Financial Services Group, Inc.). The FDIC was the primary regulator in 59% of the sample. Small shell holding companies dominate the sample, accounting for 74% of eligible TARP institutions, while 81% of potential applicants were privately held. Roughly 4% of banks in the dataset announced an acquisition during the specified period, 8% of institutions fit my definition of de novos, and 19% had investments in equity securities (which most likely was GSE stock). The age of institutions in the sample ranges from Quinnipiac Bank and Trust Company, which had just opened in March 2008, to the oldest community bank in the nation, The Washington Trust Company of Westerly, R.I., which was founded in 1800.

Table 3.4: Descriptive Statistics for Sample (5,244 observations)

	Variable	Mean	Min	Max	Standard Deviation
	TARP_RECEIVED	0.10	0.00	1.00	0.30
REGULATORY VARIABLES	*ENFORCEMENT*	0.01	0.00	1.00	0.10
	INDEPENDENT_IND	0.14	0.00	1.00	0.34
	SMALL_SHELL_IND	0.74	0.00	1.00	0.44
	LARGE_BHC_IND	0.13	0.00	1.00	0.33
	FED	0.22	0.00	1.00	0.42
	OCC	0.19	0.00	1.00	0.39
	FDIC	0.59	0.00	1.00	0.49
FINANCIAL/MACRO VARIABLES	*TOTAL_ASSETS*	0.76	0.00	247.06	6.81
	ROAA	0.43	-45.21	32.00	2.24
	TIER1_RATIO	15.57	3.77	256.84	9.22
	SECURITIZED_IND	0.02	0.00	1.00	0.13
	FOREIGN_DEPOSIT_IND	0.01	0.00	1.00	0.11
	CORE_DEPOSIT_SHARE	80.45	0.00	100.00	9.92
	NONPERFORMING	14.02	0.00	272.65	17.16
	LAND_DEV	73.19	0.00	703.84	83.22
	NONPERFORMING_IND	0.07	0.00	1.00	0.25
	LAND_DEV_IND	0.02	0.00	1.00	0.15
	GSE	0.19	0.00	1.00	0.39
	HOUSE_PRICE_CHG	-4.02	-25.96	0.00	5.90
	EMPLOYMENT_CHG	-0.76	-5.80	0.00	1.07
ADDITIONAL FACTORS	*MERGER*	0.04	0.00	1.00	0.19
	AGE	69.29	0.56	208.75	43.29
	DE_NOVO	0.08	0.00	1.00	0.27
	NASDAQ	0.07	0.00	1.00	0.25
	AMEX	0.00	0.00	1.00	0.05
	NYSE	0.01	0.00	1.00	0.08
	OTCBB	0.07	0.00	1.00	0.26
	PINK	0.04	0.00	1.00	0.19
	PRIVATE	0.81	0.00	1.00	0.39
	FRANK	0.00	0.00	1.00	0.06
	DODD	0.00	0.00	1.00	0.06
	BAUCUS	0.01	0.00	1.00	0.10
	HOUSE_FINANCE	0.70	0.00	1.00	0.46
	SENATE_BANKING	0.44	0.00	1.00	0.50
	SENATE_FINANCE	0.39	0.00	1.00	0.49
	HOUSE_FINANCE_CH	0.23	0.00	1.00	0.42
	SENATE_BANKING_CH	0.07	0.00	1.00	0.25
	SENATE_FINANCE_CH	0.15	0.00	1.00	0.36

Note: For confidentiality purposes, my descriptive statistics do not include statistics on composite or management/risk management exam ratings, the number of months since the last exam, the proportion of exams that were more than six months old, or the classified asset ratio. The variable *TOTAL ASSETS* is shown here in billions of dollars, but my regression models use the log of total assets.

3.3 Empirical Results

3.3.1 Difference in means

The results of the difference in means test are presented in Table 3.5. The results suggest that TARP recipients were in worse financial shape than other firms. Firms that received TARP had significantly lower capital ratios, weaker earnings, a smaller core deposit base, higher nonperforming loans, greater concentration of construction development loans, and were more likely to securitize loans and be located in an area with greater house price and employment declines. TARP recipients were also larger (measured both by log of total assets and the higher preponderance of large bank holding companies), significantly more likely to be listed on NASDAQ, NYSE or NYSE Amex, had some investment exposure to the GSEs, and were more likely to have made a recent acquisition.

The pool of TARP recipients had a significantly greater share of institutions regulated by the Federal Reserve, suggesting that there may have been important differences in the approval process among the regulators. TARP recipients were significantly more likely to have foreign deposits, offering some evidence that regulators considered international exposures. The age of the institution does appear to be a factor, with TARP recipients having a lower mean age and more likely to be a de novo institution. Finally, the political dummies show a mixed picture: in some cases, the results indicate banks may have benefited from being headquartered in a state with an influential politician while in other cases it appears that those institutions were *less* likely to receive TARP funding. This conflicting picture should be better resolved in the multivariate analysis that controls for firm characteristics.

Table 3.5: Difference in Means Tests

*, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively. Significance determined by first testing equality of variance and then utilizing the appropriate t-value to determine significance.

Statistic	Institutions receiving TARP (534)	Institutions not receiving TARP (4710)	Difference
ENFORCEMENT	0.01	0.01	0.00
INDEPENDENT_IND	0.11	0.14	-0.02
SMALL_SHELL_IND	0.41	0.77	-0.37 ***
LARGE_BHC_IND	0.48	0.09	0.39 ***
FED	0.55	0.18	0.37 ***
OCC	0.06	0.20	-0.14 ***
FDIC	0.39	0.61	-0.23 ***
TOTAL_ASSETS	13.35	11.76	1.59 ***
ROAA	-0.04	0.49	-0.53 ***
TIER1_RATIO	10.98	16.10	-5.12 ***
SECURITIZED_IND	0.06	0.01	0.04 ***
FOREIGN_DEPOSIT_IND	0.04	0.01	0.03 ***
CORE_DEPOSIT_SHARE	78.35	80.69	-2.34 ***
NONPERFORMING	15.54	13.84	1.70 ***
LAND_DEV	124.60	67.36	57.24 ***
NONPERFORMING_IND	0.04	0.07	-0.03 ***
LAND_DEV_IND	0.02	0.03	-0.01
GSE	0.41	0.17	0.24 ***
HOUSE_PRICE_CHG	-6.43	-3.74	-2.69 ***
EMPLOYMENT_CHG	-0.95	-0.74	-0.22 ***
MERGER	0.11	0.03	0.08 ***
AGE	53.51	71.08	-17.58 ***
DE_NOVO	0.11	0.07	0.03 **
NASDAQ	0.34	0.04	0.30 ***
AMEX	0.01	0.00	0.01 *
NYSE	0.04	0.00	0.04 ***
OTCBB	0.18	0.06	0.12 ***
PINK	0.04	0.04	0.00
PRIVATE	0.40	0.86	-0.46 ***
FRANK	0.01	0.00	0.01
DODD	0.01	0.00	0.01 *
HOUSE_FINANCE	0.73	0.70	0.03
SENATE_BANKING	0.42	0.45	-0.03
SENATE_FINANCE	0.31	0.40	-0.09 ***
HOUSE_FINANCE_CH	0.32	0.21	0.10 ***
SENATE_BANKING_CH	0.09	0.07	0.02 *
SENATE_FINANCE_CH	0.10	0.16	-0.06 ***

Note: The dummy variable for Senator Baucus is not included above because none of the 56 Montana institutions in the dataset received TARP. For confidentiality purposes, my difference in means statistics do not include results on composite or management/risk management exam ratings, the number of months since the last exam, the proportion of exams that were more than six months old, or the classified asset ratio.

3.3.2 Probit regressions

As my data is cross sectional and the dependent variable is a dummy indicating receipt of TARP capital, I use probit regressions for my multivariate analysis.[43] For models that utilize so many variables, there is an obvious concern about multicollinearity. I thus examined the variance inflation factors for both a linear model with all variables discussed above included and a nonlinear model that includes all the variables in the linear model as well as squared terms for the relevant financial and macro variables. In the linear model, no variable had a variance inflation value above 10, the generally accepted threshold for a multicollinearity problem. In the nonlinear model, *CORE_DEPOSIT_SHARE, TOTAL_ASSETS, HOUSE_PRICE_CHG, EMPLOYMENT_CHG* and the squared term for *LAND_DEV* all greatly exceeded the variance inflation threshold. To address this multicollinearity problem, I excluded the squared terms for these five variables when testing my nonlinear probit models.

The results of the six probit models that I test are presented in Table 3.6. The dependent variable, a dummy variable for TARP received, is designed so that positive coefficient estimates indicate an increased likelihood of receiving TARP capital. The first three probit models focus on subgroups of my variable list. Model 1 tests just the financial and macro variables, Model 2 examines only the regulatory variables and Model 3 tests just the additional factors such as merger activity, public/private status and political influence. Model 4 combines all the variables in Models 1-3 into a single model.

[43] I also considered a tobit regression with TARP capital as a share of risk-weighted assets as the dependent variable. However, most TARP recipients received the maximum amount available under TARP (3% of risk-weighted assets) so there was little variation in the dataset in the amount received as a percent of risk-weighted assets.

The first four models thus constitute variations on a linear probit model of TARP acceptance. In Model 5 and 6, I address the fact that the TARP approval process was most likely not linear. These final two models confront the issue that although it isn't possible to know which banks applied for government funding, the subset of eligible institutions that did not receive TARP capital likely contains both very strong banks that had no need for TARP capital and the weakest banks whose condition was too poor to qualify for aid. In Model 5, I expand on Model 1 by including squared terms for the relevant financial variables. Model 6 extends the 'kitchen sink' Model 4 by adding squared financial variables. Thus, Model 6 tests all the possible variables previously discussed.

Because of the sheer number of variables tested, the model results are displayed over two pages. Models 1 and 5 can be found in their entirety on the first page of Table 3.6 while the complete results for Models 2 and 3 are on the second page of Table 3.6. The estimates for the much larger Models 4 and 6, conversely, are displayed over both pages of Table 3.6. The chi-square and pseudo-R^2 results for all six models are displayed for comparison purposes at the bottom of the second page of Table 3.6.

Table 3.6: Probit Results—Models (1) & (5) and Partial Results of Models (4) & (6)

Results of probit models where the dependent variable is a dummy variable for whether TARP capital was received. The dummy variable is constructed so that positive coefficient estimates indicate an increased probability of receiving TARP capital. The omitted variable for the composite and management rating dummies is one-rated institutions. The omitted variable for the regulator dummies is the OCC. The omitted variable for the structure dummies is small shell holding companies. The omitted variable for the public/private status is Nasdaq. Intercept results are omitted. Square terms for *CORE_DEPOSIT_SHARE, TOTAL_ASSETS, LAND_DEV, HOUSE_PRICE_CHG,* and *EMPLOYMENT_CHG* are not included because of multicollinearity concerns. Standard errors are in brackets and *, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Total_Assets	0.360 *** [0.03]			0.168 *** [0.04]	0.372 *** [0.03]	0.163 *** [0.04]
Roaa	-0.033 *** [0.01]			-0.008 [0.01]	-0.222 *** [0.03]	-0.164 *** [0.03]
Roaa_Sq					-0.019 *** [0.00]	-0.014 *** [0.00]
Tier1_Ratio	-0.078 *** [0.01]			-0.082 *** [0.01]	-0.102 *** [0.01]	-0.103 *** [0.01]
Tier1_Ratio_Sq					0.001 *** [0.00]	0.001 *** [0.00]
Securitized_Ind	0.158 [0.18]	SEE NEXT PAGE	SEE NEXT PAGE	0.231 [0.19]	0.115 [0.18]	0.200 [0.19]
Foreign_Deposit_Ind	-0.660 *** [0.22]			-0.486 * [0.25]	-0.655 *** [0.23]	-0.391 [0.26]
Core_Deposit_Share	-0.010 *** [0.00]			-0.009 *** [0.00]	-0.009 *** [0.00]	-0.009 *** [0.00]
Classified	-0.006 *** [0.00]			-0.005 *** [0.00]	0.005 [0.00]	0.012 ** [0.01]
Classified_Sq					-0.001 *** [0.00]	-0.001 *** [0.00]
Nonperforming	0.000 [0.00]			0.000 [0.00]	0.017 ** [0.01]	0.020 ** [0.01]
Nonperforming_Sq					-0.001 *** [0.00]	-0.001 *** [0.00]
Land_Dev	0.003 *** [0.00]			0.002 *** [0.00]	0.002 *** [0.00]	0.002 *** [0.00]
Nonperforming_Ind	-0.713 *** [0.17]			-0.663 *** [0.18]	-0.062 [0.24]	0.114 [0.25]
Land_Dev_Ind	-1.226 *** [0.21]			-1.278 *** [0.22]	-1.162 *** [0.22]	-1.192 *** [0.23]
Gse	0.127 * [0.07]			0.061 [0.08]	0.049 [0.07]	-0.001 [0.08]
House_Price_Chg	-0.034 *** [0.00]			-0.014 ** [0.01]	-0.033 *** [0.01]	-0.014 ** [0.01]
Employment_Chg	0.065 ** [0.03]			0.051 [0.03]	0.096 *** [0.03]	0.076 ** [0.04]
Number of obs.	5,244				5,244	
Chi-square	963.80***				1,060.44***	
Pseudo-R^2	0.2792				0.3072	

