

# The Effect of Risk and Organizational Structures on Bank Capital Ratios

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**B**anks finance their loans and other assets with a mix of deposits, debt, and equity capital. Maintaining adequate capital is important for banks because it absorbs losses and protects them from failure. Capital also protects the financial system and overall economy from the costs that can arise from bank failures. For example, one of the reasons policymakers were concerned about financial stability during the financial crisis was low capital ratios—the ratio of equity capital to total assets—at some of the largest banks, which led to government programs to provide capital to these banks.

While capital helps ensure the safety of banks and the economy, bank owners and managers have mixed incentives to hold capital. On one hand, banks have an incentive to hold low levels of capital because it costs more to fund assets with capital than with debt or deposits. On the other hand, banks that are relatively risky might have to hold higher levels of capital to satisfy uninsured creditors or address their regulators' safety and soundness concerns.

Banks' incentives to hold capital also might differ depending on their organizational structure. For example, banks that are not owned by a bank holding company (BHC) might hold more capital than banks owned by a BHC because they have less access to sources of capital should they need to raise more. In addition, S-corp banks, which

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are banks organized under Subchapter S of the Internal Revenue Code, might hold more capital to pay shareholder dividends because shareholders are individually responsible for taxes on bank profits.

This article examines the effects of risk and different organizational structures on banks' capital holdings. It finds that banks with higher risk and banks that are not owned by a BHC have higher capital ratios, but that no economically significant relationship exists between capital holdings and S-corp banks. Section I reviews the rationale behind bank capital holdings and regulation. Section II discusses factors that affect bank decisions and regulatory goals on how much capital to hold, with an emphasis on risk and different organizational structures. Section III conducts a statistical analysis of the relationship between a bank's capital and its organizational structure and riskiness after controlling for other factors.

## I. THE IMPORTANCE OF BANK CAPITAL HOLDINGS

Bank capital is important both from a micro (bank-level) and a macroprudential perspective. At the bank level, the most immediate reason for capital is to cover unexpected losses. Banks set aside earnings in a separate account to provision for anticipated losses. However, they also hold a stock of capital to cover the risk of unexpected losses to reduce the risk of bank failure. All else equal, including risk, the lower the amount of capital for a given level of assets, the greater the likelihood of failure. Moreover, insufficient capital provides incentives for bank owners and managers to increase risk-taking and to lower asset quality, which also increase the likelihood of bank failure.<sup>1</sup>

Lower levels of bank capital also impose costs on society as a whole by increasing the risk of failure. While the preceding factors address the private cost (to owners and managers of banks) of less capital relative to other forms of finance, they do not take into account the social cost of lower capital ratios. There is a growing consensus that institutions with low capital ratios—that is, those that are highly leveraged—increase the risk of financial instability (Admati and others). A higher number of bank failures is often accompanied by losses of economic output and bankruptcy costs that increase the social costs of holding too little capital. When bank failures are more likely, banking crises and panics

are also more likely, reducing the safety and soundness of the financial system. This in turn increases the exposure of the deposit insurance fund and the central bank as a lender-of-last-resort. In short, lower bank capital may lead to higher social costs.

In view of these social costs and risks to financial stability, capital regulation requires banks to maintain minimum capital ratios. Within the regulatory framework, bank capital is an important line of defense for creditors and depositors, as well as for the deposit insurance fund. Regulatory minimum capital ratios are based on international agreements, such as the Basel Accords; national legislation, such as the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act; and the implementation of these agreements and laws by the federal bank regulatory agencies. This is the economic and regulatory environment in which bankers and regulators seek to assess the adequacy of bank capital ratios.

## II. THE DETERMINANTS OF BANK CAPITAL HOLDINGS

Two key determinants of banks' capital holdings are the incentives of banks' owners and managers on one hand and the goals of bank regulators on the other. In addition, differences in organizational structure, a factor that has not received wide attention, can also influence capital holdings.

