

# Capital and Risk in Commercial Banking

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## Abstract

Recent changes in US banking regulation have emphasized risk-based capital (RBC) as a buffer against bank insolvency. This paper compares RBC to the standard capital ratio of equity over assets. For each quarter from 2000 to 2010, we regress both capital and RBC against three indicators of risk: the absolute value of stock returns, standard deviation of stock returns, and bond yield spreads. Both capital and RBC are significantly related to these indicators in several quarters. However, we are unable to find a significant difference between the influences of capital and RBC in any quarter, indicating that RBC does not improve upon the standard capital ratio.

## 1 Introduction

The US Federal Reserve is currently in the process of implementing stricter standards of risk-based capital (RBC) for commercial banks based on the Basel II accords.<sup>1</sup> These measures are intended to improve upon the standard capital ratio of equity over assets, yet there is serious disagreement on whether RBC requirements provide any new and useful information. Here we examine the correlations in the levels of capital and RBC held by bank holding companies to each bank's bond yield spreads and the volatility of its stock returns. Although both capital and RBC are correlated to these measures of risk, we fail to find a significant difference between the coefficients of capital and RBC.

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<sup>1</sup>"Basel II" refers to the policies recommended by the Basel Committee on Banking Supervision (2004).

Basel II (2004, p.2) intends to “strengthen the soundness and stability of the international banking system” through international RBC requirements. Bernanke (2007) noted that “Strong capital levels and sound risk management are important for maintaining bank safety and soundness and, thus, promoting financial stability more generally.” However, many works have disputed the effectiveness of these statutes (Danielsson et al. 2001, VanHoose 2007, Blundell-Wingnall and Atkinson 2010).

We offer some evidence to this debate by examining the relationship between a bank’s capital holdings and its perceived level of risk. To do this, we estimate the correlations of bank capital and RBC to three indicators of a bank’s perceived risk of future insolvency: the absolute value of stock returns, standard deviation of stock returns, and yield spreads on the bank’s bonds. Capital and RBC are found to be significantly related to all three measures of risk. However, the coefficient estimates for capital and RBC are not significantly different from each other indicating that RBC does not provide an improvement over the standard capital ratio.

This paper contends that capital and RBC are both important indicators of bank solvency but that RBC fails to provide new information about bank risk. The next section describes the literature on bank capital and risk of insolvency. Section 3 outlines the empirical model. Section 4 describes our sources and methods of data collection. Results of our analysis are presented in section 5, and section 6 concludes.

## **2 Capital and Risk**

Capital standards have a long history in US banking. Ronn and Verma (1989, p.21) claims that capital regulation “is as old as the banking industry itself, since it directly affects the safety of deposits.” Berger et al. (1995, p.401-403) describes the evolution of capital standards in the US, noting that the National Banking Act of 1863 created an “implicit

10% regulatory capital ratio.” Formalized capital requirements were adopted in 1981, and RBC requirements were introduced in 1992.

The US is currently in the process of implementing stricter RBC standards. Adoption of the Basel Accords has required the Federal Reserve to “completely overhaul bank capital requirements” (Furfine 2000, p.1). Every major BHC is required to report its RBC ratio in quarterly reports to the Federal Reserve. The RBC ratio is calculated as risk-based capital over risk-based assets. “Risk-based capital” is the sum of Tier 1 and Tier 2 capital adjusted for illiquid items such as intangible assets and unrealized gains or losses. “Risk-based assets” is the sum of all asset categories multiplied by their designated risk weight. Risky assets receive a high risk weight which lowers the RBC ratio while safer assets are assigned a lower weight which raises the RBC ratio. For example, holdings of subordinated debt with less than 1 year to maturity receive a rating of 0% while subordinated debt with five years or more to maturity receives a rating of 100%. All AAA rated securities (including mortgage-backed securities) receive a risk weight of 0%. The Regulatory Capital Schedule used to calculate a bank’s RBC ratio is provided in appendix A.

Bank capital has long been known to reduce default risk. Capital acts as a buffer against liquidity shocks (Diamond and Rajan 2000, p.2431) and against portfolio losses (Avery and Berger 1991, p.848; Cordell and King 1995, p.532). “Virtually every bank failure model finds that higher equity-to-asset ratio is associated with lower probability of default” (Berger et al. 1995, p.409). However, models of *risk-based* capital show mixed results. “The theoretical banking literature is sharply divided about the effects of capital requirements on bank behavior and, hence, on the risks faced by individual institutions and the banking system as a whole” (VanHoose 2007, p.3681). Shrieves and Dahl (1992) claims that RBC regulation can effectively limit bank volatility and risk while Hellman, Murdock, and Stiglitz (2000) finds that RBC alone is not sufficient.

The empirical evidence on RBC is also mixed. Avery and Berger (1991, p.872) claims that “risk weights provide an improvement over the old capital standards,” while Hirtle (2003, p.38) states that “the market risk capital figures provide little additional information about the extent of an institution’s market risk exposure.” These points are further debated by Danielsson et al. (2001), Gambacorta and Mistrulli (2004), Van den Heuvel (2008), Berger et al. (2008) and Blundell-Wingnall and Atkinson (2010).