Table 3.6 (cont.): Probit Results—Models (2) & (3) and Rest of Models (4) & (6)

Results of probit models where the dependent variable is a dummy variable for whether TARP capital was received. The dummy variable is constructed so that positive coefficient estimates indicate an increased probability of receiving TARP capital. The omitted variable for the composite and management rating dummies is one-rated institutions. The omitted variable for the regulator dummies is the OCC. The omitted variable for the structure dummies is small shell holding companies. The omitted variable for the public/private status is Nasdaq. Intercept results are omitted. Square terms for *CORE_DEPOSIT_SHARE, TOTAL_ASSETS, LAND_DEV, HOUSE_PRICE_CHG,* and *EMPLOYMENT_CHG* are not included because of multicollinearity concerns. Standard errors are in brackets and *, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Two_Rated		0.797 ***		0.493 ***		0.362 **
		[0.12]		[0.14]		[0.14]
Three_Rated		0.947 ***		0.708 ***		0.636 **
		[0.21]		[0.25]		[0.26]
Man_Two_Rated		-0.176		-0.089		-0.094
		[0.11]		[0.13]		[0.14]
Man_Three_Rated		-0.738 ***		-0.579 **		-0.698 ***
		[0.20]		[0.23]		[0.24]
Enforcement		0.125		0.078		-0.051
		[0.25]		[0.27]		[0.27]
Num_Month_Since_Exam	SEE	0.008		0.005	SEE	0.004
		[0.01]		[0.01]		[0.01]
More_Than_Six_Mo		0.124		0.180 **		0.196 **
		[0.08]		[0.09]		[0.09]
Independent_Ind	PREVIOUS	0.182 **		0.119	PREVIOUS	0.126
		[0.08]		[0.11]		[0.11]
Large_Bhc_Ind		1.192 ***		0.231 *		0.182
		[0.10]		[0.13]		[0.14]
Fdic		0.395 ***		0.400 ***		0.428 ***
		[0.09]		[0.10]		[0.11]
Fed		0.454 ***		0.371 ***		0.401 ***
		[0.12]		[0.13]		[0.14]
Merger			0.590 ***	0.354 ***		0.390 ***
			[0.11]	[0.12]		[0.12]
Age			-0.005 ***	-0.003 ***		-0.003 ***
			[0.00]	[0.00]		[0.00]
Denovo	PAGE		0.021	0.196 *	PAGE	0.184
			[0.10]	[0.11]		[0.12]
Amex			-0.180	-0.122		-0.157
			[0.36]	[0.39]		[0.39]
Nyse			0.682 ***	0.343		0.354
			[0.26]	[0.32]		[0.33]
Otcbb			-0.800 ***	-0.393 ***		-0.468 ***
			[0.10]	[0.12]		[0.12]
Pink			-1.306 ***	-0.814 ***		-0.902 ***
			[0.14]	[0.17]		[0.17]
Private			-1.633 ***	-0.985 ***		-1.064 ***
			[0.08]	[0.11]		[0.11]
Senate_Banking			-0.093 *	-0.119 **		-0.127 **
			[0.05]	[0.06]		[0.06]
Number of obs.	5,244	5,244	5,244	5,244	5,244	5,244
Chi-square	963.80***	622.30***	748.99***	1,216.73***	1,060.44***	1,298.30***
Pseudo-R^2	0.2792	0.1803	0.2170	0.3525	0.3072	0.3762

In all specifications, chi-square tests for overall significance are supported at the 1% level. My preferred specification is Model 6, which allows for nonlinearities and contains the full collection of explanatory variables. The pseudo-R^2, a goodness of fit measure that uses the log likelihood result, is highest for Model 6 (pseudo-R^2 equals 0.376). Noting that Model 1 through Model 5 are restricted versions of Model 6, I also conducted partial F-tests of Model 6 to evaluate whether any of the more parsimonious models were superior. In each case, I rejected the null that the additional variables in Model 6 were insignificant, providing additional evidence that Model 6 is the best specification. It is worth noting that the only difference between Model 4 and Model 6 is the squared terms in Model 6. In statistically comparing these two models, the rejection of the null that the additional squared terms in Model 6 are insignificant provides additional evidence that the nonlinear terms add additional value to the model specification.

My model results also show a significantly higher goodness of fit than the Duchin and Sosyura models, which only achieve a pseudo-R^2 high of 0.246. Even the linear Model 4, which is closest to the Duchin and Sosyura models, has a pseudo-R^2 of 0.353. This suggests that the Duchin and Sosyura analysis may omit a number of key explanatory variables, perhaps explaining why the political influence variables in their models are so significant.

3.3.2.1 Significant results from probit regressions

The exam rating dummy variables *TWO_RATED* and *THREE_RATED* are positive and significant in all models. Since one-rated institutions are the omitted

category, this indicates that 2-rated and 3-rated institutions were significantly *more* likely to receive TARP capital than one-rated banks. This provides evidence that either stronger, one-rated banks were less likely to apply or regulators elected not to direct capital to the strongest banks.

MAN_THREE_RATED is negative and strongly significant in all models. Unlike most variables in my models, this variable specifically illuminates the regulator's decision process since it is unlikely that the quality of management would have affected the *firm's* decision to apply. Given that banks with a one rating for management is the omitted variable and that *MAN_TWO_RATED* is consistently insignificant, it appears that especially weak management discouraged regulators from approving TARP applications.

Like Duchin and Sosyura, I find that size appears to have been a factor in the TARP approval process, with larger banks more likely to receive TARP capital. The variable *TOTAL_ASSETS* is positive and significant at the 1% threshold in all models.

The negative sign on the Tier 1 capital ratio level variable *TIER1_RATIO* indicates that low capitalized banks were more likely to receive additional capital. This finding mirrors the results of Duchin and Sosyura. Unlike that paper, which did not explore squared terms for the financial variables, I also find that the squared Tier 1 capital variable *TIER1_RATIO_SQ* is positive and significant, suggesting that the most highly capitalized institutions were also more likely to be TARP recipients. Firms with an especially high risk profile (subprime lenders, credit card banks, etc.) typically hold an above average amount of capital. The positive and significant sign on *TIER1_RATIO_SQ* could indicate that those highly capitalized but economically vulnerable firms may also have felt a strong need to seek government aid.

Both *HOUSE_PRICE_CHG* and *EMPLOYMENT_CHG* are significant but the results are inconsistent. The negative sign on *HOUSE_PRICE_CHG* indicates that banks with a geographic concentration in states where house prices fell sharply were more likely to receive government capital. The positive sign on *EMPLOYMENT_CHG*, conversely, suggests that banks in areas where the job market was especially weak were less like to receive government funding. Presumably both manifestations of economic decline would have resulted in similar decisions by banks on whether to apply for TARP. Thus, these conflicting model results appear to reveal more about how regulators approached the approval process, with housing market fundamentals taking greater priority. Regulators appear to have especially targeted capital for applicants located in distressed housing markets.

Similarly, *AGE* and *MORE_THAN_SIX_MO* are two variables that were probably more relevant to regulators than the institutions deliberating whether to apply for TARP funding. The negative and significant result for AGE suggests that older firms were less likely to receive funding. This result, which Duchin and Sosyura also find, suggests that regulators targeted younger firms, perhaps with greater prospects for growth, than more established institutions. *MORE_THAN_SIX_MO* is a dummy variable indicating whether the institution's last exam was more than six months old. Firms with an exam older than six months were more likely to be reviewed first by the CPP Council rather than have their application directly forwarded to the TARP Investment Committee for approval. This extra layer of scrutiny for firms with an old exam would appear to reduce the overall likelihood of acceptance. However, the variable is positive and significant at the 5% level in both Model 4 and Model 6, suggesting firms with an old exam were *more* likely to get

TARP funding. This potentially indicates two things. First, it hints that the CPP Council was not especially more stringent in its approval process than the TARP Investment Committee so that the probability of acceptance did not diminish much if an application had to pass through the CPP Council first. Second, an applicant with a stale exam means that regulators had less relevant on-site information to consider. This appears to have made regulators *more* likely to approve the applicant, with supervisors perhaps rationalizing that a firm that applied for TARP was signaling that additional capital was necessary for its safety and soundness. For firms with a recent exam, conversely, regulators had more information to decide whether the capital could more effectively be allocated elsewhere.

The model results imply that highly traded public firms were significantly more likely to receive government capital, perhaps an indication that banks with a traded stock were under considerable pressure to raise capital. *NASDAQ* is the omitted variable in the models. Relative to *NASDAQ*, *OTCBB*, *PINK* and *PRIVATE* are all negative and significant at the 1% level in all models, implying that firms with a thinly traded stock or institutions that were privately held were much less likely to receive government aid than firms listed on a major exchange. Indeed, the magnitude of the coefficient estimates (with *PRIVATE* having the most negative coefficient result) appears to suggest that there were even differences between thinly traded stocks and private companies, with private firms even less likely to receive TARP funding. In omitted results, the coefficient estimates for *OTCBB* and *PRIVATE* were found to be significantly different from each other. Conversely, while trading on a major exchange mattered, there appears to be little difference between *which* major exchange a firm traded on. The model results show that

AMEX and *NYSE* are insignificantly different from *NASDAQ* in the likelihood of receiving TARP.

Regulators specifically asked firms to list pending acquisitions and it appears that this did play an important role in TARP allocations. The variable *MERGER* is significant at the 1% level in all models. This indicates that government capital was an important tool in facilitating acquisitions and mergers at a time when private capital was lacking to finance these deals.

Like in Duchin and Sosyura's analysis, the bank earnings variable *ROAA* is negative and significant, suggesting that healthy profits reduced the likelihood of receiving TARP. I also find, however, that *ROAA_SQ* is negative and significant at the 1% threshold, indicating that the probability of receiving TARP was especially low for the most profitable banks.

The *CORE_DEPOSIT_SHARE* variable is negative and significant in each model, suggesting that banks with a more stable base of deposits were less like to receive TARP capital. This result compliments a similar finding in the difference in means tests that indicated that banks with greater liquidity problems were more likely to receive capital assistance.

As noted earlier, regulators appeared to put special emphasis on three designated performance ratios in the review process: classified assets, nonperforming loans, and land development lending concentration. In Model 6, the preferred specification, the results are remarkably consistent across the three performance ratios. The level variable is positive and significant for each of these variables, while the squared term (or in the case of *LAND_DEV,* the dummy indicating construction and land development lending

exposure exceeded the specified regulatory threshold) is negative and significant. A higher value for each variable indicates weaker bank health. Consequently, the likelihood of receiving TARP capital first increases with weaker bank financials but then diminishes for firms with especially weak performance ratios. This reinforces the nonlinear representation discussed earlier—that both the weakest and strongest firms were less likely to be TARP recipients, while firms with some financial weakness were more likely to receive government aid.

Finally, *FDIC* and *FED* are significant in all models. With OCC the omitted regulator variable, the positive and significant sign on *FDIC* and *FED* suggests that there may have been regulatory differences in the rigorousness of the approval process, with institutions regulated by the OCC less likely than FDIC and Federal Reserve institutions to receive approval for TARP funding. This is consistent with the GAO's assertion that the limited guidance provided by the Treasury Department to federal regulators fostered inconsistent standards for approval among regulatory agencies.