For a number of reasons, bank owners and managers who seek to maximize profits often believe it is costlier to finance bank lending with equity than with debt or deposits. First, banks enjoy a tax advantage on debt interest payments relative to dividends on equity. Second, institutional arrangements such as insurance for depositors and potential lender-of-last-resort bailouts for bank creditors make financing assets with deposits cheaper than financing them with debt. Third, some economists have argued that bank shareholders and managers appear to focus on the bank's return on equity as a benchmark for performance and executive compensation (Thakor). A bank's return on equity is inversely related to the bank's capital ratio.<sup>2</sup> Therefore, holding higher levels of equity capital lowers the return on equity capital which, in turn, can lower compensation to bank shareholders and managers.

On the other hand, regulators seek to ensure that a bank's capital holdings are sufficient to protect against its risk of unexpected losses. This process involves examining the composition of a bank's assets and liabilities to determine its risk of unexpected losses. Although regulation stipulates the minimum capital that a bank is required to hold, the examination process is used to assess whether this minimum level is actually commensurate with the bank's risk. This assessment is usually expressed as a "capital adequacy ratio" of equity that must be held as percentages of a bank's assets and risk-weighted assets.<sup>3</sup> As a result, bank capital ratios can and typically do exceed the regulatory minimum. These requirements are put into place to ensure banks do not take on excess leverage and become insolvent. A given bank's capital ratio thus likely reflects the bank's—as well as its regulator's—assessment of the risk of unexpected losses.

Recent empirical research on the determinants of bank capital suggests bank-specific, time-invariant factors have a strong influence on capital structure.<sup>4</sup> These studies show that "like nonfinancial firms, banks appear to have stable capital structures at levels that are specific to each individual bank. The results suggest that capital requirements may only be of second-order importance for banks' capital structures" (Gropp and Heider). Such firm-level idiosyncratic factors are considered to be proxies for unobservable factors such as the risk appetite of bank owners and managers.

A second factor that also has received wide attention is the risk inherent in the bank's business strategy. This risk is attributed to the bank's balance sheet—its portfolio of assets and liabilities. On the asset side, some categories, such as subprime loans, are deemed to have greater credit risk than others, such as treasury securities. On the liability side, a greater proportion of short-term funding is viewed as significantly riskier. Given the wide variety of banks in the United States, differences in risk exposure naturally imply differences in risk of unexpected losses and, therefore, differences in capital ratios.

Differences in the organizational structure of banks may also influence bank capital. Due to a variety of factors, such as tax benefits and ready access to capital, organizational differences have emerged in the banking sector. These differences can be critical, as both tax benefits and access to capital influence the costs of maintaining high capital

ratios. However, this factor has not received wide attention in the literature on bank capital structure.

Most banks in the United States are subsidiaries of a BHC, wherein the BHC has an equity stake in one or more banks and often other financial companies as well. In fact, the majority of banking assets in the United States are currently held by BHCs, and assets of non-BHC banks make up only a tiny fraction of total U.S. banking assets (Avraham and others). In the recent past, BHCs have taken two different forms. The first is the multibank holding company, a company that owns more than one bank and, typically, nonbank assets. The second is the shell BHC, a company established primarily to hold the stock of its subsidiary bank. The BHC's equity in its bank is its primary asset, and the BHC has very little activity. Therefore, the considerations for capital holdings in a shell BHC can be somewhat different from those for a multibank holding company.