This paper studies the effectiveness of capital and RBC requirements by using equity return volatility and bond yield spreads as proxies for bank risk. “Almost all asset pricing theories rest on a specification of the way in which first moments (expected returns and risk premia) depend on second moments (variances and covariances)” (Engle et al. 1990, 213). Engle (2004) describes how various ARCH models have been used to demonstrate the relationship between firm risk and equity price volatility. Resti and Sironi (2006) shows a relationship between firm risk and bond yield spreads. We follow this literature by testing the influence of capital and RBC on bank risk by using a bank’s stock returns, volatility of stock returns, and bond yield spread as proxies for the risk of future default.

Options theory provides insights into how a bank’s stock and bond prices influence its probability of default. A firm’s bond prices, stock prices, and stock price volatility are used to calculate the the value of the firm’s assets and the probability that the asset value will fall to zero. Merton (1977) employed the options pricing model to analyze deposit insurance. Based on the models of Black and Cox (1973) and Merton (1974), Hanweck (2001) explains how a bank’s debt and equity prices can be used to calculate its probability of default with the example of the Bank of New England. Hanweck and Spellman (2005) applies this model to the Prompt Corrective Action standards for insolvent banks. Ronn and Verma (1989) reverses this process by using market values of bank stock and bond prices to derive optimal book-value capital standards. Cordell and King (1995) uses bank stock and bond

prices to estimate the market's perception of bank capital and finds that it is highly related to RBC. These studies confirm the relationship between a bank's stock and bond prices and its probability of default.

### 3 Empirical Model

This section describes a few simple econometric models intended to test the correlation between the perceived risk of a BHC and its levels of capital and RBC. For each quarter we sum the absolute values of daily returns and calculate the standard deviation of daily returns on the stock prices of each BHC. We also calculate the average yield spread on the bonds of each BHC. Each of these three quarterly cross-sections (absolute value of return on stocks, standard deviation of return on stocks, and bond yield spreads) is then regressed against the quarterly cross-section of BHC capital and RBC ratios to determine the influence of these ratios on bank risk. Bank holdings of mortgage-backed securities (MBS) and real estate assets are used as controls since these assets may also influence perceptions of the bank's level of risk.

#### 3.1 Equity Price Volatility

We use two measures of equity price volatility: the sum of the absolute values of daily returns and the standard deviation of daily returns. In order to calculate these measures, we first compute the daily returns on equity. For each BHCs, daily return is calculated as in equation 1 where  $p_{it}$  is the closing price of bank  $i$ 's stock on day  $t$ .

$$r_{it} = \frac{p_{it} - p_{i(t-1)}}{p_{i(t-1)}} \quad (1)$$

The absolute value of daily returns per quarter for each BHC are denoted  $\alpha_i$  and calculated as in equation 2 where  $T$  is the number of trading days over the quarter and  $t$  is a particular trading day.

$$\alpha_i = \sum_{t=1}^T |r_{it}| \quad (2)$$

The quarterly standard deviation of daily returns is computed as in equations 3 and 4.

$$\bar{r}_i = \sum_{t=1}^T r_{it}/T \quad (3)$$

$$\sigma_i = \sum_{t=1}^T (\bar{r}_i - r_{it})^2 \quad (4)$$

The median number of days is 62 per quarter. Companies with prices for fewer than 30 trading days in the quarter are excluded for that particular quarter. Equity price volatility is a common indicator of firm risk. These two measures of price volatility will be used as dependent variables in regressions on capital and RBC.

### 3.2 Bond Yield Spreads

For bonds, we calculate the average yield premium above US treasuries for each BHC in each quarter. Each bond is matched with a US treasury bond index of similar maturity. The indexes used are constant-maturities of 1, 2, 3, 5, 10, 20, and 30 years. Bonds are matched to the index of the closest maturity. For example, a bond with 1.4 years to maturity is matched to the 1-year maturity index while a bond with 1.5 or 1.6 years to maturity would be matched to the 2-year maturity index. Once the proper index is identified, the spread calculated as the yield on the bonds of bank  $i$  less the yield on treasury  $j$ . The average spread is calculated for each BHC in each quarter as in equation 5 where  $T$  is the number

of trading days over the quarter and  $t$  is a particular trading day.

$$\delta_i = \sum_{t=1}^T (y_{it} - y_{jt})/T \quad (5)$$

This quarterly average yield premium above the treasury rate indicates the perceived riskiness of the bond over the period. It will be used as the dependent variable in regressions against BHC capital and RBC.

