# The governance of banks:
# How do bank capital and monitoring impact post-acquisition risk taking and performance?

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**Abstract**: This paper theoretically and empirically examines how three corporate governance mechanisms – bank capital, regulatory monitoring and large shareholder monitoring – affect an acquiring bank's post-acquisition risk taking and performance. My model predicts that regulatory monitoring will be less stringent for high-capital acquirers than for low-capital acquirers and that as a result, high-capital acquirers engage in acquisitions that underperform those of low-capital acquirers and increase risk more. Moreover, my model predicts that the presence of a large shareholder mitigates the acquisition inefficiency of high-capital banks: high-capital acquirers with a large shareholder should perform significantly better than do high-capital acquirers without a large shareholder. I find empirical support for my model's predictions.

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## 1. Introduction

The corporate governance literature examines the efficiency of governance mechanisms in mitigating agency problems that arise from a separation of ownership and control (see, e.g., Fama, 1980; and Shleifer and Vishny, 1995). Banks exhibit in addition an agency problem that is unique to banking: deposit insurance gives managers an incentive to increase risk, while diminishing depositors' incentives to exert market discipline to curb this risk (see, e.g., Freixas and Rochet, 1997; Bhattacharya and Thakor, 1993). This creates a role for regulatory intervention to limit bank risk taking. Regulators use principally two governance mechanisms to control excessive risk taking: mandatory capital requirements and regulatory monitoring (see, e.g., Berger, Herring and Szego, 1995; Bhattacharya, Boot and Thakor, 1998; and Santos, 2001).

The bank governance literature finds that higher capital levels and regulatory monitoring may both reduce risk taking. The current regulatory environment in the U.S., embodied in the Federal Deposit Insurance Company Improvement Act of 1991 ('FDICIA'), recognizes the partial substitutability of capital and regulatory monitoring, and stipulates that high-capital banks may be subjected to less stringent monitoring than their lesser-capitalized counterparts.[1]

It is interesting to examine how capital and regulatory monitoring affect a key investment decision of banks: acquisitions. An acquisition may change the risk profile of the acquirer, and may change it in a way that is unacceptable to the regulator. Given that the regulator must approve acquisitions and given that banks with higher capital levels have a lower propensity to take risk, it may be more inclined to approve an acquisition when the acquirer is well-capitalized. This suggests a possible link between the level of capital of the acquirer and the types of acquisitions undertaken, and hence the post-acquisition risk taking and performance of the acquirer. The recently-adopted Basel II Capital Accord ('Basel II') recognizes market discipline exercised by shareholders and debt-holders as a third governance mechanism to aid regulators in controlling bank risk taking.[2] Although Basel II will only apply to the largest, internationally active banks, it is interesting to analyze whether shareholder monitoring also affects risk taking and post-acquisition performance. This leads to the following natural question that I address in

[1] Among other things, FDICIA stipulated that, within nine months of its enactment, the Federal banking agencies were to promulgate final regulations that would create a statutory framework whereby a system of supervisory actions would be indexed to the capital level of individual institutions. (FDICIA §131(a) – new Section 38 to the Amended Federal Deposit Insurance Act) The final regulations were to become effective no later than 12/19/92. (FDICIA §131(b)).

[2] Basel II is the new international capital standard that will become effective in 2006/2007. It states that "market discipline ('pillar 3') is to complement minimum capital requirements ('pillar 1') and the supervisory review process ('pillar 2')" (p. 154 of the BIS' Third Consultative Paper on the New Basel Accord). It defines market discipline in terms of enhanced disclosure, which should augment shareholders' and debt-holders' ability to monitor.

this paper: How do capital requirements, regulatory monitoring and shareholder monitoring affect an acquiring bank's post-acquisition risk taking and performance?

To address this question, I develop and test a simple theoretical model that analyzes the impact of acquirer capitalization and regulatory monitoring on post-acquisition risk taking and performance. In an extension I examine how shareholder monitoring affects this impact. The basic idea is as follows. A bank manager, who cares about shareholder value and private control benefits, evaluates an acquisition target. The target may be good or bad: the good target ('the good acquisition') represents a positive-NPV acquisition, whereas the bad target ('the bad acquisition') represents a more risky and negative-NPV acquisition. Both targets yield the bank manager a private control benefit, the value of which is privately known to the manager.

To proceed with the acquisition, the manager needs to obtain approval from a regulator who wishes to block the bad acquisition and approve the good one. The regulator cannot distinguish the target's type a priori, but can screen the target ('regulatory monitoring'). Monitoring is informative but noisy, so a bad acquisition may be inadvertently approved. Moreover, monitoring is costly, which implies that the regulator wants to avoid monitoring when it believes the bank's capital level is high enough to produce incentives that ensure the choice of a good acquisition. That is, the regulator will use capital and monitoring as substitute corporate governance mechanisms. Since the regulator knows that an increase in the bank's capital decreases the manager's incentive to undertake the bad acquisition, it devotes resources to monitoring only those acquisitions in which the acquirer's capital is below an endogenously-derived cutoff.

I derive that this capital cutoff depends on, among other things, the level of the manager's private control benefit. I assume that the regulator knows only the average level of the private control benefits, and sets the capital cutoff for monitoring to correspond to this average level. At the level of the individual bank, the regulatory cutoff may thus be incorrect since private control benefits actually vary in the cross-section. This introduces an inefficiency in regulatory monitoring, in the sense that the regulator may fail to (adequately) monitor banks it should.

The model produces three testable implications. The first prediction is that a U-shaped relationship exists between acquirer capital and post-acquisition performance. Acquirers with "extremely high" capital levels show the best performance as their capital levels are such that they have a natural incentive to pass up the bad acquisition. Low-capital acquirers do have an incentive to undertake the bad acquisition, but the regulator knows this and monitors these banks to block bad acquisitions. The middle group – banks with relatively high capital – exhibits the

worst performance. These banks do not have enough capital to give their managers the right incentives, and they are not subject to monitoring because the regulator mistakenly believes that capital is high enough. Empirically, I may find a negative relationship between capital and post-acquisition performance (the left part of the U): bank capital levels are low compared to capital levels in any other industry, and hence I may not have any observations in my model's "extremely high" capital category. The second prediction is that a hump-shaped relationship exists between capital and risk taking. That is, risk taking increases with capital up to a point and then flattens out and begins to diminish with further increases in capital. Thus, my model predicts that regulatory policy works well at low capital levels (where regulatory monitoring is effective) and at extremely high capital levels (where explicit monitoring is unnecessary), but not in the middle, where capital is inadequate to deter excessive risk and monitoring is not present.

In an extension of the model, I examine how the presence of a large shareholder impacts the relationship between capital and post-acquisition performance. I assume that the large shareholder has a monitoring technology ('shareholder monitoring') similar to the regulator's, but is better informed than the regulator about the bank manager's private control benefit. This generates the model's third prediction, namely that the presence of a large shareholder improves the average quality of acquisitions undertaken, and especially those by high-capital banks. In other words, large shareholder monitoring substitutes for regulatory monitoring when it comes to bank performance, particularly when the regulator's monitoring policy is ineffective.

I test my model's predictions by examining the long-run abnormal performance and increased risk taking of acquirers in univariate and multivariate regression frameworks. The results support the model and are robust. First, I find a negative relationship between capital and post-acquisition performance: high-capital acquirers invariably show the worst long-run performance, and significantly underperform low-capital acquirers both on the basis of accounting performance and long-run buy and hold returns. Moreover, I find that this performance difference cannot be explained based on the basis of free cash flow. Second, high-capital acquirers increase their risk more after the acquisition than do low-capital acquirers. And, third, the presence of a large shareholder only benefits high-capital acquirers: high-capital acquirers with a large shareholder show significantly better long-run abnormal performance than high-capital acquirers without a large shareholder. This result is statistically insignificant with low-capital acquirers.

My paper is the first to theoretically and empirically examine the interaction between the three governance mechanisms represented by bank capital, regulatory monitoring and

shareholder monitoring, and their impact on a bank's post-acquisition performance and risk taking. The analysis suggests two policy implications. First, the current regulatory policy to impose less scrutiny on high-capital banks is likely to be inefficient when regulators are incompletely informed about managerial private control benefits. Second, the finding that large shareholder monitoring improves the performance of high-capital acquirers highlights the importance of Pillar 3 ('market discipline') of Basel II.

The remainder of this paper is organized as follows. Section 2 contains a literature review. Section 3 includes a simple theoretical model that yields predictions which provide a framework for the empirical analyses. Section 4 describes the data and Section 5 discusses the methodology. Section 6 contains the main results. Section 7 provides robustness results. Section 8 concludes.

## 2. Literature review

My paper is related to two broad strands of the banking literature: the governance of banks and bank mergers. I address these two literatures in turn.

The first strand of the literature examines the governance of banks, and focuses on the use of capital requirements and regulatory monitoring as devices to limit excessive risk taking. The main findings in this literature that are relevant to my work are the following. First, the regulator should ideally set capital requirements on an individual basis to best exploit each bank's information, yet lacks processing capacity and data (Von Thadden, 2004). It therefore imposes industry-wide capital requirements, which may not be sufficiently tailored to a particular bank's situation and hence may not yield the desired level of risk taking.[3] Second, capital requirements reduce gambling incentives by putting bank equity at risk (Furlong and Keeley, 1989; Keeley, 1990), but may also encourage risk taking by reducing the present value of future earnings (Koehn and Santomero, 1980; Kim and Santomero, 1988; Genotte and Pyle, 1991; Besanko and Kanatas, 1996; Hellmann, Murdock and Stiglitz, 2000). Calem and Rob (1999) show that these perverse risk taking incentives are especially prevalent when bank capital is very low or very high. Capital requirements above a certain level may also be costly in that they reduce deposit taking (Gorton and Winton, 1995), diminish liquidity creation (Diamond and Rajan, 2000), and may even increase systemic risk (Acharya, 2003). Thus, the regulator may not

[3] While it is true that regulators sometimes impose Individual Minimum Capital Requirements (IMCRs), this is usually done only for financially-distressed banks or those that fall below regulatory minima in capital requirements.

be able to impose sufficiently high capital requirements to guarantee the desired level of risk taking.

More recent bank governance studies examine how ownership structure and/or capital impact agency problems in banking. Demsetz, Saidenberg and Strahan (1997) find that insider ownership and institutional ownership reduce banks' agency problems, especially when bank franchise values are small. Berger and Bonaccarsi di Patti (2004) find that between 1990 and 1995, banks with lower capital levels had smaller agency problems (proxied by higher profit efficiency) after controlling for ownership structure. While addressing related issues, the focus of their paper is different from mine. In particular, they do not examine regulatory capital the way I define it (the tier 1 risk-weighted capital ratio and the total risk-weighted capital ratio) but an ordinary leverage ratio (defined as stockholder equity over total assets). Moreover, these papers exclude mergers, which represent the focus of my analyses.

The second strand of the literature examines the performance of acquirers after the acquisition. Most studies focus on the accounting performance and announcement returns of acquirers. As with the merger and acquisition literature in general, this literature finds that acquirers on average experience negative announcement returns and that the post-acquisition accounting performance results are mixed (for overview articles, see e.g., Rhoades, 1994; and Pilloff and Santomero, 1998).

The long-run stock performance of acquiring banks has not received much attention. Madura and Wiant study 152 acquisitions announced between 1983 and 1987 and find significant acquirer underperformance after two and three years (-14.1% and -27.1%, respectively). Olson and Pagano (2002) study the relationship between long-run post-acquisition performance and sustainable growth of 106 acquisitions that became effective between 1987 and 1997 and also find strong and significant underperformance of acquiring banks. These findings are consistent with the merger and acquisition literature in general.

The link between the level of bank capital and acquirer performance has not been explored theoretically and only sparingly empirically. Berger, Herring and Szego (1995) find that higher capital ratios often explain little of the variation in bank performance in general. Some older studies do examine the link between capital and acquirer performance, and find that acquirer capital does not impact abnormal stock performance in the short run (Hannan and Wolken, 1989; and Baradwaj, Dubowski and Fraser, 1992) or in the long run (Madura and Wyant, 1994). However, they focus on bank mergers in the early to mid-80s, an era characterized by regulatory forbearance during which capital levels apparently affected neither

regulatory monitoring nor regulatory forbearance. I study mergers in the 1990s after the enactment of FDICIA, the law that explicitly tied regulatory monitoring to bank capital.[4]

## 3. The theory

The model examines the acquisition choice of a bank manager and the monitoring choice of the bank regulator. It shows how both choices depend on the capital of the acquiring bank. An extension also considers large shareholder monitoring.

### 3.1. The basic model

The model has three dates: t=0, t=1 and t=2. The riskless interest rate is zero and everybody is risk neutral**.**

A target arrives at t=0. The manager (costlessly) screens the target at t=0 and learns its type, which may be good or bad. I refer to the target's type as the 'quality' of the acquisition. Acquiring either target yields a synergy $S > 0$, the level of which is common knowledge. Both targets come with a private control benefit $C$ for the acquiring bank's manager, and can be high (H) or low (L) with equal probability. That is, $C \in \{C_L, C_H\}$ with $0 < C_L < C_H < \infty$, and the expected value of $C$ in the cross-section is $\overline{C}$.[5] The exact level of the private control benefit is known only to the manager. The manager cares both about the private control benefit and shareholder value; I define the latter as the gain in value accruing to the existing shareholders due to the acquisition, i.e. the increase in the market value of their equity.[6]

Let the pre-acquisition stand-alone market values of the acquirer's and target's *assets* be $V_A$ and $V_T$, respectively. The bank and the targets have equity and insured deposits.[7] Let the pre-acquisition (t=0) value of the bank's deposits and the target's deposits be $D_A$ and $D_T$,

[4] An additional complicating factor is that the banking industry was performing poorly in the 1980s. Numerous bank failures and subsequent mergers that involved government assistance may have affected the results of the older studies.

[5] Many papers employ private control benefits (see, e.g., Jensen and Ruback (1983), Demsetz (1986), Harris and Raviv (1988b), Barclay and Holderness (1989), Hart and Moore (1990), and Zwiebel (1995)), in a take-over setting (see, e.g., Grossman and Hart (1988), Harris and Raviv (1988a), Stulz (1988) and Dewatripont (1993)), or in the case of banking (see, e.g., Diamond (1993), O'Hara (1993) and Hellmann, Murdock and Stiglitz (2000)). These articles point at several potential sources of such benefits, including the ability of management or directors to divert funds for private benefit, the consumption of perquisites, and utility derived from power or control. In my model, the existence of private control benefits is important, the exact source is not.

[6] The assumption that the manager cares about shareholder value captures that management compensation may explicitly be linked to the bank's share price – which is consistent with existing compensation schemes (see, e.g., Booth, Cornett and Tehranian, 2002) – or implicitly, as the manager may risk being fired if the shareholders believe he does not act in their best interest.

[7] The assumption of insured deposits is standard in the banking literature and in line with existing bank practices.

respectively. The bank's pre-acquisition market value of *equity* then equals the difference between its stand-alone value and the value of its deposits: $MVE_{A,pre} = V_A - D_A$. Similarly, the target's pre-acquisition market value of equity is $MVE_{T,pre} = V_T - D_T$. If the manager's screening reveals that the acquisition is worthwhile, he will seek regulatory approval at t=1 and if this is granted, the acquisition occurs at t=1. I will deal with the regulator in greater detail later. Assume that upon making the good acquisition at t=1, the combined entity is successful at t=2 with probability 1. That is, the post-acquisition value of the combined entity at t=2 will be $V_A + V_T + S$. The bad acquisition, however, makes the post-acquisition entity risky at t=2: the combined entity will be worth $V_A + V_T + S$ with probability p and 0 otherwise. Also, $p[V_A + V_T + S] < V_A + V_T$. That is, the expected value of the combined entity after the acquisition is smaller than the pre-acquisition values of the acquirer and target combined.[8] The risk (with probability (1-p) the combined entity is worth zero) captures the notion that a bad acquisition does not just mean potentially losing the pre-acquisition value of the target, but putting the entire entity at risk. This formulation also captures that an acquisition is more likely to be a bad acquisition when the probability of success or the synergy is smaller, or the target is larger, which is intuitive.

To pay for the target, the acquirer engages in a stock swap at t=1, which is consistent with the fact that most (sizeable) bank acquisitions are stock deals. At t=1, the target's shareholders receive shares in the combined entity worth the target's market value of equity plus a premium, which I express as a fraction $\eta$ of the synergy created. The combined entity's equity value with the good acquisition equals $MVE_{A,pre} + MVE_{T,pre} + S$ at t=2, of which the target shareholders' share is $MVE_{T,pre} + \eta S$, and the existing shareholders' share is $MVE_{A,pre} + (1-\eta)S$. The good acquisition thus causes the current shareholders to gain $(1-\eta)S > 0$. Similarly, after the bad acquisition, the combined entity's equity is worth $p[MVE_{A,pre} + MVE_{T,pre} + S]$ at t=2. The target's shareholders receive the target's pre-acquisition market value of equity plus part of the expected synergy: $MVE_{T,pre} + p\eta S$. The acquirer's

[8] Note that this is not equivalent to assuming that the bad acquisition is socially inefficient. Social efficiency will also attach weight to the manager's private control benefit.

existing shareholders own the remainder, causing them to gain $(p-1)\left[MVE_{A,pre} + MVE_{T,pre}\right] + p(1-\eta)S < 0$. That is, the existing shareholders lose.[9]

To have an interesting problem, assume that the size of the private control benefit can be such that the loss in shareholder value with the bad acquisition plus the private control benefit can be positive. That is, the manager may have an incentive to undertake the bad acquisition, even though it is inefficient from the shareholders' perspective.[10] Assume for simplicity that this can only happen when the private control benefit is high ($C = C_H$).