Many economists believe that holding-company banks have better access to external sources of finance through their BHCs. Equity injections into a bank by its parent BHC are often the result of an increase in debt liabilities of the BHC itself—a process known as “double leveraging.” In fact, investors create BHCs to take advantage of tax-deductible interest on BHC debt.<sup>5</sup> Such incentives make it less costly for BHCs to raise capital for their subsidiary banks. Accordingly, equity injections from the parent BHC are viewed as an important source of a subsidiary bank's capital.<sup>6</sup> Several studies have pointed to the BHC as a “source of strength” for banks, arguing equity injections from BHCs into “problem bank” subsidiaries can help recapitalize banks in financial distress (Ashcraft).<sup>7</sup>

What does this imply for banks that are not subsidiaries of a BHC? On one hand, lack of access to an external capital source, specifically a BHC, may imply these stand-alone banks hold less capital for a given level of assets. On the other hand, the absence of an external capital source may provide a precautionary motive for them to hold more capital than holding company banks. Which effect dominates, however, remains an empirical question.

Another organizational difference that might influence bank capital holdings is the tax treatment for S-corp banks. Unlike other banking corporations, known as C-corporation banks, S-corp banks are not

subject to the federal corporate income tax. However, S-corp shareholders are subject to personal income tax on their pro-rata share of the firm's entire earnings including non-distributed retained earnings. Although Subchapter S has been part of the federal corporate tax code since 1958, it was only after 1996 that commercial banks were permitted to operate under Subchapter S. Since then, the number of commercial banks electing Subchapter-S tax treatment has steadily increased.

Subchapter-S status has strong implications for bank capital holdings. First, S-corp banks are not allowed to have more than 100 shareholders—a restriction that could significantly limit the banks' sources of available capital and ability to grow rapidly. Second, if supervisors determine that a bank is not sufficiently capitalized, they may restrict dividend payments and stock buybacks.<sup>8</sup> S-corp bank shareholders are responsible for paying taxes for their share of the bank's profits on their personal tax returns. Limiting dividend payments for a profitable S-corp bank could require shareholders to pay taxes on undistributed profits. S-corp banks thus have incentives to hold higher capital than similar C-corp banks.

These organizational differences, along with idiosyncratic risk and balance-sheet risk, are key determinants of capital holdings. This article investigates the empirical importance of the bank's balance-sheet risk and organizational form for capital holdings, controlling for idiosyncratic risk and other factors.<sup>9</sup>

### III. HOW IS CAPITAL RELATED TO RISK AND ORGANIZATIONAL STRUCTURE?

Simple regression techniques using bank-level data can help evaluate the importance of risk and organizational structure. The results show that while risk is an important determinant of bank capital holdings, only some forms of organizational structure affect bank capital in a significant way.

The analysis uses quarterly bank-level data on U.S. commercial banks from the Consolidated Reports of Condition and Income for a Bank (FFIEC 041), popularly known as the Call Reports. The sample period is chosen as 1996 to 2006 for two reasons. First, the aim here is to study bank capital management not during times of financial crisis but during the normal course of the business cycle. Second, no major

changes in the capital regulations guiding banks occurred during this period. Both factors make this period ideal for the study.

Different size classes of banks may favor different business models. Therefore, inflation-adjusted (real) assets are used to classify banks into different categories. A bank is classified as large if the value of its real assets is greater than or equal to \$50 billion at 2006 prices. All banks with real assets less than \$50 billion but greater than or equal to \$10 billion are classified as regional banks. Banks with assets less than \$10 billion are denoted as community banks.

Table 1 shows that organizational structure varies significantly only for community banks. Commercial banks were first permitted to file federal income taxes under Subchapter S in 1997. By the end of 2006, almost 2,200 community banks had exercised this option, 32 percent of all community banks. On the other hand, the number of non-BHC banks fell from almost 2,400 banks to fewer than 1,000, declining from 24 percent of community banks to just over 14 percent.

To evaluate a bank's capital adequacy, the analysis considers two standard regulatory measures: the leverage ratio and the Tier 1 risk-based capital ratio. The leverage ratio, or more precisely, the Tier 1 leverage ratio, is simply the ratio of Tier 1 capital to total assets. Tier 1 capital is a regulatory measure of capital that excludes intangibles like goodwill and includes, among other things, the two major components of capital: common stock (including surplus) and perpetual preferred stock. The Tier 1 risk-based capital ratio is the ratio of Tier 1 capital to risk-weighted assets.