### 3.3 Regression Equations

The three measures of price volatility (absolute value of return on stocks, standard deviation of return on stocks, and bond yield spreads) are used as the dependent variables in our regression analysis. Independent variables are taken from each bank's balance sheet, the most important of which are capital and RBC. We include other risky asset categories of real estate asset holdings and MBS as controls since they may influence market participants' perception of the bank's level of risk. Each independent variable (capital, RBC, real estate loans, and MBS) is listed as a percentage of total assets. The regression equation for capital on the absolute value of stock returns is shown in equation 6.

$$\alpha_i = \beta_{cap}(\text{capital}_i) + \beta_0(\text{real}_i) + \beta_1(\text{mbs}_i) + \beta_2 + \epsilon \quad (6)$$

We repeat this test with the bank's risk-based capital ratio replacing the capital ratio as the main independent variable. This regression is given in equation 7.

$$\alpha_i = \beta_{risk}(\text{RBC}_i) + \beta_0(\text{real}_i) + \beta_1(\text{mbs}_i) + \beta_2 + \epsilon \quad (7)$$

We then repeat these regressions using standard deviation of equity prices  $\sigma_i$  as the dependent variable and then again using bond yield spreads  $\delta_i$  as the dependent variable.

These regression give us a series of quarterly cross-sectional beta estimates representing the influence of capital and RBC on the riskiness of a BHC's debt and equity. These quarterly data are used to evaluate three testable hypotheses for each of our quarterly cross-sections (absolute value of return on stocks, standard deviation of return on stocks, and bond yield spreads). H1: Bank capital has no influence on stock returns or bond yields ( $\beta_{cap} = 0$ ). H2: Bank risk-based capital has no influence on stock returns or bond yields ( $\beta_{risk} = 0$ ). H3: Bank capital and risk-based capital have the same influence on stock returns and bond yields ( $\beta_{cap} = \beta_{risk}$ ).

The use of quarterly cross-sections has two advantages. First, we can test the significance of  $\beta_{cap}$  and  $\beta_{risk}$  in each quarter to find out not only when each  $\beta$  was significant but also how their significance has changed over time. Second, using quarterly cross-sections excludes time-dependent factors which may have affected the entire banking industry such as changes in Fed policy or trends in the composition of bank balance sheets.

## 4 Data

The data for this analysis are taken from multiple sources. A list of BHC ID numbers and corresponding CUSIPs as of 2008 is available from the Federal Reserve Bank of New York (FRBNY).<sup>2</sup> For this list of banks, we obtain stock prices from Wharton Research Data Services (WRDS)<sup>3</sup> and bond yield data from Thomson Reuters Datastream<sup>4</sup> which are matched with treasury yields to calculate the spread on each bond. These data sets are then combined with quarterly balance sheet data from the Federal Reserve.

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<sup>2</sup>Available at [http://www.newyorkfed.org/research/banking\\_research/datasets.html](http://www.newyorkfed.org/research/banking_research/datasets.html).

<sup>3</sup>Available at <https://wrds-web.wharton.upenn.edu/wrds/>.

<sup>4</sup>Available at <http://online.thomsonreuters.com/datastream/>.



Daily stock prices for each bank holding company are downloaded from WRDS. Banks are selected by PERMCO according to the bank list from the FRBNY. The fields selected are date, PERCMO, CUSIP, and daily closing price for the period January 1, 1999 to December 31, 2010. Any entries with characters or missing data in the price field are dropped. A list of distinct CUSIP numbers is created from this data set to be used for downloading bond data.

Daily bond yields for each bank holding company are downloaded from Datastream. Bonds are selected if their CUSIP matches any CUSIP from the stocks data set. Fields selected are date, CUSIP, book value, yield, and bond life (years to maturity) for the period January 1, 1999 to December 31, 2010. Firms with less than one year of data are dropped. For each firm, we calculate a daily average yield of all bonds outstanding weighted by book value. This weighted average yield is used as the single bond yield for the firm. Each bond is then matched to a constant-maturity index of US treasuries or similar maturity as described in section 3.2. Treasury index data are downloaded from the Federal Reserve Bank of St. Louis.<sup>5</sup>

Data on the balance sheets and capital is obtained from the Federal Reserve Bank of Chicago (FRBC) in their *Consolidated Financial Statements for Bank Holding Companies* (Y-9C) reports.<sup>6</sup> These quarterly reports contain full financial statements from all large BHCs.<sup>7</sup> The fields taken from these reports are report date, BHC ID number, total liabilities, total equity, holdings of real estate assets, MBS, and risk-based capital ratio. New fields are calculated for the ratios of capital, real estate, and MBS as percentages of total equity.

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<sup>5</sup> Available at <http://research.stlouisfed.org/fred2/categories/115>.

<sup>6</sup> Available at [http://www.chicagofed.org/webpages/banking/financial\\_institution\\_reports/bhc\\_data.cfm](http://www.chicagofed.org/webpages/banking/financial_institution_reports/bhc_data.cfm).

<sup>7</sup> Until 2006, BHCs were required to complete the quarterly Y-9C report if their total assets exceeded \$150 million. Since 2006, the limit has been raised to \$500 million, but some firms below this level continue to report.