I now derive a result that if the acquirer's capital is high enough, the manager will always pass up the bad acquisition. I state this proposition in terms of the book value of capital, because even though the manager's incentives are related to market values, the regulator (to be introduced next) bases its actions on book values.[11]

**Proposition 1 (Management's incentive to forego a bad acquisition):** If the acquiring bank's book value of capital exceeds a critical cutoff, call it $cap^*$, then the bank manager will never undertake a bad acquisition.

***Proof***: See Appendix. ■

This is intuitive. Recall that the manager cares about shareholder value and private control benefits and that the bad acquisition imposes a loss on the bank's existing shareholders. When the manager evaluates the bad acquisition, he trades off the private control benefit against the expected reduction in shareholder value. Given that the loss in shareholder value is an increasing function of the bank's pre-acquisition equity value, it follows that the manager will not make a bad acquisition if his bank's capital exceeds a certain cutoff.

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[9] This result follows from the assumptions that the expected value of the combined entity post-acquisition is smaller than the combined pre-acquisition values of the acquirer and target ($p\left[V_A + V_T + S\right] < V_A + V_T$), these negative synergies are incurred solely by the acquirer, and that deposits are insured (causing their value to be independent of the quality of the acquisition).

[10] This is a simplifying assumption. Though the manager enjoys the full private control benefit, he does not bear the entire drop in the bank's equity value. However, assuming that the cost borne by the manager (his stock and option holdings will be worth less and he may face a higher probability of being discharged) is proportional to the loss in equity value, I could alternatively assume that a *percentage* of the negative gain plus the entire private control benefit can be positive. The results in the alternative setup would be qualitatively the same.

[11] An important reason why the regulator focuses on book values is that a manager can increase the bank's market value of equity by taking more risk, whereas the regulator precisely wants to curb risk taking. In my model, I obtain percentage book values by dividing the bank's (dollar) market value of equity by both its market-to-book ratio and its total assets.

**Corollary 1 (Comparative statics)**: The critical capital cutoff, $cap^*$, is an increasing function of the level of the private control benefit $C$.

This follows readily from the above discussion. A higher private control benefit makes the bad acquisition more attractive, and necessitates a higher capital level to persuade the manager to not make a bad acquisition.[12]

The proposed acquisition needs to be approved by multiple regulatory agencies.[13] This approval is sought by the bank at t=1. Though these agencies consider various factors when assessing acquisition applications, all are motivated by safety and soundness considerations.[14] I capture this in my model by referring to these agencies combined as 'the regulator', and by assuming that the regulator's main objective is to prevent an increase in the exposure of the deposit insurance fund (see, e.g., Freixas and Rochet, 1998; and Bhattacharya, Boot and Thakor, 1998). Given this objective function and the assumption that the bad acquisition increases the riskiness of the combined entity whereas the good acquisition does not, the regulator wants to block the first and approve the latter. Thus, even though the regulator is not concerned about whether or not the bank makes a negative-NPV investment (the bad acquisition) per se, it wants to prevent such an investment because approving the bad acquisition would increase the exposure of the deposit insurance fund.[15]

The regulator faces two problems. It does not observe the target's type and it does not know the true private control benefit. Consider first its lack of knowledge of the target's type. The regulator's prior that the target is good is $\gamma \in (0,1)$ and 1- $\gamma$ that it is bad. Suppose that it can monitor a target at a cost, X > 0. Monitoring produces a signal Σ, which tells the regulator the target's type. I assume that monitoring is informative but noisy:

[12] The critical cutoff also increases in the level of the synergy S and the success probability p; and falls in the premium given to the target's shareholders (see the proof of Proposition 1 in the Appendix). To understand this, note that a higher synergy, a higher success probability and a lower premium all increase the attractiveness of the bad acquisition. A higher capital level gives management the proper incentive to forego the bad acquisition.

[13] Which regulatory agencies are involved in the acquisition approval process depends on the types of banks involved: (i) national banks: Comptroller of the Currency; (ii) bank holding companies: the Federal Reserve and the state authority; (iii) state member banks (i.e. banks that are members of the Federal Reserve System): the Federal Reserve and the state authority; (iv) insured state non-member banks: the Federal Deposit Insurance Agency ('FDIC'). Given that the aforementioned banks are required to be insured by the FDIC, the FDIC has some examination power over all of these institutions (Saunders, 1997).

[14] See Section 2.3 for a discussion on other issues the regulator may care about.

[15] Because of this one-to-one mapping between a negative-NPV acquisition and the exposure of the deposit insurance fund in my model, the incentives of the regulator and the bank's existing shareholders are aligned.

$\Pr(\text{signal}\,\Sigma = i \mid \text{target} = i) = \sigma > 0.5$ and $\Pr(\text{signal}\,\Sigma = i \mid \text{target} = j \neq i) = 1 - \sigma$, where $i, j \in \{G, B\}$.[16] The post-signal posterior beliefs are calculated using Bayes' rule:

$Pr(target = i \mid signal\ \Sigma = i) = \dfrac{Pr(\Sigma = i \mid i)\,Pr(i)}{Pr(\Sigma = i \mid i)\,Pr(i) + Pr(\Sigma = i \mid j)\,Pr(j)}$. Thus,

$Pr(target = G \mid signal\ \Sigma = G) = \dfrac{\sigma\gamma}{\sigma\gamma + (1-\sigma)(1-\gamma)} > \gamma$. The regulator's second problem is that it does not know the true private control benefit. I assume that the regulator takes each manager's private control benefit to equal the average value, $\overline{C}$.[17]

The sequence of events at t=1 related to the regulatory approval process is as follows. The regulator first examines the capital of the acquirer. If the acquirer's capital level exceeds $cap^*$, the regulator will not monitor, realizing that the acquirer has no incentive to engage in a bad acquisition. If the acquirer's capital level lies below this cutoff, the regulator monitors if the expected loss to the deposit insurance fund absent monitoring exceeds the expected loss with monitoring. In this case, the regulator disapproves an acquisition if the signal indicates the acquisition is bad, i.e. when $\Sigma = B$.

**Proposition 2 (The regulator's monitoring policy)**: The regulator will never investigate a proposed acquisition if the acquirer's capital equals $cap_{A,pre} > cap^*$. The regulator will investigate an acquisition proposal if the acquiring bank's capital level equals $cap_{A,pre} < cap^*$, and $\sigma(1-\gamma)(1-p)(D_A + D_T) > X$.

***Proof***: See Appendix. ■

The intuition is as follows. If the acquirer's capital is above $cap^*$, the regulator believes there is no chance that the acquirer will knowingly pursue a bad acquisition. Hence, it approves without investigation to save on monitoring costs. Lower-capital acquirers are investigated by the regulator because they have incentives to make bad acquisitions.

[16] I impose the parameter restriction $\sigma > 0.5$ because that is the necessary and sufficient condition for the signal to be informative. See Holmstrom (1979) for a discussion of informative monitoring in the context of the principal-agent model.

[17] For a discussion of this assumption, see footnote 20.

**Corollary 2 (Consequence of the regulatory monitoring policy being incorrect):** If the actual private control benefit equal $C_H > \overline{C}$, there exists a second critical cut-off $cap^{**} > cap^{*}$. Only if the bank's capital is extremely high (i.e. exceeds this second cut-off) does the manager have no incentive to undertake a bad acquisition. For banks with high capital levels ($cap^{*} < cap < cap^{**}$), the regulator does not investigate, but the manager makes a bad acquisition when available.

This can be seen as follows. The regulator's monitoring policy depends on various parameters, including her information regarding the level of the manager's private control benefit. The regulator believes that the private control benefit is $\overline{C}$, whereas in reality it is $C_H$ or $C_L$. This implies that the capital cutoff used by the regulator ($cap^{*}$) is incorrectly based on $\overline{C}$. If the private control benefit is high, the regulator's monitoring policy is too lenient, and the capital cutoff $cap^{*}$ is set too low, failing to recognize that only acquirers with extremely high capital levels (with capital exceeding $cap^{**}$) have no incentive to undertake a bad acquisition. Banks with high capital levels (with $cap^{*} < cap < cap^{**}$) have an incentive to engage in a bad acquisition and have an opportunity to do so because the regulator incorrectly fails to monitor. Banks with low capital levels are unaffected by the regulator's lack of knowledge of the manager's true private control benefit.[18] Thus, unobservable heterogeneity in private control benefits across bank managers reduces the effectiveness of the regulator's monitoring policy and gives rise to a U-shaped relationship between acquirer capital and post-acquisition performance. Moreover, since a bad acquisition is more risky than a good acquisition, there is also a hump-shaped relationship between acquirer capital and the *increase* in post-acquisition risk taking. I have the following predictions:

***Prediction 1: A U-shaped relationship exists between acquirer capital and post-acquisition performance.***

***Prediction 2: A hump-shaped relationship exists between acquirer capital and the increase in post-acquisition risk taking.***

### 3.2. Extension: concentrated ownership

[18] Note that if the true private control benefit is low, the regulator's monitoring policy is effectively too tight: the capital cut-off $cap^{*}$ is set too high, meaning that the regulator will block not only the bad acquisitions but also some good ones. I do not focus on this case as it does not yield interesting additional insights.

So far I have assumed that the regulator is the only party who may monitor acquisition proposals. I now introduce a large shareholder as an additional monitoring device. Various theoretical contributions have established that large shareholders may monitor management's actions and that they prefer active monitoring over selling shares in case of disagreement.[19] Empirical research has shown that in practice they do monitor, and that large shareholder activism has grown stronger in the 1990s, the period I examine.[20]

The large shareholder's objective is to maximize the existing shareholders' market value of equity, so he wants to block the bad acquisition. Like the regulator, the large shareholder does not know the target's type. Assume for simplicity that the large shareholder and the regulator have the same prior belief $\gamma \in (0,1)$ that the target is good, face identical monitoring costs X > 0, and observe conditionally independent and identically distributed signals $\Sigma$ upon monitoring, with $\Pr(\text{signal}\,\Sigma = i \mid \text{target} = i) = \sigma > 0.5$, and $\Pr(\text{signal}\,\Sigma = i \mid \text{target} = j \neq i) = 1 - \sigma$, where $i, j \in \{G, B\}$. Assume furthermore that the large shareholder does not know the true private control benefit, but – unlike the regulator – knows that it may be high or low. That is, I assume that the large shareholder is better informed than the regulator about the level of the private control benefit, possibly because of greater familiarity with the bank's manager.[21,22]

The sequence of events at t=1 is as follows. Management first approaches the large shareholder for approval. If the shareholder objects to the acquisition, management will not proceed with the acquisition. If the shareholder approves the acquisition, management approaches the regulator. Only if both parties agree to the acquisition can management proceed.[23]

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[19] See, e.g., Shleifer and Vishny (1986), Kahn and Winton (1998), and Maug (1998).
[20] See, e.g., Nesbitt (1994), Smith (1996), and Carleton, Nelson and Weisbach (1998).
[21] Berger, Davies and Flannery (2000) provide evidence that supervisors and shareholders produce different information. They find that equity market performance measures neither cause, nor are caused by supervisory measures; and that supervisory reports do not significantly predict changes in future bank performance, whereas equity market variables do.
[22] One might wonder why the private information of the bank manager about the private control benefit is not elicited by either the bank regulator or the large shareholder via the revelation principle. To see this, note first that the bank regulator believes that $\overline{C}$ is the private control benefit for every manager and therefore does not believe there is any information to elicit. The large shareholder is unable to use the revelation principle to elicit this information because he cannot control the entire set of allocations to the manager contingent on the report. Examples of things beyond the shareholder's control are allocations by the regulator and possible revaluation of the value of the manager's human capital in the labor market. (See, e.g., Persons, 1997.)
[23] The assumption that management listens to its large shareholder seems reasonable given evidence by Carleton, Nelson and Weisbach (1998), who analyze the relationship between TIAA-CREF and 40 firms, and show that in over 95% of the cases, management voluntarily responds to large shareholder concerns.

Assume that regulatory policy treats all banks the same, regardless of shareholder composition. This assumption seems consistent with current regulatory policy.[24] I obtain the following proposition.

**Proposition 3 (The presence of a large shareholder)**: The presence of a large shareholder improves the average quality of acquisitions undertaken. Having a large shareholder:
(i) does not impact the quality of acquisitions undertaken by extremely high-capital banks and these banks continue to make the best acquisitions;
(ii) significantly improves the quality of acquisitions undertaken by high-capital banks, although these banks continue to make the worst acquisitions; and
(iii) improves the quality of acquisitions undertaken by low-capital banks but not as much as the improvement for the high-capital banks.

***Proof***: See Appendix. ■

This is intuitive. In essence, Proposition 3 shows that extremely high-capital acquirers do not need any monitoring, so adding a large shareholder as a monitoring device has no impact on the quality of the acquisitions undertaken by these banks. In case of low-capital acquirers, a large shareholder is a source of monitoring in addition to the regulator. The average quality of acquisitions undertaken by low-capital acquirers rises because the additional monitoring leads to better screening. The presence of a large shareholder impacts the quality of acquisitions undertaken by high-capital banks the most, because monitoring by one party (the shareholder) is better than no monitoring at all, and the concavity in the incremental value of information means that the marginal impact of being monitored once (versus not being monitored at all) is larger than the marginal impact of additional monitoring.

Noting again that better acquisition quality in my model is synonymous with better post-acquisition performance, I obtain the following prediction:

***Prediction 3: The presence of a large shareholder weakens the capital – post-acquisition performance relationship (i.e. it flattens the U-curve), and especially improves the performance of high-capital acquirers.*** [25]

[24] It is possible that Basel II will change this given that it explicitly adds market discipline as a third governance mechanism.

Figure 1 contains a graphical representation of my model's predictions. It shows the U-shaped relationship between capital and post-acquisition performance (top left), the hump-shaped relationship between capital and the increase in post-acquisition risk taking (bottom left), and indicates that the presence of a large shareholder weakens the capital – post-acquisition performance relationship (top right).

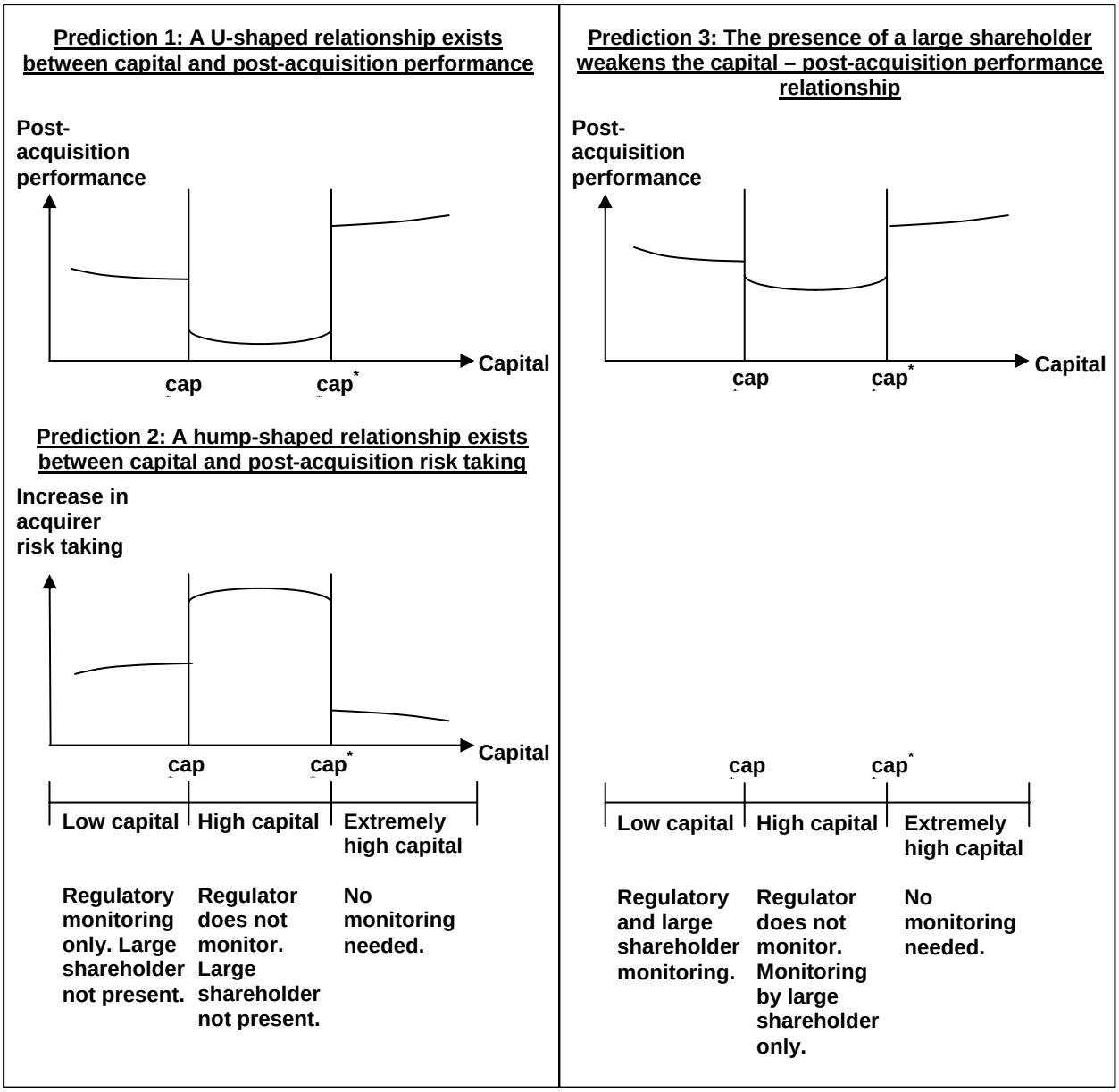


**Figure 1: A graphical representation of my model's predictions.**

[25] In the model, the riskier project is also the project that performs worse, but in practice that may not be so. Given that the shareholder cares about performance but not about risk, I concentrate on the impact the presence of a large shareholder has on post-acquisition performance.