Bank capital ratios differ with size and organizational structure. The first two columns of Table 2 show the growth rates of real assets and Tier 1 capital for banks in each size class, and the last two columns show the average Tier 1 leverage and risk-based capital ratios over the sample period. As a group, large banks show the highest growth (in percentage of real assets) over the sample period, while regional and community banks record slower growth. Within each group, however, the growth in Tier 1 capital is not very different from growth in assets.

The capital ratios for community banks are significantly higher than for large and regional banks. Among community banks, the capital ratios for non-BHC banks are higher than for the group as a whole. For S-corp banks, however, the evidence is not as obvious: they have a

Table 1

## CLASSIFICATION OF BANKING ORGANIZATIONS BY SIZE

	Total		Community		Regional		Large	
	1996:Q1	2006:Q4	1996:Q1	2006:Q4	1996:Q1	2006:Q4	1996:Q1	2006:Q4
<i>C-corp or S-corp</i>								
S-corp bank	0	2178	0	2178	0	0	0	0
C-corp bank	9769	4542	9683	4466	72	49	14	27
<i>BHC or non-BHC</i>								
Non-BHC bank	2372	978	2370	975	2	3	0	0
BHC bank	7397	5742	7313	5669	70	46	14	27
Total	9769	6720	9683	6644	72	49	14	27

Sources: Call Report Data, FFIEC.

Notes: Bank size is determined by real assets at 2006 prices. A bank is classified as *large* if the value of its real assets is greater than or equal to \$50 billion at 2006 prices. Banks with real assets less than \$50 billion but greater than or equal to \$10 billion are classified as *regional* banks. Likewise, banks with assets less than \$10 billion are denoted as *community* banks.

Table 2

## GROWTH IN ASSETS, GROWTH IN CAPITAL, AND CAPITAL RATIOS BY BANK TYPE (1996-2006)

	Growth in real assets (percent)	Growth in Tier 1 capital (percent)	Tier 1 leverage ratio (percent)	Tier 1 risk-based capital ratio (percent)
Large banks	2.26	2.40	8.78	8.32
Regional banks	0.76	1.01	9.84	9.82
Community banks	1.03	1.16	10.18	12.81
S-corp banks	2.02	1.96	9.90	13.49
C-corp bank	3.26	3.21	9.22	9.74
Non-BHC banks	0.81	1.17	12.37	16.15
BHC banks	2.50	2.47	9.18	9.55

Sources: Call Report Data, FFIEC.

Note: The growth rates and capital ratios are weighted annual averages.

lower Tier 1 leverage ratio but a higher Tier 1 risk-based capital ratio than the group of community banks.

However, drawing conclusions from Table 2 about the effect of organizational structure on capital is difficult because comparing averages does not control for other factors that may affect capital ratios. Therefore, regression analysis is needed to determine how organizational structures affect banks' capital structure.

The regression analysis is restricted to community banks, as most S-corp banks and non-BHC banks are community banks (Table 1). In



addition, the business model of large and regional banks is significantly different from that of community banks.

The regressions estimate how risk and organizational structure might affect bank capital ratios. The panel data consists of community banks for which there are at least five years of quarterly data from 1996:Q1 to 2006:Q4. The dependent variable is the capital ratio of a bank for a given quarter.<sup>10</sup> Bank-specific, time-invariant dummies (fixed effects) are used to control for a bank's idiosyncratic risk. In addition, year dummies are used to control for macro factors. Finally, the regressions use proxies for size, risk, profitability, efficiency, location and organization characteristics, and loan and deposit growth as explanatory variables.<sup>11</sup> These variables control for balance-sheet risk and other characteristics across banks that might otherwise have similar idiosyncratic risk.