These three data sets are then matched using the FRBNY bank list. Stock prices are joined to bond yield spreads using one-to-many mapping using date and CUSIP as the key fields (for each firm, dates with a stock price but not bond spread are kept while dates with a bonds spread but no stock price are dropped). For these daily yields and prices, a new field is created to identify the year and quarter. This set of stock prices and bond yield spreads is then matched to the balance sheet data using the quarter and BHC ID number as the key fields. Daily yields and prices are matched to the firm's balance sheet from the beginning of the quarter (the end of the previous quarter).

Summary statistics for the final combined data set are given in appendix B. Table B.1 contains means of balance sheet data and daily returns for the entire sample. There are an average of 301 stock prices and 23 bond yields per quarter. Figure B.1 shows a scatter plot of all quarterly BHC capital and risk-based capital ratios. Quarterly averages for capital and RBC ratios are shown in figures B.2. Figure B.3 shows the quarterly average yield on treasury indexes of 1, 5, and 10 year maturities along with the average BHC bond yield in each quarter. Figure B.4 calculates the average yield spread per quarter. B.5 shows quarterly standard deviation of stock prices and B.6 lists the number of stock price observations per quarter. The number of observations per quarter declines slightly over the sample period, likely due to the industry trend towards consolidation during this time. Figures B.7 and B.8 show quarterly standard deviations of bond yields and the number of bond yield observations per quarter. The number of observations is low in early years due to the fewer number of banks issuing bonds at that time but also due to the difficulty of matching bond data to banks in those years, many of which are no longer in existence. The year 2000 is not included in bond yield analysis since there were too few observations to conduct the regression analysis.

## 5 Results

The results from these regressions show that both capital and RBC are related to bank risk measured by bond yields and stock price volatility. Capital and RBC are most significantly related to bond yields around the recession of 2001 and to stock returns since 2008. The coefficients of capital and RBC are very similar in most regressions.

As described in section 3, our intent is to analyze the significance of  $\beta_{cap}$  and  $\beta_{risk}$  representing the influence of capital or RBC in each quarter and examine their changes over time. We display the results of this analysis in a series of charts which plot time in terms of quarters on the x-axis, and  $\beta$  coefficient on the y-axis. The solid line in each figure represents the quarterly  $\beta$  estimate while the thin dotted lines represent upper and lower confidence intervals at the 10% level. When the lower CI is above zero or the higher line below zero,  $\beta$  is significant at the 10% level. These periods of significance are shaded grey in each figure. As mentioned in the previous section, analysis on bond yields does not begin until 2001 due to the low number of observations before that time.

Several alternative specifications were used to test the robustness of these regressions on leverage and capital. The bank asset categories of real estate assets and MBS were included in regression equations because they were found to be significantly related to price volatility. Coefficient estimates and standard errors for real estate assets and MBS are given in appendix C. Other asset categories tested were subordinate debt, treasuries, trading assets, and cash, all as percentages of equity. Most of these asset categories did have some periods of significance but less often than real estate or MBS. All regressions yielded similar overall results.