This Figure shows the U-shaped relationship between capital and acquirer performance (top left), and the hump-shaped relationship between capital and the increase in acquirer risk taking (bottom left) based on the three capital regions formulated in Predictions 1 and 2, and indicates how the presence of a large shareholder impacts the relationship between capital and performance as formulated in Prediction 3 (top right).

### 3.3. Discussion of some modeling choices

I now discuss several issues related to my model. First, models that examine the relationship between capital and bank risk taking typically focus on the agency problem between the bank's shareholders and debtholders, including the deposit insurance fund (see, e.g., Calem and Rob, 1999). They generally create this agency problem by assuming that the bank can choose between a riskless investment (which is preferred by the debtholders) and a risky, positive NPV investment (which is the shareholders' preferred choice). These models implicitly assume that it is the shareholders who manage the bank or that there is no divergence of interests between the bank manager and the shareholders. My model is richer in that it explicitly acknowledges that in most banks there is a separation of ownership and control, and examines the implications on bank risk taking and post-acquisition performance. I therefore focus on potential agency problems between the manager and the bank's shareholders, and between the manager and the regulator (as a delegated monitor for the debtholders). I do that by assuming that the bad acquisition makes the combined entity risky and has negative NPV (so that both the shareholders and the regulator want to block this acquisition), while a private control benefit may give the manager an incentive to undertake the bad acquisition.

Thus, my model is similar to the 'standard' model that focuses on the capital-risk relationship and assumes that shareholders run the bank in that both have an asset-substitution moral hazard problem between the key decision-maker and the regulator, and generate the well-known result that if capital is sufficiently high, the key decision-maker has no incentive to exploit the deposit insurance fund. However, my model explicitly recognizes that the key decision-maker's actions may be driven by a desire to enjoy a private control benefit, which causes his incentives to be mis-aligned with those of the shareholders.

As a result, my model generates two predictions the 'standard' model does not generate. First, the U-shaped relationship between capital and performance only arises in a setup where the regulator may be misinformed about a manager-specific factor at the individual bank level. Second, the presence of a large shareholder would make no difference unless there was a divergence between the interests of the bank manager and bank shareholders.

Second, I assume the regulator's main objective is to prevent an increase in the deposit insurance fund's exposure. In practice, the regulator might also worry about antitrust issues: the regulator would block an acquisition if it enhances the combined entity's market power such that it increases the interest rates to consumers and small businesses. Adding antitrust concerns to the model would imply that the regulator would still try to block bad acquisitions, while approving fewer good acquisitions (as the regulator would block some for anti-trust reasons), thus causing the number of acquisitions to go down. Apart from this, the analysis and the conclusions remain qualitatively the same.

Third, in reality, the regulator plays a dual role: it sets (industry-wide) capital standards and monitors banks. My model focuses on the second role. Since it is not my intention to provide an additional theory of bank capital, I implicitly assume that industry-wide capital standards are in place. The vast literature on bank capital establishes that the regulator sets these capital requirements such that capital is high enough to deter moral hazard associated with deposit insurance, yet not so high as to create costs such as diminished liquidity creation that may more than offset the benefit.[26] All acquirers in my sample hold capital well above these general capital requirements. Interestingly, the capital cutoff I derive ($cap^*$) can be interpreted as an additional, bank-specific capital requirement.[27] If a bank's capital lies above this cutoff, the regulator does not monitor the target.

Fourth, my model assumes that the regulator wants to block any acquisition that increases the exposure of the deposit insurance fund. In reality, the regulator may allow acquisitions that increase risk to some extent. If I had made a similar assumption, couldn't the bank sufficiently reduce the riskiness of the post-acquisition combined entity by raising external capital and thus convince the regulator to approve the acquisition? Not necessarily. If the bank were to issue equity, investors would perform monitoring similar to that undertaken by the regulator. Given that the interests of the regulator and investors in my model are perfectly aligned, investors would be willing to provide equity financing only in those cases where the regulator would allow the acquisition. For simplicity, I therefore leave out this possibility. This is also consistent with the empirical observation that banks generally do not raise capital to finance acquisitions but do stock swaps instead.

[26] See Diamond and Rajan (2000).
[27] In fact, this interpretation is consistent with the fact that regulators at times impose Individual Minimum Capital Requirements (IMCRs), which are bank-specific capital requirements above the industry standard.

## 4. Data

To test the empirical predictions, I obtain transactions data from the Securities Data Corporation's ('SDC') U.S. Mergers and Acquisitions Database. Because my theory is based on a regulatory environment that stipulates an inverse relationship between bank capital and regulatory monitoring, I study acquisitions by banks that were subject to FDICIA, the law which explicitly links capital and the level of regulatory scrutiny. My sample consists of acquisitions between banks with SIC code 6021 (national commercial banks) and SIC code 6022 (state banks, member of the Federal Reserve), and excludes e.g. savings and loans institutions and foreign banks.[28] I exclude transactions involving non-bank targets, to ensure that both acquirer and target are subject to the same regulatory framework. I check Reuters and newspaper articles in Factiva to eliminate mergers of equals, because in those transactions it is not clear which party is the acquirer and which is the target. The acquirer had to be listed on NYSE, AMEX, NASDAQ or traded in the over-the-counter ('OTC') market. The OTC banks included in the sample are similar to the average NYSE/AMEX-listed bank in terms of size and do not drive the results. I exclude small acquisitions (transaction value less than $50 million), and branch sales because of their different nature.[29] I require that the merger was announced between January 1, 1993, and December 31, 2000. I chose 1993 as the starting year since FDICIA, though enacted in 1991, became only fully effective on December 19, 1992. Acquisitions announced after 2000 were eliminated because insufficient post-acquisition return data are available. Return data for acquirers had to be available from the Center for Research in Security Prices ('CRSP') from at least 120 days before the acquisition announcement until two years thereafter. Sufficient market value of equity and book value of equity data had to be available from CRSP and Compustat, respectively, to classify banks based on size and book-to-market in my long-run performance study. I obtain balance sheet data from Compustat. Of the 441 acquisitions in the SDC database, I am able to use 333.[30]

My theory examines the interaction between acquirer capital and regulatory monitoring, and their impact on post-acquisition performance. In my empirical study I therefore use regulatory capital ratio measures. FDICIA imposes three capital requirements: a tier 1 leverage

[28] The original SDC sample also included banks with SIC 6715 (bank holding companies), but these all turned out to have Compustat SIC 6021 or 6022.
[29] See, e.g., Hansen and Lott (1996), and Fuller, Netter and Stegemoller (2002).
[30] An earlier version of this paper used a smaller sample of 278 acquisitions. Upon checking the original SDC Platinum data manually, it became apparent that SDC Platinum at times shows pre-acquisition bank identifiers ('cusips') which had changed in Compustat and/or CRSP upon completion, and that some SDC Platinum cusips contain typos. I corrected these issues and was thus able to increase my sample size by 20% to 333.

ratio, a tier 1 risk-based capital ratio, and a total risk-based capital requirement.[31] Based on their actual capital levels, it classifies banks as well-capitalized, adequately capitalized; undercapitalized; significantly undercapitalized and critically undercapitalized (see Table 1 Panel A). FDICIA specifies that a bank needs to be adequately capitalized. If it is well-capitalized, it is freed from certain regulatory constraints. The further it falls below the adequately capitalized level, the more it becomes subject to regulatory scrutiny.[32] I use the two capital ratios provided by Compustat: the tier 1 risk-based capital ratio and the total risk-based capital requirement. The latter is the focus of Flannery and Rangan (2002).

Table 1 Panels B and C contain summary statistics on the number of acquisition announcements and acquirer capitalization (measured at fiscal year-end prior to the announcement) over time. The number of acquisition announcements is spread out relatively evenly over time and ranged from 26 in 1995 to 59 in 1998 and there is cross-sectional heterogeneity in capital ratios with in the sample. Tier 1 risk-weighted capital fell between 6.5% and 25.0%, and was 10.9% on average (median: 10.6%), and total risk-weighted capital ranged from 10.2% to 27.0% and was 13.5% on average (median: 13.0%). I break my sample up into capital ratio terciles and Panel D shows the cutoffs: any acquirer with tier 1 risk-weighted capital below 9.3% (above 11.9%) is classified as a low-capital (high-capital) acquirer. The cutoffs based on total risk-weighted capital are 12.1% and 14.1%, respectively.

Table 2 shows summary statistics per capital ratio tercile. Acquirers on average have total assets of $34.3 billion, market value of equity of $6.1 billion, a market-to-book ratio of 2.1,

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[31] *Tier 1 leverage ratio = tier 1 capital / total assets*, where *tier 1 capital* is defined as the sum of common equity, non-cumulative perpetual preferred stock, and minority interests in consolidated subsidiaries, minus all intangible assets other than mortgage servicing rights, minus identified losses, and minus investments in certain securities subsidiaries subject to 12 CFR 337.4. *Total assets* are defined as the average of total assets.
*Tier 1 risk-based capital ratio = tier 1 capital / risk-weighted assets*, where *tier 1 capital* is as defined above. *Risk-weighted assets* are constructed by assigning a bank's balance sheet assets and credit equivalent amount of off-balance sheet items to one of four broad risk categories (0%, 20%, 50%, or 100%) based on the perceived riskiness of the asset or off-balance sheet item. The aggregate dollar amount in each category is then multiplied by the risk-weight assigned to that category to determine risk-weighted assets. Any assets deducted from capital when computing the numerator of the risk-based capital ratio are also to be excluded from risk-weighted assets when computing the denominator of the ratio.
*Total risk-based capital requirement = qualifying total capital / risk-weighted assets,* where *qualifying total capital* consists of two types of capital: 'core capital' (tier 1) and 'supplementary capital' (tier 2). *Tier 1 'core' capital* is as defined above. *Tier 2 capital* is defined as the sum of the allowance for loan and lease losses (up to a maximum of 1.50% of gross risk-weighted assets through 12/30/92 and 1.25% of gross risk-weighted assets thereafter), cumulative perpetual preferred stock, long-term preferred stock (original maturity of at least 20 years), perpetual preferred stock, hybrid capital instruments including mandatory convertible debt securities, and term subordinated debt and intermediate-term preferred stock (original average maturity of five years or more). Tier 2 capital is limited to 100% of tier 1 capital. *Risk-weighted assets* are as defined above.

[32] Flannery and Rangan's (2002) evidence suggests that a bank needs sufficient capital to be able to undertake an acquisition. This limits my sample. However, there is heterogeneity in capital levels even among acquiring banks and regulatory scrutiny varies even across banks within this set.

return on assets of 1.22% and return on equity of 14.7%. The average transaction is $649 million. Low-capital acquirers are twice as large as the average acquirer, both in terms of total assets and market value of equity, but have similar market-to-book ratios and profitability. Their transactions are on average twice as large ($1,574 million). In contrast, high-capital acquirers are almost four times as small as the average acquirer, and have slightly higher market-to-book ratios and lower return on equity. They engage in the smallest transactions. I take these differences in acquirer size and transaction size explicitly into account to ensure that my results are driven by differences in capital ratios rather than other differences. Low-capital (High-capital) acquirers on average have 8.3% (14.0%) tier 1 risk-based capital and 11.8% (15.9%) total risk-based capital.

Panel D shows that 88% of my sample were stock transactions. Cash was used as the medium of exchange in only 7% of all acquisitions, and a mixture of cash and stock was used in five percent of the transactions. This supports the assumption in my theoretical model that acquisitions are stock financed.

## 5. Methodology

In Section 3, I developed a theory that yielded three predictions regarding the link between capital, post-acquisition performance and bank risk taking. In this section, I state these predictions as testable hypotheses. I also explain my main performance and risk-taking analyses.

### 5.1 Testable hypotheses

To formulate testable hypotheses based on my model, it is important to note three things. First, my model does not predict a continuous relationship between capital and performance, but rather a discontinuous U-shaped relationship with three distinct regions (see Figure 1). Moreover, my model produces no predictions regarding the relationship between capital and performance within each region. It does not predict, for example, that among any of the three capital groups, having more capital is associated with better post-acquisition performance.[33] It only predicts that extremely-high capital acquirers will show the best post-acquisition performance and high-capital acquirers the worst. I will therefore focus on the *average* performance of acquirers in each region. Second, my model shows that three acquirer capitalization regions exist, but provides no guidance regarding the empirical level of the two capital cutoffs ($cap^*$ and $cap^{**}$). I

[33] To properly reflect this, I should have drawn the relationship in the three regions not as solid lines as I did, but as three 'clouds' of observations.

therefore first split my sample into capital ratio terciles, but examine quintiles and deciles too to find out how well the empirical cutoffs match my theory's cutoffs. Third, it is well-known that banks (compared to non-financial firms) have relatively low capital levels on average (see, e.g., Macey and O'Hara, 2003). When I take the theory to the data, the actual capital levels of even the highest-capital banks may not exceed my model's second capital cutoff, and fall in my model's high-capital group ($cap^{*} < cap < cap^{**}$) rather than in the 'extremely-high capital' group ($cap > cap^{**}$). If so, I will observe only the left portion of the U and the hump: that is, I will find a negative relationship between capital and post-acquisition performance, and a positive relationship between capital and the increase in bank risk-taking. Note that observing such alternative relationships is consistent with the model, since the null hypothesis is that no relationship exists.

I now restate my model's predictions as testable hypotheses, and formulate accompanying null-hypotheses.

***Hypothesis 1: A U-shaped relationship exists between acquirer capital and post-acquisition performance. If the capital level of the highest-capital acquirers falls below my model's second capital cut-off,*** $cap^{**}$***, I only observe the left portion of the U and find a negative relationship between acquirer capital and post-acquisition performance.***
***Null-hypothesis: A bank's level of capital does not affect the quality of its acquisitions.***

***Hypothesis 2: A hump-shaped relationship exists between acquirer capital and the increase in post-acquisition risk taking. If the capitalization of the highest-capital acquirers is 'not high enough', I find a positive relationship between acquirer capital and the increase in post-acquisition risk-taking.***
***Null-hypothesis: A bank's level of capital does not affect post-acquisition risk taking.***

***Hypothesis 3: The presence of a large shareholder weakens the capital – post-acquisition performance relationship (i.e. it flattens the U-curve), and especially improves the performance of high-capital acquirers.***
***Null-hypothesis: The presence of a large shareholder has no impact on post-acquisition performance.***

To test these hypotheses, I analyze acquirers' long-run abnormal stock performance and accounting performance, and changes in bank risk taking. More specifically, I split the sample based on pre-acquisition acquirer capitalization and/or the presence of a large shareholder, and test whether acquirer abnormal stock returns and increases in risk taking are significantly different from zero and from each other in a way consistent with my model.

### 5.2. Long-run abnormal stock performance

Measuring long-run abnormal performance requires choosing an appropriate benchmark and testing for significance. However, no consensus has been reached in the literature on the best way to measure long-run abnormal performance. Three recent approaches are: rebalanced portfolio returns, buy-and-hold portfolio returns and calendar-time portfolio returns. I employ all three methods with adjustments to accommodate issues specific to the banking industry.

I examine abnormal stock performance of acquiring firms over a two-year period starting one month after the acquisition announcement date.[34] My main analysis uses rebalancing and buy-and-hold abnormal returns. These methods are similar in that both use the return on a size and book-to-market matched reference portfolio as the benchmark, and both typically exclude event firms when constructing reference portfolios to avoid benchmark contamination.[35] I exclude event firms (which I define as acquirers and targets) for a period of five years after the announcement date. This is consistent with Loughran and Ritter (2000), who advocate excluding event firms for a period that exceeds the period of analysis if the literature finds long-run abnormal performance beyond the analysis period. The merger and acquisition literature indeed does find underperformance beyond two years.

The key difference between the rebalancing approach and the buy-and-hold approach is in how they calculate the reference portfolio return. The rebalancing method first calculates the average return on all securities in a portfolio in each month, and then compounds this average return over the investment horizon:

$$R_{p,rebalance} = \prod_{t=s}^{s+T} \left[ 1 + \frac{\sum_{i=1}^{n_t} R_{it}}{n_t} \right] - 1,$$

where $s$ is the beginning period, $T$ is the investment horizon in months (24 in my analyses), $R_{it}$ is the return on security $i$ in month $t$, and $n_t$ is the number of securities in month $t$.

[34] The time between the announcement date and the completion date of acquirers in my sample lies between 3.3 and 8.4 months for 90% of the sample. The average (median) is 5.7 (5.5) months.
[35] Including event firms biases the results to finding zero abnormal returns (Loughran and Ritter, 2000).

The buy-and-hold method represents a passive, equally-weighed investment in all securities constituting the reference portfolio. It first compounds the monthly returns on securities in the portfolio, and then sums across securities:

$$R_{p,buy-and-hold} = \sum_{i=1}^{n_s} \frac{\left[\prod_{t=s}^{s+T}(1+R_{it})\right]-1}{n_s},$$

where $n_s$ is the number of securities traded in month $s$, the first month for the return calculation.

