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# Three Essays in Banking: Corporate Governance, Internationalization, and Government Bailouts

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# THREE ESSAYS IN BANKING: CORPORATE GOVERNANCE, INTERNATIONALIZATION, AND GOVERNMENT BAILOUTS

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## DEDICATION

To my grandma, Maria; my parents, Rodica and Mihai; my son, Oliver; my husband, Catalin; my sister, Lucy; my parents-in-law, Caliopea and Costica, and my friends for their unconditional love, endless support, and great encouragement that helped me through this journey.

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## ABSTRACT

This dissertation extends a growing literature on banking and finance by investigating bank corporate governance, internationalization, and bailouts. The first essay conducts the first assessment of shareholder activism in banking and its effects on risk and performance. Activism can create value and be an effective monitoring mechanism for banks, but it may also be a destabilizing mechanism, as maximizing shareholder value may cause financial instability. We focus on the conflicts among bank shareholders, managers, and creditors (e.g., regulators, deposit insurers, taxpayers, depositors). We find activism may generally be a destabilizing force, increasing bank risk-taking, but creating market value for shareholders, and leaving operating returns unchanged. This is consistent with the empirical dominance of the *Shareholder-Creditor Conflict*, which predicts that activist shareholders may induce managers to take higher risk to increase returns at the expense of creditors, given creditors' difficulty in monitoring and regulatory-induced incentives. However, during financial crises, the increase in risk vanishes, suggesting activism may not be a major cause of risk during such times. From a public perspective, creditors (including the government) may lose during normal times, but not during crises.

In the second essay (co-authored with Allen N. Berger, Sadok El Ghoul, and Omrane Guedhami), we document a positive relation between internationalization and bank risk. This is consistent with the empirical dominance of the *market risk hypothesis* – whereby internationalization increases banks' risk due to market-specific factors in foreign

markets – over the *diversification hypothesis* – whereby internationalization allows banks to reduce risk through diversification of their operations. The results continue to hold following a variety of robustness tests, including endogeneity and sample selection bias. We also find that the magnitude of this effect is more pronounced during financial crises. The results appear to be at least partially explained by agency problems related to poor corporate governance. These findings suggest that authorities might consider internationalization as an additional factor in bank supervision and regulation.

In the third essay (co-authored with Allen N. Berger), we investigate whether the U.S. government bailout of banks during the recent financial crisis, the Troubled Assets Relief Program (TARP), gave recipients competitive advantages. Using a difference-in-difference (DID) approach, we find that: 1) TARP recipients received competitive advantages and increased both their market shares and market power; 2) results may be driven primarily by the *safety channel* – TARP banks may be perceived as safer, which is partially offset by the *cost disadvantage channel* – TARP funds may be relatively expensive; and 3) these competitive advantages are primarily or entirely due to TARP banks that repaid early. The results of this paper may help explain other findings in the literature on TARP and yield important policy implications. The costs of the competitive distortions of bailouts should be weighed against the costs and benefits in terms of lending, risk taking, financial stability, and the overall effects on the economy.

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# CHAPTER 1

## INTRODUCTION

This dissertation proposal investigates corporate governance, internationalization, and government bailouts in banking. The robust findings of three essays add to the banking and corporate finance literatures.

The first essay in Chapter 2 is the first empirical study to test shareholder activism as a channel of external corporate governance in banking, complementing internal governance, regulators, and other external governance structures. We use a unique hand-collected dataset on shareholder activism (SEC Filings: 13D and DFAN14A) for all listed commercial banks and bank holding companies (BHCs) in the US over the period 1994-2010, we explore several the following research questions: 1) is there a role for shareholder activism for banking?, and if so, 2) what do activists do to change the focus of the targeted banks, and 3) are they a stabilizing or destabilizing force?. We focus on three conflicts arising among bank stakeholders: *Shareholder-Manager Conflict 1* (managers take less risk than desired by shareholders due to risk aversion), *Shareholder-Manager Conflict 2* (managers take more risk than desired by shareholders due to overconfidence and/or hubris), and *Shareholder-Creditor Conflict* (activists induce managers to take higher risk to increase returns at the expense of bank creditors (deposit insurers, taxpayers, regulators, etc.), given creditors' difficulty in monitoring and regulatory-induced incentives.

We find that activism is important in banking: about one third of our banks have some form of activism during the sample period and activists appear to target banks with agency problems and growth potential that are easy in which to implement changes to increase value. We find that shareholder activism creates value for shareholders but has little impact on operating returns and increases bank default risk, consistent with the empirical dominance of Hypothesis 3, the *Shareholder-Creditor Conflict*. This suggests that activism may be generally a destabilizing force. However, we find that activism differs significantly during financial crises, resulting in higher market value and no increase in risk, suggesting that the shareholder activism may not represent a significant source of risk during crises. From a public standpoint, government loses during normal times, but not during financial crises.

The paper contributes primarily to two strands of research. First, it contributes to the broader literature on shareholder activism by examining activism within one important industry rather than across a number of very different industries, which reduces the concern about confounding inter-industry differences. Although researchers point to the shareholder return benefits resulting from activism, our results suggest that other additional effects of activism, such the increase in risk, should not be neglected. Second, this paper also adds to the literature on bank risk and performance by introducing shareholder activism as a factor influencing risk and performance and sets the groundwork for further research on shareholder activism in banking. The current topic is important especially from a government policy perspective because poor governance may aggravate financial system fragility to shocks and pose systemic risk to the real economy (Laeven and Levine (2009), Kirkpatrick (2009), G30 Steering Committee on Corporate Governance (2011), Song and

Li (2012)) and is regarded as a possible important contributing factor to the recent financial crisis. In addition, shareholder activism may be regarded with skepticism. Our findings suggest that activists in banking may increase risk and market value at the expense of creditors and may be a threat to financial stability. These results may have important implications for the government policies targeting bank governance and regulation of activism regarding banks.

The second essay, in Chapter 3, offers the first assessment of the role of internationalization in bank risk using US bank data. We find strong, robust evidence that the more internationalized the bank, the higher the risk. We use a number of different measures of internationalization and risk, employ various econometric procedures to control for potential endogeneity and sample selection biases, and consider different subsamples of the data. The data persistently suggest that internationalization is associated with higher bank risk, consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*. This effect seems to be more pronounced during financial crises, particularly market crises.

Our finding that internationalization is associated with higher risk raises the question of why banks internationalize. One potential explanation is higher returns, but our results seem to contradict this explanation, given that we find lower mean profitability for internationalized banks. Second, banks may become international as part of a defensive strategy to follow their important customers abroad by setting up offices in countries where their home country customers have foreign affiliates to avoid losing their clients' business (e.g., Brimmer and Dahl, 1975; Goldberg and Saunders, 1981; Grosse and Goldberg, 1991; Brealey and Kaplanis, 1996). This strategy might not translate into large enough financial

benefits to offset the costs of internationalization. A third potential explanation is empire building by bank managers (e.g., Jensen and Meckling, 1976, Jensen, 1986, Roll, 1986, Stulz, 1990). Managers that grow the bank through international activities may gain higher salaries and/or more prestige than domestic bank managers. This may occur if there are significant agency problems in banking, particularly if these agency problems are intensified by international diversification (e.g., Laeven and Levine, 2007). We put this last explanation to test and we find that the positive relation between internationalization and bank risk is consistently stronger for banks that more likely to have severe agency problems, supporting the empire-building explanation.

This paper contributes primarily to two related strands of research. First, it adds to the literature on bank risk by introducing internationalization as a factor influencing risk and sets the groundwork for further research on bank internationalization. Although some policymakers, practitioners, and researchers point to the benefits of geographical risk diversification resulting from the internationalization of banks, our results suggest that this effect is dominated by other factors. Specifically, our results suggest that the additional local market risks taken on following international expansion outweigh the benefits of diversification. Second, this paper contributes to the broader internationalization literature by examining risk within one important industry rather than across a number of very different industries with their confounding differences. After controlling for endogeneity and other possible explanations for our results, we continue to find that bank internationalization is associated with a higher risk in an industry in which risk is highly monitored by bank supervisors as well as shareholders and debt holders. These findings

suggest that authorities might consider internationalization as an additional factor in bank supervision and regulation.

The third essay, in Chapter 4, conducts an empirical assessment of the TARP injections on bank competition and investigates whether TARP may have given its recipients competitive advantages. Our difference-in-difference (DID) regression analysis yields several important results: 1) TARP recipients did get competitive advantages and increased both their market share and market power relative to non-TARP recipients, consistent with the empirical dominance of Hypothesis H1a over Hypothesis H1b and Hypothesis H2a over Hypothesis H2b. 2) Results point to the likelihood that the positive market share and market power findings may be driven primarily by the *safety channel* (TARP banks may be perceived as safer), which is partially offset by the *cost disadvantage channel* (TARP funds may be relatively expensive). Thus, the *safety channel* and the *cost disadvantage channel* are the most important to explain the results. 3). The competitive advantages are primarily or entirely due to TARP recipients that repaid early, suggesting that these banks significantly reduced the importance of the *cost disadvantage channel* and increased the importance of the *safety channel*, consistent with Hypothesis H3.

Overall, our results suggest that TARP may have resulted in a possible distortion in competition, which may have misallocated resources, and may help explain other findings in the literature on the effects of TARP on bank risk and bank lending. First, our findings may help explain the results in the literature that TARP increased risk for the large banks (Black and Hazelwood, forthcoming; Duchin and Sosyura, forthcoming) and decreased risk for the small banks (Black and Hazelwood, forthcoming). As discussed above, results in the literature suggest that a nonmonotonic effect of market power on risk

may have been in effect during the crisis period – higher market power may be associated with higher risk for banks at high levels of market power, while higher market power may be associated with lower risk at low levels of market power (Martinez-Miera and Repullo, 2010; Berger, Imbierowicz and Rauch, 2013). Given that large (small) banks typically have higher (lower) levels of market power, TARP may have led to an increase (decrease) in risk for large (small) banks.

Our results also may help explain the findings in the literature that TARP resulted in reduced or no change in lending by large banks (Black and Hazelwood, forthcoming; Duchin and Sosyura, forthcoming) and increased lending by small banks (Black and Hazelwood, forthcoming; Li, forthcoming). According to the standard structure-conduct-performance hypothesis, an increase in market power should lead to a reduced supply of credit. However, for relationship borrowers, the supply of credit may be increased by larger market share and larger market power because limits on competition help banks force implicit contracts with relationship borrowers that result in greater credit availability (e.g., Sharpe, 1990; Petersen and Rajan, 1995). This may help explain the increase in lending by small banks which tend to specialize in relationship lending, and the decrease or no change in lending by the large banks, which more often engage in transactional lending (Berger, Miller, Petersen, Rajan and Stein, 2005).

In terms of policy implications, determination about which banks to be bailed out should rely on a comprehensive analysis of both benefits and costs. Some but not all of these costs and benefits, competition, risk taking, and lending, may be evaluated based on our results and those in the literature. Based on the findings for these three effects, any bailouts may be focused primarily on the small banks, where the effects seem to be less

distortionary and more toward the public interest, since the increase in market share and market power is the least, risk may be decreased, and lending may be increased. However, in regards to the other major benefit of bailouts, increasing the stability of the financial system, presumably the benefits would be greater for the large banks. However, also the distortions in competition may be greater, and risk taking and lending implications may be less favorable. Therefore, policymakers should balance all these different effects.

Chapter 5 summarizes the core findings of Chapters 2, 3, and 4 and discusses the implications of these results to policy makers and regulators.

# CHAPTER 2

## SHAREHOLDER ACTIVISM IN BANKING[1,2]

"Action to improve corporate governance at many financial institutions is seen by us as a matter of urgency".
Roger Ferguson, Chairman of the G30 Steering Committee on Corporate Governance, February 2011

"Weak and ineffective corporate governance of systemically important financial institutions (SIFIs) was an important contributory factor in the massive failure of financial-sector decision-making that led to the global financial crisis".
Jean-Claude Trichet, G30 Steering Committee on Corporate Governance, February 2011

"When Wall Street learned that predator Michael Price, president of Heine Securities Corp., had bought 6.1% of Chase Manhattan Corp., the sign underscored that even the biggest banks are vulnerable….his efforts to shake up management at New York's venerable Chase Manhattan Corp. make many bank managers nervous. That's especially true after his toppling of Michigan National Corp."
Daniel Kaplan, The American Banker, 1995

### 2.1 Introduction

The recent financial crisis raised serious concerns regarding banks' corporate governance

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and their ability to manage such a crisis successfully. A larger question is whether good governance in banking could have mitigated or avoided the recent financial crisis. Several papers agree that poor governance was a significant contributing factor to the crisis (e.g., Diamond and Rajan (2009), Kirkpatrick (2009), Berger, Imbierowicz, and Rauch (2014), Cheffin (2014)), while others find the opposite (e.g., Fahlenbrach and Stulz (2011), Beltratti and Stulz (2012)). There has been also discussion that financial crisis was not caused by "greedy" bank managers, but by the pressure from shareholders to maximize the put option value they enjoy from explicit and implicit government insurance (e.g., Armour and Gordon (2014)). Banking research indicates that corporate governance impacts bank risk and performance (e.g., Caprio, Laeven, and Levine (2007), Adams and Mehran (2005), Laeven and Levine (2009)), however there is no evidence on the specific mechanism of shareholder activism.

Is shareholder activism beneficial for bank shareholders, creditors, and the public? Literature on nonfinancials shows that shareholder activism may be able to create value and be an effective monitoring mechanism (e.g., Clifford (2007), Brav, Jiang, Thomas, and Partnoy (2008), Greenwood and Schor (2009), Klein and Zur (2009), Boyson and Mooradian (2012), Bebchuck, Brav, and Jiang (2013)). However, it may also be a destabilizing mechanism, as it may maximize shareholder value in the short-run, but it may increase risk-taking (e.g., Brav, Jiang, Thomas, and Partnoy (2008), Bebchuck, Brav, and Jiang (2013)). There is one place where the goal of maximizing shareholder value should not be taken for granted as it may not be socially optimal: the banking industry. Here, a single firm's maximization may spill negative externality to the financial system. Therefore, it would be important for researchers and policy makers to understand whether

shareholder activism could be destabilizing, even when what activists advocate may be individually maximizing from the shareholders' perspective. To our knowledge, there are no studies which focus on assessing how shareholder activism affects banks. This omission from the literature may be potentially serious from a policy perspective due to the importance of banks for the overall financial stability and real economy.

This paper contributes to the banking literature on bank risk and performance by introducing shareholder activism as a factor influencing risk and performance, and sets the groundwork for further research. It also adds to the broader literature on shareholder activism by examining activism within one important industry rather than across a number of very different industries, reducing the concern about confounding inter-industry differences. Our findings suggest that activism in banking may increase risk and market value at the expense of creditors and may be a threat to financial stability during normal times. However activists do not seem to increase risk during financial crises. From a public perspective, creditors (including the government) may lose during normal times, but not during financial crises. We also add to the debate in the literature on the role of bank governance around financial crises and show that at least one corporate governance mechanism, shareholder activism, may not have been a major source of risk during the financial crisis.[3]

Understanding the role of shareholder activism in banking is important because there are several critical peculiarities of banks, which make them different from non-financials and can impact their corporate governance and the economy at large. First, bank

[3] This is consistent with Beltratti and Stultz (2010), which document that poor bank governance (e.g., lower shareholder friendliness of the board) was not a major cause for the financial instability during the recent crisis.

stability is relatively important to society as a whole as bank failure and distress can have major impacts on the economy and growth.[4] Second, banks are more fragile, vulnerable to instability than other firms or sectors as they tend to be the most highly levered firms and subject to runs on their short-term liabilities. Third, banks are inherently opaque as they are in the business of gathering proprietary information about their customers.[5] Banks' opacity can make information asymmetries between management and other stakeholders arguably more severe in banking (e.g., Furfine (2001), Morgan (2002), Levine (2004)). Thus, on the one hand, it may be more difficult for regular shareholders to monitor and reduce agency problems. But, on the other hand, it may be a bigger role and need for activist shareholders to act as delegated monitors to cut through this opacity. Finally, regulation makes banks different from other industries as explicit and implicit insurance may induce more risk-taking (e.g., Laeven and Levine (2009), Srivastav, Armitage, and Hagendorff (2013). Prudential supervision and regulation, such as capital requirements, are designed in part to offset this moral hazard incentive. At the same time, heavy regulation may make it more costly for activist investors to reduce agency problems in banks and harder to derive benefits from it (e.g., Levine (2004), Laeven and Levine (2009)).[6] While some other industries, such as utilities, are also regulated, banking stands out in that the regulation is

[4] The recent financial crisis involved a significant decline in bank lending, resulting in the most serious recession since the Great Depression.

[5] There are several reasons why banks are particularly opaque: loan quality is not observable and can be hidden for long periods; banks can alter the risk composition of their assets more quickly than nonfinancials, banks can readily hide problems by extending loans to clients that cannot service debt obligations, bond analysts disagree more often over bonds issued by banks than those issued by nonfinancials (e.g., Furfine (2001), Morgan (2002)).

[6] For example, there are restrictions on who can own bank shares and regulators can limit the capability of outsiders to buy a significant percent of bank shares without regulatory approval (Barth, Caprio and Levine (2006)). It is a rule that nonfinancials cannot buy banks. Also, (Prowse (1995, 1997), and Adams and Mehran (2003) show that, despite active consolidation, there have been very few hostile takeover bids in the banking industry.

primarily prudential, to reduce risk taking, rather than setting prices. The capital requirements in particular may affect corporate governance by changing the conflicts among the parties via changing the leverage of the firm.

This paper is the first, to our knowledge, to test shareholder activism[7] as a channel of external corporate governance in banking, and its effects on performance and risk-taking during both normal times and financial crises. We focus on the conflicts between shareholders and managers and those between shareholders and creditors (which, in banking, are more loosely defined to mean all the other financial claimants other than shareholders, such as: deposit insurers, taxpayers, regulators, depositors, etc.). Using a hand-collected dataset on shareholder activism (SEC Filings: 13D and DFAN14A) for all public banks and bank holding companies (BHCs) in the US (1994 to 2010), we analyze whether there is a role for shareholder activism in banking, what do activists do to change the focus of the bank, and whether activist investors are a stabilizing or destabilizing force in banking.

To analyze activism in banking, we consider three conflicts that may arise among different bank stakeholders, and which may be addressed by activism. The first conflict is the ***Shareholder-Manager Conflict 1*** caused by the risk aversion of managers. This suggests that managers take less risk than desired by shareholders, and activists can reduce agency problems between managers and shareholders and increase returns by inducing managers to take value-enhancing risk. The second conflict is the ***Shareholder-Manager***

[7] Tirole (2006, p.27) defines shareholder activism as "interfering with management in order to increase the value of the investors' claims. Gantchev (2013) defines activism as an active monitoring process which often can take the form of a sequence of the announcement of activist intentions and escalating decision steps of the activist to bring about change within the company such as demand negotiations, board representation, and (threatened) proxy fight.

***Conflict 2*** caused by overconfidence and/or hubris of managers. This suggests that managers may take more risk than desired by shareholders, and activists can curtail agency problems between the two parties and improve performance by correcting the overly-risky investments by managers. The third conflict is the ***Shareholder-Creditor Conflict*** caused by a moral hazard problem induced by creditors' difficulties in monitoring banks and regulatory-induced incentives. This suggests that activists may induce managers to take higher risk to increase market value at the expense of bank creditors (deposit insurers, taxpayers, regulators, etc.). This may suggest undesired consequences for bank health and stability.

The three conflicts among bank stakeholders are used to develop and test our competing hypotheses. Importantly, each of the three hypotheses may hold simultaneously for different sets of banks at a given time. All that we can do as researchers is to evaluate which of these hypotheses has stronger empirical support, i.e., which hypothesis empirically dominates the other. To address this question, we test empirically the impact of activism on bank behavior. To run the tests, we use OLS regressions with bank and time fixed effects and regress measures of market value, operating returns, and default risk on a dummy for shareholder activism and a set of bank characteristics (including primary regulator dummies to account for regulatory influence), following prior research on bank governance (Beltratti and Stutz (2012)) and shareholder activism (e.g., Brav, Jiang, Thomas and Partnoy (2008), Muller-Kahle (2010)). We lag all independent variables four quarters to reduce concerns of endogeneity and to give time for activists to have effects.

We have a number of key findings. First, we find that activism is important in banking: about one-third of the banks (337 unique banks) have some form of activism

during the sample period (1994-2010), and about 8.5% of banks have activism during each year. In total, there are 1,204 activist events, with a surge in activism during financial crises, such as during 2000-2002 and 2007-2009. Also, activists appear to target banks with more agency problems and growth potential, and where it is easier to implement changes to increase value. Our regression results are consistent with the empirical dominance of the ***Shareholder-Creditor Conflict***. Activism creates market value gains for shareholders, leaves unchanged operating returns, and increases bank default risk. This suggests that activist shareholders may generally be a destabilizing force, inducing managers to increase risk in order to increase shareholder returns at the expense of creditors. However, we find that results are significantly altered during financial crises: the market value increase is greatest during financial crises and risk does not increase. This suggests that activism was not a major source of risk during the crises. From a public perspective, creditors, including the government, may lose during normal times, but not during financial crises.

We perform a variety of robustness checks. First, we check the sensitivity of our results to alternative proxies of performance, risk-taking, and activism measures. Second, we employ alternative econometric approaches and standard errors: an event study employing cumulative abnormal returns (CARs), several other model and error specifications such as fixed effects, random effects, two-way clusters, Newey-West errors, and a model using macro variables instead of time fixed effects. Third, to address the potential endogeneity concerns and sample selection bias, we employ an instrumental variable analysis, a matched sample analysis using propensity score probabilities, a Heckman selection model, and an analysis including also Lexis-Nexis news events. The results are robust to all these checks. Fourth, we conduct subsample analyses based on:

hedge funds (*HF*) versus non-hedge funds, regular activism versus proxy fights, excluding too-big-to-fail (*TBTF)* banks, and different bank sizes. Among these results, we find higher risk when activists are hedge funds or when there is a proxy fight. In addition, we find that the overall results of activism on returns, operating performance, and risk hold primarily for smaller banks, although large banks also experience an increase in market value.

The remainder of this chapter is organized as follows. In Section 2.2, we present the related literature. In Section 2.3, we explain the hypotheses. In Section 2.4, we explain the data and empirical approach and Section 2.5 discusses the empirical results. In Sections 2.6 and 2.7, we describe robustness tests and subsample analyses. In Section 8, we discuss channels of action for activism, and in Section 2.9, we conclude.

**2.2 Related Literature**

Our paper is related to the shareholder activism literature for nonfinancial firms. Researchers in this literature find that activism can create value and be an effective monitoring mechanism of publicly listed companies, reducing agency costs and improving returns. Clifford (2007), Brav, Jiang, Thomas, and Partnoy (2008), and Greenwood and Schor (2009) find that activist shareholders can induce positive changes in the companies they monitor and increase shareholder value. They report significant positive abnormal returns and positive modest changes in operating returns around the time of the activism. On the contrary, Karpoff, Malatesta, and Walkling (1996), Strickland, Wiles, and Zenner (1996), Wahal (1996), Gillian and Starks (2000), Karpoff (2001), and Song and Szewezyk (2003) find little impact of activism on firm performance or operations. In addition, some of the shareholder activism literature regarding nonfinancial firms shows that activism influences risk (e.g., Brav, Jiang, Thomas, and Partnoy (2008)). Literature on nonfinancials

also shows that activism can increase the probability of CEO turnover (e.g., Parrino, Sias and Starks (2003), Gopalan (2008), Gallagher, Gardner and Swan (2009), Bharath, Jayaraman and Nagar (2013), Qian (2011), Helwege, Intintoli, and Zhang (2012)). Boyson and Mooradian (2011) find that governance-related hedge fund activism through management turnover is associated with favorable stock market reactions.[8] Helwege, Intintoli, and Zhang (2012) find that voting-with-their-feet techniques can lead to more forced CEO turnovers. In contrast, Black (1990) and Roe (1994) show that activists can be unsuccessful in removing entrenched managers.

As discussed in the introduction, the banking industry is one place where the goal of maximizing shareholder value may not be socially optimal. Here a single firm's maximization may spill negative externality to the financial system. There are no studies which focus on assessing how shareholder activism affects banks and bank stakeholders. Two papers related to banking, although not focusing on banking, are Li and Xu (2010) and Sunder, Sunder, and Wongsunwai, (2014) which both focus on nonfinancial firms' hedge fund activism and effects on target firms' bank loan contract terms. Li and Xu (2010) document tighter bank contract terms for the firms after targeting and Sunder, Sunder, and Wongsunwai, (2014) document that loan spreads increase when activism relies on the market for corporate control, while loan spreads decrease when agency problems are addressed.

Our paper is also related to the literature on bank governance and its effects on performance and risk. First, there are papers that look at the effects of bank governance on

[8] Also, several papers (Denis, Denis, and Sarin (1997), Kang and Shivdasani (1995), Kaplan and Minton (1994) and Conyon and Florou (2002)) find that the presence of a large shareholder is associated with management turnover.

performance. Caprio, Laeven, and Levine (2007) find that larger cash flow rights by the controlling owners and stronger shareholder protection leads to higher bank valuation. Other papers find that board size is positively associated with valuation (Adams and Mehran (2002, 2003, 2005), Caprio, Laeven, and Levine (2007), Belkhir (2009)). Second, there are papers that look at the effects of bank governance on bank risk-taking. Saunders, Strock, and Travlos (1990) find that shareholder-controlled banks take higher risk than banks controlled by managers. Also, Laeven and Levine (2009) find that banks with controlling shareholders are characterized by higher risk-taking and that different aspects of regulation (e.g., FDIC deposit insurance, capital regulation, and restrictions on nonlending activies of banks) may induce owners to select a riskier investment portfolio to compensate for the loss of utility from costly regulatory requirements. Other researchers find that stock-option-based executive compensation is associated with higher risk taking (Mehran and Rosenberg (2009), DeYoung, Peng, and Yan (2012)). Opposing this, Pathan (2009) finds that more independent boards, and thus more monitoring of managers, may reduce risk-taking.

Finally, there are papers that look at the role of bank governance around financial crises. There are opposing views on whether poor bank governance was a significant contributing factor to the recent financial crisis. Several papers find that governance was important. Berger, Imbierowicz, and Rauch (2014) find that high shareholdings of lower-level management increased banks' default risk significantly. Diamond and Rajan (2009) suggest that traders and executives of banks had incentives to take risks that were not in the best interest of the shareholders, suggesting failure of governance. Kirkpatrick (2009) suggests that weak governance of banks lead to inadequate risk management, especially

insufficient risk monitoring through the board, a factor that contributed significantly to the financial instability during the crisis. Cheffin (2014) suggests that the persistence of the imperial CEOs in the financial services industry to whom boards would give more and more freedom plausibly contributed to the market turmoil of 2008. Other papers find that the governance was not to blame. Beltratti and Stulz (2012) find that banks with more shareholder-friendly board structures performed significantly worse during the crises than other banks and had higher stability risk. Fahlenbrach and Stulz (2011) document that banks with higher option compensation and a larger fraction of compensation in cash bonuses for CEOs did not perform worse during the crisis. They suggest that CEOs and senior executives cannot be blamed for the crisis or poor bank performance during the crisis, as they could not have foreseen the extremely high risks in some of their bank investment and trading strategies.

However, there is no study in the literature focusing on how activist shareholders interact with bank managers and creditors to shape the behavior of banks during normal times and financial crises. This paper attempts to fill this gap in the literature.

### 2.3 Hypotheses Development

Our hypotheses examine the effects of activism on bank behavior: market value, operating returns, and bank risk. We consider three conflicts arising among bank stakeholders and which may be addressed by shareholder activism. These correspond to our hypotheses are shown in Table 2.1 Panel A.

The first conflict is the ***Shareholder-Manager Conflict 1*** (shown in Figure 1, Column 1). It suggests that managers may be inherently risk-averse as they would like to preserve or increase their career security and private benefits of controls, so they may take

less risk than desired by the shareholders (e.g., Jensen and Smith (1985), Hirshleifer and Thakor (1992)).[9] Even if the managers are risk-neutral, shareholders may wish them to take more risks than managers to take advantage of the creditors, particularly the deposit insurer and taxpayers, because they are not charged for the risk and can take the value of the put option from FDIC. Some researchers also find that the agency problem between shareholders and managers distorts investment and managers may pursue a "quiet life" to preserve resources for private benefits, so they may avoid expanding into a profitable new line of products (underinvestment) or getting rid of unprofitable divisions, both cases leading to suboptimal investment (e.g., Bertrand and Mullainathan (2003), Boot (1992)).[10] According to this conflict, activists can curb agency problems between managers and shareholders, and improve performance by inducing managers to perform better and take value-enhancing risks (e.g., Jensen and Meckling (1976), Fama and Jensen (1983), Demsetz and Lehn (1985), Jensen and Smith (1985), Dalton, Daily, Ellstrand, and Johnson (1998)). Our first hypothesis (H1) and empirical predictions are:

***Hypothesis 1 (Shareholder-Manager Conflict 1):*** *Shareholder activism is associated with* ***better market value****,* ***higher operating returns****, and* ***more risk-taking*** *by the targeted banks.*

The second conflict between bank stakeholders is the ***Shareholder-Manager Conflict 2*** (shown in Table 2.1, Panel A, Column 2), which may be caused by overconfidence and/or hubris of managers (e.g., Roll (1986), Wiseman and Gomez-Mejia

[9] Jensen and Smith (1985) show that managers are more likely to minimize risk, and engage in short-term investments as well as employee growth strategies to increase their compensation and job security.

[10] Underinvestment may also be pursued in banking if some of the benefits of investment may go to the bank creditors.

(1998), Malmendier and Tate (2005, 2008), Li and Tang (2010)). This conflict suggests that managers are prone to biases such as hubris, over-optimism, and overconfidence and thus may underestimate risk and take more risk than is good for shareholders. Jensen and Meckling (1976) and Jensen (1986, 1993) also argue that the agency problem between shareholders and managers distorts investment and that firm insiders have the tendency to build an empire and expropriate resources for private benefits at the cost of outsiders. Thus, when a firm has plentiful resources for investment, insiders may overinvest. Activists may curb agency problems between managers and shareholders, and improve performance by correcting the over-risky investments by managers and thus reducing risk. Our second hypothesis (H2) and empirical predictions are:

***Hypothesis 2 (Shareholder-Manager Conflict 2):*** *Shareholder activism is associated with* ***better market value****,* ***higher operating returns****, and* ***less risk-taking*** *by the targeted banks.*

The third conflict between bank stakeholders is the ***Shareholder-Creditor Conflict*** (shown in Table 2.1, Panel A, Column 3). In this conflict, activists may induce bank managers[11] to take higher risk to increase market value at the expense of bank creditors (e.g., Laeven and Levine (2009), Erkens, Hung, and Matos (2010), Prabha, Wihlborg, and Willett (2012), Srivastav, Armitage, and Hagendorff (2013)). This is due to the difficulties of creditors (e.g., deposit insurers, taxpayers, regulators, etc.) to monitor and discipline banking organizations due to banks' opaqueness and regulatory-induced incentives. First, as noted above, banks are opaque, and as a result, creditors might not be able to obtain

[11] Managers may be willing to represent shareholders' interests if they may have a vested interest through the managerial compensation schemes that align interests (Cheng, Hong and Scheinkman (2010), DeYoung, Peng, and Yan (2012), Hagendorff and Vallascas (2011)).

information to assess accurately the bank's riskiness and monitor on-going bank activities. Second, several aspects of bank regulation and government safety net protect bank creditors from losses in case of bank default and may reduce their incentives and ability to monitor banks: explicit insurance (deposit insurance put option (e.g., Merton (1977), Karekan and Wallace (1978), Keeley (1990), Gorton and Rosen (1995)) and implicit insurance (bank creditors expect to be bailed out in case of insolvency because the bank is considered too-big-to-fail (TBTF), too-important-to-fail (TITF), or a wide-spread government guarantee is expected in case that many banks face distress (e.g., Acharya and Yorulmazer (2007, 2008), Brown and Dinc (2011), Duchin and Sosyura (2012), Black and Hazelwood (2012)). Explicit and implicit insurance induce banks to shift default risk to deposit insurance funds and taxpayers.[12] [13] Our third hypothesis (H3) and empirical predictions are:

***Hypothesis 3 (Shareholder-Creditor Conflict):*** *Shareholder activism is associated with* ***better market value*** *and* ***more risk-taking*** *by the banks****, but not necessarily better operating returns****.*

Finally, a last conflict that may arise between bank stakeholders is the ***Shareholder-Other Stakeholders Conflict*** (shown in Table 2.1, Panel A, Column 4), which may be caused by overconfidence and/or hubris of the activists**.** This conflict suggests that

[12] However, prudential supervision and regulation, such as capital requirements, are designed in part to offset this moral hazard incentive.

[13] Billett, Garfinkel, and O'Neal (1998) show that deposit insurance reduces the incentive of depositors and debt holders to monitor banks and increases the incentive of other bank stakeholders to increase risk. Also, Laeven and Levine (2009) show that deposit insurance intensifies the ability and incentives of shareholders to increase risk and the impetus for greater risk generated by deposit insurance operates on owners, not on bank managers.

activists, similar to managers, can be prone to hubris and overconfidence, which make them think that they know what is best for the company. Thus, they may induce the bank managers to take risky decisions that end up not being good for any of the parties, including bank managers, other shareholders, creditors, and themselves. Activists may induce over-risky investments by managers and at the same time not produce the desired returns and they may also get out of their position quickly. Our fourth hypothesis (H4) and empirical predictions are:

***Hypothesis 4 (Activist-Other Stakeholders Conflict):*** *Shareholder activism is associated with* ***worse market value****,* ***worse operating returns****, and* ***more risk-taking*** *by the targeted banks.*

Each of the four hypotheses can hold simultaneously for different sets of banks at a given time. We test empirically the impact of activism on bank behavior to try to understand which of the four hypotheses (***Shareholder-Manager Conflict 1***, ***Shareholder-Manager Conflict 2***, ***Shareholder-Creditor Conflict***, ***Activist-Other Stakeholders Conflict***) empirically dominates or finds more empirical support. Results are reported in Section 2.5. In Section 2.8, we further explore the channels that activists may use to induce changes in the target banks.

## 2.4 Data, Variables and Summary Statistics

### *2.4.1 Data and sample*

The sample consists of all public commercial banks and BHCs in the US for the period 1994:Q1 to 2010:Q4 and our data come from multiple sources.

Our bank data is sourced from the quarterly Report of Condition and Income (Call Report) filed by all active commercial banking institutions. Given that the majority of the public banking organizations are holding companies, data in the Call Report are aggregated at the bank holding company (BHC) level when the BHC has more than one commercial bank owned, otherwise the information for the commercial bank is preserved. For convenience, we will use the term bank to mean either type of entity. We remove bank-quarter observations that have missing or incomplete financial data on basic accounting variables such as total assets and equity. To avoid distortions in ratios that use equity as the numerator, for all observations with total equity less than 1% of gross total assets (GTA),[14] we replace equity with 1% of gross total assets (e.g., Berger and Bouwman, 2013). Finally, we normalize all financial variables be in real 2010:Q4 dollars using the seasonally-adjusted GDP deflator. The resulting sample is then intersected with CRSP and Compustat using the CRSP-FRB link of the Federal Reserve Bank of New York.

Activist filings (SEC Schedule 13D and DFAN14A) are retrieved by manual collection from the SEC EDGAR database for the period 1994:Q1[15] to 2010:Q4 following a procedure similar to that described in Greenwood and Schor (2009). We restrict our searches to public US commercial banks and BHCs in the CRSP-FRB file of the Federal Reserve Bank of New York.[16] Schedule 13D of the SEC requires that investors file within

[14] Gross total assets (GTA) equals total assets plus the allowance for loan and lease losses and the allocated transfer risk reserve (a reserve for certain foreign loans). Total assets on Call Reports deduct these two reserves, which are held to cover potential credit losses. We add these reserves back to measure the full value of the assets financed.

[15] The sample starts in 1994 because the shareholder activism data becomes available online in SEC EDGAR in 1994.

[16] We also performed searches using all SIC Codes relevant for commercial banks 6021, 6022, 6029, 6035, and 6036 and this gives a higher number of total filings, however a large number of them cannot be ultimately

10 days of acquiring more than 5% of a voting class of a publicly traded company's equity securities. 13D documents the size of the share purchase and the investors' intentions.[17] In addition, we also include any material amendments in the investor's purposes from the initial Schedule 13D reported in Schedule 13D/A. 13D can also be filed for crossholdings formed when two firms merge or form business alliances (Greenwood and Schor (2009)). To deal with this problem, we manually screen for such events and/or cross-reference our initial sample of 13D filings with 13F holding reports (Thompson Institutional database) and get the activist filings. To the sample of 13Ds and amendments on 13Ds are added the definitive proxy statements filed by non-management (DFAN14A) as literature suggests these are another important form of activism (e.g., Dod and Warner (1983), Pound (1988), DeAngelo and DeAngelo (1989), Mulherin and Poulsen (1998)). These statements are filed with the SEC by investors who intend to or are involved in a proxy fight with a company's management. Form DFAN14A is defined as "Additional definitive proxy soliciting materials filed by non-management",[18] and is filed ahead of the annual shareholder meeting when soliciting shareholder votes. A proxy contest may be initiated with less than a 5% stake in the target companies' shares. Activist investors can use the proxy statements as a tactical instrument to achieve objectives often specified previously in their Schedule 13D. To be comprehensive, we include both 13D and DFAN14A filings.[19] We obtain 3,142 13D

matched to the Call Report, CRSP, and Compustat intersection as they are not covered in at least one of these databases.

[17] See http://www.sec.gov/answers/sched13.htm

[18] http://www.sec.gov/info/edgar/forms/edgform.pdf; http://www.sec.gov/news/press/2010/2010-155.htm.

[19] To mitigate the concern that at some very large firms, some investors could have engaged in activism with a less than 5% stake in the company and these events were not accompanied by Schedule 13D & 13D/A or DFAN 14A filings, we also collect information about such events through news searches in LexisNexis for

filings and 369 DFAN14A filings, for a total of 3,511 filings. We discard 1,693 filings that refer to one of the following situations: filings by a parent holding company that assists with financing or restructuring or other internal strategies, bank mergers not associated with activism, or filings by corporate insiders (e.g., CEO, CFO, etc.), which are not true activist filings. This results in a final sample of 1,818 filings for the period 1994:Q1 to 2010:Q4.

After reading the "purpose of transaction" section of the 13D reports to understand whether the filer is pursuing an activist strategy, we take out 614 filings with no Item 4 or passive investment only (where filer says the purchase was only for investment, with no intention to engage in any form of activism, or if the filing has no Item 4: Purpose of Transaction). Our final sample of material activist events consists of 1,204 events corresponding to 337 unique banking organizations which we use in our empirical analysis. We create the variable *ACTIVISM* as a dummy variable, which takes a value of 1 if there is shareholder activism targeting the bank during a quarter.

We also use data from several other sources for additional control variables: FDIC Summary of Deposits, Federal Housing Finance Agency website, St. Louis Federal Reserve website, Thompson Institutional dataset, I/B/E/S, SEC DEF 14A and 10K filings, and LexisNexis news articles. We end up with a final sample of 27,731 bank-quarter observations and 1002 unique banking organizations. All bank-specific variables, other than activism or internal governance, are constructed using the Call Report / Summary of Deposits for US commercial banks and the WRDS database (including CRSP, COMPUSTAT, Thomson Institutional Data, I/B/E/S).

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our top largest 100 banks in each time period. Our results are robust to the inclusion of these and are discussed in detail in Section 2.6.3.4 and Appendix B.

*2.4.2. Empirical methodology*

To investigate determinants of activism in banking, we use a probit model for targeting as in Brav, Jiang, Thomas, and Partnoy (2008).

$$ACTIVISM_{it} = \varphi_0 + \varphi_1 Control_{it-k} + Time_t + \omega_{it} \quad (2.1)$$

Where $ACTIVISM_{it}$ is the dependent variable and represents a dummy variable equal to one if the bank-quarter observation corresponds to a bank $i$ being targeted by an activist investor during quarter $t$. $Control_{it-k}$ is a vector of controls of bank $i$ during quarter $t$-$k$, $Time_t$ represents time fixed effects, and $\omega_{it}$ is an error term. Standard errors are clustered by the bank. For controls, we use a broad set of bank characteristics that were previously used also in Brav, Jiang, Thomas, and Partnoy (2008) in the shareholder activism literature complemented with other bank-specific variables from the banking literature. For all independent variables, we retain $k$=4 to capture 4-quarter effects as in Brav, Jiang, Thomas, and Partnoy (2008).

To investigate whether activism has a significant impact on bank market value, operating returns, and risk, we estimate several versions of the following econometric model:

$$Y_{it} = \beta_0 + \beta_1 ACTIVISM_{it-k} + \beta_2 Bank\ Characteristic_{it-k} + Time_t + Bank_i + \varepsilon_{it} \quad (2.2)$$

where $Y_{it}$ is the dependent variable of interest for bank $i$ during quarter $t$, $ACTIVISM_{it-k}$ is shareholder activism dummy for bank $i$ during quarter $t$-$k$, $Bank\ Characteristic_{it-k}$ is a vector of controls of bank $i$ during quarter $t$-$k$, $Time_t$ represents time fixed effects, $Bank_i$ represents bank fixed effects, and $\varepsilon_{it}$ is an error term. The main dependent variables ($Y_{it}$) are: market value proxied by *TOBIN's Q* – defined as market value of common stock over equity book value), operating returns proxied by *ROA* (defined as the ratio of annualized net income to

GTA), default risk proxied by bank *Z-SCORE* – calculated as the sum of a bank's *ROA* and *Capitalization Ratio* (equity capital over GTA) divided by *Std_ROA* (the volatility of ROA).[20] For all independent variables, we retain $k$=4 in our analysis and robustness tests to capture 4-quarter effects.

For controls, we use a set of bank characteristics following prior research on bank governance and shareholder activism (e.g. Beltratti and Stutz (2012), Brav, Jiang, Thomas, and Partnoy (2008)). We control for *BANK SIZE* (the log of GTA), *BANK AGE* (age in years of the oldest bank in the BHC), *DEPOSITS/GTA* (ratio of deposits to GTA), *LOANS/GTA* (ratio of loans to GTA), *INCOME DIVERSITY* (following Laeven and Levine (2007), constructed as 1 – ((Net Interest Income – Other Operating Income) / Total Operating Income), *OVERHEAD_COSTS (*a proxy of the bank's cost structure determined as the ratio of overhead expenses to assets as in Demirguc-Kunt and Huizinga (2011)), *FOREIGN_OWNERSHIP* (a dummy equal to 1 if a bank is foreign owned) and regulatory environment. The regulatory environment is an important determinant of bank risk-taking and individual bank behavior mentioned in the banking literature (e.g., Buch and DeLong (2007), Laeven and Levine (2009), Berger, Bouwman, Kick, and Schaeck (2014) and Berger, Imbierowicz, and Rauch (2014)). We control for the bank's primary federal regulator, by including: *FRS, OCC,* and *FDIC* dummies if the bank's primary federal regulator is the Federal Reserve System, the Office of the Comptroller of the Currency, and the Federal Deposit Insurance Corporation, respectively. In the regressions, we omit

[20] Many researchers use the *Z-SCORE* as defined here as a measure of bank risk (e.g., Laeven and Levine (2009), Demirguc-Kunt and Huizinga (2010), Houston, Lin, Lin, and Ma (2010), Duchin and Sosyura (2013), Ongena, Popov, and Udell (2013)).

the FRS dummy to avoid perfect collinearity. Our main models are OLS regressions with bank and time fixed effects.[21]

## 2.5 Empirical Results

In this section, we analyze empirically the importance of shareholder activism in banking, activist objectives, and effects on individual bank behavior (market value, operating returns, and risk).

### *2.5.1 Prevalence of activism in banking and determinants*

How important is activism in banking? In Table 2.2 Panel A, we find that about one third of the banks (337 unique banks) in the sample have some form of shareholder activism at some time during the sample period 1994-2010 and about 8.5% banks have events during each year.[22] Activism tends to surge during crises periods (2000:Q2-2002:Q3 and 2007:Q3-2009:Q4).[23,24] The documented prevalence of activism makes the study of the effects of activism worthwhile and each of the four hypotheses described in Section 2.3 could hold, however only an empirical analysis of the effects can assess which of them empirically dominates.

[21] We do not control for bank risk because it is an endogenous variable.

[22] One fifth of the total 13D filings for banks are non-material events, that is, the filer does not specify a particular objective or future plans to engage in activism. This latter percentage is slightly smaller than the results reported in Brav, Jiang, Thomas, and Partnoy (2008), Greenwood and Schor (2009), and Boyson and Mooradian (2011), for hedge fund activism for non-financials. In their cases, approximately one half of the activism events, hedge funds do not state specific objectives.

[23] These periods were identified as financial crises in Berger and Bouwman (2013).

[24] The surge in activism during crises may be due to general discontent of investors when all firms in the market are not doing well. This is consistent also with investors asking for CEO turnover during crises when performance is lower (e.g., Helwege, Intintoli, and Zhang (2012)). For example, when Bank of America's share price declined dramatically by 85% during 2008-2009, shareholders blamed Ken Lewis, the CEO and Chairman, for the decline.

We also analyze what type of banks are targeted by activists. Table 2.3 reports results for the probit regressions predicting shareholder activism targeting. Our first model shown in column (1) includes target characteristics as in Brav, Jiang, Thomas, and Partnoy (2008) and Brav, Jiang, and Kim (2010): *BANK SIZE, TOBIN's Q, GROWTH* (bank asset growth), *ROA* (defined as the ratio of annualized net income to GTA), *CAPITALIZATION RATIO* (equity capital over GTA), *DIVYLD* (dividend yield or the ratio of common dividend over market value of common stocks), *INST OWNERSHIP* (percentage of institutional ownership), trading illiquidity, *AMIHUD* (calculated as 1000 multiplied by the square root of the absolute value of market return over the dollar trading value), and *NUMBER OF ANALYSTS* (number of analysts covering the entity).[25] Column (3) reports the results when including additional bank specific characteristics: *BANK AGE, BRANCHES / GTA* (ratio of branches over GTA), *NO_STATES* (the log of the number of states in which the bank has branches), *METROPOLITAN* (number of metropolitan markets as a fraction of all markets in which the bank is active), *DEPOSITS / GTA, LOANS / GTA, CASH_HOLDINGS* (ratio of cash holding over GTA), *NPL RATIO* (the ratio of bank nonperforming loans to total loans), *INCOME DIVERSITY, FOREIGN_OWNERSHIP, HHI DEPOSITS* (Herfindahl-Hirschman deposits index, a proxy for the local market concentration), primary regulator dummies, and *INCORP_DE*

[25] Since *NUMBER OF ANALYSTS*, defined as the number of analysts covering the company from IBES as in Brav, Jiang, Thomas, and Partnoy (2008), is available for less than two thirds of our sample banks, the multivariate regression with *NUMBER OF ANALYSTS* is reported separately in column (2).

(a dummy equal to 1 if the bank is incorporated in Delaware).[26,27] In all models, independent variables are lagged 4 quarters and models include time fixed effects as in Brav, Jiang, Thomas, and Partnoy (2008). In addition, standard errors are clustered by the bank.

Table 2.3 reveals several interesting results. First, we find that activists tend to target **value banks**, banks with low profitability and growth potential: smaller size (consistent with results for non-financials in Brav, Jiang, Thomas, and Partnoy (2008), Klein and Zur (2009), Greenwood and Schor (2009), Brav, Jiang, Thomas, and Partnoy (2008), Clifford (2008), and Mietzner and Schweizer (2008)), lower *TOBIN's Q* and lower *ROA*, consistent with Gillian and Starks (2007), low *NO_STATES,* indicating that they operate in fewer states, which gives them opportunities to grow more geographically. Second, we find that activists target **banks with more agency problems:** banks with more *CASH HOLDINGS,* but paying fewer dividends (*DIVYLD*), symptoms of the agency problem of free cash flow according to Jensen (1986) and Brav, Jiang, Thomas, and Partnoy (2008), and banks with more complex organizational structures, that is, with more branches per dollar of assets (*BRANCHES/GTA,* ratio of branches over GTA). Finally, we find that activists seem to target **banks in which it is easier to implement changes:** having higher institutional ownership (*INST OWNERSHIP*) and analyst coverage (*NUMBER OF ANALYSTS*), allowing them to get more allies and information to implement changes, and with higher trading liquidity (indicated by the negative coefficient on *AMIHUD,* a direct

[26] Delaware is known to have less antitakeover provisions which makes firms more likely to become a takeover target (e.g., Daines (2001).

[27] We also tried to run a model which considers regulatory enforcement actions taken by FDIC, FED, and OCC regulators against banks (data on enforcement actions is limited to 2005-2010), however it could not be run as there are too few enforcement actions for these publicly listed institutions for the period.

measure of trading illiquidity with lower values meaning more liquidity) making it easier for activists to accumulate a high share in a bank in a short period of time without incurring adverse price changes.[28, 29] Finally, targets tend to have fewer deposits and more loans. A lower reliance on deposits for funding means that banks use more money-market funding, so that shareholders may have more information about them. The fact that activists target banks with more loans is consistent with the view that activists may target banks with a smaller portfolio of securities, and which are less subject to market credit spreads (Beltratti and Stutz (2012)). The other variables are not statistically significant, suggesting that they are not important determinants for activism in banking.

Overall, results seem to indicate that activists target banks with more agency problems and growth potential, which could be easily turned around to increase shareholder returns.

### *2.5.2 Activists' objectives and tactics*

What is the nature of activists' demands in banking? Panel B of Table 2.2 summarizes the stated objectives that activists provide when they announce their intent to intervene (1994-2010). The panel classifies the demands into the following seven categories following prior literature (e.g., Greenwood and Scor (2009)): *ENGAGE MANAGEMENT, CAPITAL STRUCTURE, INTERNAL CORPORATE GOVERNANCE, ASSET SALE (STRATEGIC),*

[28] Results are consistent with Brav, Jiang, Thomas, and Partnoy (2008) and Norli, Ostergaard, and Schindele (2009), and Brav, Jiang, and Kim (2010) who find that liquid stocks (above median) have a 50% higher likelihood to be targeted by activists. In addition, it is consistent with the theoretical model of Maug (1998), in which "liquidity mitigates the free-rider problem in costly monitoring of managers because activist blockholders can compensate for their monitoring costs through the increased trading profits due to high liquidity."

[29] It is to be noted that the coefficient on *AMIHUD* becomes insignificant when included together with *ANALYST* due to its collinearity with this latter variable as noted also in Brav, Jiang, and Kim (2010).

*STRATEGIC CHANGES, LITIGATION/BANKRUPTCY* and *PROXY FIGHT*. The categories are not mutually exclusive, so an event can sometimes fall into multiple categories.

First, *ENGAGE MANAGEMENT* represents 36.5% of all activist events. This is the lightest form of shareholder activism and includes events in which the activists try to help the managers maximize shareholder value by discussions with management and making suggestions for improvements. They can send letters, phone bank management or have face-to-face meetings, request company documents or make a general statement that shares are "undervalued" and might engage in future discussions / meet management etc. Second, *STRATEGIC CHANGES* are 35.1% of all events. These include a wide variety of strategies targeted by activists such as changes in business strategy (operational efficiency, growth and cost strategies and business line restructuring), M&A, sale of the target company to a third party, hire an investment bank to explore strategic alternatives, offer to acquire the company, block a merger and request a higher price, sell the company, etc.

Third, *INTERNAL CORPORATE GOVERNANCE* represents 28.1% of all events. It can include election of activist-selected directors, firing a company officer or board member, challenging board independence and fair representation, board or executive compensation issues, a call to declassify the board, remove a poison pill, or question potential corporate fraud. Fourth, *CAPITAL STRUCTURE* represents 13.9% of all events. It includes activism targeting firm's payout policy and capital structure. This category includes events in which the activist proposes changes oriented towards the reduction of excess cash, an increase in firm leverage, or higher payouts to shareholders. This group of

events also involves issuance of securities by the target banks such as modifying seasoned equity offerings or proposing debt restructuring.

Fifth, *PROXY FIGHT* represents 11.6% of all events. It refers to situations in which the activist solicits proxies from shareholders to elect proposed directors or to adopt a shareholder proposal. Sixth, *ASSET SALE (STRATEGIC)* represents 6.5% of all events. These refer to cases in which activists express their discontent by selling their entire position in the company. This is consistent with the literature for nonfinancials where some researchers document that activist investors will sell their stock to cut losses (e.g., McCahery, Sautner, and Starks (2010), Helwege, Intintoli, and Zhang (2012)) and their exit can serve as a governance mechanism (Admati and Pfleiderer (2009), Edmans (2009), Edmans and Manso (2011)). Finally, *LITIGATION / BANKRUPTCY* represents 2.6% of all events. It involves situations in which the activist files a lawsuit, the target is in bankruptcy, and/or the activist offers to help with financing and other restructuring options.[30] [31]

*2.5.3 Effects of activism*

Table 2.4 reports results from regressing measures of market performance (*TOBIN's Q*), operating returns (*ROA*), and risk (*Z-SCORE*), on shareholder activism (*ACTIVISM*). As

[30] Using a sample of hedge fund activism for non-financials, Greenwood and Schor (2009) report the objectives of their activists as follows: about a half (45.5%) of the hedge fund activism events include comments about target being "undervalued" and engage management to improve the value of the firm. Further, activism agendas related to capital structure, asset sales, and internal corporate governance represent 11.5, 18.1, and 21.9 percent of their full sample, respectively. Our results are qualitatively similar as composition to Greenwood and Schor (2009).

[31] In a separate test, reported in Appendix B, we break down our *ACTIVISM* measure into these seven different demands that activists declare to try to understand which of these are most important to explain our results. We find that all channels have an impact on bank behavior, except for *ENGAGE MANAGEMENT*, and *PROXY FIGHT* contributes to the highest increase in bank risk.

discussed in Section 2.4.2, we use ordinary least square (OLS) models with time and bank fixed effects.