3.3.2.2 Insignificant results from probit regressions

It is also instructive to study what was *not* significant in the models to illuminate factors that did not actually play a major role in the allocation of TARP capital. The variables *FOREIGN_DEPOSIT_IND, SECURITIZED_IND, ENFORCEMENT, NUM_MONTH_SINCE_EXAM, DE_NOVO*, *GSE, INDEPENDENT_IND* and *LARGE_BHC_IND* were not consistently significant in the models and none of these variables was significant in Model 6, the preferred specification.

For *FOREIGN_DEPOSIT_IND, SECURITIZED_IND,* and *ENFORCEMENT*, the estimates may simply suffer from a lack of variation in the data. There was only a small subset of institutions that collected foreign deposits, securitized, or had enforcement actions, likely limiting the potential for significant results. Duchin and Sosyura actually found a negative and significant relationship between enforcement actions and TARP funding. My insignificant result for *ENFORCEMENT* may be due to the fact that the management exam dummy, *MAN_THREE_RATED,* is a more precise proxy for the quality of management.

NUM_MONTH_SINCE_EXAM, DE NOVO, and *GSE* were perhaps insignificant because there were other similar model variables that better captured the relevant information. For example, the significant *MORE_THAN_SIX_MO*, the dummy variable indicating whether the last bank exam was more than six months old, appears to proxy well for regulatory decisions about the timing of the last bank exam, leaving the continuous variable *NUM_MONTH_SINCE_EXAM* insignificant. Similarly, the significant *AGE* appears to be a more relevant measure of the life span of an institution than *DE_NOVO*. Finally, the loss to earnings from the plunge in value of GSE stock may already be well represented by the overall measure of bank earnings, *ROAA*.

The insignificant finding for *INDEPENDENT_IND* and *LARGE_BHC_IND* suggest that institution structure did not affect whether the firm sought government aid. Further, whether an applicant was a commercial bank or a holding company had little bearing on the approval process.

Although the table of model results only shows one political dummy variable, I tested eight different political dummies separately representing Senate and House finance

committees, heads of subcommittees, and chairs. Only one of the eight political dummies was significant. However, in the case of that variable, SENATE_BANKING (shown in the second page of Table 3.6), the significant results suggest banks represented by senators on the Senate Committee on Banking, Housing and Urban Affairs were *less* likely to receive government assistance. Overall, these tests for political influence suggest no evidence that political connections may have helped in the approval process. My findings appear to corroborate SIGTARP's August 2009 report, which stated that the TARP approval process had important internal controls in place to prevent external influences in the approval process (Office of the Special Inspector General for the Troubled Asset Relief Program 2009). The model results, however, stand in sharp contrast to the findings of political influence in the work of Duchin and Sosyura. My political variables are admittedly not nearly as comprehensive as those designed by Duchin and Sosyura. However, my models do contain numerous additional variables not included in their work and consequently have significantly better overall explanatory power. More comprehensive tests for political connectedness are an important area for further research.

3.4 Conclusions

My models suggest that there were a number of factors influencing which institutions received TARP assistance. Taken together, however, some clear patterns emerge. The positive correlation between TARP acceptance and measures such as bank size and publicly traded status suggest a bias towards TARP capital flowing to larger, systemically important firms. The model results also clearly show that firms under

financial stress were more likely to receive TARP funding. Institutions with poor earnings, less capital, a lower core deposit base, and located in an area that had suffered greater house price declines were significantly more likely than their peers to be a TARP recipient. Because the actual applicant and approval decisions are not known, it isn't clear whether this pattern is due to weaker firms having a greater inclination to apply for funding or regulators targeting firms that had some financial troubles but were still expected to survive if given additional capital. It may in fact be a combination of these two trends.

The model results also shed some light on the regulatory approval process. Regulators clearly avoided allocating capital to firms with bad management. The positive relationship between merger activity and TARP funding and bank age and TARP acceptance both suggest a preference by regulators to inject capital in younger firms with greater prospects for growth, perhaps envisioning that this would be the best way to alleviate the credit crunch. The significance of the regulator dummy variables also shows that there was some important variation in the approval rates among the Federal Reserve, FDIC and OCC.

Finally, my analysis suggests that the relationship between the likelihood of receiving TARP capital and firm performance was nonlinear. Given that I am modeling two separate decision processes, this finding is not surprising. The bank decision process created a pool of applicants with certain characteristics while regulators approved only a subset of that pool. Jointly, then, this capital allocation process resulted in a mix of TARP recipients that defies the simple characterization of a linear model.

Chapter 4

How Was TARP Capital Used?

4.1 Introduction

Stabilizing the financial system was the main motivation of the Troubled Asset Relief Program (TARP). The hope was that a better capitalized banking industry would both reduce the fear of a financial collapse and minimize the disruption in financial intermediation. In this chapter, I propose that TARP recipients could have used the additional capital they received in one of three ways: to increase lending, acknowledge losses, and/or alter CEO compensation. If TARP capital is found to have increased lending and/or encouraged firms to be more transparent about losses then one could argue that the government aid was successful in furthering policymakers' aim of stabilizing financial institutions and minimizing the macroeconomic impact of the financial crisis. Changes to CEO compensation, conversely, would appear to have more of a longer term impact on banking sector performance. However, given the public anger over bonuses being awarded to executives who had accepted government aid, CEO compensation appears to be another critical area where TARP recipient behavior may differ from institutions that did not receive government support.

This chapter both closely parallels and extends the work in chapter 3 of this dissertation. Like chapter 3, the models in this chapter use as a starting point the same universe of commercial bank and bank holding companies that *could* have received TARP funding. I then study whether the institutions that *actually* received TARP funding in the sample differed in any significant way from non-TARP recipients in lending practices, loss recognition or CEO pay. Specifically, I utilize existing models of

bank lending, bank provisions and executive compensation from the economic literature, augmenting these established models to include a TARP indicator variable. If that indicator variable is significant, it would suggest that receiving TARP money had an influence on lending, acknowledging losses, or CEO compensation practices. In each of the three models in this chapter, the explanatory variables are for 2008 and are used to explain an outcome (loan growth, provisions or changes in CEO pay) in 2009. Thus, like in chapter 3, the data are cross-sectional for a sample of financial institutions.

The remainder of this chapter is organized as follows. Sections 4.2, 4.3 and 4.4 describe the bank lending, loss and CEO compensation models respectively and discuss the empirical results. Section 4.5 concludes.

4.2 The Lending Model

4.2.1 The model

My bank lending model is based on the paper *Interest-Rate Derivatives and Bank Lending* (1999) by Elijah Brewer, Bernadette Minton, and James Moser, which looked at the impact of derivative use on bank lending. Brewer et al. model quarterly lending growth as a function of a bank's lagged capital ratio, lagged loan charge-off rate[44], lagged quarterly growth in employment in the state where the bank is headquartered, and an instrumental variable for derivative use. Formally, for bank j, the Brewer et al. model is:

$$Lending\ Growth_{j,t} = \beta_0 + \beta_1 Capital\ Ratio_{j,t-1} + \beta_2 Charge-offs_{j,t-1} + \beta_3 Job\ Growth_{t-1} + \beta_4 Derivative\ Use_{j,t} + \varepsilon_{j,t}$$

[44] Loan charge-offs are the loans that are written off the bank's balance sheet in a given quarter.

I alter this framework in several ways to conceivably improve the model and make it applicable to the study of the influence of TARP capital on loan growth. Naturally, a variable, *TARP_RECEIVED,* replaces the derivative usage variable. Instead of a variable for employment growth in the state where the institution is headquartered, I used a variable (*JOB_GROWTH*), consistent with my model in chapter 3, which reflects the peak change in employment for the specific geographic footprint of each firm. This variable is calculated by using a weighted average of changes in employment from state-specific peaks, where the weights are based on the number of bank branches in each state.

Simply looking at a firm's balance sheet loan growth potentially underreports total loan origination by an organization because many loans, especially at larger firms, are securitized, which moves those loans off the balance sheet. I thus construct my model variables to include both on and off balance sheet activities. Thus, total loan growth (*LENDING_GROWTH*) is growth in both owned and securitized loans (henceforth referred to as managed loans) and the capital ratio (*CAPITAL_RATIO*) is defined as total equity divided by the sum of reported assets and securitized loans.[45]

I add two additional variables to the Brewer et al. model.[46] The first is a dummy variable (*MERGER*) indicating whether the firm announced either a full merger or a purchase of specific branches between the third quarter of 2008 and the third quarter of 2009. *MERGER* is a control variable to reflect the fact that any acquisition would have a material impact on the total size of the institution's loan portfolio and thus on loan

[45] Total loan charge-offs (*CHARGE_OFFS*) is similarly calculated as charge-offs of both owned and securitized loans divided by the sum of reported assets and securitized loans.

[46] I also considered a firm's securitization exposure, the size of a firm's loan commitments, and exposure to mortgage and asset backed securities as potential determinants of loan growth. None of these variables were found to be significant and were thus not included in the final model.

growth over the period of study. The assumption with the date range for the *MERGER* dummy is that any announced acquisition would be realized in the quarter following the announcement. Thus, this variable captures any potential increase in loan portfolio size from the fourth quarter of 2008 through the fourth quarter of 2009, the period of study in my model. The second addition to the Brewer et al. model is a variable for lagged lending growth (*LENDING_GROWTH_LAG*). This variable recognizes that previous lending activity is likely highly predictive of future loan growth.[47]

My model studies whether firms that received TARP funding behaved any differently in their lending activities than institutions that did not receive TARP capital. TARP capital first began to be distributed in the fourth quarter of 2008 and the last recipients received funding in the fourth quarter of 2009. Thus, my dependent variable for loan growth is constructed as the change in managed loans from the third quarter of 2008 to the fourth quarter of 2009 to capture the five quarters (fourth quarter of 2008 through fourth quarter of 2009) when an influx of capital could have led to markedly different loan growth for TARP recipients than institutions that did not receive government funds. The lagged independent variables are then either for the third quarter of 2008 if the variables are in levels (*CAPITAL_RATIO, CHARGE_OFFS*) or a growth rate ending in the third quarter of 2008 (*JOB_GROWTH, LENDING_GROWTH_LAG*).

[47] A final departure from the Brewer et al. lending model is that I study total loan growth whereas Brewer et al. examined growth only in commercial and industrial loans, arguing that this type of lending activity is especially important for the productive sector of the economy. I elected to examine total loan growth because the principal concern of policymakers at the time was to reinvigorate lending to all borrowers, not just commercial enterprises and industry.

Incorporating these changes to the Brewer et al. framework, the model I test for firm j is:

$$Lending\ Growth_{09_j} = \beta_0 + \beta_1 Capital\ Ratio_{08Q3_j} + \beta_2 Charge-offs_{08Q3_j} + \beta_3 Lending\ Growth\ Lag_{08_j} + \beta_4 Merger_j + \beta_5 Job\ Growth_{08_j} + \beta_6 TARP\ Received_j + \varepsilon_j$$

My lending model is cross sectional, with loan growth from the fourth quarter of 2008 to the fourth quarter of 2009 explained by a number of firm financial measures and local job market activity in 2008. The data sources for my sample are the same as in chapter 3. My information on banking industry acquisition announcements is from SNL Financial. Firm financials come from standardized bank Call Reports or bank holding company FR Y-9C reports. Finally, data on employment growth is from Haver Analytics.

The data sample I start out with is the same 5,244 firms studied in chapter 3. Of this sample, however, 78 firms failed from the third quarter of 2008 through the end of 2009 and thus loan growth information is not available. Three additional institutions changed their structure, resulting in incomplete lending data over the sample period. Finally, I excluded de novo banks because these recently opened institutions consistently have higher growth rates that would reflect organic growth rather than an impact from receiving TARP capital. Consistent with chapter 3, I define an institution as a de novo bank if it started operations between 2004 and 2008. This designation captures all institutions that were less than five years old, in accordance with the Federal Reserve's de novo definition, at the inception of TARP (Board of Governors of the Federal Reserve

System 1991). Excluding de novo banks eliminates an additional 395 firms. Thus, my sample consists of 4,768 institutions, 475 of which are classified as receiving TARP funding (10% of the sample).[48]

4.2.2 Model hypotheses

The main hypothesis being tested in my lending model is that institutions that received TARP capital behaved differently in their lending practices than other institutions in the commercial bank system. Formally, this is:

H1: Loan growth and the likelihood of receiving TARP capital are significantly related.