Long-run abnormal returns are calculated in both cases as:

$$AR_{iT} = R_{iT} - E(R_{iT}) = \prod_{t=s}^{s+T}(1+R_{it}) - \prod_{t=s}^{s+T}(1+R_{pt}),$$

where $AR_{iT}$ is the rebalanced or the buy-and-hold abnormal return and $R_{pt}$ is the rebalanced or the buy-and-hold reference portfolio return.

The advantage of the rebalancing method is that it allows the sample firm and the benchmark firms to change size and book-to-market portfolios over the investment horizon. Two commonly-cited criticisms of this method are that it is subject to the rebalancing bias and the new-listing bias. The rebalancing bias is caused by assuming monthly rebalancing to maintain equal weights. This inflates long-run reference portfolio returns, possibly because of bid-ask bounce and non-synchronous trading (Blume and Stambaugh, 1983; Roll, 1983; and Conrad and Kaul, 1993). The new-listing bias is caused by this portfolio return including firms that are newly listed after the initial formation of the portfolio. Since most of these firms are IPOs, which are known to underperform an equally-weighted index return, long-run portfolio returns are downwardly biased. The buy-and-hold return is not subject to the new-listing or the rebalancing bias, yet a disadvantage may be that banks remain in the same size and book-to-market portfolio over the entire investment horizon.

I employ both methods with two main modifications: my reference portfolios only contain banks, and I use an additional matching method. I do this for the following reasons. First, studies that use the rebalancing and buy-and-hold approach typically examine all industries but utilities and financial firms, and hence use return data on all firms (including or excluding utilities and financials) to construct benchmark portfolios. I examine a very specific set of firms, namely banks with SIC codes 6021 and 6022. It seems therefore more appropriate to use only banks with these SIC codes in constructing reference portfolios. To ensure, however, that my results are not driven by the choice of my benchmark, I also examine calendar-time abnormal returns where I use all firms as the benchmark (see Section 7.2). Second, the summary statistics

in Table 2 suggest that matching based on size and book-to-market may not be appropriate when analyzing bank acquisitions since book-to-market ratios are relatively similar despite significant size differences. In fact, 90% of my sample had book-to-market ratios between 0.32 and 1.20 one month before the acquisition announcement. Furthermore, it has been argued that geographic location significantly impacts bank performance (e.g. Cornett, McNutt and Tehranian, 2003; and Pilloff, 1996). In addition to size and book-to-market matching, I therefore also match based on size and geographic location. I use Pilloff's (1996) approach and divide the U.S. into six regions: the mid-Atlantic, southeast, northeast, north-central, southwest, and west.[36]

### 5.2.1. Creating reference portfolios

I create six size and book-to-market matched reference portfolios following Fama and French (1993), and twelve size and geographic location matched portfolios. The first step (size matching) is the same in both procedures.

I match banks based on size as follows. I calculate firm size (market value of equity calculated as the price per shares times the number of shares outstanding) in June of each year *t* for all banks. I use the median NYSE size to split NYSE, AMEX, NASDAQ and banks traded in the OTC market into two groups (small and big). The small group contains a disproportionate number of banks because most AMEX, NASDAQ and OTC banks are smaller than the NYSE median, yet their combined market value is relatively small: on average, small banks constitute 87% of all banks, but only 18% of total market value over the sample period. This is similar to Fama and French's (1993) finding for firms in general: they report that in 1991, 75% of all firms were classified as small, and their combined market value was 8% of all firms.

I match banks based on book-to-market in a similar fashion. I break NYSE banks into three book-to-market groups using the book value of common equity for the calendar year ending in $t - 1$ divided by the market value of equity at the end of December of $t - 1$. I use Fama and French's (1993) cutoffs: low (bottom 30%), medium (middle 40%) and high (top 30%). I then place AMEX, NASDAQ and OTC banks in the appropriate book-to-market portfolio.

In case of size and geographic location matching, I match banks first based on size (market value of equity), and then split the banks into the six regions detailed in footnote 9 based on each bank's state of incorporation as listed in Compustat.

[36] The regions contain the following states: mid-Atlantic: DC, DE, MD, NJ, NY, and PA; southeast: AL, FL, GA, KY, MS, NC, SC, TN, VA, and WV; northeast: CT, MA, ME, NH, RI, and VT; north-central: IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, and WI; southwest: AR, LA, OK, and TX; and west: AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA, and WY.

I construct six portfolios from the intersections of the two size and three book-to-market groups, and twelve portfolios from the intersections of the two size and six geographic location groups. Monthly equally-weighted returns are calculated on all portfolios from July of year *t* to June of *t* + 1, and portfolios are adjusted in June of *t* + 1.

When I follow this procedure, I end up with an empty reference portfolio for the large size, medium market-to-book category in a few months, because all banks in that category are engaged in merger activity. To prevent this, I assign the average portfolio return of the two other large size categories (low and high market-to-book) to this category.

### 5.2.2. Testing whether long-run abnormal returns are significant

Long-run rebalancing and buy-and-hold abnormal returns are positively skewed, and this positive skewness leads to negatively biased t-statistics (Neyman and Pearson, 1928; Pearson 1929; Barber and Lyon, 1997a). Inference can therefore not be based on the normality assumption. To eliminate the skewness bias, Lyon, Barber and Tsai (1999) advocate the use of a bootstrapped skewness-adjusted t-statistic:

$$t_s = \sqrt{n}\left( S + \frac{1}{3}\hat{\gamma}S^2 + \frac{1}{6n}\hat{\gamma} \right),$$

where $S = \dfrac{\overline{AR}_T}{\sigma\left(AR_T\right)}$, and $\hat{\gamma} = \dfrac{\sum_{i=1}^{n}\left(AR_{iT} - \overline{AR}_T\right)}{n\sigma\left(AR_T\right)^3}$.

In this equation, $\overline{AR}_T$ is the average abnormal return and $\sigma\left(AR_T\right)$ is the standard deviation of abnormal returns for a sample of n banks; $\sqrt{n}S$ is the conventional t-statistic, and $\hat{\gamma}$ is an estimate of the coefficient of skewness. Sutton (1993) shows that the use of this transformed t-statistic, developed by Johnson (1978), reduces the probability of type I errors.

A critical assumption underlying conventional bootstrapping is that abnormal returns of event-firms are independent. Mitchell and Stafford (2000), however, argue that major corporate events are not independent. One way to preserve the dependence structure of the data is to block-bootstrap the t-statistic (Horowitz, 2001). I divide the original data into overlapping blocks of size n/10, where n is the size of the original sample. I sample blocks randomly with replacement from the original sample and lay the blocks end-to-end in the order sampled, ensuring that the block-bootstrapped sample is at least of length n. I do this 2,000 times. I calculate the skewness-adjusted t-statistic in each of the 2,000 resamples and calculate the critical values based on the empirical distribution of these block-bootstrapped skewness-adjusted t-statistics. I use two-tailed

tests because I do not have any prior regarding whether the abnormal performance of various subsamples will be negative or positive.

### 5.3. Accounting study

An accounting study constitutes an alternative way to examine performance. I use two accounting measures of performance: return on assets and return on equity. I define return on assets as net income over total assets and return on equity as net income over shareholder equity, using the latest pre-completion accounting data. For each acquirer, I establish the median return over the two years pre-completion and over the two years post-completion. Following Healy, Palepu and Ruback (1991) I exclude the year of completion from my analysis, to control for one-time merger costs and accounting differences between the pooling and purchase method. I examine performance both on an unadjusted and an industry-adjusted basis, to ensure that performance changes are not driven by industry-wide factors. In the spirit of Cornett, McNutt and Tehranian (2003), I define an acquirer's industry-adjusted performance as its unadjusted performance minus the performance of non-acquiring peers of similar size and geographic location as the acquirer.[37] I impose that at least one year of pre-acquisition and post-acquisition data are available.

I measure acquirer pre-acquisition performance in two ways My first measure uses a 'pro-forma' approach: I calculate a weighted average of target and acquirer performance pre-acquisition using the two parties' relative asset size pre-acquisition as weights, and take this to be the acquirer's pre-acquisition performance (see, e.g., Healy, Palepu and Ruback (1991), Cornett and Tehranian (1992), and Cornett, McNutt and Tehranian (2003)). This measure is widely used in the literature and seems especially useful when comparing *changes* in performance. Using this measure, I have an accounting sample of only 137 acquirers due to limited availability of target data. My second measure uses only the acquirer's pre-acquisition accounting performance. This measure seems particularly appropriate when establishing *differences* in pre-acquisition performance between high-capital acquirers and low-capital acquirers. Using this measure, I obtain a larger accounting sample of 262 acquirers.

### 5.4. Bank risk taking

[37] Consistent with my long-run abnormal stock performance study, I use two asset size categories (acquirers are large (small) if their assets exceed (are less than) $10 billion) and six geographic regions (mid-Atlantic, southeast, northeast, north-central, southwest, and west.)

The banking literature uses various measures to assess different aspects of bank risk taking. Given that my model's predictions concern (the increase in) risk at an aggregate level, I examine four measures that capture overall bank risk taking: subordinated debt ratings, the yield spread on subordinated debt, asset return volatility, and a bank's distance to default.

The first two risk measures involve subordinated debt. Recent studies have established that subordinated debt may help to discipline excessive risk taking, because subordinated debt holders have a claim on the bank's cash flows that is junior to the claims of all other debtholders.

The first risk measure is a bank's subordinated debt rating. Banks in my sample may have subordinated debt outstanding, and this debt may be rated by a rating agency. Such a rating reflects the rating agency's opinion regarding the bank's ability to service its subordinated debt. I obtain Moody's rating data on subordinated debt issues for all the banks in my sample. I exclude subordinated debt issues if they were outstanding pre-acquisition but not post-acquisition (or vice versa). If a bank has multiple rated subordinated debt issues outstanding, I establish a weighted average subordinated debt rating using the issue sizes as weights.

The second risk measure is the yield spread on subordinated debt. Evidence from the 1990s suggests that changes in bank risk taking are reflected in the yield spread (see, e.g., Flannery and Sorescu, 1996; Covitz, Hancock and Kwast, 2003). I obtain Bloomberg data (matrix prices, coupon, coupon frequency, issue date, maturity date and call provisions) for all subordinated debt issued by acquirers in my sample, and Treasury yield data from the St. Louis Federal Reserve Bank's website for all available maturities (one month to 30 years). I calculate the average yield spread for each acquirer over the two years ending 30 days before the announcement date ('pre-acquisition yield spread'), and over a two-year period starting 30 days after the announcement date ('post-acquisition yield spread') using the following methodology. For each day for which Bloomberg has price data, I calculate the yield to maturity. I calculate the corresponding treasury yield by (linearly) interpolating between the two closest maturity matches. The yield spread is the yield to maturity minus the corresponding treasury yield. I calculate the average yield spread pre-acquisition and post-acquisition per subordinated bond issue. I obtain an acquirer's average pre-acquisition and post-acquisition yield spread by taking a value-weighted average of the average yield spreads of all subordinated bonds issued by that acquirer. I value-weight the acquirer-level yield spreads to derive the average yield spread of high-capital and low-capital acquirers.

The third risk measure is asset return volatility, which I calculate as in Flannery and Rangan (2002) by de-levering and annualizing a bank's equity return volatility. I obtain this

measure in three steps. I first calculate each bank's equity return volatility as the standard deviation of daily equity returns over a calendar quarter. I then de-lever this measure by multiplying it by the market value of equity divided by the market value of assets (using end-of-quarter data). Finally, I annualize this de-levered volatility measure by multiplying it by the square root of 250 (the approximate number of trading days in a year). Flannery and Rangan (2002) call this measure 'asset risk", although they note that it incorporates all sources of uncertainty about a firm's share value.

I establish each bank's pre-acquisition asset risk by averaging its asset return volatility over the eight quarters before (not including) the quarter in which the acquisition was announced. I measure post-acquisition asset risk as the average asset return volatility over eight quarters, starting the first quarter in the year after in which the acquisition became effective.[38] I then split the banks into capitalization terciles and examine the increase in post-acquisition asset risk per capital group. I define 'increase' in two ways: the actual increase (i.e. the difference between post-acquisition and pre-acquisition asset risk), and the relative increase (i.e. the actual increase divided by the pre-acquisition asset risk).

A potential criticism of an asset return volatility risk measure is that the regulator may not care about the actual level of risk, but worry about a bank's distance to default. My final risk measure therefore is the acquirer's distance to default. Distance to default is generally measured by a so-called Z-score, introduced by Altman (1968). The Z-score estimates the number of standard deviations below the mean by which profits would have to fall before equity becomes negative (Boyd, Graham and Hewitt, 1993): $Z = \frac{aveROA - ave(E/A)}{\sigma(ROA)}$, where aveROA is the average return on assets, ave(E/A) is the average equity over total assets, and $\sigma(ROA)$ is the bank's standard deviation of return on assets.. Thus, a higher Z-score implies a larger distance to default. A Z-score approach is frequently used in banking studies (see, e.g., Boyd, Graham and Hewitt, 1993), but has one undesired property: it combines a bank's risk taking and its capital in one measure. That is, if two banks hold equally risky portfolios but differ in their capitalization, the better-capitalized bank will have a larger distance to default. It is not possible to unlever the distance to default measure. Given that I want to examine how a bank's capital level impacts post-acquisition risk taking, and thus need a risk measure that allows me to separate the two, I only analyze changes in the distance to default.

[38] I exclude the year in which the acquisition became effective, because one-time merger write-offs and differences in accounting methods limit the comparability of results for that year. (See the accounting study in Section 6.2.)

I calculate each bank's pre-acquisition distance to default using accounting data over the eight quarters before the acquisition announcement, and its post-acquisition distance to default over eight quarters starting the year after the acquisition has become effective. I exclude banks for which any of the data items are missing and some apparent outliers (14 banks have pre-acquisition distance to default exceeding 200 standard deviations).

## 6. Main empirical analyses: long-run abnormal stock performance

I use the methodology outlined in the previous section to examine the relationship between acquirer capitalization and long-run post-acquisition abnormal stock performance, and the relationship between acquirer capitalization and the increase in post-acquisition risk taking. I first show results using a univariate approach. I then use a multivariate regression framework which allows me to control for other factors that may impact post-acquisition performance.

### 6.1. Base long-run results

Table 3 shows 2-year abnormal returns for the entire sample and acquirer terciles, using size and book-to-market matching, and size and geographic location matching. In Panel A, abnormal returns are true buy-and-hold abnormal returns (BHARs). This panel shows that acquirers in general significantly underperform their non-acquiring peers over a 2-year period. If matching is done based on acquirer size and book-to-market, such underperformance is -6.2%, whereas it is -5.0% based on size and location matching. High-capital acquirers consistently show the worst performance using either tier 1 risk-weighted capital (-12.0% and -11.0% depending on the matching method) or total risk-weighted capital (-11.9% and -10.8%, again depending on the matching method). Low and medium-capital acquirers show the best performance. Panel B shows that the difference between the BHARs of low and medium-capital acquirers is never significant. In contrast, the difference in mean 2-year BHARs of high and low-capital acquirers is significant, with high-capital acquirers underperforming low-capital acquirers by 8.0% to 9.4%. Panels C and D show results using rebalanced abnormal returns instead of BHARs. The picture that emerges is very similar, with even stronger underperformance by high-capital acquirers. (The difference in 2-year abnormal returns now ranges from 8.3% to 13.5%.)
In discussing the results, I refer to the first measure as 'weighted average' and the second measure as 'acquirer only'.

Table 9 shows the results using total risk-weighted capital as the capital measure. (Results are similar using tier 1 risk-weighted capital instead.) I show the results using both definitions of pre-acquisition performance, but given the similarity of the results, I focus my discussion on the first definition. Panel A shows that all acquirers have a median pre-acquisition and post-acquisition unadjusted return on assets of 1.24%. Low-capital acquirers show a slightly lower pre-acquisition median return on assets (1.21%), but their performance increases by 0.12% post-acquisition to 1.33%. High-capital acquirers, however, have higher pre-acquisition median return on assets (1.31%), but they show poorer post-acquisition performance: their return on assets decreases by 0.10% to 1.21%. The industry-adjusted return on assets figures show a very similar picture: though low-capital acquirers outperform their non-acquiring peers by only 0.02% whereas high-capital acquirers outperform their peers by a higher 0.13%, the industry-adjusted performance of low-capital acquirers improves post-acquisition whereas that of high-capital acquirers deteriorates. Panel B confirms this: though high-capital acquirers show a 0.11% higher industry-adjusted return on assets than low-capital acquirers pre-acquisition, they show a 0.05% lower industry-adjusted performance post-acquisition. Though the differences are not significant using the first definition of pre-acquisition performance, it can be seen that using the second definition high-capital acquirers did significantly outperform low-capital acquirers in the pre-acquisition period.

The return on equity numbers convey a mixed story when investigating performance in the pre-acquisition period, but show similar results when examining performance changes (see Panels C and D). On an unadjusted basis, high-capital acquirers show better pre-acquisition performance than low-capital acquirers using the weighted average measure, but poorer performance using the acquirer only measure. On an industry-adjusted basis their performance is also worse. However, the performance of high-capital acquirers deteriorates post-acquisition whereas that of low-capital acquirers improves. Based on the second definition of pre-acquisition performance, high-capital acquirers significantly underperform low-capital acquirers post-acquisition. The change in return on equity of high-capital and low-capital acquirers may have been caused mechanically by changes in leverage at the time of the acquisition. If high-capital (low-capital) acquirers have higher (lower) equity ratios post-acquisition than pre-acquisition, their return on equity would deteriorate (improve) automatically. Panel E investigates this. It shows the equity ratios of high-capital and low-capital acquirers in the pre-acquisition period, at the time of the announcement and post-acquisition. Interestingly, high-capital acquirers have slightly lower equity ratios post-acquisition than pre-acquisition, whereas low-capital acquirers

have slightly higher equity ratios. Thus, the return on equity of high-capital acquirers is worse post-acquisition despite a lower equity base, and the return on equity of low-capital acquirers is better post-acquisition despite a higher equity base.