Column (1) analyzes whether activism creates value for shareholders by using *TOBIN's Q* as a dependent variable. We find that banks with activism experience positive and significant increases in market value. Activism may be perceived by the market as a positive signal since activists are expected to provide more monitoring that will curb agency problems and costs (e.g., Jensen and Meckling (1976)), and thus improve bank performance.

Column (2) uses *ROA* as a measure of operating returns. The coefficient estimate indicates that activism has little impact on the operating profitability of the targets, consistent with results in Klein and Zur (2009). The difference in sign between *Tobin's Q* and *ROA* can be due to Tobin's Q incorporating market-based information and being more forward-looking than *ROA*, while *ROA* may take longer to manifest a positive effect. Another possibility is that these banks may have a higher market value in the event of failure because of the prospect of being bailed out.

Column (3) presents results for the risk-taking of banks as a result of activism by using *Z-SCORE* as a dependent variable. A larger value for the *Z-SCORE* indicates less risk and greater overall bank stability (e.g., Boyd and Runkle (1993), Berger, Klapper, and Turk-Ariss (2009), Laeven and Levine (2009), Houston, Lin, Lin, and Ma (2010), Demirgüç-Kunt and Huizinga (2010), Beltratti and Stulz (2012)). We find that activism is associated with a lower *Z-SCORE,* and thus, a higher default risk after intervention.[32]

[32] In unreported results, we decompose the *Z-SCORE* into its subcomponents and we find that the increase in risk is primarily due to both a decline in the bank capitalization ratio and an increase in the standard deviation of ROA.

Looking together at the results for market value, operating returns, and risk, we can conclude that activism creates market value for shareholders, has little impact on operating returns, and increases bank risk (lower Z-score). Although all hypotheses may hold to some degree, our results are most consistent with the empirical dominance of the Hypothesis H3, the ***Shareholder-Creditor Conflict***. This suggests that activists may induce management to increase risk in order to increase shareholder returns at the expense of bank creditors (regulators, taxpayers, deposit insurers, depositors etc.) given the difficulty of creditors in monitoring and regulatory-induced incentives. This shows that activism may be a destabilizing force, at odds with financial stability.

## 2.6 Robustness Checks

### *2.6.1 Alternative measures*

We test whether our results are robust to using alternative measures of market value, operating performance, risk, and activism. In Table 2.45 Panel A, we examine whether our results for effects of activism on performance are robust to using alternative measures of market performance: buy and hold return (*BUY-AND-HOLD_RET),* buy and hold abnormal return *(BUY-AND-HOLD_AB_RET)*, and *SHARPE_RATIO* (columns 2-4), while column 1 repeats the main effect. In each of the estimations (columns 2-4), we find that the coefficient on the *ACTIVISM* variable is statistically significant at the 10% level or better. We thus continue to find consistent evidence of an increase in market performance associated with activism.

Table 2.5 Panel B column 2 reports the estimation results when using an alternative measure of operating returns on *ACTIVISM*, namely return on equity (*ROE)*. We find that

results are qualitatively similar to our main model (which is repeated in column 1 for comparison).

In Table 2.5 Panel C, we examine whether our main results continue to hold when we consider alternative measures of bank risk-taking. We first analyze the sensitivity of our results to *VOLATILITY_STOCK_RET*, the volatility of daily returns for each calendar year in column 2. Second, we use as a measure of risk, the *LLA RATIO,* or the ratio of loan loss allowance over GTA, in column 3. Third, we use as a measure of risk, the *NPL Ratio,* the bank-level ratio of nonperforming loans to total loans in column 4. Finally, in model 5, we show the estimation results when using as a dependent variable *VOLATILITY ROA*, determined as the standard deviation of ROA over the previous 4 quarters, where ROA is annualized net income as a percentage of GTA. All regressions include time and bank fixed effects. In each of the estimations, we find that the coefficient on the *ACTIVISM* variable is statistically significant at the 5% level or better. We thus continue to find consistent evidence of an increase in bank risk associated with activism.

In Table 2.5 Panel D, we consider an alternative measure of *ACTIVISM* – *NO_ACTIVISM_EVENTS* – the number of activist events that a banks has during a quarter as per 13D and DFAN14A filings. Results using this measure are qualitatively similar to main findings.

*2.6.2 Alternative econometric specifications*

In this subsection, we check the sensitivity of the results to the use of alternative econometric specifications.

For market performance (Table 2.6, Panel A1-A2), we conduct both daily and monthly event studies reporting the mean cumulative abnormal returns (CAR) and using a value weighted index.

In Panel A1, we conduct a daily event study using several event windows. The returns are on average 1.42% for (0, 1) days, 1.79% for (-1, 1) days, 2.26% for (-2, 2) days, 2.89% for (-5, 5) days, indicating that the market reacts positively to the activism events.

In Panel A2, we conduct a monthly event study using several event windows. We find positive and significant CARs for all periods, with the highest returns being achieved by investors for longer time windows up to 3 years: That is, returns are on average 4.22% for (0, 3) months, 4.88% for (0, 6) months, 6.77% for (0, 12) months, 8.93% for (0, 24) months and 13.11% for (0, 36) months. Returns are also positive and significant for the (-1, 12) months window. Overall, our results in this event study confirm that shareholder activism creates value for shareholders.

Panels B and C of Table 2.6 report results from alternative econometric specifications for operating returns, and bank risk. Column (2) of each these panels reports the results when using a simple OLS model without time and bank fixed effects. Column (3) reports results when using a specification with time fixed effects only. Column (4) reports results when using a bank random effects model. Column (5) uses regression specifications with Newey-West (1987) standard errors and time fixed effects to control for residual autocorrelation and heteroskedasticity. Column (6) implements two-way clustering models by firm and time as suggested in Thompson (2006) and Cameron, Gelbach and Miller (2006). These models allows for correlations among different banks in the same quarter and different quarters in the same bank, for example, and calculates

standard errors that account for two dimensions of within-cluster correlation. The results in all models of Table 2.6, Panels B, and C, using *ACTIVISM* as a dependent variable, confirm our earlier evidence. More specifically, we find that *ACTIVISM* leads to higher market value, unchanged operating returns, and more risk.[33]

*2.6.3 Endogeneity*

In this subsection, we carry out several tests to address the problem of potential endogeneity of our *ACTIVISM* variable, which could bias our findings. For example, it may be possible that activism and the bank key outcomes (market value, operating returns, and risk) may be simultaneously driven by certain unobservable bank-level characteristics. Also, our key independent variable (*ACTIVISM*) could be improperly measured due to difficulty to observe and/or quantify its magnitude. Finally, there might be a potential causal link from our outcome variables for market value, operating performance, and bank risk, to *ACTIVISM*, as bank market value, operating performance, and risk, may affect *ACTIVISM* involvement. In the main analysis, we attempt to alleviate some of these concerns by lagging the ACTIVISM variable**.** To more directly address the endogeneity concerns, we perform several sets of tests discussed below.[34]

[33] In unreported results, to address the potential concern that time fixed effects may not capture the full impact of macroeconomic variables during our sample period, we also try models that include the percentage change in national GDP growth, percentage change in the Federal Housing Finance Agency (FHFA) real estate index, and interest rate spread instead of time fixed effects. The results confirm our prior findings.

[34] In addition to the tests discussed in this section, to alleviate the concern about potential endogeneity stemming from potentially omitted correlated variables, we also try saturating the main regressions with a lot more bank level controls, including several other corporate governance mechanisms, and results are consistent. These results are presented in detail in the online Appendix B.

*2.6.3.1 Instrumental variables analysis*

It is possible that the endogeneity may be the result of reverse causality that runs from bank behavior for market value, operating performance, and bank risk to activism. For example, banks with a poor performance and a higher risk, might be more likely to be targeted by activists and this bias may invalidate the interpretation of the coefficient on *ACTIVISM*. We use instrumental variable techniques (two-stage least squares (2SLS)) to extract the exogenous component of bank activism in assessing the influence of activism on market value, operating performance, and bank risk. We use as an instrument, *% BUSY ACTIVISTS*, the percentage of busy activists in the financial services industry (SIC codes between 6000 and 6999) based on number of activist campaigns (13D filings) and proxy fights (DFAN 14A filings). Busy activists are those with five or more campaigns and/or 2 or more proxy fights at the same time and are likely to generate more activism.[35] The results of the IV regressions are reported in Panel A of Table 2.7. The first-stage regression indicates that our instrumental variable is positively and significantly related to activism. We perform two tests to check the suitability of the selected instrument. First, we conduct the Kleibergen-Paap under-identification test to evaluate the rank condition. We find that the Kleibergen-Paap *rk* LM rejects the null hypothesis at the 1% level (*rk LM* = 544.718 with a *p*-value less than 0.001), indicating that the model is well identified. Second, using an instrument that is weakly correlated with the endogenous explanatory variable can lead to large inconsistencies in the coefficient estimates. To examine the relevance of our IV,

[35] In unreported results, we also tried tests with three instruments: *% BUSY ACTIVISTS*, *AMIHUD*, the Amihud (2002)'s measure of illiquidity since liquid stocks were found by Brav, Jiang, and Kim (2010) to be more likely to be targeted by activists, and *% ACTIVISM OF OTHERS (N-1),* the average level of activism for the other (N-1) banks in the industry following the logic in Laeven and Levine (2009) for cash flow and we obtain consistent results.

we conduct an *F*-test of the excluded exogenous variable in the first stage regression, in which the null hypothesis is that the instrument does not explain the variation in the *ACTIVISM*. We reject this null hypothesis at the 1% level ($F$ = 3605.728 with a $p$-value less than 0.001). The IV second stage regression estimates indicate that *ACTIVISM* is associated with better market performance, little impact on operating returns, and higher risk, consistent with our earlier evidence.

*2.6.3.2 Propensity score matching (PSM) analysis*

Another potential concern with our results is that perceived market value, operating performance, and bank risk differentials between banks targeted by activists and those that are not targeted may spuriously reflect bank characteristics rather than activism characteristics. To control for this, we use the propensity score matching (PSM) analysis. PSM models match observations based on the probability of undergoing the treatment, which in our case is the probability of being targeted by activists.

In our case, PSM estimates the effect of activism on a bank's market value, operating performance, and risk, by comparing the bank's current behavior with the behavior that the bank would have observed if activists had not targeted it. This quasi-experiment is conducted by matching each targeted bank with a non-targeted bank sharing similar characteristics as indicated by their propensity scores. To estimate a bank's propensity score (or probability of being targeted), we use a probit model in which the dependent variable is a dichotomous activism measure that takes a value of 1 if the bank has activism and 0 otherwise and the independent variables are all bank characteristics from the main specification and year fixed effects. We use a nearest-neighbor matching with n=5 with replacement, which matches each targeted bank with, respectively, the 5

banks with the closest propensity scores.[36,37] Regression results are reported in Table 2.7 Panel B and are qualitatively similar to the main models, with the only exception being that the coefficient of activism in the *ROA* equation is negative and significant.

*2.6.3.3 Heckman selection model*

Another potential concern with our results is that perceived risk differential found may reflect selection bias. For example, our results may reflect differences in bank characteristics between those targeted by activists and those not targeted rather than the impact of activism per se on market value, operating performance, default risk, and leverage risk. We address this issue by using Heckman's (1979) two-step procedure to control for selection bias induced by banks being targeted by activists by incorporating the activism decision into the econometric estimation. In the first step, we determine whether the bank has activism using a probit estimation. The dependent variable in the first step is our *ACTIVISM* dummy. The explanatory variables are the instrumental variable used in the IV estimation and all control variables from our main specification. In the second stage, the *TOBIN's Q*, *ROA*, and *Z-SCORE* are the dependent variables and we include all the variables from the main regressions, the activism variable, and the self-selection parameter (lambda or inverse Mills' ratio).

The results are reported in Panel C of Table 2.7. While controlling for potential self-selection bias, the results of the two-step estimation model continue to confirm that

[36] In unreported tests, we compare the means of the bank characteristics used in the selection models across the samples of targeted banks and other banks to assess the effectiveness of our propensity matching procedure. Reassuringly, the distributions of the bank characteristics are statistically indistinguishable at conventional levels.

[37] In unreported results, we also do a nearest-neighbor matching with n=10 and obtain consistent results.

*ACTIVISM* is associated with better market performance, little impact on operating returns, and higher risk. In the selection equation, the instrumental variable is positively related to *ACTIVISM*. In the outcome equation, the *ACTIVISM* variable enters significantly positively on *TOBIN's Q* and negatively on *ROA,* and *Z-SCORE,* consistent with our prior results.

*2.6.3.4 Including Lexis Nexis News*

Given the amount of capital that is needed to acquire a 5% stake in a large-cap company, we worry that the previously collected filings may bias the sample toward smaller targets. At very large firms, some pension funds may engage in activism with a less than 5% stake in the company. To incorporate activism events that were not accompanied by Schedule 13D or DFAN 14A, we collect information about such events through news searches in LexisNexis for our top 100 banks in each time period in terms of total assets using a general search with the company current name and any previous names (where information is available) and any and various combinations of the following keywords: "activism" or "activist investor" or "dissident investor" or "activist shareholder" or "group of concerned shareholders" or "shareholder activism" or "hedge fund activist" or "hedge fund activism" or "institutional activism" or "activist campaign" or "investor campaign." This generates 96 events, the majority (~85%) of which, has a pension fund as an activist.[38] We add these new events to our sample and incorporate them in our *ACTIVISM* variable and re-estimate our results to understand whether our results may be impacted by these investors with stake

[38] We impose no limitation to the percentage of shares owned as many times this information is not available in the LexisNexis news. In few cases, we are able to retrieve the ownership from the DEF 14A report when the shareholder appears in the Shareholder Proposals section and for those cases the share ownership is small, many times < 1%.

less than 5% that may behave as activists. The results are robust to these tests and are presented in detail in Appendix B.

## 2.7 Effects of Activism: Subsample Analyses

### *2.7.1 Hedge fund (HF) or not*

Not all activists may be alike. Some may be more aggressive such as hedge funds compared to mutual funds, pension funds, individuals, or other types of shareholders. Hedge funds might have the pressure to deliver short-term results via asset sales and increased cash payouts, while other minority investors may be more interested in long-term results.

To differentiate between hedge fund activists and other types of investors, we use a list of commonly known hedge funds in Bloomberg Markets Magazine[39] and Wikipedia to identify hedge fund activists among the filers in the 13D and DFAN14A material events. We then complement the list with manual searches on Google and fund internet website to understand if the filer is a hedge fund or not.[40]

We break down the *ACTIVISM* dummy into *HF_ACTIVIST* and *NON_HF_ACTIVIST* to take into account the two types of activists (Table 2.8 Panel A). We conduct a test for the equality of the coefficients (*HF_ACTIVIST* and *NON_HF_ACTIVIST*). The regression results reveal that HFs tend to improve the bank market value more when looking at the magnitude of the coefficients, however the *t*-test reveals that the difference is not statistically significant. When looking at the earnings (*ROA*), it appears that HFs do not significantly impact ROA, while the non-HF investors

[39] http://media.bloomberg.com/bb/avfile/rJWUURETpDOE,http://media.bloomberg.com/bb/avfile/rEpa5XEFo000, http://en.wikipedia.org/wiki/List_of_hedge_funds#Other_notable_hedge_fund_companies.

[40] We recognize that this search process may be imperfect, but we are confident that almost all (if not all) activists that are hedge funds are classified adequately.

tend to negatively impact *ROA*. In regards to risk-taking, both HF and non-HF investors are driving the bank to take on more risk, but hedge funds tend to lead to a higher bank risk. Results are consistent with the main analysis and suggest that HF activists may have a more positive influence on banks' changes compared to non-HF investors, though the increase in risk remains a potential concern.

*2.7.2 13D versus DFAN 14A*

We next break down the *ACTIVISM* dummy into *DFAN14A*, a more aggressive activism form, and *13D* filings, to take that into account whether aggressiveness of filings makes a difference for our findings. The results in Table 2.8 Panel B show that our main results continue to hold for the two types. However, the coefficient for *DFAN14A* is larger for the default risk.

*2.7.3 Excluding TBTF banks*

Next, we exclude too-big-to-fail (*TBTF)* banks from our sample (Table 2.8 Panel C) to understand whether our results may be caused by the banks that are too big to fail. We define *TBTF* as a dummy variable which takes a value of 1 in all quarters when the banks has GTA greater or equal to $100 billion, which were subject to the stress tests (SCAP) in 2009.[41] We find that our results are not driven by *TBTF* banks.

*2.7.4 Bank size*

We further re-estimate our main regressions by bank size to understand whether results are dominated by a particular size class. Table 2.8 Panel D reports effects of activism by bank

[41] This definition of too-big-to-fail is also used in Houston, Lin, Lin, and Ma (2010).

size: *SMALL*, *MEDIUM* and *LARGE*. *SMALL* represents banks with GTA up to $1 billion, *MEDIUM* represents banks with GTA exceeding $1 billion and up to $5 billion, and LARGE represents banks with GTA exceeding $5 billion. The regression results indicate that results only hold strongly for the small banks, suggesting that activists have a lesser influence on the larger banks. However, we find that activists do increase the market value of large banks, without affecting their operation or risk.

### *2.7.5 Activism effects during financial crises*

We also study whether effects of activism may be different during financial crises. Under normal circumstances, banks may take more risk as a result of activism. However, during financial crises, banks already have been taking a lot of risk and are under more heightened scrutiny by regulators, so that it may be harder for activists to get them to take more risk, so these risk-taking incentives are muted. Alternatively, consistent with a limited liability effect, in the presence of financial distress (high bank leverage or capital) and low demandable deposits (Calomiris and Kahn (1991)) during crises, there may be an increase in moral hazard and adverse selection problems for banks and activists can take advantage of it and induce bank managers to take risky decisions in an attempt to "gamble for resurrection".

We re-estimate our regressions to take into account the financial crises and understand whether the effects may be different during financial crises versus normal times. For testing this, we use the following modified model:

$$Y_{it} = \gamma_0 + \gamma_1 ACTIVISM_{it-k} + \gamma_2 ACTIVISM_{it-k}\ x\ FINANCIAL\_CRISES_{t-k} + \\ + \gamma_3 Bank\ Characteristic_{it-k} + Time_t + Bank_i + \varepsilon_{it} \quad (2.3)$$

*FINANCIAL_CRISES* is a dummy variable equal to 1 whenever there is a banking crisis or a market crisis. We follow Berger and Bouwman (2013), and identify three financial crises (the credit crunch (1990:Q1-1992:Q4), the bursting of the dot.com bubble and September 11 terrorist attack (2000:Q2-2002:Q3), and the subprime lending crisis (2007:Q3-2009:Q4)). We exclude *FINANCIAL_CRISES* alone from the model because time fixed effects absorb the direct effects of *FINANCIAL_CRISES*. The interaction term between *FINANCIAL_CRISES* and *ACTIVISM* captures the differential impact of activism on bank behavior during financial crises, and the sum of $(\gamma_1 + \gamma_2)$ captures the total effect of activism during financial crises.

We report the results in Table 2.9. The results reported in Panels A suggest that activism has a significantly different effect during crises versus normal time periods. Thus, we find higher market value, but there is no increase in risk, suggesting that it may be harder for activists to get banks to take more risk during crises, so risk-taking incentives are muted. Therefore, activists do not seem to increase risk during financial crises. Because some authors discuss about poor governance being a contributing factor to the subprime crisis, we also conduct the crises regressions by focusing on the subprime crisis only. In this sense, we rerun regressions over the 2006-2010 period and report the results in Panel B. We find again a higher market value, but no increase in risk, suggesting that the effects of activism during crises are muted.[42] This also adds to the debate on the role of bank governance during financial crises and shows that at least one corporate governance mechanism, shareholder activism, was not a major cause of risk during the financial crisis.

[42] In unreported results, we also rerun the results using the three individual crises and we find that results hold tightly for the last two financial crises: the dot-com bubble and the recent subprime lending crisis.

We find that during a crisis, activists raise market value without increasing risk or income. There are two possibilities to explain this: either 1) it may be the case that risk did not go up, but market value went up because operating revenue will go up in the following years or 2) government interventions during the crises such as TARP (The Troubled Asset Relief Program), Discount Window (DW), and Term Auction Facility (TAF) may offset the increase in risk. In Panel C we report the results when considering separately the effects of the three government intervention programs and use the dummies *TARP, DW,* and *TAF,* for whether a bank received TARP capital support, discount window loans and/or Term Auction Facility (TAF) funding during the crisis. We find that the risk is decreasing primarily for the banks that received TARP, but the other programs do not seem to have an important effect.[43] Therefore, the government, in its role as a creditor, may lose during normal times, but not during financial crises.

### 2.8 Channels of Action for Activists and Actual Outcomes

Finally, we conduct an analysis to better understand the channels through which activists may act.

#### *2.8.1 Channels predictions*

As shown above, our results are generally consistent with the empirical dominance of the ***Shareholder-Creditor Conflict.*** In this conflict, activists may induce bank managers to take higher risk to increase market value at the expense of bank creditors (e.g., depositors, deposit insurers, taxpayers, regulators, etc.) due to banks' opaqueness and regulatory-induced incentives. This leads to the prediction that shareholder activism is associated with

[43] In unreported results, we also look at the effects of activism on operating revenue up to 2 years for the full sample, however we do not find a significant increase in operating revenue.

better market value and more risk-taking by the banks, but not necessarily better operating returns. In this section, we explain how activist investors can make targeted banks better or worse and change the focus of the banks in the ***Shareholder-Creditor Conflict***. We consider three potential channels of action: **Internal Corporate Governance**, **Capital Structure**, and **Strategic Direction**, as shown in Table 2.1 Panel B.

One channel activists may use is to induce changes in the **Internal Corporate Governance** of the targeted banks. [44] Activists may increase pay-for-performance sensitivity for managers to better align the interest between managers and shareholders (Brav, Jiang, Thomas and Partnoy (2008), Brav, Jiang and Kim (2010)). Although there is no clear prediction in regards to CEO/board turnover and CEO pay, activist shareholders can force out management if it has conflicting views to the shareholders in regards to how the company should be run or the bank is poorly run and/or can change the board composition by nominating themselves or other members elected by them to the board to be able to better implement their proposals (e.g., Parrino, Sias and Starks (2003), Gopalan (2008), Brav, Jiang, Thomas and Partnoy (2008), Brav, Jiang and Kim (2010), Qian (2011), Boyson and Mooradian (2011), Helwege, Intintoli, and Zhang (2012), Bharath, Jayaraman and Nagar (2013)).[45] Besides exerting discipline over managers, activists can also make

[44] For example, in April 1999, Lawrence Seidman, activist investor of South Jersey Financial Corp was involved in a proxy contest seeking to elect two directors to the company's board and an agreement was reached between the company and Seidman, which permitted Seidman and a second proposed nominee to become directors of the company. Similarly, in October 2007, Financial Edge Fund, activist of Alliance Bancorp Inc of Pennsylvania, met with the Company's CEO, Dennis Cirucci, to discuss the company's dismal financial performance and the need for management to dramatically enhance shareholder value and design compensation and benefit plans that are tied to financial performance and shareholder value metrics.

[45] Changes in the board composition that lead to an increase the number of outside directors with equity ownership may also increase the willingness of managers to accept a takeover bid (Brook, Hendershott, and Lee (2000)) and changes leading to a higher proportion of independent outside directors may increase bid premiums offered for target banks (Brewer, Jackson and Jagtiani (2000)) if activists consider getting the company taken over.

changes to bank executive compensation, by curtailing the executives' base pay (Brav, Jiang, Thomas and Partnoy (2008), Brav, Jiang and Kim (2010), Hartzell and Starks (2003)), however the prediction is unclear for the total compensation.[46]

A second channel that activists may use is to change bank **Capital Structure**. Activists can reduce agency problems of free cash flow in banks by reducing cash holdings and increasing dividend payouts to shareholders or repurchasing shares (e.g., Brav, Jiang, Thomas and Partnoy (2008), Brav, Jiang and Kim (2010), Clifford (2009).[47] Activists can also induce management to hold a lower level of equity capital to improve bank's asset choice, which may favor higher returns to shareholders (e.g., Calomiris and Kahn (1991)). A lower level of equity capital can also offer debt discipline and alleviate agency problems of free cash flow, which may increase returns to shareholders (e.g., Jensen, (1986), Jiraporn and Gleason, (2007)).

A third channel to induce change in the target banks is to change the **Strategic Direction** of the bank.[48] Thus, activists may induce management to engage in more investments in risky assets in order to improve performance (e.g., commercial real estate loans, more M&As). In addition, although there may not be a clear prediction for takeovers,

[46] DeYoung, Peng, and Yan (2012) find that bank CEOs respond to risk-taking incentives by taking more risk, and bank boards use executive compensation incentives to reinforce or support increased risk taking.

[47] For example, in November 2007, Seidman Lawrence, activist investor of MassBank Corporation demands higher dividends for shareholders, in the form of both quarterly and special payments and recommends accelerated share repurchases, including a possible Dutch auction. In a similar example, in August 1998, Seidman Lawrence, activist of 1st Bergen Bancorp believes the profitability of the company's business can be improved by re-deploying certain assets and better utilizing its excess capital.

[48] For example, in December 1997, Lawrence Seidman, activist of Wayne Bancorp requested that company's board consider acquisition/merger discussions with potentially interested commercial banks to maximize shareholders' value. Similarly, in August 2005, Lawrence Seidman, activist of Interchange Financial Services Corporation, states that because Mr. Abbate, the CEO of the bank was unable to grow EPS, or hold the line on the net interest margin and it is time for someone else to take the reins of the company. He strongly encourages management to hire an investment bank and solicit bids from potential acquirers.

activists may make the bank a takeover target if it increases shareholders' value (e.g., bank can take advantage of too-big-to-fail (TBTF) or too-important-to-fail (TITF) policies). Literature on nonfinancials shows that returns to investor activism are driven by activists' success at getting target firms taken over, in which case they can get a takeover premium (e.g., Greenwood and Schor (2009)). The effects on divestitures of bank divisions and costs are ambiguous, however these can be used as a preparatory step to make the bank look good on the books before becoming a takeover target so that activists can get a higher premium. [49]

We test empirically the impact of the activism on the three channels described above and try to understand which of the channels are most important to explain the main results. The empirical results are presented in Table 2.10 Panels A and B.

*2.8.2 Channels of action for activists*

In Table 2.10 Panel A, we conduct a change analysis which considers all banks targeted by activism and means changes in their ***Internal Corporate Governance***[50]***, Capital Structure,*** and ***Strategic Direction*** channels, 8 quarters (2 years) before the activism and 8

[49] Activists can also induce more divestitures if they can create value for shareholders (e.g., Brav, Jiang, Thomas and Partnoy (2008), Gillian, Kensinger and Martin (2000), Del Guercio and Hawkins (1999)).

[50] All Corporate Governance variables are manually collected for the target banks from DEF 14A proxy statements, 10K annual reports, and 8K quarterly reports. *CEO TURNOVER* is a dummy equal to 1 if the CEO changes from 1 year to the next as per DEF 14A and 10K annual filings. *CEO/BOARD TURNOVER* is a dummy equal to 1 if CEO or another board member changes as per 8K quarterly filings. To construct this latter variable, we look at the 8K information contained in "Item 5.02 - Departure of Directors or Certain Officers; Election of Directors; Appointment of Certain Officers; Compensatory Arrangements of Certain Officers". Search keywords include one of the following commonly mentioned phrases to indicate executive turnover: dismiss, dismissed, dismissed for cause, employment ceased, fire, fired, appointment revoked, eliminate, position eliminated, position change within company, let leave, not re-elected, expiration of employment agreement etc. We eliminated cases involving death (deceased), health based resignations, and mandatory retirement. In regards to the CEO compensation variables, these are manually collected from the DEF 14A and 10K annual filings. *EQUITY BASED-COMPENSATION/CEO TOTAL COMPENSATION* is the sum of total restricted stock grants and stock options granted to the CEO divided by CEO Total Compensation. *CASH BONUS/CEO TOTAL COMPENSATION* is total cash bonus granted to the CEO divided by CEO Total Compensation.

quarters (2 years) after the activism to account for the fact that some outcomes of activism could take a longer time period. We find that all three channels play an important role in the ***Shareholder-Creditor Conflict***.

First, in terms of ***Internal Corporate Governance***, we find that shareholder activists in banking are successful at both changing the CEO and inducing changes in the boards (*CEO TURNOVER* and *CEO/BOARD TURNOVER*), which may help mitigate some of the agency problems between management and shareholders. We also find a higher pay-for-performance sensitivity after activism as indicated by the statistically significant results on *EQUITY BASED-COMPENSATION/CEO TOTAL COMPENSATION*, consistent with the prior prediction of the ***Shareholder-Creditor Conflict*** that activists may induce more alignment with shareholders to increase market value. In regards to *CASH BONUS/CEO TOTAL COMPENSATION*, we find that this declines perhaps due to the fact that it is not directly tied to the shareholders' value. There is no significant effect on the CEO total pay.

Second, in terms of ***Capital Structure***, we find that shareholder activism leads to more *STOCK REPURCHASES* and a lower *CAPITALIZATION RATIO,* although there are no significant effects on either cash holdings or dividend yield paid. Finally, in terms of ***Strategic Direction***, we find that shareholder activism leads to more investments in risky assets as indicated by the *COMMERCIAL REAL ESTATE LOANS* (the ratio of bank commercial real estate loans over GTA) and *REAL ESTATE LOANS* (the ratio of bank real estate loans over GTA)[51], and also riskier funding as indicated by the increase in the *NONDEPOSIT FUNDING* (ratio of bank nondeposit funding over GTA). As for banking organizations becoming a takeover target (*TAKEOVER TARGET*), the actual takeover rate

[51] Prior literature in banking suggests that real estate loans, and in particular commercial real estate loans was a factor that contributed significantly to the recent crisis (e.g., Berger, Imbierowicz and Rauch, 2013).

is about 10%, suggesting that activists in banking may be quite successful at getting the banks acquired. This may increase these banks' government safety net by getting them acquired by larger institutions and/or stepping into the TBTF umbrella[52] and may also lead to significant premiums for the activists when successful (as indicated in Greenwood and Schor (2009)). Also, we find that activism in banking leads to a reduction in costs and acquisitions and an increase in divestitures of banks in the BHCs, potentially designed to make the banks more attractive targets on the market for strategic alternatives such as takeovers. To sum up, all channels seem to play an important role in explaining the ***Shareholder-Creditor Conflict***.

*2.8.3 Actual outcomes*

In Table 2.10 Panel B, to better understand what actual actions the target firms take in response to the activist's requests, we follow Greenwood and Schor (2009) and collect news data on what happened after each event by conducting searches in Lexis-Nexis for each target – activist pair and also researching the NIC banking organization history up to two years after the activism events. We classify the outcomes into four broad outcomes (the three from Panel A, ***Internal Corporate Governance, Capital Structure,*** and ***Strategic Direction***, plus an additional one named ***Other*** which could not be adequately fit into the others). These comprise of thirteen subcategories. The classifications are not mutually exclusive: for example, if a target gives board seats to the activist and also repurchases shares, this company will have two outcomes represented. We include the number of

[52] Several researchers find that bank M&As may serve as a mechanism to increase the financial safety-net benefits to shareholders and lead them to shift risk to the safety-net, thus exposing taxpayers (who guarantee the safety-net) to potentially greater losses (e.g., Benston, Hunter, and Wall (1995), Carbo-Valverde, Kane, and Rodriguez-Fernandez (2012), Srivastav, Armitage, and Hagendorff (2013)).

unique banks that fall under each category and also the percentage out of all target banks and that of all target banks that were found to have news about the outcomes.

For about 49.26% (166) of the target banks (generally smaller), no additional news are found about outcomes except that, in some cases, we find a reiteration of some of the 13D filings by the activist. For the other 50.74% (171) banks, we find information about outcomes. The first category of outcomes comprises events that relate to changes in the ***Internal Corporate Governance*** of the target banks. In a very large number of cases (63), the activist is granted seats on the board either for himself or his nominees, while in 19 cases, the activist is not successful to get board seats (he may withdraw his solicitation for seats or suffer a proxy fight defeat). In 14 cases, the CEO is changed, and in 7 cases, company by-laws are changed (e.g., remove a poison pill, de-stagger the board, or change in a majority voting rule).

The second category of outcomes comprises events that relate to changes in the ***Capital Structure*** of the target banks. In 15 cases, the target announces that it repurchases shares and/or makes changes to the dividends paid out to shareholders. In another 21 cases, the activist induces the bank to raise capital or helps the bank with financing options, in most cases accompanied by the target acquiring another institution.

The third category of outcomes comprises events that relate to changes in the ***Strategic Direction*** of the target banks. In 37 cases, the target is acquired and in 5 cases there is announcement that the company hired an investment banker to explore strategic alternatives and solicit potential buyers. In 7 cases, there are news which indicate that activist was not successful to get the company acquired. In one case, a spin-off is announced and in another 10 cases there are news about target acquiring other institutions.

The last category of outcomes, called ***Other*** comprises events that could not be adequately fit into the other three categories. In 49 cases, the activist and the target sign either a settlement or a standstill agreement. With a settlement, the target may be able to extract some concessions from the activists (e.g., board seats) that it was unlikely to have obtained if the original slates had gone to a vote. Moreover, the company management is able to save face by not officially "losing" the proxy contest. At the same time, the activists often can get everything they asked for and appear reasonable, which can only enhance their options in future negotiations. The standstill agreement is very similar, expect it is usually giving various concessions to the activist with the only restriction that the company does not want the activist to take over control[53] and/or become a takeover target. In 45 cases, the activist cuts position below 5% ownership, and this outcome can occur also immediately after the company becomes a takeover target.

To summarize, ex-post classifications of activism based on the outcomes reveal that CEO and board changes, takeover target outcomes, capital changes and agreements between the activist and target bank are the most frequent mechanisms that activists use in banking to induce changes and increase market value.

**2.9 Conclusions**

Sound corporate governance of banks is critical for the economic growth and development, and poor governance may exacerbate the financial system vulnerability to shocks. This paper is the first empirical study to test shareholder activism as a channel of external

[53] As per the Change in Bank Control Act of 1978, a position of 10% ownership is considered a controlling position and regulatory approval may need to be obtained. Most of the activists have less than 10% stake in a bank.

corporate governance in banking, complementing internal governance, regulators, and other external governance structures.

Using a unique hand-collected dataset on shareholder activism for all public commercial banks and bank holding companies (BHCs) in the US over the period 1994:Q1-2010:Q4, we have the following findings: 1) We find that activism is important in banking: about one third of the public banks (337 unique banks) have some form of activism during the sample period. 2) Activists appear to target banks with agency problems and growth potential that are easy in which to implement changes to increase value. 3) We find that shareholder activism creates value for shareholders but has little impact on operating returns and increases bank default risk, consistent with the empirical dominance Hypothesis 3, the ***Shareholder-Creditor Conflict*** which predicts that activists may induce higher risk to increase market value at the expense of bank creditors. This suggests that activism may be generally a destabilizing force. 4) However, we find that activism differs significantly during financial crises, resulting in higher market value and no increase in risk, suggesting that activism was not a major source of risk during the financial crises. Therefore, the creditors (including the government) may lose during normal times, but not during financial crises.

The paper contributes primarily to two strands of research. First, it contributes to the broader literature on shareholder activism by examining activism within one important industry rather than across a number of very different industries, which reduces the concern about confounding inter-industry differences. Although researchers point to the shareholder return benefits resulting from activism, our results suggest that other additional effects of activism, such as the increase in risk, should not be neglected.

Second, this paper also adds to the literature on bank risk and performance by introducing shareholder activism as a factor influencing risk and performance and sets the groundwork for further research on shareholder activism in banking. The current topic is important especially from a government policy perspective because poor governance may aggravate financial system fragility to shocks and pose systemic risk to the real economy (e.g., Laeven and Levine (2009), Kirkpatrick (2009), G30 Steering Committee on Corporate Governance (2011), Song and Li (2012)) and is regarded as a possible important contributing factor to the recent financial crisis. In addition, shareholder activism may be regarded with skepticism.[54] Our findings suggest that activists in banking may increase risk and market value at the expense of creditors and may be a threat to financial stability. These results have important implications for the government policies targeting bank governance and regulation of activism regarding banks. Regulators may keep a close watch on activists because they may increase bank risk during normal times. However activists do not seem to increase risk during financial crises. This adds to the debate on the role of bank governance during financial crises and shows that at least one corporate governance mechanism, shareholder activism, may not have been a major cause of risk during the financial crisis (e.g., Beltratti and Stultz (2010)).

[54] Some authors argue that activists should be subject to more rigorous public scrutiny and accountability (Weber (1922, 1947)). Anabtawi and Stout (2008) argue that an increase in shareholder power should come with an increase in fiduciary responsibility. In the banking industry, this concern may be even more acute. Moreover, shareholder activism has received increased attention in light of the Dodd-Frank Wall Street Reform and Consumer Protection Act as well as recent SEC rulings which increase the rights of the investors.

## Table 2.1 Hypotheses and Potential Channels

### Panel A: Hypotheses and Main Effects

| Variable | Hypothesis 1 | Hypothesis 2 | Hypothesis 3 | Hypothesis 4 |
|---|---|---|---|---|
| | Shareholder-Manager Conflict 1 | Shareholder-Manager Conflict 2 | Shareholder-Creditor Conflict | Activist-Other Stakeholders Conflict |
| | (1) | (2) | (3) | (4) |
| **Main Effects** | **Predicted Sign** | **Predicted Sign** | **Predicted Sign** | **Predicted Sign** |
| **Market Value/Performance** | | | | |
| *TOBIN's Q* | + | + | + | - |
| **Operating Returns** | | | | |
| *ROA* | + | + | ? | - |
| **Default Risk** | | | | |
| *Z-SCORE* | - | + | - | - |

### Panel B Potential Channels for Shareholder Activism in Banking

| Variable | Creditor-Shareholder Conflict |
|---|---|
| **Potential Channels** | **Predicted Sign** |
| **Internal Corporate Governance** | |
| *CEO/Board Turnover* | ? |
| *CEO Pay* | ? |
| *CEO Pay-for-performance Sensitivity* | + |
| *Changes in By-laws* | + |
| **Capital Structure** | |
| *Dividend Payout* | + |
| *Stock Repurchases* | + |
| *Cash Holdings* | - |
| *Capital Ratio* | - |
| **Strategic Direction** | |
| *Risky Assets* | + |
| *Cost Reduction/ Efficiency* | - |
| *Divestitures/Spin-Off* | - |
| *Acquisitions* | + |
| *Takeover Target* | ? |

## Table 2.2: Shareholder Activism (1994-2010) – Events by Year and Demand

Panel A reports the number of activism events per year based on information in 13D and DFAN14A filings and Item 4 – Purpose of Transaction section. Panel B reports the number of activist demands for each year in our sample period, classified in seven well-defined categories shown below. The categories are considered non-exclusive, so an event can sometimes fall into multiple categories at a time. The sample period runs from $t$ = 1994 to $t$ = 2010. Please see Appendix A for the detailed definitions of the variables.

**Panel A: Distribution of Shareholder Activism - Events by Year**

| Year | All Types of Activism (Material Events) | No Unique Banks w/ Material Activism | Total Unique Banks | % Banks with Activism |
|---|---|---|---|---|
| **1994** | 10 | 7 | 391 | 0.018 |
| **1995** | 29 | 19 | 392 | 0.048 |
| **1996** | 57 | 25 | 401 | 0.062 |
| **1997** | 75 | 49 | 442 | 0.111 |
| **1998** | 76 | 42 | 472 | 0.089 |
| **1999** | 82 | 47 | 459 | 0.102 |
| **2000** | 91 | 42 | 445 | 0.094 |
| **2001** | 97 | 46 | 446 | 0.103 |
| **2002** | 73 | 41 | 435 | 0.094 |
| **2003** | 70 | 41 | 440 | 0.093 |
| **2004** | 53 | 28 | 455 | 0.062 |
| **2005** | 42 | 32 | 443 | 0.072 |
| **2006** | 91 | 40 | 451 | 0.089 |
| **2007** | 93 | 34 | 428 | 0.079 |
| **2008** | 103 | 39 | 402 | 0.097 |
| **2009** | 84 | 42 | 382 | 0.110 |
| **2010** | 78 | 41 | 374 | 0.110 |
| **Total** | **1204** | **337** | **1002** | **Average = 0.085** |

**Panel B: Shareholder Activism by Type of Demand & Year**

| Year | 1. Engage Management | 2. Strategic Changes | 3. Internal Governance | 4. Capital Allocation | 5. Proxy Fight | 6. Asset Sale | 7. Litigation/ |
|---|---|---|---|---|---|---|---|
| **1994** | 1 | 7 | 3 | | | | |
| **1995** | 10 | 21 | 5 | | | 1 | |
| **1996** | 10 | 30 | 15 | 1 | 12 | 2 | 4 |
| **1997** | 20 | 44 | 18 | 5 | 3 | 4 | 4 |
| **1998** | 29 | 37 | 18 | 1 | 6 | 6 | 2 |
| **1999** | 32 | 32 | 20 | 4 | 9 | 3 | |
| **2000** | 25 | 28 | 28 | 8 | 16 | 3 | |
| **2001** | 48 | 43 | 20 | 31 | 1 | 6 | 4 |
| **2002** | 17 | 15 | 18 | 41 | 4 | 6 | 1 |
| **2003** | 22 | 34 | 18 | 13 | 3 | 7 | 1 |
| **2004** | 11 | 26 | 17 | 10 | 4 | 1 | 3 |
| **2005** | 14 | 21 | 11 | 6 | | 3 | 1 |
| **2006** | 35 | 24 | 29 | 4 | 18 | 7 | 5 |
| **2007** | 48 | 12 | 37 | 6 | 17 | 11 | 3 |
| **2008** | 41 | 14 | 32 | 9 | 35 | 8 | 1 |
| **2009** | 41 | 17 | 30 | 11 | 11 | 9 | 2 |
| **2010** | 36 | 18 | 19 | 17 | 1 | 2 | |
| **Total** | **440** | **423** | **338** | **167** | **140** | **78** | **31** |
| **%** | **36.5%** | **35.1%** | **28.1%** | **13.9%** | **11.6%** | **6.5%** | **2.6%** |

## Table 2.3: Antecedents of Shareholder Activism

This table reports probit estimates for the shareholder activism of banks using determinants previously identified for non-financials and additional ones specific to banks. The main activism measure (*ACTIVISM*) is a dummy equal to 1 in all quarters in which the bank has activism. *SIZE is* the log value of gross total assets (GTA). *TOBIN's Q* is a measure of financial performance determined as market value of common stock over equity book value. *ROA* is the ratio of annualized net income to gross total assets (GTA). *GROWTH* is the growth rate of GTA. *CAPITALIZATION RATIO* is equity capital over gross total assets (GTA). *DIVYLD* is the dividend yield, defined as (common dividend + preferred dividends)/(market value of common stocks + book value of preferred). *INST OWNERSHIP* is the proportion of shares held by institutions. *AMIHUD* is the Amihud (2002)'s measure of trading illiquidity determined as the yearly average (using daily data) of 1000*sqrt(|return|/dollar trading volume). *NUMBER OF ANALYSTS* is the number of analysts covering the company. *AGE* is age (in years) of the oldest bank owned by the BHC. *BRANCHES/GTA* are the ratio of total bank branches over GTA. *NO_STATES* is the log of the number of states in which the bank has branches. *METROPOLITAN is* a dummy equal to 1 when the majority of bank deposits (50% or more) are in MSA areas. *DEPOSITS/GTA* is total deposits over GTA. *LOANS/GTA* is a measure of the composition of bank assets determined as total loans over GTA. *CASH_HOLDINGS* is cash holdings divided by GTA. *NPL* is the ratio of nonperforming loans and loans in default to GTA. *INCOME_DIVERSITY* is 1 minus the absolute value of the ratio between the difference between net interest income and other operating income and total operating income. *FOREIGN_OWNERSHIP* is equal to 1 when foreign shareholdings exceed 50% of total bank ownership. *HHI* is bank concentration, measured by the Herfindahl-Hirschman Index for bank deposits. *OCC* is a dummy equal to 1 for banks supervised by OCC. *FDIC* is a dummy equal to 1 for banks supervised by FDIC. *INCORP_DE* is equal to 1 if the bank is incorporated in Delaware. All independent variables are lagged 4 quarters and all regressions include time fixed effects and standard errors are clustered by the bank. The sample period runs from t = 1994 to t = 2010. Appendix A provides definitions for all variables utilized in the regressions. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

| **Dependent Variable:** | **(1)** | | **(2)** | | **(3)** | |
|---|---|---|---|---|---|---|
| **Dummy of being targeted** | **Marg. Prob** | **t-statistic** | **Marg. Prob** | **t-statistic** | **Marg. Prob** | **t-statistic** |
| ***BANK SIZE*** | -0.005** | (-2.136) | -0.014*** | (-3.327) | -0.003 | (-1.242) |
| ***TOBIN's Q*** | -0.159*** | (-2.086) | -0.131*** | (-1.528) | -0.200*** | (-4.788) |
| ***GROWTH*** | -0.000 | (-1.306) | -0.000 | (-1.232) | -0.000 | (-0.812) |
| ***ROA*** | -0.319*** | (-4.013) | -0.272*** | (-3.150) | -0.278*** | (-4.438) |
| ***EQRAT*** | -0.028 | (-0.255) | -0.058 | (-0.624) | -0.065 | (-0.759) |
| ***DIVYLD*** | -0.260** | (-2.163) | -0.116* | (-0.987) | -0.213** | (-2.044) |
| ***INST*** | 0.036*** | (2.924) | 0.022* | (1.724) | 0.023** | (2.274) |
| ***AMIHUD*** | -0.008* | (-2.309) | -0.003 | (-0.583) | -0.007** | (-2.536) |
| ***NUMBER OF ANALYSTS*** | | | 0.001** | (2.022) | | |
| ***BANK AGE*** | | | | | -0.000 | (-0.716) |
| ***BRANCHES / GTA*** | | | | | 0.038*** | (3.918) |
| ***NO_STATES*** | | | | | -0.010** | (-2.260) |
| ***URBAN*** | | | | | 0.003 | (0.318) |
| ***DEPOSITS / GTA*** | | | | | -0.052** | (-2.415) |
| ***LOANS / GTA*** | | | | | 0.026 | (1.482) |
| ***CASH_HOLDINGS*** | | | | | 0.081** | (2.417) |
| ***NPL RATIO*** | | | | | 0.055 | (0.429) |
| ***INCOME_DIVERSITY*** | | | | | -0.010 | (-0.856) |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***FOREIGN_OWNERSHIP*** | | | | | -0.022 | (-1.609) |
| ***HHI DEPOSITS*** | | | | | 0.063 | (1.478) |
| ***OCC_SUPERVISOR*** | | | | | 0.011 | (1.638) |
| ***FDIC_SUPERVISOR*** | | | | | 0.006 | (1.131) |
| ***INCORP_DE*** | | | | | 0.008 | (1.234) |
| No. obs. & Pseudo-R-sq | 22,492 | 0.047 | 14,879 | 0.067 | 21,999 | 0.084 |

## Table 2.4: Effects of Shareholder Activism (Main Effects)

This table reports the regression estimates of the relation between the shareholder activism of US Commercial banks and financial performance (*TOBIN's Q*), operating returns (*ROA*), and risk (*Z-SCORE*). We define the activism measure (*ACTIVISM*) as a dummy, which takes a value of 1 in all quarters in which the bank had material activist events. *TOBIN's Q is a* measure of financial performance determined as market value of common stock over equity book value. *ROA* is operating net income over GTA. The bank-level *Z-SCORE* is a measure of financial risk and it is determined as A (ROA) + A(EQ/TA) / Std_ROA, with a larger value indicates lower overall bank risk; *BANK SIZE is t*he log value of Total Assets. *AGE is* age (in years) of the oldest bank owned by the bank holding company. *DEPOSITS/GTA* is a measure of the composition of bank liabilities determined as total deposits over GTA. *LOANS/GTA* is a measure of the composition of bank assets side determined as total loans over GTA. *INCOME_DIVERSITY* is the Leaven and Levine (2009)'s measure of income diversity defined as 1 minus the absolute value of the ratio between the difference between net interest income and other operating income and total operating income. *FOREIGN_OWNERSHIP is a* dummy variable set to 1 when total foreign shareholding exceeds 50% of total bank ownership. *OCC is a* dummy variable taking a value of 1 for national banks that are supervised by OCC. *FDIC is a* dummy variable taking a value of 1 for state non-member banks that are supervised by FDIC. *FRS is a* dummy variable taking a value of 1 for state banks that are members of the Federal Reserve System. We use an OLS model with time and bank fixed effects. All independent variables are lagged 4 quarters. The sample period runs from t = 1994 to t = 2010. Please see Appendix A for details on the definitions and determination of all variables utilized in the regressions. T-statistics based on robust standard errors are shown in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

| | ***TOBIN'S Q*** | ***ROA*** | ***Z-SCORE*** |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***ACTIVISM*** | **0.007*** ** | **-0.000** | **-4.317*** ** |
| | **(3.976)** | **(-1.214)** | **(-3.208)** |
| ***BANK SIZE*** | -0.011* | -0.001*** | 1.072 |
| | (-1.923) | (-5.775) | (1.173) |
| ***BANK AGE*** | -0.009 | 0.000 | 6.799** |
| | (-1.196) | (1.308) | (2.534) |
| ***DEPOSITS / GTA*** | -0.048** | 0.001 | -8.323** |
| | (-2.281) | (1.090) | (-2.292) |
| ***LOANS / GTA*** | 0.078*** | 0.003*** | 19.273*** |
| | (4.407) | (7.912) | (6.757) |
| ***INCOME DIVERSITY*** | 0.021** | 0.002*** | 5.526*** |
| | (2.191) | (8.500) | (3.134) |
| ***OVERHEAD COSTS*** | 650.989*** | -3.420*** | -25,295.554*** |
| | (2.854) | (-2.759) | (-2.955) |

| | | | |
|---|---|---|---|
| ***FOREIGN OWNERSHIP*** | 0.028*** | -0.001 | -15.558*** |
| | (2.679) | (-1.030) | (-2.632) |
| ***OCC SUPERVISOR*** | -0.008*** | -0.000 | -1.998 |
| | (-3.417) | (-0.187) | (-1.183) |
| ***FDIC SUPERVISOR*** | 0.003 | 0.000 | 4.171*** |
| | (1.079) | (0.577) | (2.761) |
| ***INTERCEPT*** | 1.162*** | 0.012*** | -6.633 |
| | (12.945) | (7.094) | (-0.470) |
| ***Time fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,821 | 23,965 | 23,801 |
| ***R-squared*** | 0.875 | 0.604 | 0.472 |

## Table 2.5: Alternative Measures

This table reports the OLS regression estimates of the relation between the shareholder activism of US Commercial banks and their financial performance, operating returns, and risk. We show models with alternative measures. *ACTIVISM* is a dummy which takes a value of 1 in all quarters in which the bank had material activist events. We use an OLS model with time and bank fixed effects. All independent variables are lagged 4 quarters. The sample period runs from t = 1994 to t = 2010. Please see Appendix A for details on the definitions and determination of all variables utilized in the regressions. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

**Panel A: Different Measures of Market Performance**

| | *TOBIN'S Q* | *BUY-AND-HOLD_RET* | *BUY-AND-HOLD_AB_RET* | *SHARPE RATIO* |
|---|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** | **(4)** |
| ***ACTIVISM*** | **0.007*** | **0.028**** | **0.023**** | **0.711**** |
| | **(3.976)** | **(2.529)** | **(2.157)** | **(5.346)** |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time fixed effects*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed effects*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,821 | 23,842 | 23,842 | 23,842 |
| ***R-squared*** | 0.875 | 0.563 | 0.572 | 0.593 |

**Panel B: Different Measures of Accounting Performance**

| | *ROA* | *ROE* |
|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** |
| ***ACTIVISM*** | **-0.000** | **-0.001** |
| | **(-1.214)** | **(-0.820)** |
| ***Controls*** | **Yes** | **Yes** |
| ***Time fixed effects*** | **Yes** | **Yes** |
| ***Bank Fixed effects*** | **Yes** | **Yes** |
| ***Observations*** | 23,965 | 23,965 |
| ***R-squared*** | 0.604 | 0.630 |

**Panel C: Different Measures of Bank Risk-Taking**

| | *Z-SCORE* | *VOLATILITY_STOCK_RET* | *LLA RATIO* | *NPL RATIO* | *VOLATILITY ROA* |
|---|---|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** |
| ***ACTIVISM*** | **-4.317*** ** | **0.006*** ** | **0.001*** ** | **0.003** ** | **0.001** ** |
| | **(-3.208)** | **(3.139)** | **(3.035)** | **(2.439)** | **(2.403)** |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time fixed effects*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed effects*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 23,801 | 23,933 | 23,965 | 23,965 | 23,963 |
| ***R-squared*** | 0.472 | 0.549 | 0.607 | 0.462 | 0.533 |

**Panel D: Different Measures of Activism (Number of Activism Events)**

| | *TOBIN'S Q* | *ROA* | *Z-SCORE* |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***NO_ACTIVISM_EVENTS*** | **0.003*** ** | **0.000** | **-1.645*** ** |
| | **(5.205)** | **(0.774)** | **(-5.390)** |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,819 | 23,963 | 23,799 |
| ***R-squared*** | 0.875 | 0.604 | 0.472 |