The analysis focuses on three explanatory variables: risk, S-corp status, and non-BHC status. A widely used proxy for the risk of unexpected losses for a bank is its earnings risk volatility, measured in terms of the standard deviation of the bank's return on assets (ROA) for the last four quarters.<sup>12</sup> This risk measure is used in all of the regressions. For organizational structures such as S-corp or non-BHC banks, indicator (dummy) variables take the value of 1 if the bank is an S-corp bank or a non-BHC bank for that quarter and 0 otherwise. The model is estimated with each capital ratio as the dependent variable and risk, S-corp status, and non-BHC status as explanatory variables.

The regression models are then used to predict capital ratios for different values of the explanatory variable of interest. This exercise allows us to determine the effect of the variable of interest on capital ratios. For example, the first row in Table 3 shows the predicted capital ratios evaluated at the mean value of the risk measure (columns 1 and 4) and the mean plus one standard deviation of the risk measure (columns 2 and 5). The difference in the two predicted capital ratios is attributed to a change of one standard deviation in the risk measure (columns 3 and 6). Accordingly, a one-standard-deviation increase in risk is associated with a 0.12-percentage-point higher Tier 1 leverage ratio and 0.20-percentage-point higher Tier 1 risk-based capital ratio.

Table 3  
CAPITAL RATIOS AND RISK

Explanatory variables	Predicted values of Tier 1 leverage ratio			Predicted values of Tier 1 risk-based capital ratio		
	(1)	(2)	(3)=(2)-(1)	(4)	(5)	(6)=(5)-(4)
Risk	At mean 9.854*** [9.853, 9.855]	At mean + 1 sd 9.972*** [9.910, 10.034]	Difference 0.118	At mean 15.223*** [15.222, 15.224]	At mean + 1 sd 15.424*** [15.332, 15.5175]	Difference 0.201
S-corp	S-corp=0 9.88*** [9.86, 9.89]	S-corp=1 9.76*** [9.70, 9.82]	Difference -0.12	S-corp=0 15.27*** [15.24, 15.30]	S-corp=1 15.05*** [14.93, 15.18]	Difference -0.22
Non-BHC	Non-BHC=0 9.65*** [9.62, 9.68]	Non-BHC=1 10.70*** [10.59, 10.82]	Difference 1.06	Non-BHC=0 14.80*** [14.74, 14.85]	Non-BHC=1 17.00*** [16.75, 17.23]	Difference 2.19

\*\*\*Significant at the .01 percent level

Note: The numbers in parentheses indicate the 95 percent confidence interval for the point estimates. The mean of the risk measure is 0.21 percent while the mean plus standard deviation (sd) is 0.71 percent. The results are from regression results presented in the Appendix.

While different measures of risk would likely yield different magnitudes of the estimated capital ratios at different risk levels, the estimates based on ROA variability indicate that increased risk is associated with higher capital ratios in a statistical sense. The numbers in parentheses below each predicted value in Table 3 show the 95-percent confidence interval of each estimate. As seen in the first row, the confidence interval of the predicted capital ratio for risk measured at the mean does not overlap with the confidence interval of the predicted capital ratio for risk measured at one standard deviation above the mean. Thus, the two predicted capital ratios are statistically distinct from each other, with higher capital ratios associated with higher risk.

The second and third rows of Table 3 measure the effect of S-corp and non-BHC status, respectively. The second row reports the predicted capital ratios if all banks in the sample were treated as if they were C-corp banks (S-corp =0) in columns 1 and 4. Likewise, columns 2 and 5 show the predicted capital ratios if all banks in the sample were treated as if they were S-corp banks (S-corp =1). The third row of Table 3 shows the predicted capital ratios first treating all banks as if they were holding company banks (non-BHC =0, columns 1 and 4) and then treating all banks as if they were not part of a holding company (non-BHC =1, columns 2 and 5). For both S-corp and non-BHC banks, the difference in the two predicted capital ratios can be attributed to differences in organizational structure.