The long-run stock return and accounting results reject the null-hypothesis that capital is irrelevant. I find a negative relationship between acquirer capital and post-acquisition performance: high-capital acquirers significantly underperform low-capital acquirers in the long run. This is consistent with my theory, which predicts a U-shaped relationship between capital and performance: the capitalization of the highest-capital acquirers in my sample apparently does not exceed $cap^{**}$, meaning that their capital levels are not "high enough" to observe the right side of the U. To ensure that splitting the data into terciles does not inadvertently conceal excellent performance of the highest-capital acquirers, I also split the data into quintiles and deciles. Again, I find that the top quintile and decile show the poorest long-run abnormal performance. (Not shown.) Thus, I consistently find support for my theory, with high-capital acquirers underperforming low-capital acquirers.

### 6.3. The presence of a large shareholder

Table 4 shows how the presence of a large shareholder impacts the long-run abnormal stock performance of acquirers. I define a large shareholder as a shareholder who beneficially owns at least 5% of the acquirer's total shares outstanding at the time of the merger announcement. I obtain the data from the CDA Spectrum 5 database (using the June and December CD-Roms), and supplement the data where needed based on acquirers' proxy statements. I refer to banks with a large shareholder as having "concentrated ownership" and those without a large shareholder as having "dispersed ownership". Panel A shows that 24% of the acquirers in my sample have dispersed ownership. By constructions, these banks have no 5% owner. The remaining 76% of the sample has concentrated ownership: these acquirers have on average 2.2 5% owners. Acquirers with dispersed ownership on average hold more capital than those with concentrated ownership (12.0% versus 10.6% tier 1 risk-weighted capital; and 14.2% versus 13.3% total risk-weighted capital).

Panels A and B show that acquirers with dispersed ownership show significantly lower 2-year buy-and-hold returns than acquirers with concentrated ownership: the BHARs of acquirers without a large shareholder are -15.2% versus -3.4% (based on size and book-to-market matching), and -12.2% versus -3.1% (based on size and geographic location matching). Though high-capital acquirers show the worst performance regardless the level of ownership

concentration, the difference in performance of high-capital and low-capital acquirers is only significant among acquirers with dispersed ownership based on tier 1 risk-weighted capital and size and location matching. (Underperformance is 16.4% in this case.) Panel B also shows that when splitting the data first based on acquirer capitalization, high-capital acquirers with concentrated ownership perform significantly better than high-capital acquirers with dispersed ownership, with high-capital acquirers without a large shareholder underperforming those with a large shareholder by 7.8% to 11.4%.

The results clearly reject the Null Hypothesis that capital does not matter, and support my prediction that the presence of a large shareholder weakens the impact of capital on post-acquisition performance, especially for high-capital acquirers. The presence of a large shareholder improves acquirer performance, and this effect is stronger for high-capital acquirers.

### 6.4. Controlling for other factors

Thus far, I have analyzed how capital, regulatory monitoring and shareholder monitoring impact post-acquisition performance in a univariate framework. I now use a multivariate regression approach, which allows me to control for other factors that may influence the market's initial reaction and the long-run performance of bank mergers: size, method of payment, type of acquisition, active acquirer, misvaluation, diversification, prior profitability, portfolio risk, insider ownership, and omitted variables.

***Size***: Three aspects of size may impact merger performance. First, scale economies seem to exist for financial institutions with less than $100 million in assets. Positive abnormal performance may reflect such scale economies. Given that only a handful of acquirers in my sample have assets below this threshold, I ignore scale economies. Second, James and Wier (1987) show that the larger the target is relative to the acquirer, the more positive the abnormal returns are to the bidder. I therefore include the relative size of the target and acquirer. I measure relative size as the log of the transaction value divided by the acquirer's market value of equity 30 days before the announcement date. Third, some banks may be too big to fail (O'Hara and Shaw, 1990). These banks will have an incentive to increase their riskiness to enjoy higher expected returns. Mergers may only exacerbate such behavior. I control for too-big-to-fail by including the log of total assets of the acquirer.

***Method of payment***: Numerous studies have established that both the announcement returns and long-run abnormal returns are higher for cash acquirers than for stock acquirers (see, e.g., Travlos (1987), and McCabe and Yook (1997)). I include a dummy to indicate whether the

acquirer pays cash and a dummy to indicate whether the acquirer pays stock. This does not lead to overspecification, since acquirers can also pay with a mixture of cash and stock.

***Active acquirer***: Asquith, Bruner and Mullins (1983) find that active acquirers earn positive abnormal announcement returns. I include a dummy to indicate whether a bank has made at least one acquisition announcement in the two years prior to an announcement.

***Misvaluation***: Recent papers provide evidence that misvaluation affects merger performance (Rhodes-Kropf, Robinson and Viswanathan (2003), and Dong, Hirshleifer, Richardson and Teoh (2002)). These papers use the acquirer's book-to-market ratio as an overvaluation measure, while indicating that this may not be a clean measure of overvaluation as firms with low book-to-market ratios may simply have high growth opportunities. I therefore use the acquirer's book-to-market ratio (book value of stockholder equity of the fiscal year prior to the announcement divided by the acquirer's market value of equity 30 days prior to the announcement) as a measure of misvaluation.

***Diversification***: Previous research finds that diversification matters. For example, Morck, Shleifer and Visnhny (1990) find that focusing mergers enhance value and diversifying mergers destroy value. Others find, however, that diversifying mergers do create value (Hubbard and Palia, 1999). DeLong (2001) examines both geographic and activity focusing, and finds that firms that increase both their geographic focus and their activity focus create the most value. I follow DeLong (2001) and classify mergers as geographic focusing if both the acquirer and target are headquartered in the same state. By this measure, 40% of the mergers in my sample are focus-enhancing. This approach ignores the fact that an acquirer may already be active in the target's state of incorporation. I do not examine activity focusing: given that all acquisitions in my sample involve acquirers and targets with SIC codes 6021 and 6022, enhancing activity focus is unlikely to be a key factor for my sample. Besides, the data requirements (sufficient pre-acquisition daily returns for acquirer-target pairs) are such that I would lose a considerable part of my sample if I used this as a sorting criterion.

***Prior profitability***: Banks with high past profitability could be well-run banks that are also likely to show high future profitability. I control for this by including a three-year historical average return on assets and equity (net income divided by total assets and net income divided by stockholder equity, respectively).[39]

[39] Results are qualitatively similar if I use net income from continuing operations rather than net income.

***Portfolio risk***: Differences in abnormal performance may reflect differences in portfolio risk. High-capital acquirers could e.g. enjoy greater abnormal returns than low-capital acquirers simply because their activities are riskier. I control for risk by including two parameters. The first measure is the asset risk measure I also use in analyzing the capital –risk taking relationship. The second risk measure is the 3-year historical average level of non-performing assets over total assets. Berger, King and O'Brien (1991) show that this ex-post performance measure helps predict future performance problems.

***Insider ownership***: Various studies establish that insider ownership affects firm performance, although some differences in opinion seem to exist regarding the exact functional form of this relationship. Morck, Shleifer and Vishny (1988) create three variables that reflect different levels of insider ownership and find that valuations rise when insider ownership is low (<5%) or high (>25%), but decline for intermediate ownership levels.[40] Gorton and Rosen (1995) use a semi-parametric approach and a quadratic specification. Berger and Bonaccorsi di Patti (2004) allow for non-monotonicity by including first-, second- and third-order terms. In my analysis, I follow Morck, Shleifer and Vishny (1988), and use Berger and Bonaccorsi di Patti's (2004) approach as a robustness check.

***Omitted variables***: I may have left out important macroeconomic or other variables that impact merger performance. I capture this by adding year dummies.

I check the correlation between the two risk measures and the two profitability measures to detect signs of multicollinearity. Given that the correlation between asset risk and nonperforming assets is low and negative (-0.37), I include both measures jointly in the regression. Given the high and positive correlation between the two profitability measures (0.82), I use ROA and ROE separately in regressions. I also examine the correlation between the presence of a large shareholder and insider ownership. The correlation coefficient is low (0.19), suggesting that I can use both in my regression analysis.

I use three regression specifications. In the first specification, I regress the acquirers' long-run abnormal performance measures on acquirer capital (tier 1 risk-weighted capital or total risk-weighted capital). In the second specification, I add a dummy indicating whether a large shareholder is present, and a term interacting the presence of a large shareholder with a high-

[40] The three variables are: *insider ownership (< 5%)* equals actual insider ownership if ownership is less than 5%, and equals 5% if ownership exceeds 5%; *insider ownership (5% - 25%)* equals 0 if insider ownership is less than 5%, equals actual insider ownership minus 5% if ownership falls between 5% and 25%, and equals 20% if ownership exceeds 25%; *insider ownership (>25%)* equals 0 if ownership is less than 25%, and equals actual insider ownership minus 25% if ownership exceeds 25%.

capital dummy. My model predicts that the coefficient on acquirer capital is negative (as high-capital acquirers are predicted to display the poorest performance), and that the coefficients on the large shareholder dummy and the interaction term are positive (as the presence of a large shareholder weakens the impact of capital, especially for high-capital banks. In my final specification, I control for the above-described factors by running the following regression:

Abnormal performance = $\alpha$
+ $\beta 1$ * capital measure
+ $\beta 2$ * large shareholder dummy
+ $\beta 3$ * large shareholder dummy * high-capital dummy
+ $\beta 4$ * relative size
+ $\beta 5$ * cash dummy
+ $\beta 6$ * stock dummy
+ $\beta 7$ * active acquirer dummy
+ $\beta 8$ * market-to-book
+ $\beta 9$ * geographic focus dummy
+ $\beta 10$ * asset risk
+ $\beta 11$ * non-performing assets
+ $\beta 12$ * prior profitability
+ $\beta 13$ * insider ownership (< 5%)
+ $\beta 14$ * insider ownership (5% - 25%)
+ $\beta 15$ * insider ownership (> 25%)
+ ($\beta 16$ to $\beta 12$) * year dummies for 1994 to 2000,

where abnormal performance is the 3-day CAR established using the equally-weighted or the value-weighted CRSP market index or the equally-weighted or value-weighted bank index (short-run analysis); or the 2-year BHAR estimated using size and book-to-market matching or size and location matching (long-run analysis).

Table 5 contains the regression results using total risk-weighted capital as capital measure, return on equity as profitability measure and Morck, Shleifer and Vishny's (1988) definition of insider ownership. The first two columns contain the results based on the simplest regression specification. The results show that a significantly negative relationship exists between long-run abnormal performance and acquirer capitalization, regardless the matching method used to estimate abnormal performance. The third and fourth column confirm the negative relationship between capital and long-run abnormal performance, and show that the

presence of a large shareholder significantly improves long-run abnormal performance (size and book-to-market matching only; the coefficient is insignificant using size and location matching). The coefficient on the interaction term is insignificant, but does have the expected sign, meaning that concentrated ownership positively impacts acquirer performance especially when the acquirer is well-capitalized.

In the next four columns, I control for all the factors identified above (the fifth and sixth column do not contain year dummies, whereas the last two columns do contain year dummies). I find that long-run performance is significantly better when the acquirer has a higher market-to-book ratio and if insiders hold between 5% and 25% of all shares, but is significantly worse if the target is relatively large, and if asset risk is high. The main result, however, is that I continue to find a significantly negative relationship between capital and long-run post-acquisition performance. The coefficients of the large shareholder dummy and the interaction term are insignificant, but do have the expected signs.

The results are similar when I use return on assets as profitability measure and when I use Berger and Bonaccorsi di Patti's (2004) specification for insider ownership (not shown). When I use tier 1 risk-weighted capital as capital measure, the results are qualitatively the same except that the coefficient on capital is not significant anymore. One could argue, however, that total risk-weighted capital may be more relevant to the regulator than tier 1 risk-weighted capital, given the regulator's concern about the exposure of the deposit insurance fund: total risk-weighted capital measures a bank's entire capital cushion, whereas tier 1 risk-weighted capital only measures the equity portion.

The evidence I have shown so far indicates that a negative relationship exists between capital and post-acquisition performance. I now perform a simple analysis to find at least some support for a U-shaped relationship by limiting my attention to acquirers with the highest capital levels (top tercile, top 20% and top 10%). I regress the long-run abnormal stock returns on the level of capital. Though the coefficient on capital is negative and significant using the sample as a whole or the top capitalization tercile, I find that when I use only the top 20% or 10% of all acquirers, the coefficient is negative but insignificant. This provides weak evidence for the U-shaped relationship between capital and performance predicted by my theory.

I conclude that the regression results confirm the univariate results. First, acquirer capitalization helps to explain acquirer performance, especially in the long run. Though high capitalization is looked upon neutrally by the market at the time of the announcement, even if I control for other factors that could explain merger performance, I still find that high-capital

acquirers show significantly worse post-merger performance. And second, the presence of a large shareholder weakens the impact of capital, especially for high-capital banks. Furthermore, though most findings point at a negative relationship between capital and post-acquisition performance, I find some evidence that the relationship may in fact be U-shaped.

### 6.5 Increase in risk taking

My theory predicts a hump-shaped relationship between capital and the increase in risk post-acquisition. The risk findings support my theory.

Slightly over 40% of all acquisitions in the sample (138 out of 333) were undertaken by banks that had in total 438 subordinated debt issues outstanding in both the pre-acquisition and post-acquisition period. High-capital acquirers undertook roughly 30% of these acquisitions (43), and averaged a subordinated debt rating between A and A+ at the time of the acquisition announcement (median: A+). Low-capital acquirers undertook approximately 50% of these acquisitions (70), and averaged a subordinated debt rating slightly below BBB- (median: BBB+). Interestingly, none of the 438 subordinated debt issues were upgraded or downgraded during the two-year period after the acquisition was announced. This suggests that according to Moody's, the acquisitions did not materially improve or deteriorate the banks' ability to service their subordinated debt issues. While these results do not provide support for the theory, they are likely to be in part due to the stickiness of ratings.

Out of the 115 subordinated debt issues identified by Bloomberg, I have sufficient data for 74 subordinated debt issues, which were issued by acquirers associated with 33 acquisitions. This limited availability of data precludes a meaningful analysis.

Figure 2 shows the increase in asset return volatility. While low-capital acquirers increase their risk profile the least (0.34%) and high-capital acquirers raise the riskiness of their activities the most (1.43%), acquirers with the highest capital levels seem to increase their risk slightly less. A simple regression analysis supports this. When I regress the increase in asset risk on the actual level of acquirer capital, I find that the coefficient on capital is positive, but insignificant (not shown). When I limit the analysis to the top tercile (or top 20% or top 10%), the coefficient on capital is again insignificant, but negative. The results thus seem to suggest that a U-shaped relationship exists between capital and the increase in asset return volatility.

Figure 3 shows increase in the distance to default. My theory predicts that a hump-shaped relationship exists between capital and the increase in risk taking. Given that a higher distance to default means lower risk taking, I should find a U-shaped relationship between capital and the

increase in the distance to default. The results are broadly consistent with my theory: acquirers with the very highest capital levels increase their risk less than their slightly lesser-capitalized counterparts.

In sum: data availability issues caused me to use three (out of the intended four) risk measures to examine the relationship between capital and risk taking. I find support for my theory based on two measures – asset return volatility and distance to default. My findings suggest that a hump-shaped relationship exists between capital and risk taking. While high-capital acquirers increase their risk more than low-capital acquirers, acquirers with the highest capital levels seem to increase their risk less than their lesser-capitalized counterparts.

## 7. Robustness results

My main analyses have established that high-capital acquirers significantly underperform low-capital acquirers in the long-run. I now perform three robustness checks. First, my results are based on including only banks in the reference portfolios, and by focusing on rebalanced and buy-and-hold abnormal returns, which are known to be skewed. I now use a calendar-time portfolio approach using all firms as the benchmark to examine whether the average monthly return of high-capital acquirers over a two-year period is also significantly lower than that of low-capital acquirers. Second, I examine whether my results may be caused by a free cash-flow problem among high-capital acquirers. And third, my finding could be driven by small banks, implying that my results may be statistically but not economically significant. I split the sample based on size to examine the economic significance of my finding.

### 7.1. Robustness check 1: Calendar-time portfolio results

My long-run stock performance results have so far been based on rebalanced and buy-and-hold abnormal returns, which I calculated using banks in the reference portfolio. I established that acquiring banks underperform non-acquiring banks over the two years following the acquisition, and that high-capital banks underperform low-capital acquirers. Alternatively, I could have asked whether high-capital banks persistently earn poorer abnormal monthly returns than low-capital acquirers during this two-year period, and whether they do so relative to all firms. The calendar-time portfolio approach allows me to address this question. Fama (1997) indicates that in a calendar-time approach, abnormal returns can be estimated using a reference portfolio or an asset

pricing model.[41] Lyon, Barber and Tsai (1999) argue that a reference portfolio may be preferred because the three-factor model's implicit assumption of linearity in the three factors may be violated, and there may be interaction between the three factors. They also show that empirical rejection levels for test statistics are more conservative using this method. I therefore use a reference portfolio approach.