## Table 2.6: Different Econometric Approaches

This table reports the regression estimates of the relation between the shareholder activism of US Commercial banks and their financial performance, operating returns, and risk. We show models with alternative measures. *ACTIVISM* is a dummy which takes a value of 1 in all quarters in which the bank had material activist events. Panel A shows using an event study (EVENTUS) the compound abnormal returns round activism events for several time windows, daily windows of (0,+1), (-1,+1), (-2,+2), and (-5,+5) and monthly windows of (0,3), (0,6), (0,12), (0,24), (0,36), (-1,12). Panels B, C and D show alternative econometrical models for operating returns (*ROA*), and bank risk (*Z-SCORE*): OLS, OLS with Time and Bank Fixed Effects (FE), Simple OLS, Time fixed effects (FE) only, Random Effects (RE), model with two-way clusters (bank and time), and model with Newey-West standard errors. All independent variables are lagged 4 quarters. The sample period runs from t = 1994 to t = 2010. Please see Appendix A for details on the definitions and determination of all variables utilized in the regressions. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

### Panel A: Market Performance (Event Studies)

#### Panel A.1: Market Performance (Event Study) – Daily

***Market Adjusted Returns, Value Weighted Index***

| ***Days*** | **N** | **CAR** | ***t*-test** | ***p*-value** |
|---|---|---|---|---|
| **(0,+1)** | 915 | **1.42%** | 8.302 | <.0001 |
| **(-1,+1)** | 915 | **1.79%** | 8.542 | <.0001 |
| **(-2,+2)** | 915 | **2.26%** | 8.370 | <.0001 |
| **(-5,+5)** | 915 | **2.89%** | 7.200 | <.0001 |

#### Panel A.2: Market Performance (Event Study) – Monthly

***Market Adjusted Returns, Value Weighted Index***

| ***Months*** | **N** | **CAR** | ***t*-test** | ***p*-value** |
|---|---|---|---|---|
| **(0,+3)** | 939 | **4.22%** | 4.799 | <.0001 |
| **(0,+6)** | 939 | **4.88%** | 4.196 | <.0001 |
| **(0,+12)** | 939 | **6.77%** | 4.271 | <.0001 |
| **(0,+24)** | 939 | **8.93%** | 4.061 | <.0001 |
| **(0,+36)** | 939 | **13.11%** | 4.902 | <.0001 |
| **(-1,+12)** | 939 | **7.68%** | 4.670 | <.0001 |

**Panel B: Operating Performance (*ROA*)**

| | Dependent Variable: *ROA* | | | | | |
|---|---|---|---|---|---|---|
| | *OLS w/ FE* | *Simple OLS* | *Time FE Only* | *RE* | *Newey-West* | *Two-way Clusters* |
| *Independent Variables* | (1) | (2) | (3) | (4) | (5) | (6) |
| *ACTIVISM* | -0.000 | -0.001*** | -0.001*** | -0.000 | -0.001*** | -0.001*** |
| | (-1.214) | (-6.773) | (-7.393) | (-1.259) | (-4.167) | (-5.276) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Time Effects* | Yes | No | Yes | Yes | No | No |
| *Bank Effects* | Yes | No | No | Yes | No | No |
| *Observations* | 23,965 | 23,965 | 23,965 | 23,045 | 23,045 | 23,045 |
| *R-squared* | 0.604 | 0.157 | 0.297 | | 0.294 | |

**Panel C: Bank Risk-Taking (*Z-SCORE*)**

| | Dependent Variable: *Z-SCORE* | | | | | |
|---|---|---|---|---|---|---|
| | *OLS w/ FE* | *Simple OLS* | *Time FE Only* | *RE* | *Newey-West* | *Two-way Clusters* |
| *Independent Variables* | (1) | (2) | (3) | (4) | (5) | (6) |
| *ACTIVISM* | -4.317*** | -5.920*** | -5.647*** | -3.570* | -6.176*** | -6.069* |
| | (-3.208) | (-4.042) | (-3.888) | (-1.678) | (-3.280) | (-1.733) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Time Effects* | Yes | No | Yes | Yes | No | No |
| *Bank Effects* | Yes | No | No | Yes | No | No |
| *Observations* | 23,801 | 23,801 | 23,801 | 22,915 | 22,915 | 22,915 |
| *R-squared* | 0.472 | 0.056 | 0.122 | 0.0998 | 0.05489119 | 0.121 |

## Table 2.7: Endogeneity Treatments

This table reports the regression estimates with endogeneity treatments of the relation between the shareholder activism of US Commercial banks and strategic consequences such as financial performance (*TOBIN's Q*), operating returns (*ROA*), and their risk taking behavior (*Z-SCORE*). We define the main activism measure as a dummy which takes a value of 1 in all quarters in which the bank had material activist events. The bank-level *Z-SCORE* is a measure of financial risk and it is determined as A(ROA) + A(EQ/TA) / Std_ROA; a larger value indicates lower overall bank risk. *ROA* is operating net income over GTA. We use an OLS model with time and bank FE. Panel A reports results when using a 2SLS instrumental variable (IV) estimation that controls for endogeneity of activism. We use as instrument *% BUSY ACTIVISTS,* which is the percentage of busy activists, that is, activists with five or more campaigns and/or 2 or more proxy fights at the same time. Panel B reports models using a propensity score matched sample. Panel C shows the results Heckman's two-step treatment effect model used to correct the self-selection in activism. The selection (activism) equation uses a ACTIVISM dummy as a dependent variable and uses the same instrument as in the instrumental variable analysis. The outcome equation uses *TOBIN's Q, ROA,* and *Z-SCORE* as dependent variables. We include all control variables from the main specification in all panel specifications. All independent variables are lagged 4 quarters. The sample period runs from t = 1994 to t = 2010. Please see Appendix A for details on the definitions and determination of all variables utilized in the regressions. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

### Panel A: Instrumental Variable Analysis



***IV Analysis (First Stage)***

| | **Dependent Variable: *ACTIVISM*** |
|---|---|
| ***Independent Variables*** | **(1)** |
| ***% BUSY ACTIVISTS*** | **0.044*** (5.397)** |
| ***Controls*** | **Yes** |
| ***Time Fixed Effects*** | **Yes** |
| ***Bank Fixed Effects*** | **Yes** |
| ***Observations*** | 23,963 |
| ***R-squared*** | 0.219 |
| ***Kleibergen-Paap rk LM statistic*** | 544.718*** |
| ***Kleibergen-Paap Wald rk F statistic*** | 3605.73*** |

*IV Analysis (Second Stage)*

| | *TOBIN'S Q* | *ROA* | *Z-SCORE* |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***ACTIVISM*** | **0.080*** ** | **-0.002** | **-50.260*** ** |
| | **(3.869)** | **(-1.169)** | **(-3.174)** |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,819 | 23,963 | 23,799 |
| ***R-squared*** | 0.875 | 0.604 | 0.472 |

**Panel B: PSM Analysis**

| | *TOBIN'S Q* | *ROA* | *Z-SCORE* |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***ACTIVISM*** | **0.006** ** | **-0.000** ** | **-4.883** ** |
| | **(2.252)** | **(-2.052)** | **(-2.310)** |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 4,701 | 4,958 | 4,958 |
| ***R-squared*** | 0.897 | 0.668 | 0.548 |

**Panel C: Heckman Selection**

***Heckman Analysis (Selection Equation)***

| | Dependent Variable: *ACTIVISM (Probit)* |
|---|---|
| ***Independent Variables*** | **(1)** |
| ***% BUSY ACTIVISTS*** | **0.047*** ** |
| | **(26.020)** |
| ***Controls*** | **Yes** |
| ***Time Fixed Effects*** | **Yes** |
| ***Bank Fixed Effects*** | **No** |
| ***Observations*** | 23,962 |
| ***Pseudo R-squared*** | 0.111 |

***Heckman Analysis (Outcome Equation)***

| | ***TOBIN'S Q*** | ***ROA*** | ***Z-SCORE*** |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***ACTIVISM*** | **0.008*** ** | **-0.000** | **-4.664*** ** |
| | **(4.479)** | **(-1.351)** | **(-3.437)** |
| ***LAMBDA*** | 0.004*** | -0.000* | -1.576*** |
| | (5.567) | (-1.701) | (-3.002) |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed Effects*** | **No** | **No** | **No** |
| ***Observations*** | 22,818 | 23,962 | 23,798 |
| ***R-squared (or Pseudo)*** | 0.875 | 0.604 | 0.472 |

## Table 2.8: Subsamples Analysis for Effects of Activism

This table reports the subsamples regression estimates of the relation between the shareholder activism of US Commercial banks and strategic consequences: financial performance (*TOBIN's Q*), operating returns (*ROA*), and risk taking behavior (*Z-SCORE*). We define the main activism measure as a dummy, which takes a value of 1 in all quarters in which the bank had material activist events. The bank-level *Z-SCORE* is a measure of financial risk and it is determined as A (ROA) + A(EQ/TA) / Std_ROA; a larger value indicates lower overall bank risk. *ROA* is operating net income over GTA. We use an OLS model with time and bank FE. All independent variables are lagged 4 quarters. Panel A reports results separately for hedge fund activists and non-hedge funds activists. Panel B reports results separately for more aggressive activism (*DFAN14A*) versus less aggressive activism (*13D*). Panel C looks at effects of activism using a sample that excludes TBTF banks. Panel D reports effects of activism by bank size: *SMALL, MEDIUM* and *LARGE*. *SMALL* represents banks with GTA up to $1 billion, *MEDIUM* represents banks with GTA exceeding $1 billion and up to $5 billion, and *LARGE* represents banks with GTA exceeding $5 billion. GTA equals total assets plus the allowance for loan and the lease losses and the allocated transfer risk reserve. The sample period runs from t = 1994 to t = 2010. Please see Appendix A details on the definitions and determination of all variables utilized in the regressions. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

**Panel A: Hedge Fund or Not**

| | ***TOBIN'S Q*** | ***ROA*** | ***Z-SCORE*** |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***HF_ACTIVIST*** | **0.010*** ** | **-0.000** | **-9.628*** ** |
| | **(5.689)** | **(-0.333)** | **(-4.854)** |
| ***NON_HF_ACTIVIST*** | **0.008*** ** | **-0.001*** ** | **-3.619** ** |
| | **(3.698)** | **(-3.242)** | **(-2.420)** |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,821 | 23,965 | 23,801 |
| ***R-squared*** | 0.875 | 0.604 | 0.472 |
| ***t*-stat** for equality of coefficients: ***HF_ACTIVIST = NON_HF_ACTIVIST*** | 0.663 | **1.758*** | **2.474** ** |

**Panel B: Effects by 13D vs. DFAN14A**

| | *TOBIN'S Q* | *ROA* | *Z-SCORE* |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***DFAN14A*** | **0.006*** | **-0.000** | **-14.864***** |
| | **(1.656)** | **(-0.368)** | **(-4.336)** |
| ***13D*** | **0.010***** | **-0.000*** | **-4.867***** |
| | **(6.479)** | **(-1.721)** | **(-4.351)** |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,821 | 23,965 | 23,801 |
| ***R-squared*** | 0.875 | 0.604 | 0.472 |
| ***t*-stat** for equality of coefficients: ***DFAN14A = 13D*** | 1.179 | 0.200 | **2.886***** |

**Panel C: Excluding Too-big-to-fail (TBTF)**

| | *TOBIN'S Q* | *ROA* | *Z-SCORE* |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***ACTIVISM*** | **0.003**** | **-0.000*** | **-5.902***** |
| | **(1.964)** | **(-1.748)** | **(-4.289)** |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 19,716 | 20,736 | 20,579 |
| ***R-squared*** | 0.883 | 0.607 | 0.476 |

**Panel D: Effects by Bank Size**

| | *TOBIN'S Q* | *ROA* | *Z-SCORE* |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| | | | |
| ***SMALL*** | **0.005*** ** | **-0.000** | **-2.852*** |
| | **(2.649)** | **(-0.598)** | **(-1.688)** |
| ***Observations*** | 9,678 | 10,431 | 10,311 |
| ***R-squared (or Pseudo)*** | 0.935 | 0.629 | 0.529 |
| | | | |
| ***MEDIUM*** | **-0.001** | **-0.000** | **-7.677*** ** |
| | **(-0.400)** | **(-0.877)** | **(-3.494)** |
| ***Observations*** | 8,147 | 8,376 | 8,345 |
| ***R-squared (or Pseudo)*** | 0.795 | 0.631 | 0.517 |
| | | | |
| ***LARGE*** | **0.026*** ** | **0.000** | **5.083** |
| | **(4.185)** | **(0.075)** | **(1.380)** |
| ***Observations*** | 4,996 | 5,158 | 5,145 |
| ***R-squared (or Pseudo)*** | 0.792 | 0.597 | 0.511 |
| | | | |
| ***ALL SIZE GROUPS*** | | | |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed Effects*** | **Yes** | **Yes** | **Yes** |

## Table 2.9: Shareholder Activism during Financial Crises

This table reports the regression estimates of the relation between the shareholder activism of US Commercial banks and strategic consequences: financial performance (*TOBIN's Q*), operating returns (*ROA*), and their risk taking behavior (*Z-SCORE*) during crises versus normal times. We define the main activism measure (*ACTIVISM*) as a dummy, which takes a value of 1 in all quarters in which the bank had material activist events. The bank-level *Z-SCORE* is a measure of financial risk and it is determined as A (ROA) + A(EQ/TA) / Std_ROA; a larger value indicates lower overall bank risk. *ROA* is operating net income over GTA. We use an OLS model with time and bank FE. All independent variables are lagged 4 quarters. *FINANCIAL_CRISES* variable construction follows Berger and Bouwman (2013). *FINANCIAL_CRISES* [55] is a dummy variable which takes a value of 1 for a crisis period and it includes both market (those originated in the capital markets) and banking crises (those originated in the banking sector). Panel A reports effects of activism during financial crises for the full sample. Panel B reports effects of activism during the subprime financial crisis (2006-2010). The sample period runs from t = 1994 to t = 2010. Please see Appendix A for details on the definitions and determination of all variables utilized in the regressions. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

**Panel A: Effects during Financial Crises (Full Sample)**

| | ***TOBIN'S Q*** | ***ROA*** | ***Z-SCORE*** |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***ACTIVISM*** | 0.003 | -0.000** | -9.885*** |
| | (1.408) | (-2.015) | (-6.337) |
| ***ACTIVISM * FINANCIAL_CRISES*** | 0.009*** | 0.000 | 12.263*** |
| | (2.771) | (1.578) | (5.171) |
| ***(ACTIVISM + ACTIVISM * FINANCIAL_CRISES)*** | **0.012*** ** | **0.000** | **2.378** |
| ***t*-stat (*ACTIVISM + ACTIVISM * FINANCIAL_CRISES* = 0)** | **4.443** | **0.332** | **1.179** |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,821 | 23,965 | 23,801 |
| ***R-squared*** | 0.875 | 0.604 | 0.472 |

[55] Banking crisis is the recent subprime lending crisis and market crises are the Russian debt crisis plus LTCM bailout in 1998, and the bursting of the dot.com bubble plus September 11. Normal times is a dummy variable which takes a value of 1 for all time periods that are not financial crises.

**Panel B: Effects during the Subprime Financial Crisis (2006-2010)**

| | *TOBIN'S Q* | *ROA* | *Z-SCORE* |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***ACTIVISM*** | -0.003 | -0.002*** | -9.941*** |
| | (-1.490) | (-4.443) | (-3.499) |
| ***ACTIVISM * FINANCIAL_CRISES*** | 0.010*** | 0.002*** | 10.821*** |
| | (3.608) | (4.258) | (3.361) |
| ***(ACTIVISM + ACTIVISM * FINANCIAL_CRISES)*** | **0.007*** ** | **0.000** | **0.880** |
| ***t*-stat (*ACTIVISM + ACTIVISM * FINANCIAL_CRISES* = 0)** | **3.250** | **1.421** | **0.400** |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 7,535 | 7,786 | 7,757 |
| ***R-squared*** | 0.896 | 0.628 | 0.633 |

**Panel C: Effects during Recent Financial Crisis (2006-2010) – TARP, Discount Window, and Term Auction Facility**

This table reports the regression estimates of the relation between the shareholder activism of US Commercial banks and financial performance (*TOBIN's Q*), operating returns (*ROA*), and risk taking (*Z-SCORE*) during crises versus normal times and considers impact of TARP, Discount Window and TAF support. We define the main activism measure (*ACTIVISM*) as a dummy, which takes a value of 1 in all quarters in which the bank had material activist events. The bank-level *Z-SCORE* is a measure of financial risk and it is determined as A (ROA) + A(EQ/TA) / Std_ROA; a larger value indicates lower overall bank risk. *ROA* is operating net income over GTA. We use an OLS model with time and bank FE. All independent variables are lagged 4 quarters. *FINANCIAL_CRISES* variable construction follows Berger and Bouwman (2013). *FINANCIAL_CRISES* [56] is a dummy variable which takes a value of 1 for a crisis period and it includes both market (those originated in the capital markets) and banking crises (those originated in the banking sector). Panel A reports effects of activism during financial crises. The sample period runs from t = 2006 to t = 2010. Please see Appendix A for details on the definitions and determination of all variables utilized in the regressions. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

| | ***TOBIN'S Q*** | ***ROA*** | ***Z-SCORE*** |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***ACTIVISM*** | **-0.000** | **-0.000** | **-7.688*** ** |
| | **(-0.176)** | **(-0.723)** | **(-3.865)** |
| ***ACTIVISM * FINANCIAL_CRISES*** | **0.008*** | **-0.001** | **4.308** |
| | **(1.907)** | **(-1.262)** | **(1.418)** |
| ***TARP * ACTIVISM*** | **-0.007** | **0.002*** ** | **-6.582** |
| | **(-1.587)** | **(3.652)** | **(-1.398)** |
| ***TARP * ACTIVISM * FINANCIAL_CRISES*** | **0.008** | **-0.000** | **16.669*** ** |
| | **(1.141)** | **(-0.704)** | **(2.810)** |
| ***DW* ACTIVISM*** | **0.005** | **-0.001*** | **3.981** |
| | **(1.325)** | **(-1.835)** | **(1.069)** |
| ***DW* ACTIVISM * FINANCIAL_CRISES*** | **-0.015*** ** | **0.001*** | **0.376** |
| | **(-2.603)** | **(1.900)** | **(0.071)** |
| ***TAF * ACTIVISM*** | **0.011** | **-0.002*** ** | **-4.458** |
| | **(1.278)** | **(-3.074)** | **(-0.582)** |
| ***TAF * ACTIVISM * FINANCIAL_CRISES*** | **0.021**** | **0.001** | **-4.160** |

[56] Banking crisis is the recent subprime lending crisis and market crises are the Russian debt crisis plus LTCM bailout in 1998, and the bursting of the dot.com bubble plus September 11. Normal times is a dummy variable which takes a value of 1 for all time periods that are not financial crises.

| | (1.987) | (0.969) | (-0.513) |
|---|---|---|---|
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,821 | 23,965 | 23,801 |
| ***R-squared*** | 0.875 | 0.604 | 0.473 |

## Table 2.10: Potential Channels and Actual Outcomes of Action for Activists

This table reports channels for the effects of activism: Internal Corporate Governance, Capital Structure, and Strategic Direction. The sample includes the banks that are targeted by activists and the sample period runs from t = 1994 to t = 2010. Panel A, presents a change analysis which investigates changes in means in the channels' components, by comparing them 8 quarters (2 years) before the activism with 8 quarters (2 years) after the activism events to account for the fact that some outcomes for activism could take a longer time period. Panel B follows Greenwood and Schor (2009) and is based on Lexis Nexis news collected about what happened after each activism event.

**Panel A: Potential Channels of Activism (Change Analysis)**

| **Channel** | | **Before Activism (Quarters: t-8, t-1)** | **After Activism (Quarters: t+1, t+8)** | **Difference in Means After - Before** | |
|---|---|---|---|---|---|
| **Variable** | **N** | **Mean** | **Mean** | **Difference** | ***t*-stat** |
| **Internal Corporate Governance** | | | | | |
| *CEO TURNOVER* | 5735 | 0.08 | 0.095 | 0.015** | 2.031 |
| *CEO/BOARD TURNOVER* | 5735 | 0.157 | 0.194 | 0.037*** | 3.928 |
| *LOG(1+CEO TOTAL PAY)* | 5735 | 13.183 | 13.229 | 0.046 | 1.285 |
| *CASH BONUS/CEO TOTAL PAY* | 5701 | 0.131 | 0.119 | -0.012*** | -2.817 |
| *CEO Pay-for-Performance: EQUITY-BASED COMPENSATION/CEO TOTAL PAY* | 5700 | 0.151 | 0.167 | 0.016** | 2.071 |
| **Capital Structure** | | | | | |
| *Dividend Payout (DIVYLD)* | 6843 | 0.022 | 0.022 | 0.000 | 0.419 |
| *STOCK REPURCHASES* | 6845 | 0.400 | 0.453 | 0.053* | 1.652 |
| *CASH HOLDINGS* | 6845 | 0.040 | 0.040 | 0.000 | -0.321 |
| *CAPITALIZATION RATIO* | 6845 | 0.093 | 0.091 | -0.001*** | -2.383 |
| **Strategic Direction** | | | | | |
| *Risky Assets: COMMERCIAL REAL ESTATE LOANS* | 6845 | 0.241 | 0.251 | 0.010*** | 3.028 |
| *Risky Assets: REAL ESTATE LOANS* | 6845 | 0.473 | 0.483 | 0.010** | 2.39 |
| *Risky Financing: NON-DEPOSIT FUNDING* | 6845 | 0.152 | 0.158 | 0.006** | 2.251 |
| *OVERHEAD COSTS* | 6845 | 0.061 | 0.035 | -0.026*** | -2.827 |

| **Strategic Direction (cont.)** | |
|---|---|
| *DIVESTITURES (*BHCs have banks acquired by other institutions) | ~5% increase from 14% (46/337) up to 2 years before activism to 19% (64/337) of the BHCs have banks acquired by other institutions up to 2 years after shareholder activism. |
| *ACQUISITIONS* | ~1% decrease from 12% (41/337) organizations making acquisitions up to 2 years after activism to 13% (44/337) organizations making acquisitions up to 2 years before activism. |
| *TAKEOVER TARGET* (the organization - BHC or commercial bank - is acquired by another institution) | ~10% (37 /337) of the organizations become takeover targets up to 2 year after shareholder. |

**Panel B: Outcomes of Activism (Lexis-Nexis News)**

| **Outcome** | **Number of Unique Banks** | **% of All Banks** | **% of Banks with News** |
|---|---|---|---|
| **No News** | 166 | 49.26% | |
| **News:** | 171 | 50.74% | |
| **Corporate Governance:** | | | |
| *Changes of CEO* | 14 | 4.15% | 8.19% |
| *Board Seats Granted to Activist and/or his Nominees* | 63 | 18.69% | 36.84% |
| *Activist Is Not Granted Board Seats/Withdrawal/Proxy Defeat* | 19 | 5.64% | 11.11% |
| *Changes in By-Laws: Staggered Board, Poisson Pill etc.* | 7 | 2.08% | 4.09% |
| **Capital Structure:** | | | |
| *Shares Repurchased / Dividend Policy* | 15 | 4.45% | 8.77% |
| *Capital Raise / Financing Agreement* | 21 | 6.23% | 12.28% |
| **Strategic Changes:** | | | |
| *Takeover of the Target Completed* | 37 | 10.98% | 21.64% |
| *Activist Wants to Sell the Company and Does not Succeed* | 7 | 2.08% | 4.09% |
| *Announcement that Company Hires IB for Strategic Alternatives* | 5 | 1.48% | 2.92% |
| *Divestiture or Spinoff Completed or Announced* | 1 | 0.30% | 0.58% |
| *Acquisitions of Other Institutions* | 10 | 2.97% | 5.85% |
| **Other:** | | | |
| *Settlement / Standstill Agreement* | 49 | 14.54% | 28.65% |
| *Activist Cuts Position Below 5%* | 45 | 13.35% | 26.32% |

# CHAPTER 3

## INTERNATIONALIZATION AND BANK RISK[57,58]

### 3.1 Introduction

Economists generally believe that diversification into activities with returns that are not highly correlated with those of the existing portfolio reduces risk. However, this might not always be the case. If the diversification is into activities with higher risk, it could increase overall portfolio risk even if the returns on the activities are not highly correlated with those of the existing portfolio. The recent global financial crisis has reinvigorated the debate on the benefits of financial integration. During this crisis, risk seemed to be contagious across countries, suggesting that diversification across international borders may not have been effective. As also observed during the crisis, bank risk can have a first-

[57] Allen N. Berger, Sadok El Ghoul, Omrane Guedhami, and Raluca A. Roman. Submitted to *Management Science*, 02/11/2015.

[58] We thank Jennie Bai, Nicolla Cetorelli, Lucy Chernykh, Saiying Deng, George Filis, Linda Goldberg, Chuck Kwok, Luc Laeven, Tanakorn Makaew, Sabur Mollah, Don Morgan, Frederike Niepmann, Jiaping Qiu, Kwangwoo Park, Andreas Pfingsten, Gordon Roberts, Asani Sarkar, Kenneth Singleton, Peter Wong, participants at the Federal Reserve Bank of New York, North Carolina State University, Tokyo Keizai University, and University of South Carolina seminars, participants at the American Finance Association, Financial Management Association European Conference, Eastern Finance Association, International Finance and Banking Society, European Finance Management Association, Multinational Finance Society, Finance Management Association, Southern Finance Association, the Asia-Pacific Financial Markets (CAFM) of the Korean Securities Association (KSA), and the International Conference on Asian Financial Markets and World Conference on Risk, Banking, and Finance meetings for constructive comments and Christa Bouwman for some data help. We thank Justin Choma and Constantin Roman for excellent research assistance. We appreciate generous financial support from the Social Sciences and Humanities Research Council of Canada.

order effect on financial and economic stability (Laeven and Levine, 2009). To mitigate the destabilizing potential of such risk,national and international organizations have focused on implementing regulations to limit bank risk and avoid future financial crises.[59] Much of the focus of such reforms has been on constraining banks' risk within one country. However, Houston, Lin, and Ma (2012) and Ongena, Popov, and Udell (2013) suggest that banks may engage in regulatory arbitrage, circumventing strict domestic regulations by taking more risk abroad. This raises the question of how bank internationalization affects the risk of individual banks. This is the question we address in this paper.

The literature identifies a number of other determinants of bank risk, including bank capital (e.g., Koehn and Santomero, 1980; Kim and Santomero, 1988; Holmstrom and Tirole, 1997; Allen, Carletti, and Marquez, 2011; Mehran and Thakor, 2011; Berger and Bouwman, 2013), regulation and other government interventions (e.g., Laeven and Levine, 2009; Black and Hazelwood, 2013; Berger, Bouwman, Kick, and Schaeck, 2014; Duchin and Sosyura, 2014), competition (e.g., Keeley, 1990; Boyd and De Nicolo, 2005; Berger, Klapper, and Turk-Ariss, 2009; Martinez-Miera and Repullo, 2010), bank size (e.g., Demsetz and Strahan, 1997; Hakenes and Schnabel, 2011; Bhagat, Bolton, and Lu, 2012), and governance (e.g., Saunders, Strock, and Travlos, 1990; Laeven and Levine, 2009; Beltratti and Stulz, 2012; Berger, Imbierowicz, and Rauch, 2014).

However, to our knowledge no prior study focuses on the direct link between internationalization and bank risk.[60] Further, prior work has little to say about the effects

[59] Examples include the Dodd-Frank requirement that systemically important financial institutions in the U.S. receive additional supervision from the Federal Reserve and the Bank for International Settlements' Basel III capital and liquidity standards.

[60] A partial exception is Buch, Koch, and Koetter (2013). However, their focus is different – on risk and market power in an international context. As a side result, they find a weak negative relation between internationalization and risk for German banks. We find a very different result for U.S. banks.

of bank internationalization during financial crises. In addition, there is no research to our knowledge that examines agency problems in explaining bank internationalization decisions. This paper aims to fill these gaps in the literature.

There is also a literature that considers the effect of internationalization on nonfinancial firm risk. There are two opposing views in this literature. On the one hand, Hughes, Logue, and Sweeney (1975), Rugman (1976), Agmon and Lessard (1977), Amihud and Lev (1981), and Michel and Shaked (1986) document a lower risk for multinational corporations (MNCs) relative to purely domestic corporations. The most cited argument for the observed lower risk is the diversification benefit of generating cash flows in different countries. On the other hand, Bartov, Bodnar, and Kaul (1996) and Reeb, Kwok, and Baek (1998) find a higher risk for these MNCs due to greater volatility of cash flows. The most commonly advanced arguments for the observed higher risk are: foreign exchange risk (Solnik, 1974; Eun and Resnik, 1988; Black, 1990), political risk (Mahajan, 1990; Burgman, 1996; Cuervo-Cazurra, Maloney, and Manrakhan, 2007), increased agency problems and difficulties in effectively monitoring managers abroad (Lee and Kwok, 1988), and the presence of asymmetric information due to competition and unfamiliarity with the foreign markets (Reeb, Kwok, and Baek, 1998). These factors can offset the benefit from the diversification of MNCs' cash flows. Finally, Kwok and Reeb (2000) find that the effect of internationalization on the risk of MNCs might vary with home and host market conditions.

In contrast to the literature on nonfinancial firms, this paper focuses on banks because bank risk is a central issue affecting financial stability, business cycle fluctuations, and economic growth (Laeven and Levine, 2009). This paper also contributes to the

broader literature on internationalization by examining risk within one important industry rather than across a number of very different industries with their confounding differences.

To investigate the impact of internationalization on bank risk, we first consider a simple model of an international bank's portfolio with two risky assets: a single foreign asset with expected return $\mu_F$ and standard deviation $\sigma_F$ and a single domestic asset with expected return $\mu_D$ and standard deviation $\sigma_D$. The correlation between the two assets is $\rho_{FD}$, and the bank invests proportion $w$ in the foreign asset. Our (inverse) measure of risk is *Z-score*. *Z-score* is defined as the sum of a bank's mean return on assets and mean capitalization ratio divided by the standard deviation of return on assets. We assess the impact of the degree of internationalization, captured by $w$, on *Z-score* by computing the partial derivative of *Z-score* with respect to $w$. We cannot unambiguously sign this derivative, but we use Matlab to gain insight as to how the sign varies with different values of the underlying parameters. Most findings are consistent with intuition.

From this model, we develop two hypotheses on the impact of internationalization on bank risk. The *diversification hypothesis* suggests that international banks may have lower risk because they diversify their portfolios (e.g., DeLong, 2001; Amihud, DeLong, and Saunders, 2002; Laeven and Levine, 2007). For example, if asset returns are not highly correlated across countries ($\rho_{FD}$ is low), internationally diversified banks may be safer because they are less exposed to domestic shocks (e.g., Diamond, 1984; Demsetz and Strahan, 1997) as long as the risk of the foreign asset is not too high relative to the risk of the domestic asset (i.e., $\sigma_F$ is not too large relative to $\sigma_D$ and $\mu_F$ is not too low relative to $\mu_D$).

Alternatively, the *market risk hypothesis* suggests that international banks may have higher risk due to market-specific factors that make foreign assets relatively risky (i.e., $\sigma_F$ high relative to $\sigma_D$ and/or $\mu_F$ low relative to $\mu_D$), unless this risk is offset by a low correlation $\rho_{FD}$ (e.g., Winton, 2000; Amihud, DeLong, and Saunders, 2002). Foreign market conditions may cause international banks to face greater risks on their foreign assets. As in the nonfinancial firm risk literature, foreign exchange risk may make foreign assets riskier to the extent that they are not denominated in the home currency (e.g., Brimmer and Dahl, 1975). Further, local competition in the foreign markets may affect the time it takes for a new entrant to establish market share and to create lending relationships (e.g., Berger, Klapper, and Udell, 2001; Chari and Gupta, 2008). Another important factor is the local culture (e.g., Li and Guisinger, 1992), since it takes time to learn the local market's language, preferences, and informal institutions. Other market factors include the degree of regulatory, monetary, and legal complexity (e.g., Berger, Buch, DeLong, and DeYoung, 2004; Alibux, 2007), the degree of economic and political instability (e.g., Shapiro, 1985; Brewer and Rivoli, 1990), and the extent of market imperfections and asymmetric information problems in the foreign countries (e.g., Buch and DeLong, 2004; Gleason, Mathur, and Wiggins, 2006). In addition, there may be operational diseconomies associated with monitoring from a distance, consistent with the *home field advantage hypothesis* of Berger, DeYoung, Genay, and Udell (2000).

Importantly, both the *diversification hypothesis* and the *market risk hypothesis* may hold simultaneously for different sets of banks. All that we can do as researchers is determine which of these hypotheses has stronger empirical support, i.e., which hypothesis empirically dominates the other. To address this question, we use virtually all (15,988)

U.S. commercial banks for the period 1989:Q1 to 2010:Q4, and evaluate whether international or purely domestic banks have more risk. We find that international banks have much higher risk than purely domestic banks. In addition, we document that a greater marginal degree of internationalization within the subset of internationalized banks is associated with higher risk. These results are consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*.

To ensure the robustness of our findings, we re-run our analyses using alternative proxies for bank internationalization and risk, alternative samples, and alternative estimation methods. We also address potential endogeneity issues using an instrumental variable estimation and a propensity score matching analysis. In each of these checks, we find evidence supporting our main findings.

In additional analyses, we examine the impact of internationalization on the three components of *Z-score* – mean return on assets, mean capitalization ratio, and standard deviation of returns – to identify the sources of the higher risk of internationalization. We find that internationalization is associated with a higher volatility of bank earnings, which might reflect higher risks that international banks face in the foreign markets. We also find that internationalization is associated with lower mean profitability, consistent with prior empirical evidence that banks' foreign operations are generally relatively inefficient (e.g., Berger, DeYoung, Genay, and Udell, 2000). In addition, internationalization is associated with higher capitalization, perhaps designed to offset part of the higher risks from the other sources.

We also examine publicly listed banks and banks in listed bank holding companies, since this subsample allows us to examine market-based risk measures. We find that listed

international banks have higher market risk as measured by higher standard deviations of stock returns and lower Standard & Poor's credit ratings than their purely domestic counterparts, consistent with market participants being aware of the higher risk of international banks. We also separately examine financial crisis periods and non-crisis periods to investigate whether internationalization affects risk differently during financial crises. Our results suggest that the relation between internationalization and risk is stronger during financial crises. Finally, we find that the positive relation between internationalization and bank risk is more pronounced in banks that are more likely to suffer from agency problems related to poor corporate governance, supporting an empire-building explanation for the main results.

In the remainder of this chapter, Section 3.2 presents a simple model of an international bank's portfolio. Section 3.3 describes the data, variables, and summary statistics. Section 3.4 presents the main results and Section 3.5 provides the robustness tests. Section 3.6 discusses additional analyses. Section 3.7 concludes.

### 3.2 A Simple Model of an International Bank's Portfolio

Assume that an international bank has a simple portfolio with two risky assets: a foreign asset with expected return $\mu_F$ and standard deviation $\sigma_F$ and a domestic asset with expected return $\mu_D$ and standard deviation $\sigma_D$. The correlation between the two assets is $\rho_{FD}$ and the bank's ratio of foreign assets to total assets is $w$, which ranges from 0 to 1. The expected return of the portfolio is:

$$\mu_P = w\mu_F + (1 - w)\mu_D. \tag{3.1}$$

The variance of the portfolio is:

$$\sigma_P^2 = w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D. \tag{3.2}$$

The standard deviation of the portfolio $\sigma_p$ is:

$$\sigma_p = \sqrt{w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D}. \tag{3.3}$$

Our (inverse) measure of risk is *Z-score*. *Z-score* for an international bank is:

$$Z = \frac{\mu_P + (K/A)}{\sigma_p}, \tag{3.4}$$

where $K/A$ represents the mean *Capitalization Ratio*.

We rewrite $Z$ from equation (3.4) as:

$$Z = \frac{w\mu_F + (1-w)\mu_D + (K/A)}{\sqrt{w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D}}. \tag{3. 5}$$

We attempt to assess the impact of internationalization on risk, that is, the effect of the foreign assets ratio, $w$, on the *Z-score*:

$$\partial Z/\partial w = \frac{\partial\left[\frac{\mu_P + (K/A)}{\sigma_p}\right]}{\partial w}. \tag{3.6}$$

We show in Appendix C that $\partial Z/\partial w$ can be written in terms of the basic parameters as:

$$\begin{aligned}\partial Z/\partial w = &\left[\frac{[(1-w)\sigma_D^2 + w\rho_{FD}\sigma_F\sigma_D]}{[w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D]^{\frac{3}{2}}}\right]\mu_F \\ &-\left[\frac{[w\sigma_F^2 + (1-w)\rho_{FD}\sigma_F\sigma_D]}{[w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D]^{\frac{3}{2}}}\right]\mu_D \\ &-\left[\frac{[w\sigma_F^2 - (1-w)\sigma_D^2 + (1-2w)\rho_{FD}\sigma_F\sigma_D]}{[w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D]^{\frac{3}{2}}}\right](K/A).\end{aligned} \tag{3.7}$$

We cannot unambiguously sign this derivative, but we use Matlab to solve equation (3.7) by entering the following parameters and conditions:

$$w \in [0,1],\ \sigma_F \in (0,1),\ \sigma_D \in (0,1), \rho_{FD} \in [-1,1], \mu_F \in (0, 0.5), \mu_D \in (0,0.5), K/A \in (0,0.5). \tag{3.8}$$

We consider starting values of 0 for $w$, 0.1 for $\sigma_F$, $\sigma_D$, $\mu_F$, $\mu_D$, and *K/A*, and -1 for $\rho_{FD}$, and increments of 0.1 for all.

The effect of higher $w$ on $Z$ depends crucially on both $\rho_{FD}$ and the relative risk of the foreign asset (i.e., magnitudes of $\sigma_F$ compared to $\sigma_D$ and $\mu_F$ compared to $\mu_D$). There are two clear-cut cases in which the correlation and the relative risks intuitively point to reduced or increased risk from more investment in the foreign asset.

Case 1 – Negative correlation and relatively low foreign asset risk: $\rho_{FD} \leq 0;\ \sigma_F < \sigma_D; \mu_F > \mu_D$.

Case 2 – Positive correlation and relatively high foreign asset risk: $\rho_{FD} > 0;\ \sigma_F > \sigma_D; \mu_F < \mu_D$.

The findings are as follows. In Case 1, we find that $\partial Z/\partial w$ is mostly positive: 75,876 positive solutions, 28,667 negative solutions, and 1 zero solution. This is intuitive and suggests that for most, but not all values, more of the foreign asset reduces overall portfolio risk when the correlations of returns are negative and the foreign asset is relatively safe.

In Case 2, we find that $\partial Z/\partial w$ is mostly negative: 90,194 negative solutions, 4,832 positive solutions, and 14 zero solutions. This is intuitive and suggests that for most, but

not all values, more of the foreign asset increases overall portfolio risk when the correlations of returns are positive and the foreign asset is relatively risky.

We also consider other possible cases in which there is either positive correlation with relatively low foreign asset risk ($\rho_{FD} > 0$; $\sigma_F < \sigma_D$; $\mu_F > \mu_D$) or negative correlation with relatively high foreign asset risk ($\rho_{FD} \leq 0$; $\sigma_F > \sigma_D$; $\mu_F < \mu_D$), as well as cases in which the mean and standard deviation relations go in the opposite directions and find mixed results.[61]

The model suggests our two hypotheses regarding the effects of internationalization ($w$) on bank risk ($Z$): the *diversification hypothesis* and the *market risk hypothesis.* The *diversification hypothesis* that international banks have lower risk ($\partial Z/\partial w > 0$) will hold if asset returns are not highly correlated across countries ($\rho_{FD}$ is low) as long as the foreign asset is not risky relative to the domestic asset (i.e., $\sigma_F$ is not too large relative to $\sigma_D$ and $\mu_F$ is not too low relative to $\mu_D$). This is best exemplified by Case 1. The *market risk hypothesis* that international banks have higher risk ($\partial Z/\partial w < 0$) will hold if market-specific factors make the foreign asset relatively risky (i.e., $\sigma_F$ high relative to $\sigma_D$, and/or $\mu_F$ low relative to $\mu_D$ unless they are offset by a low correlation $\rho_{FD}$. This is best exemplified by Case 2.

[61] To briefly summarize, in Case 3, positive correlation and relatively low foreign asset risk, $\partial Z/\partial w$ is positive for most parameter values. In Case 4, negative correlation and relatively high foreign asset risk, $\partial Z/\partial w$ is mostly negative. In Case 5, relatively high foreign asset return and relatively high foreign asset risk, $\partial Z/\partial w$ is mostly negative. In Case 6, relatively low foreign asset return and relatively low foreign asset risk, $\partial Z/\partial w$ is mostly positive.

### 3.3 Data, Variables, and Summary Statistics

*3.3.1 Sample banks*

We acquire bank data from quarterly Call Reports, which contain financial information on all banks in the U.S. Our raw data cover the period 1986:Q1 to 2010:Q4, although our risk measure starts in 1989:Q1 because of the lag structure of our model. We adjust the data to be in real 2010:Q4 terms using the GDP price deflator. Our initial dataset comprises 1,069,609 bank-quarter observations. We omit observations that do not refer to commercial banks according to the Call Reports Indicator, which leaves 969,053 observations. We next remove any bank-quarter observations with missing or incomplete financial data on basic accounting variables such as total assets and equity, as well as observations that have missing or negative data for income statement variables such as interest expenses, personnel expenses, and non-interest expenses, resulting in 964,150 bank-quarter observations. Following the procedure in Berger and Bouwman (2009), we further refine our sample by excluding observations with i) gross total assets (GTA)[62] less than or equal to $25 million and ii) no outstanding loans or deposits (i.e., entities not engaged in deposit-taking or loan-making, which are required for banks to be considered commercial banks). These screens leave us with a final sample of 778,664 bank-quarter observations for 15,988 commercial banks over the entire sample period. Finally, to avoid distortions in ratios that contain equity, for all observations with total equity less than 1% of total assets, we replace equity with 1% of total assets.

[62] Gross total assets (GTA) equals total assets plus the allowance for loan and lease losses and the allocated transfer risk reserve (a reserve for certain foreign loans). Total assets on Call Reports deduct these two reserves, which are held to cover potential credit losses. We add these reserves back to measure the full value of the assets financed.

### *3.3.2 Bank variables*

#### *3.3.2.1 Measures of risk*

As noted, our main (inverse) measure of bank risk is *Z-Score*, with larger values indicating lower overall bank risk (e.g., Boyd and Runkle, 1993; Laeven and Levine, 2009; Houston, Lin, Lin, and Ma, 2010; Beltratti and Stulz, 2012). It is calculated as the sum of a bank's mean *ROA* (net income over GTA) and mean *Capitalization Ratio* (equity capital over GTA) divided by *Stdv. ROA* (the volatility of *ROA*). In our main analysis, we compute *Z-Scores* over a 12-quarter period, following a methodology similar to Berger, Klapper, and Turk-Ariss (2009) and Demirgüç-Kunt and Huizinga (2010).

We also employ several alternative measures of bank risk. We take the log of the 12-quarter *Z-score*. We also construct *Z-score* over 8 quarters and 20 quarters. We use *Stdv. ROE*, the standard deviation of *ROE* over 12 quarters, where ROE is net income over total equity. We also use the *Sharpe Ratio*, calculated as the risk-adjusted rate of return on equity (mean *ROE/Stdv. ROE*), following Demirgüç-Kunt and Huizinga (2010). In addition, we use *NPL Ratio*, the nonperforming loans ratio, a measure of financial stability calculated as the bank ratio of nonperforming loans (past due at least 90 days or in nonaccrual status) to total loans (e.g., Berger, Klapper, and Turk-Ariss, 2009), and *LLA Ratio*, the ratio of the loan and lease loss allowance to total loans.

#### *3.3.2.2 Measures of internationalization*

We construct several measures of bank internationalization, following Cetorelli and Goldberg (2012). Our main measure is *Foreign Assets Ratio*, the ratio of a bank's foreign

assets to GTA.[6364] A larger *Foreign Assets Ratio* indicates a higher degree of internationalization, while a ratio of 0 indicates that a bank has purely domestic operations. We also specify three alternative measures of internationalization. The first is *Bank Internationalization Dummy*, which takes the value 1 if *Foreign Assets Ratio* is positive, and 0 otherwise. The second is *Foreign Loans Ratio*, the ratio of a bank's foreign loans to the total loans of the bank. The third is *Foreign Deposits Ratio*, the ratio of foreign deposits to total deposits.

*3.3.2.3 Control variables*

To isolate the role of internationalization in bank risk, we employ a number of control variables for bank characteristics shown to affect a bank's risk outcome. We first control for *Income Diversification*. Demirgüç-Kunt and Huizinga (2010) and Baele, De Jonghe, and Vander Vennet (2007) find that a greater reliance on non-interest income is linked to more volatile returns. Stiroh (2006) finds a negative link between total bank risk and diversification of revenue.[65] We follow Laeven and Levine (2007) and construct *Income Diversification* as 1 – |(Net Interest Income – Other Operating Income)/(Total Operating Income)|.[66]

[63] Due to data limitations, we are only able to capture the assets in the foreign offices of U.S. banks, not the foreign assets in domestic offices. We also lack information on host countries where foreign offices of U.S. banks operate.

[64] Our data for the foreign assets is sourced from the Call Report, where this data is already converted into U.S. dollars, (eliminating the need for conversion from other currencies).

[65] In a study of European banks, LePetit, Nys, Rous, and Tarazi (2008) find that increased non-interest income exposure is positively linked to risk. Stiroh and Rumble (2006) also find that an increased share of volatile non-interest activities outweighs the diversification benefits. Houston, Lin, Lin, and Ma (2010) use a diversification index and find that diversification reduces risk.

[66] In unreported results, we also run our regression analysis using a measure of asset diversification, which is calculated as 1 – |(Net Loans – Other Operating Assets)/(Total Earning Assets)|. The relation between internationalization and risk does not change.

Following Demirgüç-Kunt and Huizinga (2010), we include *Size*, measured as the log of GTA, since prior research shows that bank size is an important determinant of international competitive success (e.g., Hirtle, 1991), and that risk varies with bank size. In particular, prior work shows that larger banks have a greater capacity to absorb risk (e.g., Berger, Bouwman, Kick, and Schaeck, 2014), economies of scale in foreign exchange management (e.g., Minh To and Tripe, 2002), and more stable earnings (e.g., De Haan and Poghosyan, 2012). Alternatively, larger banks may take on higher risk due to safety-net policies that can put them under the "too big to fail" umbrella (e.g., O'Hara and Shaw, 1990).

Our third control is the public status of the bank, *Listed*, since prior research shows that this factor affects risk (e.g., Nichols, Wahlen, and Wieland, 2009; Barry, Lepetit, and Tarazi, 2011). Banks that are publicly traded could have different risk behavior because they tend to be more informationally transparent, and are subject to more monitoring from capital markets. We construct *Listed* as a dummy that takes the value of 1 if a bank is listed or is part of a bank holding company that is listed, and 0 otherwise.

Fourth, we control for membership in a bank holding company, *BHC*. Such membership is expected to help a bank strengthen its position because the holding company is required to support its affiliates by injecting capital as needed. Consistent with this view, Houston, James, and Marcus (1997) find that bank loan growth depends on bank holding company membership. We construct *BHC* as a dummy that takes the value of 1 if the bank is part of a bank holding company, and 0 otherwise.

Our fifth control is *Overhead Costs,* which captures the bank's operating cost structure. Demirgüç-Kunt and Huizinga (2010) find that banks with high overhead costs

are less stable. We construct *Overhead Costs* as the ratio of total bank operating expenses to GTA.

Finally, we control for the effect of the regulatory environment on bank risk (e.g., Laeven and Levine, 2009; Berger and Bouwman, 2013). We control for potential differences in bank stability owing to a bank's primary federal regulator with three proxies. We include *FED* and *OCC*, dummies that equal 1 if the Federal Reserve or the Office of the Comptroller of the Currency, respectively, is the bank's primary federal regulator. We omit *FDIC*, a dummy that equals 1 if the Federal Deposit Insurance Corporation is the bank's primary federal regulator, to avoid perfect collinearity.

*3.3.3 Summary statistics*

Figure 3.1 plots the evolution of the numbers of U.S. commercial banks with foreign assets, foreign loans, and foreign deposits over our sample period (1989:Q1–2010:Q4). There is a decline in the number of international commercial banks with foreign assets, from 181 in 1989:Q1 to 53 in 2010:Q4, which could be due to the consolidation of the banking sector.[67] However, the total number of unique international banks over our entire sample period is 390, which is much larger than the number at the beginning of our sample period due to new entries and switches. A similar pattern obtains in the evolution of internationalization ratios in Figure 3.2, with *Foreign Assets Ratio* declining from 0.23% to 0.05%, *Foreign Loans Ratio* declining from 0.16% to 0.05%, and *Foreign Deposits Ratio* declining to a lesser degree, from 0.35% to 0.18%.

[67] Cetorelli and Goldberg (2012) report in their Table II that the number of global banks was 247 in 1985, 170 in 1995, and 107 in 2005. Our numbers are slightly lower because we focus only on commercial banks, whereas Cetorelli and Goldberg include all banks in the Call Reports.

In Figure 3.3, we find that despite the decline in the number of international banks and internationalization ratios, there are increases in the dollar amounts of their foreign activities, foreign assets, foreign loans, and foreign deposits. Thus, the decline in the ratios was primarily due to domestic assets, loans, and deposits growing faster than corresponding foreign quantities over the sample period.

Figure 3.4 compares the risk (*Z-score*) of international commercial banks with purely domestic peers. This figure also depicts crisis periods, with banking crises (crises originating in the banking sector) represented by dark gray shaded areas and market crises (crises originating in capital markets) by light gray shaded areas following the definitions in Berger and Bouwman (2013) (discussed in more detail in Section 3.6.3). The figure shows that the mean *Z-score* of international banks is lower than that of purely domestic banks each year in the sample, with the exception of a short period prior to the recent subprime mortgage crisis. This is generally consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*. Comparing financial crises with normal time periods, the figure also reveals a steeper decline in the mean *Z-score* for international banks during financial crises. These raw data are generally consistent with a stronger dominance of the *market risk hypothesis* during crises.

Table 3.1 provides definitions and summary statistics for our variables. In terms of risk, commercial banks have a mean 12-quarter *Z-score* of 36.053, indicating that the average bank is very far from default, a mean *Stdv. ROE* of 0.035, and a mean *NPL Ratio* of 0.016. The internationalization measures indicate that on average 0.1–0.3% of U.S. commercial banks' operations are international, with some banks having very intense foreign operations during some of the bank-quarters (unreported). In terms of bank

characteristics, the average commercial bank has a level of *Income Diversification* of 20%, and a *Size* of 11.9 (mean GTA of $0.968 billion). About 15% of the commercial banks are listed or part of a listed bank holding company (*Listed*) and about 70% are owned by a bank holding company (*BHC*). Also, the average commercial bank has *Overhead Costs* of 1.62. Finally, 10.6%, 30.9%, and 58.5% of the banks have the *FED*, the *OCC*, and the *FDIC* as their primary regulator, respectively.[68]

Table 3.2 presents correlations among the key variables. Banks with higher *Foreign Assets Ratios* exhibit lower *Z-scores*, suggesting that, consistent with Figure 4, these banks have a higher likelihood of default. Furthermore, international banks tend to have more *Income Diversification*, are larger (*Size*), are more likely to be publicly listed (*Listed*), are less likely to be members of bank holding companies (*BHC*), and have higher overhead costs (*Overhead Costs*). Banks that internationalize are also more likely to have the *FED* or the *OCC* as their primary regulator, likely because they tend to be among the larger banks that are either state-chartered members of the Federal Reserve or nationally-chartered.

### 3.4 Empirical Results

In this section, we empirically analyze the effect of internationalization on bank risk. We first perform univariate tests that compare the risk of international versus purely domestic banks. We then conduct multivariate regressions with control variables included.

[68] These percentages do not sum up to exactly 100% due to rounding.

*3.4.1 Univariate analysis*

We compare the means and medians of our measures of bank risk (*Z-score*, *Stdv. ROE*, *Sharpe Ratio, NPL Ratio,* and *LLA Ratio*) for the international bank and domestic bank subsamples in Table 3.3. The results in Panel A indicate that the mean (median) 12-quarter *Z-score* is 28.69 (20.24) for international banks compared to 36.16 (28.41) for domestic banks. These differences, which are statistically significant at the 1% level, support the view that banks with international operations are riskier, consistent with the empirical dominance of the *market risk hypothesis*.

This result continues to hold using alternative measures of risk. For instance, the mean (median) logarithm of the 12-quarter *Z-score* is 0.35 (0.33) lower, the mean (median) 8-quarter *Z-score* is 7.40 (9.05) lower, and the mean (median) 20-quarter *Z-score* is 6.90 (6.88) lower for international banks. Moreover, the standard deviation of ROE is larger for international banks than their domestic peers, with the difference in the mean (median) of 0.0049 (0.0053). The *Sharpe Ratio* is smaller for international banks compared to domestic peers, with the difference in the mean (median) of -0.49 (-0.72). We also find that the ratio of nonperforming loans (*NPL Ratio*) and the ratio of loan loss allowances (*LLA Ratio*) are higher for international than domestic banks, with the difference in the mean (median) of 0.0106 (0.0060) and 0.0128 (0.0068), respectively. All of these differences are statistically significant, except for the mean difference of the *Sharpe Ratio*. Each of the findings above suggests that international banks are riskier, consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis.*

Furthermore, Panel B compares the means and medians of 12-quarter Z-*score* for international banks and domestic banks by different bank size categories to mitigate the

potential concern that our results are driven by a particular bank size group. We define small banks as having GTA less than $1 billion, medium-sized banks as having GTA between $1 billion and $5 billion, and large banks as having GTA greater than $5 billion. All size thresholds are measured in constant 2010:Q4 dollars. The results indicate that the mean (median) 12-quarter *Z-score* is 10.13 (8.85) lower for small international banks, 14.98 (10.50) lower for medium international banks, and 6.71 (5.13) for large international banks. All differences are statistically significant at the 1% level. Overall, our preliminary evidence provides consistent support for the view that international banks are riskier than purely domestic banks, consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*.