Importantly, the predicted capital ratios shown in Table 3 using the S-corp dummy variable show that, all else equal, S-corp banks have marginally lower capital ratios than C-corp banks. However, while the predicted capital ratios are statistically significant, the magnitude of their differences does not appear to be economically significant.<sup>13</sup>

These results seem not to support the hypothesis that S-corp banks hold higher capital ratios; however, it is important to recognize that their incentives to do so only apply if their capital ratios fall in the neighborhood of the regulatory minimum thresholds for adequate capital ratios. For example, suppose an S-corp bank just barely exceeds the adequately capitalized threshold. With such a small capital buffer, the likelihood increases that a negative shock to earnings would cause

capital ratios to drop below the threshold. As a result, the regulator may require the bank to withhold dividend payments, causing shareholders to pay taxes on undistributed profits. Such regulatory actions are less likely if the capital ratios of the S-corp bank far exceed the regulatory minimum. Consequently, at high capital ratios, there is less incentive for S-corp banks to hold more capital than C-corp banks. The summary statistics in Table 2 show that the average capital ratios for S-corp banks in the sample are well above the regulatory minimum for adequately capitalized banks.<sup>14</sup> Thus, while these differences in predicted capital ratios might conflict with the hypothesis, they are perhaps unsurprising, as they occur at levels well above the adequately capitalized thresholds.

The predicted capital ratios for non-BHC banks show that they tend to have higher capital ratios than BHC banks. Non-BHC banks are associated with a 1.06-percentage-point higher Tier 1 leverage ratio and a 2.19-percentage-point higher Tier 1 risk-based capital ratio, after controlling for other determinants of capital ratios. The predicted leverage ratios are statistically significant and the differences in the predicted capital ratios appear to be economically significant. This finding supports the hypothesis that a precautionary motive may lead non-BHC banks to hold more capital than holding company banks.

#### IV. CONCLUSION

Adequate capital holdings provide crucial protection against bank failures and their related social and economic costs. Risk and organizational structures vary widely among banks, and bank incentives to hold higher levels of capital can vary accordingly. An analysis relating these differences to capital holdings finds that banks with higher dispersion in earnings (risk) predictably hold higher capital ratios. Similarly, non-BHC banks hold significantly higher capital ratios than holding company banks, even after controlling for all other factors that may affect bank capital. These results lend support to the precautionary motive of non-BHC banks to hold more capital because they have less access to external sources of capital. S-corp banks, however, do not seem to hold more capital than their C-corp peers.

## APPENDIX

### SAMPLE DATA AND REGRESSION RESULTS

The data are quarterly observations from 1996 to 2006 for an unbalanced panel of banks. For the regression analysis, the sample is trimmed further. First, the analysis focuses on community banks, defined here as banks with (real) assets of \$10 billion or less in 2006 dollars. Second, banks with fewer than 20 quarters of data (less than five years) are dropped from the sample. Finally, some outliers, such as bank quarters with zero total loans and zero total deposits, were dropped from the sample. The data included 334,424 quarterly observations and the average number of quarterly observations per bank is 54. However, the number of banks in the regressions is overstated because survivor banks of a merger are considered as a new bank.

#### *Dependent variables*

The model is estimated using two dependent variables. The first is the Tier 1 leverage ratio, or Tier 1 capital divided by average total assets for leverage capital purposes (as defined on Call Report Schedule RC-R), where average total assets for quarter  $t$  is the average of total assets at the end of quarters  $t$  and  $t-1$ .

The second dependent variable is the Tier 1 risk-based capital ratio, or Tier 1 capital divided by risk-weighted assets.

#### *Explanatory variables*

The explanatory variables are divided into two categories: bank-specific balance sheet variables and dummy variables. Except for nonfinancial variables, lagged values of the explanatory variables are used in the regressions.