Each month, I calculate the average abnormal return of all banks that announced an acquisition in the last two years by deducting the returns on six size and book-to-market reference portfolios, using the return data on all firms provided on Fama's website. Given that I need to include all banks that announced an acquisition in the preceding two years and do not want to include acquisition announcements from the pre-FDICIA era, I start my calendar-time portfolio calculations in January 1995. In each calendar month, I calculate the mean abnormal return ('MAR') across all banks in the portfolio (i.e. all banks which announced an acquisition over the preceding two years), and for each capitalization tercile:

$$MAR_t = \sum_{i=1}^{n_t} x_{it}\left(R_{it} - R_{pt}\right),$$

where $n$ is the number of banks in the portfolio in month $t$, and $x_{it}$ is a weight which can be $1/n_t$ (equally-weighted abnormal returns) or $MV_{it} / \sum MV_{it}$ (value-weighted abnormal returns). I calculate a mean monthly abnormal return ('MMAR') over a 2-year holding period by averaging 24 subsequent mean abnormal returns. Thus, the first (last) two-year mean monthly abnormal return is calculated by averaging the mean abnormal returns from December 1994 through November 1995 (January 1999 through December 2000).[42] I end up with 49 two-year mean monthly abnormal return figures. I test the null-hypothesis that each of these two-year mean monthly abnormal returns is zero using the following t-statistic:

$$t_{MMAR} = \frac{MMAR}{\sigma\left(MAR_t\right)/\sqrt{24}},$$

and calculate the percentage of statistically significant MMARs (Barber, Lyon and Tsai, 1999).

Table 10 shows the results of this analysis per capitalization tercile. The Table shows that the percentage of statistically significant mean monthly abnormal returns is either zero of low for high-capital banks and far higher for low-capital banks. This holds regardless of whether I use equally-weighted or value-weighted portfolios of all banks that announced an acquisition during

[41] Loughran and Ritter (1995), and Brav and Gompers (1997), e.g., use a calendar-time portfolio approach based on the Fama-French (1993) three-factor model.

[42] Alternatively, I could have repeated the procedure until December 2002, but that would involve using mergers announced in 2001 and 2002, which are not included in my sample.

the preceding two-year period, and regardless of whether I test significance of individual mean monthly abnormal returns at the 10%, 5% or 1% level. This result may sound counterintuitive, as I find higher abnormal performance for low-capital banks rather than for high-capital banks. However, it is important to mention that virtually all abnormal performance in this analysis is positive abnormal performance. This is consistent with the general observation that the banking industry on average outperformed non-banks in the 1990s. Thus, the calendar-time portfolio approach shows that high-capital banks underperform low-capital banks, which is consistent with my earlier findings.

### 7.2. Robustness check 2: Not a free cash-flow story

My theory shows that a U-shaped relationship exists between capital and post-acquisition performance. A critic may say, however, that my theory may be wrong, and that my findings ('high-capital acquirers show the worst underperformance') are consistent with Jensen's (1986) free cash-flow story ('agency problems are most severe at high free cash-flow banks') as they can finance these value-destroying investments without having to raise external capital. I now examine whether my results may be a free cash-flow effect rather than a combined capital/monitoring effect.

Note first that the incentives of the manager in my model actually *improve* in the level of capital. The only reason an incentive problem arises is the interaction between the incentive effect of capital and the regulator's decision about who to monitor: high-capital banks make worse acquisitions than low-capital banks because the regulator does not monitor these banks, mistakenly believing that their capital is high enough to give their managers the right incentives. But again, if my theory is wrong, this is not convincing evidence. Let me therefore turn to the empirical support. Interestingly, 88 percent of all acquisitions in my sample do not involve cash but are stock swaps, meaning that high-capital and low-capital acquirers have similar resources. Next, I examine whether high-capital acquirers are high free cash-flow banks. Free cash-flow in banking is generally defined as net income because depreciation levels are low. I have the percentage of capital of banks in my sample, not the dollar amounts. I therefore use a scaled version of free cash-flow also: net income over total assets (ROA). I find that the correlation between tier 1 risk-weighted capital (total risk-weighted capital) and ROA is 0.1248 (0.0276). Both correlations are low, indicating that high-capital banks are not the high free cash-flow banks. And finally, if my results were driven by free cash flow effects, high-capital banks should not just show poorer stock performance and accounting performance post-acquisition, but also in

the pre-acquisition period. In fact, I find the exact opposite. High-capital acquirers show similar or better accounting performance (see Secton 6.1) and stock performance (not shown) than low-capital acquirers over the two years before the acquisition. Based on this evidence, I conclude that my results are not driven by free cash-flow problems.

### 7.3. Robustness check 3: Large versus small banks

If my finding that high-capital acquirers underperform low-capital acquirers is confined to small acquirers, the result is statistically significant, but has relatively little economic significance. I therefore split the sample into above and below median size acquirers, where size is defined as the market value of equity 30 days prior to the merger announcement.

Table 13 Panel A clearly shows that among large acquirers, high-capital acquirers are the worst performers, with 2-year BHARs ranging from -12.8% to -15.5% depending on the matching method (size and book-to-market matching versus size and geographic location matching) and the definition of capital used (tier 1 risk-weighted capital versus total risk-weighted capital). Among the small acquirers, high-capital and low-capital acquirers generally show similar performance. More importantly, Panel B indicates that high-capital acquirers significantly underperform low-capital acquirers only among large banks. I therefore conclude that my result that high-capital acquirers underperform low-capital acquirers is both statistically and economically significant.

## 8. Conclusion

This paper examines the interaction between three corporate governance mechanisms – bank capital, regulatory monitoring and large shareholder monitoring – and their impact on a bank's post-acquisition risk taking and performance. I establish that bank capital and monitoring are partial substitutes in controlling the bank's acquisition behavior and affecting post-acquisition performance and risk taking. Consistent with my model, I find that high-capital acquirers are the worst performers and underperform low-capital acquirers in the long-run. The presence of a large shareholder improves the average quality of acquisitions undertaken by high-capital banks. If a large shareholder is present, high-capital acquirers and low-capital acquirers exhibit similar performance. Long-run underperformance is most severe among those acquirers that lack both regulatory monitoring and large shareholder monitoring. Moreover, risk-taking exhibits a hump-shaped relationship with respect to capital. Low-capital acquirers increase risk the least, high-

capital acquirers increase risk the most, and the highest-capital acquirers increase risk less. This prediction too is empirically supported for most risk measures.

These results hold in univariate and multivariate regression frameworks regardless the method used to estimate abnormal returns and risk. An accounting study yields results that are consistent with the stock return findings. I establish that my results are not driven by a free cash-flow problem of high-capital acquirers. A comparison of large versus small acquirers suggests that my results are not just statistically but also economically significant.

My paper exposes a potential weakness in the current link between capital and regulatory monitoring under FDICIA when the regulator is imperfectly informed about private control benefits of bank managers. It furthermore highlights the importance of pillar 3 ('market discipline') of Basel II. A final policy implication can be extracted by viewing my findings from a 'law and finance' perspective. La Porta et al. (1998) analyze how investor protection laws differ across countries, and conclude that when the regulatory environment protects investors poorly, ownership concentration becomes a substitute for legal protection. Ownership concentration is less important when investor protection is strong. My results suggest that in banking, ownership concentration matters even when investor protection is strong because ownership concentration becomes a substitute for legal protection if the bank regulator's monitoring policy has a potential to fail.

## Appendix: Proofs

### *Proof of Proposition 1*

The manager will not undertake a bad acquisition if the existing shareholders' drop in equity value plus the expected control benefit is negative:
$(p-1)\left[MVE_{A,pre}+MVE_{T,pre}\right]+p(1-\eta)S+pC<0$. This can be rewritten as:

$$MVE_{A,pre}>\frac{p\left[(1-\eta)S+C\right]+(p-1)MVE_{T,pre}}{1-p}.$$

Given that the regulator does not care about market values per se, but focuses on the percentage of book equity, I restate the above condition using $BVE=\frac{MVE}{M/B}$ and $\%BVE=\frac{BVE}{TA}$, where BVE is the book value of equity, M/B is the market-to-book ratio, %BVE is the percentage of book equity and TA stands for total assets. Thus, the manager does not acquire the bad target if:

$$\%BVE>cap^{*}=\frac{p\left[(1-\eta)S+C\right]+(p-1)MVE_{T,pre}}{(1-p)(M/B)TA}.$$ ■

### *Proof of Proposition 2*

It is obvious that the regulator will not investigate an acquisition proposal when the acquirer's capital equals $cap_{A,pre}>cap^{*}$, because a bank with this capital level will voluntarily not undertake a bad acquisition, so investing X in investigating such an acquisition is just a net loss.

When $cap_{A,pre}\le cap^{*}$, the manager has an incentive to acquire the bad target. The regulator investigates if the expected loss to the deposit insurance fund absent monitoring exceeds the expected loss with monitoring. If the target it bad, the combined entity is worth 0 with probability $(1-p)$, in which case the deposit insurance fund is obliged to pay depositors the value of their deposits, $(D_A+D_T)$. Recalling that $\gamma$ is the regulator's prior that the target is good, the *expected* loss to the deposit insurance fund if the regulator does not investigate equals $(1-\gamma)(1-p)(D_A+D_T)$. If the regulator does investigate, the expected loss is $\Pr(\text{signal}\,\Sigma=G\mid\text{target}=B)(1-\gamma)(1-p)(D_A+D_T)+X$, i.e. the probability that the regulator inadvertently approves a bad acquisition times the expected loss to the deposit insurance fund in case of such an acquisition plus the monitoring cost.

The regulator investigates if:

$(1-\gamma)(1-p)(D_A + D_T) > \Pr(\text{signal}\,\Sigma = G \mid \text{target} = B)(1-\gamma)(1-p)(D_A + D_T) + X$, which simplifies to: $\{1 - \Pr(\text{signal}\,\Sigma = G \mid \text{target} = B)\}(1-\gamma)(1-p)(D_A + D_T) > X$. Given that $\{1 - Pr(signal\ \Sigma = G \mid target = B)\}$ equals $Pr(signal\ \Sigma = B \mid target = B) = \sigma$, this simplifies to the rule that the regulator investigates if $\sigma(1-\gamma)(1-p)(D_A + ) > X$. ■

***Proof of Proposition 3***

Consider extremely high-capital acquirers first. Capitalization of these banks equals $cap_{A,pre} > cap^{**}$, which means that they have no incentive to make the bad acquisition. They will only undertake good acquisitions regardless of whether or not a large shareholder is present.

Consider low-capital acquirers next. Since the capital level of low-capital banks is $cap_{A,pre} < cap^{*}$, these banks have an incentive to undertake the bad acquisition, but can only do so if both the regulator and the large shareholder make a type II error. Absent a large shareholder, the regulator is the only monitoring device. If the regulator monitors, the quality of approved acquisitions equals:

$$Pr(target = G \mid signal\ \Sigma = G) = \frac{\sigma * \gamma}{\sigma * \gamma + (1-\sigma) * (1-\gamma)} = \gamma_{p1} > \gamma .$$

If a large shareholder is present and both monitor, the quality of approved acquisitions is:

$$Pr(target = G \mid both\ signals\ \Sigma\ are\ G) = \frac{\sigma * \gamma_{p1}}{\sigma * \gamma_{p1} + (1-\sigma) * (1-\gamma_{p1})} = \gamma_{p2} .$$

It follows immediately from $\gamma_{p1} > \gamma$ that $\gamma_{p2} > \gamma_{p1}$. Hence, low-capital acquirers make better acquisitions with concentrated ownership than with dispersed ownership.

And, finally, consider high-capital acquirers (with $cap^{*} < cap_{A,pre} < cap^{**}$). These banks have an incentive to undertake the bad acquisition, but the regulator does not monitor because lacking knowledge of the precise level of the manager's private control benefit, it believes that capital is "high enough". Thus, absent a large shareholder, no monitoring takes place. A large shareholder, however, is better informed about the true private control benefit than the regulator, and realizes that the manager may have an incentive to undertake a bad acquisition. Thus, if a large shareholder is present and monitors, the average quality of approved acquisitions is:

$$Pr(target = G \mid signal\ \Sigma = G) = \frac{\sigma * \gamma}{\sigma * \gamma + (1-\sigma) * (1-\gamma)} = \gamma_{p1} > \gamma .$$

Hence, the quality of acquisitions undertaken by high-capital banks is higher with concentrated ownership than with dispersed ownership.

It is easy to show that $\gamma_{p1} - \gamma > \gamma_{p2} - \gamma_{p1}$, meaning that the improvement in the quality of acquisitions undertaken by high-capital acquirers is larger than the improvement in the quality of the acquisitions made by low-capital acquirers. Hence, the presence of a large shareholder has the largest impact on high-capital acquirers. ■

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## Table 1: Summary statistics on acquirer capitalization

The sample consists of 333 bank acquisitions announced between January 1993 and December 2000. The sample is divided into capitalization terciles based on two capital measures: tier 1 risk-weighted capital and total risk-weighted capital. Panel A shows the capitalization categories FDICIA introduced, which were published on 9/15/1992 and became effective 12/19/1992. Panels B and C show how acquirer tier 1 capital and total risk-weighted capital at the time of the announcement has developed over time. Panel D shows the (tier 1 risk-weighted and total risk-weighted) capital cutoffs used to classify banks as high-capital, medium-capital and low-capital acquirers.

**Panel A: FDICIA capitalization categories**

| Capital category | Tier 1 leverage ratio | Tier 1 risk-based capital ratio | Total risk-based capital ratio |
|---|---|---|---|
| Well capitalized | ≥ 5% | ≥ 6% | ≥ 10% |
| Adequately capitalized | ≥ 4% | ≥ 4% | ≥ 8% |
| Undercapitalized | ≥ 3% | ≥ 3% | ≥ 6% |
| Significantly undercapitalized | < 3% | < 3% | < 6% |
| Critically undercapitalized | Ratio of tangible equity to total assets ≤ 2% | | |

**Panel B: Acquirer tier 1 risk-weighted capital from 1993 - 2000**

| | N | Mean | Median | Minimum | Maximum | Std dev. |
|---|---|---|---|---|---|---|
| 1993 – 2000 | 333 | 10.9% | 10.6% | 6.5% | 25.0% | 2.7% |
| 1993 | 37 | 10.8% | 10.5% | 7.2% | 20.0% | 2.6% |
| 1994 | 34 | 10.9% | 10.7% | 7.2% | 16.4% | 2.5% |
| 1995 | 26 | 10.2% | 9.2% | 6.6% | 17.3% | 2.8% |
| 1996 | 38 | 11.8% | 12.1% | 7.2% | 18.0% | 2.5% |
| 1997 | 51 | 11.2% | 10.7% | 6.5% | 19.9% | 2.6% |
| 1998 | 59 | 11.4% | 10.9% | 7.7% | 15.5% | 2.3% |
| 1999 | 54 | 10.3% | 9.6% | 6.5% | 17.0% | 2.5% |
| 2000 | 34 | 10.4% | 9.3% | 7.1% | 25.0% | 3.5% |

**Panel C: Acquirer total risk-weighted capital from 1993 - 2000**

| | N | Mean | Median | Minimum | Maximum | Std dev. |
|---|---|---|---|---|---|---|
| 1993 - 2000 | 333 | 13.5% | 13.0% | 10.2% | 27.0% | 2.3% |
| 1993 | 37 | 13.8% | 13.7% | 11.0% | 21.3% | 1.8% |
| 1994 | 34 | 13.7% | 13.2% | 10.2% | 20.5% | 2.2% |
| 1995 | 26 | 13.8% | 12.9% | 10.2% | 25.0% | 3.2% |
| 1996 | 38 | 14.2% | 14.1% | 10.4% | 19.2% | 1.9% |
| 1997 | 51 | 13.6% | 13.1% | 10.6% | 21.2% | 2.1% |
| 1998 | 59 | 13.6% | 13.1% | 10.6% | 18.1% | 2.1% |
| 1999 | 54 | 12.8% | 12.2% | 10.5% | 18.2% | 2.2% |
| 2000 | 34 | 12.6% | 12.0% | 10.2% | 27.0% | 3.1% |

**Panel D: Acquirer capitalization terciles**

| Tier 1 risk-weighted capital | | Total risk-weighted capital |
|---|---|---|
| 25.0% | | 27.0% |
| | High capital | |
| 11.9% | | 14.1% |
| | Medium capital | |
| 9.3% | | 12.1% |
| | Low capital | |
| 6.5% | | 10.2% |

## Table 2: Acquirer summary statistics

The sample consists of 333 bank acquisitions announced between January 1993 and December 2000. The sample is divided into capitalization terciles based on two capital measures: tier 1 risk-weighted capital and total risk-weighted capital. This Table shows descriptive statistics for the entire sample (Panel A) and per tier 1 risk-weighted capital tercile (Panels B – D). Each Panel shows the following summary statistics for the acquirers which announced the acquisitions: total assets (prior fiscal year), tier 1 risk-weighted capital (%), total risk-weighted capital (%), market value of equity (number of shares times the share price 30 days prior to the announcement), market-to-book (market value of equity divided by book value of assets of the prior fiscal year), transaction value, return on assets (net income over total assets) and return on equity (net income over stockholder equity). Panel E shows summary statistics on the method of payment.