*3.4.2 Regression analysis*

To examine the relation between internationalization and bank risk in a multivariate setting, we estimate several versions of the following model:

$$Risk_{i,t-k+1,t} = \alpha + \beta_1 \cdot Internationalization_{i,t-k} + \beta_2 \cdot Controls_{i,t-k} + \omega_t + \varepsilon_{i,t-k+1,t} \quad (3.9)$$

where *Risk* is bank risk as measured by *Z-score* and the other proxies outlined in Section 3.3.2.1, *Internationalization* is bank internationalization as measured by the proxies discussed in Section 3.3.2.2, *Controls* is the vector of bank control variables described in Section 3.3.2.3, $\omega$ denotes time fixed effects, and $\varepsilon$ is an error term. Because risk is likely correlated within a bank over time, we adjust standard errors for clustering at the bank level.[69] The risk variables are measured over the $k$ quarters from $t$-$k$+1 to $t$, while the

[69] We consider alternative ways to adjust the standard errors for possible dependence in the residuals in Section 3.5.3.

independent variables are measured in the quarter *t-k* to ensure that they are predetermined relative to the dependent variable.[70] We use *k*=12 in our main analysis and consider other values in Section 3.5.1.

The results are presented in Table 3.4 Panel A. Model 1 reports results from regressing *Z-score* on *Foreign Assets Ratio* (our main internationalization measure) using ordinary least squares (OLS). After controlling for bank characteristics and time fixed effects, we find that the coefficient on *Foreign Assets Ratio* is negative and statistically significant at the 1% level. This result is also economically material – moving the *Foreign Assets Ratio* from 0 to 0.0992 (the mean of the *Foreign Assets Ratio* for the international banks in our sample), with all other independent variables held at their means, decreases *Z-score* by about 6.752 (from 38.429 to 31.677). This suggests that bank internationalization is associated with greater bank risk, consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*.

In Model 2, we replace *Foreign Assets Ratio* with *Bank Internationalization Dummy*. The coefficient estimate on *Bank Internationalization Dummy* is negative and statistically significant at the 1% level. This estimate is also economically material—moving *Bank Internationalization Dummy* from 0 to 1 (i.e., the bank internationalizes), with all other independent variables held at their means, decreases *Z-score* by about half from 38.617 to 19.066, again consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*.

[70] Some researchers argue that models with lagged independent variables help attenuate endogeneity concerns (e.g., Duchin, Ozbas, and Sensoy, 2010). However, we recognize that endogeneity might still be an issue. We methodically address this concern in Section 3.5.4.

In Model 3, we assess the impact of the *Foreign Assets Ratio* for the subsample of banks with nonzero *Foreign Assets Ratio*. We find that international banks with greater foreign assets ratios are riskier. This suggests that in addition to internationalization status, the degree of bank internationalization also matters for bank risk.

Models 4 to 8 of Table 3.4 report additional results. In Model 4, we exclude too-big-to-fail entities, defined as banks with GTA greater than $100 billion, consistent with banks that were subject to stress tests or the Supervisory Capital Assessment Program (SCAP) and the Comprehensive Capital Analysis and Review (CCAR). In Model 5, we exclude the 20 most internationally active banking organizations, defined as entities with the largest *Foreign Assets Ratio* in each quarter. In Models 4 and 5, we continue to find that international banks are riskier, suggesting that our core result is not driven by too-big-to-fail or the most internationally active banks. Next, we report results by bank size to assess whether our main evidence is concentrated in a particular bank size class, since previous studies find differences in portfolio composition by bank size (e.g., Berger, Miller, Petersen, Rajan and Stein, 2005). In Models 6 to 8, we find that bank internationalization is associated with higher risk across all size classes.

Turning to the bank controls, we find across nearly all models in Table 3.4 that firm size has positive coefficients, consistent with larger banks having better risk management skills and/or greater capacity to absorb losses through risk diversification, consistent with Berger, Bouwman, Kick, and Schaeck (2014). We also find that *Listed* has positive and significant coefficients, suggesting that public status is associated with less insolvency risk, consistent with Houston, Lin, Lin, and Ma (2010). We further find that BHC membership is associated with higher values of *Z-score*. Next, *Overhead Costs* enters with negative

coefficients, consistent with the finding in Demirgüç-Kunt and Huizinga (2010) that banks with higher overhead costs are less stable. Finally, we find that the regulatory environment matters for bank risk. Specifically, we find that *FED* and *OCC* enter with positive and statistically significant coefficients, suggesting that Federal Reserve- and OCC-regulated banks are less risky than FDIC-regulated banks.

For bank holding companies, it might be that the risk of the group is more relevant than the risk of individual banks. To account for this possibility, we consolidate the commercial banks in multibank holding companies at the holding company level (BHC) and re-run all of the regressions. The results, reported in Table 3.4 Panel B, are consistent with our previous evidence, suggesting that internationalization is associated with greater risk.

## 3.5 Robustness Tests

### *3.5.1 Alternative measures of risk*

In Table 3.5, we examine whether our main results are sensitive to alternative measures of bank risk. Unless specifically stated otherwise, these measures are also computed over the 12-quarter interval from *t–11* to *t*. In Model 1, we analyze the sensitivity of our results to using the log of *Z-score* as the dependent variable. This specification has the advantage of mitigating the impact of outliers. Next, we compute *Z-score* over alternative time intervals. Specifically, the dependent variable is *Z-score* computed over 8 quarters (from *t–7* to *t*) in Model 2 and *Z-score* computed over 20 quarters (from *t–19* to *t*) in Model 3. Next, in Model 4 we use as the dependent variable *Sharpe Ratio*, the risk-adjusted return on equity (mean *ROE/Stdv. ROE*). In Model 5, we use *Stdv. ROE,* the standard deviation of *ROE*. In Model 6, we use *NPL Ratio*, the bank ratio of nonperforming

loans to total loans. Finally, we report regression estimates using *LLA Ratio*, the ratio of loan and lease loss allowance to total loans, in Model 7. In Models 6 and 7, we measure the risk variables at the end of quarter *t*.[71] In each of the specifications, we find that the coefficient on *Foreign Assets Ratio* is statistically significant at the 5% level or better in the direction of internationalization being associated with more risk, reinforcing our finding of an empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*.

*3.5.2 Alternative measures of internationalization*

In Table 3.6, we examine whether our findings persist when we consider alternative measures of internationalization. For ease of comparison, we repeat the results based on *Foreign Assets Ratio*, our primary measure of internationalization, in Model 1. We use *Foreign Loans Ratio* (the ratio of the bank's total foreign loans to total loans) in Model 2 and *Foreign Deposits Ratio* (the ratio of the bank's foreign deposits to total deposits) in Model 3. In each of these regressions, the coefficient on the internationalization variable is negative and statistically significant at the 1% level, suggesting that the positive relation between internationalization and risk is robust to using alternative measures of internationalization.

[71] For Models 1, 4, and 5, the independent variables are constructed as of quarter *t–12*, since the dependent variable is computed over *t–11* to t. For Model 2, the independent variables are constructed as of quarter *t–8*, while for Model 3, the independent variables are constructed as of quarter *t–20*. Finally, for Models 6 and 7, we lag the independent variables by 1 quarter as the dependent variables only contain contemporaneous components.

*3.5.3 Alternative econometric specifications and standard errors*

Table 3.7 reports results from employing alternative econometric specifications and alternative standard errors. Model 1 again reports the results from our main specification to facilitate comparison.

In Models 2 to 5, we use alternative methodologies to correct standard errors for heteroskedasticity and autocorrelation. In Model 2, we report Newey-West standard errors to control for heteroskedasticity and autocorrelation. In Model 3, we employ Prais-Winsten standard errors that extend the Newey-West correction by integrating the panel structure of the data. In Model 4, we make inferences based on the standard errors of the time series of coefficients to account for cross-sectional dependence (Fama and MacBeth, 1973). In Model 5, we implement two-way clustering by bank and time to allow for correlations among different banks in the same quarter and across quarters for the same bank (Thompson, 2011). The results confirm our earlier evidence: the coefficient on *Foreign Assets Ratio* is negative and statistically significant at the 1% level in all cases.

*3.5.4 Endogeneity and sample selection concerns*

In this section, we perform tests to address the potential endogeneity of our internationalization variable, which could bias our findings. In particular, there could be a causal link from bank risk to internationalization. For example, banks with risky assets could have incentives to internationalize to diversify their risks. This may result in correlation between our internationalization proxy and the error term, leading to spurious inferences on the effect of internationalization on bank risk. We conduct tests to address this potential problem as well as the related concern of self-selection bias.

*Instrumental variables*. We use instrumental variable (IV) estimation to extract the exogenous component of bank internationalization in assessing the influence of internationalization on risk. A proper instrument should satisfy the requirements of relevance and exogeneity, that is, it must correlate with bank internationalization, but not be a direct cause of bank risk.

Our instrument is *Border State*, a dummy equal to 1 if a bank is headquartered in one of the U.S. states bordering an ocean, Canada, or Mexico, and 0 otherwise.[72] *Border State* should be positively correlated with internationalization, as banks in border states are more likely to have foreign operations. Also, the average bank in the sample was established 62.6 years ago, suggesting that for most cases, the bank choice of state headquarters location occurred long before the decision to internationalize, suggesting that the decision to locate in the state is not endogenous.

The IV regression results are reported in Panel A of Table 3.8. To facilitate comparison, we include the OLS results from Model 1 of Table 4 in the first column. We report the first-stage regression results in Model 2 and the second-stage results for the 2SLS estimation in Model 3.

The first-stage regression indicates that our instrumental variable, *Border State,* is positively and significantly (at the 1% level) related to internationalization. We perform two tests to check the suitability of the selected instrument. First, we conduct the Kleibergen-Paap under-identification test to evaluate the rank condition. We find that the Kleibergen-Paap *rk* LM rejects the null hypothesis at the 1% level (*rk LM* = 739.551 with

[72] These states are: Alaska, Arizona, California, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont, Virginia, and Washington.

a *p*-value less than 0.001), indicating that the model is well identified. Second, using an instrument that is weakly correlated with the endogenous explanatory variable can lead to large inconsistencies in the coefficient estimates. To examine the relevance of our IV, we conduct an *F*-test of the excluded exogenous variable in the first stage regression, in which the null hypothesis is that the instrument does not explain the variation in the *Foreign Assets Ratio*. We reject this null hypothesis at the 1% level ($F = 720.795$ with a *p*-value less than 0.001). The second-stage regression indicates that bank internationalization is associated with greater risk, consistent with our earlier evidence. The IV estimate is much larger in absolute value terms than the OLS estimate.[73] This suggests that in our main regressions, OLS may underestimate the causal effect of bank internationalization on risk.

*Propensity score matching analysis.* To confront the issue of self-selection bias, we use propensity score matching (PSM) analysis, developed by Rosenbaum and Rubin (1983), closely following Lawrence, Minutti-Meza, and Zhang (2011).[74] We conduct both a univariate comparison between international and domestic banks and a regression analysis.

PSM analysis involves matching observations based on the probability of undergoing the treatment, which in our case is the probability of internationalizing. Specifically, PSM estimates the effect of internationalization on a bank's risk by comparing the risk (*Z-score*) of banks that expand into foreign markets (treatment group) with the risk

[73] Documenting a much larger coefficient estimate for IV compared to OLS is consistent with Levitt (1996) and Berger and Bouwman (2009).

[74] As noted by Lawrence, Minutti-Meza, and Zhang (2011), PSM has important advantages such as: 1) the ability to produce samples in which the treated and untreated entities are similar, providing a natural framework to estimate the effects of treatment and firm characteristics; 2) independence from an explicit functional form (as opposed to Heckman selection models); and 3) the ability to estimate the treatment effects more directly as well as the ability to alleviate potential nonlinearities related to the treatment effects.

of banks that have a similar probability of going international, but for which no such event takes place (control group). This quasi-experiment is conducted by matching each international bank with one or more domestic banks sharing similar characteristics as indicated by their propensity scores. The effect of internationalization is calculated as the average difference between the international group and the matched control group. To estimate a bank's propensity score, we use a probit model in which the dependent variable is *Bank Internationalization Dummy,* the indicator for whether the bank has positive foreign assets. The independent variables are bank characteristics from our main model, our instrumental variable, *Border State*, as well as time fixed effects.

We use several matching techniques. First, we use one-to-one matching without replacement, matching each international bank (treated group) to the nearest domestic (untreated) control bank. This technique ensures that we do not have multiple domestic banks assigned to the same international bank, which can lead to a smaller control group than the treated group. Second, we use one-to-one matching with replacement, which differs in that each treated bank is matched to the nearest control bank even if the latter is used more than once (Dehejia and Wahba, 2002). Finally, we use nearest-neighbor matching with n=2 and n=3 with replacement, which match each international bank with the two and three domestic banks with the closest propensity scores, respectively.[75]

We first estimate the internationalization effect on risk as the mean difference between international banks' risk and that of their matched domestic peers. We then

[75] In unreported tests, we compare the means of the bank characteristics used in the selection models across the international and domestic bank samples to assess the effectiveness of our propensity matching procedure. Reassuringly, these results indicate that the distributions of the bank characteristics are statistically indistinguishable between the international and domestic samples at conventional levels.

perform regressions on the matched samples to control for observable confounders in the process of estimating the causal effects. Panel B of Table 3.8 reports both univariate and regression tests.[76] In the univariate tests, we report *t*-statistics for the differences in risk between the treated and control groups for each of the four PSM techniques. Using one-to-one matching without replacement, we find that *Z-score* is 6.44 lower for international banks than for the control group. Applying the other three techniques, we obtain differences in *Z-score* of 5.96, 6.04, and 6.08, respectively. All differences are significant at the 1% level.

Turning to the regression analysis, we regress the *Z-score* on the *Foreign Assets Ratio* and all control variables and time fixed effects used in the main regression specification using only the treated and control banks. In all matched samples (Models 1 to 4), we continue to find a negative and statistically significant coefficient on *Foreign Assets Ratio,* consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*. This evidence helps dispel the competing explanation that our results above spuriously reflect differences in the characteristics of international banks and purely domestic banks, rather than the effect of internationalization on bank risk.[77]

[76] The number of banks included is larger than (the number of unique international banks)+(n+1), where n is the number of matches for each bank. This is because matches are done individually quarter-by-quarter as characteristics of the banks can change over time and thus a bank can be matched to different banks in different quarters. For one-to-one matching without replacement, we have 8,886 observations in the treated group and 8,886 observations in the control group. For one-to-one matching with replacement, we have 8,886 observations in the treated group and 5,835 observations in the control group. For nearest-neighbor matching with n=2 and replacement, and respectively nearest-neighbor matching with n=3 and replacement, we have 8,886 observations in the treated group (international banks), and 10,219 observations, and respectively 13,960 observations in the control group.

[77] In unreported results, we analyze changes in the *Z-score* when the internationalization status of our sample banks changes. The results suggest that, on average, banks seem to increase risk when they become international, but do not decrease risk when they revert back to domestic status. In our analysis we focus on the full sample of international and purely domestic banks rather than the switches between the two categories because the small number of switches may not provide a meaningful analysis.

## 3.6 Additional Analyses

### *3.6.1 Z-score decomposition*

To shed light on the channels through which bank internationalization affects risk, we decompose *Z-score* into its three components: mean *ROA*, mean *Capitalization Ratio,* and *Stdv. ROA*. In Table 3.9, we report results of regressions of these components of *Z-score* on *Foreign Assets Ratio*. The regressions include the same control variables and time fixed effects as in our main specification.

In Model 1, we find that bank internationalization is associated with lower profitability as measured by mean *ROA,* consistent with findings in DeYoung and Nolle (1996), Peek, Rosengren, and Kasirye (1999), and Berger, DeYoung, Genay, and Udell (2000). Our result is also consistent with Goetz, Laeven, and Levine (2013), who find that bank geographical diversification across U.S. states is detrimental to bank performance. In Model 2, we find that bank internationalization is associated with increased mean *Capitalization Ratio*, which reduces bank risk. To the extent that bank managers are aware that internationalization is associated with higher risk, they may want to partially offset this as a precautionary measure with a higher *Capitalization Ratio*. Similarly, to the extent that capital market participants and regulators are aware of the higher risks associated with internationalization activities, they may pressure banks to increase their capital as well. In Model 3, we find that bank internationalization is associated with increased volatility in bank profitability as measured by *Stdv. ROA*, which increases bank risk.

*3.6.2 Listed banks and market measures of risk*

In Table 3.10, we investigate whether our main results are sensitive to examining the subsample of publicly listed banks and those in publicly traded holding companies. This allows us toanalyze the impact of internationalization on bank risk using several market-based risk measures. We aggregate banks in the Call Reports at the holding company level and merge the resulting sample with CRSP to obtain stock returns and with Compustat to obtain S&P credit ratings. We first employ the 12-quarter accounting *Z-score* as above as our dependent variable for this subsample of banks in Model 1. Despite the dramatic decrease in the number of observations (29,953 listed banks compared to 600,953 in the full sample), our core evidence persists in this subsample of banks.

We construct three measures of bank market risk based on stock returns. First, we estimate Carhart's (1997) four-factor model for each bank at the end of each calendar quarter using daily stock returns over the previous 12 months. Specifically, we regress each bank's stock returns on the Fama and French (1993) three factors (Market, HML, and SMB) and the momentum factor (UMD), and then construct *Idiosyncratic Risk* as the standard deviation of the regression's residuals. Second, at the end of each calendar quarter, we compute *Total Bank Risk* as the standard deviation of daily stock returns over the previous 12 months (Esty, 1998). Third, we compute *Merton Default Probability* as the normal transform of the distance-to-default measure (Merton, 1974) using bank-level stock return data from CRSP and financial data from the Call Report.[78] We use *Idiosyncratic*

[78] We model the market equity value of a bank as a call option on the bank's assets, where we use the market value of equity to proxy for the market value of the bank and total liabilities to proxy for the face value of debt following Acharya, Anginer, and Warburton (2013). The call option on the bank's assets is given as follows: (i) $V_E = V_A e^{-T} N(d_1) - X e^{-T} N(d_2) + (1 - e^{-T}) V_A$ ; $d_1 = [ln(V_A/X) + (r + s_A^2/2)T]/s_A\sqrt{T}$ ; $d_2 = d_1 - s_A\sqrt{T}$, where $V_E$ is the market value of a bank, $V_A$ is the value of the bank's total assets, $X$ is the face value of debt proxied by the total bank liabilities, $T$ equals 1 year, $r$ is the market yield on U.S. Treasury

*Risk*, *Total Bank Risk*, and *Merton Default Probability* as our measures of bank risk in Models 2, 3, and 4 respectively.

Finally, we create two measures of bank market risk based on credit ratings. First, we convert the quarter-end long-term issuer credit ratings compiled by Standard & Poor's (S&P) to a numeric scale. Specifically, we create *S&P Credit Rating* by assigning a value of 8 if the bank has an S&P rating of AAA, 7 if AA, 6 if A, 5 if BBB, 4 if BB, 3 if B, 2 if CCC, and 1 if CC. Second, we create the dummy *S&P Investment Grade*, which is equal to 1 if the bank has a credit rating of BBB or higher, and 0 otherwise. Higher values of these two variables indicate lower risk.[79] We consider the effect of internationalization on *S&P Credit Rating* using an ordered probit analysis in Model 5 and *S&P Investment Grade using* a simple probit analysis in Model 6.

The results in Table 3.10 indicate that international public banks have higher idiosyncratic risk, higher total bank risk, higher probability of default, and lower credit ratings than purely domestic public banks, suggesting that capital market participants recognize the higher risk of international banks.

### *3.6.3 Internationalization and risk during financial crises*

In Table 3.11, we examine the effect of internationalization and bank risk during financial crises and normal times to explore whether internationalization affects risk

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Securities at 1-year constant maturity, which we take to be the risk-free rate, $s_A$ is the volatility of the value of assets, which is related to equity volatility $s_E$, which is the standard deviation of daily equity returns over each time period calculated as follows: (ii) $s_E = [V_A e^{-T} N(d_1) s_A] / V_E$. We simultaneously solve equations (i) and (ii) to obtain the values of $V_A$ and $s_A$. Once we determine $V_A$, we follow Hillegeist, Keating, Cram, and Lundstedt (2004) and Acharya, Anginer, and Warburton (2013) and compute a bank's asset returns as $m = max\left[\left(V_{A,t}/V_{A,t-1}\right) - 1, r\right]$ . Finally, we compute the *Merton Default Probability* as $N\left[-(ln[V_A/X] + [m - (s_A^2/2)T])/s_A\sqrt{T}\right]$.

[79] We exclude unrated banks from this analysis.

differently during financial crises. On the one hand, international banks may increase their risk less than purely domestic banks during financial crises because their exposure to shocks is lessened as they hold assets and deposits both in the domestic and foreign markets. This could offer them greater income diversification and risk-sharing, provide them with a stronger and more diversified deposit base, and ensure better liquidity provision through access to international capital markets (Cetorelli and Goldberg, 2011).

On the other hand, international banks may further increase their risk during financial crises because of their organizational complexity, making it difficult for management to deal with financial crises. International banks may also rely more often on inter-bank and capital markets for their funding, while domestic banks may rely more on insured deposits, which are less volatile during financial crises.

To identify financial crises, we follow Berger and Bouwman (2013). Specifically, we identify two banking crises (crises that originated in the banking sector) – the credit crunch (1990:Q1–1992:Q4) and the subprime lending crisis (2007:Q3–2009:Q4) – and two market crises (crises that originated in the financial market) – the Russian debt crisis/Long Term Capital Management (LTCM) bailout (1998:Q3–1998:Q4), and the bursting of the dot.com bubble and September 11 (2000:Q2–2002:Q3). We first include the interaction term *Foreign Assets Ratio* × *Financial Crises* in Model 1 and focus on whether there is a difference in the effects of the *Foreign Assets Ratio* during financial crises. In Models 2 and 3, we consider separate interaction terms with a *Banking Crises* dummy and a *Market*

*Crises* dummy, respectively. In Model 4, we include interactions with both the *Banking Crises* and *Market Crises* dummies.[80]

The results suggest that the impact of bank internationalization on risk is higher during financial crises than in normal times, as indicated by the negative coefficient on the interaction term *Foreign Assets Ratio* × *Financial Crises* in Model 1.[81] When we split financial crises into banking crises and market crises, the effect of internationalization on risk is more pronounced during market crises as indicated by Models 2, 3, and 4. Moreover, in unreported results we conduct a *t*-test for the equality of the effects of internationalization for the two types of crises from Model 4 and find that the coefficients of the two interaction terms are statistically significantly different from one another ($t$ = 2.702). Our result on market crises may be due to recent developments that have made banking organizations more dependent on the capital markets (Gennaioli, Shleifer, and Vishny, 2012; IMF Financial Stability Report, 2012). The lower increase in risk as a result of internationalization during banking crises may also be due to internationalized banks cutting back their risks more or receiving more government help during banking crises.

### *3.6.4 Why do banks internationalize?*

Our findings raise the question of why banks internationalize. We offer three potential explanations. First, banks may internationalize to achieve higher returns. However, our results seem to contradict this explanation, given that we find lower mean

[80] We do not include the financial crises dummies as stand-alone variables because they would be subsumed by the time fixed effects. However, in unreported tests, we replace the time fixed effects with the financial crises dummies and find consistent results.

[81] In a theoretical framework, Wagner (2011) discusses a possibility where the probability of joint liquidation of assets during a crisis may lead banks to forgo some diversification benefits.

profitability for internationalized banks. Second, banks may follow their important customers abroad as part of a defensive strategy by setting up offices in countries where their home country customers have foreign affiliates to avoid losing their clients' business and maintain existing relationships (e.g., Brimmer and Dahl, 1975; Goldberg and Saunders, 1981; Grosse and Goldberg, 1991; Brealey and Kaplanis, 1996). Although this phenomenon might occur, it is unlikely to explain our results, as we would expect that such a strategy should at least translate into large enough financial benefits from servicing important customers abroad to offset the costs of bank internationalization.[82] Third, internationalization could be driven by empire-building behavior of bank managers (e.g., Jensen and Meckling, 1976; Jensen, 1986; Roll, 1986; Stulz, 1990). Managers that enlarge their banks through international activities may gain higher compensation and/or more prestige than domestic bank managers. This might occur if there are significant agency problems in banking, particularly if these agency problems are intensified by bank diversification (e.g., Laeven and Levine, 2007; Goetz, Laeven, and Levine, 2013).

We investigate whether empire-building is a potential explanation for our results. Our empirical strategy involves estimating our model for subsamples of banks with varying levels of agency problems due to differences in corporate governance. This analysis is limited to publicly listed banks because corporate governance data are available only for these banks.

[82] There is also some evidence that international banks do not always rely heavily on a "follow your customer" strategy to support their multinational expansion (e.g., Engwall and Wallenstål, 1988; Hellman, 1996; Miller and Parkhe, 1998; Seth, Nolle, and Mohanty, 1998).

Following prior research, we consider various measures of corporate governance.[83] We first construct three measures of institutional ownership: *Institutional Ownership*, the ratio of institutional share holdings to bank outstanding shares; *Pension Fund Ownership*, the ratio of public pension funds' holdings to bank outstanding shares, where the list of public pension funds is from Dittmar and Mahrt-Smith (2007); and *Long Term Institutional Ownership*, the ratio of holdings by long-term institutions to bank outstanding shares following Gaspar, Massa, and Matos (2005). Prior evidence suggests that institutional investors, particularly activist investors such as public pension funds and long-term institutional investors, have the incentives and ability to monitor managers (e.g., Gillan and Starks, 2000; Gaspar, Massa, and Matos, 2005; Chen, Harford, and Li, 2007). For all three measures, a lower ownership ratio would indicate less monitoring by institutional investors and potentially higher agency problems.

We also construct a measure of analyst coverage, *Number of Analysts*, which is the number of financial analysts providing earnings forecasts for the bank in each quarter. Prior research suggests that analyst coverage enhances corporate transparency, making managerial extraction of private benefits more difficult (e.g., Lang, Lins, and Miller, 2004).

Our next measure, *CEO Duality*, is an indicator variable for whether the CEO is also chairman of the board. CEO duality may be indicative of agency problems because it may restrict the information flow to directors and undermine the effectiveness of board oversight (e.g., Jensen, 1993; Brickley, Coles, and Jarrell, 1997).

[83] We obtain data on corporate governance from multiple sources. We retrieve the institutional ownership data from Thomson-Reuters Institutional Holdings (13F) Database and the analyst coverage data from I/B/E/S. In addition, we manually collect data on CEO duality and insider ownership from SEC EDGAR DEF 14A proxy filings and 10K reports for the time period 1994–2010. Our corporate governance data starts in 1994, which corresponds to the date when the data became publicly available on the SEC EDGAR.

Our final measure of corporate governance relates to insider ownership. *Insider Ownership* is the ratio of shares owned by insiders (all directors and executive officers as a group as reported in the DEF 14A report) divided by shares outstanding of the bank. Prior research finds a curvilinear relation between firm valuation and insider ownership (e.g., Stulz, 1988; McConnell and Servaes, 1990), suggesting that insiders with relatively low ownership and relatively high ownership are entrenched. With very low ownership, insiders externalize much of the outcome of their actions. With very high ownership, they secure enough control of the firm to be able to misuse the firm assets for their personal benefit.

Based on prior corporate governance literature, we identify the following groups of banks as being more likely to have severe agency problems: lower institutional ownership, lower public pension fund ownership, lower long-term institutional ownership, lower analyst coverage, CEO is Chairman, and very low and very high levels of insider ownership.

Our results are reported in Table 3.12. In Panel A we use *Institutional Ownership* in Models 1 and 2, *Pension Fund Ownership* in Models 3 and 4, and *Long Term Institutional Ownership* in Models 5 and 6. For each ownership variable, we report the results for subsamples of below-median (higher agency problems) and above-median (lower agency problems) ownership. We find that the coefficient estimates on *Foreign Assets Ratio* are negative and significant at the 1% level, but are larger in absolute value in the subsamples of banks with higher agency problems (Models 1, 3, and 5) relative to the subsamples with lower agency problems (Models 2, 4, and 6). Importantly, for the three ownership variables, the difference in the *Foreign Assets Ratio* coefficient between the

subsamples is statistically significant at the 1% level. These results suggest that the positive relation between internationalization and bank risk is stronger for banks that are more likely to have higher agency problems, supporting the empire-building explanation.[84]

In Panel B, we use the *Number of Analysts* and *CEO is Chairman* as indicators of agency problems. We find that the coefficient estimate on *Foreign Assets Ratio* is negative and larger in absolute value in the subsamples of banks with below-median analyst coverage (Model 1) and CEO duality (Model 4). These differences between the subsamples are significant at the 1% level. Again, these results suggest that the relation between internationalization and bank risk is stronger in banks suffering from more severe agency problems, supporting the empire-building explanation.

Finally, in Panel C we use *Insider Ownership* to indicate agency problems. To account for nonlinearity of the relation between insider ownership and firm value documented in prior studies (Stulz, 1988; McConnell and Servaes, 1990), we split the sample according to the 20$^{th}$ and 80$^{th}$ percentiles of insider ownership to capture different incentives of insiders across the ownership range.[85] We consider insider ownership below the 20$^{th}$ percentile and above the 80$^{th}$ percentile to be indicative of more agency problems. We find that the coefficient estimates on our internationalization proxy, *Foreign Assets Ratio*, are negative and significant only in the subsamples of banks with more agency problems (Models 1 and 3), consistent with the curvilinear relation between firm valuation and insider ownership previously documented in the literature. An *F*-test rejects the null

[84] In unreported results, we also run tests alternatively using the numbers of institutional investors, pension funds, and long-term institutional investors and obtain qualitatively similar results.

[85] In unreported results, we use alternative cutoffs of the 25$^{th}$ and 75$^{th}$ percentiles. The results are qualitatively similar.

hypothesis of equality of these coefficients at the 1% level. Again, these results suggest that the internationalization-risk relation is stronger for banks that are more likely to have severe agency problems.

In summary, our results suggest that the positive relation between internationalization and bank risk is consistently stronger for banks that are more likely to have high agency problems due to poor corporate governance, supporting the empire-building explanation.[86] [87]

### 3.7 Conclusions

This paper is the first to assess the role of internationalization in bank risk using U.S. bank data. We find strong, robust evidence that the more internationalized the bank, the higher the risk. We use a number of different measures of internationalization and risk, employ various econometric procedures to control for potential endogeneity and sample selection biases, and consider different subsamples of the data. The data persistently suggest that internationalization is associated with higher bank risk, consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*. This effect appears to be more pronounced during financial crises, particularly market crises. Additional results suggest that capital market participants recognize the difference in risk between international and domestic banks.

[86] In unreported results, we repeat these tests using interactions and we obtain similar evidence.

[87] In unreported tests, we created dummies for each of the corporate governance variables which indicate governance attributes that are most likely to indicate severe agency problems and regressed internationalization on these dummies, the instrumental variable, and the other controls from the main specification. For most of these, but the analyst coverage and very low levels of insider ownership, banks more likely to have worse governance (less institutional ownership, less public pension fund ownership, less long-term institutional ownership, CEO is Chairman and very high levels of insider ownership) appear to be associated with more internationalization.

Our finding that internationalization is associated with higher risk raises the question of why banks internationalize. We rule out higher returns and follow-your-customer as primary explanations because of our finding that returns are lower for internationalized banks. A third potential explanation is empire building by bank managers to gain higher compensation and/or more prestige, which may occur if there are significant agency problems in these banks due to poor corporate governance. We test this explanation and find that the positive relation between internationalization and bank risk tends to be much stronger for banks that are more likely to have severe agency problems, supporting the empire-building explanation. The results about increased risk from international diversification may or may not apply to other countries which may have very different domestic versus international risks.

This paper contributes primarily to two related strands of research. First, it adds to the literature on bank risk by introducing internationalization as a factor influencing risk and sets the groundwork for further research on bank internationalization. Although some policymakers, practitioners, and researchers point to the benefits of geographical risk diversification resulting from the internationalization of banks, our results suggest that this effect is dominated by other factors. Specifically, our results suggest that the additional local market risks taken on following international expansion outweigh the benefits of diversification.

Second, this paper contributes to the broader internationalization literature by examining risk within one important industry rather than across diverse industries with their confounding differences. We find that bank internationalization is associated with higher risk in an industry in which risk is highly monitored by bank supervisors as well as

shareholders and debtholders. These findings suggest that authorities might consider internationalization as an additional factor in bank supervision and regulation.

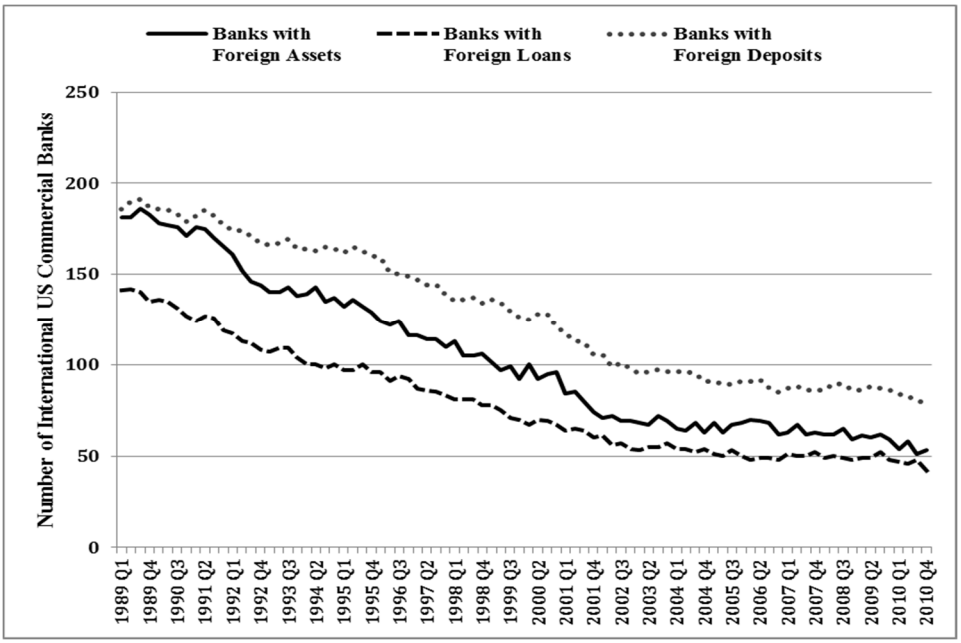


**Figure 3.1: Numbers of International U.S. Commercial Banks over Time**

Figure 3.1 shows the evolution of bank internationalization over our sample period. It plots the number of international U.S. commercial banks for each quarter in our sample period. Three dimensions of bank internationalization are considered: foreign assets, foreign loans, and foreign deposits. The sample period illustrated is 1989:Q1 to 2010:Q4.

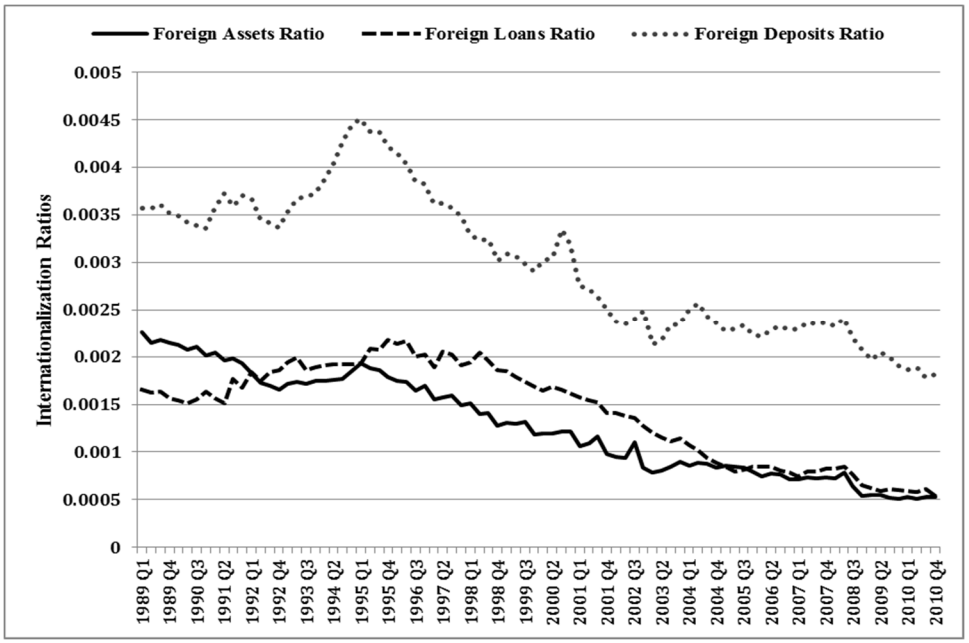


**Figure 3.2: Different Internationalization Ratios over Time**

Figure 3.2 plots the mean internationalization ratios of U.S. commercial banks by quarter. Three dimensions of bank internationalization are considered: foreign assets, foreign loans, and foreign deposits. The sample period illustrated is 1989:Q1 to 2010:Q4.

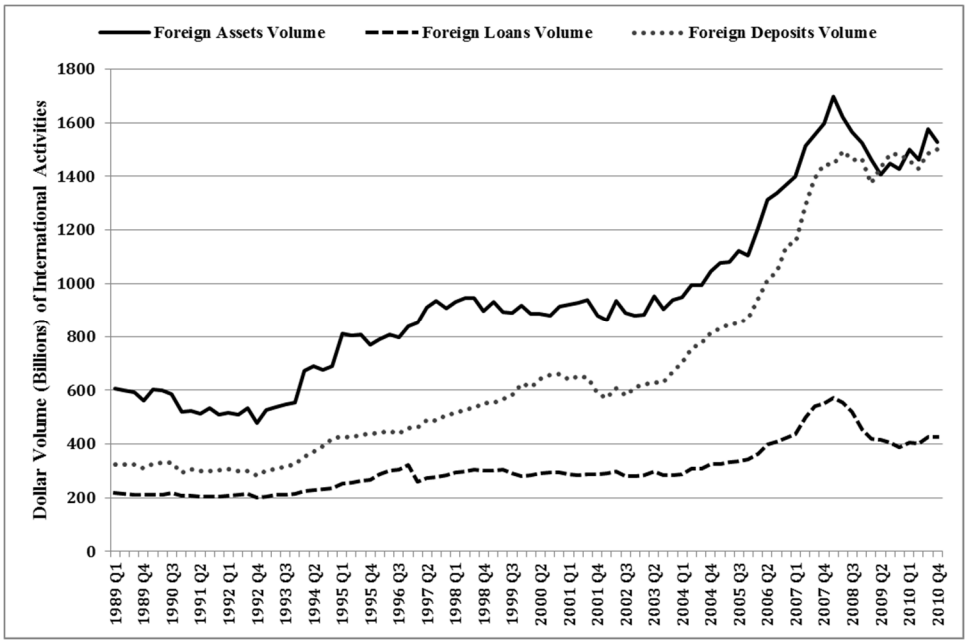


**Figure 3.3: Total Volumes of International Activities over Time**

Figure 3.3 plots the actual dollar amount (billions) of U.S. commercial banks' foreign activities by quarter. Three dimensions of bank internationalization are considered: foreign assets, foreign loans, and foreign deposits. The sample period illustrated is 1989:Q1 to 2010:Q4.

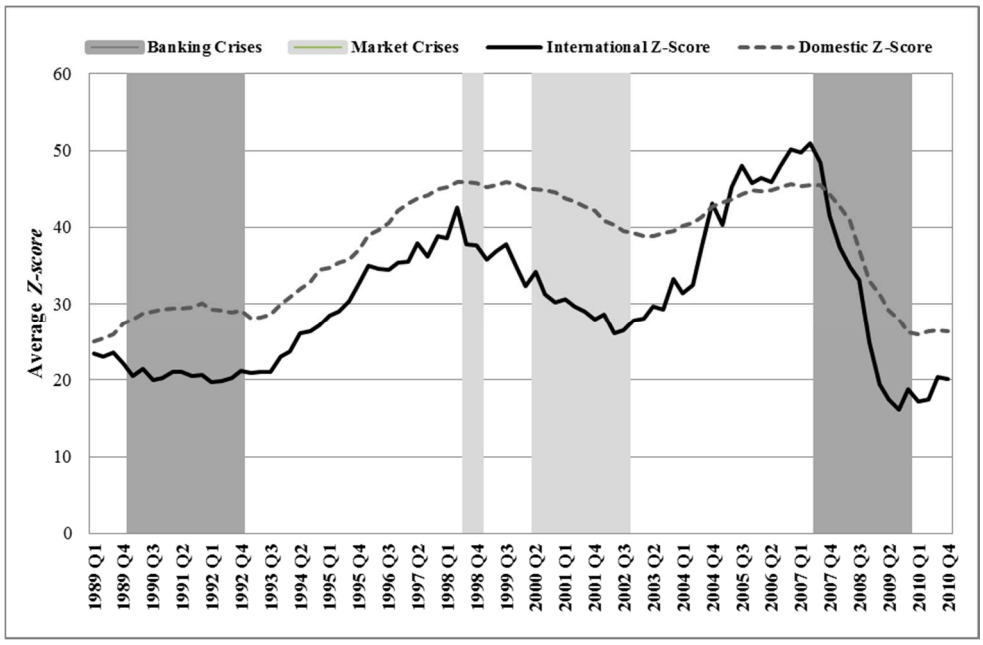


**Figure 3.4: Mean *Z-score* for International Banks vs. Domestic Banks over Time**

Figure 3.4 compares the risk (mean *Z-score*) of international commercial banks versus purely domestic banks during our sample period. This figure depicts financial crisis periods in shaded gray areas: Banking Crises in dark gray and Market Crises in light gray. The sample period illustrated is 1989:Q1 to 2010:Q4.

## Table 3.1: Definitions and Summary Statistics

This table presents variable definitions and reports summary statistics for the full sample of U.S. commercial banks used in the analysis. All variables using dollar amounts are expressed in real 2010:Q4 dollars using the implicit GDP price deflator.

| *Variable* | *Definition* | *Mean* | *Median* | *Std* | *25p* | *75p* |
|---|---|---|---|---|---|---|
| ***Risk Variables*** | | | | | | |
| *Z-score ( 12 quarters)* | A bank measure of financial risk calculated as [Avg.(ROA) + Avg.(Equity/GTA)]/Stdv. ROA; a larger value indicates lower overall bank risk. Means of ROA and Equity/GTA as well as the standard deviation of ROA are computed over the previous 12 quarters (*t-11* to *t*). | 36.053 | 28.287 | 30.754 | 14.459 | 48.771 |
| *Log of Z-score (12 quarters)* | A bank measure of financial risk calculated as the logarithm of *Z-score (12 quarters)*. | 3.198 | 3.343 | 1.001 | 2.674 | 3.888 |
| *Z-score (8 quarters)* | A bank measure of financial risk calculated as [Avg.(ROA) + Avg.(Equity/GTA)]/Stdv. ROA; a larger value indicates lower overall bank risk. Means of ROA and Equity/GTA as well as the standard deviation of ROA are computed over the previous 8 quarters (*t-7* to *t*). | 42.561 | 32.564 | 38.504 | 16.415 | 56.988 |
| *Z-score (20 quarters)* | A bank measure of financial risk calculated as [Avg.(ROA) + Avg.(Equity/GTA)]/Stdv. ROA; a larger value indicates lower overall bank risk. Means of ROA and Equity/GTA as well as the standard deviation of ROA are computed over the previous 20 quarters (*t-19* to *t*). | 29.805 | 23.830 | 24.374 | 12.425 | 40.460 |
| *Sharpe Ratio* | The risk-adjusted return on equity defined as ROE/Stdv. ROE. ROE is defined as the ratio of net operating income to total equity. | 6.477 | 3.238 | 157.687 | 1.911 | 5.937 |
| *Stdv. ROE* | The standard deviation of ROE calculated over the previous 12 quarters (*t-11 to t*.) ROE is defined as the ratio of net operating income to total equity. | 0.035 | 0.031 | 0.021 | 0.019 | 0.048 |
| *NPL Ratio* | A measure of financial stability defined as the ratio of nonperforming loans (past due at least 90 days or in nonaccrual status) to total loans; a higher value indicates a riskier loan portfolio. | 0.016 | 0.009 | 0.025 | 0.003 | 0.020 |
| *LLA Ratio* | A measure of risk defined as the ratio of loan and lease loss allowance to bank total loans; a higher value indicates higher risk. | 0.022 | 0.018 | 0.021 | 0.014 | 0.024 |

| *Variable* | *Definition* | *Mean* | *Median* | *Std* | *25p* | *75p* |
|---|---|---|---|---|---|---|
| ***Risk Variables (cont.)*** | | | | | | |
| *Idiosyncratic Risk* | A measure of bank idiosyncratic risk calculated at the end of each calendar quarter using bank stock daily returns over the previous 12 months. Specifically, we regress each bank's stock returns on the Fama-French three factors (Market, HML, and SMB) and the momentum factor (UMD), and then construct *Idiosyncratic Risk* as the standard deviation of the regression's residuals. | 0.025 | 0.020 | 0.019 | 0.015 | 0.029 |
| *Total Bank Risk* | The standard deviation of daily stock returns over the previous 12 months (Esty, 1998) computed at the end of each calendar quarter. | 0.027 | 0.022 | 0.020 | 0.016 | 0.030 |
| *Merton Default Probability* | The normal transform of the distance-to-default measure using bank-level stock return data from CRSP and financial data from the Call Report. Details for this measure are shown in footnote 20 in the text. . | 0.033 | 0.000 | 0.112 | 0.000 | 0.009 |
| *S&P Credit Rating* | Based on S&P Domestic Long-Term Issuer Credit Rating, *S&P Credit Rating* equals 8 if the bank has an S&P rating of AAA, 7 if AA, 6 if A, 5 if BBB, 4 if BB, 3 if B, 2 if CCC, and 1 if CC. | 2.282 | 1.000 | 1.814 | 1.000 | 4.000 |
| *S&P Investment Grade* | A dummy equal to 1 if the bank has a credit rating of BBB or higher (investment grade), and 0 otherwise. | 0.354 | 0.000 | 0.478 | 0.000 | 1.000 |
| ***Internationalization Variables*** | | | | | | |
| *Foreign Assets Ratio* (full sample) | A measure of bank internationalization defined as the ratio of foreign total assets to GTA of the bank; a larger value indicates a higher degree of internationalization and a ratio of 0 refers to purely domestic banks. | 0.001 | 0.000 | 0.021 | 0.000 | 0.000 |
| *Foreign Assets Ratio* (international banks only) | A measure of bank internationalization defined as the ratio of foreign total assets to GTA of the bank; a larger value indicates a higher degree of internationalization. | 0.099 | 0.035 | 0.145 | 0.006 | 0.126 |
| *Bank Internationalization Dummy* | A dummy that takes a value of 1 if ratio of the foreign total assets to GTA of the bank is positive, and 0 otherwise. | 0.015 | 0.000 | 0.120 | 0.000 | 0.000 |
| *Foreign Loans Ratio* | A measure of bank internationalization defined as the ratio of foreign total loans to total loans of the bank; a larger value indicates a higher degree of internationalization. | 0.002 | 0.000 | 0.025 | 0.000 | 0.000 |

| *Variable* | *Definition* | *Mean* | *Median* | *Std* | *25p* | *75p* |
|---|---|---|---|---|---|---|
| ***Internationalization Variables (cont.)*** | | | | | | |
| *Foreign Deposits Ratio* | A measure of bank internationalization defined as the ratio of foreign total deposits to total deposits of the bank; a larger value indicates a higher degree of internationalization. | 0.003 | 0.000 | 0.038 | 0.000 | 0.000 |
| ***Control Variables*** | | | | | | |
| *Income Diversification* | A measure of diversification across different sources of income, calculated as 1- \| (Net Interest Income - Other Operating Income)/Total Operating Income\|. | 0.200 | 0.216 | 0.158 | 0.079 | 0.332 |
| *Size* | The logarithm of GTA. | 11.904 | 11.649 | 1.168 | 11.094 | 12.386 |
| *Listed* | A dummy that takes a value of 1 if the bank is listed on a stock exchange or is part of a bank holding company that is listed on a stock exchange, and 0 otherwise. | 0.146 | 0.000 | 0.353 | 0.000 | 0.000 |
| *BHC* | A dummy that takes a value of 1 if the bank is owned by a bank holding company, and 0 otherwise. | 0.695 | 1.000 | 0.460 | 0.000 | 1.000 |
| *Overhead Costs* | A proxy for the bank's cost structure calculated as the ratio of overhead expenses to GTA. | 1.621 | 1.592 | 0.362 | 1.323 | 1.922 |
| *FED* | A dummy indicating whether the bank is a state-chartered Federal Reserve member, that is, the Federal Reserve is the bank's primary federal regulator, and 0 otherwise. | 0.106 | 0.000 | 0.308 | 0.000 | 0.000 |
| *OCC* | A dummy indicating whether the bank has a national bank charter, that is, the bank's primary federal regulator is the Office of the Comptroller of the Currency (OCC), and 0 otherwise. | 0.309 | 0.000 | 0.462 | 0.000 | 1.000 |
| *FDIC* | A dummy that takes a value of 1 for non-member banks that have the Federal Deposit Insurance Corporation (FDIC) as a primary regulator, and 0 otherwise. | 0.585 | 1.000 | 0.493 | 0.000 | 1.000 |
| *Time FE* | Time fixed effects, dummies for each quarter of the sample period. | | | | | |
| ***Instrumental Variable*** | | | | | | |
| *Border State* | A dummy that takes a value of 1 if a bank is headquartered in one of the U.S. states having a border with an ocean, Canada, or Mexico, and 0 otherwise. | 0.471 | 0.000 | 0.499 | 0.000 | 1.000 |

| *Variable* | *Definition* | *Mean* | *Median* | *Std* | *25p* | *75p* |
|---|---|---|---|---|---|---|
| ***Other Variables*** | | | | | | |
| *ROA* | Ratio of net income to bank GTA. | 0.009 | 0.011 | 0.027 | 0.007 | 0.014 |
| *Capitalization Ratio* | The bank capitalization ratio, measured as equity capital to GTA; a lower ratio indicates higher bank distress. | 0.098 | 0.089 | 0.042 | 0.089 | 0.042 |
| *Stdv. ROA* | The standard deviation of ROA calculated over the previous 12 quarters (*t-11* to *t*). ROA is defined as the ratio of net operating income to GTA. | 0.008 | 0.004 | 0.016 | 0.002 | 0.008 |
| *Financial Crises* | A dummy that takes a value of 1 for a financial crisis period, and 0 otherwise, following Berger and Bouwman (2013). | 0.346 | 0.000 | 0.476 | 0.000 | 1.000 |
| *Banking Crises* | A dummy that takes a value of 1 for a banking crisis period, and 0 otherwise. A banking crisis is a crisis that originated in the banking sector, following Berger and Bouwman (2013). | 0.223 | 0.000 | 0.416 | 0.000 | 0.000 |
| *Market Crises* | A dummy that takes a value of 1 for a market crisis period. A market crisis is a crisis that originated in the capital markets, following Berger and Bouwman (2013). | 0.123 | 0.000 | 0.328 | 0.000 | 0.000 |
| *Normal Times* | A dummy that takes a value of 1 for a normal time period, and 0 otherwise. A normal time period is a period other than a financial crisis period, following Berger and Bouwman (2013). | 0.654 | 1.000 | 0.476 | 0.000 | 1.000 |
| *Institutional Ownership* | The ratio of institutional share holdings to bank outstanding shares. | 0.200 | 0.138 | 0.203 | 0.041 | 0.302 |
| *Pension Fund Ownership* | The ratio of public pension funds' holdings to bank outstanding shares. The list of public pension funds is from Dittmar and Mahrt-Smith (2007). | 0.007 | 0.001 | 0.012 | 0.000 | 0.007 |
| *Long-term Institutional Ownership* | The ratio of holdings by long-term institutions to bank outstanding shares following Gaspar, Massa and Matos (2005). | 0.070 | 0.044 | 0.079 | 0.009 | 0.110 |
| *Analyst Coverage* | The number of financial analysts providing earnings forecasts for the bank in each quarter. | 6.027 | 3.000 | 6.928 | 1.000 | 8.000 |
| *CEO Duality* | An indicator variable for whether the CEO is the chairman of the board. | 0.445 | 0.000 | 0.497 | 0.000 | 1.000 |
| *Insider Ownership* | The ratio of shares owned by insiders (all directors and executive officers as a group as reported in the DEF 14A report) to bank outstanding shares. | 0.167 | 0.130 | 0.133 | 0.069 | 0.232 |

## Table 3.2: Correlations among Selected Variables

This table reports pair-wise correlations among the key variables used in the regression analysis. Table 1 shows definitions for all variables. *** indicates significance at the 1% level.

| | *Z-score* | *Foreign Assets Ratio* | *Income Diversification* | *Size* | *Listed* | *BHC* | *Overhead Costs* | *FED* | *OCC* |
|---|---|---|---|---|---|---|---|---|---|
| ***Z-score*** | 1 | | | | | | | | |
| ***Foreign Assets Ratio*** | -0.0226*** | 1 | | | | | | | |
| ***Income Diversification*** | 0.0401*** | 0.0765*** | 1 | | | | | | |
| ***Size*** | 0.1275*** | 0.2292*** | 0.1739*** | 1 | | | | | |
| ***Listed*** | 0.0625*** | 0.0486*** | 0.1303*** | 0.4234*** | 1 | | | | |
| ***BHC*** | 0.0770*** | -0.0060*** | 0.0293*** | 0.0559*** | 0.0696*** | 1 | | | |
| ***Overhead Costs*** | -0.2585*** | 0.0190*** | 0.4312*** | -0.0722*** | 0.0379*** | -0.0811*** | 1 | | |
| ***FED*** | 0.0358*** | 0.0365*** | -0.0284*** | 0.0760*** | 0.0643*** | 0.0228*** | -0.0464*** | 1 | |
| ***OCC*** | 0.0179*** | 0.0068*** | 0.0561*** | 0.1301*** | 0.0922*** | -0.0228*** | 0.0859*** | -0.2308*** | 1 |

## Table 3.3: Internationalization and Bank Risk: Univariate Analysis

This table reports univariate comparison tests for bank risk and other controls between international banks and purely domestic banks. Panel A reports results for the full sample. Panel B reports differences in *Z-score* by bank size. Table 1 shows definitions for all variables. *** indicates significance at the 1% level.