If being a TARP recipient did indeed result in different lending behavior, then there are two possibilities:

H1A: Loan growth and the likelihood of receiving TARP capital are positively related.

H1B: Loan growth and the likelihood of receiving TARP capital are negatively related.

[48] As in chapter 3, I designate an institution as a TARP recipient if it had accepted TARP capital by June 30, 2009. There are 33 additional institutions in my sample that receiving TARP capital after this date. With 508 TARP institutions total, my sample captures 72% of the 707 institutions that received capital from TARP. The TARP institutions that are not in my sample include the largest institutions that were forced to accept government capital and TARP institutions that were not commercial banks such as thrifts and thrift holding companies, S corporations, and mutual banks.

The rationale for hypothesis H1A is that additional capital supports lending by providing a larger backstop against unexpected losses. Indeed, Brewer et al. find that a bank's capital ratio is positively related to loan growth. Hypothesis H1A thus says that if a bank sees an increase in capital through an injection from TARP, then that increases the capacity of that institution to lend and should lead to stronger loan growth.

Alternatively, hypothesis H1B is supported if the institution perceived TARP capital as special and distinct from other forms of capital. There is a strong argument that TARP capital was in fact special. Unlike traditional forms of capital such as the issuance of common stock, there was always an expectation that banks would eventually return TARP funds to the government, giving this cash a distinctly transitory quality. This fact, coupled with the public backlash against TARP recipients, may have encouraged banks to hoard capital (both TARP capital and their existing capital) until such time as it was financially acceptable to return the TARP capital and still maintain sufficient capital reserves to weather the economic downturn. The potentially special nature of TARP capital could also have encouraged institutions to use that capital in unconventional ways. For example, as will be tested in the bank loss model below, TARP institutions may have felt that the additional capital gave them greater cover to acknowledge losses. The capital would thus have been deployed primarily to offset higher losses rather than support lending. Both the hoarding of capital to prepare for TARP payback and the deployment of TARP capital for nontraditional uses could thus result in a scenario where TARP recipients had weaker loan growth than other institutions.

4.2.3 Univariate results

To explore these hypotheses, I first conducted difference in means tests for each of the key variables in the lending model. The results of these tests are presented in Table 4.1. By this statistical measure, TARP institutions had significantly greater growth in managed loans from the third quarter of 2008 to the fourth quarter of 2009 than banks that did not receive TARP funding.[49] This supports hypothesis H1A that loan growth and the likelihood of being a TARP recipient are positively related. Many of the other results in the difference in means test are consistent with the findings in chapter 3. For example, as in chapter 3, I find that TARP recipients held less capital, were more likely to be involved in an acquisition and were weaker financially (as measured, in this case, by the significantly higher charge-off rate for TARP recipients).

Table 4.1: Difference in Means Tests for the Lending Model

*, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively. Significance determined by first testing equality of variance and then utilizing the appropriate t-value to determine significance.

Statistic	Institutions receiving TARP (475)	Institutions not receiving TARP (4,293)	Difference
LENDING_GROWTH	0.044	0.025	0.019 **
CAPITAL_RATIO	0.089	0.107	-0.018 ***
CHARGE_OFFS	0.004	0.003	0.001 ***
LENDING_GROWTH_LAG	0.125	0.059	0.066 ***
MERGER	0.074	0.018	0.056 ***
JOB_GROWTH	-0.942	-0.688	-0.254 ***

[49] It should be noted that the institutions in my sample reported positive loan growth over the survey period. For the commercial bank system as a whole, however, total managed loans declined from the third quarter of 2008 to the fourth quarter of 2009. This disparity between my sample and the total population is due to the fact that my sample does not include the largest institutions that were forced to accept TARP capital in October 2008. Because of their overall market share, these large institutions were the driving force behind the overall decline in loans in the commercial bank system over this period. Excluding these large institutions does not materially affect my multivariate regression results, however, because I focus on the *number* of TARP recipients, not the dollar amount of TARP received, so that excluding these banks is immaterial for a sample with 4,768 observations.

While the difference in means test lends some support to the theory that TARP capital helped foster greater lending, the data are far from definitive because this univariate analysis does not control for other important factors that determine bank lending activities. I will thus now turn to the modified Brewer et al. lending model for a more robust test of the hypotheses defined above.

4.2.4 Testing for endogeneity

In both the lending model and my other two models below, there is a potential endogeneity problem with just using a simple dummy variable for whether the bank received TARP money in an OLS regression. For example, both loan growth and receiving TARP funds are potentially influenced by the health of the bank. Indeed, using a Hausman test, Brewer et al. found that derivative use was endogenous in their bank lending model. Brewer et al. addressed this endogeneity problem by using a probit specification to create an instrumental variable for derivative use that was then employed in the lending model. As will be discussed in greater detail below, Brewer et al.'s approach is the same method that I use in this chapter to address endogeneity.

I test for endogeneity in my lending model in two ways. My first approach is the Hausman test, which evaluates whether OLS is a consistent estimator and thus appropriate to use in this context (Hausman 1978). Under the Hausman test, I compare a consistent instrumental variables regression with the efficient OLS estimator. The null is that OLS is a consistent estimator so that a rejection of the null requires the use of the instrumental variables approach assuming suitable instruments are available. Using the

Hausman test for my lending model, I reject the null that OLS is a consistent estimator at the 1% significance level, suggesting that an instrumental variables approach is required.

A second, and related test for endogeneity I employ is the Durbin–Wu–Hausman test (also known as the augmented regression test), which is a more direct test of the endogeneity of the TARP dummy variable (MacKinnon and Davidson 1993). With this test, one generates predicted values for the endogenous right hand side variable, by regressing it against all exogenous variables, and then includes this predicted variable in the OLS regression. Hence, the OLS regression includes both the variable that is suspected of being endogenous and predicted values of that variable. The null hypothesis is that the coefficient on the predicted variable is equal to zero. The rejection of this null indicates that the predicted variable has some value and hence the TARP dummy variable is endogenous. The Durbin–Wu–Hausman test also indicates that the *TARP_RECEIVED* dummy variable is endogenous in my model of bank lending, rejecting exogeneity at the 1% significant level. Collectively, my two endogeneity tests provide strong support for generating an instrumental variable for *TARP_RECEIVED* that can then be used appropriately in my model of bank lending.

4.2.5 Addressing endogeneity

My approach to addressing detected endogeneity is, like Brewer et al., to use a first stage probit model to generate a predicted value for the variable of interest (in my case, *TARP_RECEIVED*). The probit model I use is the nonlinear Model 6 from chapter 3, which examined the determinants of which firms receiving TARP funding. From the output of this probit model, I generate a predicted value for a firm's likelihood of

receiving TARP, which I then use in my OLS cross-sectional regression model of bank lending.

To derive an appropriate instrumental variable for receiving TARP, I must find at least one variable that explains TARP allocations but does not reflect firm conditions. Fortunately, the empirical results from chapter 3 have several very strong candidates. Table 4.2 reproduces the probit results from chapter 3, omitting the financial and macro variables that clearly would reflect firm condition. Among the remaining variables, those that are bolded highlight potential factors that do not necessarily indicate firm condition but that my chapter 3 model found significantly affected TARP allocation.

The first of those factors is the *MORE_THAN_SIX_MO* variable, which is a dummy variable indicating whether the institution's last exam was more than six months old. As noted in chapter 3, regulators used a six month exam date threshold for determining whether firms would have an expedited review or potentially face an additional layer of scrutiny in the approval process. The timing of the last exam clearly mattered to the TARP process (the variable is significant at the 5% threshold), but would not have any bearing on firm condition since the timing of bank exams is largely randomly determined.

Table 4.2: Probit Results From Chapter 3 Omitting Financial/Macro Variables

Results of probit models where the dependent variable is a dummy variable for whether TARP capital was received. The dummy variable is constructed so that positive coefficient estimates indicate an increased probability of receiving TARP capital. The omitted variable for the composite and management rating dummies is one-rated institutions. The omitted variable for the regulator dummies is the OCC. The omitted variable for the structure dummies is small shell holding companies. The omitted variable for the public/private status is Nasdaq. Intercept and financial/macro results are omitted. Standard errors are in brackets and *, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Two_Rated		0.797 ***		0.493 ***		0.362 **
		[0.12]		[0.14]		[0.14]
Three_Rated		0.947 ***		0.708 ***		0.636 **
		[0.21]		[0.25]		[0.26]
Man_Two_Rated		-0.176		-0.089		-0.094
		[0.11]		[0.13]		[0.14]
Man_Three_Rated		-0.738 ***		-0.579 **		-0.698 ***
		[0.20]		[0.23]		[0.24]
Enforcement		0.125		0.078		-0.051
		[0.25]		[0.27]		[0.27]
Num_Month_Since_Exam		0.008		0.005		0.004
		[0.01]		[0.01]		[0.01]
More_Than_Six_Mo		0.124		**0.180 ** **		**0.196 ** **
		[0.08]		**[0.09]**		**[0.09]**
Independent_Ind		0.182 **		0.119		0.126
		[0.08]		[0.11]		[0.11]
Large_Bhc_Ind		1.192 ***		0.231 *		0.182
		[0.10]		[0.13]		[0.14]
Fdic		**0.395 *** **		**0.400 *** **		**0.428 *** **
		[0.09]		**[0.10]**		**[0.11]**
Fed		**0.454 *** **		**0.371 *** **		**0.401 *** **
		[0.12]		**[0.13]**		**[0.14]**
Merger			0.590 ***	0.354 ***		0.390 ***
			[0.11]	[0.12]		[0.12]
Age			**-0.005 *** **	**-0.003 *** **		**-0.003 *** **
			[0.00]	**[0.00]**		**[0.00]**
Denovo			0.021	0.196 *		0.184
			[0.10]	[0.11]		[0.12]
Amex			-0.180	-0.122		-0.157
			[0.36]	[0.39]		[0.39]
Nyse			0.682 ***	0.343		0.354
			[0.26]	[0.32]		[0.33]
Otcbb			**-0.800 *** **	**-0.393 *** **		**-0.468 *** **
			[0.10]	**[0.12]**		**[0.12]**
Pink			**-1.306 *** **	**-0.814 *** **		**-0.902 *** **
			[0.14]	**[0.17]**		**[0.17]**
Private			**-1.633 *** **	**-0.985 *** **		**-1.064 *** **
			[0.08]	**[0.11]**		**[0.11]**
Senate_Banking			-0.093 *	-0.119 **		-0.127 **
			[0.05]	[0.06]		[0.06]
Number of obs.	5,244	5,244	5,244	5,244	5,244	5,244
Chi-square	963.80***	622.30***	748.99***	1,216.73***	1,060.44***	1,298.30***
Pseudo-R^2	0.2792	0.1803	0.2170	0.3525	0.3072	0.3762

The regulator variables *FDIC* and *FED,* which are dummy variables indicating the regulator that would have reviewed each potential TARP applicant, also appear to be valid instruments. Both are positive and significant at the 1% level, suggesting that institutions that had their applications reviewed by the FDIC or Federal Reserve were more likely to receive TARP capital than OCC regulated institutions. While this suggests some important differences among regulators in the TARP approval process, it is not likely that being regulated by either of these agencies (instead of the OCC) affects firm condition.

The age of the firm was a factor in the TARP process, with the sign on *AGE* indicating that older firms were significantly less likely to receive capital. Like the previous variables discussed, this may reflect a preference by regulators to target newer firms with greater opportunities for growth. It is not necessarily obvious, though, that how many years an institution has existed has a strong influence on its financial condition.