| | N | Mean | Median | Minimum | Maximum | Std. dev. |
|---|---|---|---|---|---|---|
| **Panel A: ALL acquisitions** | | | | | | |
| Total assets ($ mln) | 333 | 34,273 | 12,839 | 294 | 715,348 | 63,014 |
| Market value of equity ($ mln) | 333 | 6,080 | 1,926 | 48 | 65,786 | 12,255 |
| Market-to-book ratio | 333 | 2.09 | 1.79 | 0.68 | 6.06 | 0.97 |
| Transaction value ($ mln) | 333 | 694 | 132 | 50 | 33,555 | 2,519 |
| ROA | 333 | 1.22% | 1.23% | 0.19% | 2.05% | 0.29% |
| ROE | 333 | 14.73% | 14.98% | 2.38% | 35.62% | 3.68% |
| Tier 1 risk-weighted capital | 333 | 10.9% | 10.6% | 6.5% | 25.0% | 2.7% |
| Total risk-weighted capital | 333 | 13.5% | 13.0% | 10.2% | 27.0% | 2.3% |
| **Panel B: Low-capital acquirers** | | | | | | |
| Total assets ($ mln) | 111 | 76,494 | 43,481 | 585 | 715,348 | 93,964 |
| Market value of equity ($ mln) | 111 | 13,291 | 5,465 | 128 | 65,786 | 18,663 |
| Market-to-book ratio | 111 | 2.08 | 1.79 | 0.71 | 4.32 | 0.92 |
| Transaction value ($ mln) | 111 | 1,574 | 198 | 51 | 33,555 | 4,190 |
| ROA | 111 | 1.18% | 1.19% | 0.22% | 2.05% | 0.35% |
| ROE | 111 | 14.96% | 15.76% | 3.83% | 25.45% | 3.94% |
| Tier 1 risk-weighted capital | 111 | 8.3% | 8.4% | 6.5% | 9.3% | 0.7% |
| Total risk-weighted capital | 111 | 11.8% | 11.6% | 10.2% | 14.1% | 1.0% |
| **Panel C: Medium-capital acquirers** | | | | | | |
| Total assets ($ mln) | 111 | 77,918 | 12,108 | 294 | 90,454 | 17,506 |
| Market value of equity ($ mln) | 111 | 2,813 | 1,751 | 49 | 12,329 | 2,853 |
| Market-to-book ratio | 111 | 2.06 | 1.81 | 0.89 | 5.46 | 0.89 |
| Transaction value ($ mln) | 111 | 253 | 128 | 50 | 2,489 | 320 |
| ROA | 111 | 1.20% | 1.23% | 0.19% | 1.82% | 0.21% |
| ROE | 111 | 15.37% | 15.38% | 2.38% | 35.62% | 4.01% |
| Tier 1 risk-weighted capital | 111 | 10.6% | 10.6% | 9.4% | 11.8% | 0.7% |
| Total risk-weighted capital | 111 | 12.8% | 12.7% | 10.5% | 16.6% | 1.2% |
| **Panel D: High-capital acquirers** | | | | | | |
| Total assets ($ mln) | 111 | 8,408 | 4,894 | 325 | 45,857 | 10,245 |
| Market value of equity ($ mln) | 111 | 2,134 | 758 | 48 | 22,665 | 4,228 |
| Market-to-book ratio | 111 | 2.12 | 1.78 | 0.68 | 6.06 | 1.09 |
| Transaction value ($ mln) | 111 | 256 | 102 | 52 | 4,954 | 573 |
| ROA | 111 | 1.29% | 1.31% | 0.34% | 2.00% | 0.28% |
| ROE | 111 | 13.86% | 13.69% | 5.07% | 20.41% | 2.83% |
| Tier 1 risk-weighted capital | 111 | 14.0% | 13.5% | 11.9% | 25.0% | 1.9% |
| Total risk-weighted capital | 111 | 15.9% | 15.5% | 13.1% | 27.0% | 2.2% |

**Panel E: Method of payment**

| | ALL | Stock | Cash | Mixed |
|---|---|---|---|---|
| **N** | 333 | 294 | 22 | 17 |

## Table 3: Long-run results

This Table examines the long-run abnormal performance of acquirers per capitalization tercile. I use two measures of capital: tier 1 risk-weighted capital and total risk-weighted capital. Panels A and B show 2-year buy-and-hold abnormal returns, and Panels C and D contain 2-year rebalanced abnormal returns. (See Section 4.2 for an explanation of the difference of these methods.) Abnormal performance is always estimated based on:
(1) size (market value of equity) and book-to-market matching; and
(2) size (market value of equity) and geographic location matching (six U.S. regions)
Inference is based on block-bootstrapped t-statistics, shown in parenthesis. Bold font indicates significance at least at the 10% level.

**Panel A: Mean 2-year buy-and-hold abnormal returns (BHARs)**

| | Tier 1 risk-weighted capital | | | | Total risk-weighted capital | | | |
|---|---|---|---|---|---|---|---|---|
| | N | Mean capital | BHAR (1) | BHAR (2) | N | Mean capital | BHAR (1) | BHAR (2) |
| ALL | 333 | 10.9% | -6.2% | -5.0% | 333 | 13.5% | -6.2% | -5.0% |
| | | | ***(-3.23)*** | ***(-2.65)*** | | | ***(-3.23)*** | ***(-2.65)*** |
| Low capital | 111 | 8.8% | -4.0% | -2.9% | 112 | 11.4% | -3.2% | -1.4% |
| | | | ***(-1.20)*** | ***(-0.88)*** | | | *(-0.93)* | ***(-0.43)*** |
| Medium capital | 111 | 10.6% | -2.5% | -1.1% | 110 | 13.1% | -3.4% | -2.7% |
| | | | ***(-0.72)*** | ***(-0.31)*** | | | ***(-1.03)*** | ***(-0.82)*** |
| High capital | 111 | 14.0% | -12.0% | -11.0% | 111 | 16.0% | -11.9% | -10.8% |
| | | | ***(-4.09)*** | ***(-3.55)*** | | | ***(-3.87)*** | ***(-3.42)*** |

**Panel B: Differences in mean 2-year BHARs**

| | Tier 1 risk-weighted capital | | Total risk-weighted capital | |
|---|---|---|---|---|
| | (1) | (2) | (1) | (2) |
| High minus low capital | -8.0% | -8.1% | -8.7% | -9.4% |
| | ***(-1.85)*** | ***(-1.86)*** | ***(-1.93)*** | ***(-2.14)*** |
| High minus medium capital | -9.5% | -9.9% | -8.4% | -8.12% |
| | ***(-2.14)*** | ***(-2.25)*** | ***(-1.95)*** | ***(-1.83)*** |
| Medium minus low capital | 1.5% | 1.9% | -0.2% | -1.3% |
| | *(0.31)* | *(0.41)* | *(-0.05)* | *(-0.29)* |

**Panel C: Mean 2-year rebalanced abnormal returns**

| | Tier 1 risk-weighted capital | | | | Total risk-weighted capital | | | |
|---|---|---|---|---|---|---|---|---|
| | N | Mean capital | Rebalanced AR (1) | Rebalanced AR (2) | N | Mean capital | Rebalanced AR (1) | Rebalanced AR (2) |
| ALL | 333 | 10.9% | -7.0% | -7.5% | 333 | 13.5% | -7.0% | -7.5% |
| | | | ***(-3.65)*** | ***(-3.52)*** | | | ***(-3.65)*** | ***(-3.52)*** |
| Low capital | 111 | 8.8% | -3.9% | -2.5% | 112 | 11.4% | -3.9% | -0.62% |
| | | | *(-1.11)* | ***(-0.74)*** | | | ***(-1.10)*** | *(-0.17)* |
| Medium capital | 111 | 10.6% | -4.9% | -4.1% | 110 | 13.1% | -4.6% | -8.0% |
| | | | ***(-1.43)*** | *(-0.99)* | | | *(-1.40)* | ***(-2.00)*** |
| High capital | 111 | 14.0% | -12.1% | -16.0% | 111 | 16.0% | -12.5% | -14.0% |
| | | | ***(-4.00)*** | ***(-4.76)*** | | | ***(-3.97)*** | ***(-4.13)*** |

**Panel D: Differences in mean 2-year rebalanced abnormal returns**

| | Tier 1 risk-weighted capital | | Total risk-weighted capital | |
|---|---|---|---|---|
| | (1) | (2) | (1) | (2) |
| High minus low capital | -8.3% | -8.6% | -13.5% | -13.4% |
| | ***(-1.82)*** | ***(-1.85)*** | ***(-2.81)*** | ***(-2.78)*** |
| High minus medium capital | -7.3% | -7.9% | -11.9% | -6.1% |
| | ***(-1.65)*** | ***(-1.81)*** | ***(-2.22)*** | *(-1.16)* |
| Medium minus low capital | -1.0% | -0.7% | -1.6% | -7.3% |
| | *(-0.21)* | *(-0.14)* | *(-0.30)* | *(-1.37)* |

## Table 4: Long-run results in the presence of a 5% owner

This Table examines the long-run abnormal performance of acquirers with and without a 5% owner per capitalization tercile. Size is defined as the market value of equity 30 days prior to the merger announcement. I use two measures of capital: tier 1 risk-weighted capital and total risk-weighted capital. 'N 5% own' is the average number of 5% owners in a particular capitalization tercile. Panel A shows mean 2-year BHARs estimated based on:
(1) size (market value of equity) and book-to-market matching; and
(2) size (market value of equity) and geographic location matching (six U.S. regions)
Panel B shows differences in mean 2-year BHARs.

Inference is based on block-bootstrapped t-statistics, shown in parenthesis. Bold font indicates significance at least at the 10% level.

**Panel A: Mean 2-year BHARs**

| | | Tier 1 risk-weighted capital | | | | | Total risk-weighted capital | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | Mean capital | N 5% own | BHAR (1) | BHAR (2) | N | Mean capital | N 5% own | BHAR (1) | BHAR (2) |
| **ALL** | | 333 | 10.9% | 1.6 | -6.2% | -5.0% | 333 | 13.5% | 1.6 | -6.2% | -5.0% |
| | | | | | ***(-3.23)*** | ***(-2.65)*** | | | | ***(-3.23)*** | ***(-2.65)*** |
| **Dispersed** | ALL | 79 | 12.0% | 0 | -15.2% | -12.2% | 79 | 14.2% | 0 | -15.2% | -12.2% |
| | | | | | ***(-4.40)*** | ***(-4.26)*** | | | | ***(-4.40)*** | ***(-4.26)*** |
| | Low capital | 15 | 8.4% | 0 | -3.7% | 0.45% | 18 | 11.5% | 0 | 12.9% | -6.9% |
| | | | | | *(-0.37)* | *(0.12)* | | | | *(-1.40)* | *(-1.25)* |
| | Medium capital | 23 | 10.6% | 0 | -17.1% | -13.8% | 20 | 13.0% | 0 | -9.3% | -5.9% |
| | | | | | ***(-3.06)*** | ***(-2.33)*** | | | | ***(-1.58)*** | ***(-1.08)*** |
| | High capital | 41 | 14.1% | 0 | -18.4% | -16.0% | 41 | 15.9% | 0 | -19.1% | -17.6% |
| | | | | | ***(-4.27)*** | ***(-3.79)*** | | | | ***(-4.27)*** | ***(-4.13)*** |
| **Concentrated** | ALL | 254 | 10.6% | 2.2 | -3.4% | -3.1% | 254 | 13.3% | 2.2 | -3.4% | -3.1% |
| | | | | | ***(-1.51)*** | ***(-1.93)*** | | | | ***(-2.13)*** | ***(-1.93)*** |
| | Low capital | 96 | 8.3% | 2.0 | -4.1% | -3.5% | 94 | 11.3% | 1.9 | -1.4% | -0.4% |
| | | | | | ***(-1.14)*** | ***(-0.91)*** | | | | *(-0.36)* | *(-0.09)* |
| | Medium capital | 88 | 10.5% | 2.1 | 1.3% | 2.3% | 90 | 13.1% | 2.3 | -2.1% | -2.0% |
| | | | | | *(0.34)* | *(0.61)* | | | | ***(-0.55)*** | *(-0.52)* |
| | High capital | 70 | 13.9% | 2.4 | -8.3% | -8.1% | 70 | 16.1% | 2.3 | -7.7% | -6.9% |
| | | | | | ***(-2.10)*** | ***(-1.92)*** | | | | ***(-1.86)*** | ***(-1.62)*** |

**Panel B: Differences in mean 2-year BHARs**

| | | Tier 1 risk-weighted capital | | Total risk-weighted capital | |
|---|---|---|---|---|---|
| | | (1) | (2) | (1) | (2) |
| **Dispersed** | High minus low capital | -14.7% | -16.4% | -6.2% | -10.7% |
| | | *(-1.44)* | ***(-2.71)*** | *(-0.67)* | *(-1.54)* |
| | High minus medium capital | -1.3% | -2.2% | -9.7% | -11.7% |
| | | *(-0.19)* | *(-0.31)* | *(-1.45)* | *(-1.80)* |
| | Medium minus low capital | -13.5% | -14.2% | 3.6% | 1.0% |
| | | *(-1.22)* | ***(-1.85)*** | *(0.34)* | *(0.13)* |
| **Concentrated** | High minus low capital | -4.2% | -4.6% | -6.3% | -6.5% |
| | | *(-0.80)* | *(-0.84)* | *(-1.14)* | *(-1.17)* |
| | High minus medium capital | -9.6% | -10.35% | -5.5% | -4.9% |
| | | ***(-1.70)*** | ***(-1.85)*** | *(-1.00)* | *(-0.86)* |
| | Medium minus low capital | 5.3% | 5.7% | -0.8% | -1.7% |
| | | *(1.01)* | *(1.09)* | *(-0.15)* | *(-0.32)* |
| **Dispersed minus concentrated ownership** | | -11.8% | -11.8% | -9.2% | -11.8% |
| | | ***(-3.16)*** | ***(-3.48)*** | ***(-2.86)*** | ***(-3.48)*** |
| **Low capital** | Dispersed minus concentrated | 0.40% | 3.9% | -11.5% | -6.6% |
| | | *(0.04)* | *(0.64)* | *(-1.23)* | *(-0.96)* |
| **Medium capital** | Dispersed minus concentrated | -18.4% | -16.1% | -7.2% | -3.9% |
| | | ***(-2.75)*** | ***(-2.26)*** | *(-1.06)* | *(-0.60)* |
| **High capital** | Dispersed minus concentrated | -10.1% | -7.8% | -11.4% | -10.8% |
| | | ***(-1.91)*** | *(-1.44)* | ***(-2.12)*** | ***(-1.88)*** |

## Table 5: Long-run regression results

This Table shows multivariate regression results: I analyze the impact of capital and the presence of a large shareholder on post-acquisition performance, while controlling for other factors that may impact performance: size (log of total assets), relative size (log of transaction value over acquirer market value of equity), method of payment (cash and stock dummies, leaving out mixed payment), active acquirer (at least one acquisition announcement in the two years prior to the announcement), misvaluation (as measured by acquirer market-to-book, i.e. the market value of equity 30 days before the announcement divided by the book value of equity the year prior to the acquisition), geographic focus (in-state dummy), risk (asset risk and non-performing assets over total assets), profitability (return on equity or return on assets (not shown), insider ownership (the three ownership categories specified by Morck, Shleifer and Vishny (1988); in a robustness check, I use first-, second- and third-order terms as in Berger and Bonaccorsi di Patti (2004) (not shown)), and other factors (captured by year dummies, leaving out d1993). Capital is defined as tier 1 risk-weighted capital (not shown) or total risk-weighted capital.