**Panel A: Full Sample**

| | International Banks | | | Purely Domestic Banks | | | Difference in Means International - Domestic | | Difference in Medians International - Domestic | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| **Variable** | **N** | **Mean** | **Median** | **N** | **Mean** | **Median** | **Difference** | **T-Stat** | **Difference** | **Wilcoxon M-W Stat** |
| ***Z- score (12 quarters)*** | 10,376 | 28.6939 | 20.2356 | 690,300 | 36.1638 | 28.4147 | -7.4699*** | -24.6 | -8.1791*** | -33.9 |
| ***Log of Z-score (12 quarters)*** | 10,337 | 2.8558 | 3.0133 | 689,604 | 3.2037 | 3.3480 | -0.3479*** | -35.1 | -0.3347*** | -33.5 |
| ***Z- score (8 quarters)*** | 10,376 | 35.2728 | 23.6481 | 690,300 | 42.6703 | 32.6969 | -7.3975*** | -19.4 | -9.0488*** | -30.7 |
| ***Z- score (20 quarters)*** | 10,376 | 23.0126 | 17.0507 | 690,300 | 29.9072 | 23.9328 | -6.8946*** | -28.6 | -6.8821*** | -35.8 |
| ***Stdv. ROE*** | 10,376 | 0.0397 | 0.0367 | 690,300 | 0.0348 | 0.0314 | 0.0049*** | 24.8 | 0.0053*** | 21.1 |
| ***Sharpe Ratio*** | 10,212 | 6.9604 | 2.5289 | 678,290 | 6.4694 | 3.2498 | 0.4910 | 0.3 | -0.7208*** | -21.7 |
| ***NPL Ratio*** | 11,499 | 0.0269 | 0.0149 | 767,162 | 0.0163 | 0.0089 | 0.0106*** | 44.5 | 0.0060*** | 43.4 |
| ***LLA Ratio*** | 11,499 | 0.0344 | 0.0244 | 767,165 | 0.0216 | 0.0176 | 0.0128*** | 65.4 | 0.0068*** | 59.7 |

**Panel B: Risk (*Z- score (12 quarters)* by Different Bank Sizes**

| | International Banks | | | Purely Domestic Banks | | | Difference in Means International - Domestic | | Difference in Medians International - Domestic | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| **Bank Size (GTA)** | **N** | **Mean** | **Median** | **N** | **Mean** | **Median** | **Difference** | ***t*-stat** | **Difference** | **Wilcoxon M-W Stat** |
| ***Small (≤ 1 Billion)*** | 2,400 | 25.7071 | 19.4527 | 651,483 | 35.8357 | 28.2982 | -10.1286*** | -16.4 | -8.8455*** | -19.8 |
| ***Medium (1-5 Billion)*** | 1,740 | 28.0117 | 21.9034 | 30,616 | 42.9889 | 32.3988 | -14.9771*** | -15.8 | -10.4954*** | -16.9 |
| ***Large (> 5 Billion)*** | 6,236 | 30.0338 | 20.1937 | 8,201 | 36.7430 | 25.3221 | -6.7092*** | -11.6 | -5.1284*** | -13.8 |

## Table 3.4: Internationalization and Bank Risk: Regression Analysis

This table reports regression estimates of the relation between internationalization and bank risk. The dependent variable is *Z-score* (12 quarters). Panel A reports estimates using data at the commercial bank level, while Panel B shows estimates using data aggregated at the bank holding company (BHC) level. The main internationalization measure is the *Foreign Assets Ratio*. Model 1 is an OLS regression with time fixed effects, Model 2 uses *Bank Internationalization Dummy* as a proxy of internationalization, Model 3 includes international banks only, Model 4 excludes too-big-to-fail (*TBTF*) banks, Model 5 excludes the top 20 banks with the most intensive foreign activity each quarter, Model 6 includes small banks defined as banks with GTA <1 Billion, Model 7 includes medium-sized banks defined as banks with GTA between 1 and 5 Billion, and Model 8 includes large banks defined as banks with GTA over 5 Billion. Table 1 provides definitions for all variables. Robust *t*-statistics adjusted for bank clustering are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

**Panel A: Internationalization and Bank Risk: Regression Analysis (Commercial Bank Level)**

| | Dependent Variable: *Z-Score* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| **Independent Variables:** | **Full Sample** | **Full Sample** | **International Banks Only** | **Exclude *TBTF*** | **Exclude Top 20 International Banks** | **Small Size (GTA ≤ 1 Bill)** | **Medium Size (1 Bill < GTA ≤ 5 Bill)** | **Large Size (GTA > 5 Bill)** |
| ***Foreign Assets Ratio*** | -68.064*** | | -15.884** | -61.465*** | -90.924*** | -47.035*** | -49.981*** | -31.945*** |
| | (-8.725) | | (-2.167) | (-6.139) | (-7.072) | (-4.105) | (-4.704) | (-2.706) |
| ***International Bank Dummy*** | | -19.551*** | | | | | | |
| | | (-11.808) | | | | | | |
| ***Income Diversification*** | 0.957 | 0.923 | -4.624 | 1.327 | 0.910 | 1.782 | -12.203* | -16.791* |
| | (0.720) | (0.695) | (-0.550) | (0.996) | (0.683) | (1.345) | (-1.701) | (-1.652) |
| ***Size*** | 2.496*** | 3.038*** | -0.017 | 3.250*** | 2.604*** | 5.447*** | 2.757*** | 1.323 |
| | (11.514) | (13.714) | (-0.024) | (14.254) | (11.958) | (20.255) | (2.710) | (1.476) |
| ***Listed*** | 2.893*** | 2.847*** | 7.210*** | 2.827*** | 2.821*** | 4.264*** | 2.253 | 6.214*** |
| | (4.672) | (4.641) | (2.912) | (4.528) | (4.549) | (6.512) | (1.269) | (2.989) |
| ***BHC*** | 1.300*** | 1.120*** | -2.149 | 1.125*** | 1.295*** | 0.615 | 4.485** | 0.674 |
| | (3.457) | (2.988) | (-0.824) | (2.993) | (3.444) | (1.634) | (2.060) | (0.272) |
| ***Overhead Costs*** | -38.817*** | -38.526*** | -26.203*** | -38.647*** | -38.899*** | -38.379*** | -31.110*** | -25.345*** |
| | (-54.022) | (-53.653) | (-6.478) | (-53.434) | (-53.984) | (-51.450) | (-12.741) | (-7.874) |
| ***FED*** | 2.475*** | 2.472*** | -2.936 | 2.455*** | 2.530*** | 2.473*** | -0.541 | 0.505 |
| | (3.743) | (3.753) | (-0.613) | (3.709) | (3.818) | (3.619) | (-0.226) | (0.124) |
| ***OCC*** | 1.300*** | 1.380*** | -7.626** | 1.430*** | 1.299*** | 1.543*** | -0.665 | -8.614*** |
| | (2.996) | (3.194) | (-2.027) | (3.304) | (2.995) | (3.551) | (-0.329) | (-2.646) |
| ***Constant*** | 53.255*** | 46.567*** | 64.909*** | 44.337*** | 58.119*** | 24.793*** | 61.110*** | 40.689*** |
| | (19.109) | (16.353) | (5.434) | (15.163) | (21.352) | (7.450) | (4.663) | (2.720) |
| ***Time FE*** | **YES** | **YES** | **YES** | **YES** | **YES** | **YES** | **YES** | **YES** |
| ***Observations*** | 600,055 | 600,055 | 8,886 | 593,939 | 598,340 | 557,607 | 29,295 | 13,153 |
| ***R-squared*** | 0.148 | 0.150 | 0.154 | 0.151 | 0.148 | 0.161 | 0.147 | 0.166 |
| ***N-Clusters(Bank)*** | 13,448 | 13,448 | 319 | 13,402 | 13,439 | 12,901 | 1,324 | 428 |

**Panel B: Internationalization and Bank Risk: Regression Analysis (BHC Level)**

| | Dependent Variable: *Z-Score* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| **Independent Variables:** | **Full Sample** | **Full Sample** | **International Banks Only** | **Exclude *TBTF*** | **Exclude Top 20 International Banks** | **Small Size (GTA ≤ 1 Bill)** | **Medium Size (1 Bill < GTA ≤ 5 Bill)** | **Large Size (GTA > 5 Bill)** |
| ***Foreign Assets Ratio*** | -87.159*** | | -27.186*** | -70.464*** | -116.299*** | -62.405*** | -68.028*** | -47.006*** |
| | (-9.406) | | (-3.195) | (-6.195) | (-6.491) | (-4.153) | (-5.251) | (-3.451) |
| ***International Bank Dummy*** | | -23.007*** | | | | | | |
| | | (-11.148) | | | | | | |
| ***Income Diversification*** | 0.767 | 0.608 | -6.434 | 0.935 | 0.745 | 1.760 | -8.115 | 1.882 |
| | (0.508) | (0.402) | (-0.624) | (0.618) | (0.492) | (1.193) | (-0.864) | (0.137) |
| ***Size*** | 4.145*** | 4.686*** | 0.438 | 5.154*** | 4.302*** | 6.233*** | 2.180 | -2.017 |
| | (15.963) | (17.979) | (0.448) | (19.267) | (16.600) | (21.055) | (1.634) | (-1.414) |
| ***Listed*** | 1.762 | 2.222** | 11.656*** | 2.203* | 1.656 | 1.826 | 6.968*** | 7.870** |
| | (1.539) | (1.974) | (3.280) | (1.894) | (1.443) | (1.307) | (3.478) | (2.256) |
| ***BHC*** | -1.274** | -1.337*** | 8.202* | -1.419*** | -1.302*** | -1.610*** | -1.253 | 9.029 |
| | (-2.525) | (-2.653) | (1.807) | (-2.819) | (-2.581) | (-3.229) | (-0.293) | (1.326) |
| ***Overhead Costs*** | -40.431*** | -40.013*** | -26.374*** | -40.146*** | -40.473*** | -40.105*** | -38.313*** | -29.501*** |
| | (-48.580) | (-48.169) | (-5.560) | (-48.223) | (-48.475) | (-46.995) | (-11.841) | (-5.602) |
| ***FED*** | 2.427*** | 2.478*** | -9.241** | 2.580*** | 2.546*** | 2.605*** | 1.764 | 2.008 |
| | (3.178) | (3.260) | (-2.069) | (3.377) | (3.329) | (3.305) | (0.612) | (0.415) |
| ***OCC*** | 2.444*** | 2.644*** | -9.448** | 2.641*** | 2.481*** | 2.514*** | 4.017* | -0.993 |
| | (4.858) | (5.288) | (-2.539) | (5.272) | (4.933) | (4.997) | (1.749) | (-0.236) |
| ***Constant*** | 60.897*** | 53.971*** | 72.818*** | 48.516*** | 59.174*** | 35.385*** | 93.941*** | 121.499*** |
| | (17.375) | (15.414) | (5.139) | (13.559) | (16.880) | (9.017) | (4.907) | (5.069) |
| ***Time FE*** | **YES** | **YES** | **YES** | **YES** | **YES** | **YES** | **YES** | **YES** |
| ***Observations*** | 471,599 | 471,615 | 7,049 | 464,974 | 469,985 | 436,331 | 24,554 | 10,714 |
| ***R-squared*** | 0.165 | 0.168 | 0.164 | 0.170 | 0.166 | 0.171 | 0.153 | 0.147 |
| ***N-Clusters(Bank)*** | 12,873 | 12,875 | 268 | 12,776 | 12,860 | 12,281 | 1,122 | 348 |

## Table 3.5: Alternative Measures of Risk

This table reports regression estimates of the relation between internationalization and bank risk. The dependent variable are *Log of Z-score* (over prior 12 quarters) in Model 1, *Z-score* (over prior 8 quarters) in Model 2, *Z-score* (over prior 20 quarters) in Model 3, *Sharpe Ratio* (over prior 12 quarters) in Model 4, *Stdv. ROE* in Model 5*, NPL Ratio* in Model 6*,* and *LLA Ratio*.is *Z-score* (12 quarters) in Model 7. *Foreign Assets Ratio* is the measure of bank internationalization. All models include time fixed effects. Table 1 provides definitions for all variables. Robust *t*-statistics adjusted for bank clustering are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | **Dependent Variable: Alternative Measures of Risk** | | | | | | |
|---|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** |
| **Independent Variables:** | ***Log of Z-score* (over 12 quarters)** | ***Z-score* (over 8 quarters)** | ***Z-score* (over 20 quarters)** | ***Sharpe Ratio* (12 quarters)** | ***Stdv. ROE* (over 12 quarters)** | ***NPL Ratio* (Nonperforming Loans)** | ***LLA Ratio* (Loan Loss Allowance)** |
| ***Foreign Assets Ratio*** | -1.999*** | -78.231*** | -59.208*** | -29.948*** | 0.035*** | 0.055** | 0.061*** |
| | (-6.544) | (-8.224) | (-8.759) | (-3.706) | (6.420) | (2.135) | (2.865) |
| ***Income Diversification*** | 0.197*** | -0.617 | 3.357*** | 2.543 | 0.001 | -0.003** | -0.000 |
| | (5.029) | (-0.423) | (2.625) | (0.812) | (0.778) | (-2.503) | (-0.357) |
| ***Size*** | 0.024*** | 3.282*** | 1.894*** | 1.507** | -0.001*** | 0.001*** | 0.000*** |
| | (4.278) | (13.780) | (9.136) | (2.417) | (-9.392) | (6.056) | (2.639) |
| ***Listed*** | 0.076*** | 5.055*** | 0.496 | 2.636* | -0.002*** | -0.004*** | 0.001*** |
| | (4.626) | (7.533) | (0.819) | (1.727) | (-7.547) | (-13.455) | (2.696) |
| ***BHC*** | 0.060*** | 1.783*** | 0.664* | -0.631 | -0.001*** | -0.001*** | -0.002*** |
| | (5.751) | (4.339) | (1.869) | (-0.575) | (-3.369) | (-5.024) | (-6.690) |
| ***Overhead Costs*** | -1.334*** | -44.649*** | -32.296*** | -5.240*** | 0.020*** | 0.016*** | 0.006*** |
| | (-63.319) | (-56.272) | (-47.134) | (-4.574) | (44.892) | (25.312) | (7.661) |
| ***FED*** | 0.063*** | 2.573*** | 2.461*** | -1.654*** | -0.001*** | -0.001*** | -0.001** |
| | (3.692) | (3.594) | (3.881) | (-2.857) | (-4.070) | (-3.385) | (-2.005) |
| ***OCC*** | 0.021* | 1.208** | 1.396*** | -0.293 | -0.001** | 0.000* | 0.001*** |
| | (1.797) | (2.531) | (3.419) | (-0.334) | (-2.219) | (1.955) | (4.328) |
| ***Constant*** | 4.391*** | 49.990*** | 40.611*** | -3.071 | 0.017*** | 0.004* | 0.009*** |
| | (58.182) | (16.309) | (15.686) | (-0.394) | (10.864) | (1.954) | (4.618) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***Time FE*** | **YES** | **YES** | **YES** | **YES** | **YES** | **YES** | **YES** |
| ***Observations*** | 599,746 | 656,175 | 498,015 | 591,760 | 600,055 | 762,671 | 762,674 |
| ***R-squared*** | 0.185 | 0.138 | 0.144 | 0.000 | 0.125 | 0.115 | 0.063 |
| ***N-Clusters(Bank)*** | 13,423 | 14,389 | 11,868 | 13,365 | 13,448 | 15,750 | 15,750 |

## Table 3.6: Alternative Measures of Bank Internationalization

This table reports regression estimates of the relation between internationalization and bank risk. The dependent variable is *Z-score* (12 quarters). The internationalization measures are *Foreign Assets Ratio* in Model 1, *Foreign Loans Ratio* in Model 2, and *Foreign Deposits Ratio* in Model 3. All models include time fixed effects. Table 1 provides definitions for all variables. Robust *t*-statistics adjusted for bank clustering are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| Dependent Variable: *Z-Score* | | | |
|---|---|---|---|
| | **(1)** | **(2)** | **(3)** |
| **Independent Variables:** | ***Foreign Assets Ratio*** | ***Foreign Loans Ratio*** | ***Foreign Deposits Ratio*** |
| ***Internationalization Ratio*** | -68.064*** | -50.636*** | -43.267*** |
| | (-8.725) | (-9.045) | (-8.281) |
| ***Income Diversification*** | 0.957 | 0.883 | 1.220 |
| | (0.720) | (0.665) | (0.918) |
| ***Size*** | 2.496*** | 2.375*** | 2.571*** |
| | (11.514) | (10.996) | (11.762) |
| ***Listed*** | 2.893*** | 3.019*** | 2.855*** |
| | (4.672) | (4.867) | (4.613) |
| ***BHC*** | 1.300*** | 1.296*** | 1.241*** |
| | (3.457) | (3.448) | (3.304) |
| ***Overhead Costs*** | -38.817*** | -38.732*** | -38.746*** |
| | (-54.022) | (-53.890) | (-54.025) |
| ***FED*** | 2.475*** | 2.482*** | 2.469*** |
| | (3.743) | (3.748) | (3.733) |
| ***OCC*** | 1.300*** | 1.370*** | 1.263*** |
| | (2.996) | (3.155) | (2.912) |
| ***Constant*** | 53.255*** | 54.567*** | 52.318*** |
| | (19.109) | (19.646) | (18.621) |
| ***Time FE*** | **YES** | **YES** | **YES** |
| ***Observations*** | 600,055 | 600,055 | 600,055 |
| ***R-squared*** | 0.148 | 0.147 | 0.148 |
| ***N-Clusters(Bank)*** | 13,448 | 13,448 | 13,448 |

## Table 3.7: Alternative Econometric Specifications and Standard Errors

This table reports regression estimates of the relation between internationalization and bank risk. The dependent variable is *Z-score* (12 quarters). *Foreign Assets Ratio* is the measure of bank internationalization. Model 1 (baseline model) is an OLS regression with time fixed effects and standard errors clustered by bank, Model 2 uses Newey-West standard errors, Model 3 uses Prais-Winsten standard errors, Model 4 uses Fama-MacBeth standard errors, and Model 5 uses two-way clustered standard errors by bank and time. Table 1 provides definitions for all variables. *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | **Dependent Variable: *Z-Score*** | | | | |
|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** |
| **Independent Variables:** | **OLS w/ Time FE & Bank Clusters** | **Newey-West w/Lags** | **Prais-Winsten** | **Fama MacBeth** | **Two-way Clustering By Bank & Time** |
| ***Foreign Assets Ratio*** | -68.064*** | -61.317*** | -31.286*** | -66.712*** | -61.317*** |
| | (-8.725) | (-25.476) | (-5.818) | (-16.430) | (-7.015) |
| ***Income Diversification*** | 0.957 | 15.963*** | -5.907*** | 2.082 | 15.963*** |
| | (0.720) | (42.188) | (-26.760) | (1.588) | (9.819) |
| ***Size*** | 2.496*** | 1.531*** | 2.609*** | 2.748*** | 1.531*** |
| | (11.514) | (22.949) | (28.974) | (11.020) | (4.015) |
| ***Listed*** | 2.893*** | 4.212*** | 2.985*** | 2.070*** | 4.212*** |
| | (4.672) | (18.769) | (10.157) | (5.562) | (5.759) |
| ***BHC*** | 1.300*** | 0.629*** | 0.756*** | 1.239*** | 0.629 |
| | (3.457) | (5.199) | (5.373) | (7.266) | (1.434) |
| ***Overhead Costs*** | -38.817*** | -28.725*** | -4.763*** | -38.502*** | -28.725*** |
| | (-54.022) | (-168.170) | (-36.639) | (-59.272) | (-26.439) |
| ***FED*** | 2.475*** | 2.691*** | 1.885*** | 2.479*** | 2.691*** |
| | (3.743) | (13.065) | (7.196) | (18.656) | (3.950) |
| ***OCC*** | 1.300*** | 2.083*** | 0.554*** | 1.457*** | 2.083*** |
| | (2.996) | (16.168) | (3.290) | (9.583) | (4.061) |
| ***Constant*** | 53.255*** | 62.457*** | 15.067*** | 66.084*** | 62.457*** |
| | (19.109) | (75.380) | (13.716) | (27.934) | (17.232) |
| ***Time Effects*** | **YES** | **NO** | **NO** | **NO** | **NO** |
| ***Observations*** | 600,055 | 600,055 | 600,055 | 600,055 | 600,055 |
| ***R-squared*** | 0.148 | | 0.162 | 0.105 | 0.102 |
| ***N-Clusters(Bank)*** | 13,448 | | | | 13,447 |

## Table 3.8: Endogeneity

### Panel A: IV Model

Panel A presents the results of instrumental variable (IV) estimation that controls for the endogeneity of bank internationalization. The instrument is *Border State*, a binary indicator for whether a bank is headquartered in a state that borders an ocean, Canada, or Mexico. Model 1 (baseline model) is an OLS regression. Models 2 and 3 are the first- and second-stage regressions of the IV estimation. The row labeled "*F*-statistic" reports the *F*-statistic of the test on whether the IV is significant in the first-stage regression. All models include time fixed effects. Table 1 provides definitions for all variables. Robust *t*-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | (1) | (2) | (3) |
|---|---|---|---|
| **Independent Variables:** | **OLS** | **IV 2SLS First Stage** | **IV 2SLS Second Stage** |
| ***Foreign Assets Ratio*** | -68.064*** | | -200.382*** |
| | (-8.725) | | (-4.115) |
| ***Border State*** | | 0.001*** | |
| | | (26.988) | |
| ***Income Diversification*** | 0.957 | 0.004*** | 1.413*** |
| | (0.720) | (14.493) | (3.820) |
| ***Size*** | 2.496*** | 0.005*** | 3.249*** |
| | (11.514) | (43.595) | (11.659) |
| ***Listed*** | 2.893*** | -0.004*** | 2.251*** |
| | (4.672) | (-29.665) | (8.030) |
| ***BHC*** | 1.300*** | -0.000*** | 1.197*** |
| | (3.457) | (-6.075) | (13.463) |
| ***Overhead Costs*** | -38.817*** | 0.001*** | -38.694*** |
| | (-54.022) | (4.402) | (-216.549) |
| ***FED*** | 2.475*** | 0.002*** | 2.669*** |
| | (3.743) | (11.352) | (17.620) |
| ***OCC*** | 1.300*** | -0.001*** | 1.128*** |
| | (2.996) | (-23.130) | (10.733) |
| ***Constant*** | 53.255*** | -0.060*** | 44.179*** |
| | (19.109) | (-42.759) | (12.999) |
| ***Time FE*** | **YES** | **YES** | **YES** |
| ***Observations*** | 600,055 | 600,055 | 600,055 |
| ***R-squared*** | 0.148 | 0.065 | 0.139 |
| ***F-Statistic*** | | 720.795*** | |

**Panel B: Propensity Score Matching**

Panel B reports the difference in *Z-score* between international banks and matched purely domestic banks. Four different propensity score matching (PSM) methods are used to construct the control sample of purely domestic banks: 1:1 matching without replacement, 1:1 matching with replacement, nearest neighbor (n=2), and nearest neighbor (n=3). The propensity scores are computed from a probit model that uses the same control variables as in the baseline model (Model 1 in Table 4) plus the instrumental variable, *Border State*. Panel B also shows regression estimates of the relation between internationalization and bank risk on the four PSM samples. Table 1 provides definitions for all variables. Robust *t*-statistics adjusted for bank clustering are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| Dependent Variable: *Z-score* | | | | |
|---|---|---|---|---|
| **Propensity Score Matching Estimation** | **Treated (International)** | **Controls** | **Difference** | ***t*-stat** |
| ***1:1 Matching without replacement*** | 29.33 | 35.77 | -6.44*** | -12.28 |
| ***1:1 Matching with replacement*** | 29.33 | 35.28 | -5.96*** | -4.42 |
| ***Nearest neighbor (n=2)*** | 29.33 | 35.36 | -6.04*** | -5.53 |
| ***Nearest neighbor (n=3)*** | 29.33 | 35.41 | -6.08*** | -6.15 |

| Dependent Variable: *Z-Score* | | | | |
|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** |
| **Independent Variables:** | **1:1 Matching without replacement** | **1:1 Matching with replacement** | **Nearest neighbor (n=2)** | **Nearest neighbor (n=3)** |
| ***Foreign Assets Ratio*** | -24.552*** | -24.329*** | -27.596*** | -28.733*** |
| | (-3.483) | (-3.531) | (-3.918) | (-4.085) |
| ***Income Diversification*** | -9.697 | -10.014 | -10.977* | -11.538** |
| | (-1.493) | (-1.543) | (-1.826) | (-2.013) |
| ***Size*** | -0.912* | -0.836 | -1.199** | -1.336*** |
| | (-1.779) | (-1.627) | (-2.533) | (-2.951) |
| ***Listed*** | 5.515*** | 5.362*** | 4.343*** | 3.743*** |
| | (3.341) | (3.179) | (2.861) | (2.648) |
| ***BHC*** | 0.887 | -0.022 | 1.454 | 1.896 |
| | (0.516) | (-0.012) | (0.937) | (1.340) |
| ***Overhead Costs*** | -28.404*** | -29.423*** | -31.123*** | -32.228*** |
| | (-11.067) | (-10.451) | (-12.578) | (-14.335) |
| ***FED*** | 1.681 | 0.213 | 1.768 | 1.948 |
| | (0.540) | (0.065) | (0.639) | (0.790) |
| ***OCC*** | -5.327** | -5.304** | -4.000** | -3.404** |
| | (-2.557) | (-2.417) | (-2.135) | (-2.015) |
| ***Constant*** | 77.760*** | 79.442*** | 89.190*** | 93.349*** |
| | (9.570) | (10.011) | (12.257) | (13.866) |
| ***Time FE*** | **YES** | **YES** | **YES** | **YES** |
| ***Observations*** | 17,772 | 14,721 | 19,105 | 22,846 |
| ***R-squared*** | 0.149 | 0.154 | 0.153 | 0.155 |
| ***N-Clusters(Bank)*** | 2,020 | 1,999 | 2,750 | 3,220 |

## Table 3.9: *Z-score* Decomposition

This table reports regression estimates of the relation between internationalization and the components of *Z-score*. The dependent variables are mean *ROA* in Model 1, mean *Capitalization Ratio* in Model 2, and *Stdv. ROA* in Model 3. *Foreign Assets Ratio* is the measure of bank internationalization. All models include time fixed effects. Table 1 provides definitions for all variables. Robust *t*-statistics adjusted for bank clustering are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | **Dependent Variable: *Z-Score* Components** | | |
|---|---|---|---|
| | **(1)** | **(2)** | **(3)** |
| **Independent Variables:** | **Mean *ROA*** | **Mean *Capitalization Ratio*** | ***Stdv. ROA*** |
| ***Foreign Assets Ratio*** | -0.018*** | 0.050** | 0.009** |
| | (-6.152) | (2.016) | (2.475) |
| ***Income Diversification*** | 0.011*** | 0.002 | 0.000 |
| | (14.418) | (0.703) | (0.575) |
| ***Size*** | 0.000* | -0.004*** | 0.000** |
| | (1.743) | (-11.474) | (2.309) |
| ***Listed*** | 0.000 | -0.003*** | -0.000 |
| | (0.551) | (-3.660) | (-1.378) |
| ***BHC*** | 0.000 | -0.011*** | -0.001*** |
| | (0.323) | (-17.886) | (-8.397) |
| ***Overhead Costs*** | -0.006*** | -0.030*** | 0.010*** |
| | (-11.590) | (-13.605) | (18.781) |
| ***FED*** | -0.001*** | -0.002*** | -0.000*** |
| | (-4.208) | (-2.606) | (-2.903) |
| ***OCC*** | 0.000 | -0.001** | 0.000 |
| | (0.330) | (-2.080) | (0.510) |
| ***Constant*** | 0.010*** | 0.208*** | -0.005*** |
| | (7.150) | (37.888) | (-2.962) |
| ***Time FE*** | **YES** | **YES** | **NO** |
| ***Observations*** | 600,055 | 600,055 | 600,055 |
| ***R-squared*** | 0.101 | 0.136 | 0.036 |
| ***N-Clusters(Bank)*** | 13,448 | 13,448 | 13,448 |

## Table 3.10: Accounting and Market Risk Measures for Listed Banks

This table reports regression estimates of the relation between internationalization and bank risk. The dependent variables are *Z-score* in Model 1 (baseline model), *Idiosyncratic Risk* in Model 2, *Total Bank Risk* in Model 3, *Merton Default Probability* in Model 4, *S&P Credit Rating* in Model 5, and *S&P Investment Grade* in Model 6. Models 1 to 4 are OLS regressions. Model 5 is an ordered logit regression (intercepts of this model are not shown). Model 6 is a logit regression. *Foreign Assets Ratio* is the measure of bank internationalization. All models include time fixed effects. Table 1 provides definitions for all variables. Robust *t*-statistics adjusted for bank clustering are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | **Dependent Variable: Risk** | | | | | |
|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| **Independent Variables:** | ***Z-score*** | ***Idiosyncratic Risk*** | ***Total Bank Risk*** | ***Merton Default Probability*** | ***S&P Credit Rating*** | ***S&P Investment vs. Speculative*** |
| ***Foreign Assets Ratio*** | -60.236*** | 0.016*** | 0.015*** | 0.032** | -0.694*** | -6.189*** |
| | (-4.534) | (4.167) | (3.633) | (2.026) | (-2.971) | (-19.603) |
| ***Income Diversification*** | 14.606** | -0.005 | -0.005 | -0.021 | 1.317*** | 0.715*** |
| | (1.983) | (-1.220) | (-1.212) | (-1.035) | (8.458) | (3.103) |
| ***Size*** | -0.659 | -0.003*** | -0.002*** | -0.008*** | 0.594*** | 0.999*** |
| | (-0.907) | (-9.065) | (-6.766) | (-4.346) | (38.863) | (35.655) |
| ***BHC*** | -0.600 | -0.004 | -0.004* | -0.011 | -0.448*** | -0.523*** |
| | (-0.176) | (-1.628) | (-1.777) | (-1.265) | (-6.980) | (-3.436) |
| ***Overhead Costs*** | -46.186*** | 0.011*** | 0.012*** | 0.048*** | 0.076 | 0.516*** |
| | (-12.036) | (6.557) | (6.725) | (5.479) | (0.923) | (3.750) |
| ***FED*** | 5.632** | -0.001 | -0.001* | -0.005 | 0.318*** | 0.087 |
| | (2.072) | (-1.329) | (-1.794) | (-1.335) | (9.953) | (1.406) |
| ***OCC*** | 8.195*** | -0.002*** | -0.003*** | -0.014*** | 0.135*** | 0.099* |
| | (3.149) | (-3.264) | (-3.591) | (-3.286) | (4.244) | (1.915) |
| ***Constant*** | 137.480*** | 0.052*** | 0.041*** | 0.072*** | | -26.387*** |
| | (10.593) | (11.667) | (9.075) | (3.360) | | (-45.523) |
| ***Time FE*** | **YES** | **YES** | **YES** | **YES** | **YES** | **YES** |
| ***Observations*** | 29,953 | 29,816 | 29,816 | 29,176 | 10,022 | 10,022 |
| ***R-squared*** | 0.155 | 0.350 | 0.154 | 0.174 | 0.379 | 0.722 |
| ***N-Clusters(Bank)*** | 941 | 941 | 941 | 933 | | |

## Table 3.11: Internationalization and Bank Risk during Financial Crises

This table reports regression estimates of the relation between internationalization and bank risk during financial crises and normal times. The construction of the financial crisis periods follows Berger and Bouwman (2013). The dependent variable is *Z-score* (12 quarters). All models include time fixed effects. *Foreign Assets Ratio* is the measure of bank internationalization. Table 1 provides definitions for all variables. Robust *t*-statistics adjusted for bank clustering are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

| | **Dependent Variable: *Z-score*** | | | |
|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** |
| **Independent Variables:** | ***Financial Crises*** | ***Banking Crises*** | ***Market Crises*** | ***Banking Crises* and *Market Crises*** |
| ***Foreign Assets Ratio*** | -61.650*** | -65.164*** | -65.985*** | -61.647*** |
| | (-7.452) | (-7.875) | (-8.443) | (-7.452) |
| ***Foreign Assets Ratio* × *Financial Crises*** | -16.856*** | | | |
| | (-3.490) | | | |
| ***Foreign Assets Ratio* × *Banking Crises*** | | -10.967* | | -14.491** |
| | | (-1.662) | | (-2.260) |
| ***Foreign Assets Ratio* × *Market Crises*** | | | -17.903** | -22.259*** |
| | | | (-2.032) | (-2.672) |
| ***Income Diversification*** | 0.950 | 0.949 | 0.963 | 0.953 |
| | (0.714) | (0.714) | (0.725) | (0.717) |
| ***Size*** | 2.498*** | 2.498*** | 2.496*** | 2.498*** |
| | (11.525) | (11.520) | (11.514) | (11.523) |
| ***Listed*** | 2.893*** | 2.893*** | 2.894*** | 2.894*** |
| | (4.673) | (4.672) | (4.674) | (4.674) |
| ***BHC*** | 1.300*** | 1.299*** | 1.301*** | 1.300*** |
| | (3.458) | (3.456) | (3.460) | (3.459) |
| ***Overhead Costs*** | -38.809*** | -38.815*** | -38.812*** | -38.808*** |
| | (-54.002) | (-54.015) | (-54.014) | (-54.003) |
| ***FED*** | 2.475*** | 2.473*** | 2.478*** | 2.476*** |
| | (3.742) | (3.740) | (3.747) | (3.744) |
| ***OCC*** | 1.300*** | 1.300*** | 1.300*** | 1.300*** |
| | (2.996) | (2.996) | (2.996) | (2.996) |
| ***Constant*** | 53.214*** | 53.234*** | 53.247*** | 53.216*** |
| | (19.097) | (19.100) | (19.109) | (19.098) |
| ***Time FE*** | **YES** | **YES** | **YES** | **YES** |
| ***Observations*** | 600,055 | 600,055 | 600,055 | 600,055 |
| ***R-squared*** | 0.148 | 0.148 | 0.148 | 0.148 |
| ***N-Clusters(Bank)*** | 13,448 | 13,448 | 13,448 | 13,448 |

## Table 3.12: Role of Corporate Governance for the Impact of Internationalization on Bank Risk

This table reports regression estimates of the relation between internationalization and bank risk conditional on the magnitude of agency problems. The dependent variable is *Z-score* (12 quarters). The main internationalization measure is the *Foreign Assets Ratio*. The following are banks that are more likely to suffer from agency problems: less institutional ownership, less public pension fund ownership, and less long-term institutional ownership (Panel A); less analyst coverage and CEO is Chairman (Panel B); and relatively low and relatively high levels of insider ownership (Panel C). All models include time fixed effects. Robust *t*-statistics adjusted for bank clustering are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

**Panel A: Institutional Ownership**

| | *Institutional Ownership* | | *Pension Fund Ownership* | | *Long-Term Institutional Ownership* | |
|---|---|---|---|---|---|---|
| | **≤ median** | **> median** | **≤ median** | **> median** | **≤ median** | **> median** |
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| **Independent Variables:** | ***Z-score*** | ***Z-score*** | ***Z-score*** | ***Z-score*** | ***Z-score*** | ***Z-score*** |
| ***Foreign Assets Ratio*** | -174.189*** | -47.810*** | -250.119*** | -42.306*** | -264.529*** | -43.954*** |
| | (-7.639) | (-3.601) | (-5.653) | (-3.171) | (-4.433) | (-3.381) |
| ***Income Diversification*** | 22.637** | 6.360 | 18.040** | 5.665 | 16.066* | 9.408 |
| | (2.389) | (0.648) | (2.008) | (0.599) | (1.778) | (0.974) |
| ***Size*** | 3.184** | -1.399 | 5.162*** | -2.252** | 4.772*** | -2.212** |
| | (2.277) | (-1.500) | (3.674) | (-2.506) | (3.502) | (-2.392) |
| ***BHC*** | 1.197 | -4.088 | -2.410 | -4.757 | 0.291 | -5.373 |
| | (0.287) | (-0.831) | (-0.635) | (-0.971) | (0.076) | (-1.087) |
| ***Overhead Costs*** | -51.130*** | -40.862*** | -57.691*** | -34.777*** | -51.913*** | -39.418*** |
| | (-9.737) | (-7.896) | (-10.987) | (-7.855) | (-10.180) | (-7.837) |
| ***FED*** | 4.073 | 5.321 | 9.342** | 2.041 | 3.964 | 5.348* |
| | (1.036) | (1.617) | (2.424) | (0.648) | (1.099) | (1.721) |
| ***OCC*** | 5.323 | 9.415*** | 8.953** | 7.979*** | 3.349 | 10.934*** |
| | (1.520) | (2.763) | (2.521) | (2.595) | (0.998) | (3.432) |
| ***Constant*** | 74.228*** | 134.312*** | 86.329*** | 149.069*** | 22.616 | 151.726*** |
| | (3.607) | (8.039) | (3.925) | (8.835) | (1.103) | (9.969) |
| ***Time FE*** | **YES** | **YES** | **YES** | **YES** | **YES** | **YES** |
| ***Observations*** | 12,519 | 17,434 | 11,685 | 18,268 | 11,879 | 18,074 |
| ***R-squared*** | 0.182 | 0.146 | 0.191 | 0.159 | 0.175 | 0.159 |
| ***N-Clusters(Bank)*** | 718 | 656 | 747 | 678 | 757 | 700 |

| | *Institutional Ownership* | *Pension Fund Ownership* | *Long-Term Institutional Ownership* |
|---|---|---|---|
| *t*-test for equality of the *Foreign Assets Ratio* coefficients across subsamples | -4.789*** | -4.497*** | -3.612*** |

**Panel B: Analyst Coverage and CEO Duality**

| | *Number of Analysts* | | *CEO Duality* | |
|---|---|---|---|---|
| | **≤ median** | **> median** | **NO** | **YES** |
| | **(1)** | **(2)** | **(3)** | **(4)** |
| **Independent Variables:** | ***Z-score*** | ***Z-score*** | ***Z-score*** | ***Z-score*** |
| ***Foreign Assets Ratio*** | -167.039*** | -43.260*** | 2.148 | -54.929*** |
| | (-7.453) | (-3.029) | (0.096) | (-3.337) |
| ***Income Diversification*** | 15.467 | -6.304 | -15.047 | 21.926* |
| | (1.274) | (-0.469) | (-1.496) | (1.682) |
| ***Size*** | 1.137 | -2.395* | -0.262 | -1.849* |
| | (0.688) | (-1.742) | (-0.220) | (-1.678) |
| ***BHC*** | 0.909 | -10.863 | 0.778 | -7.767 |
| | (0.186) | (-1.386) | (0.105) | (-1.272) |
| ***Overhead Costs*** | -45.901*** | -32.286*** | -43.367*** | -46.187*** |
| | (-6.829) | (-4.893) | (-8.789) | (-7.660) |
| ***FED*** | 4.140 | 5.431 | -3.476 | 6.136 |
| | (0.982) | (1.297) | (-0.785) | (1.465) |
| ***OCC*** | 7.197* | 7.366* | 5.275 | 7.882* |
| | (1.800) | (1.760) | (1.260) | (1.925) |
| ***Constant*** | 115.740*** | 145.439*** | 134.051*** | 158.309*** |
| | (4.043) | (6.792) | (5.761) | (8.597) |
| ***Time FE*** | **YES** | **YES** | **YES** | **YES** |
| ***Observations*** | 8,933 | 9,082 | 11,004 | 9,822 |
| ***R-squared*** | 0.171 | 0.157 | 0.158 | 0.152 |
| ***N-Clusters(Bank)*** | 613 | 374 | 550 | 435 |

| | *Number of Analysts* | *CEO Duality* |
|---|---|---|
| *t*-test for equality of the *Foreign Assets Ratio* coefficients across subsamples | -4.658*** | -2.0493** |

**Panel C: Insider Ownership**

| | *Insider Ownership* | | |
|---|---|---|---|
| | **≤ p20** | **(p20, p80]** | **> p80** |
| | **(1)** | **(2)** | **(3)** |
| **Independent Variables:** | ***Z-score*** | ***Z-score*** | ***Z-score*** |
| ***Foreign Assets Ratio*** | -26.200* | 16.037 | -316.526*** |
| | (-1.755) | (0.653) | (-5.751) |
| ***Income Diversification*** | 9.306 | 7.407 | -29.911** |
| | (0.617) | (0.667) | (-2.461) |
| ***Size*** | -4.308*** | 0.458 | 4.300** |
| | (-3.071) | (0.359) | (2.368) |
| ***BHC*** | -8.654 | -8.302 | -0.487 |
| | (-0.882) | (-1.167) | (-0.044) |
| ***Overhead Costs*** | -35.687*** | -47.123*** | -34.272*** |
| | (-5.201) | (-7.683) | (-6.590) |
| ***FED*** | 6.987 | -1.419 | -3.572 |
| | (1.219) | (-0.339) | (-0.675) |
| ***OCC*** | 12.256** | 3.848 | 1.706 |
| | (2.166) | (0.981) | (0.356) |
| ***Constant*** | 178.817*** | 129.416*** | 86.203*** |
| | (7.619) | (5.195) | (2.792) |
| ***Time FE*** | **YES** | **YES** | **YES** |
| ***Observations*** | 4,718 | 12,327 | 3,631 |
| ***R-squared*** | 0.171 | 0.148 | 0.210 |
| ***N-Clusters(Bank)*** | 224 | 575 | 216 |

| | ***Insider Ownership*** |
|---|---|
| *F*-test for equality of the *Foreign Assets Ratio* coefficients across subsamples | 15.56*** |

# CHAPTER 4

## DID TARP BANKS GET COMPETITIVE ADVANTAGES?[88,89]

### 4.1 Introduction

This paper investigates whether the Troubled Assets Relief Program (TARP) – one of the largest government interventions in the US during the recent financial crisis – may have given its recipients competitive advantages. Also, if such competitive advantages were conferred, which channel(s) brought about these changes? The main component of TARP, the Capital Purchase Program (CPP), is a preferred stock and equity warrant purchase program led by the US Treasury's Office of Financial Stability. We use the name TARP henceforth to refer to CPP, since this is the name ultimately widely used in the media (although CPP is only one of the interventions).

The main objectives of TARP were to improve the stability of the financial system and increase the availability of credit. However, it may also have had unintended effects on bank competition and resource allocation, given that the literature on regulatory

[88] Allen N. Berger, and Raluca A. Roman. A modified version has been accepted for publication by *Journal of Financial and Quantitative Analysis,* 08/13/2014.

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interventions in the banking sector often opines that public guarantees distort competition (TARP funds may be relatively expensive).[90] The competitive advantages appear to be primarily or entirely due to TARP banks that repaid early, suggesting that these banks had reduced importance of the *cost disadvantage channel* and had increased importance of the *safety channel*. Our results suggest a possible distortion in competition due to the government intervention, which may have misallocated resources. The results may also help explain other findings in the literature on the effects of TARP on bank risk and lending, and yield important policy implications.

Our hypotheses suggest diverging predictions regarding the effect of TARP on bank competitive indicators, market share and market power. TARP can either increase or decrease these measures of competitive advantage. We consider separately the cases of market share and market power as our different channels may influence them in the same or opposite directions.

We first consider market share as measured by local market share of assets. Three potential channels may lead to higher market shares for TARP recipients: the *predation channel* (TARP banks may compete more aggressively), the *safety channel* (TARP banks may be considered safer), and the *cost advantage channel* (TARP funds may be cheaper than non-TARP funds). In contrast, three different channels may lead to lower market shares for TARP banks: the *charter value* / *quiet life channel* (bailout may increase charter value and/or allow for a "quiet life"), the *stigma channel* (TARP banks may be perceived as riskier), and the *cost disadvantage channel* (TARP funds may be more expensive than non-TARP funds). Importantly, the *safety* and *stigma channels* are opposites and the *cost*

[90] These and other channels are described in detail in Section 4.4.

*advantage* and *cost disadvantage channels* are opposites, and only one of each pair can hold for a given bank at a given time.

We then consider market power as measured by Lerner Index. TARP banks may increase their market power relative to non-TARP banks due to four different channels, three of which also affect market share as described above: the *safety channel,* the *increased moral hazard channel* (reduction in discipline results in shifts into riskier portfolios), the *charter value / quiet life channel*, and the *cost advantage channel*. Alternatively, TARP banks may decrease their market power relative to non-TARP banks due to four different channels, three of which also affect market share as described above: the *predation channel*, the *decreased moral hazard channel* (increase in capital results in shifts into safer portfolios), the *stigma channel*, and the *cost disadvantage channel*. The *increased moral hazard* and *decreased moral hazard channels* are opposites, and only one can hold for a given bank at a given time.[91]

Some of the market share and market power channels go in the same direction and some go in the opposite direction, and we formulate hypotheses that take these channels into consideration. We test the hypotheses and try to distinguish which of the channels empirically dominate using a difference-in-difference (DID) regression model. The model uses the two indicators of competitive advantage – local market share of assets as a proxy for market share and Lerner index as a proxy for market power – as the key dependent variables. The exogenous variables include a *TARP Recipient* dummy and a DID term, *Post TARP x TARP Recipient* (where *Post TARP* is a dummy equal to one in 2009-2012, the

[91] The *predation* and *charter value/quiet life channels* may also be regarded as opposites because they have opposing implications for both market share and market power and because only one can hold for a given bank at a given time.

period after the TARP program initiation), to capture the effect of the TARP treatment. We also control for proxies for CAMELS, the declared set of financial criteria used by regulators to assess the health of banking organizations, as well as a rich set of other bank characteristics and time fixed effects.

Our results suggest that TARP banks did get competitive advantages and increased both their market shares and market power. When splitting the TARP participants by whether or not they repaid early, we find that the competitive advantages are primarily or entirely due to recipients that repaid early, suggesting that these banks had significantly reduced importance of the *cost disadvantage channel* and had increased importance of the *safety channel*. When assessing which of the channels above are the strongest and weakest, we find that: 1) the *moral hazard channels* seem to be unimportant, 2) the *cost disadvantage channel* seems to dominate the *cost advantage channel*, at least for the banks that repaid early, and 3) the *safety channel* dominates the *stigma* and *cost disadvantage channels*.

We perform a number of robustness checks. We address the potential endogeneity between our independent variable (*TARP recipient*) and the dependent variables for competitive advantage using instrumental variable analysis (following Bayazitova and Shivdasani (2012), Li (2013), Duchin and Sosyura (2014)). We address potential selection-bias issues using a propensity score matching analysis. We attempt to rule out the possibility that alternative forces may drive our results using placebo experiments. We also check the sensitivity of our results to alternative proxies of TARP – TARP infusion amount divided by gross total assets (GTA) and TARP infusion amount divided by risk-weighted

assets – instead of a TARP recipient dummy.[92] We try alternative proxies of market share – local market shares of loans, deposits, and uninsured deposits – instead of the local market share of assets. We use alternative econometric models – bank fixed effects and random effects models – as well as a model with standard errors clustered at the bank level. We also perform tests to capture the effects of different bank sizes. Finally, we also conduct several subsample analyses such as: excluding involuntary participants, excluding stress-tested banks, and subsample analyses based on bank capitalization and local market concentration. Our results are robust to all these checks.

The remainder of this chapter is organized as follows. In Section 4.2, we describe TARP and in Section 4.3, we review the related literature. In Section 4.4, we develop the empirical hypotheses. In Section 4.5, we describe the econometric framework. In Section 4.6, we discuss the data. In Section 4.7, we present the main empirical results and in Section 4.8, we focus on robustness tests. In Section 4.9, we draw conclusions, describe how our findings may explain other results in the TARP literature, and give policy implications.

[92] Gross total assets (GTA) equals total assets plus the allowance for loan and lease losses and the allocated transfer risk reserve (a reserve for certain foreign loans). Total assets on Call Reports deduct these two reserves, which are held to cover potential credit losses. We add these reserves back to measure the full value of the assets financed. Risk-weighted assets are based on the Basel I requirements.

### 4.2 Description of the Troubled Asset Relief Program (TARP)

The Troubled Asset Relief Program (TARP) was established in October 2008 pursuant to the Emergency Economic Stabilization Act of 2008 (EESA). It was one of the largest government interventions to address the subprime mortgage crisis. Its primary purposes were to improve financial stability by purchasing up to $700 billion of the banking organizations' "troubled assets" (to stabilize their balance sheets and avoid further losses) and encourage banks to increase lending.

Rather than purchasing "troubled assets," the Capital Purchase Program (CPP) of TARP authorized the U.S. Treasury to invest up to $250 billion (out of the $700 billion bailout package) in the preferred equity of selected financial institutions to enhance their capital ratios. This included $125 billion in $10 billion and $25 billion increments to nine large involuntary participants (Citigroup, Bank of America, JPMorgan Chase, Wells Fargo, Goldman Sachs Group, Morgan Stanley, Wachovia Corporation, State Street Corporation, and Merrill Lynch).These initial recipients did not follow the formal CPP evaluation process, while the rest followed the formal process and applied for CPP funds from the U.S. Treasury. During 2008:Q4-2009:Q4, TARP infused capital of $204.9 billion into 709 banking organizations. Approval to receive TARP took into account the health of the banking organizations, with the viable, healthier ones being more likely to receive capital. In addition, Duchin and Sosyura (2012, 2014), Bayazitova and Shivdasani (2012), and Li (2013) find that banks with more political influence were more likely to receive TARP

funds. The CPP investment in preferred shares was determined by the Treasury, ranging from 1-3% of a firm's risk-weighted assets or $25 billion (whichever was smaller).[93]

In return for the capital infusion, banks provided the Treasury with non-voting preferred stock (paying dividends at an annual yield of 5% for the first five years and 9% afterwards) and ten-year life warrants for the common stock (allowing the purchase of common stock for an amount equal to 15% of the preferred equity infusion), giving taxpayers the opportunity to benefit from the banks' future growth. TARP participants were also subject to compensation restrictions. Some of these were outlined at program inception in October 2008: limiting tax deductibility of compensation for senior executives to $500,000, requiring bonus claw-backs, and limiting golden parachute payments. In February 2009, the Treasury revised the rules and limited total annual compensation for senior executives at TARP banks to $500,000 excluding certain incentive awards. The American Recovery and Reinvestment Act (ARRA) further prohibited bonuses, retention awards, and incentive compensation other than long-term restricted stock awards that exceed one-third of annual compensation. As of December 31, 2012, the Treasury had received over $220 billion back on $204.9 billion TARP invested in banking organizations.[94]

### 4.3 Related Literature

A number of papers look at TARP determinants and effects. First, several papers look at factors that affect the initial decisions to apply for and receive TARP funds by banks.

[93] TARP investments outside the CPP were not subject to these limits (e.g., AIG, GMAC (now Ally Financial)). In addition, Citigroup and Bank of America initially received $25 billion, but later got installments of additional funds.

[94] http://www.treasury.gov/initiatives/financial-stability/reports/Pages/Monthly-Report-to-Congress.aspx

Bayazitova and Shivdasani (2012), Duchin and Sosyura (2012, 2014), Li (2013), and Berger and Roman (2014) find that banks with more political connections were more likely to receive TARP funds. Bayazitova and Shivdasani (2012) find that banks that posed systemic risk and faced high financial distress costs, but had strong asset quality, obtained TARP equity infusions. Cornett, Li, and Tehranian (2013) find that financial characteristics related to the probability of receiving TARP differ for the healthiest (''over-achiever'') versus the least healthy (''under-achiever'') banks. TARP under-achievers had weaknesses in income production and experienced liquidity issues while TARP over-achievers' loans performed well, but liquidity issues hurt the abilities of these banks to continue lending. Other papers look at "exit from TARP" decisions. Bayazitova and Shivdasani (2012) and Wilson and Wu (2012) find that banks with high levels of CEO pay were more likely to exit early, presumably due to TARP restrictions on executive pay.

Second, some papers look at valuation effects of TARP. Ng, Vasvari, and Wittenberg-Moerman (2013) find that TARP banks had lower equity returns in the program initiation and increased their valuations later. Harrisa, Huertab, and Ngob (2013) find deteriorating operating efficiency for TARP banks. Veronesi and Zingales (2010) find that as of the end of 2009, TARP increased the value of the top 10 banks' financial claims by $130 billion at a taxpayers' cost of $21 billion - $44 billion with a net benefit between $86 billion and $109 billion. Norden, Roosenboom, and Wang (2013) find that TARP led to spillover effects from banking to the corporate sector, leading to a significantly positive impact on borrowing firms' stock returns. In contrast, Lin (2013) finds that firms that have relationships with TARP banks suffer a significant valuation loss of 2.5% in 3-day abnormal returns around TARP approval announcements.

Third, other papers investigate the impacts of TARP on bank risk and/or lending. Duchin and Sosyura (2014) use a sample of 529 publicly traded financial firms (which tend to be the largest firms) over the period 2006-2010, and find that TARP banks approved riskier loans, but find no evidence of an increase in credit supply. Black and Hazelwood (2013) analyze risk-taking by bank size using 81 banks from the Survey of Terms of Bank Lending survey over 2007-2010. They find that risk of loans originated increased for large TARP banks, but decreased for small TARP banks. They also find that outstanding commercial and industrial loans (C&I) increased at small TARP banks, but decreased at large TARP banks relative to non-TARP banks. Li (2013) looks at TARP's effect on bank loan supply using 7,062 banks (both public and private), of which 647 are TARP recipients. He focuses on banks with below-median Tier 1 ratios (less well capitalized) because these are more likely to receive TARP, and finds that these TARP banks expanded their credit supply, and this increase was registered in all major types of loans. Puddu, and Walchli (2013) find that TARP banks provide on average 12% more small business loan originations than non-TARP banks. Chang, Contessi, and Francis (2014) find that banks that received TARP funds maintained lower cash-to-assets ratios (and thus lower excess reserves ratios), consistent with the view that the TARP capital injection possibly resulted in more lending for the TARP beneficiaries. Presumably, the results in these last three studies were dominated by the effects on small banks, which constitute the vast majority of banks.