Figure 1: Absolute value of stock returns

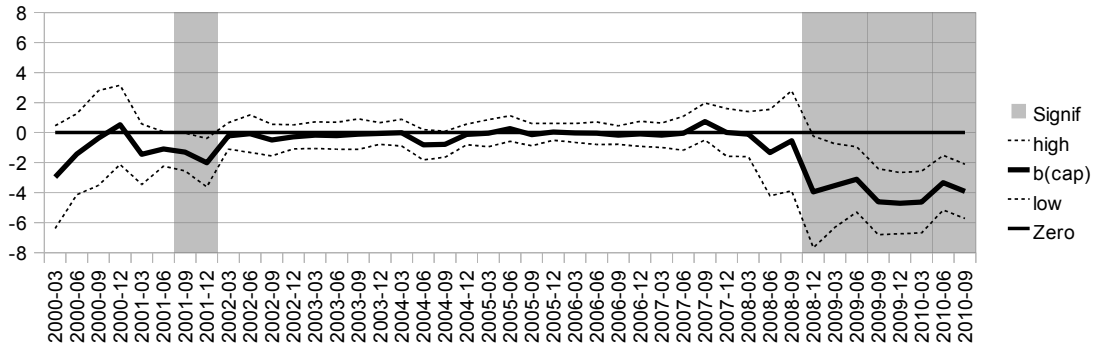


Figure 1.a. Beta of absolute stock returns on capital

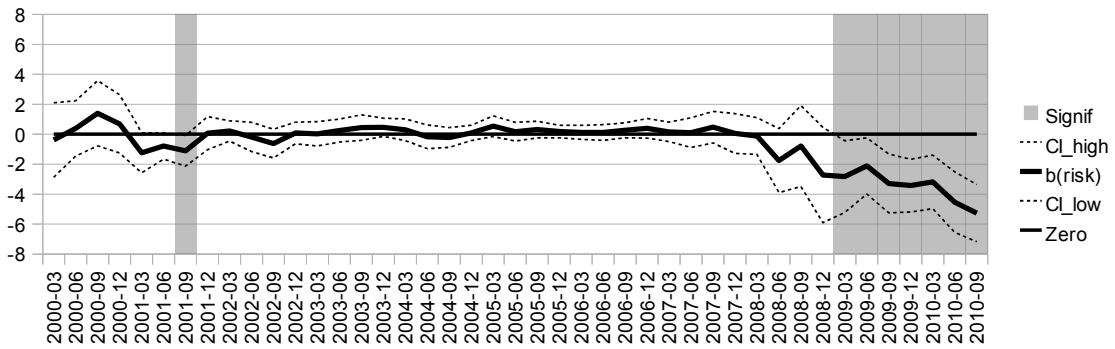


Figure 1.b. Beta of absolute stock returns on risk-based capital

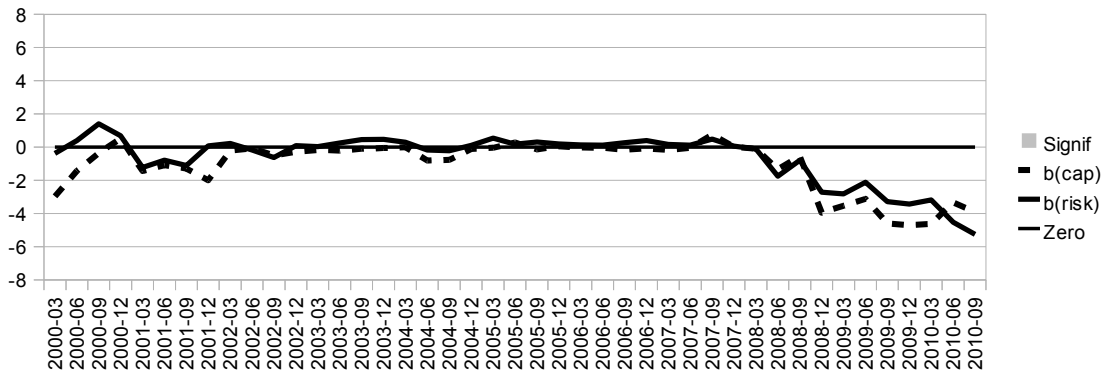


Figure 1.c. Betas of absolute stock returns on capital and risk-based capital

## 5.1 Absolute Value of Stock Returns

Figure 1 shows the results of the quarterly regressions of the absolute values of stock returns on capital and RBC. Figure 1.a shows the quarterly estimates of  $\beta_{cap}$  which are used to test H1. The chart is shaded gray in 10 of the 43 quarters indicating that the  $\beta_{cap}$  coefficient is significant in these periods. We find significance for 2 quarters in 2001 and all quarters since Q4 of 2008. Figure 1.b tests H2 with quarterly estimates of  $\beta_{risk}$  which are significant in 8 of 43 quarters. These are Q3 of 2001 and since Q1 of 2009, all of which were also significant

Figure 1.c tests H3 that  $\beta_{cap} = \beta_{risk}$ . Quarterly estimates of  $\beta_{cap}$  are shown as a dotted black line while estimates of  $\beta_{risk}$  are shown in solid black. We can see that the patterns of these coefficients are quite similar. Periods where these coefficients are significantly different at the 10% level would be shaded grey except that there are no such periods. In every quarter we fail to reject the null hypothesis that  $\beta_{cap} = \beta_{risk}$ .

## 5.2 Standard Deviation of Stock Returns

Figure 2 shows the results of quarterly regressions of the standard deviation of stock returns on capital and RBC. Figure 2.a shows the quarterly estimates of  $\beta_{cap}$ . Grey shading indicates that we reject the null hypothesis H1 at the 10% level. The coefficient is significant in 10 of 43 quarters: Q4 of 2001, Q2 of 2004, and since Q4 of 2008. Figure 2.b gives the  $\beta_{risk}$  estimates which are used to test H2. We find that  $\beta_{risk}$  is significant in 8 of 43 quarters. These are Q3 of 2005 and all quarters since Q1 of 2009.

Figure 2.c tests hypothesis H3 that  $\beta_{cap} = \beta_{risk}$ . It shows the estimates of  $\beta_{cap}$  as a dotted line and  $\beta_{risk}$  as a solid line. The trends are again similar. Periods when the estimates are significantly different would be shaded gray, but again there are none. In all 43 quarters we fail to reject the null hypothesis.