Bold font denotes significance at least at the 10% level. t-statistics are in parenthesis.

| | **Size & B/M matching** | **Size & location matching** | **Size & B/M matching** | **Size & location matching** | **Size & B/M matching** | **Size & location matching** | **Size & B/M matching** | **Size & location matching** |
|---|---|---|---|---|---|---|---|---|
| Intercept | 0.255 | 0.274 | 0.197 | 0.267 | 0.218 | 0.513 | 0.277 | 0.457 |
| | ***(2.37)*** | ***(2.57)*** | *(1.27)* | ***(1.73)*** | *(0.84)* | ***(2.01)*** | *(1.01)* | ***(1.67)*** |
| Capital | -0.024 | -0.024 | -0.025 | -0.027 | -0.022 | -0.028 | -0.018 | -0.026 |
| | ***(-2.99)*** | ***(-3.09)*** | ***(-2.31)*** | ***(-2.59)*** | ***(-1.98)*** | ***(-2.58)*** | *(-1.62)* | ***(-2.41)*** |
| Large shareh. dummy | | | 0.085 | 0.055 | 0.068 | 0.053 | 0.086 | 0.062 |
| | | | ***(1.72)*** | *(1.12)* | *(1.31)* | *(1.04)* | *(1.64)* | *(1.18)* |
| Large shareh. dummy * high capital dummy | | | 0.037 | 0.050 | 0.052 | 0.050 | 0.007 | 0.042 |
| | | | *(0.60)* | *(0.81)* | *(0.82)* | *(0.80)* | *(0.10)* | *(0.64)* |
| Size | | | | | -0.016 | -0.014 | -0.032 | -0.013 |
| | | | | | *(-0.78)* | *(-0.69)* | *(-1.53)* | *(-0.62)* |
| Relative size | | | | | -0.028 | -0.022 | -0.034 | -0.020 |
| | | | | | ***(-1.65)*** | *(-1.31)* | ***(-1.96)*** | *(-1.12)* |
| Cash | | | | | -0.013 | -0.046 | 0.014 | -0.039 |
| | | | | | *(-0.12)* | *(-0.43)* | *(0.13)* | *(-0.36)* |
| Stock | | | | | -0.054 | -0.142 | -0.035 | -0.132 |
| | | | | | *(-0.63)* | ***(-1.69)*** | *(-0.40)* | *(-1.51)* |
| Active | | | | | -0.023 | -0.049 | -0.034 | -0.058 |
| | | | | | *(-0.54)* | *(-1.20)* | *(-0.76)* | *(-1.31)* |
| Market-to-book | | | | | -0.013 | 0.063 | 0.019 | 0.064 |
| | | | | | *(-0.47)* | ***(2.42)*** | *(0.63)* | ***(2.11)*** |
| Geographic focus | | | | | 0.012 | 0.067 | 0.003 | 0.064 |
| | | | | | *(0.29)* | *(1.60)* | *(0.08)* | *(1.51)* |
| Asset risk | | | | | -0.016 | -0.030 | -0.020 | -0.031 |
| | | | | | *(-1.45)* | ***(-2.83)*** | *(-1.57)* | ***(-2.40)*** |
| Non-performing assets | | | | | 0.001 | 0.000 | 0.000 | 0.000 |
| | | | | | *(0.90)* | *(0.15)* | *(0.54)* | *(0.20)* |
| Return on equity | | | | | 0.009 | -0.004 | 0.006 | -0.004 |
| | | | | | *(1.60)* | *(-0.66)* | *(0.99)* | *(-0.65)* |
| Insider own (<5%) | | | | | 0.02 | -0.01 | 0.016 | -0.006 |
| | | | | | *(1.04)* | *(-0.39)* | *(1.06)* | *(-0.40)* |
| Insider own (5%-25%) | | | | | 0.00 | 0.01 | 0.005 | 0.015 |
| | | | | | *(0.47)* | ***(1.91)*** | *(0.66)* | ***(1.97)*** |
| Insider own (>25%) | | | | | -0.01 | -0.01 | -0.006 | -0.013 |
| | | | | | *(-0.61)* | *(-1.34)* | *(-0.62)* | *(-1.42)* |
| Year dummies | N | N | N | N | N | N | Y | Y |
| Adj. R2 | 2.3% | 2.5% | 3.4% | 3.0% | 4.4% | 5.9% | 5.9% | 4.5% |
| *F-statistic* | *8.95* | *9.53* | *4.89* | *4.41* | *1.96* | *2.31* | *1.90* | *1.68* |
| N | 333 | 333 | 333 | 333 | 333 | 333 | 333 | 333 |

## Table 9: Robustness check 2: Accounting performance

This Table compares the median two-year accounting performance of high-capital and low-capital acquirers pre-acquisition with their median two-year accounting performance post-acquisition. I show results using total risk-weighted capital. Results are qualitatively very similar when I use tier 1 risk-weighted capital instead. Accounting performance is measured in terms of return on assets (Panels A and B) and return on equity (Panels C and D). Pre-acquisition performance is defined in two ways: I use the weighted average of acquirer and target performance pre-acquisition using total assets as weights, or only the acquirer's own pre-acquisition performance.

Panels B and D show differences in median industry-adjusted accounting performance of high-capital and low-capital acquirers pre-acquisition and post-acquisition.

Panel E shows the (two-year) average equity ratio of low- and high-capital acquirers pre-acquisition, at the time of the announcement and post-acquisition, to examine whether changes in return on equity are driven by changes in leverage. The equity ratio is defined as shareholders' equity as a percentage of total assets.

Inference is based on the Wilcoxon-Mann-Whitney rank sum test (industry-adjusted performance) and the Wilcoxon signed rank test (% positive returns). Bold font indicates significance at least at the 10% level.

**Panel A: Median return on assets pre- and post-acquisition**

| | **Pre-acquisition = weighted average of target and acquirer** | | | | **Pre-acquisition = acquirer only** | | | |
|---|---|---|---|---|---|---|---|---|
| | **N** | **Unadjusted** | **Industry-adjusted** | **Industry-adjusted: % positive** | **N** | **Unadjusted** | **Industry-adjusted** | **Industry-adjusted: % positive** |
| ALL | | | | | | | | |
| Pre-acquisition | 137 | 1.24% | 0.11% | **70%** | 262 | 1.20% | 0.09% | **69%** |
| Post-acquisition | 137 | 1.24% | 0.09% | **69%** | 262 | 1.23% | 0.09% | **69%** |
| Difference | | +0.00% | -0.02% | | | +0.03% | -0.00% | |
| Low capital | | | | | | | | |
| Pre-acquisition | 53 | 1.21% | 0.02% | 60% | 83 | 1.17% | 0.01% | 52% |
| Post-acquisition | 53 | 1.33% | 0.10% | **70%** | 83 | 1.25% | 0.10% | **67%** |
| Difference | | +0.12% | +0.08% | | | +0.08% | +0.09% | |
| High capital | | | | | | | | |
| Pre-acquisition | 44 | 1.31% | 0.13% | **67%** | 92 | 1.21% | 0.11% | **70%** |
| Post-acquisition | 44 | 1.21% | 0.04% | **64%** | 92 | 1.22% | 0.09% | **75%** |
| Difference | | -0.10% | -0.09% | | | +0.01% | -0.02% | |

**Panel B: Differences in median industry-adjusted return on assets**

| | **Pre-acquisition = weighted average of target and acquirer** | **Pre-acquisition = acquirer only** |
|---|---|---|
| **High-capital minus low-capital acquirers:** | | |
| Pre-acquisition | +0.11% | **+0.10%** |
| Post-acquisition | -0.06% | -0.01% |

## Table 9: Robustness check 2 (cont'd): Accounting performance

**Panel C: Median return on equity pre- and post-acquisition**

| | Pre-acquisition = weighted average of target and acquirer | | | | Pre-acquisition = acquirer only | | | |
|---|---|---|---|---|---|---|---|---|
| | **N** | **Unadjusted** | **Industry-adjusted** | **Industry-adjusted: % positive** | **N** | **Unadjusted** | **Industry-adjusted** | **Industry-adjusted: % positive** |
| ALL | | | | | | | | |
| Pre-acquisition | 137 | 14.92% | 1.05% | **71%** | 262 | 14.64% | 1.19% | **70%** |
| Post-acquisition | 137 | 15.57% | 0.69% | **64%** | 262 | 15.15% | 0.69% | **64%** |
| Difference | | +0.65% | -0.36% | | | +0.51% | -0.50% | |
| Low capital | | | | | | | | |
| Pre-acquisition | 43 | 13.94% | 1.04% | 60% | 81 | 14.55% | 1.18% | **70%** |
| Post-acquisition | 43 | 15.24% | 1.54% | **70%** | 81 | 15.24% | 1.36% | **68%** |
| Difference | | +1.30% | +0.50% | | | +0.69% | +0.18% | |
| High capital | | | | | | | | |
| Pre-acquisition | 45 | 14.57% | 0.54% | 56% | 93 | 13.82% | 0.83% | **65%** |
| Post-acquisition | 45 | 14.46% | -0.13% | 49% | 93 | 14.39% | 0.54% | 58% |
| Difference | | -0.11% | -0.67% | | | +0.57% | -0.29% | |

**Panel D: Differences in median industry-adjusted return on equity**

| | Pre-acquisition = weighted average of target and acquirer | Pre-acquisition = acquirer only |
|---|---|---|
| **High-capital minus low-capital acquirers:** | | |
| Pre-acquisition | -0.50% | -0.35% |
| Post-acquisition | -1.67% | **-0.82%** |

**Panel E: Changes in leverage for high- and low-capital acquirers**

| | | Equity ratio | | |
|---|---|---|---|---|
| | **N** | **Average pre-acquisition** | **At announcement** | **Average post-acquisition** |
| Low capital | 102 | 8.0% | 8.0% | 8.2% |
| High capital | 88 | 9.1% | 9.3% | 9.0% |

## Table 10: Robustness check 3: Mean monthly calendar-time abnormal returns

This Table shows the results from a calendar-time portfolio analysis which uses a reference portfolio approach and a 2-year investment horizon (Barber, Lyon and Tsai, 1999). In each month between January 1995 and December 2000, I calculate the mean abnormal return ('MAR') of an equally-weighted and a value-weighted portfolio of all banks that announced an acquisition during the preceding two-year period. Abnormal return is defined as the return on a particular stock minus the return on a size and book-to-market matched reference portfolio, including all firms (using data from Fama's website.) I thus end up with 72 MARs. I then average 24 consecutive mean abnormal returns to arrive at a mean monthly abnormal return ('MMAR') over a 2-year investment horizon. Using a rolling-portfolio approach, I end up with 49 MMARs, and calculate the percentage of statistically significant mean monthly abnormal returns.

**The percentage of significant mean monthly abnormal returns per capitalization tercile**

| | **Tier 1 risk-weighted capital** | | | | | | **Total risk-weighted capital** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Significance at:** | | | | | | **Significance at:** | | | | | |
| | **10%** | | **5%** | | **1%** | | **10%** | | **5%** | | **1%** | |
| | **EW** | **VW** | **EW** | **VW** | **EW** | **VW** | **EW** | **VW** | **EW** | **VW** | **EW** | **VW** |
| Low capital | 47% | 22% | 37% | 16% | 14% | 8% | 51% | 31% | 47% | 20% | 20% | 8% |
| Medium capital | 51% | 24% | 41% | 6% | 0% | 0% | 53% | 24% | 31% | 6% | 4% | 0% |
| High capital | 18% | 6% | 4% | 0% | 0% | 0% | 22% | 12% | 2% | 2% | 0% | 0% |

## Table 11: Robustness check 5: Large versus small acquirers

This Table examines the long-run abnormal performance of large and small acquirers per capitalization tercile. Size is defined as the market value of equity 30 days prior to the merger announcement. I use two measures of capital: tier 1 risk-weighted capital and total risk-weighted capital. Panel A shows mean 2-year BHARs estimated based on:
(1) size (market value of equity) and book-to-market matching; and
(2) size (market value of equity) and geographic location matching (six U.S. regions)
Panel B shows differences in mean 2-year BHARs.

Inference is based on block-bootstrapped t-statistics, shown in parenthesis. Bold font indicates significance at least at the 10% level.

**Panel A: Mean 2-year BHARs**

| | | Tier 1 risk-weighted capital | | | | Total risk-weighted capital | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | N | Mean capital | BHAR (1) | BHAR (2) | N | Mean capital | BHAR (1) | BHAR (2) |
| **ALL** | | 333 | 10.9% | -6.2% | -5.0% | 333 | 13.5% | -6.2% | -5.0% |
| | | | | ***(-3.23)*** | ***(-2.65)*** | | | ***(-3.23)*** | ***(-2.65)*** |
| **Large** | ALL | 163 | 9.7% | -3.6% | -5.2% | 163 | 13.0% | -3.6% | 5.2% |
| | | | | ***(-1.36)*** | ***(-1.96)*** | | | ***(-1.36)*** | ***(-1.96)*** |
| | Low capital | 89 | 8.2% | 0.7% | -1.3% | 66 | 11.3% | 0.3% | 0.2% |
| | | | | *(0.18)* | *(-0.32)* | | | *(0.74)* | *(0.08)* |
| | Medium capital | 50 | 10.4% | -6.7% | -7.2% | 60 | 13.1% | -3.6% | -5.3% |
| | | | | ***(-1.35)*** | ***(-1.79)*** | | | ***(-0.84)*** | *(-1.24)* |
| | High capital | 24 | 13.8% | -12.8% | -15.4% | 37 | 16.0% | -15.5% | -14.5% |
| | | | | ***(-2.26)*** | ***(-2.65)*** | | | ***(-3.07)*** | ***(-3.06)*** |
| **Small** | ALL | 170 | 12.1% | -8.7% | -4.8% | 170 | 13.9% | -8.7% | -4.8% |
| | | | | ***(-3.11)*** | ***(-1.78)*** | | | ***(-3.11)*** | ***(-1.78)*** |
| | Low capital | 22 | 8.5% | -22.8% | -9.6% | 46 | 11.4% | -12.3% | -3.8% |
| | | | | ***(-3.53)*** | ***(-1.92)*** | | | ***(-2.14)*** | *(-0.75)* |
| | Medium capital | 61 | 10.7% | 0.9% | 4.0% | 50 | 13.1% | (-3.3% | 0.4% |
| | | | | *(0.19)* | *(0.81)* | | | *(-0.60)* | *(0.10)* |
| | High capital | 87 | 14.1% | -11.8% | -9.8% | 74 | 16.0% | -10.1% | -9.0% |
| | | | | ***(-3.45)*** | ***(-2.69)*** | | | ***(-2.62)*** | ***(-2.20)*** |

**Panel B: Differences in mean 2-year BHARs**

| | | Tier 1 risk-weighted capital | | Total risk-weighted capital | |
|---|---|---|---|---|---|
| | | (1) | (2) | (1) | (2) |
| **Large minus small** | | 5.1% | -0.4% | 5.1% | -0.4% |
| | | *(1.39)* | *(-0.10)* | *(1.39)* | *(-0.10)* |
| **Large** | High minus low capital | -13.4% | -14.1% | -18.6% | -14.8% |
| | | ***(-2.07)*** | ***(-2.32)*** | ***(-2.93)*** | ***(-2.42)*** |
| | High minus medium capital | -6.1% | -8.2% | -11.9% | -9.2% |
| | | *(-0.87)* | *(-1.33)* | *(-1.92)* | *(-1.50)* |
| | Medium minus low capital | 7.4% | -5.9% | -6.7% | -5.6% |
| | | *(1.27)* | *(-1.07)* | *(-1.13)* | *(-0.94)* |
| **Small** | High minus low capital | 11.0% | -0.2% | 2.2% | -5.2% |
| | | *(1.62)* | *(-0.03)* | *(0.34)* | *(-0.81)* |
| | High minus medium capital | -12.7% | -13.7% | -6.8% | -9.3% |
| | | ***(-2.12)*** | ***(-2.25)*** | *(-1.08)* | *(-1.47)* |
| | Medium minus low capital | 23.7% | 13.6% | 9.0% | 4.2% |
| | | ***(3.06)*** | ***(1.91)*** | *(1.22)* | *(0.59)* |

**Figure 2: The increase in mean asset return volatility**
This figure shows the increase in mean asset risk post-acquisition per acquirer capitalization decile. I measure asset risk as in Flannery and Rangan (2003). They define asset risk as the bank's asset return volatility, and calculate it by de-levering and annualizing a bank's equity return volatility. For each acquirer, I calculate the mean quarterly asset return volatility over eight quarters pre-acquisition ending one quarter before the announcement date ('pre-acquisition asset risk') and over the eight quarters post-acquisition starting the first quarter after the acquisition became effective ('post-acquisition asset risk'. I define the "increase" in asset risk in two ways: the actual increase (i.e. the difference between post-acquisition and pre-acquisition asset risk) and the relative increase (i.e. the actual increase divided by the pre-acquisition asset risk). The Figure shows the results based on the actual increase. (Results are similar when I use the relative increase instead.) I use two capital measures: tier 1 risk-weighted capital (not shown) and total risk-weighted capital (shown). Results are qualitatively similar using either measure.

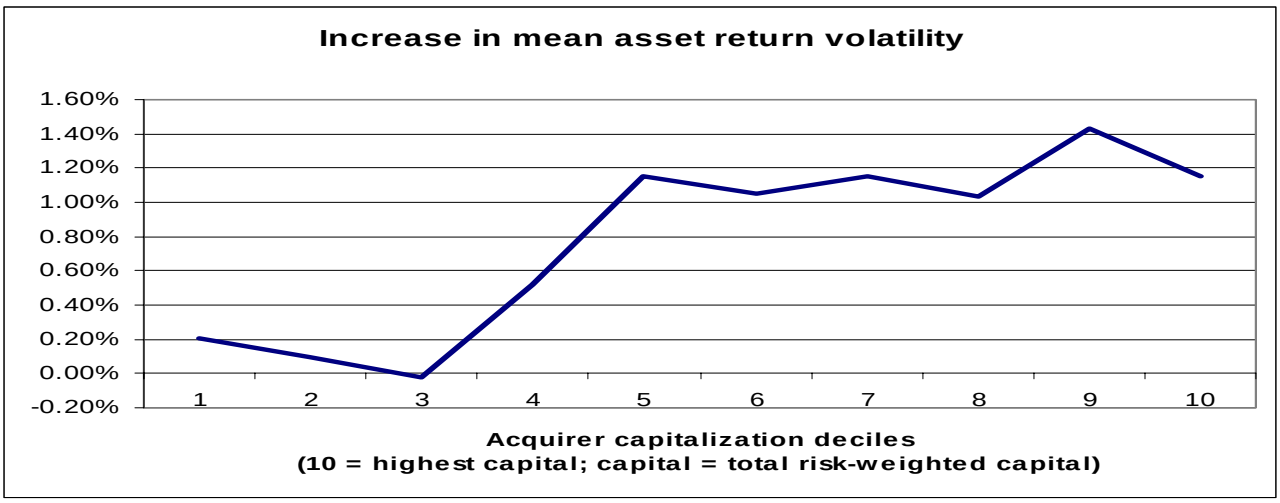

**Figure 3: The increase in the distance to default**

This Figure shows by how many standard deviations acquirers increase their distance to default post-acquisition. The distance to default is measured by a Z-score (Boyd, Graham and Hewitt, 1993): $Z = \frac{aveROA - ave(E/A)}{\sigma(ROA)}$, where aveROA is the average return on assets, ave(E/A) is the average equity over total assets, and $\sigma(ROA)$ is the bank's standard deviation of return on assets. I calculate each bank's pre-acquisition distance to default using accounting data over the eight quarters before the acquisition announcement, and its post-acquisition distance to default over eight quarters after the acquisition has become effective, excluding the year in which the acquisition became effective.