Fourth, one paper examines the effects of TARP on local economic conditions (Berger and Roman (2015)). (Berger and Roman, 2015) that investigates the impact of TARP on real economic conditions. They find that banks' TARP bailouts were followed

by improvements in economic conditions in the local markets in which they operate. TARP increased net job creation and net hiring establishments, and decreased business and personal bankruptcies.

Another relevant paper is Koetter and Noth (2014) which finds competitive distortions as a result of TARP for unsupported banks. They find that higher bailout expectations for unsupported banks are associated with increases in banks' interest margins: loan rates increase and deposit rates decrease. We focus on the competitive effects (market power and market share) for the TARP recipient banks.

Related literature looks at government interventions in other nations on bank risk-taking, lending, and liquidity creation (e.g., Brandao-Marques, Correa, and Sapriza (2012), Dam and Koetter (2014), Hryckiewicz (2012), Berger, Bouwman, Kick, and Schaeck (2014)) and find either reductions or increases in risk-taking, and reductions in credit growth and liquidity creation. Others look at effects on competition (e.g., Cordella and Yeyati (2003), Gropp, Hakenes, and Schnabel (2011), Calderon and Schaeck (2012), King (2013)) and find less aggressive competitive conduct when banks are subject to bailouts, and lower market power or more aggressive conduct for competitors of bailed out institutions, and mixed competitive effects on shareholders.

Also relevant are papers studying the impact of capital on competition, given that TARP increased bank capital (e.g., Calomiris and Mason (2003), Calomiris and Wilson (2004), Allen, Carletti, and Marquez (2011), Mehran and Thakor (2012), Berger and Bouwman (2013)), which generally report positive effects of capital on banks' market share or ability to compete.

Finally, there is research examining the effect of competition on financial stability, which is relevant because TARP may distort competition, with further implications for financial stability. Two opposing strands of literature relate competition to stability. The "competition-fragility" view (e.g., Marcus (1984), Keeley (1990), Demsetz, Saidenberg, and Strahan (1996), Carletti and Hartmann (2003)) contends that more banking competition increases bank instability, while the "competition-stability" view (e.g., Boyd and De Nicolo (2005), Boyd, De Nicolo, and Jalal (2006), Schaeck and Cihak (2010)) asserts that lower competition is associated with financial instability. Berger, Klapper, and Turk-Ariss (2009) find that the two views do not necessarily yield opposing predictions and find evidence supporting both. Others predict a potential nonmonotonic U-shape relationship between market power and risk-taking (e.g., Martinez-Miera and Repullo (2010)). Berger, Imbierowicz, and Rauch (2014) account for competition as a factor impacting bank failure during the recent financial crisis, and find results consistent with Martinez-Miera and Repullo (2010) that the effect of concentration increased the probability of failure at high levels and decreased it at low levels.

We raise the possibility that the effects on bank risk and lending may be related to the effects on competition. As discussed in the conclusions in Section 4.9 below, if TARP banks obtained competitive advantages and the relationship between market power and risk-taking was nonmonotonic during the crisis, this may help explain the results on risk and lending by large and small banks.

### 4.4 Hypothesis Development

Our hypotheses examine the impact of TARP on competition, measured by market share and market power. We first consider market share. Government capital infusions can help

TARP banks increase their market shares (Holmstrom and Tirole (1997), Boot and Marinc (2008), Allen, Carletti, and Marquez (2011), Mehran and Thakor (2012), Berger and Bouwman (2013)). Three potential channels could lead to this. First, the *predation channel* (Telser (1966), Fudenberg and Tirole (1986)) suggests that better capitalized banks may have used TARP capital to act aggressively to take market share away from financially constrained peers. Anecdotal evidence suggests that some TARP recipients used the funds to acquire peers with poorer capital ratios.[95] Second, under the *safety channel,* TARP banks may be perceived as safer due to the extra capital and/or the selection criteria which targeted "healthy, viable institutions." The *safety channel* includes the effects of both the banks' decision to apply for TARP and whether the application is accepted. Customers may take more loans and loan commitments from TARP banks because they are less likely to fail or become distressed, and creditors are more likely to lend to them because they are more likely to pay back, both suggesting higher market shares for the TARP banks. Finally, under the *cost advantage channel,* TARP funds may be cheaper than other funds, so TARP banks have an incentive to expand their portfolios, yielding higher market shares.

A contrasting view is that higher capital as a result of capital infusions decreases the market shares of TARP banks. There are three different channels that can lead to this. First, under the *charter value* / *quiet life channel* (Hicks (1935), Keeley (1990), Cordella and Yeyati (2003)), bailouts may increase charter values and/or allow for "quiet lives," decreasing incentives for aggressive behavior, leading to lower market shares.[96] Second,

[95] As examples, MB Financial acquired in 2009 several failing institutions: Benchmark Bank, Corus Bank NA, InBank, and Heritage Community Bank. M&T Bank Corp, New York also acquired all the outstanding common stock of Provident Bankshares Corp in 2009 and Wilmington Trust Corporation in 2010.

[96] In addition, the bailout may induce more aggressive behavior by competitors, leading to lower market shares for the TARP banks (Gropp, Hakenes, and Schnabel (2011)).

there may be a *stigma channel* if market participants perceive TARP banks as riskier.[97] The *stigma channel*, like the *safety channel*, includes the effects of both the decisions to apply for and to accept bailout funds. Customers may take less credit from TARP banks because they may be more likely to fail or become financially distressed, and creditors to be more reluctant to lend to them because they are less likely to pay back. Finally, under the *cost disadvantage channel*, TARP funds may be more expensive than other funds, leading TARP banks to decrease their portfolio sizes, resulting in lower market shares. As noted above, the *safety* and *stigma channels* are opposites and the *cost advantage* and *cost disadvantage channels* are opposites, and only one of each pair can hold for a given bank at a given time.[98]

We test empirically the impact of the TARP on market share to understand which view finds empirical support and which channels dominate. Our first hypotheses (H1a-H1b) are:

*H1a: TARP banks increased their market shares relative to non-TARP banks.*

*H1b: TARP banks decreased their market shares relative to non-TARP banks.*

We next consider market power, proxied by *Lerner GTA, Price* minus *MC* (marginal cost) divided by *Price* (discussed in Section 4.6.2). TARP banks may increase their market power due to four different channels (three of which also affect market share above). First, under the *safety channel*, customers may pay more for credit from TARP

[97] Hoshi and Kashyap (2010), in their study about lessons from Japan crisis, mention that a bank may refuse government assistance if it generates stigma or an adverse signal that the bank is expected to have high future losses.

[98] As discussed above, the *predation* and *charter value/quiet life channels* may also be regarded as opposites because they have opposing implications and only one can hold for a given bank at a given time.

banks because these banks are less likely to fail or become distressed, and creditors may charge them lower interest rates because TARP banks are more likely to pay back, both leading to higher market power. Second, under the *increased moral hazard channel*, there may be reductions in market and regulatory discipline due to the increased probability of future bailouts, resulting in shifts into riskier portfolios. This leads to higher measured market power because the riskier pool of customers pay higher interest rates. Creditors may also charge more if they perceive the TARP banks as riskier, but this increase will be less than enough to compensate for the riskier asset portfolio. Third, under the *charter value / quiet life channel*, TARP bailout may decrease incentives for aggressive behavior. This may lead to higher market power as TARP banks maintain higher rates and fees for credit and maintain lower deposit and non-deposit funding rates rather than going after business. Finally, under the *cost advantage channel*, TARP banks have decreased marginal costs and may reduce price (by a lesser amount) to attract more business, yielding higher market power.

Alternatively, TARP banks may have decreased market power due to four different channels (three of which are from the market share hypotheses above). First, under the *predation channel,* TARP banks may use the capital infusions to compete more aggressively by offering customers lower rates and fees on loans and loan commitments and higher rates on deposits and other funds, resulting in lower market power. Second, under the *decreased moral hazard channel*, the increase in capital may result in shifts into safer portfolios. This leads to lower measured market power because the safer pool of customers pay less for loans and loan commitments, which is partially offset by lower interest rates from creditors. Third, under the *stigma channel,* customers may demand

lower rates on credit from TARP banks because they are perceived as riskier, and creditors may charge them more for funds, leading to lower market power. Finally, under the *cost disadvantage channel,* TARP banks have an increase in marginal cost and may increase price (by a lesser amount), leading to lower market power. The *increased moral hazard* and *decreased moral hazard channels* are opposites, and only one can hold for a given bank at a given time.

We test empirically the impact of the TARP on market power to try to understand which view finds more empirical support. Our second series of hypotheses (H2a-H2b) are:

*H2a: TARP banks increased their market power relative to non-TARP banks.*

*H2b: TARP banks decreased their market power relative to non-TARP banks.*

The eight channels may influence market share and market power in the same or opposite directions, as shown in Graph A of Figure 4.1. The only exceptions are the *moral hazard channels*, for which we only have predictions for market power.

We also distinguish between TARP banks that repaid early and those that did not. We expect that those that repaid early would have shed some of the cost advantages or disadvantages of the program by leaving it. In addition, any stigma attached to the program would likely largely be lifted, and there may be an increased *safety channel* from demonstrating the ability to repay. The changes in the importance of the channels from early repayment are shown with the smaller and larger arrows in Graph B of Figure 4.1. We expect that for those that repaid early, the *cost disadvantage channel* and/or the *stigma channel* was likely in force encouraging the repayment. Since the *cost disadvantage channel* and *stigma channel* have negative influences on both market share and market

power, the reduction of the importance of these channels and any increase in the importance of the *safety channel* should make the overall impact of TARP more positive or less negative for those that repaid early. These arguments lead to our third hypothesis:

*H3: TARP banks that repaid early incurred more positive or less negative market share and market power outcomes.*

**4.5 Econometric Framework**

We test the effects of TARP on competition using data for virtually all US banking organizations. The changes in banks' behavior after TARP are studied using a difference-in-difference (DID) analysis. A DID estimator is commonly used in the program evaluation literature (e.g., Meyer (1995)) to compare a treatment group to a control group before and after treatment. Recently, it has been used in the banking literature (e.g., Beck, Levine, and Levkov (2010), Gilje (2012), Schaeck, Cihak, Maehler, and Stolz (2012), Berger, Kick, and Schaeck (forthcoming)). In this case, the treated group consists of banks that received TARP funds, and the control group consists of other banks. An advantage of this approach is that by analyzing the time difference of the group differences, the DID estimator accounts for omitted factors that affect treated and untreated banks alike.

The first DID regression model considers TARP banks that repaid early and those that did not equally, and accounts for Hypotheses H1a, H1b, H2a, and H2b:

$$Y_{it} = \beta_0 + \beta_1 \cdot TARP\ Recipient_{it} + \beta_2 \cdot Post\ TARP_{it}\ x\ TARP\ Recipient_{it} + \\ + \beta_3 \cdot X_{it-1} + \beta_4 \cdot Time_t + \varepsilon_{it} \qquad (4.1)$$

$Y_{it}$ is a competitive advantage indicator (market share or market power), $TARP\ Recipient_{it}$ is a dummy variable equal to one if the bank was provided TARP capital support, $Post\ TARP_{it}\ x\ TARP\ Recipient_{it}$ is the DID term and captures the effect of the treatment (TARP)

on the treated (TARP recipients) compared to the untreated (non-TARP banks) after treatment. $Post\ TARP_{it}$ is a dummy equal to one in 2009-2012, the period after the TARP program initiation (following Duchin and Sosyura (2014)), but considering a longer period for estimation. $X_{it-1}$ are control variables, $Time_t$ is a series of time fixed effects, and $\varepsilon_{it}$ represents a white noise error term.[99] A positive coefficient on the DID term would show the presence of a competitive advantage associated with TARP.

The second DID regression model analyzes the different behavior of TARP banks that repaid early and those that did not repay early, and accounts for Hypothesis H3:

$$Y_{it} = \delta_0 + \delta_1 \cdot TARP\ Recipient\_Not\ Repaid_{it} + \delta_2 \cdot TARP\ Recipient\_Repaid_{it} + \\ + \delta_3 \cdot Post\ TARP_{it}\ x\ TARP\ Recipient\_Not\ Repaid_{it} + \\ + \delta_4 \cdot Post\ TARP_{it}\ x\ TARP\ Recipient\_Repaid_{it} + \delta_5 \cdot X_{it-1} + \delta_6 \cdot Time_t + \eta_{it} \quad (4.2)$$

All the variables are the same as in equation (1), except that $TARP\ Recipient\_Not\ Repaid_{it}$ (a dummy equal to one if the bank did not repay in 2009-2010) and $TARP\ Recipient\_Repaid_{it}$ (a dummy equal to one if the bank repaid early in 2009-2010) replace $TARP\ Recipient_{it}$. $Post\ TARP_{it}$ x $TARP\ Recipient\_Not\ Repaid_{it}$ and $Post\ TARP_{it}$ x $TARP\ Recipient\_Repaid_{it}$ are the DID terms and capture the effects of the treatment (TARP capital infusion) on the treated (TARP recipients that did not repay early and TARP recipients that repaid early) compared to the rest. Positive coefficients on these DID terms would show competitive advantages. Under Hypothesis H3, the effect of TARP is more positive or less negative for those that repaid early, predicting that $\delta_4 > \delta_3$.

[99] The term *Post TARP* is not included in the model by itself because it is subsumed by the time fixed effects.

## 4.6 Data and Sample

### *4.6.1 Data Sources*

Data are collected from multiple sources. We obtain TARP transactions data for October 2008 to December 2010 and TARP recipients list from the Treasury's website.[100] We match by name and location the institutions in the list with their corresponding RSSD9001 (Call Report ID) where available. The TARP report has 756 transactions included for 709 unique institutions (572 bank holding companies (BHCs), 87 commercial banks, 50 S&Ls and thrifts), since some institutions have multiple transactions – some received more than one TARP capital purchase and some made one or more repayment transactions.[101] We exclude S&Ls and thrifts because datasets are not comparable with banks and these institutions compete in different ways than commercial banks.

We obtain bank data from quarterly Call Reports for the period 2005:Q1 to 2012:Q4. Given that the majority of our TARP recipients are BHCs, we aggregate Call Report data of all the banks in each BHC at the holding company level. This aggregation is done for all bank-level variables, including competitive indicators. If the commercial bank is independent, we keep the data for the commercial bank. For convenience, we use the term bank to refer to either type of entity.

We exclude observations that do not refer to commercial banks (RSSD9331 $\neq$ 1), have missing or incomplete financial data for total assets or common equity, have missing

[100] http://www.treasury.gov/initiatives/financial-stability/Pages/default.aspx

[101] A few special cases are resolved as follows: For Union First Market Bancshares Corporation (First Market Bank, FSB) located in Bowling Green, VA, we include the RSSD9001 of the branch of the commercial bank First Market Bank because this is the institution located in Bowling Green, VA. In two other cases where M&As occurred (the bank was acquired by another BHC according to the National Information Center (NIC)), and TARP money were received by the unconsolidated institution, we included the RSSD9001 of this unconsolidated institution.

or negative data for the income statement items such as interest expenses, personnel expenses, and non-interest expenses, or if the bank failed before 2009:Q1 (before observation of TARP effects). To avoid distortions for the Equity to GTA ratio, for all observations with equity less than 0.01 * GTA, we replace equity with 1% of GTA (e.g., Berger and Bouwman, 2013). In addition, we normalize financial variables using seasonally adjusted GDP deflator to be in real 2012:Q4 dollars.

We also use data from several other sources for additional control variables and instruments: FDIC Summary of Deposits, List of Corrective Actions, House of Representatives website, Missouri Census Data Center, Execucomp, DEF 14A Filings from SEC Edgar website, Center for Responsible Politics, and the Federal Reserve Bank of Philadelphia website. The regressions lose one quarter of observations because of the use of lagged values for some of the exogenous variables. We end up with a final regression sample of 178,604 firm-quarter observations for 7,323 unique banks.

*4.6.2. Main Dependent Variables*

For dependent variables, we first consider market share proxied by local market asset share of each bank (Metropolitan Statistical Area (MSA), New England County Metropolitan Area (NECMA), or rural county). In the cases of multimarket banks, we use the weighted average local market asset share, where the weights are the proportions of deposits in the different local markets (locations of assets are not available).[102,103]

[102] As alternative method in unreported results, we construct the weighted average local market asset share using as weights the proportions of branches that banks have in their local markets, and results are robust.

[103] We assume that assets and loans are distributed the same as deposits according to the "cluster" approach in the industrial organization literature. This originated in the Supreme Court's 1963 Philadelphia National Bank decision, which confirmed that antitrust laws are applicable also to banking mergers and defined both the product and geographical markets to be used in the structural analysis of bank mergers. The Court found

Our second way of measuring competitive advantage is market power. We proxy market power by the Lerner Index for GTA, and calculated as the price-cost margin divided by price:

$$Lerner\ GTA_{it} = \frac{Price_{it} - MC_{it}}{Price_{it}} \tag{4.3}$$

where $Price_{it}$ is the price of GTA proxied by the ratio of total revenues (interest and non-interest income) to GTA for bank $i$ at time $t$ and $MC_{it}$ represents marginal cost of assets for bank $i$ at time $t$. The main advantage of this method is that it can be calculated for each bank at each point in time and does not require the assumption of long-run equilibrium, unlike other indicators such as the Panzar and Rosse H-Statistic (Dick and Hannan (2010)). A firm in perfect competition has an index value of 0 and thus no market power (as *Price* = *MC*) and a firm with market power has a positive index. The detailed calculation of the Lerner Index is explained in Appendix D.

*4.6.3. Main Independent Variables*

As discussed above, we use several TARP variables for our analysis: *TARP Recipient*, *TARP Recipient_Repaid*, and *TARP Recipient_Not Repaid* and the interaction terms of *Post_TARP* with these variables. These are defined above in Section 4.5.

that banks produce a "cluster" of services that are traded in "local markets" and established this cluster analytical approach. This method defines that the relevant product market includes in that market all products and services provided by the commercial banks. In addition, there is a large literature on whether bank deposit and lending markets are geographically segmented, with some researchers finding that bank product markets have become more integrated over time and that local monopoly power remains (e.g., Eichengreen (1984), Berger and Hannan (1989), Cyrnak and Hannan (1999)).

*4.6.4. Control Variables*

We include a broad set of control variables to mitigate potential omitted variable problems. We control for proxies for CAMELS (the declared set of financial criteria used by regulators for evaluating banks) as in Duchin and Sosyura (2014) because these are widely perceived as good indicators of a bank's financial health. We control for *Capital Adequacy* – the ratio of equity capital divided by GTA – to account for the extent to which a bank can absorb potential losses and compete more vigorously. We control for *Asset Quality* – the fraction of nonperforming loans to total loans – to account for the overall condition of a bank's portfolio. We control for *Management Quality/Regulatory Action*, a dummy taking a value of -1 if a bank had a corrective action by the corresponding banking regulator (FED, FDIC, and OCC) during the quarter and 0 otherwise.[104] *Earnings* is proxied by return on assets (ROA), the ratio of the annualized net income to GTA. We account for bank *Liquidity*, the ratio of cash over total deposits. Finally, *Sensitivity to Market Risk* is the ratio of the absolute difference (gap) between short-term assets and short-term liabilities to GTA.

We also control for several other bank characteristics following the literature. We include *Bank Size*, the natural log of GTA, because prior research shows there may be a connection between size and capacity to gain a competitive advantage (Berger and Bouwman (2009, 2013)). Second, we control for *Bank Age*, the age (in years) of the commercial bank or the oldest bank owned by the BHC (when there are multiple banks owned by a BHC). This is important because market share usually rises as a bank

[104] The list of enforcement actions are taken by FDIC, FED, and OCC regulators against banks. We consider that this variable captures management quality also as bank regulators would not take regulatory actions against banks unless they judged that bank management would not take appropriate action in the absence of the enforcement actions.

accumulates years in a market (Berger and Dick (2007)). Third, we control for *DWTAF* – a dummy for whether a bank received discount window loans and/or Term Auction Facility (TAF) funding during the crisis. Berger, Black, Bouwman, and Dlugosz (2014) find that banks that received these funds increased their lending significantly, raising the possibility that these programs may have also affected competitive advantages in terms of market share and market power.[105] Fourth, we control for *Merger,* a dummy equal to 1 from the time that the bank acquired another institution. Institutions that acquire others may gain market share and market power.[106] Fifth, we control for *BHC,* a dummy equal to 1 if the entity is a BHC, as this may help a bank strengthen its competitive position because the holding company may support its affiliates by injecting capital through internal capital markets (Houston, James, and Marcus (1997)). Sixth, we control for the public status of the bank or its holding company (*Listed*), as listed entities have better access to capital markets and more public information available, which may affect their competitive advantages. *Listed* is a dummy equal to 1 if a bank is listed or is part of a BHC that is listed on a stock exchange.[107] Seventh, we control for *Metropolitan* – a dummy equal to 1 if the majority of bank deposits are in MSAs or NECMAs – as banks in metropolitan locations may have more opportunities for expansion and growth. Eighth, we control for *HHI Deposits*, the Herfindahl-Hirschman Index determined using the bank deposit data from the FDIC Summary of Deposits, which may affect the pricing strategy of the bank. HHI is

[105] Data on these programs during the crisis were made public due to the Freedom of Information Act (FOIA) requests and a provision of the Dodd-Frank Act, and the data were generously provided to us by those authors.

[106] As an alternative way to control for mergers in unreported results, we exclude the quarter of the acquisition. Results are robust to this alternative method.

[107] In order to split banks by listed versus non-listed status, we match banks in the Call Reports with the CRSP dataset using the CRSP-FRB link from the University of Chicago.

weighted by the share of bank deposits in each local market over bank's total deposits over all the markets in which the bank operates. Ninth, we control for *Branches/GTA* – the ratio of the number of branches that the bank has over GTA multiplied by 1000 – as banks with more branches per dollar of assets may have more complex organizational structures, which may also affect banks' ability to compete (e.g., Degryse and Ongena (2005, 2007), Bharath, Dahiya, Saunders, and Srinivasan (2007), Degryse, Laeven, and Ongena (2009), Berger and Bouwman (2013)).

## 4.7 Empirical Results

### *4.7.1 Summary Statistics*

Table 4.1 provides definitions and summary statistics for the variables. We present means, medians, standard deviations, and numbers of observations across all banks in the sample for the variables used in the analyses. In terms of competitive advantage indicators, the average bank has a *Local Market Share of Assets* of 0.049 and a *Lerner GTA* of 0.051. As for the TARP indicators, *TARP Recipient* dummy shows that 9.7% of the banks received TARP money – 1.8% repaid early (*TARP Recipient_Repaid*) and the remaining 7.9% did not repay early (*TARP Recipient_Not Repaid*).

Looking at the proxies for CAMELS ratings for the sample banks, we find that the average bank has *Capital Adequacy* of 0.109, *Asset Quality* of 0.003, *Management Quality/Regulatory Action* of -0.005, *Earnings* of 0.017, *Liquidity* of 0.137, and *Sensitivity to Market Risk* of 0.130. These statistics suggest that, on average over the sample period, banks were well capitalized and did not have many performance problems, although the means mask problems for individual banks at different points in time. Turning to the other bank variables, we find that the average bank has a *Bank Size* (logarithm of the GTA) of

12.053 (GTA of $1.89 billion) and a *Bank Age* of 76.26 years. In addition, 23.7% of the banks obtained Discount Window and/or TAF funds (*DWTAF)*, 21.90% of the banks in the sample acquired another institution (*Merger*), 86.3% of the banks are BHCs or part of a BHC (*BHC*), 6.80% are listed (*Listed*), and 67.3% are in metropolitan locations (*Metropolitan*). The average bank also has a local market concentration (*HHI Deposits)* of 1,162 and a ratio of *Branches/GTA* of 0.029.

*4.7.2. Regression Analysis*

Table 4.2 tabulates the main estimation results for equation (2) that tests our Hypotheses (time fixed effects are not shown for brevity). Panel A columns (1) and (3) show that the DID term, $Post\ TARP_{it}$ * $TARP\ Recipient_{it}$, is positive and statistically significant at 1% level, indicating that TARP banks gained a competitive advantage and increased both market share and market power after TARP capital injections. These results are also economically significant. The coefficient on $Post\ TARP_{it}$ * $TARP\ Recipient_{it}$ of 0.0045 in the market share equation increases the local market share by 9.14%, evaluated at the average market share of 0.0492. In addition, the coefficient on $Post\ TARP_{it}$ * $TARP\ Recipient_{it}$ of 0.0384 in the market power equation increases the Lerner Index by 74.85%, evaluated at the average Lerner Index of 0.0513. Results are consistent with the empirical dominance of Hypothesis H1a over Hypothesis H1b and Hypothesis H2a over Hypothesis H2b. Panel A columns (2) and (4) and Panel B showing *t*-tests for the equality of the effects for the two types of TARP banks indicate that the competitive advantage is predominantly for the TARP banks that repaid early, suggesting that these banks significantly reduced their cost disadvantages and increased their revenues more than those that did not repay early, consistent with Hypothesis H3.

While we are primarily interested in the DID terms, Post TARP * TARP, the coefficients of the TARP dummy are also of interest. The TARP dummies from both the market share and market power regressions suggest that prior to TARP, recipients had lower market share and market power. The sums of the TARP dummies and the interaction coefficients indicate that after TARP, the recipients still had lower market share, although closer to that of the non-recipients, while they surpassed their competitors in terms of market power. When splitting between TARP banks that repaid early and those that did not, we find that all TARP recipients had lower market share and power prior to the program, and in all cases except for the market share for TARP recipients that did not repay early, they increase their market share and market power.

Turning to the bank control variables, we find that most of the proxies for *CAMELS* indicate that banks with better asset quality, better management quality, higher earnings, higher liquidity, and lower sensitivity to market risk may be better able to gain competitive advantages in both market share and market power. The only CAMELS variable that differs across the two competitive advantage indicators is capital adequacy, which tends to decrease market share and increase market power. Looking at the other control variables, across both market share and market power regressions we find that banks with more experience (as proxied by the *Bank Age*), higher local market concentration, lower metropolitan coverage, without a BHC membership, not engaging in M&As, and with a less complex organizational structure are more likely to gain competitive advantages.[108] The *DWTAF* variable does not appear to affect market share significantly, but it has a

[108] We also try dropping the local market concentration variable (*HHI Deposits*) to mitigate the potential concern that it is an alternative measure of competition that may bias our regression estimates. The results are robust (not shown).

negative impact on market power. As for the effects of size and public status on market share, estimates suggest that it may be harder for larger and public banks to increase their market shares due to different growth and expansion strategies, consistent with Berger and Bouwman (2013). However, in terms of market power, larger and public banks are more likely to increase market power due to better ability to set higher prices for products or obtain cheaper funding from the capital markets.

*4.7.3. Lerner Index Decomposition*

In Table 4.3, we decompose *Lerner GTA* into its components, *Price* and *MC,* to shed light on the source of the market power competitive advantage that TARP banks obtain. An increase in *Price* would come from charging higher interest rates and fees for loans and loan commitments, while a lower *MC* may come from paying lower interest rates on deposits or non-deposit funds. Results in Panel A columns (1) and (3) suggest that the competitive advantage findings are primarily due to marginal costs going down, suggesting that the market power gain is mainly on the input side (lower prices for deposits and/or other sources of funding). When splitting the banks between banks that repaid early and those that did not, both groups had an increase in their market power on the input side and banks that repaid early also had an increase in market power on the output side.

*4.7.4. Channels Analysis*

In Graph C of Figure 4.1, we examine which of the possible channels of TARP on competition appear to be relatively important and unimportant for explaining our empirical results. The shaded areas surrounded by dotted lines illustrate the channels most consistent with our findings, while the crossed-out areas illustrate the channels least consistent with

our findings.[109] We have several important findings. First, the *moral hazard channels* seem to be unimportant because *Price* does not change nearly as much as *MC* and goes in two different directions for those that did not repay and those that repaid. Second, the *cost disadvantage channel* seems to dominate the *cost advantage channel*, at least for the banks that repaid early, because when the cost effects are reduced by early repayment, the competitive advantages are amplified. Finally, the *safety channel*, the only remaining one with positive influences on both market share and market power appears to dominate the *stigma* and *cost disadvantage channels*, which have negative influences on both. For banks that did not repay, the *safety channel* seems to primarily come in the form of lower interest rates for deposits and/or other types of financing, which more than offset the higher cost of TARP funds. Banks that repaid also appear to have gotten a boost in their revenues from an enhanced *safety channel*. In sum, the *safety channel* and the *cost disadvantage channel* are the most important to explain the results.

### 4.8 Robustness Tests

In this section, we provide a number of robustness tests. We include all control variables from the main regressions in these tests, but they are not shown for brevity.

#### *4.8.1. Instrumental Variable (IV) Analysis*

We first address the potential endogeneity of our *TARP Recipient* variables, which could bias our findings. For example, TARP capital might be more often provided to the strongest banks, which may be more likely to gain a competitive advantage, yielding a spurious relationship. To deal with this, we employ an instrumental variable (IV) analysis.

[109] The remaining channels are generally not strongly consistent with our findings because the predicted market share and market power effects of these channels go in opposite directions, counter to our results.

To find instruments, we first note that prior research on TARP finds that bank's political and regulatory connections can affect the bank's probability of receiving TARP funds. Following this research, we use the following instruments for the *TARP Recipient* variables: *Subcommitee on Financial Institutions or Capital Markets*, a dummy variable which takes a value of 1 if a firm is headquartered in a district of a House member who served on the Financial Institutions Subcommittee or the Capital Markets Subcommittee of the House Financial Services Committee in 2008 or 2009, following Sosyura and Duchin (2014); *Democrat*, a dummy variable which takes a value of 1 if a bank's local Representative was a Democrat in the 2007-2008 campaign election cycle, following Li (2013); *Fed Director*, a dummy which takes a value of 1 if one of the bank's directors was on the board of directors of one of the 12 Federal Reserve Banks (FRB) or a branch in 2008 or 2009, following Bayazitova and Shivdasani (2012), Duchin and Sosyura (2012), and Li (2013).[110]

Because we consider the TARP recipients that did and did not repay early separately, we include two additional instrumental variables that account for exit from the TARP program. Bayazitova and Shivdasani (2012) show that costs of participation in the TARP program are a major determinant for whether banks chose to remain in the program. Thus, revised compensation rules announced in February 2009 may pose restrictions for management compensation and freedom of decisions in TARP banks with highly compensated executives. We include *CEO Compensation*, a dummy which takes a value

[110] We use the MABLE/Geocorr2k software on the Missouri Census Data Center website to match banks with congressional districts using the zip codes of their headquarters. The final regression sample for this test is 167,112 bank-quarter observations, less than the main regression sample. This is due to two reasons: First, some of the banks could not be mapped into a congressional district (either due to an invalid headquarters zipcode or because we could not match it to a congressional district), a problem reported also by Li (2013). Second, we use an indicator of local market conditions for the 2007-2010 period, although some entities may not be present during this entire period.

of one if bank's CEO had a total compensation greater than $500,000 in 2008[111,112] because banks with high CEO compensation are more likely to exit the program, following Wilson and Wu (2010) and Bayazitova and Shivdasani (2012). We also use the change in state economic conditions, *Coincident Index (weighted)*, which combines four state-level indicators to summarize economic conditions in a single statistic.[113] The *Coincident Index (weighted)* is calculated as the weighted average of the changes in the Philadelphia Federal Reserve's state coincident indexes from December 2007 to December 2010 with the share of the deposits of a given bank taken as weights, following Bayazitova and Shivdasani (2012), because banks in states that experience more economic growth may exit the program earlier since they can raise cheaper financing in the local market, have more internal growth in funding, and/or have fewer loan performance problems.

Because the potential endogenous explanatory variable in equation (1) is binary and we need the instrument to predict treatment, we employ a dummy endogenous variable model as suggested in section 18.4.1 of Wooldridge (2002). For the first stage, we use a probit model in which we regress the *TARP Recipient* dummy on the political and regulatory instruments discussed and all control variables from the main regression model. We then use the predicted probability obtained from the first stage as an instrument for the

[111] To construct this variable, we consider banks with GTA greater than $1 billion and use ExecuComp complemented with DEF14A Filings in SEC Edgar to determine the compensation package for the CEO in 2008 for all banks with information available. We assume for the rest that 2008 CEO Compensation is less than $500,000, based on the reasoning that small banks are less likely to receive such a high level of compensation.

[112] In unreported results, we also use a continuous variable, *Excess CEO Compensation*, the log of the 1 plus the excess of $500,000 of 2008 CEO total compensation. Results are comparable using this alternative instrument.

[113] The four indicators are: nonfarm payroll employment, average hours worked in manufacturing, the unemployment rate, and wage and salary disbursements deflated by the consumer price index.

second stage. Similarly, for equation (2), we conduct probit regressions for each of the two types of TARP banks, *TARP Recipient_Not Repaid* and *TARP Recipient_Repaid* on all political instruments and regulatory instruments discussed and the two extra instruments for early program exit decisions. We also include all control variables from the main regression model. We then use the predicted probabilities obtained from the first stage as instruments for the second stage.

The results of the IV regressions are reported in Table 4.4. We report the first-stage regression results in Table 4.4 Panel A columns (1)-(3), and the second-stage results for the IV specification in Table 4.4 Panel B, with columns (1) and (3) for market share and columns (2) and (4) for market power, respectively. The first-stage regressions in column (1) indicate that the instrumental variables are positively related to TARP injections, and the *F*-tests indicates that the instruments are valid. Similarly, the first-stage regression in columns (2) and (3) indicate that the additional instruments for repayment of TARP, *CEO Compensation* and *Coincident Index (weighted)* are related to TARP repayment decisions, so that TARP recipients that repaid early are more likely to have had higher CEO compensation and higher growth in local markets, while the opposite is true for the TARP banks that did not repay early. The *F*-tests from the first stage again indicate that the instruments are valid.

The second stage results in Panel B and the tests of equality for different types of TARP banks in Panel C show that the main results about our DID terms are robust. The *Post_TARP* TARP Recipient* terms remain positive and significant for both market share and power. Also the results for the *Post_TARP* TARP Recipient_Repaid* terms remain positive and significant in both equations, showing that TARP recipients that repaid early

obtained a competitive advantage. Some of our secondary results, however, are not robust. For example, the TARP Recipient dummies switch sign from negative to positive in the IV estimation. This result might be consistent with endogeneity concerns, and hence the IV estimates may be better able to identify the true effects.

*4.8.2. Propensity Score Matching (PSM) Analysis*

We address the related potential concern of selection bias using a propensity score matching analysis. We follow Black and Hazelwood (2013) and Duchin and Sosyura (2014) and match each TARP recipient based on the propensity score probabilities to one or more non-TARP banks with similar characteristics to help dispel the competing explanation that our results spuriously reflect differences in the characteristics of recipients and non-recipients rather than the effect of TARP per se on competitive advantage indicators. Using a probit regression, we estimate the propensity scores of all banks using the proxies for *CAMELS, Bank Size*, and *DWTAF*.[114] The propensity score is the probability of a bank receiving TARP funds, based on the bank's pre-treatment characteristics. TARP banks are assigned their corresponding non-TARP bank matches based on the absolute difference in propensity scores. Banks with the smallest differences are considered matches and are selected to be part of our analysis.

We use several matching techniques: 1) Nearest-neighbor Matching with N=1, which matches each treatment unit to the nearest control unit, 2) Nearest-neighbor Matching with N=2, which match each TARP bank with 2 non-TARP banks with the closest propensity scores, and 3) Nearest-neighbor Matching with N=3, which match each

[114] As an alternative, in unreported results, we also estimate the propensity scores using only the bank characteristics of size, capitalization level, and profitability. The PSM results are robust to this method.

TARP bank with 3 non-TARP banks with the closest propensity scores. The matches are done with replacement, so that a non-TARP bank could be the closest match for multiple TARP banks. We rerun all main regressions using these matched samples. Table 4.5 Panel A shows the results for market share using the three different PSM samples (columns (1)-(6)) and we find that market share results continue to hold, except that in some instances only TARP recipients that repaid early continue to show a competitive advantage. Table 4.5 Panel B shows the results for market power using the three different PSM samples (columns 1-6) and we find that market power results continue to hold. The *t*-tests of equality for the different groups of TARP banks reported in Panel C again indicate that the competitive advantage is greater for TARP banks that repaid early.

*4.8.3. Placebo Experiments*

We are also concerned that alternative forces may drive the effects we document. To mitigate this potential problem, we conduct two types of placebo experiments.

First, we do a placebo experiment following Puddu, and Walchli (2013). We fictionally assume that the TARP participation took place four years earlier, while still distinguishing between banks that received TARP and those that did not and banks that repaid early versus those that did not according to the "true" TARP program. To mimic our main analysis, we use an eight-year period immediately preceding the TARP program from 2001-2008, and assume that the fictional Post TARP period begins four years before the actual program. We rerun the regressions using the placebo sample (2001-2008) and define *Placebo Post TARP* as a dummy equal to one in 2005-2008, the period after the fictional

TARP program initiation.[115] If our main results reflect the true program, we should not find positively significant results for the DID terms.

The results of the first placebo experiment, reported in Table 4.6 Panel A, confirm that indeed there are no positively significant results on market share and measured market power for the fictional TARP. In the case of market share, the fictional TARP effect is negative and statistically significant, and in the case of measured market power, the effect is insignificantly different from zero. The negative effects for market share may reflect that these banks may have been in relatively poor condition in the period just before the TARP program started. Results are similar when we distinguish between TARP banks that repaid early and those that did not. The *t*-tests in Panel C confirm that there is no statistically significant difference in terms of competitive advantages between the two groups.

As an alternative placebo experiment, we allocate the TARP treatment randomly to banks and then re-estimate the regressions with boot-strapped confidence intervals using 1000 replications. Results are reported in Table 6 Panel B and confirm that indeed there are no positively significant results on market share and market power for the randomly assigned TARP banks. The *t*-tests in Panel C confirm that there is no statistically significant difference in terms of competitive advantages between TARP banks that repaid early and those that did not. In sum, the two types of placebo experiments suggest that our main results do not appear to be driven by alternative forces.

[115] In the regressions, we include all controls as in our main analysis, except that we are not able to include *Management Quality/Regulatory Action* because of data limitations on enforcement actions (only available from 2005 onwards).

*4.8.4. Alternative Measures of TARP*

We next test the robustness of our main results to the use of alternative measures of TARP. In Table 4.7, we replace the *TARP Recipient* dummies with: *Bailout Amount / GTA* and *Bailout Amount / Risk-Weighted Assets*. Our results hold, except that in some instances only TARP banks that repaid early continue to show a competitive advantage.

*4.8.5. Alternative Measures of Market Share*

We test the robustness of our results to the use of alternative measures of market share. In Table 4.8, we replace the *Local Market Share Assets* with *Local Market Share Loans, Local Market Share Deposits*, and *Local Market Share Uninsured Deposits*. Uninsured deposits may be particularly sensitive to the safety and stigma channels because these depositors are not explicitly protected by FDIC deposit insurance.[116] Our main results hold, except that in some instances, only TARP recipients that repaid early show a competitive advantage. Moreover, results that TARP recipients increased their *Local*

[116] To calculate uninsured deposits, we take all the funds in accounts that are partially insured and subtract off the amount that is insured. This requires separate treatment for several time periods because of the changes in deposit insurance limits over time. For the period 2005:Q1-2006:Q1, we calculate the uninsured deposits as the amount of bank deposit accounts (demand, savings, and time) with a balance on the report date of more than $100,000 minus the number of such deposit accounts multiplied by $100,000. For the period 2006:Q2-2009:Q2, we take into account the different treatment of deposit retirement accounts versus the rest. Thus, we calculate the uninsured deposits as the amount of bank deposit accounts (demand, savings, and time, excluding retirement accounts) with a balance on the report date of more than $100,000 minus the number of such deposit accounts multiplied by $100,000 plus the amount of bank deposit retirement accounts with a balance on the report date of more than $250,000 minus the number of such deposit accounts multiplied by $250,000. For the period 2009:Q3 onwards, we account for the deposit insurance limit increase from $100,000 to $250,000 for all deposits except foreign ones. Thus, we calculate the uninsured deposits as the amount of bank deposit accounts (demand, savings, and time, including retirement accounts) with a balance on the report date of more than $250,000 minus the number of such deposit accounts multiplied by $250,000. While the last change in deposit insurance took place in October 2008, the Call Report did not change to reflect it until 2009:Q3. For all time periods, we also add the foreign deposits to the uninsured deposits because foreign deposits are not covered by the FDIC deposit insurance.

*Market Share Uninsured Deposits* confirm that the *safety channel* is one of the most important channels *to explain our findings.*

*4.8.6. Alternative Econometric Models*

To help alleviate the concern that omitted unobserved bank-specific determinants might be explain our results, we also test robustness using specifications with bank fixed effects in Table 4.9 Panel A columns (1)-(4) and random effects (using a generalized least squares approach) in Table 4.9 Panel A columns (5)-(8). We also present a model with time fixed effects and White standard errors which are robust to within-cluster correlation at the bank level (Rogers standard errors) in Table 4.9 Panel A columns (9)-(12). Panel B shows the tests of the equality of the coefficients for different types of TARP banks. In all specifications, we continue to find support for our main results.

*4.8.7. Dynamics of TARP and Competitive Indicators*

We next examine the dynamics of the relation between TARP and competitive advantage indicators for the TARP banks in a similar fashion to Beck, Levine, and Levkov (2010). We do this by including a series of dummy variables in the standard regression to trace out the quarter-by-quarter effects of TARP on the competitive indicators for the TARP recipients. In the regression, we replace the DID term $Post\ TARP_{it}\ x\ TARP\ Recipient_{it}$ from equation (1) with DID terms created by interacting the $TARP\ Recipient_{it}$ with quarter dummies for each of the time periods before and after the TARP.

$$\begin{aligned} Y_{it} = {} & \lambda_0 + \lambda_1 \cdot TARP\ Recipient_{it} + \\ & + \lambda_2 \cdot D^{-14}{}_{it}\, x\ TARP\ Recipient_{it} + \ldots + \lambda_{32} \cdot D^{+16}{}_{it}\ x\ TARP\ Recipient_{it} + \\ & + \lambda_{33} \cdot X_{it-1} + \lambda_{34} \cdot Time_t + \zeta_{it} \end{aligned} \tag{4.4}$$

where $Y_{it}$, $TARP\ Recipient_{it}$, $X_{it-1}$, and $Time_t$ are defined as above. The "*D*s" are dummies defined such that $D^{-j}$ equals one for banks in the $j^{th}$ quarter before 2008:Q4 and $D^{+j}$ equals one for banks in the $j^{th}$ quarter after 2008:Q4, and $\zeta_{it}$ represents a white noise error term. We plot the DID coefficients, adjusted for seasonality, with their 95% confidence intervals and trends in Graphs A and C of Figure 4.2 for market share and market power, respectively.[117] We repeat the exercise by separating out the TARP recipients that repaid early and those that did not in Graphs B and D of Figure 4.2.

Graph A of Figure 4.2 illustrates that the increase in the market share of TARP banks did not precede TARP. The impact of TARP on market share takes time to materialize and only becomes significantly positive in 2010:Q1, and this effect remains at a high level until the end of the sample period. This may suggest that taking share away from competitors is a medium- to long-term strategic process.

As for the impact of TARP on market power, Graph C of Figure 2 illustrates that there is an increase in TARP banks' market power after TARP. This materializes very quickly, from the first quarter after TARP (2009:Q1), possibly because it may immediately affect banks' costs of funds. The effect eventually disappears in 2011. In sum, market share and market power record different patterns of increase post TARP, but both show a positive trend.

Graph B of Figure 4.2 illustrates an increase in market share post TARP for both those that repaid early and those that did not, but the increase is much higher for the TARP banks that repaid early. For timing, both groups experience an increase in market share by same time (2010:Q1), but the TARP banks that did not repay early quickly lose this

[117] To deseasonalize the data, we follow use the X11 procedure developed by the U.S. Census Bureau.

advantage, while TARP banks that repaid early maintain the advantage until the end of the sample period. Similarly, Graph D of Figure 2 illustrates that there is an increase in market power post TARP for both groups, but the increase is much higher for TARP banks that repaid early. Although initially both TARP groups experience an increase in market power up to 2009:Q4, after this, TARP banks that did not repay early experience a decline in market power to preceding levels or below, while TARP banks that repaid early maintain or enhance their competitive advantage for market power up until the end of the sample period. In sum, the competitive advantage effects of TARP last for TARP banks that repaid early, and are only short-lived for TARP banks that did not.

*4.8.8 Other Robustness Tests*

In Appendix E, we conduct several additional analyses to see the types of banks for which TARP offered most competitive advantages. We find that the impact of TARP increases with bank size, and is robust to excluding involuntary participants and those subject to stress tests (SCAP). We also find that only TARP banks with high capitalization ratios obtain competitive advantages and TARP banks in more concentrated local markets gain greater competitive advantages.

**4.9 Conclusions**

This paper investigates whether TARP may have given its recipients competitive advantages and if so, which channel(s) brought about these changes. Our difference-in-difference (DID) regression analysis yields several important results:

1. TARP recipients did get competitive advantages and increased both their market shares and market power relative to non-TARP recipients, consistent with the empirical

dominance of Hypothesis H1a over Hypothesis H1b and Hypothesis H2a over Hypothesis H2b.

2. The positive market share and market power findings may be driven primarily by the ***safety channel*** (TARP banks may be perceived as safer), which is partially offset by the ***cost disadvantage channel*** (TARP funds may be relatively expensive). Thus, the ***safety channel*** and the ***cost disadvantage channel*** are the most important to explain the results.

3. The competitive advantages are primarily or entirely due to TARP recipients that repaid early, suggesting that these banks significantly reduced the importance of the ***cost disadvantage channel*** and increased the importance of the ***safety channel***, consistent with Hypothesis H3.

Overall, our results suggest that TARP may have resulted in a possible distortion in competition, which may have misallocated resources, and may help explain other findings in the literature on the effects of TARP on bank risk and bank lending. First, our findings may help explain the results in the literature that TARP increased risk for the large banks (Black and Hazelwood (2013), Duchin and Sosyura (2014)) and decreased risk for the small banks (Black and Hazelwood (2013)). As discussed above, results in the literature suggest that a nonmonotonic effect of market power on risk may have been in effect during the crisis period – higher market power may be associated with higher risk for banks at high levels of market power, while higher market power may be associated with lower risk at low levels of market power (Martinez-Miera and Repullo (2010), Berger, Imbierowicz, and Rauch (2014)). Given that large (small) banks typically have higher (lower) levels of market power, TARP may have led to an increase (decrease) in risk for large (small) banks.

Our results also may help explain the findings in the literature that TARP resulted in reduced or no change in lending by large banks (Black and Hazelwood (2013), Duchin and Sosyura (2014)) and increased lending by small banks (Black and Hazelwood (2013), Li (2013), Puddu, and Walchli (2013), Chang, Contessi, and Francis (2014)). According to the standard structure-conduct-performance hypothesis, an increase in market power should lead to a reduced supply of credit. However, for relationship borrowers, the supply of credit may be increased by larger market share and larger market power because limits on competition help banks force implicit contracts with relationship borrowers that result in greater credit availability (e.g., Petersen and Rajan (1995)). This may help explain the increase in lending by small banks which tend to specialize in relationship lending, and the decrease or no change in lending by the large banks, which more often engage in transactional lending (Berger, Miller, Petersen, Rajan, and Stein (2005)).

In terms of policy implications, determination about which, if any, banks to be bailed out should rely on a comprehensive analysis of both benefits and costs. Some of these costs and benefits – those for competition, risk taking, and lending – may be evaluated based on our results and those in the literature. Based on the findings for these three effects, any bailouts may be focused primarily on the small banks, where the effects seem to be less distortionary and more toward the public interest, since the increase in market share and market power is the least, risk may be decreased, and lending may be increased. However, for one of the other major benefits of bailouts, increasing the stability of the financial system, presumably the benefits would be greater for the large banks. However,

also the distortions in competition may be greater, and risk taking and lending implications may be less favorable. Policymakers may balance all these different effects.[118]

[118] Some of the other benefits and costs, such as the net gains to the Treasury, recipient banks, and their customers are also generally beneficial. However, in the literature, these effects are generally not differentiated by bank size, so they do not give a guide as to which bank sizes, if any, should be bailed out. Finally, in regards to effects on local economic conditions, TARP led to only economically insignificant improvements in economic conditions in the local markets in which it was applied (Berger and Roman (2015)).

| Channel | Indicators of Competitive Advantage | |
|---|---|---|
| | Market Share | Market Power |
| Predation | ↑ | ↓ |
| Safety | ↑ | ↑ |
| Cost Advantage | ↑ | ↑ |
| Charter Value/Quiet Life | ↓ | ↑ |
| Stigma | ↓ | ↓ |
| Cost Disadvantage | ↓ | ↓ |
| Increased Moral Hazard | ? | ↑ |
| Decreased Moral Hazard | ? | ↓ |

**Figure 4.1: Channels and Indicators of Competitive Advantage**

Graph A. TARP Banks that Did and Did Not Repay Early Considered Equally

Graph A of Figure 4.1 displays the eight channels which may influence market share and market power of TARP banks in the same or opposite directions. The only exceptions are the moral hazard channels, for which we only have predictions for market power.

| Channel | Indicators of Competitive Advantage | |
|---|---|---|
| | Market Share | Market Power |
| Predation | ↑ | ↓ |
| Safety | ↑↑ | ↑↑ |
| Cost Advantage | ↑ | ↑ |
| Charter Value/Quiet Life | ↓ | ↑ |
| Stigma | ↓ | ↓ |
| Cost Disadvantage | ↓ | ↓ |
| Increased Moral Hazard | ? | ↑ |
| Decreased Moral Hazard | ? | ↓ |

**Figure 4.1: Channels and Indicators of Competitive Advantage**

Graph B. TARP Banks that Repaid Early

Graph B of Figure 4.1 displays the changes in the importance of the channels from early TARP repayment. The decrease in the importance of a channel is shown with the smaller arrows, while the increase in the importance of a channel is shown with larger arrows.

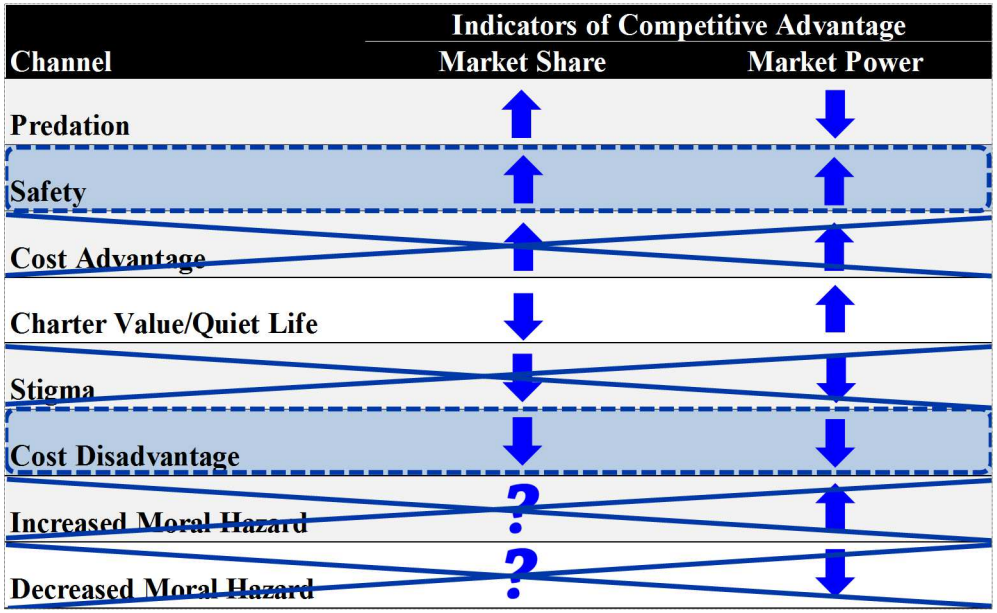


**Figure 4.1: Channels and Indicators of Competitive Advantage**

Graph C. Channels and Indicators of Competitive Advantage Considering the Empirical Results

Graph C of Figure 4.1 displays which of the possible channels of TARP on competition appear to be relatively important and unimportant for explaining the results. The shaded areas surrounded by dotted lines illustrate the channels most consistent with our findings, while the crossed-out areas illustrate the channels least consistent with our findings.

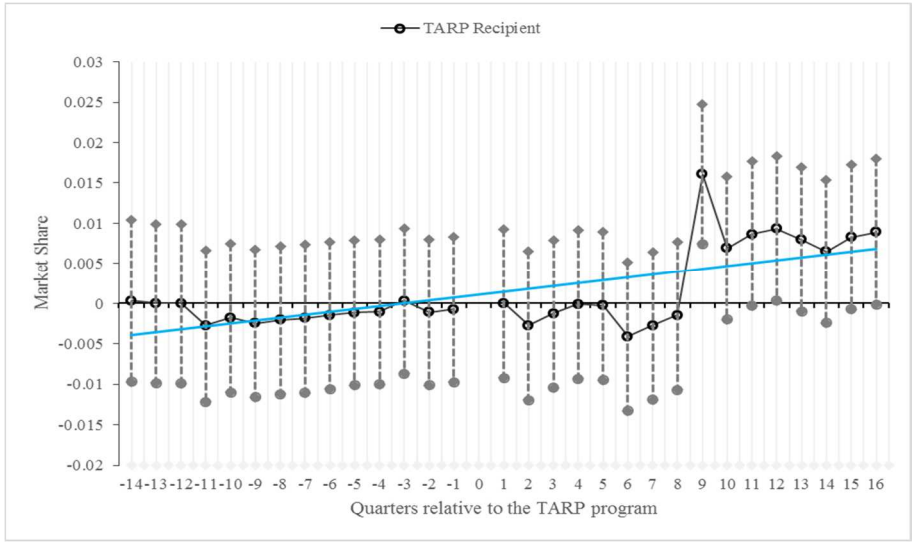


**Figure 4.2: The Dynamic Impacts of TARP on Bank Market Share and Market Power**

Graph A. The Dynamic Impacts of TARP on Bank Market Share (TARP Banks that Did and Did Not Repay Early Considered Equally)

Graph A of Figure 4.2 plots the DID coefficients for the dynamic impact of TARP on bank market share, adjusted for seasonality (represented by small circles), with their 95% confidence intervals (represented by the dashed lines) and trend (represented by the solid straight line). We consider both TARP banks that repaid early and those that did not repay early equally. DID coefficients are created by interacting the *TARP Recipient* variable with quarter dummies for each of the time periods before and after the TARP program.