Figure 2: Standard deviation of stock returns

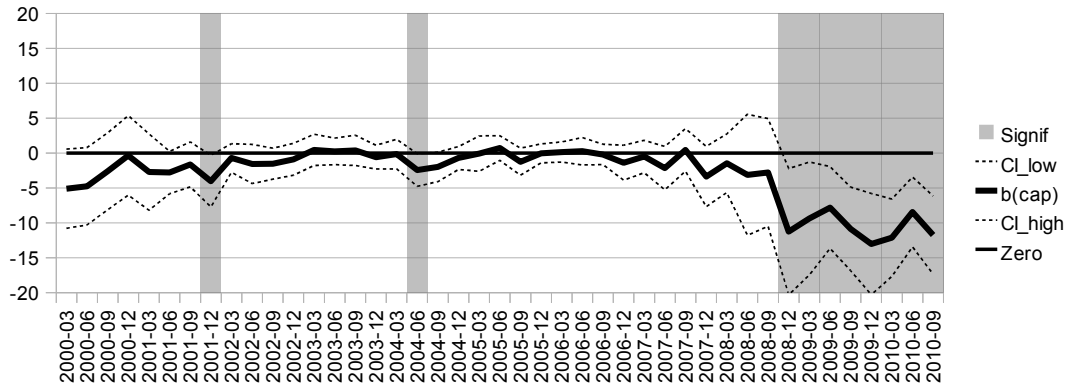


Figure 2.a. Beta of standard deviation of stock returns on capital

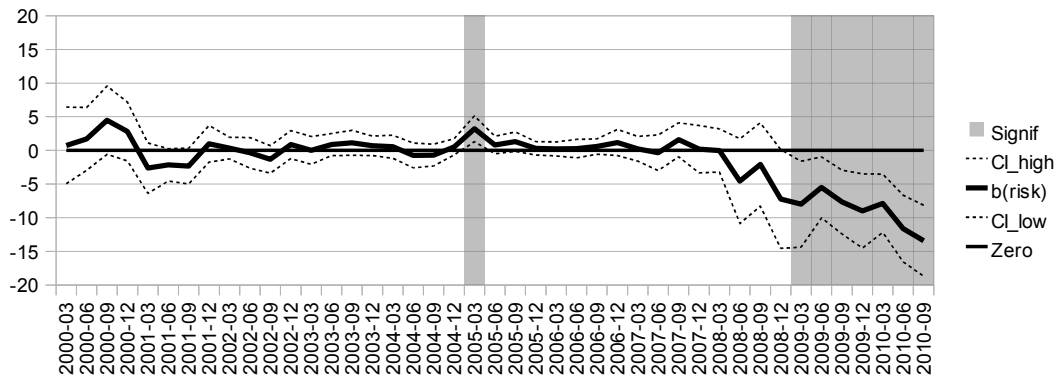


Figure 2.b. Beta of standard deviation of stock returns on risk-based capital

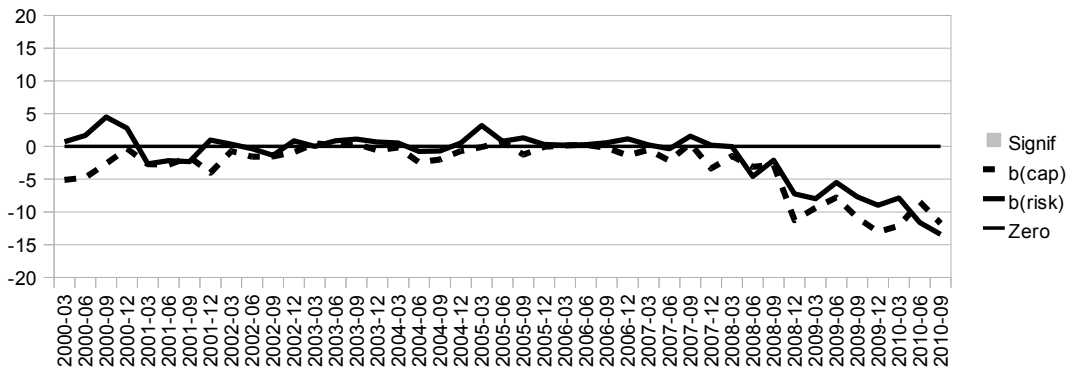


Figure 2.c. Beta of standard deviation of stock returns on capital and risk-based capital

### 5.3 Bond Yield Spreads

Figure 2 shows the results of quarterly regressions of bond yield spreads on capital and RBC. H1 is tested in figure 2.a which shows the quarterly estimates of  $\beta_{cap}$ . We can reject H1 in 6 quarters in which the coefficient is found to be significant: Q2 of 2002 and Q4 of 2005 to Q4 of 2006. Figure 2.b gives the  $\beta_{risk}$  estimates in each quarter which are used to test H2. The coefficient is significant in 7 quarters from Q2 of 2001 to Q2 of 2002, Q4 of 2002, and Q2 of 2003.