***Bank-specific balance sheet variables.*** Size is measured by inflation-adjusted assets. Profitability is measured as net interest income divided by total assets (return on assets (ROA) at quarter's end). Risk is computed as the standard deviation of the ROA for the previous four quarters. Finally, efficiency is computed as noninterest expense divided by total assets from the previous quarter.

***Dummy variables.*** Non-BHC bank is equal to 1 if the bank is not a holding company and 0 otherwise. S-corp bank is equal to 1 if the

bank is an S-corporation and 0 otherwise. Rural bank is equal to 1 for a bank that is not in a Metropolitan Statistical Area and 0 otherwise. High deposit growth is equal to 1 if annualized deposit growth for each quarter is greater than or equal to the 75th percentile and 0 otherwise. High loan growth is equal to 1 if annualized loan growth for each quarter is greater than or equal to the 75th percentile and zero otherwise.

*Table A1*  
REGRESSION RESULTS FOR COMMUNITY BANK  
CAPITAL RATIOS

Explanatory variables	Tier 1 leverage ratio	Tier 1 risk-based capital ratio
Risk (ROA) <sup>a</sup>	0.0264*** (3.69)	0.0311*** (4.25)
S-corp bank	-0.0132*** (-2.98)	-0.0167*** (-2.64)
Non-BHC bank	0.116*** (14.77)	0.164*** (14.89)
Rural bank	-0.0490** (-2.33)	0.0571* (1.88)
Size <sup>a</sup>	-0.0216*** (-9.83)	-0.0244*** (-9.11)
Profitability <sup>a</sup>	-0.000656 (-0.21)	-0.00499 (-1.58)
Efficiency <sup>a</sup>	0.00413*** (6.18)	0.00381*** (3.39)
High deposit growth <sup>a</sup>	-0.0615*** (-45.25)	-0.0728*** (-38.17)
High loan growth <sup>a</sup>	-0.0203*** (-13.89)	-0.0749*** (-37.82)
Bank fixed effects	Yes	Yes
Year	Yes	Yes
Adjusted R <sup>2</sup>	0.0749	0.121
Observations	334424	334424
Groups/banks	10322	10322

\* Significant at .1 percent level

\*\* Significant at .05 percent level

\*\*\* Significant at .01 percent level

Notes: *t* statistics are in parentheses. Explanatory variables marked with <sup>a</sup> are lagged by one quarter.

## ENDNOTES

<sup>1</sup>For a given level of assets, an equity holder who has relatively less capital in the bank is more willing to take risks because he or she stands to lose less if the bank fails.

<sup>2</sup>The lower the equity capital, the higher the return on equity. There are essentially two ways to measure a bank's profitability: return on equity and return on assets. While both use net income (profits) in the numerator, the former uses equity in the denominator while the latter uses assets. For reasons beyond the scope of this paper, bank managers and owners prefer to use return on equity as a benchmark of profitability.

<sup>3</sup>Risk-weighted assets are the sum of assets weighted by their relative riskiness.

<sup>4</sup>The evidence has been presented for nonfinancial firms (Lemmons, Roberts, and Zender) as well as financial companies, including banks (Gropp and Heider).

<sup>5</sup>In some instances, BHCs are created to set up nonbank subsidiaries to carry out activities prohibited for banks. See Keeton for a historical background on such issues and Avraham and others for a more recent account on BHCs.

<sup>6</sup>Covenants on BHC debt will often restrict subsidiaries from issuing equity to non-BHC investors because it reduces the income that supports debt repayment.

<sup>7</sup>Access to external sources of capital varies among BHCs, with large BHCs having better access than smaller ones. In addition, Section 6.18 of the Dodd-Frank Act of 2010 requires BHCs to be a source of strength and defines what this means.

<sup>8</sup>Regulators can limit capital distribution, such as paying dividends or bonuses, for banks that barely satisfy the minimum capital ratio requirements but are deemed to be insufficiently capitalized. This practice has more recently been formalized under Basel III with an explicit capital conservation buffer requirement.