Finally, private institutions or public firms with a relatively illiquid stock were significantly less likely to receive TARP funding than banks listed on a major stock exchange, as evidenced by the negative and significant signs for *OTCBB, PINK* and *PRIVATE*. Indeed, in calculations of the marginal effects (omitted here, but available upon request) of each of the variables in the probit model, the variable *PRIVATE* had the largest impact on the probability of receiving TARP funding. While the firm's public or private status had a measurable impact on whether it receiving government support, this characteristic does not likely affect the health of the institution.

Even if the argument for a particular proposed instrument is not persuasive, the abundance of potential instruments suggest that the probit model in chapter 3 offers ample opportunity for generating a valid exogenous predicted value for a firm's likelihood of receiving TARP.

4.2.6 Multivariate results

My multivariate results are presented in Table 4.3. The results of the first stage probit regression are omitted here because they are quantitatively similar to those found in chapter 3.[50] Importantly, however, the variables I proposed as potential instruments such as the regulatory dummies (*FED, FDIC*) or the public/private status of a firm (*OTCBB, PINK, PRIVATE*) are all still significant in the probit regression results at either the 1% or 5% level, giving a level of comfort that the generated predicted variable $TARP\_\widehat{RECEIVED}$ is a valid instrumental variable.

Following the first stage probit regression, I tested three versions of my bank lending model in cross-sectional OLS regressions. The first model, referred to as Model 1 in Table 4.3, omits the $TARP\_\widehat{RECEIVED}$ variable. The purpose of Model 1 is to provide a basis of comparison with Brewer et al. to establish that my results are consistent with previous economic work. Consistent with Brewer et al., I find that both higher capital and greater job growth are positively related to loan growth while charge-offs negatively affect lending. The two variables that were additions to the Brewer et al. model are also strongly significant. The results indicate, not surprisingly, that

[50] The only important changes in the probit regression are that the sample size is slightly smaller (4,768 observations in this chapter compared to 5,244 observations in chapter 3), the right hand side variables include the exogenous variables in my lending model as additional instruments, and the de novo dummy variable, which was not found to be significant in chapter 3, was omitted since my sample excludes de novos.

acquisitions result in a jump in total loans and that loan growth is strongly predicted by past loan growth.

Table 4.3: Regression Results for the Lending Model

Cross-sectional regression results where the dependent variable is the change in managed loans from the third quarter of 2008 to the fourth quarter of 2009. The coefficient estimates for Model 1 are generated from an OLS regression. The coefficient estimates for Model 2 and 3 are generated by first creating a predicted value for *TARP_RECEIVED* from a probit model and then using this predicted value for *TARP_RECEIVED* in an OLS regression. Standard errors are in brackets. *, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Capital_Ratio	0.427 *** [0.05]		0.378 *** [0.05]
Charge_Offs	-2.170 *** [0.22]		-2.105 *** [0.22]
Lending_Growth_Lag	0.228 *** [0.01]		0.242 *** [0.01]
Merger	0.172 *** [0.01]		0.182 *** [0.01]
Job_Growth	0.008 *** [0.00]		0.007 *** [0.00]
TARP_Received		0.060 *** [0.01]	-0.045 *** [0.01]
Intercept	-0.025 *** [0.01]		-0.017 *** [0.01]
Number of obs.	4,768	4,768	4,768
Adjusted R^2	0.1460	0.0089	0.1494

Having established that the model results accord with both economic theory and prior empirical work, I moved to models that include the variable of interest, the $TARP\_\widehat{RECEIVED}$ predicted variable. In Model 2 in Table 4.3, I test a restricted case where loan growth over the survey period is explained by the $TARP\_\widehat{RECEIVED}$ predicted variable only. These results were generated by first creating a

$\widehat{TARP\_RECEIVED}$ predicted variable from a probit regression model and then using this instrumental variable in an OLS regression of loan growth. Model 2 has very low explanatory power (the adjusted R^2 is less than 0.01) and although $\widehat{TARP\_RECEIVED}$ is significant, it could be because a host of explanatory variables are omitted.

The full lending model is presented as Model 3 in Table 4.3. The adjusted R^2 of Model 3 is just a slight improvement over Model 1 (the adjusted R^2 equals 0.149 for Model 3 vs. 0.146 for Model 1), consistent with the finding from Model 2 that $\widehat{TARP\_RECEIVED}$ alone does not have great explanatory power. Nonetheless, $\widehat{TARP\_RECEIVED}$ is significant at the 1% level in Model 3, suggesting TARP did have some impact on bank lending behavior.

Notably, the sign on $\widehat{TARP\_RECEIVED}$ in my preferred specification, Model 3, is negative. This indicates, in a reversal from the difference in means tests, that firms that were the most likely to be TARP recipients were *less* likely to lend. The results thus support hypothesis H1B that loan growth and the likelihood of being a TARP recipient are negatively related. This finding is perhaps counterintuitive. Indeed, *CAPITAL_RATIO* is positive and significant, indicating that in general a firm with higher capital in the third quarter of 2008 did experience greater loan growth over the survey period. That finding is consistent with past economic literature. The $\widehat{TARP\_RECEIVED}$ variable measures the probability of receiving TARP but it also in effect proxies for the fact that these firms were likely to see an increase in capital over this period. The negative and significant sign on $\widehat{TARP\_RECEIVED}$ thus says that this influx of capital actually led to *less* lending.

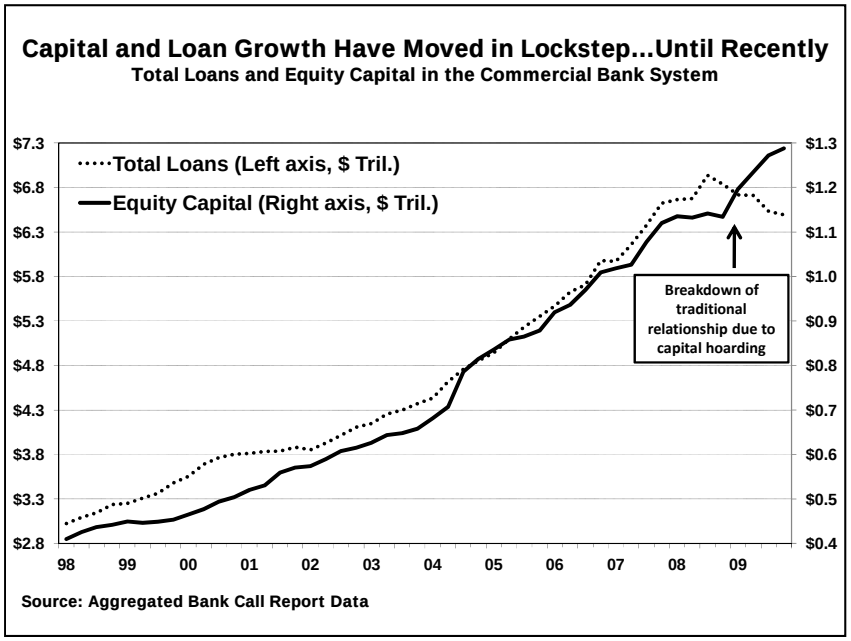
As noted in the prior discussion of hypothesis H1B, capital hoarding is likely an important factor in this result. As the financial crisis intensified in the fall of 2008, banks were unable to raise additional capital for months, making any capital that was generated (either through retained earnings or TARP funding) especially precious. Once the capital markets did reopen later in 2009 and banks were able to raise additional capital, firms were still reluctant to deploy that capital lest conditions deteriorate again. The result was an end to the traditional positive relationship between capital growth and loan growth. This phenomenon is shown in Figure 4.1, which depicts total loans and total equity capital in the commercial bank system from 1998 through 2009. From 1998 through most of 2008, the growth in equity capital was matched by a commensurate increase in loan growth as higher capital helped support additional lending. However, from the third quarter of 2008 through the fourth quarter of 2009—the period I study—equity capital in the commercial bank system grew an additional 13% while total loans contracted 6%. In essence, despite a large influx of capital (primarily from TARP[51]), firms were strikingly reticent to deploy their capital to make new loans.

Capital hoarding cannot, however, fully explain the finding that the likelihood of receiving TARP capital is *negatively* related to loan growth. If, for example, TARP injections generated a Ricardian situation where recipients simply saved the government capital with the intention of paying it back at a future date, then the $\widehat{TARP\_RECEIVED}$ variable should be insignificant. Put another way, controlling for other important determinants of loan growth such as charge-offs, acquisitions and regional economic conditions, receiving TARP would have no effect on loan growth in a classic case of

[51] TARP's overall contribution to the increase in equity capital is difficult to calculate exactly because over the survey period firms were both receiving *and* repaying TARP funds.

capital hoarding. That $TARP\_\widehat{RECEIVED}$ is in fact significantly negative means that there are other influences at work.

Figure 4.1: Historical Trends in Capital and Loan Growth



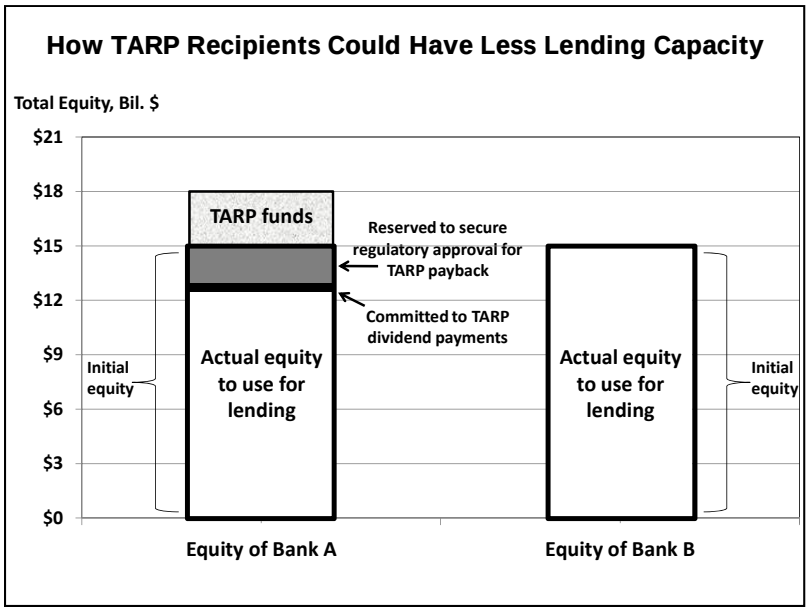
One possibility is that receiving TARP funding made firms more conservative about their *existing* capital reserves, to the detriment of loan growth. A TARP recipient was required to pay a 5% annual dividend on the preferred shares it issued to the Treasury Department in exchange for the government capital. Paying this dividend would have been a significant priority for TARP firms to demonstrate their continued viability to customers and shareholders. Thus, even if a TARP recipient decided to fully hoard its TARP capital, its existing capital base would still be further depleted by the payment of this dividend, limiting the firm's ability to lend.

The motivation by many firms to quickly pay back the TARP funds could also have limited the lending activities of TARP recipients. Regulators, for example, would

have required that any firm wishing to pay back its TARP funds have enough capital in place to still be well capitalized after returning the TARP capital. This would have put added pressure on banks to preserve a portion of existing capital to maintain the specified regulatory capital buffer.

Figure 4.2 offers a hypothetical example of how TARP recipients could actually have less capital capacity to lend. In this example, both Bank A and Bank B begin with initial equity of $15 billion, outlined by the thick rectangle of each stacked bar in Figure 4.2. Bank A then receives $3 billion in TARP funding (shown at the top of the stacked bar for Bank A in Figure 4.2), raising its total equity to $18 billion. At this point, it would appear that Bank A has significantly more lending capacity than Bank B. However, in order to meet its quarterly dividend obligations on the preferred shares it issued to the Treasury Department for the TARP capital, Bank A earmarks a portion of its existing capital (shown in black in Figure 4.2) for dividend payments. Like many banks, Bank A also intends to fully pay back the capital infusion in a timely manner. As a result, Bank A elects not to commit its $3 billion in TARP funds to new loans. In consultation with its regulator, Bank A also learns that if it is to pay back its TARP capital, the regulator expects the bank to still have $14.5 billion in equity capital remaining. Bank A thus establishes $2 billion in equity capital (shown in dark gray in Figure 4.2) as a cushion to ensure it meets this threshold. After establishing this equity cushion and its reserve for TARP dividend payments, Bank A is left with less than $13 billion in equity that can be used to backstop future lending, well below the $15 billion in capacity of Bank B. Thus, despite not receiving any funding from TARP, it is actually Bank B that is in a better position to lend than Bank A.