Figure 3.c compares the quarterly coefficient estimates of  $\beta_{cap}$  and  $\beta_{risk}$ . Like figures 1.c and 2.c,  $\beta_{cap}$  is shown as a dotted black line, and  $\beta_{risk}$  is shown in solid black. However, unlike 1.c and 2.c, there appears to be more variation between these estimates. Both begin below 0 and decline in 2001, although  $\beta_{risk}$  reaches a minimum in Q4 of 2001 while  $\beta_{cap}$  declines until Q2 of 2002.  $\beta_{cap}$  then becomes positive in 2003 and stays mostly positive until 2005, while  $\beta_{risk}$  remains negative over the period. Despite these modest variations, the trends of  $\beta_{cap}$  and  $\beta_{risk}$  are generally similar. They both start off negative, first decline, then begin to rise. Both are close to 0 from 2005 through 2008 and become slightly negative in 2009. The estimates of  $\beta_{cap}$  and  $\beta_{risk}$  are not significantly different in any quarter, signified by the lack of shading in figure 3.c. In every quarter we fail to reject the null hypothesis H3 that  $\beta_{cap} = \beta_{risk}$ .

Overall, the results from figures 1-3 are very similar. Estimates of the  $\beta$  coefficients tend to be significant around the recessions of 2001, especially for bonds, and of 2008-2009 for stocks. One unusual period is the significance of  $\beta_{cap}$  for bond yields in 2005 and 2006 as shown in figure 3.a. However the coefficient is small and is not significantly different from  $\beta_{risk}$ . The trends of  $\beta_{cap}$  and  $\beta_{risk}$  are remarkably similar in figures 1.c, 2.c, and 3.c, and these coefficient estimates are not found to be significantly different from each other in any quarter. Capital and RBC are found to be significantly related to bank risk but are