<sup>9</sup>The analysis controls for idiosyncratic risk by using fixed effects for each bank in the econometric model.

<sup>10</sup>A complication of using the capital ratio as the dependent variable is that it lies between 0 and 1. To address this issue, the dependent variable is transformed (logit transformation) as a linear function of regressors, which can then be estimated as a standard panel regression with fixed effects (Baum).

<sup>11</sup>The profitability measure is the return on assets, the efficiency measure is non-interest expense as a proportion of total assets, and the location characteristic is proxied by a rural indicator variable that takes the value 1 if the bank's head office is not located in a Metropolitan Statistical Area (MSA) (see the Appendix for details).

<sup>12</sup>Consider two distributions of earnings, the second being the mean-preserving spread of the first. The second distribution has a higher dispersion than the first and also a greater likelihood of larger, unexpected losses (fatter tails). In this sense, the second bank is considered to be more risky than the first.



<sup>13</sup>The magnitude of the differences in the predicted capital ratios for S-corp banks is comparable to the differences in the risk measure. However, unlike the economic significance of the S-corp dummy variable (or the non-BHC dummy variable), the magnitude of the differences for the risk measure can vary with how the measure is defined. In this sense, it is difficult to comment on the economic significance of the differences in the predicted capital ratios of the risk measure.

<sup>14</sup>In fact, they are even greater than the regulatory minimum for well-capitalized banks. The well-capitalized threshold for the period under consideration was 6 percent for the Tier 1 risk-based capital ratio and 5 percent for the Tier 1 leverage ratio. The adequately capitalized threshold was 4 percent for both ratios.

## REFERENCES

- Admati, Anat R., Peter M. DeMarzo, Martin F. Hellwig, and Paul Pfleiderer. 2013. "Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is Not Expensive," Stanford Graduate School of Business Research Paper No. 2065.
- Ashcraft, Adam B. 2008. "Are Bank Holding Companies a Source of Strength to Their Banking Subsidiaries?" *Journal of Money, Credit and Banking*, vol. 40, no. 2-3, pp. 273-294.
- Avraham, Dafna, Patricia Selvaggi, and James I. Vickery. 2012. "A Structural View of U.S. Bank Holding Companies," *Economic Policy Review*, vol. 18, no. 2, pp. 65-81. Available at SSRN: <http://ssrn.com/abstract=2118036>.
- Baum, Christopher F. 2008. "Modeling Proportions," *Stata Journal*, vol. 8, no. 2, pp. 299-303.
- Bednar, William, and Mahmoud Elamin. 2013. "Bank Holding Companies and Changing Capital Ratios," Federal Reserve Bank of Cleveland, *Economic Trends*, August.
- Gilbert, R. Alton, and David C. Wheelock. 2007. "Measuring Commercial Bank Profitability: Proceed with Caution," Federal Reserve Bank of St. Louis, *Review*, vol. 89, no. 6, pp. 515-532.
- Gropp, Reint, and Florian Heider. 2010. "The Determinants of Bank Capital Structure," *Review of Finance*, vol. 14, no. 4, pp. 587-622.
- Keeton, William R. 1990. "Bank Holding Companies, Cross-Bank Guarantees, and Source of Strength," Federal Reserve Bank of Kansas City *Economic Review*, vol. 75, no. 3, pp. 54-67.
- Lemmon, Michael L., Michael R. Roberts, and Jaime F. Zender. 2008. "Back to the Beginning: Persistence and the Cross-Section of Corporate Capital Structure," *Journal of Finance*, vol. 63, no. 4, pp. 1575-1608.
- Thakor, Anjan V. 2014. "Bank Capital and Financial Stability: An Economic Tradeoff or a Faustian Bargain?" Forthcoming, *Annual Review of Financial Economics*, ECGI-Finance Working Paper No. 386. Available at SSRN: <http://ssrn.com/abstract=2341835> or <http://dx.doi.org/10.2139/ssrn.2341835>.

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