Figure 4.2: Hypothetical Example of a TARP Recipient and a Non-TARP Bank



Another explanation for how a TARP recipient could exhibit weaker loan growth than a non-TARP bank is that the TARP bank could have decided to deploy the windfall of capital in an unconventional way. Put another way, while traditionally capital is used to support new loans, a bank could have decided that TARP funding created a unique opportunity to employ its capital base for an alternative purpose. One such purpose, for example, was to be more forthcoming about losses inherent on the bank's balance sheet. This theory is the subject of the next section of this chapter.

4.3 The Loss Model

4.3.1 The model

I create a model of bank provisions to test the proposition that TARP recipients could have been more forthcoming about asset quality problems. I focus on a bank's

provisions, rather than a bank's recorded losses, because it is provisions that have the most direct impact on a bank's profitability. Under bank accounting rules, a bank provisions (or sets aside) a reserve each quarter to offset expected future losses. Because these provisions are recorded on a bank's income statement, higher provisions directly result in lower profits for an institution in that quarter.

Charge-offs, conversely, have a more indirect impact on a firm's finances. Each bank has an existing pool of loss reserves known as the allowance for loan and lease losses (ALLL) which is funded by quarterly provisions. When losses are recognized in a quarter, they are not reported on the firm's income statement. Instead, the bank debits the ALLL to cover these losses. As a result of this accounting treatment, a firm could report significant losses in a quarter but if its ALLL was sufficient to cover these losses and it makes no additional provision in the quarter, the firm could still report a large profit. Conversely, a firm that announces a very large provision for future losses would find it difficult to still be profitable in that quarter. Because of the financial consequences of provisions, I use this variable as my measure of a firm's willingness to acknowledge balance sheet problems.

My bank provisions model is based on the paper *U.S. Bank Loan-Loss Provisions, Economic Conditions, and Regulatory Guidance* (2006) by William Handorf and Lili Zhu, which looked at the timing of bank loan loss provisions. Handorf and Zhu argue that bank provisions are a function of the existing reserves in the ALLL, GDP growth, and management's forecast of future losses. Formally, for bank j the Handorf and Zhu model is:

$$Provisions_{j,t} = \beta_0 + \beta_1 ALLL_{j,t} + \beta_2 GDP\ Growth_t + \beta_3 Future\ Losses_{j,t+T} + \varepsilon_{j,t}$$

Handorf and Zhu studied a ten-year panel dataset and thus had the luxury of using charge-offs in subsequent quarters as an approximation for management's expectations for future losses. I could similarly use losses over the five quarter survey period (fourth quarter 2008 through fourth quarter 2009) as my proxy for a firm's projected losses. However, the possibility that a bank could adequately predict five quarters of losses with a great degree of accuracy during a period of extreme financial turmoil seems unlikely.

I thus modify the Handorf and Zhu model in several important ways. To proxy for the firm's projection of future losses, I use the firm's early and late stage delinquency ratios[52] in the third quarter of 2008 since delinquencies are a leading indicator of future charge-offs. I split the firm's delinquency ratio into early stage (*EARLY_DELINQUENCY_RATE*) and late stage delinquency (*LATE_DELINQUENCY_RATE*) to recognize that accounts that are just a few payments behind result in smaller losses (because of higher cure rates) than customers that are many payments late.

Like Handorf and Zhu, my dependent variable (*LOSSES*) includes a firm's loan loss provision. However, I also include off-balance sheet net charge-offs recorded during this period to reflect securitized asset quality problems.[53] My dependent variable also includes goodwill impairment losses, which are losses taken when the carrying value of a business unit exceeds the fair value of that unit. Like provisions, goodwill impairment

[52] Early stage delinquencies are defined as loans 30 to 89 days past due. Late stage delinquencies are defined as loans 90 days or more past due or in nonaccrual status.

[53] A firm does not provision for securitized loans so this is the best proxy of the performance of these exposures.

losses have a direct negative impact on earnings so they are another important measure of a firm's candor in acknowledging the impact of the financial crisis on the value of its businesses.

The Handorf and Zhu model uses GDP growth to test for the potential correlation of provisions to macroeconomic cycles. Since my data is cross sectional rather than panel, I cannot test for cyclicality over a business cycle. However, to acknowledge the potential economic impact on provisions and for consistency with my lending model, I include a variable for state employment growth (*JOB_GROWTH*) to represent macroeconomic conditions. This variable is specified in exactly the same way as in my lending model, with job growth reflecting the precise geographic footprint of the organization as defined by its branch locations. I also include the firm's capital ratio (*CAPITAL_RATIO*) since highly capitalized firms may be more inclined to take provisions because even if such a reserve results in a large quarterly loss, the firm is still likely to remain well capitalized. Conversely, firms with weak capital may be more reluctant to acknowledge losses since it would hurt earnings and thus further deplete their already deficient capital position.

Finally, I include a dummy variable for acquisitions (*MERGER*) to control for the fact that mergers could impact loss recognition in several ways. On the one hand, a merger could result in significant provisions to address the distressed condition of the target firm. There are two ways, however, that mergers could result in lower provisions. First, a merger could be an indirect indicator of firm strength and thus firms that make acquisitions could have smaller losses to report. Second, a firm that uses its capital base to acquire another institution could be more reluctant to also expend that capital to

recognize losses. Both *CAPITAL_RATIO* and *MERGER* are defined in the same way as in the lending model of section 4.2.

As in my lending model, I construct all my variables to include both on and off balance sheet activities to account for the involvement of firms in the securitization market. Thus, both *EARLY_DELINQUENCY_RATE* and *LATE_DELINQUENCY_RATE* represent delinquencies for both the owned and securitized loan portfolios. Similarly, my variable for the allowance for loan and lease losses (*ALLL*) is the sum of the end-of-period balance sheet allowance plus the allowance for credit losses on off-balance sheet credit exposures. Handorf and Zhu scale each of their variables by total loans. To capture the full scale of a firm's activities, I instead scale each financial variable, including the dependent variable, by managed assets.[54]

My model studies whether firms that received TARP funding were any more or less likely to provision for future charge-offs or acknowledge losses than firms that did not receive TARP capital. My dependent variable is constructed as the sum of total provisions, off-balance sheet charge-offs and goodwill impairment losses recognized from the fourth quarter of 2008 to the fourth quarter of 2009, normalized by third quarter 2008 managed assets, to capture the five quarters when an injection of TARP capital could have resulted in very different behavior by TARP recipients than other institutions. Like the lending model, the lagged independent variables are either for the third quarter of 2008 if the variables are in levels (*CAPITAL_RATIO, EARLY_DELINQUENCY_RATE, LATE_DELINQUENCY_RATE, ALLL*) or growth from the peak of employment to the third quarter of 2008 (*JOB_GROWTH*).

[54] Managed assets equal total assets plus securitized loans.

Incorporating these changes into the Handorf and Zhu framework, the model I test for firm j is:

$$Losses_{09_j} = \beta_0 + \beta_1 Early\ Delinqueny\ Rate_{08Q3_j} + \beta_2 Late\ Delinquency\ Rate_{08Q3_j} + \beta_3 Capital\ Ratio_{08Q3_j} + \beta_4 ALLL_{08Q3_j} + \beta_5 Merger_j + \beta_6 Job\ Growth_{08_j} + \beta_7 TARP\ Received_j + \varepsilon_j$$

My loss model is cross sectional, with losses recognized from the fourth quarter of 2008 through the fourth quarter of 2009 explained by a number of firm financial measures, merger announcements, and local job market activity in 2008 as well as the likelihood of participation in TARP. The data sources for my sample are the same as in the lending model of section 4.2. The data sample I use is also the same as in section 4.2, totaling 4,768 institutions, 475 of which are classified as receiving TARP funding (10% of the sample).

4.3.2 Model hypotheses

The main hypothesis being tested in this section is that institutions that received TARP capital behaved differently in acknowledging asset quality problems than other institutions in the commercial bank system. Formally, this is:

H2: Loss recognition and the likelihood of receiving TARP capital are significantly related.

If being a TARP recipient did indeed result in different behavior, then there are two possibilities:

H2A: Loss recognition and the likelihood of receiving TARP capital are positively related.

H2B Loss recognition and the likelihood of receiving TARP capital are negatively related.

Hypothesis H2A is supported by the argument that a stronger equity position allows a firm to acknowledge significant losses while still retaining sufficient capital to remain well capitalized. Handorf and Zhu, for example, find a positive relationship between GDP growth and loan loss provisions. This suggests that firms are more likely to report higher provisions in good economic times when there is lower risk of acknowledging these problem loans. Receiving TARP capital may be a similar situation where the increase in capital allows management to be more candid with asset quality issues.

The lending model in section 4.2 showed that firms that were more likely to receive TARP funding had weaker loan growth. Thus, another rationale for hypothesis H2A is that TARP firms focused on acknowledging losses at the expense of lending. Put another way, TARP institutions had a finite amount of capital to deploy and the decision was made to be more transparent about losses at the expense of generating new loans. This decision to disclose losses could have come internally from management or it might have come from outside sources. For example, regulators could have emphasized that

firms accepting government capital had a responsibility to be forthright about asset quality problems. Similarly, investors in TARP institutions could have pressured these firms to use the additional capital to be more transparent about their balance sheet issues.

Alternatively, hypothesis H2B is supported by the argument of capital hoarding discussed in section 4.2. Just as firms were reluctant to utilize TARP funds to generate new loans, they could have been equally hesitant to use the capital to acknowledge losses, especially if the institution planned to quickly return the government capital. Alternatively, the firm might forgo disclosing losses because it had earmarked the TARP capital for some other important purpose. The evidence in section 4.2 suggests that the TARP funds were not used for lending. However, the firm could have instead decided that it should use the capital to attract new managerial talent to turn around the business. Allocating the funds for CEO compensation or other activities would have limited the ability of the firm to acknowledge financial problems.

4.3.3 Univariate results

Like in the lending model, I begin my analysis with a difference in means test for each of the model variables. The results, presented in Table 4.4, provide preliminary support for hypothesis H2A that TARP recipients were more likely to acknowledge losses. TARP banks reported provisions, goodwill impairment losses and off-balance sheet net losses representing 2.4% of managed assets over the five quarter survey period compared to a significantly smaller 1.1% loss rate for institutions that did not receive TARP funding. Many of the other results in Table 4.4 have already been discussed previously. However, TARP recipients in general appeared to have greater asset quality

problems in the third quarter of 2008 than other institutions, consistent with my prior finding in chapter 3 that TARP recipients were typically weaker financially. For example, the difference in means tests show that TARP firms had a significantly higher late stage delinquency rate and a higher allowance for loan and lease losses than firms that did not participate in TARP. Early stage delinquencies, however, were lower for TARP recipients than other institutions in the commercial bank system.

Table 4.4: Difference in Means Tests for the Loss Model

*, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively. Significance determined by first testing equality of variance and then utilizing the appropriate t-value to determine significance.

Statistic	Institutions receiving TARP (475)	Institutions not receiving TARP (4,293)	Difference
LOSSES	0.024	0.011	0.014 ***
EARLY_DELINQUENCY_RATE	0.009	0.010	-0.001 ***
LATE_DELINQUENCY_RATE	0.013	0.011	0.001 **
CAPITAL_RATIO	0.089	0.107	-0.018 ***
ALLL	0.010	0.009	0.001 ***
MERGER	0.074	0.018	0.056 ***
JOB_GROWTH	-0.942	-0.688	-0.254 ***

4.3.4 Multivariate results

I next moved to the multivariate analysis using the augmented Handorf and Zhu loss model to test for significantly different loss recognition behavior between TARP and non-TARP firms. My two tests for endogeneity, the Hausman test and the Durbin–Wu–Hausman test, both show strong evidence (at the 1% level) of an endogeneity problem with simply using a *TARP_RECEIVED* dummy variable. Thus, as in my lending model process, I used the nonlinear probit model from chapter 3 to generate an instrumental

variable for *TARP_RECEIVED* to use in the second stage OLS loss model.[55] As in the lending model, the potential instruments enumerated earlier (*MORE_THAN_SIX_MO, FED, FDIC*, etc.) are all strongly significant in the first stage probit model, lending validity to the derived $\widehat{TARP\_RECEIVED}$ instrumental variable.