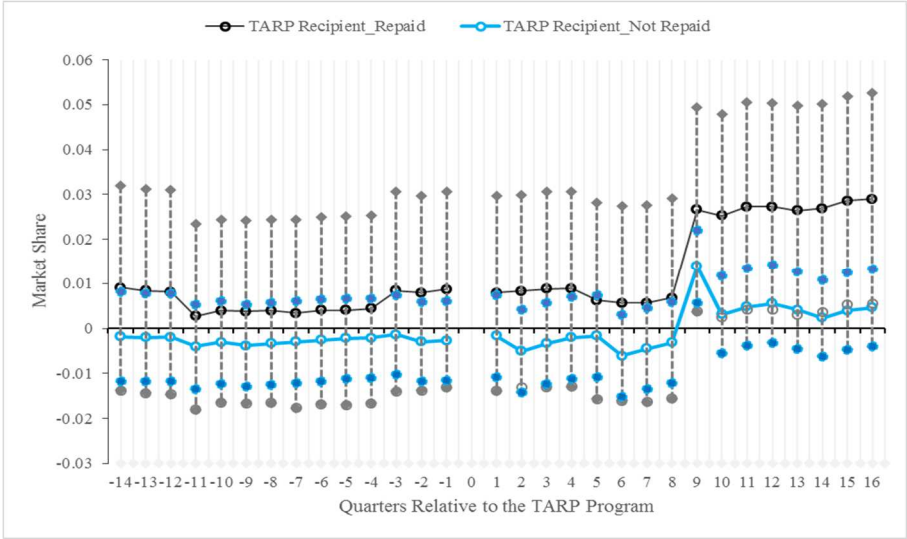


**Figure 4.2: The Dynamic Impacts of TARP on Bank Market Share and Market Power**

Graph B. The Dynamic Impacts of TARP on Bank Market Share (TARP Banks that Repaid Early vs. Those that Did Not)

Graph B of Figure 4.2 plots the DID coefficients for the dynamic impact of TARP on bank market share, adjusted for seasonality (represented by small circles), with their 95% confidence intervals (represented by the dashed lines). We separate the TARP recipients that repaid early (TARP Recipient_Repaid) from those that did not (TARP Recipient_Not Repaid).

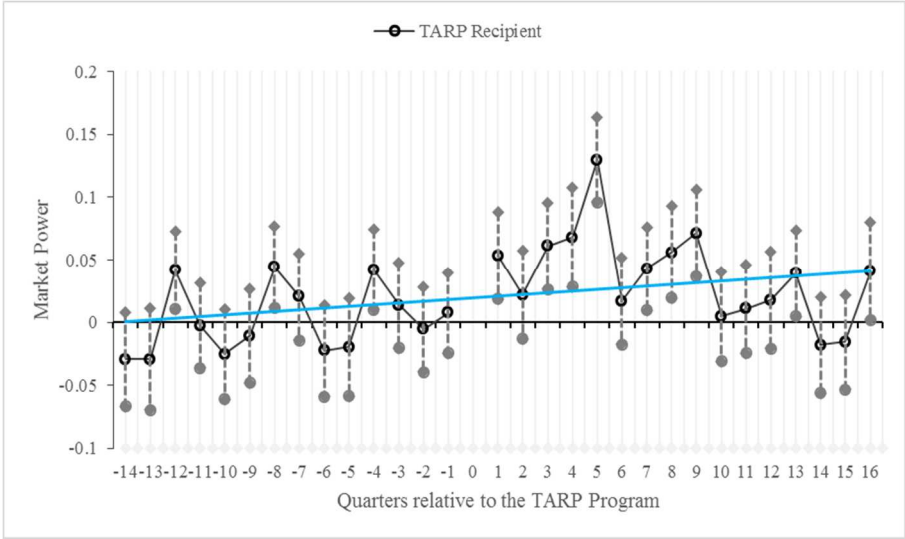


**Figure 4.2: The Dynamic Impacts of TARP on Bank Market Share and Market Power**

Graph C. The Dynamic Impacts of TARP on Bank Market Power (TARP Banks that Did and Did Not Repay Early Considered Equally)

Graph C of Figure 4.2 plots the DID coefficients for the dynamic impact of TARP on bank market power, adjusted for seasonality (represented by small circles), with their 95% confidence intervals (represented by the dashed lines) and trend (represented by the solid straight line). We consider all TARP banks equally. DID coefficients are created by interacting the *TARP Recipient* variable with quarter dummies for each of the time periods before and after the TARP program.

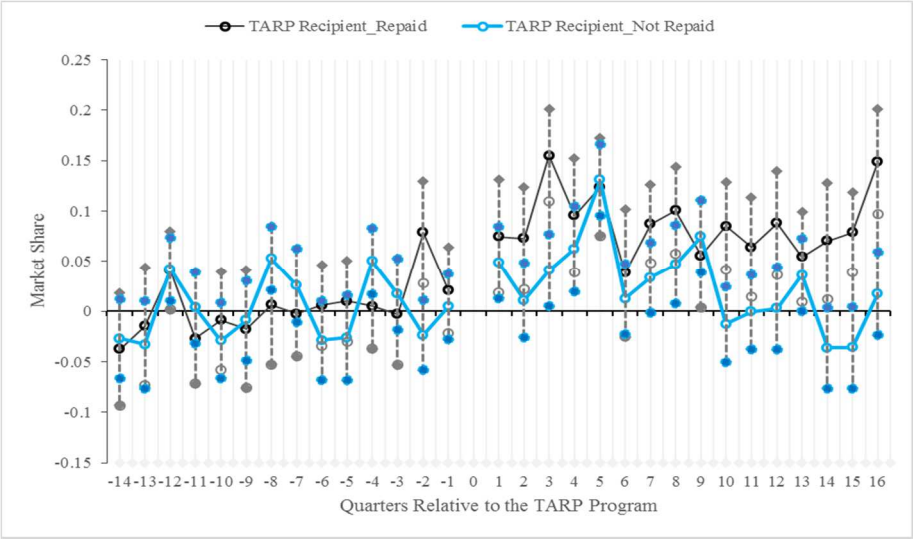


**Figure 4.2: The Dynamic Impacts of TARP on Bank Market Share and Market Power**

Graph D. The Dynamic Impacts of TARP on Bank Market Power (TARP Banks that Repaid Early vs. Those that Did Not)

Graph D of Figure 4.2 plots the DID coefficients for the dynamic impact of TARP on bank market power, adjusted for seasonality (represented by small circles), with their 95% confidence intervals (represented by the dashed lines). We separate the TARP recipients that repaid early (TARP Recipient_Repaid) from those that did not (TARP Recipient_Not Repaid). DID coefficients are created by interacting the *TARP Recipient* variable with quarter dummies for each of the time periods before and after the TARP program.

## Table 4.1: Definitions and Summary Statistics

This table reports summary statistics for the full US bank sample. This table reports summary statistics of the variables for the full US bank sample. All variables are constructed via aggregation of all the banks in the BHC at the holding company level if the BHC has more than one commercial bank owned. Otherwise, the data for the commercial bank is retained. All variables using dollar amounts are expressed in real 2012:Q4 dollars using the implicit GDP price deflator.

**Variable Definitions and Summary Statistics for the Full Sample (2005-2012)**

| ***Type*** | ***Variable*** | ***Definition*** | ***Mean*** | ***Median*** | ***Std*** | ***N*** |
|---|---|---|---|---|---|---|
| ***Competition Variables*** *(Source: Call Reports and Summary of Deposits)* | *Local Market Share Assets* | Bank's GTA local market share, measured as the bank's average market share given the weight of the bank deposits in each local market. GTA equals total assets plus the allowance for loan and the lease losses and the allocated transfer risk reserve. | 0.049 | 0.014 | 0.099 | 178,604 |
| | *Local Market Share Loans* | Bank's total loans local market share, measured as the bank's average market share given the weight of the bank deposits in each local market. | 0.048 | 0.014 | 0.094 | 178,604 |
| | *Local Market Share Deposits* | Bank's total deposits local market share, measured as the bank's average market share given the weight of the bank deposits in each local market. | 0.027 | 0.009 | 0.060 | 178,604 |
| | *Local Market Share Uninsured Deposits* | Bank's total uninsured deposits local market share, measured as the bank's average market share given the weight of the bank deposits in each local market. Uninsured deposits are calculated as discussed in Footnote 25 in the text. | 0.040 | 0.009 | 0.095 | 178,278 |
| | *Lerner GTA* | A proxy for the bank level competition measured as the observed price-cost margin for total assets. A bank in perfect price competition would have an index value of 0 and thus no market power (as *Price* = *MC*) and a bank that has market power will show a positive index value. | 0.051 | 0.098 | 0.358 | 178,604 |
| | *Price* | A subcomponent of *Lerner GTA,* represents average price of bank activities and is a proxy for market power in the loan market. | 0.015 | 0.015 | 0.003 | 178,604 |
| | *MC* | A subcomponent of *Lerner GTA*, a proxy for the cost of funding (among other costs). | 0.014 | 0.013 | 0.005 | 178,604 |

| *Type* | *Variable* | *Definition* | *Mean* | *Median* | *Std* | *N* |
|---|---|---|---|---|---|---|
| ***TARP Variables*** *(Source: US Department of the Treasury)* | *TARP Recipient* | A dummy variable which takes a value of 1 if the bank was provided TARP capital support. | 0.097 | 0.000 | 0.297 | 178,604 |
| | *TARP Recipient_Not Repaid* | A dummy taking a value of 1 if the bank did not repay in 2009-2010. | 0.079 | 0.000 | 0.270 | 178,604 |
| | *TARP Recipient_Repaid* | A dummy taking a value of 1 if the bank repaid in 2009-2010. | 0.018 | 0.000 | 0.133 | 178,604 |
| | *Bailout Amount/GTA* | A ratio of the bank dollar bailout support over bank GTA; a larger value indicates a higher degree of TARP support. | 0.003 | 0.000 | 0.009 | 178,604 |
| | *Bailout Amount/Risk-Weighted Assets* | A ratio of the bank dollar bailout support over bank risk-weighted assets; a larger value indicates a higher degree of TARP support. | 0.003 | 0.000 | 0.014 | 178,604 |
| | *Post TARP* | An indicator equal to 1 in 2009 -2012 and 0 in 2005-2008. Similar to Sosyura and Durchin(2012) but using an extended time period. | 0.501 | 1.000 | 0.500 | 178,604 |
| ***Control Variables*** *(Source: Call Reports, Summary of Deposits, Bank List with Corrective Actions, Federal Housing Finance Agency website, US Census Bureau, FOIA Request of the Federal Reserve)* | *CAMELS Proxy: Capital Adequacy* | Capitalization ratio, defined as equity capital divided by GTA. Capital adequacy refers to the amount of a bank's capital relative to its assets. Broadly, this criterion evaluates the extent to which a bank can absorb potential losses. | 0.109 | 0.099 | 0.048 | 178,604 |
| | *CAMELS Proxy: Asset Quality* | Asset quality evaluates the overall condition of a bank's portfolio and is typically evaluated by a fraction of nonperforming assets and assets in default. Noncurrent loans and leases are loans that are past due for at least ninety days or are no longer accruing interest. Higher proportion of nonperforming assets indicates lower asset quality. | 0.003 | 0.000 | 0.008 | 178,604 |
| | *CAMELS Proxy: Management Quality* | A dummy taking a value of -1 if a bank had a corrective action by the corresponding banking regulator (FED, FDIC, and OCC) during the quarter. | -0.005 | 0.000 | 0.074 | 178,604 |
| | *CAMELS Proxy: Earnings (ROA)* | Return on assets (ROA), measured as the ratio of the annualized net income to GTA. | 0.017 | 0.018 | 0.045 | 178,604 |
| | *CAMELS Proxy: Liquidity* | Cash divided by bank total deposits. | 0.137 | 0.051 | 14.400 | 178,604 |
| | *CAMELS Proxy: Sensitivity to Market Risk* | The sensitivity to interest rate risk, defined as the ratio of the absolute difference (gap) between short-term assets and short-term liabilities to GTA. | 0.130 | 0.105 | 0.107 | 178,604 |
| | *Bank Size* | The log value of GTA. | 12.053 | 11.917 | 1.339 | 178,604 |

| *Type* | *Variable* | *Definition* | *Mean* | *Median* | *Std* | *N* |
|---|---|---|---|---|---|---|
| ***Control Variables (cont.)*** | *Bank Age* | Age (in years) of the bank or the oldest bank owned by the bank holding company. | 76.263 | 81.000 | 66.913 | 178,604 |
| | *DWTAF* | A dummy that takes a value of 1 if a bank received discount window loans and/or Term Auction Facility (TAF) funding during the crisis. | 0.237 | 0.000 | 0.425 | 178,604 |
| | *Merger* | A dummy that takes a value of 1 from the time that the bank acquired another institution and 0 otherwise. | 0.219 | 0.000 | 0.414 | 178,604 |
| | *BHC* | A dummy that takes a value of 1 if the entity is a bank holding company (BHC). | 0.863 | 1.000 | 0.940 | 178,604 |
| | *Listed* | A dummy that takes a value of 1 if bank is listed on a stock exchange or is part of a bank holding company that is listed on a stock exchange. | 0.068 | 0.000 | 0.252 | 178,604 |
| | *Metropolitan* | A dummy that takes a value of 1 when the majority of bank deposits (50% or more) are in metropolitan areas and 0 otherwise. | 0.672 | 1.000 | 0.469 | 178,604 |
| | *HHI Deposits* | A measure of bank concentration, measured by the Herfindahl-Hirschman Deposits Index determined using the bank deposit data from the FDIC Summary of Deposits. Higher values show greater market concentration. | 1162.678 | 1041.415 | 883.522 | 178,604 |
| | *Branches/GTA* | A measure of organizational complexity defined as the ratio of the number of branches over GTA multiplied by 1000. | 0.029 | 0.024 | 0.022 | 178,604 |
| ***Instrumental Variables: Political & Regulatory*** *(Sources: Center for Responsive Politics, House of Representatives, Federal Reserve Bank of Philadelphia website, Execucomp, SEC EDGAR DEF14A Filings, etc.)* | *Subcommittee on Financial Institutions or Capital Markets* | A dummy variable which takes a value of 1 if a firm is headquartered in a district of a House member, who served on the Capital Markets Subcommittee or the Financial Institutions Subcommittee of the House Financial Services Committee in 2008 or 2009. | 0.088 | 0.000 | 0.227 | 167,112 |
| | *Democrat* | A dummy variable which takes a value of 1 if a bank's local Representative was a Democrat in the 2007-2008 campaign election cycle. | 0.429 | 0.000 | 0.495 | 167,112 |
| | *Fed Director* | A dummy that equals 1 if a bank's director sat on the board of directors of a Federal Reserve Bank (FRB) or of a branch of a FRB in 2008 or 2009. | 0.013 | 0.000 | 0.112 | 167,112 |
| | *CEO Compensation* | A dummy variable that takes a value of 1 if bank's CEO had a total compensation greater than $500,000 in 2008. | 0.030 | 0.000 | 0.172 | 167,112 |
| | *Excess CEO Compensation* | The log of the 1 plus the excess of $500,000 of CEO total compensation in 2008. | 0.185 | 0.000 | 1.081 | 167,112 |
| | *Coincident_Index (weighted)* | A state macro growth index calculated as a weighted average of the changes in the Philadelphia Fed's state coincident indexes from December 2007 to December 2010 with the share of the deposits of a given bank taken as weights. | -0.771 | -0.759 | 0.358 | 167,112 |

## Table 4.2: Effects of TARP on Bank Competition: Main Results

This table reports estimates from difference-in-difference (DID) regression estimates for analyzing the impact of TARP on competition in Panel A. The measures of competitive advantage are *Market Share* (proxied by *Local Market Share Assets*) and *Market Power* (proxied by *Lerner GTA*). *TARP Recipient* is a dummy variable equal to one if the bank was provided TARP capital support, *Post TARP* is a dummy equal to one in 2009-2012, the period after TARP program initiation. *TARP Recipient_Repaid* is a dummy equal to one if the bank repaid in 2009-2010. *TARP Recipient_Not Repaid* is a dummy equal to one if the bank did not repay in 2009-2010. All models include time fixed effects. The estimation results are for 2005-2012. Panel B shows the tests of equality for the effects of TARP for two types of TARP banks: TARP banks that repaid early and TARP banks that did not. All variables are defined in Table 1. *, **, and *** denote significance at 10%, 5%, and 1% level.

**Panel A: Regression Parameters**

| **Dependent Variable:** | ***Market Share*** | | ***Market Power*** | |
|---|---|---|---|---|
| **Independent Variables:** | **(1)** | **(2)** | **(3)** | **(4)** |
| ***TARP Recipient*** | -0.013*** | | -0.023*** | |
| | (-15.283) | | (-6.726) | |
| ***Post TARP x TARP Recipient*** | 0.005*** | | 0.038*** | |
| | (4.117) | | (9.135) | |
| ***TARP Recipient_Not Repaid*** | | -0.014*** | | -0.023*** |
| | | (-16.485) | | (-6.183) |
| ***TARP Recipient_Repaid*** | | -0.008*** | | -0.015** |
| | | (-3.162) | | (-2.538) |
| ***Post TARP x TARP Recipient_Not Repaid*** | | 0.003*** | | 0.029*** |
| | | (2.998) | | (6.007) |
| ***Post TARP x TARP Recipient_Repaid*** | | 0.011*** | | 0.083*** |
| | | (3.240) | | (10.703) |
| ***Capital Adequacy*** | -0.051*** | -0.052*** | 2.008*** | 2.004*** |
| | (-13.991) | (-14.205) | (36.809) | (36.744) |
| ***Asset Quality*** | -0.043** | -0.049** | -0.811*** | -0.837*** |
| | (-1.990) | (-2.251) | (-6.749) | (-6.956) |
| ***Management Quality/Regulatory Action*** | 0.006** | 0.006** | 0.205*** | 0.204*** |
| | (2.510) | (2.393) | (14.955) | (14.864) |
| ***Earnings(ROA)*** | 0.146*** | 0.145*** | 3.096*** | 3.093*** |
| | (25.974) | (25.831) | (39.949) | (39.916) |
| ***Liquidity*** | 0.000*** | 0.000*** | -0.000 | -0.000 |
| | (5.944) | (6.065) | (-0.616) | (-0.614) |
| ***Sensitivity to Market Risk*** | -0.019*** | -0.019*** | -0.155*** | -0.155*** |
| | (-9.621) | (-9.641) | (-16.046) | (-16.068) |
| ***DWTAF*** | 0.000 | 0.000 | -0.020*** | -0.020*** |
| | (0.468) | (0.597) | (-12.040) | (-11.910) |
| ***Bank Size*** | -0.006*** | -0.006*** | 0.015*** | 0.014*** |
| | (-25.136) | (-26.357) | (16.147) | (15.341) |
| ***Bank Age*** | 0.000*** | 0.000*** | 0.000*** | 0.000*** |
| | (21.847) | (21.796) | (29.573) | (29.499) |
| ***Merger*** | -0.011*** | -0.011*** | -0.002 | -0.002 |
| | (-22.835) | (-22.587) | (-1.440) | (-1.105) |

| | | | | |
|---|---|---|---|---|
| ***BHC*** | -0.004*** | -0.004*** | -0.019*** | -0.019*** |
| | (-17.954) | (-17.980) | (-18.582) | (-18.512) |
| ***Listed*** | -0.015*** | -0.015*** | 0.023*** | 0.020*** |
| | (-21.702) | (-22.507) | (6.930) | (6.122) |
| ***Metropolitan*** | -0.035*** | -0.035*** | -0.049*** | -0.048*** |
| | (-42.497) | (-42.440) | (-29.017) | (-28.851) |
| ***HHI Deposits*** | 0.000*** | 0.000*** | 0.000*** | 0.000*** |
| | (65.261) | (65.270) | (3.674) | (3.645) |
| ***Branches/GTA*** | -0.737*** | -0.741*** | -0.923*** | -0.936*** |
| | (-64.501) | (-64.685) | (-16.768) | (-16.964) |
| ***Constant*** | 0.099*** | 0.101*** | -0.845*** | -0.837*** |
| | (31.860) | (33.128) | (-56.676) | (-55.667) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 178,604 | 178,604 | 178,604 | 178,604 |
| ***Adjusted R-squared*** | 0.219 | 0.219 | 0.452 | 0.452 |

**Panel B: Tests of the Equality of the Effects of TARP for the Two Types of TARP Banks**

| | ***Market Share*** | ***Market Power*** |
|---|---|---|
| ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 2.245** | 6.141*** |

## Table 4.3: Effects of TARP on Bank Competition: Lerner Index Decomposition

This table reports estimates from difference-in-difference (DID) regression estimates for the impact of TARP on *Lerner GTA* components: *Price* (price of bank GTA) and *MC* (marginal cost). The regression estimates are reported in Panel A. *TARP Recipient* is a dummy variable equal to one if the bank was provided TARP capital support, *Post TARP* is a dummy equal to one in 2009-2012, the period after TARP program initiation. *TARP Recipient_Repaid* is a dummy equal to one if the bank repaid in 2009-2010. *TARP Recipient_Not Repaid,* which is a dummy equal to one if the bank did not repay in 2009-2010. The estimation results are for 2005-2012. All models include time fixed effects. Panel B shows the tests of equality for the effects of TARP for two types of TARP banks: TARP banks that repaid early and TARP banks that did not. All variables are defined in Table 1. Robust *t*-statistics are reported in parentheses. *, **, and *** denote significance at 10%, 5%, and 1% level.

**Panel A: Regression Parameters**

| **Dependent Variable: Lerner Components** | | | | |
|---|---|---|---|---|
| | ***Price*** | | ***MC*** | |
| **Independent Variables:** | **(1)** | **(2)** | **(3)** | **(4)** |
| ***TARP Recipient*** | 0.00024*** | | 0.00061*** | |
| | (12.085) | | (15.126) | |
| ***Post TARP x TARP Recipient*** | -0.00023*** | | -0.00068*** | |
| | (-7.954) | | (-13.665) | |
| ***TARP Recipient_Not Repaid*** | | 0.00029*** | | 0.00068*** |
| | | (13.580) | | (15.681) |
| ***TARP Recipient_Repaid*** | | 0.00004 | | 0.00021** |
| | | (0.874) | | (2.437) |
| ***Post TARP x TARP Recipient_Not Repaid*** | | -0.00031*** | | -0.00068*** |
| | | (-9.898) | | (-12.352) |
| ***Post TARP x TARP Recipient_Repaid*** | | 0.00011* | | -0.00074*** |
| | | (1.686) | | (-6.656) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 178,604 | 178,604 | 178,604 | 178,604 |
| ***Adjusted R-squared*** | 0.540 | 0.540 | 0.508 | 0.508 |

**Panel B: Tests of the Equality of the Effects of TARP for the Two Types of TARP Banks**

| | ***Price*** | ***MC*** |
|---|---|---|
| ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 5.750*** | 0.469 |

## Table 4.4: Effects of TARP on Bank Competition – Instrumental Variable Analysis

This table shows difference-in-difference (DID) regression estimates for analyzing the impact of TARP on competition using an instrumental variable approach as in Wooldridge Section 18.4.1. We use as instruments several political and regulatory connections variables: *Subcommittee on Financial Institutions or Capital Markets, Democrat, Fed Director, CEO Compensation,* and the *Coincident Index (weighted)*. *Subcommittee on Financial Institutions or Capital Markets* is a dummy which takes a value of 1 if a firm is headquartered in a district of a House member, who served on the Capital Markets Subcommittee or the Financial Institutions Subcommittee of the House Financial Services Committee in 2008 or 2009. *Democrat* is a dummy which takes a value of 1 if a bank's local Representative was a Democrat in the 2007-2008 campaign election cycle. *Fed Director* is a dummy that equals 1 if a bank's director sat on the board of directors of a Federal Reserve Bank (FRB) or of a branch of a FRB in 2008 or 2009. *CEO Compensation* is a dummy variable that takes a value of 1 if bank's CEO had a total compensation greater than 500,000 in 2008. *Coincident Index (weighted)* is a state macro growth index calculated as a weighted average of the changes in the Philadelphia Fed's state coincident indexes from December 2007 to December 2010 with the share of the deposits of a given bank taken as weights. The measures of competitive advantage are *Market Share* (proxied by *Local Market Share Assets*) and *Market Power* (proxied by *Lerner GTA*). *TARP Recipient* is a dummy equal to one if the bank was provided TARP capital support, *Post TARP* is a dummy equal to one in 2009-2012, the period after TARP program initiation. *TARP Recipient_Repaid* is a dummy equal to one if the bank repaid in 2009-2010. *TARP Recipient_Not Repaid,* is a dummy equal to one if the bank did not repay in 2009-2010. All models include time fixed effects. Panel A reports first stage results. Panel B reports second stage regression estimates. The estimation results are for 2005-2012. Panel C reports the tests of equality for the effects of TARP on two types of TARP banks: TARP banks that repaid early and TARP banks that did not. All variables are defined in Table 1. Robust *t*-statistics are reported in parentheses. *, **, and *** denote significance at 10%, 5%, and 1% level.

**Panel A: IV First Stage as in Wooldridge (Section 18.4.1)**

| | First Stage (Probit Model) | | |
|---|---|---|---|
| **Dependent Variable:** | ***TARP Recipient*** | ***TARP Recipient_Not Repaid*** | ***TARP Recipient_Repaid*** |
| **Independent Variables:** | **(1)** | **(2)** | **(3)** |
| ***Subcommitee on Financial Institutions or Capital Markets*** | 0.110*** | 0.098*** | 0.132*** |
| | (5.719) | (4.977) | (3.488) |
| ***Democrat*** | 0.039*** | 0.035*** | 0.063*** |
| | (4.087) | (3.475) | (3.503) |
| ***FED Director*** | 0.353*** | -0.078** | 0.466*** |
| | (11.338) | (-2.036) | (11.399) |
| ***CEO Compensation*** | | -0.504*** | 0.741*** |
| | | (-17.264) | (21.465) |
| ***Coincident_Index (weighted) (state-level economic conditions)*** | | -0.045*** | 0.105*** |
| | | (-3.271) | (4.339) |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 167,112 | 167,112 | 167,112 |
| ***Pseudo R-squared*** | 0.2469 | 0.1832 | 0.3444 |

**Panel B: IV Second Stage as in Wooldridge (Section 18.4.1)**

| Second Stage (IV 2SLS) | | | | |
|---|---|---|---|---|
| **Dependent Variable:** | ***Market Share*** | | ***Market Power*** | |
| **Independent Variables:** | **(1)** | **(2)** | **(3)** | **(4)** |
| ***TARP Recipient*** | 0.036*** | | 0.090* | |
| | (4.191) | | (1.933) | |
| ***Post TARP x TARP Recipient*** | 0.014*** | | 0.062*** | |
| | (4.471) | | (4.854) | |
| ***TARP Recipient_Not Repaid*** | | 0.219*** | | -0.264** |
| | | (8.489) | | (-2.385) |
| ***TARP Recipient_Repaid*** | | 0.102*** | | -0.093* |
| | | (6.840) | | (-1.799) |
| ***Post TARP x TARP Recipient_Not Repaid*** | | -0.028*** | | 0.040 |
| | | (-3.092) | | (1.301) |
| ***Post TARP x TARP Recipient_Repaid*** | | 0.037*** | | 0.185*** |
| | | (3.468) | | (7.643) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 167,112 | 167,112 | 167,112 | 167,112 |
| ***Adjusted R-squared*** | 0.205 | 0.090 | 0.450 | 0.435 |
| ***First Stage F-test*** | 349.545*** | 40.348*** | 349.545*** | 40.348*** |

**Panel C: Tests of the Equality of the Effects of TARP for the Two Types of TARP Banks**

| | ***Market Share*** | ***Market Power*** |
|---|---|---|
| ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 3.900*** | 2.937*** |

## Table 4.5: Effects of TARP on Bank Competition: Propensity Score Matched Sample Analysis

This table reports difference-in-difference (DID) regression estimates for analyzing the impact of TARP on competition in Panel A and Panel B. We use three different propensity score matched samples: Nearest-neighbor Matching: N=1, Nearest-neighbor Matching: N=2, and Nearest-neighbor Matching: N=3. The measures of competitive advantage are *Market Share* (proxied by *Local Market Share Assets*) and *Market Power* (proxied by *Lerner GTA*). *TARP Recipient* is a dummy variable equal to one if the bank was provided TARP capital support, *Post TARP* is a dummy equal to one in 2009-2012, the period after TARP program initiation. *TARP Recipient_Repaid* is a dummy equal to one if the bank repaid in 2009-2010. *TARP Recipient_Not Repaid,* which is a dummy equal to one if the bank did not repay in 2009-2010. All models include time fixed effects. The estimation results are for 2005-2012. Panel C reports the tests of equality for the effects of TARP for two types of TARP banks: TARP banks that repaid early and TARP banks that did not. All variables are defined in Table 1. Robust *t*-statistics are reported in parentheses. *, **, and *** denote significance at 10%, 5%, and 1% level.

**Panel A: Market Share**

| | **Dependent Variable: *Market Share*** | | | | | |
|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| **Independent Variables:** | **Nearest-neighbor Matching: N=1** | | **Nearest-neighbor Matching: N=2** | | **Nearest-neighbor Matching: N=3** | |
| ***TARP Recipient*** | -0.014*** | | -0.014*** | | -0.014*** | |
| | (-10.263) | | (-12.685) | | (-13.723) | |
| ***Post TARP x TARP Recipient*** | 0.004** | | 0.004** | | 0.004*** | |
| | (2.347) | | (2.464) | | (2.930) | |
| ***TARP Recipient_Not Repaid*** | | -0.014*** | | -0.015*** | | -0.015*** |
| | | (-10.985) | | (-13.788) | | (-15.066) |
| ***TARP Recipient_Repaid*** | | -0.009*** | | -0.009*** | | -0.008*** |
| | | (-3.699) | | (-3.582) | | (-3.324) |
| ***Post TARP x TARP Recipient_Not Repaid*** | | 0.003 | | 0.002* | | 0.003** |
| | | (1.587) | | (1.649) | | (2.062) |
| ***Post TARP x TARP Recipient_Repaid*** | | 0.011*** | | 0.010*** | | 0.011*** |
| | | (3.045) | | (2.885) | | (3.020) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 31,222 | 31,222 | 42,159 | 42,159 | 51,073 | 51,073 |
| ***Adjusted R-squared*** | 0.120 | 0.121 | 0.135 | 0.136 | 0.138 | 0.139 |

**Panel B: Market Power**

| Dependent Variable: *Market Power* | | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **Independent Variables:** | **Nearest-neighbor Matching: N=1** | | **Nearest-neighbor Matching: N=2** | | **Nearest-neighbor Matching: N=3** | |
| ***TARP Recipient*** | -0.010** | | -0.010** | | -0.012*** | |
| | (-2.160) | | (-2.576) | | (-3.222) | |
| ***Post TARP x TARP Recipient*** | 0.014** | | 0.017*** | | 0.020*** | |
| | (2.270) | | (3.245) | | (4.180) | |
| ***TARP Recipient_Not Repaid*** | | -0.011** | | -0.012*** | | -0.014*** |
| | | (-2.396) | | (-2.809) | | (-3.411) |
| ***TARP Recipient_Repaid*** | | 0.000 | | 0.001 | | -0.001 |
| | | (0.055) | | (0.127) | | (-0.123) |
| ***Post TARP x TARP Recipient_Not Repaid*** | | 0.007 | | 0.011* | | 0.014*** |
| | | (1.152) | | (1.899) | | (2.710) |
| ***Post TARP x TARP Recipient_Repaid*** | | 0.046*** | | 0.048*** | | 0.050*** |
| | | (5.169) | | (5.772) | | (6.190) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 31,222 | 31,222 | 42,159 | 42,159 | 51,073 | 51,073 |
| ***Adjusted R-squared*** | 0.489 | 0.490 | 0.495 | 0.496 | 0.497 | 0.497 |

**Panel C: Tests of the Equality of the Effects of TARP for the Two Types of TARP Banks**

| | | ***Market Share*** | ***Market Power*** |
|---|---|---|---|
| **Nearest-neighbor Matching: N=1** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 2.427** | 4.484*** |
| **Nearest-neighbor Matching: N=2** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 2.261** | 4.310*** |
| **Nearest-neighbor Matching: N=3** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 2.261** | 4.110*** |

## Table 4.6: Effects of TARP on Bank Competition: Placebo Experiments

This table reports difference-in-difference (DID) regression estimates for analyzing the impact of TARP on competition in Panel A and Panel B. In Panel A, we use a placebo experiment, in which we fictionally assume that the TARP participation took place four years earlier and we still distinguish between banks that received TARP and those that did not and banks that repaid early versus those that did not according to their "true" TARP program. Accordingly, we define *Placebo Post TARP* as a dummy equal to one in 2005-2008, the period after the fictional TARP program initiation. We run the regressions by using the placebo-sample (2001-2008). The measures of competitive advantage are *Market Share* (proxied by *Local Market Share Assets*) and *Market Power* (proxied by *Lerner GTA*). *TARP Recipient* is a dummy variable equal to one if the bank was provided TARP capital support, *Placebo Post TARP* is a dummy equal to one in 2005-2008, the period after the fictional TARP program initiation. In Panel B, we use a placebo experiment in ehich we allocate the TARP treatment randomly to banks and report regression estimates with boot-strapped confidence intervals using 1000 replications. *TARP Recipient_Repaid* is a dummy equal to one if the bank repaid early in the true TARP program. *TARP Recipient_Not Repaid,* which is a dummy equal to one if the bank did not repay early in the true TARP program. All models include time fixed effects. Panel C reports the tests of equality for the effects of TARP for two types of TARP banks: TARP banks that repaid early and TARP banks that did not. Robust *t*-statistics are reported in parentheses. *, **, and *** denote significance at 10%, 5%, and 1% level.

**Panel A: Regression Parameters (TARP Assumed to Take Place Four Years Earlier)**

| **Dependent Variable:** | ***Market Share*** | | ***Market Power*** | |
|---|---|---|---|---|
| **Independent Variables:** | **(1)** | **(2)** | **(3)** | **(4)** |
| ***TARP Recipient*** | -0.001 | | -0.024*** | |
| | (-1.609) | | (-8.227) | |
| ***Placebo Post TARP x TARP Recipient*** | -0.011*** | | 0.003 | |
| | (-10.112) | | (0.860) | |
| ***TARP Recipient_Not Repaid*** | | -0.001 | | -0.028*** |
| | | (-1.167) | | (-8.919) |
| ***TARP Recipient_Repaid*** | | -0.002 | | -0.007 |
| | | (-1.318) | | (-1.188) |
| ***Placebo Post TARP x TARP Recipient_Not Repaid*** | | -0.012*** | | 0.004 |
| | | (-10.235) | | (0.979) |
| ***Placebo Post TARP x TARP Recipient_Repaid*** | | -0.009*** | | 0.003 |
| | | (-3.139) | | (0.394) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 195,256 | 195,256 | 194,783 | 194,783 |
| ***Adjusted R-squared*** | 0.257 | 0.257 | 0.436 | 0.437 |

**Panel B: Regression Parameters (Random Assignment of the Banks to the TARP Treatment)**

| **Dependent Variable:** | ***Market Share*** | | ***Market Power*** | |
|---|---|---|---|---|
| **Independent Variables:** | **(1)** | **(2)** | **(3)** | **(4)** |
| ***TARP Recipient*** | -0.001 | | 0.001 | |
| | (-0.781) | | (0.208) | |
| ***Placebo Post TARP x TARP Recipient*** | 0.000 | | 0.003 | |
| | (0.029) | | (0.633) | |
| ***TARP Recipient_Not Repaid*** | | -0.001 | | -0.000 |
| | | (-0.710) | | (-0.087) |
| ***TARP Recipient_Repaid*** | | -0.001 | | 0.005 |
| | | (-0.323) | | (0.716) |
| ***Placebo Post TARP x TARP Recipient_Not Repaid*** | | 0.000 | | 0.001 |
| | | (0.050) | | (0.288) |
| ***Placebo Post TARP x TARP Recipient_Repaid*** | | -0.000 | | 0.009 |
| | | (-0.036) | | (0.959) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 178,604 | 178,604 | 178,604 | 178,604 |
| ***Adjusted R-squared*** | 0.218 | 0.218 | 0.452 | 0.452 |

**Panel C: Tests of the Equality of the Effects of TARP for the Two Types of TARP Banks**

| | | ***Market Share*** | ***Market Power*** |
|---|---|---|---|
| **Placebo Experiment (TARP Is Assumed to Have Taken Place Four Years Earlier)** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 0.141 | 0.933 |
| **Placebo Experiment (Random Assignment of the Banks to the TARP Treatment)** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 0.000 | 0.728 |

## Table 4.7: Alternative Measures of TARP Support

This table reports estimates from difference-in-difference (DID) regression estimates for the impact of TARP on competition using an alternative measures for TARP Support: *Bailout Amount/GTA* and *Bailout Amount/ Risk-Weighted Assets* in Panel A. The measures of competitive advantage are *Market Share* (proxied by *Local Market Share Assets*) and *Market Power* (proxied by *Lerner GTA*). *TARP Recipient* is a dummy variable equal to one if the bank was provided TARP capital support, *Post TARP* is a dummy equal to one in 2009-2012, the period after TARP program initiation. *TARP Recipient_Repaid* is a dummy equal to one if the bank repaid in 2009-2010. *TARP Recipient_Not Repaid,* which is a dummy equal to one if the bank did not repay in 2009-2010. All models include time fixed effects. Estimation results are for 2005-2012. Panel B reports the tests of equality for the effects of TARP on the two types of TARP banks: TARP banks that repaid early and TARP banks that did not. All variables are defined in Table 1. Robust *t*-statistics are reported in parentheses. *, **, and *** denote significance at 10%, 5%, and 1% level.

**Panel A: Regression Parameters**

| | ***Bailout Amount / GTA*** | | | | ***Bailout Amount / Risk-Weighted Assets*** | | | |
|---|---|---|---|---|---|---|---|---|
| **Dependent Variable:** | ***Market Share*** | | ***Market Power*** | | ***Market Share*** | | ***Market Power*** | |
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** | **(8)** |
| **Independent Variables:** | | | | | | | | |
| ***TARP Recipient*** | -0.290*** | | -0.536*** | | -0.162*** | | -0.710*** | |
| | (-13.064) | | (-2.947) | | (-7.984) | | (-3.989) | |
| ***Post TARP x TARP Recipient*** | 0.156*** | | 0.968*** | | 0.109*** | | 0.806*** | |
| | (3.994) | | (4.617) | | (3.853) | | (4.258) | |
| ***TARP Recipient_Not Repaid*** | | -0.279*** | | -0.528*** | | -0.163*** | | -0.716*** |
| | | (-12.166) | | (-2.644) | | (-7.796) | | (-3.686) |
| ***TARP Recipient_Repaid*** | | -0.327*** | | -0.444** | | -0.105* | | -0.506*** |
| | | (-5.364) | | (-2.080) | | (-1.652) | | (-3.057) |
| ***Post TARP x TARP Recipient_Not Repaid*** | | 0.033 | | 0.556** | | 0.046 | | 0.603*** |
| | | (0.818) | | (2.304) | | (1.482) | | (2.811) |
| ***Post TARP x TARP Recipient_Repaid*** | | 0.714*** | | 2.774*** | | 0.538*** | | 2.200*** |
| | | (6.909) | | (9.081) | | (5.433) | | (9.427) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 178,604 | 178,604 | 178,604 | 178,604 | 178,604 | 178,604 | 178,604 | 178,604 |
| ***Adjusted R-squared*** | 0.219 | 0.219 | 0.451 | 0.452 | 0.218 | 0.219 | 0.452 | 0.452 |

**Panel B: Tests of the Equality of the Effects of TARP for the Two Types of TARP Banks**

| | | ***Market Share*** | ***Market Power*** |
|---|---|---|---|
| ***Bailout Amount / GTA*** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 6.250*** | 5.829*** |
| ***Bailout Amount / Risk-Weighted Assets*** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 4.787*** | 5.175*** |

## Table 4.8: Alternative Measures of Market Share

This table reports difference-in-difference (DID) regression estimates for the impact of TARP on competition using an alternative measures for market share: *Local Market Share Loans, Local Market Share Deposits,* and *Local Market Share Uninsured Deposits*. The regression estimates are reported in Panel A. The measures of competitive advantage are *Market Share* (proxied by *Local Market Share Loans, Local Market Share Deposits*, and *Local Market Share Uninsured Deposits*). *TARP Recipient* is a dummy variable equal to one if the bank was provided TARP capital support, *Post TARP* is a dummy equal to one in 2009-2012, the period after TARP program initiation. *TARP Recipient_Repaid* is a dummy equal to one if the bank repaid in 2009-2010. *TARP Recipient_Not Repaid,* which is a dummy equal to one if the bank did not repay in 2009-2010. All models include time fixed effects. The estimation results are for 2005-2012. Panel B reports the tests of equality for the effects of TARP on two types of TARP banks: TARP banks that repaid early and TARP banks that did not. All variables are defined in Table 1. Robust *t*-statistics are reported in parentheses. *, **, and *** denote significance at 10%, 5%, and 1% level.

**Panel A: Regression Parameters**

| **Dependent Variable:** | ***Local Market Share Loans*** | | ***Local Market Share Deposits*** | | ***Local Market Share Uninsured Deposits*** | |
|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| **Independent Variables:** | | | | | | |
| ***TARP Recipient*** | -0.012*** | | -0.008*** | | -0.010*** | |
| | (-14.260) | | (-18.247) | | (-12.198) | |
| ***Post TARP x TARP Recipient*** | 0.003*** | | 0.002*** | | 0.002** | |
| | (3.027) | | (3.958) | | (2.143) | |
| ***TARP Recipient_Not Repaid*** | | -0.011*** | | -0.007*** | | -0.011*** |
| | | (-12.816) | | (-16.506) | | (-13.586) |
| ***TARP Recipient_Repaid*** | | -0.013*** | | -0.009*** | | -0.006** |
| | | (-8.083) | | (-10.508) | | (-2.254) |
| ***Post TARP x TARP Recipient_Not Repaid*** | 0.001* | 0.001* | 0.002*** | 0.002*** | | 0.000 |
| | (1.766) | (1.780) | (5.487) | (5.495) | | (0.141) |
| ***Post TARP x TARP Recipient_Repaid*** | | 0.002* | | 0.001* | | 0.013*** |
| | | (1.721) | | (1.728) | | (3.285) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***Observations*** | 178,603 | 178,603 | 178,604 | 178,604 | 178,278 | 178,278 |
| ***Adjusted R-squared*** | 0.215 | 0.215 | 0.298 | 0.298 | 0.211 | 0.212 |

**Panel B: Tests of the Equality of the Effects of TARP for the Two Types of TARP Banks**

| | ***Local Market Share Loans*** | ***Local Market Share Deposits*** | ***Local Market Share Uninsured Deposits*** |
|---|---|---|---|
| ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 2.796*** | 4.549*** | 3.191*** |

## Table 4.9: Alternative Econometric Models

This table reports difference-in-difference (DID) regression estimates for the impact of TARP on competition using alternative econometric models: bank fixed effects, bank random effects, and a model with standard errors clustered at the bank level in Panel A. The measures of competitive advantage are *Market Share* (proxied by *Local Market Share Assets*) and *Market Power* (proxied by *Lerner GTA*). *TARP Recipient* is a dummy variable equal to one if the bank was provided TARP capital support, *Post TARP* is a dummy equal to one in 2009-2012, the period after TARP program initiation. *TARP Recipient_Repaid* is equal to one if the bank repaid in 2009-2010. *TARP Recipient_Not Repaid,* which is a dummy equal to one if the bank did not repay in 2009-2010. All models include time fixed effects. The estimation results are for 2005-2012. Panel B reports the tests of equality for the effects of TARP on two types of TARP banks: TARP banks that repaid early and TARP banks that did not. All variables are defined in Table 1. For the bank fixed effects, (1)-(4), we report adjusted R-squared and for the bank random effects, (5)-(8), R-squared. Robust *t*-statistics are in parentheses. *, **, and *** denote significance at 10%, 5%, and 1% level.

**Panel A: Regression Parameters**

| | **Bank Fixed Effects** | | | | **Bank Random Effects** | | | | **Clusters by Bank** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dependent Variable:** | ***Market Share*** | | ***Market Power*** | | ***Market Share*** | | ***Market Power*** | | ***Market Share*** | | ***Market Power*** | |
| **Independent Variables:** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** | **(8)** | **(9)** | **(10)** | **(11)** | **(12)** |
| ***TARP Recipient*** | | | | | -0.027*** | | -0.043*** | | -0.013*** | | -0.023*** | |
| | | | | | (-8.013) | | (-5.714) | | (-4.174) | | (-3.557) | |
| ***Post TARP x TARP Recipient*** | 0.004*** | | 0.024*** | | 0.005*** | | 0.038*** | | 0.005*** | | 0.038*** | |
| | (9.949) | | (5.706) | | (3.862) | | (4.753) | | (2.662) | | (5.438) | |
| ***TARP Recipient_Not Repaid*** | | | | | | -0.029*** | | -0.043*** | | -0.014*** | | -0.023*** |
| | | | | | | (-9.181) | | (-5.504) | | (-4.490) | | (-3.386) |
| ***TARP Recipient_Repaid*** | | | | | | -0.017* | | -0.034** | | -0.008 | | -0.015 |
| | | | | | | (-1.732) | | (-2.284) | | (-0.845) | | (-1.197) |
| ***Post TARP x TARP Recipient_Not Repaid*** | | 0.004*** | | 0.012** | | 0.004*** | | 0.026*** | | 0.003* | | 0.029*** |
| | | (7.465) | | (2.533) | | (2.877) | | (2.803) | | (1.691) | | (3.551) |
| ***Post TARP x TARP Recipient_Repaid*** | | 0.008*** | | 0.078*** | | 0.008*** | | 0.094*** | | 0.011*** | | 0.083*** |
| | | (9.677) | | (10.178) | | (4.161) | | (7.361) | | (3.398) | | (6.892) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** | **No** | **No** | **No** | **No** | **No** | **No** | **No** | **No** |
| ***Bank Random Effects*** | **No** | **No** | **No** | **No** | **Yes** | **Yes** | **Yes** | **Yes** | **No** | **No** | **No** | **No** |
| ***Observations*** | 178,604 | 178,604 | 178,604 | 178,604 | 178,604 | 178,604 | 178,604 | 178,604 | 178,604 | 178,604 | 178,604 | 178,604 |
| ***R-squared (or Adjusted R-squared)*** | 0.882 | 0.882 | 0.610 | 0.610 | 0.257 | 0.257 | 0.419 | 0.4187 | 0.219 | 0.219 | 0.452 | 0.452 |
| ***No. Clusters*** | | | | | | | | | 7333 | 7333 | 7333 | 7333 |

**Panel B: Tests of the Equality of the Effects of TARP for the Two Types of TARP Banks**

| | | ***Market Share*** | ***Market Power*** |
|---|---|---|---|
| ***Bank Fixed Effects*** | ***t*-stat**: Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 4.463*** | 7.625*** |
| ***Bank Random Effects*** | ***t*-stat**: Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 1.789* | 4.513*** |
| ***Clusters by Bank*** | ***t*-stat**: Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 2.166** | 3.839*** |

# CHAPTER 5

## OVERALL CONCLUSIONS

This dissertation investigates corporate governance, internationalization, and government bailouts in banking. The robust findings of three essays add to the banking and corporate finance literatures.

In the first essay in Chapter 2, we use a unique hand-collected dataset on shareholder activism (SEC Filings: 13D and DFAN14A) for all listed commercial banks and bank holding companies (BHCs) in the US over the period 1994-2010, we explore several the following research questions: 1) is there a role for shareholder activism for banking?, and if so, 2) what do activists do to change the focus of the targeted banks, and 3) are they a stabilizing or destabilizing force?. We focus on three conflicts arising among bank stakeholders: *Shareholder-Manager Conflict 1* (managers take less risk than desired by shareholders due to risk aversion), *Shareholder-Manager Conflict 2* (managers take more risk than desired by shareholders due to overconfidence and/or hubris), and *Shareholder-Creditor Conflict* (activists induce managers to take higher risk to increase returns at the expense of bank creditors (deposit insurers, taxpayers, regulators, etc.), given creditors' difficulty in monitoring and regulatory-induced incentives.

We find that activism is important in banking: about one third of our banks have some form of activism during the sample period and activists appear to target banks with

agency problems and growth potential that are easy in which to implement changes to increase value. We find that shareholder activism creates value for shareholders but has little impact on operating returns and increases bank default risk, consistent with the Hypothesis 3, the *Shareholder-Creditor Conflict*. This suggests that activism may be generally a destabilizing force. However, we find that activism differs significantly during financial crises, resulting in higher market value and no increase in risk, suggesting that shareholder activism may not be a major source of risk during crises. From a public standpoint, government loses during normal times, but not during financial crises.

The paper contributes primarily to two strands of research. First, it contributes to the broader literature on shareholder activism by examining activism within one important industry rather than across a number of very different industries, which reduces the concern about confounding inter-industry differences. Although researchers point to the shareholder return benefits resulting from activism, our results suggest that other additional effects of activism, such the increase in risk, should not be neglected. Second, this paper also adds to the literature on bank risk and performance by introducing shareholder activism as a factor influencing risk and performance and sets the groundwork for further research on shareholder activism in banking. The current topic is important especially from a government policy perspective because poor governance may aggravate financial system fragility to shocks and pose systemic risk to the real economy (Laeven and Levine (2009), Kirkpatrick (2009), G30 Steering Committee on Corporate Governance (2011), Song and Li (2012)) and is regarded as a possible important contributing factor to the recent financial crisis. In addition, shareholder activism may be regarded with skepticism. Our findings suggest that activists in banking may increase risk and market value at the expense of

creditors and may be a threat to financial stability. These results have important implications for policies targeting bank governance and regulation of activism in banking.

The second essay, in Chapter 3, offers the first assessment of the role of internationalization on bank risk using US bank data. We find strong, robust evidence that the more internationalized the bank, the higher the risk. We use a number of different measures of internationalization and risk, employ various econometric procedures to control for potential endogeneity and sample selection biases, and consider different subsamples of the data. The data persistently suggest that internationalization is associated with higher bank risk, consistent with the empirical dominance of the *market risk hypothesis* over the *diversification hypothesis*. This effect seems to be more pronounced during financial crises, particularly market crises.

Our finding that internationalization is associated with higher risk raises the question of why banks internationalize. One potential explanation is higher returns, but our results seem to contradict this explanation, given that we find lower mean profitability for internationalized banks. Second, banks may become international as part of a defensive strategy to follow their important customers abroad by setting up offices in countries where their home country customers have foreign affiliates to avoid losing their clients' business (e.g., Brimmer and Dahl, 1975; Goldberg and Saunders, 1981; Grosse and Goldberg, 1991; Brealey and Kaplanis, 1996). This strategy might not translate into large enough financial benefits to offset the costs of internationalization. A third potential explanation is empire building by bank managers (e.g., Jensen and Meckling, 1976, Jensen, 1986, Roll, 1986, Stulz, 1990). Managers that grow the bank through international activities may gain higher salaries and/or more prestige than domestic bank managers. This may occur if there are

significant agency problems in banking, particularly if these agency problems are intensified by international diversification (e.g., Laeven and Levine, 2007). We put this last explanation to test and we find that the positive relation between internationalization and bank risk is consistently stronger for banks that more likely to have severe agency problems, supporting the empire-building explanation.

This paper contributes primarily to two related strands of research. First, it adds to the literature on bank risk by introducing internationalization as a factor influencing risk and sets the groundwork for further research on bank internationalization. Although some policymakers, practitioners, and researchers point to the benefits of geographical risk diversification resulting from the internationalization of banks, our results suggest that this effect is dominated by other factors. Specifically, our results suggest that the additional local market risks taken on following international expansion outweigh the benefits of diversification. Second, this paper contributes to the broader internationalization literature by examining risk within one important industry rather than across a number of very different industries with their confounding differences. After controlling for endogeneity and other possible explanations for our results, we continue to find that bank internationalization is associated with a higher risk in an industry in which risk is highly monitored by bank supervisors as well as shareholders and debt holders. These findings suggest that authorities might consider internationalization as an additional factor in bank supervision and regulation.

The third essay, in Chapter 4, conducts an empirical assessment of the TARP injections on bank competition and investigates whether TARP may have given its recipients competitive advantages. Our difference-in-difference (DID) regression analysis

yields several important results: 1) TARP recipients did get competitive advantages and increased both their market share and market power relative to non-TARP recipients, consistent with the empirical dominance of Hypothesis H1a over Hypothesis H1b and Hypothesis H2a over Hypothesis H2b. 2) Results point to the likelihood that the positive market share and market power findings may be driven primarily by the *safety channel* (TARP banks may be perceived as safer), which is partially offset by the *cost disadvantage channel* (TARP funds may be relatively expensive). Thus, the *safety channel* and the *cost disadvantage channel* are the most important to explain the results. 3). The competitive advantages are primarily or entirely due to TARP recipients that repaid early, suggesting that these banks significantly reduced the importance of the *cost disadvantage channel* and increased the importance of the *safety channel*, consistent with Hypothesis H3.