My multivariate regression results are shown in Table 4.5. Model 1 is the baseline loss model that excludes the *TARP_RECEIVED* variable to allow for a direct comparison to the original Handorf and Zhu model. Handorf and Zhu find that a firm's expected losses over the next year are positively correlated with provisions as firms use their loss forecast to adequately fund their allowance for losses. Similarly, I find that both early and late stage delinquencies, typical inputs in bank loss forecasting models, are positively related to bank provisions. Not surprisingly, the coefficient estimate for *LATE_DELINQUENCY_RATE* is much larger than *EARLY_DELINQUENCY_RATE* since customers that are very late on their debts are much more likely to translate into losses than debtors that have missed just a few payments.

Unlike Handorf and Zhu, I find a positive relationship between the allowance for loan and lease losses and future provisions. Similarly, job growth is negatively related to future recognized losses in my empirical results compared to a positive relationship between GDP growth and provisions reported by Handorf and Zhu. These discrepancies are likely due to the cross sectional nature of my model compared to Handorf and Zhu's ten-year panel dataset. For example, it is intuitive that weaker local job growth in late 2008 would translate into higher bank losses in 2009, as my model indicates, but it is equally reasonable to accept that *over the business cycle*, as analyzed by Handorf and

[55] The only deviation from the chapter 3 probit model is that I excluded the variable *NONPERFORMING_SQ* because of multicollinearity problems. All other variables in the probit model were found to satisfy the generally accepted tests for multicollinearity.

Zhu, stronger GDP growth would encourage firms to be more candid about losses as a means to smooth earnings performance over time.

Table 4.5: Regression Results for the Loss Model

Cross-sectional regression results where the dependent variable is the sum of loan loss provisions, goodwill impairment losses, and off-balance sheet net charge-offs reported from the fourth quarter of 2008 through the fourth quarter of 2009 divided by total managed assets in the third quarter of 2008. The coefficient estimates for Model 1 are generated from an OLS regression. The coefficient estimates for Model 2 and 3 are generated by first creating a predicted value for *TARP_RECEIVED* from a probit model and then using this predicted value for *TARP_RECEIVED* in an OLS regression. Standard errors are in brackets. *, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Early_Delinquency_Rate	0.090 ***		0.143 ***
	[0.02]		[0.02]
Late_Delinquency_Rate	0.467 ***		0.472 ***
	[0.02]		[0.02]
Capital_Ratio	-0.020 ***		0.012 **
	[0.01]		[0.01]
ALLL	0.728 ***		0.524 ***
	[0.05]		[0.05]
Merger	0.003 **		-0.003 **
	[0.00]		[0.00]
Job_Growth	-0.002 ***		-0.002 ***
	[0.00]		[0.00]
TARP_Received		0.053 ***	0.028 ***
		[0.00]	[0.00]
Intercept	-0.001		-0.005 ***
	[0.00]		[0.00]
Number of obs.	4,768	4,768	4,768
Adjusted R^2	0.2984	0.2637	0.3729

In Model 2, I test the restricted case where recognized losses are explained only by the $TARP\_\widehat{RECEIVED}$ predicted variable. This parsimonious model is actually quite predictive. The adjusted R^2 of Model 2 is 0.264, not much lower than the modified Handorf and Zhu Model 1. Notably, the $TARP\_\widehat{RECEIVED}$ variable is positive and

significant at the 1% level. Both the respectable adjusted R^2 of Model 2 and the significance of $\widehat{TARP\_RECEIVED}$ suggest that TARP played a very important role in bank behavior on reporting losses.

The full loss model is presented as Model 3 in Table 4.5. Before moving to the variable of interest, $\widehat{TARP\_RECEIVED}$, it is worth noting that there are two sign changes from Model 1 to Model 3: *CAPITAL_RATIO* is negative and significant in Model 1 but positive and significant in Model 3, while the reverse is true of *MERGER* between the two models.[56] The adjusted R^2 also jumps from 0.298 for Model 1 to a more robust 0.373 for Model 3. These changes in variable signs and the improvement in overall model explanatory power are interpreted as evidence that $\widehat{TARP\_RECEIVED}$ is an important explanatory variable in the analysis of bank loss recognition during this period.

As in Model 2, the $\widehat{TARP\_RECEIVED}$ variable in Model 3 is positive and significant at the 1% level. Thus, consistent with the univariate difference in means tests and in support of hypothesis H2A, TARP recipients were likely to report higher losses from the fourth quarter of 2008 through the end of 2009 than non-TARP banks. Since the modeling process has taken special care to control for firm condition[57], this provides strong evidence that TARP firms were more candid about acknowledging losses than other financial institutions. Receiving a significant injection of capital from the government likely facilitated that candor. Indeed, the positive and significant sign for

[56] *MERGER* is negative and significant in Model 3, providing support for the argument presented earlier that the high capital cost of executing a merger could cause a firm to be less likely to also use its precious capital to disclose material losses. The negative relationship between *MERGER* and provisions could also, however, indicate firm strength since acquisitions are typically announced by stronger firms looking to gain market share.

[57] For example, the loss model controls for firm asset quality and the existing allowance for loan and lease losses. Furthermore, the $\widehat{TARP\_RECEIVED}$ variable is an instrumental variable that uses appropriate instruments to estimate the likelihood of receiving TARP funding.

CAPITAL_RATIO in Model 3 indicates that, in general, banks with higher capital are more likely to acknowledge losses, consistent with the hypothesis that greater capital gives banks more cover to disclose problem assets while still remaining well capitalized. For TARP institutions in particular, the influx of capital would have come at a particularly opportune time as the financial crisis generated mounting losses.

The empirical results for the loss model provide a nice compliment to the findings from the lending model. Focusing on just these two possible actions—recognizing losses and increasing lending—it appears that TARP recipients showed a strong preference for disclosing material asset quality problems, perhaps at the expense of loan growth. It remains to be seen, as the executive compensation model below will explore, whether firms used TARP funds for other purposes as well.

4.4 The Compensation Model

4.4.1 The model

My model of executive compensation is based largely on *An Examination of Multiple Governance Forces Within Bank Holding Companies* by Gregory Sierra, Eli Talmor and James Wallace (2006) and *Regulator Scrutiny and Bank CEO Incentives* by Elizabeth Webb (2008), although the analysis is informed by a more extensive review of the bank compensation literature (Hubbard and Palia (1995); Crawford, Ezzell and Miles (1995); Evans, Noe and Thornton (1997); Hermalin and Wallace (2001); Bliss and Rosen (2001); and Cooper (2009)). Both Sierra, Talmor and Wallace and Webb argue that the annual change in CEO pay is a function of the contemporaneous and lagged change in shareholder wealth. Webb also specifies that changes in compensation are influenced by

return on average assets and CEO tenure. Using this specification[58] but adding an indicator for TARP received, my CEO compensation model for firm j is:

$$CEO\ Compensation\ Growth_{09j} = \beta_0 + \beta_1 Shareholder\ Wealth\ Growth_{09_j} + \beta_2 Shareholder\ Wealth\ Growth\ Lag_{08_j} + \beta_3 ROA_{09_j} + \beta_4 CEO\ Tenure_{09_j} + \beta_5 TARP\ Received_j + \varepsilon_j$$

Using the convention of Sierra, Talmor and Wallace, *CEO_COMPENSATION_GROWTH* is the log change of annual executive pay from 2008 to 2009[59] and is defined as all forms of compensation listed in the annual SEC proxy statements.[60] *SHAREHOLDER_WEALTH_GROWTH* is the year-over-year dividend adjusted stock price return in 2009 while *SHAREHOLDER_WEALTH_GROWTH_LAG* is the year-over-year dividend adjusted stock price return in 2008.[61] *ROA* is the ratio of net income to average assets for fiscal 2009. Finally, *CEO_TENURE* indicates the number of years (including fractions of a year) that the executive had served as CEO from the individual's start date as CEO through December 31, 2009.

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[58] Sierra, Talmor and Wallace also consider Board of Director strength in their changes in executive pay model while Webb also includes a dummy if CEO age is greater than 57 and interaction terms between this age dummy and contemporaneous and lagged shareholder wealth. I do not include these additional variables in my model to preserve degrees of freedom. However, in unreported results, I tested the additional Webb variables in the model and did not find them significant.

[59] Specifically, the dependent variable is calculated as $\text{LN}(CEO\ Compensation_{09j}/CEO\ Compensation_{08j})$.

[60] Executive compensation information is specifically reported on SEC form DEF 14A. Total compensation is defined as the sum of salary, bonus, other annual income, total value of restricted stock granted, long-term incentive payouts, all other total compensation and the value of stock options granted calculated by Execucomp using the Black-Scholes option pricing method. In Execucomp, this aggregation of the various compensation measures is also referred to as TDC1.

[61] In CRSP, this variable is known as RET.

Data on CEO compensation and CEO tenure come from Standard & Poor's Execucomp database.[62] Execucomp reports compensation data for up to nine executives. I focus specifically on CEO compensation both because this is the convention of the financial literature as well as the fact that during the financial crisis the CEO was the most high profile target of public scrutiny for compensation practices. Thus, any material changes to company compensation packages were most likely to start with the CEO's compensation. Information on stock price returns was collected from the Center for Research in Security Prices (CRSP) database. Finally, I used SNL Financial to collect return on average assets data for each institution.

Like the lending model and the loss model, the CEO compensation model is cross sectional, with compensation rewarded to a CEO in fiscal 2009 explained by CEO tenure and recent firm performance (both financial and stock returns) as well as participation in TARP. Unlike the first two models in this chapter, my model sample is much smaller given the severe limitations imposed by focusing only on publicly traded companies with annual compensation data in Execucomp and stock price data in the CRSP database. These data challenges are the subject of the next section of this chapter.

4.4.2 Defining my sample

As before, my starting point for the CEO compensation model is the 5,244 firms studied in chapter 3. From my chapter 3 sample, however, only 63 firms had both stock price and annual CEO compensation information for the specified time period and

[62] Information for the tenure of a few CEOs was not available in Execucomp. For these cases, a web search was used to find each executive's start date.

retained the same CEO over the two year sample period.[63] It is important to test only those firms with the same CEO over the sample period to avoid the results being influenced by an alternative pay package for a newly hired CEO. Of the 63 firms, 46 are classified as receiving TARP funding (73% of the sample, a much higher share than the 10% share found in my larger sample because, as the results of chapter 3 showed, large, publicly traded firms were much more likely to be TARP recipients). Under the Durbin–Wu–Hausman test, however, I fail to reject the hypothesis that a simple TARP dummy variable in the compensation model is exogenous.[64] Put another way, unlike in the lending or loss models, using a simple dummy to indicate whether a firm was a TARP recipient does not constitute an endogeneity problem.

Along with the statistical evidence of the Durbin–Wu–Hausman test, there is a theoretical explanation for this result. In the lending and loss models, there was a reasonable concern about endogeneity because using a *TARP_RECEIVED* dummy could be a proxy for firm condition, and firm health has a direct impact on loan growth and losses. In the compensation model, it is not clear that changes in CEO pay from 2008 to 2009 would be tied to financial performance during this period. Given the pressures of the financial crisis, firms may have had other priorities like trying to retain an executive

[63] For perspective, the sample size in Webb (2008), which focused on the 1992-2004 time frame, was just 107 unique banks. In that context, my sample size of 63 institutions is not surprising given my much smaller time horizon (just 2008 and 2009).

[64] Running the Durbin-Wu-Hausman test required running my first stage probit model from chapter 3 to generate a predicted value for *TARP_RECEIVED*. However, given the degrees of freedom problem of working with a sample size of 63 observations, I was forced to significantly pare down the independent variables in my first stage probit model. As explanatory variables, I chose to retain only those variables that were significant at the 1% level in my chapter 3 results. My reduced probit model also excluded any squared terms, the stock market dummy variables (since all firms in the sample were publicly traded) and the regulatory dummies (since all firms in the sample happen to be regulated by the Federal Reserve). The final explanatory variables in the probit model were: *TOTAL_ASSETS, CORE_DEPOSIT_SHARE, LAND_DEV, MAN_THREE_RATED, MERGER, AGE, AND TIER1_RATIO*. The predicted value for *TARP_RECEIVED* is found to be insignificant in the second stage model, with a p-value of 0.497, indicating under the Durbin-Wu-Hausman test that using a simple dummy variable for *TARP_RECEIVED* is acceptable.

with the experience to weather the storm or curbing CEO pay to avoid a public backlash about rewarding executives at a time of acute economic distress. Even in the financial literature, the link between bank executive pay and performance is not always clear. For example, John and Qian (2003) find that CEO pay-performance sensitivities in banking are lower than in the manufacturing sector. Their paper also finds that pay sensitivities decline with bank size. Since my sample includes a number of very large banks, this may explain the finding that endogeneity is not a concern.

The conclusion that it is statistically acceptable to use a simple *TARP_RECEIVED* dummy variable for the compensation model has important consequences for my analysis. First, it allows me to use a single-stage OLS model to test the CEO compensation model rather than a two-stage probit and OLS modeling approach. Second, I am no longer confined to the data filters imposed by my probit model from chapter 3 such as excluding the largest financial institutions that were forced to accept TARP funds or dropping entities that had a later TARP application window.

Starting fresh, I thus define my new sample as all firms in the Execucomp database with an S&P Global Industry Classification Standard (GICS) code of 4010 (banks) or 4020 (diversified financials), stock price performance information from CRSP for 2008 and 2009, and the same CEO over the two year period.[65] This specification results in a sample of 122 firms, 62 of which received TARP funding (51%).

[65] Webb (2008) similarly restricts her sample to firms with a GICS code of 4010. I also include GICS code 4020 because some firms in this industry group were also eligible and received TARP funding (examples include American Express, Goldman Sachs, and Capital One).

4.4.3 Model hypotheses

The hypothesis being tested in this section is that the institutions that received TARP capital altered their CEO's pay in 2009 in a manner that was significantly different than other financial institutions. Formally, this is:

H3: The change from 2008 to 2009 in CEO compensation and receiving TARP capital are significantly related.

If being a TARP recipient did indeed result in different behavior among firms in compensating their CEOs, then there are two possibilities:

H3A: The change from 2008 to 2009 in CEO compensation and receiving TARP capital are positively related.

H3B The change from 2008 to 2009 in CEO compensation and receiving TARP capital are negatively related.

Hypothesis H3A says that CEOs at firms that received TARP funding enjoyed a significantly better change in pay in 2009 than CEOs at other financial institutions that did not receive government assistance. One possible reason for this is that, by virtue of the government aid they received, TARP institutions had additional cash on hand to reward top executives. If compensation packages could be designed to exploit loopholes

in Congress's rules on executive pay[66], CEOs for TARP firms could have enjoyed better changes in compensation than their non-TARP peers.

There are two possible reasons that TARP firms could have devoted at least a portion of their government capital to CEO compensation, resulting in a greater improvement in pay at TARP firms than other institutions. The first scenario is what could be called "raiding the spoils," where the CEO enriches him or herself with some of the government capital by pushing through an increase in salary. In this scenario, there is no rational financial reason for the TARP firm to increase CEO compensation; instead, the pay increase occurs because the CEO enjoys enough influence over the firm's board of directors to force the change to be made. The other explanation is that the TARP firm decided that it was in its financial interest to increase CEO pay to retain the executive, perhaps to avoid the flight of a talented individual at a particularly challenging time. While securing a competent CEO might be the rationale of a lot of financial firms during the economic crisis, TARP firms were uniquely positioned to employ this strategy because they had recently received an infusion of government capital.

Conversely, hypothesis H3B suggests that the change in CEO pay in 2009 could have been significantly worse at TARP institutions. The main rationale for this hypothesis is that CEO pay was curbed at TARP institutions because of the restrictions on compensation imposed by Congress and the Treasury Department on firms accepting TARP funding. For example, TARP firms were asked by the Treasury Department to ensure executive compensation for senior executives does not "encourage unnecessary

[66] For example, as will be discussed below, TARP recipients were prohibited from paying a bonus to their CEO (or other highly paid personnel) that exceeded one-third of total compensation. This restriction only applied to the CEO's *bonus*, however, and thus wouldn't stop the firm from significantly increasing the CEO's *base pay* to ensure the individual was well compensated.

and excessive risks that threaten the value of the financial institution." (The U.S. Department of the Treasury 2009) Regardless of how this broad requirement was interpreted, it likely encouraged TARP firms to consider limiting performance incentives in CEO pay packages. Additionally, as part of the economic stimulus bill in February 2009, Congress prohibited TARP recipients from paying bonuses that exceeded one-third of total compensation for the highest paid personnel. Bonuses also could not be cashed out until after the TARP capital was fully repaid (Andrews and Dash, Stimulus Plan Places New Limits on Wall St. Bonuses 2009). Congress's actions would have limited bonus payments for CEOs at TARP institutions in 2009, so unless the CEO's base pay was increased substantially (which was permissible under the law), total compensation for TARP CEOs in 2009 could have fallen short relative to CEOs at firms that did not seek government aid.

One other argument in support of hypothesis H3B is that TARP recipients may have felt a patriotic, moral or financial obligation to reduce CEO compensation because the firm required the assistance of the government. Citigroup CEO Vikram S. Pandit, for example, announced in February 2009 in testimony to Congress that he would voluntarily cut his pay to $1 per year until Citigroup, a large beneficiary of TARP, returned to profitability. That was a significant pay cut from the more than $38 million that Mr. Pandit earned in 2008 (D. Campbell 2010).[67] Similarly, the public anger about bank CEO compensation during the financial crisis could have compelled TARP recipients (or their CEOs) to electively reduce compensation to mitigate firm reputational risk.

[67] Citigroup reported that Mr. Pandit actually earned $128,751 in total compensation in 2010 because of salary earned before his February 2010 pay cut to a $1 annual salary.

4.4.4 Univariate results

My first step in testing these hypotheses was a difference in means test for each of the model variables. The results of this analysis are presented in Table 4.6. For my sample of 122 firms, total CEO compensation fell from $544.3 million in 2008 to $395.2 million in 2009, a drop of more than 27%. The difference in means test shows that CEOs at TARP institutions saw significantly large declines in compensation in 2009 compared to small increases in pay for non-TARP CEOs, providing support for hypothesis H3B that being a TARP recipient was negatively related to changes in CEO pay from 2008 to 2009. This result is significant at the 5% level. The TARP recipients in my sample also performed significantly worse in 2009 than non-TARP recipients, as measured by both changes in shareholder wealth and return on average assets.

Table 4.6: Difference in Means Tests for the Compensation Model

*, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively. Significance determined by first testing equality of variance and then utilizing the appropriate t-value to determine significance.

Statistic	Institutions receiving TARP (62)	Institutions not receiving TARP (60)	Difference
CEO_COMPENSATION_GROWTH	-0.393	0.047	0.440 **
SHAREHOLDER_WEALTH_GROWTH	0.023	0.321	0.299 ***
SHAREHOLDER_WEALTH_GROWTH_LAG	-0.236	-0.255	-0.019
ROA	-0.089	2.303	2.392 **
CEO_TENURE	9.542	9.171	-0.372

4.4.5 Multivariate results

I next turned to the multivariate analysis. Since I had found that endogeneity is not a concern for the compensation model, I used OLS and a simple TARP dummy variable indicating TARP acceptance to test my hypotheses. The multivariate regression results are reported in Table 4.7. Model 1 is the baseline compensation model that excludes the *TARP_RECEIVED* variable to allow for a direct comparison to the work by both Webb and Sierra, Talmor and Wallace. Like Sierra, Talmor and Wallace, I find a positive and significant relationship between the change in CEO pay in 2009 and contemporaneous shareholder returns. I also find that the change in CEO pay in 2009 is positively related to lagged shareholder returns. This result, significant at the 1%, was not found by Webb or Sierra, Talmor and Wallace, who found that lagged shareholder returns had an insignificant impact on CEO pay. The tighter link in my sample between past performance and CEO pay may be a product of the financial crisis, with bank directors reflecting on both CEO performance at the peak of the crisis (2008) *and* the most recent time period (2009) when setting CEO compensation. Like Webb, I find that both bank return on average assets in 2009 and CEO tenure are not significant in defining CEO compensation growth. The former result is further proof that accounting measures of bank condition (like ROA) do not directly impact executive compensation, which may be why my earlier analysis did not detect an endogeneity problem with my compensation model specification.

Model 2 is the restricted CEO compensation model that includes just a *TARP_RECEIVED* dummy. This model provides some encouraging evidence that the *TARP_RECEIVED* dummy is an important model variable. First, the adjusted R^2 is not

that much lower than Model 1 (an adjusted R^2 of 0.055 for Model 2 vs. 0.065 for Model 1). Second, *TARP_RECEIVED* is significant at the 1% level.

Table 4.7: Regression Results for the Compensation Model

Cross-sectional regression results where the dependent variable is the log change of annual CEO pay from 2008 to 2009. The coefficient estimates for Model 1, Model 2 and Model 3 are generated from OLS regressions. Standard errors are in brackets. *, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Shareholder_Wealth_Growth	0.460 **		0.370 *
	[0.19]		[0.19]
Shareholder_Wealth_Growth_Lag	0.639 ***		0.619 ***
	[0.22]		[0.22]
ROA	0.001		-0.004
	[0.02]		[0.02]
CEO_Tenure	0.015		0.016
	[0.01]		[0.01]
TARP_Received		-0.393 ***	-0.357 *
		[0.14]	[0.20]
Intercept	-0.241		-0.047
	[0.17]		[0.20]
Number of obs.	122	122	122
Adjusted R^2	0.0650	0.0550	0.0812

The full CEO compensation model is presented in Model 3. The variable of interest, *TARP_RECEIVED*, is negative and significant at the 10% level. Like the univariate analysis, this supports hypothesis H3B that being the CEO at a TARP institution had a significantly negative impact on compensation. This indicates both the power of Congressionally-mandated curbs on executive pay for TARP recipients as well as, perhaps, the public pressure for TARP beneficiaries to limit the pay packages of their top executives at a time of acute financial distress.

4.5 Conclusions

In this chapter, I have examined three ways that TARP recipients could have utilized their newly gained government capital: to support lending, recognize additional losses or augment CEO pay. Each of my three case studies modifies an existing model from the economic literature to answer a key question about TARP's impact on bank actions. In each case, my analysis studies the actions firms took from the inception of the TARP program in the fourth quarter of 2008 through year-end 2009.

My empirical analysis concludes that TARP recipients were significantly less likely to lend, but significantly more likely to acknowledge fresh losses. TARP firms were also significantly more likely to reduce CEO compensation. Taken together, these findings suggest that TARP capital was not employed to facilitate loan growth or bolster executive pay, but was used by firms to disclose new losses while still remaining well capitalized.

There are two important conclusions from this analysis. The first is that capital hoarding appears to have played an important role during the financial crisis. The TARP capital was not redeployed to support new loans nor was it used to supplement executive pay (indeed, in the latter case, TARP firms appear to have marshaled even more capital because the generous executive pay packages of the past were scaled back, leaving more cash in the firm's coffers). Instead, a significant portion of the capital appears to have been held in reserve for future payback. This finding is perhaps not surprising given the myriad influences on TARP firms at that time, from the growing market stigma attached

to being on government support to the brutal economic environment, which argued for retaining a deep capital reserve to weather the storm.

The second insight from the empirical results is that the TARP program's main contribution appears to have been financial stability and not, given the lack of lending by TARP firms, stimulating economic growth. Indeed, the only evidence that TARP capital was deployed came from the loss model, which showed that TARP firms were significantly more likely to report greater loan loss provisions, goodwill impairment losses and off-balance sheet net charge-offs. This result suggests that TARP fostered greater transparency in the financial industry, with firms accepting government aid more likely to be candid about their problem assets. At the height of the financial crisis, the principal problem was that market participants and financial institutions were unable to discern which firms were on the verge of failure, causing an overall crisis of confidence and collapse in interbank lending. TARP's lasting legacy thus may be its contribution in unfreezing these markets by incentivizing greater transparency and reinvigorating investor confidence in the viability of the U.S. financial system.

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