Overall, our results suggest that TARP may have resulted in a possible distortion in competition, which may have misallocated resources, and may help explain other findings in the literature on the effects of TARP on bank risk and bank lending. First, our findings may help explain the results in the literature that TARP increased risk for the large banks (Black and Hazelwood, forthcoming; Duchin and Sosyura, forthcoming) and decreased risk for the small banks (Black and Hazelwood, forthcoming). As discussed above, results in the literature suggest that a nonmonotonic effect of market power on risk may have been in effect during the crisis period – higher market power may be associated with higher risk for banks at high levels of market power, while higher market power may be associated with lower risk at low levels of market power (Martinez-Miera and Repullo, 2010; Berger, Imbierowicz and Rauch, 2013). Given that large (small) banks typically have

higher (lower) levels of market power, TARP may have led to an increase (decrease) in risk for large (small) banks.

Our results also may help explain the findings in the literature that TARP resulted in reduced or no change in lending by large banks (Black and Hazelwood, forthcoming; Duchin and Sosyura, forthcoming) and increased lending by small banks (Black and Hazelwood, forthcoming; Li, forthcoming). According to the standard structure-conduct-performance hypothesis, an increase in market power should lead to a reduced supply of credit. However, for relationship borrowers, the supply of credit may be increased by larger market share and larger market power because limits on competition help banks force implicit contracts with relationship borrowers that result in greater credit availability (e.g., Sharpe, 1990; Petersen and Rajan, 1995). This may help explain the increase in lending by small banks which tend to specialize in relationship lending, and the decrease or no change in lending by the large banks, which more often engage in transactional lending (Berger, Miller, Petersen, Rajan and Stein, 2005).

In terms of policy implications, determination about which banks to be bailed out should rely on a comprehensive analysis of both benefits and costs. Some but not all of these costs and benefits, competition, risk taking, and lending, may be evaluated based on our results and those in the literature. Based on the findings for these three effects, any bailouts may be focused primarily on the small banks, where the effects seem to be less distortionary and more toward the public interest, since the increase in market share and market power is the least, risk may be decreased, and lending may be increased. However, in regards to the other major benefit of bailouts, increasing the stability of the financial system, presumably the benefits would be greater for the large banks. However, also the

distortions in competition may be greater, and risk taking and lending implications may be less favorable. Therefore, policymakers should balance all these different effects.

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# APPENDIX A FOR CHAPTER 2

## VARIABLE DEFINITIONS AND SOURCES

| Variable | Definition | Source |
|---|---|---|
| **Panel A1. Dependent Variables** | | |
| **A1.1 Financial Performance** | | |
| *TOBIN's Q* | A measure of financial performance determined as market value of common stock over equity book value. | Authors' calculation based on Compustat data |
| *BUY-AND-HOLD_RET* | Buy-and-hold stock return over the previous 4 quarters. | Authors' calculation based on CRSP data |
| *BUY-AND-HOLD_AB_RET* | Buy-and-hold abnormal stock return over the previous 4 quarters. | Authors' calculation based on CRSP data |
| *SHARPE RATIO* | Ratio of stocks returns over standard deviation of stock returns over the previous 4 quarters. | Authors' calculation based on CRSP data |
| **A1.2 Operating returns** | | |
| *ROA* | Return on assets (ROA), measured as the ratio of the annualized net income to GTA. | Authors' calculation based on Call Report data |
| *ROE* | Return on equity (ROE), measured as the ratio of the annualized net income to total equity. | Authors' calculation based on Call Report data |
| **A1.3 Risk-taking** | | |
| *Z-SCORE* | A measure of financial risk: the bank-level Z-index determined as A(ROA)+ A(EQ/TA) / Std_ROA; a larger value indicates higher overall bank risk. Averages of ROA and EQ/TA as well as the standard deviation of ROA are computed over the previous 4 quarters. | Authors' calculation based on Call Report data |
| *LLA RATIO* | A Measure of bank risk defined as loan loss allowance over GTA, with higher values indicating more bank risk. | As above |
| *NPL RATIO* | Fraction of nonperforming loans and loans in default from GTA. Noncurrent loans and leases are loans that are past due for at least ninety days or are no longer accruing interest. Higher proportion of nonperforming assets indicates lower asset quality. | As above |

| Variable | Definition | Source |
|---|---|---|
| **A1.3 Risk-taking (cont.)** | | |
| *VOLATILITY ROA* | For each quarter, the standard deviation of ROA is calculated as the quarterly standard deviation over the previous 4 quarters. ROA is determined as the ratio of net operating income over gross total assets (GTA). | Authors' calculation based on CRSP data |
| *VOLATILITY_STOCK_RET* | The volatility of daily returns for each calendar year. | As above |
| **Panel A2. Shareholder Activism Variables** | | |
| *ACTIVISM* | A dummy variable which takes a value of 1 if there is shareholder activism targeting the bank during the quarter. | Authors' calculation based on SEC EDGAR 13D and DFAN 14A Filings. |
| *NO_ACTIVISM_EVENTS* | Number of activism events for the bank during the quarter. | As above |
| *HF_ACTIVIST* | A dummy variable which takes a value of 1 the activist targeting the bank during the quarter is a hedge fund. | Authors' calculation based on Bloomberg Markets Magazine, Wikipedia, individual Google searches |
| **Panel A2. Shareholder Activism Variables (cont.)** | | |
| *NON_HF_ACTIVIST* | A dummy variable which takes a value of 1 the activist targeting the bank during the quarter is not a hedge fund. | Authors' calculation based on Bloomberg Markets Magazine, Wikipedia, individual Google searches |
| *13D* | A dummy variable which takes a value of 1 if there is 13D shareholder activism targeting the bank during the quarter. | As above |
| *DFAN14A* | A dummy variable which takes a value of 1 if there is DFAN14A (proxy statements) shareholder activism targeting the bank during the quarter. | As above |
| **Panel A3. Main Control Variables** | | |
| *BANK SIZE* | The log value of bank GTA. | Authors' calculation based on Call Report data |
| *BANK AGE* | Age (in years) of the oldest bank owned by the bank holding company. | As above |
| *DEPOSITS / GTA* | Measure of the composition of bank liabilities determined as total total deposits over GTA. | As above |

| Variable | Definition | Source |
|---|---|---|
| **Panel A3. Main Control Variables (cont.)** | | |
| *LOANS / GTA* | Measure of the composition of bank assets side determined as total total loans over GTA. | As above |
| *INCOME_DIVERSITY* | Measure of diversity defined as 1 minus the absolute value of the ratio between difference between net interest income and other operating income and total operating income. | As above |
| *OVERHEAD_COSTS* | A proxy of the bank's cost structure determined as the ratio of overhead expenses to assets. | As above |
| *FOREIGN_OWNERSHIP* | A dummy is equal to 1 when foreign shareholdings exceed 50% of total bank ownership. | Authors' calculation based on Call Report data |
| *OCC SUPERVISOR* | A dummy variable taking a value of 1 for national banks that are supervised by OCC. | As above |
| *FDIC SUPERVISOR* | A dummy variable taking a value of 1 for state non-member banks that are supervised by FDIC. | As above |
| *FRS SUPERVISOR* | A dummy variable taking a value of 1 for state banks that are members of the Federal Reserve System. | As above |
| **Panel A4. Instrumental Variable** | | |
| *% BUSY ACTIVISTS* | Percent % busy activists, that is, activists with five or more campaigns and/or 2 or more proxy fights at the same time. | Authors' calculation based on SEC EDGAR 13D and DFAN 14A Filings. |
| **Panel A5. Other Variables** | | |
| *TBTF* | Too-big-to-fail, a dummy variable which takes a value of 1 in all quarters when the banks has GTA greater or equal to 100 Billion. | Authors' calculation based on Call Report data |
| *FINANCIAL_CRISES* | A dummy variable which takes a value of 1 for a financial crisis period and 0 otherwise | Authors' calculation based on Call Report data |
| *GROWTH* | The growth rate of real bank gross total assets (GTA). | Authors' calculation based on Call Report data |
| *CAPITALIZATION RATIO* | The bank level capitalization ratio measured as equity capital over GTA. Capital adequacy refers to the amount of a bank's capital relative to its GTA. Broadly, this criterion evaluates the extent to which a bank can absorb potential losses. | Authors' calculation based on Call Report data |
| *DIVYLD* | Dividend yield, defined as (common dividend + preferred dividends)/(market value of common stocks + book value of preferred). | Authors' calculation based on COMPUSTAT data |

| Variable | Definition | Source |
|---|---|---|
| **Panel A5. Other Variables (cont.)** | | |
| *INST OWNERSHIP* | The proportion of shares held by institutions. | Authors' calculation based on Thompson Institutional Dataset |
| *AMIHUD* | The Amihud (2002) measure of trading illiquidity determined as the yearly average (using daily data) of 1000*sqrt(\|return\|/dollar trading volume), with lower values meaning more liquidity. | Authors' calculation based on CRSP data |
| *NUMBER OF ANALYSTS* | The number of analysts covering the company. | Authors' calculation based on I/B/E/S data |
| *BRANCHES / GTA* | A measure of organizational complexity defined as the ratio of total bank branches over GTA. Banks that have more branches per dollar of assets are more complex. | As above |
| *NO_STATES* | A measure of organizational structure defined as the log of the number of states in which the bank has branches. Banks that are active in multiple states have more complex organizational structures that cover longer distances. | As above |
| *METROPOLITAN* | A dummy variable that takes a value of 1 when the majority of bank deposits (50% or more) are in MSA areas and 0 otherwise. | As above |
| *CASH_HOLDINGS* | Cash holdings divided by GTA. | Authors' calculation based on Call Report data |
| *HHI DEPOSITS* | A measure of bank concentration, measured by the Herfindahl-Hirschman Deposits Index determined using the bank deposit data. Higher values show greater market concentration. | Authors' calculation based on Summary of Deposits data |
| *INCORP_DE* | A dummy variable equal to 1 if the bank is incorporated in the state of Delaware. | Authors' calculation based on COMPUSTAT data |
| *BIG_4 AUDITOR* | A dummy variable equal to one if the firm hires a Big Four auditor, and zero otherwise. | As above |

# APPENDIX B FOR CHAPTER 2

## OTHER ROBUSTNESS TESTS

### B.1 Other Potentially Omitted Correlated Variable

One potential concern is that unobserved determinants of market value, operating performance, and bank risk would cause them to appear in the error term, and if these omitted variables are correlated with our included explanatory variable, there is an endogeneity problem which could bias our results. Although we saturate the main regressions with several bank level controls to alleviate the concern of correlated omitted variables, we examine whether our earlier results are sensitive to adding more controls for other determinants of bank market value, operating performance, and risk. These controls are *BHC INDICATOR* (a dummy which takes a value of 1 if bank is owned by a bank holding company (BHC) or is a BHC itself), *MERGERS* (a dummy equal to one from the moment that the bank itself or its immediate parent acquired another institution), *WRITEOFF_INDICATOR* (a dummy variable which is equal to one if past acquisitions and/or capital expenditures are written off as in Helwege, Intintoli, and Zhang (2012)), *MBS/GTA* (ratio of mortgage-backed securities (MBS) to GTA as reported on the balance sheet as in Berger, Imbierowicz and Rauch (2014)), *COMMERCIAL REAL ESTATE LOANS* (*c*ommercial real estate divided by GTA as in Berger and Bouwman (2013)),

*CASH_HOLDINGS* (ratio of cash holding over GTA), and *HHI DEPOSITS* (Herfindahl-Hirschman deposits index, a proxy for the local market concentration). The results reported in Table B.1 Panel A columns (1)-(3) indicate that adding the above controls does not materially affect our previous findings.

In addition, to mitigate the concern that other governance indicators may influence the effectiveness of shareholder activists in implementing changes in the target banks, we conduct also tests in which we include four other governance controls. *INST OWNERSHIP* is the ratio of the total institutional share holdings to total bank outstanding shares and *LONG-TERM INST OWNERSHIP* is the ratio of total long-term holdings by institutions to total bank outstanding shares. For both measures, a lower ownership ratio would indicate less monitoring by institutions. *NUMBER BLOCKHOLDERS* is the number of institutions holdings 5% or more ownership, and *NUMBER OF ANALYSTS* is a measure of analyst coverage, which is the number of stock analysts providing earnings forecasts for the bank in each quarter as per I/B/E/S and a lower number of analysts would indicate less monitoring by analysts.[119] The results reported in Table B.1 Panel A models (4)-(6) indicate that adding the above controls does not materially affect our previous findings.

**B.2 Including LexisNexis News**

Our activism data presented in the analysis covers all SEC registrants who have either filed an Schedule 13D[120] – often referred to as a "beneficial ownership report and its amendments Schedule 13D/A (if there is any material change in the facts disclosed in the

[119] Because a large number of banks do not have information reported in I/B/E/S, we include in the estimation also the variable *NUMBER OF ANALYSTS NOT IN IBES* to account for this.

[120] Securities and Exchange Act of 1934 Rule §240.13d provides details on the SEC registrants and requirements.

initial SC 13D (shares owned, discussions with management, etc.) – or DFAN 14A for proxy fights with management. These are generally including shareholders who acquire greater than a 5% stake in the company.

Given the amount of capital that is needed to acquire a 5% stake in a large-cap company, the previously collected filings could bias the sample toward smaller targets. At very large firms, some pension funds could have engaged in activism with a less than 5% stake in the company.[121] To incorporate activism events that were not accompanied by Schedule 13D or DFAN 14A, we collect information about such events through news searches in LexisNexis for our top 100 banks in each time period in terms of total assets using a general search with the company current name and any previous names (where information is available) and any and various combinations of the following keywords: "activism" or "activist investor" or "dissident investor" or "activist shareholder" or "group of concerned shareholders" or "shareholder activism" or "hedge fund activist" or "hedge fund activism" or "institutional activism" or "activist campaign" or "investor campaign." The searches were limited to the sample period of 1994 to 2010. This retrieves news articles for 140 unique entities. Results vary and range from 2 pages to 3,415 pages of news for one single entity. We manually look at each of the cases to check the relevance of the results and exclude news that include the company, but contain activism about a different company in the article, that are only social activists pleading for several social causes and not investor activists, and any others that are not true activists and cannot be deemed to be an event. In some cases, we further check the completeness of the news searches using the

[121] A recent article in The New York Times (November 28, 2013, http://dealbook.nytimes.com/2013/11/28/some-big-public-pension-funds-are-behaving-like-activist-investors/) shows that some of the biggest public pension funds, which have sought to influence companies for years, are now starting to emulate the activist investors by engaging with, and sometimes seeking to oust, directors of companies whose stock they own.

DEF 14A report to check if the investor appears in the shareholder proposals section. Our analysis deems 98 news results as not relevant and finds 42 with new relevant results that sometimes belong to several companies as some of the pension funds may target several banks at the same time. This generates 96 events the majority (~85%) of which has a pension fund as an activist such as California Public Employees' Retirement System (CalPERS), American Federation of State, County and Municipal Employees (AFSCME), several pension funds in the New York State Retirement System, Connecticut Retirement Plans and Trust Funds (CRPTF), United Brotherhood of Carpenters and Joiners of America Pension Fund, The Laborers' International Union of North America (LIUNA), American Federation of Labor and Congress of Industrial Organizations (AFL-CIO).[122]

We add these new events to our sample and incorporate them in our *ACTIVISM* variable and re-estimate our results to understand whether our results may be impacted by these investors with stake less than 5% that may behave as activists. We present the results in Table B.2 Panels A-C. Panel A and Panel B show that our main results and the results for financial crises versus normal times continue to hold and are not affected by the addition of these new events. Panel C provides a more detailed view of the effects of these events from LexisNexis compared to SC 13D and DFAN14A filings. It shows that effects of these activists are generally weaker and potentially more negative on performance, which may be due to both the fact that many of the proposals that pension funds put forward may not be successful and also due to their limited power because of their small stake in the companies. Our results are consistent with Wahal (1996), which studies the efficacy of

[122] We impose no limitation to the percentage of shares owned as many times this information is not available in the LexisNexis news. In few cases, we are able to retrieve the ownership from the DEF 14A report when the shareholder appears in the Shareholder Proposals section and for those cases the share ownership is small, many times < 1%.

pension fund activism and impact on performance and find no evidence of long-term improvements in either stock price or accounting measures of performance in the post-targeting period. However, these events do not tend to increase risk, so the ***Shareholder-Creditor Conflict*** is potentially not in effect for them.

**B.3 Channels of Activism Based on Demands**

Table B.3 details the effects of activism by channels of action. Thus, the *ACTIVISM* measure is broken down into the seven different demands that activists declare in the13D filing. We create dummies for each of these demands and include them in our regression analysis to better understand channels of action based on activist demands. In this context, activist demands for a particular event are being represented by the most predominant objective. Secondary objectives are ignored.

First, we look at the effect of activism on market value, represented by *TOBIN's Q*. We find that activists increase bank market performance via an array of actions ranging from capital structure changes (e.g., financing, stock repurchases), operating and corporate strategic structure changes (spin-off, divestiture, M&A) to internal corporate governance changes (changes in board composition, CEO, compensation, removal of poison pill, declassified board etc.). In addition, market tends to perceive proxy fights filed by shareholders positively as we tend to see a boost in the value of the firm due to expected improvements within the firm once shareholders may win these conflicts.

Second, we look at the impact of activism on operating returns, as measured by ROA. The minimal impact found in the main analysis is consistent across the various channels. The one exception is proxy fights, which show a negative impact on operating

returns. Results indicate that proxy fights initiated by activists may be costly for the firm and may consume resources, which may be materialized in poor accounting results.

Third, we analyze the impact on bank risk. As expected, almost all of the activism channels generate an increase in risk consistent with ***Manager-Shareholder Conflict 1*** and ***Shareholder-Creditor Conflict***, but to a lesser extent engage management and strategic changes actions (insignificant). The most severe decreases in *Z-score* come from proxy fights.

## Table B.1: Other Potentially Omitted Correlated Variables

This table reports the regression estimates of the relation between the shareholder activism of US Commercial banks and financial performance (*TOBIN's Q*), operating returns (*ROA*), and risk taking (*Z-SCORE*) using several models that include additional possible omitted variables to account for the potential omitted correlated variables bias. We define the main activism measure (*ACTIVISM*) as a dummy, which takes a value of 1 in all quarters in which the bank had material activist events. The bank-level *Z-SCORE* is a measure of financial risk and it is determined as A (ROA) + A(EQ/TA) / Std_ROA; a larger value indicates lower overall bank risk. *ROA* is operating net income over GTA. We use an OLS model with time and bank FE. All independent variables are lagged 4 quarters. The sample period runs from t = 1994 to t = 2010. Please see Appendix A for details on the definitions and determination of all variables utilized in the regressions. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

| | ***TOBIN'S Q*** | ***ROA*** | ***Z-SCORE*** | ***TOBIN'S Q*** | ***ROA*** | ***Z-SCORE*** |
|---|---|---|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| ***ACTIVISM*** | 0.005*** | -0.000 | -4.421*** | 0.004** | -0.000 | -4.181*** |
| | (3.099) | (-1.506) | (-3.029) | (2.418) | (-1.469) | (-2.865) |
| ***BHC INDICATOR*** | 0.028*** | 0.001*** | -4.013 | 0.026*** | 0.001*** | -3.097 |
| | (6.395) | (2.758) | (-1.459) | (5.639) | (3.003) | (-1.132) |
| ***MERGERS*** | 0.009 | -0.001 | 5.312 | 0.008 | -0.001 | 5.564 |
| | (1.594) | (-1.428) | (1.546) | (1.446) | (-1.533) | (1.600) |
| ***WRITEOFF_INDICATOR*** | -0.034 | -0.001** | -10.497*** | -0.034 | -0.001** | -10.515*** |
| | (-1.448) | (-2.222) | (-4.959) | (-1.456) | (-2.198) | (-4.948) |
| ***MBS/GTA*** | 0.100*** | 0.002*** | 4.943 | 0.097*** | 0.002*** | 6.062 |
| | (3.791) | (3.063) | (0.791) | (3.735) | (3.084) | (0.971) |
| ***COMMERCIAL REAL ESTATE LOANS*** | 0.050*** | 0.000 | -28.212*** | 0.051*** | 0.000 | -28.518*** |
| | (3.177) | (0.182) | (-4.147) | (3.176) | (0.179) | (-4.188) |
| ***CASH_HOLDINGS*** | 0.109** | -0.000 | -13.978 | 0.109** | -0.000 | -13.018 |
| | (2.450) | (-0.226) | (-1.298) | (2.428) | (-0.207) | (-1.203) |
| ***HHI DEPOSITS*** | -0.009 | 0.001 | 28.813*** | -0.005 | 0.001 | 27.761*** |
| | (-0.448) | (1.142) | (3.751) | (-0.257) | (0.866) | (3.588) |
| ***INST OWNERSHIP*** | | | | 0.013 | 0.001*** | 6.328** |
| | | | | (1.269) | (3.656) | (2.170) |

| | | | | | | |
|---|---|---|---|---|---|---|
| ***LONG-TERM INST OWNERSHIP*** | | | | -0.047*** | -0.002*** | 15.773** |
| | | | | (-2.829) | (-3.202) | (2.230) |
| ***NUMBER BLOCKHOLDERS*** | | | | 0.003 | -0.000*** | -1.422*** |
| | | | | (1.413) | (-3.536) | (-3.224) |
| ***NUMBER OF ANALYSTS*** | | | | -0.003*** | 0.000 | 0.678*** |
| | | | | (-2.799) | (0.777) | (5.105) |
| ***NUMBER OF ANALYSTS_NOT_IN_IBIS*** | | | | -0.004** | 0.000 | 2.460*** |
| | | | | (-2.037) | (1.042) | (2.966) |
| ***Previous Controls*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,128 | 22,584 | 22,514 | 22,094 | 22,549 | 22,479 |
| ***R-squared*** | 0.878 | 0.608 | 0.473 | 0.879 | 0.609 | 0.474 |

## Table B.2: Shareholder Activism during Normal Times and Financial Crises (including LexisNexis News)

This table reports the regression estimates of the relation between the shareholder activism of US Commercial banks and financial performance (*TOBIN's Q*), operating returns (*ROA*), and risk taking (*Z-SCORE*) during normal times and during crises versus normal times. We define the main activism measure (*ACTIVISM*) as a dummy, which takes a value of 1 in all quarters in which the bank had material activist events. The bank-level *Z-SCORE* is a measure of financial risk and it is determined as A (ROA) + A(EQ/TA) / Std_ROA; a larger value indicates lower overall bank risk. *ROA* is operating net income over GTA. We use an OLS model with time and bank FE. All independent variables are lagged 4 quarters. *FINANCIAL_CRISES* variable construction follows Berger and Bouwman (2013). *FINANCIAL_CRISES*[123] is a dummy variable which takes a value of 1 for a crisis period and it includes both market (those originated in the capital markets) and banking crises (those originated in the banking sector). Panel A reports effects of activism during financial crises. The sample period runs from t = 1994 to t = 2010. Please see Appendix A for details on the definitions and determination of all variables utilized in the regressions. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

**Panel A: Main Effects (including LexisNexis News)**

| | ***TOBIN'S Q*** | ***ROA*** | ***Z-SCORE*** |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***ACTIVISM*** | **0.004**** | **-0.000** | **-3.571***** |
| | **(2.521)** | **(-1.349)** | **(-2.700)** |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,832 | 23,976 | 23,812 |
| ***R-squared*** | 0.875 | 0.604 | 0.472 |

[123] Banking crisis is the recent subprime lending crisis and market crises are the Russian debt crisis plus LTCM bailout in 1998, and the bursting of the dot.com bubble plus September 11. Normal times is a dummy variable which takes a value of 1 for all time periods that are not financial crises.

**Panel B: Effects during Financial Crises (including LexisNexis News)**

| | *TOBIN'S Q* | *ROA* | *Z-SCORE* |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***ACTIVISM*** | 0.001 | -0.000 | -8.385*** |
| | (0.358) | (-1.347) | (-5.252) |
| ***ACTIVISM * FINANCIAL_CRISES*** | 0.008** | 0.000 | 10.542*** |
| | (2.449) | (0.443) | (4.505) |
| ***(ACTIVISM + ACTIVISM * FINANCIAL_CRISES)*** | **0.009*** ** | **0.000** | **2.157** |
| ***t*-stat (*ACTIVISM + ACTIVISM * FINANCIAL_CRISES* = 0)** | **3.292** | **0.566** | **1.118** |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,821 | 23,965 | 23,801 |
| ***R-squared*** | 0.875 | 0.604 | 0.472 |

**Panel C: Effects by Filing Type**

| | *TOBIN'S Q* | *ROA* | *Z-SCORE* |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***LexisNexis News*** | **-0.022*** ** | **-0.001*** | **8.133** |
| | **(-2.996)** | **(-1.931)** | **(1.577)** |
| ***DFAN14A*** | **0.005** | **0.000** | **-14.962*** ** |
| | **(0.987)** | **(0.625)** | **(-4.157)** |
| ***13D*** | **0.008*** ** | **-0.000** | **-4.798*** ** |
| | **(4.928)** | **(-0.494)** | **(-3.883)** |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed Effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,821 | 23,965 | 23,801 |
| ***R-squared*** | 0.875 | 0.604 | 0.472 |

| | | | |
|---|---|---|---|
| ***t*-test** for equality of coefficients ***DFAN14A = 13D*** | 0.574 | 0.748 | **2.793*****|
| ***t*-test** for equality of coefficients ***LexisNexis News = DFAN14A*** | **3.017*****| **1.895*** | **3.670*****|
| ***t*-test** for equality of coefficients ***LexisNexis News = 13D*** | **3.999*****| **1.772*** | **2.443*****|

## Table B.3: Channels of Action for Activists (Based on Demands)

This table reports the OLS regression estimates of the relation between the shareholder activism of US Commercial banks and their financial performance, operating returns, and risk. *ACTIVISM* is a dummy which takes a value of 1 in all quarters in which the bank had material activist events. We show models in which we broke down *ACTIVISM* into its seven activist demands to understand the channels through which activists work: *ENGAGE MANAGEMENT, CAPITAL STRUCTURE, INTERNAL CORPORATE GOVERNANCE, ASSE SALE (STRATEGIC), LITIGATION/BANKRUPTCY, PROXY FIGHT,* and *STRATEGIC CHANGES.* We consider the categories to be exclusive, by keeping the most important reason of the filing and ignoring the secondary reasons. We use an OLS model with time and bank fixed effects. All independent variables are lagged 4 quarters. The sample period runs from t = 1994 to t = 2010. Please see Appendix A, for details on the definitions and determination of all variables utilized in the regressions. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

| | ***TOBIN'S Q*** | ***ROA*** | ***Z-SCORE*** |
|---|---|---|---|
| ***Independent Variables*** | **(1)** | **(2)** | **(3)** |
| ***ENGAGE MANAGEMENT*** | 0.003 | 0.000 | -1.925 |
| | (1.066) | (0.622) | (-0.861) |
| ***STRATEGIC CHANGES*** | **0.031*** ** | -0.000 | 2.269 |
| | **(4.491)** | (-1.219) | (0.876) |
| ***INTERNAL GOVERNANCE*** | **0.019*** ** | 0.000 | **-4.676*** |
| | **(4.520)** | (0.627) | **(-1.904)** |
| ***CAPITAL STRUCTURE*** | **0.012** ** | 0.000 | **-9.942** ** |
| | **(2.444)** | (0.448) | **(-2.375)** |
| ***PROXY FIGHT*** | **0.014*** ** | **-0.001** ** | **-33.054*** ** |
| | **(2.748)** | **(-2.566)** | **(-4.904)** |
| ***ASSET SALE (STRATEGIC)*** | 0.006 | 0.000 | **-15.808*** ** |
| | (1.070) | (0.618) | **(-4.300)** |
| ***LITIGATION/BANKRUPTCY*** | 0.000 | -0.000 | **-5.553*** ** |
| | (0.024) | (-0.693) | **(-2.742)** |
| ***Controls*** | **Yes** | **Yes** | **Yes** |
| ***Time fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Bank Fixed effects*** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 22,819 | 23,963 | 23,799 |
| ***R-squared (or Pseudo)*** | 0.875 | 0.604 | 0.473 |

# APPENDIX C FOR CHAPTER 3

## MODEL DETAILS

We assess the impact of internationalization on risk, that is, the effect of the foreign assets ratio, *w*, on the *Z-score*, that is:

$$\partial Z/\partial w = \frac{\partial\left[\frac{\mu_P + (K/A)}{\sigma_p}\right]}{\partial w}. \tag{C.1}$$

Given that the expected return of the portfolio is:

$$\mu_P = w\mu_F + (1-w)\mu_D, \tag{C.2}$$

and the standard deviation of the portfolio $\sigma_p$ is:

$$\sigma_p = \sqrt{w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D}\,, \tag{C.3}$$

the impact of the foreign assets ratio ($w$) on the $Z$ of the international bank is:

$$\partial \mathrm{Z}/\,\partial \mathrm{w} = \frac{\partial\left[\frac{w\mu_F + (1-w)\mu_D + (K/A)}{\sqrt{w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D}}\right]}{\partial w}. \tag{C.4}$$

Equation (C.4) is equivalent to:

$$\begin{aligned}\partial Z/\partial w = &\frac{\partial\left[\frac{w\mu_F}{\sqrt{w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D}}\right]}{\partial w} \\ &+ \frac{\partial\left[\frac{(1-w)\mu_D}{\sqrt{w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D}}\right]}{\partial w} \\ &+ \frac{\partial\left[\frac{(K/A)}{\sqrt{w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D}}\right]}{\partial w}.\end{aligned} \tag{C.5}$$

After taking the derivatives, we obtain:

$$\partial Z/\partial w = \left[\frac{[(1-w)\sigma_D^2 + w\rho_{FD}\sigma_F\sigma_D]}{[w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D]^{\frac{3}{2}}}\right]\mu_F$$
$$-\left[\frac{[w\sigma_F^2 + (1-w)\rho_{FD}\sigma_F\sigma_D]}{[w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D]^{\frac{3}{2}}}\right]\mu_D \qquad \text{(C.6)}$$
$$-\left[\frac{[w\sigma_F^2 - (1-w)\sigma_D^2 + (1-2w)\rho_{FD}\sigma_F\sigma_D]}{[w^2\sigma_F^2 + (1-w)^2\sigma_D^2 + 2w(1-w)\rho_{FD}\sigma_F\sigma_D]^{\frac{3}{2}}}\right](K/A)\,,$$

which is the same as equation (3.7) in Section 3.2.

# APPENDIX D FOR CHAPTER 4

## LERNER INDEX CALCULATION

We proxy market power by the Lerner Index for GTA, and calculate it as observed price-cost margin divided by price (e.g., Lerner,1933; Brucker, 1970, 1972; Benston, 1972; Fernandez de Guevara, Maudos, and Perez, 2005; Berger, Klapper, and Turk-Ariss, 2009; Jimenez, Lopez, and Saurina, 2010). The *Lerner GTA* is calculated as

$$Lerner\ GTA_{it} = \frac{Price_{it} - MC_{it}}{Price_{it}} \tag{D.1}$$

A firm in perfect competition has an index value of 0 and thus no market power (as *Price* = *MC*), while a firm with market power has a positive index.

We consider $Price_{it}$ as the price of GTA proxied by the ratio of total revenues (interest and non-interest income) to GTA for a bank *i* at a time *t* and $MC_{it}$ represents marginal cost of total assets for a bank *i* at time *t*. In order to get $MC_{it}$ for each bank for each point in time, we take the derivative from the following estimated translog cost function:

$$\ln(Cost_{it}) = \theta_0 + \theta_1 \ln GTA_{it} + \frac{\theta_2}{2} \ln GTA_{it}^{\ 2} + \sum_{k=1}^{3} \gamma_k \ln W_{k,it} + \sum_{k=1}^{3} \phi_k \ln GTA_{it} \ln W_{k,it} + \sum_{k=1}^{3} \sum_{j=1}^{3} \gamma_{kj} \ln W_{k,it} \ln W_{j,it} + \theta_3 Time_t + \mu_{it} \tag{D.2}$$

where *i* represents banks and *t* represents time in quarters, $Cost_{it}$ is total operating plus financial costs, $W_{k,it}$ represents input prices: $W_{1,it}$ is the ratio of personnel expenses to GTA

(proxy for input price of labor), $W_{2,it}$ is the ratio of interest expenses to total deposits and money market funding (proxy for input price of all funds) and $W_{3,it}$ is the ratio of other operating and administrative expenses to GTA (proxy for input price of fixed capital), and $Time_t$ is a vector of time fixed effects. The $W_{k,it}$ are average prices in the market because we want to allow individual banks to have different prices to reflect their individual market power. To construct the input prices $W_{k,it}$, we calculate the weighted average of the input prices for all local markets in which the bank operates, where the weights are the ratios of the deposits of bank $i$ in the local markets over the bank total deposits.[1] Marginal cost for GTA is finally determined as:

$$MC_{it} = \frac{Cost_{it}}{GTA_{it}}\left[\hat{\theta}_1 + \hat{\theta}_2 \ln GTA_{it} + \sum_{k=1}^{3} \hat{\phi}_k \ln W_{k,it}\right] \qquad \text{(D.3)}$$

where the ^'s indicate estimated coefficients.

[1] As an alternative method in unreported results, we construct the weighted average of the input prices using as weights the proportions of branches that banks have in the local markets in which they operate. Results are robust to this alternative method.

# APPENDIX E FOR CHAPTER 4

## OTHER ROBUSTNESS TESTS

### E.1 Effects by Size Classes

As discussed above, size may be a source of economic strength for a bank and could offer a better competitive position on the market, and thus effects of TARP may differ by bank size. We split the banks according to their size in GTA into three different classes: small banks (GTA ≤ $1 billion), medium banks ($1 billion ≤ GTA < $3 billion) and large banks (GTA > $3 billion) and create the following three size dummies: *SMALL, MEDIUM*, and *LARGE*. We interact these size dummies with the *TARP Recipient* dummy and obtain the following interaction terms: *SMALL*TARP Recipient*, *MEDIUM*TARP Recipient, LARGE*TARP Recipient*. We then create interaction terms between the previously obtained variables and our *Post TARP* dummy: *SMALL * TARP Recipient * Post TARP*, *MEDIUM * TARP Recipient * Post TARP*, *LARGE * TARP Recipient * Post TARP*. We similarly create variables for the two types of TARP banks.

We rerun our regressions using these new variables to understand the impact of various class sizes on our results. Table E.1 Panel A, columns (1)-(2) present the results for the market share regressions and Table E.1 Panel A, columns (3)-(4) show the results for market power. Table E.1 Panel B reports results from a test for the equality of coefficients for the two types of TARP recipients. The regressions show that the greater

the bank size, the higher the competitive advantage the TARP banks can obtain in terms of both market share and market power. When splitting between TARP banks that repaid and those that did not, we find that for those banks that did not repay, again the greater the bank size the higher the competitive advantage of TARP banks. For banks that repaid, the results are again stronger for the large banks than for the small banks, but the results for the medium banks are mixed.

**E.2 Excluding Involuntary Participants**

Most of the banks voluntarily participated in the TARP program, however there are a few that were involuntary – they were required to participate in the program at its inception. We classify the following eight banks as involuntary participants: Citigroup, JP Morgan, Wells Fargo, Morgan Stanley, Goldman Sachs, Bank of New York, Bank of America, and State Street Bank.[1] Since we would like to ensure that our results are not driven by the involuntary participants, we rerun our analysis using a sample that excludes them in Table E.2 Panel A, columns (1) - (4), and report the tests of equality between the two types of TARP groups in Panel E. The results are qualitatively similar to our main findings.

**E.3 Excluding Banks Subject to Stress Tests (SCAP and CCAR)**

The US Banks 2009 Stress Tests aka Supervisory Capital Assessment Program (SCAP) was a mandatory program applied to 19 banking organizations with assets exceeding $100 billion that cover about 2/3 of U.S banking assets and about half of loans.[2] It was conducted

[1] We exclude Merrill Lynch from the original 9 involuntary recipients because it is not a bank.

[2] These were 19 banks, including Bank of America, Citigroup, Goldman Sachs, JP Morgan Chase, Morgan Stanley, Wells Fargo, Bank of NY Mellon, BB&T, Fifth Third Bancorp, Keycorp, PNC Financial, Regions Financial, SunTrust Banks, US Bancorp, Ally Financial, American Express Company, Capital One Financial, Metlife, and State Street.

by Federal Bank Regulatory Agencies (FED, FDIC, OCC) from February 25, 2009 to late April 2009 and it was designed to ensure that large banking organizations had enough capital to withstand the recession and a more adverse scenario that might occur over the rest of 2009 and 2010. These organizations had to have or raise enough capital to meet capital requirements under a more adverse scenario, or else the Treasury would provide the capital. A possible consequence of the SCAP program was to essentially publicize that the 19 biggest banking organizations were too-big-to-fail (TBTF) to assure the public of the safety of the financial system. Given this special treatment of banks under SCAP, we worry that our competitive advantage for TARP banks might be driven by this subsample of banks. These same banking organizations were also subject to the Comprehensive Capital Analysis and Review (CCAR) stress tests in 2011 and 2012, which may also impact their competitive advantages. Therefore, we reestimate our regressions by using a sample which excludes banks that were subject to the SCAP and CCAR stress tests. Table E.2 Panel B, columns (1) - (4) report the estimation results and Panel E reports the tests of equality between the two types of TARP groups. We find that our main results continue to hold.

**E.4 Capitalization Ratio**

The level of capital a bank has prior to infusion can impact the competitive advantage that the TARP recipients can get. Banks with a higher level of capital prior to infusion may have a better ability to use the extra capital to expand and acquire less well capitalized peers (e.g., Berger and Bouwman (2013)). We group banks according to whether they had low equity to assets ratio (*EQCAP_08Q3* $\leq$ 7%) or high capital (*EQCAP_08Q3* > 7%) before the TARP program started (2008:Q3) and regression estimates are shown in Table E.2 Panel C, columns (1)-(8) and Panel E reports the tests of equality between the two

types of TARP groups. Looking at the regression results, we find that only banks with a higher capitalization ratio gained competitive advantages in terms of market share and market power as indicated by the positive coefficients for the DID terms.

**E.5 HHI**

We also group banks according to their local market concentration. This is proxied by *HHI Deposits* for the local markets in which the bank is present. We consider three groups for the bank concentration: unconcentrated (HHI $\leq$ 1,000), moderately concentrated (1000 < HHI $\leq$ 1,800), and highly concentrated (HHI >1,800).

Our results for the three subsamples are reported in Table E.2 Panel D, columns (1)-(12) and Panel E reports the tests of equality between the two types of TARP groups. Results suggest that the most competitive advantages given by TARP were gained by the banks in the highly concentrated category, followed by the moderately concentrated category. Therefore, the more concentrated the local banking market, the higher increase in competitive advantage a bank gets.

## Table E.1: Effects of TARP on Bank Competition by Size Class

This table shows tests for the impact of TARP on competition by bank size classes. We report difference-indifference (DID) regression estimates for banks with interactions of the key terms with different bank sizes: small *(GTA ≤ 1 Billion*), medium (*1 Billion < GTA ≤ 3 Billion)* and large (*GTA > 3 Billion*). The measures of competitive advantage are *Market Share* (proxied by *Local Market Share Assets*) and *Market Power* (proxied by *Lerner GTA*). *TARP Recipient* is a dummy variable equal to one if the bank was provided TARP capital support, *Post TARP* is a dummy equal to one in 2009-2012, the period after TARP program initiation. *TARP Recipient_Repaid* is a dummy equal to one if the bank repaid in 2009-2010. *TARP Recipient_Not Repaid,* which is a dummy equal to one if the bank did not repay in 2009-2010. All models include time fixed effects. Panel C reports the tests of equality for the effects of TARP on two types of TARP banks: TARP banks that repaid early and TARP banks that did not. The estimation results are for 2005-2012. All variables are defined in Table 1. Robust *t*-statistics are reported in parentheses. *, **, and *** denote significance at 10%, 5%, and 1% level.

**Panel A: Regression parameters**

| **Dependent Variable:** | **Market Share** | | **Market Power** | |
|---|---|---|---|---|
| **Independent Variables:** | **(1)** | **(2)** | **(3)** | **(4)** |
| ***SMALL x TARP Recipient*** | -0.013*** | | -0.025*** | |
| | (-13.318) | | (-6.497) | |
| ***MEDIUM x TARP Recipient*** | -0.012*** | | 0.001 | |
| | (-10.216) | | (0.133) | |
| ***LARGE x TARP Recipient*** | -0.005* | | 0.010 | |
| | (-1.821) | | (1.205) | |
| ***SMALL x Post TARP x TARP Recipient*** | 0.001 | | 0.022*** | |
| | (0.563) | | (4.264) | |
| ***MEDIUM x Post TARP x TARP Recipient*** | 0.007*** | | 0.031*** | |
| | (5.388) | | (3.450) | |
| ***LARGE x Post TARP x TARP Recipient*** | 0.017*** | | 0.111*** | |
| | (4.671) | | (11.467) | |
| ***SMALL x TARP Recipient_Not Repaid*** | | -0.013*** | | -0.025*** |
| | | (-13.120) | | (-5.808) |
| ***MEDIUM x TARP Recipient_Not Repaid*** | | -0.011*** | | 0.001 |
| | | (-8.601) | | (0.192) |
| ***LARGE x TARP Recipient_Not Repaid*** | | -0.017*** | | -0.003 |
| | | (-11.323) | | (-0.283) |
| ***SMALL x Post TARP x TARP Recipient_Not Repaid*** | | -0.000 | | 0.016*** |
| | | (-0.096) | | (2.837) |
| ***MEDIUM x Post TARP x TARP Recipient_Not Repaid*** | | 0.008*** | | 0.026** |
| | | (5.344) | | (2.568) |
| ***LARGE x Post TARP x TARP Recipient_Not Repaid*** | | 0.020*** | | 0.130*** |
| | | (9.026) | | (8.944) |
| ***SMALL x TARP Recipient_Repaid*** | | -0.013*** | | -0.029*** |
| | | (-4.182) | | (-3.745) |
| ***MEDIUM x TARP Recipient_Repaid*** | | -0.015*** | | -0.000 |
| | | (-8.624) | | (-0.033) |
| ***LARGE x TARP Recipient_Repaid*** | | 0.007 | | 0.022** |
| | | (1.609) | | (2.100) |
| ***SMALL x Post TARP x TARP Recipient_Repaid*** | | 0.009* | | 0.075*** |

| | | | | |
|---|---|---|---|---|
| | | (1.705) | | (6.449) |
| ***MEDIUM x Post TARP x TARP Recipient_Repaid*** | | 0.003 | | 0.056*** |
| | | (1.303) | | (3.103) |
| ***LARGE x Post TARP x TARP Recipient_Repaid*** | | 0.013** | | 0.093*** |
| | | (2.081) | | (7.361) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 178,604 | 178,604 | 178,604 | 178,604 |
| ***Adjusted R-squared*** | 0.219 | 0.220 | 0.453 | 0.453 |

**Panel B: Tests of the Equality of the Effects of TARP for the Two Types of TARP Banks**

| | **Market Share** | **Market Power** |
|---|---|---|
| ***t*-stat:** Effect for Small TARP Banks (GTA ≤ 1 Billion) that Repaid Early = Effect for Small TARP Banks (GTA ≤ 1 Billion) that Did Not Repay Early | 1.685* | 4.657*** |
| ***t*-stat:** Effect for Medium TARP Banks (1 Billion < GTA ≤ 3 Billion) that Repaid Early = Effect for Medium TARP Banks (1 Billion < GTA ≤ 3 Billion) that Did Not Repay Early | 1.828* | 1.435 |
| ***t*-stat:** Effect for Large TARP Banks (GTA > 3 Billion) that Repaid Early = Effect for Large TARP Banks (GTA > 3 Billion) that Did Not Repay Early | 0.959 | 1.936* |

## Table E.2: Effects of TARP on Bank Competition: Subsamples Analysis

This table shows additional subsample tests for analyzing the impact of TARP on competition. Panel A columns (1)-(4) report difference-in-difference (DID) regression estimates from a sample that excludes involuntary participants. Panel B columns (1)-(4) report difference-in-difference (DID) regression estimates from a sample that excludes banks subject to stress-tests (SCAP and CCAR).Panel C columns (1)-(8) report difference-in-difference (DID) regression estimates for banks with low capitalization (*EQCAP_08Q3 ≤ 7%)* and high capitalization (*EQCAP_08Q3 > 7%*). Panel D columns (1)-(12) report difference-in-difference (DID) regression estimates for banks with different local concentration: *Unconcentrated*, which represents banks for which HHI is below 1,000 points, *Moderately Concentrated*, which covers banks for which HHI is between 1,000 and 1,800 points, and *Highly Concentrated*, those for which the HHI is in excess of 1,800 points. The measures of competitive advantage are *Market Share* (proxied by *Local Market Share Assets*) and *Market Power* (proxied by *Lerner GTA*). *TARP Recipient* is a dummy variable equal to one if the bank was provided TARP capital support, *Post TARP* is a dummy equal to one in 2009-2012, the period after TARP program initiation. *TARP Recipient_Repaid* is a dummy equal to one if the bank repaid in 2009-2010. *TARP Recipient_Not Repaid,* which is a dummy equal to one if the bank did not repay in 2009-2010. All models include time fixed effects. Panel E reports the tests of equality for the effects of TARP on two types of TARP banks: TARP banks that repaid early and TARP banks that did not. The estimation results are for 2005-2012. All variables are defined in Table 1. Robust *t*-statistics are reported in parentheses. *, **, and *** denote significance at 10%, 5%, and 1% level.

**Panel A: Excluding TARP Involuntary Participants**

| **Dependent Variable:** | ***Market Share*** | | ***Market Power*** | |
|---|---|---|---|---|
| **Independent Variables:** | **(1)** | **(2)** | **(3)** | **(4)** |
| ***TARP Recipient*** | -0.013*** | | -0.022*** | |
| | (-16.679) | | (-6.518) | |
| ***Post TARP x TARP Recipient*** | 0.004*** | | 0.037*** | |
| | (4.324) | | (8.801) | |
| ***TARP Recipient_Not Repaid*** | | -0.013*** | | -0.023*** |
| | | (-16.035) | | (-6.195) |
| ***TARP Recipient_Repaid*** | | -0.013*** | | -0.012** |
| | | (-7.299) | | (-1.997) |
| ***Post TARP x TARP Recipient_Not Repaid*** | | 0.003*** | | 0.029*** |
| | | (3.023) | | (6.006) |
| ***Post TARP x TARP Recipient_Repaid*** | | 0.010*** | | 0.080*** |
| | | (4.160) | | (10.051) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 178,408 | 178,408 | 178,408 | 178,408 |
| ***Adjusted R-squared*** | 0.223 | 0.223 | 0.452 | 0.452 |

**Panel B: Excluding Banks Subject to the Stress Tests (SCAP and CCAR)**

| **Dependent Variable:** | ***Market Share*** | | ***Market Power*** | |
|---|---|---|---|---|
| **Independent Variables:** | **(1)** | **(2)** | **(3)** | **(4)** |
| ***TARP Recipient*** | -0.013*** | | -0.022*** | |
| | (-16.529) | | (-6.463) | |
| ***Post TARP x TARP Recipient*** | 0.004*** | | 0.036*** | |
| | (4.075) | | (8.410) | |
| ***TARP Recipient_Not Repaid*** | | -0.013*** | | -0.023*** |
| | | (-15.921) | | (-6.138) |
| ***TARP Recipient_Repaid*** | | -0.013*** | | -0.012** |
| | | (-7.107) | | (-2.099) |
| ***Post TARP x TARP Recipient_Not Repaid*** | | 0.003*** | | 0.028*** |
| | | (2.920) | | (5.768) |
| ***Post TARP x TARP Recipient_Repaid*** | | 0.009*** | | 0.079*** |
| | | (3.774) | | (9.753) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 178,101 | 178,101 | 178,101 | 178,101 |
| ***Adjusted R-squared*** | 0.223 | 0.223 | 0.452 | 0.452 |

**Panel C: Subsamples by Capitalization Level (EQCAP_08Q3)**

| **Dependent Variable:** | ***Market Share*** | | | | ***Market Power*** | | | |
|---|---|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** | **(8)** |
| | **Poorly Capitalized** | | **Highly Capitalized** | | **Poorly Capitalized** | | **Highly Capitalized** | |
| **Independent Variables:** | **EQCAP_08Q3 ≤ 7%** | | **EQCAP_08Q3 > 7%** | | **EQCAP_08Q3 ≤ 7%** | | **EQCAP_08Q3 > 7%** | |
| ***TARP Recipient*** | 0.029*** | | -0.016*** | | 0.040*** | | -0.026*** | |
| | (4.483) | | (-20.133) | | (3.476) | | (-7.599) | |
| ***Post TARP x TARP Recipient*** | 0.009 | | 0.005*** | | -0.019 | | 0.040*** | |
| | (0.832) | | (5.068) | | (-1.206) | | (9.285) | |
| ***TARP Recipient_Not Repaid*** | | -0.005 | | -0.015*** | | 0.043*** | | -0.027*** |
| | | (-1.383) | | (-16.907) | | (3.278) | | (-7.223) |
| ***TARP Recipient_Repaid*** | | 0.122*** | | -0.021*** | | 0.031 | | -0.013** |
| | | (6.133) | | (-18.753) | | (1.615) | | (-2.131) |
| ***Post TARP x TARP Recipient_Not Repaid*** | | 0.003 | | 0.003*** | | -0.014 | | 0.030*** |
| | | (0.679) | | (3.112) | | (-0.794) | | (6.212) |
| ***Post TARP x TARP Recipient_Repaid*** | | 0.039 | | 0.012*** | | -0.034 | | 0.087*** |
| | | (1.159) | | (7.723) | | (-1.166) | | (10.829) |
| ***Controls*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Time Fixed Effects*** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** | **Yes** |
| ***Observations*** | 7,176 | 7,176 | 171,428 | 171,428 | 7,176 | 7,176 | 171,428 | 171,428 |
| ***Adjusted R-squared*** | 0.144 | 0.187 | 0.225 | 0.225 | 0.575 | 0.575 | 0.447 | 0.447 |

**Panel D: Subsamples by Local Concentration (HHI)**

| *Dependent Variable:* | *Market Share* | | | | | | *Market Power* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| | Unconcentrated | | Moderately Concentrated | | Highly Concentrated | | Unconcentrated | | Moderately Concentrated | | Highly Concentrated | |
| *Independent Variables:* | HHI ≤ 1000 | | 1000 < HHI ≤ 1,800 | | HHI > 1800 | | HHI ≤ 1000 | | 1000 < HHI ≤ 1,800 | | HHI > 1800 | |
| *TARP Recipient* | -0.007*** | | -0.016*** | | -0.033*** | | -0.021*** | | -0.024*** | | -0.056*** | |
| | (-7.489) | | (-15.421) | | (-8.646) | | (-3.717) | | (-5.074) | | (-5.915) | |
| *Post TARP x TARP Recipient* | 0.001 | | 0.006*** | | 0.027*** | | 0.022*** | | 0.049*** | | 0.075*** | |
| | (0.847) | | (4.279) | | (5.870) | | (3.097) | | (8.324) | | (6.310) | |
| *TARP Recipient_Not Repaid* | | -0.008*** | | -0.015*** | | -0.040*** | | -0.023*** | | -0.027*** | | -0.033*** |
| | | (-10.668) | | (-13.752) | | (-10.455) | | (-3.682) | | (-5.350) | | (-2.949) |
| *TARP Recipient_Repaid* | | 0.002 | | -0.017*** | | -0.005 | | -0.009 | | 0.001 | | -0.125*** |
| | | (0.386) | | (-7.739) | | (-0.595) | | (-0.869) | | (0.143) | | (-9.626) |
| *Post TARP x TARP Recipient_Not Repaid* | | 0.004*** | | 0.003* | | 0.024*** | | 0.018** | | 0.042*** | | 0.039*** |
| | | (3.642) | | (1.929) | | (4.936) | | (2.281) | | (6.278) | | (2.704) |
| *Post TARP x TARP Recipient_Repaid* | | -0.015*** | | 0.020*** | | 0.046*** | | 0.049*** | | 0.082*** | | 0.196*** |
| | | (-2.834) | | (4.951) | | (4.485) | | (3.524) | | (7.519) | | (12.085) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Time Fixed Effects* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 84,627 | 84,627 | 68,181 | 68,181 | 25,796 | 25,796 | 84,627 | 84,627 | 68,181 | 68,181 | 25,796 | 25,796 |
| *Adjusted R-squared* | 0.095 | 0.096 | 0.073 | 0.074 | 0.252 | 0.253 | 0.526 | 0.527 | 0.398 | 0.398 | 0.436 | 0.436 |

**Panel E: Tests of the Equality of the Effects of TARP for Different Types of TARP Recipients**

| | | *Market Share* | *Market Power* |
|---|---|---|---|
| ***Excluding Involuntary Participants*** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 2.604*** | 5.673*** |
| ***Excluding Banks Subject to the Stress Tests*** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 2.328** | 5.559*** |
| ***Poorly Capitalized EQCAP _08Q3 ≤ 7%*** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 1.068 | 0.600 |
| ***Highly Capitalized EQCAP _08Q3 > 7%*** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 4.691*** | 6.133*** |
| ***Unconcentrated HHI ≤ 1000*** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 3.393*** | 2.007** |
| ***Moderately Concentrated 1000 < HHI ≤ 1,800*** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 4.140*** | 3.162*** |
| ***Highly Concentrated HHI > 1800*** | ***t*-stat:** Effect for TARP Banks that Repaid Early = Effect for TARP Banks that Did Not Repay Early | 2.019** | 7.288*** |