Figure 3: Bond yield spreads

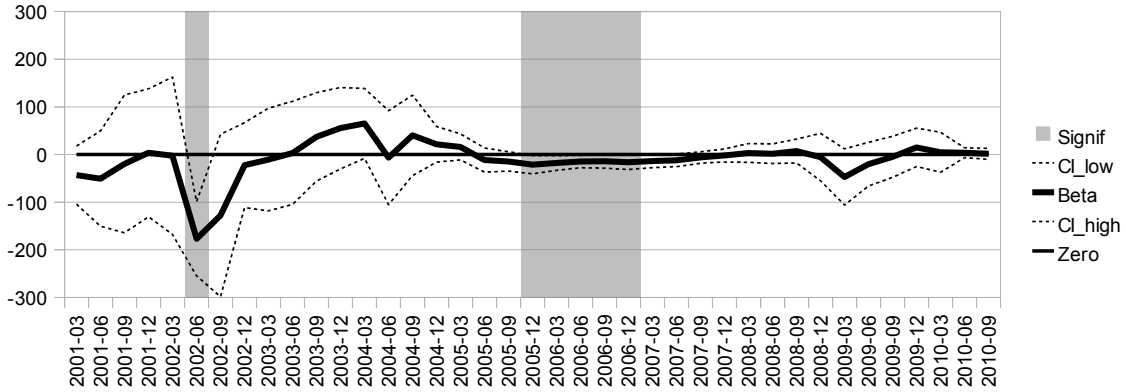


Figure 3.a. Beta of bond yield spreads on capital

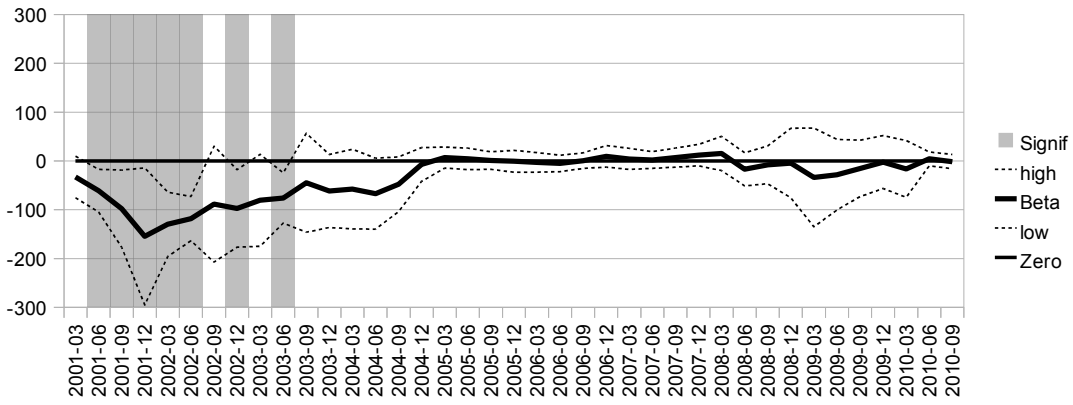


Figure 3.b. Beta of bond yield spreads on risk-based capital

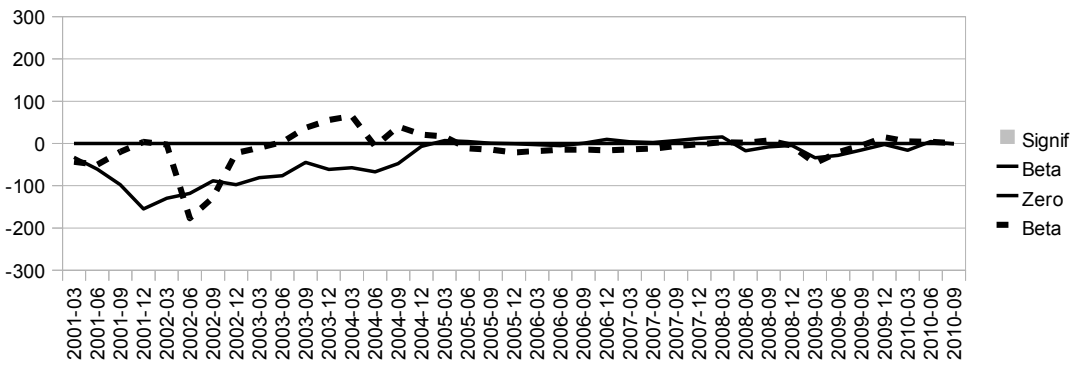


Figure 3.c. Beta of bond yield spreads on capital and risk-based capital



not significantly different from each other.

## **6 Conclusion**

This paper compares the influences of capital and risk-based capital on bank default risk. We analyze the correlations of capital and RBC to three indicators of bank risk: the absolute value of stock returns, the standard deviation of stock returns, and bond yield spreads. Both capital and RBC are found to be significantly related to all three measures of risk in several quarters, especially around the recessions of 2001 and 2008-2009. However, the  $\beta$  coefficients of capital and RBC are not found to be significantly different from each other in any quarter.

# A Federal Reserve Y9-C Regulatory Capital Schedule

## Schedule HC-R—Regulatory Capital

This schedule is to be submitted on a consolidated basis.

For Federal Reserve Bank Use Only  
C.I.

FR Y-9C  
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Dollar Amounts in Thousands		BHCX	Bil	Mil	Thou	
<b>Tier 1 capital</b>						
1.	Total bank holding company equity capital (from Schedule HC, item 27.a) .....	3210				1.
2.	LESS: Net unrealized gains (losses) on available-for-sale securities <sup>1</sup> (if a gain, report as a positive value; if a loss, report as a negative value).....	BHCK				
		8434				2.
3.	LESS: Net unrealized loss on available-for-sale equity securities <sup>1</sup> (report loss as a positive value) ..	A221				3.
4.	LESS: Accumulated net gains (losses) on cash flow hedges <sup>1</sup> (if a gain, report as a positive value; if a loss, report as a negative value) .....	4336				4.
5.	LESS: Nonqualifying perpetual preferred stock .....	B588				5.
6.	a. Qualifying Class A noncontrolling (minority) interests in consolidated subsidiaries .....	G214				6.a.
	b. Qualifying restricted core capital elements (other than cumulative perpetual preferred stock) <sup>2</sup> ...	G215				6.b.
	c. Qualifying mandatory convertible preferred securities of internationally active bank holding companies .....	G216				6.c.
7.	a. LESS: Disallowed goodwill and other disallowed intangible assets .....	B590				7.a.
	b. LESS: Cumulative change in fair value of all financial liabilities accounted for under a fair value option that is included in retained earnings and is attributable to changes in the bank holding company's own creditworthiness (if a net gain, report as a positive value; if a net loss, report as a negative value).....	F264				7.b.
8.	Subtotal (sum of items 1, 6.a., 6.b., and 6.c., less items 2, 3, 4, 5, 7.a, and 7.b) .....	C227				8.
9.	a. LESS: Disallowed servicing assets and purchased credit card relationships .....	B591				9.a.
	b. LESS: Disallowed deferred tax assets .....	5610				9.b.
10.	Other additions to (deductions from) Tier 1 capital .....	B592				10.
11.	Tier 1 capital (sum of items 8 and 10, less items 9.a and 9.b).....	8274				11.
<b>Tier 2 capital</b>						
12.	Qualifying subordinated debt, redeemable preferred stock, and restricted core capital elements <sup>2</sup> (except Class B noncontrolling (minority) interest) not includible in items 6.b. or 6.c. ....	G217				12.
13.	Cumulative perpetual preferred stock included in item 5 and Class B noncontrolling (minority) interest not included in 6.b., but includible in Tier 2 capital.....	G218				13.
14.	Allowance for loan and lease losses includible in Tier 2 capital.....	5310				14.
15.	Unrealized gains on available-for-sale equity securities includible in Tier 2 capital.....	2221				15.
16.	Other Tier 2 capital components .....	B594				16.
17.	Tier 2 capital (sum of items 12 through 16).....	5311				17.
18.	Allowable Tier 2 capital (lesser of item 11 or 17).....	8275				18.
19.	Tier 3 capital allocated for market risk .....	1395				19.
20.	LESS: Deductions for total risk-based capital.....	B595				20.
21.	Total risk-based capital (sum of items 11, 18, and 19, less item 20).....	3792				21.
<b>Total assets for leverage ratio</b>						
22.	Average total assets (from Schedule HC-K, item 5) .....	bhct				
		3368				22.
23.	LESS: Disallowed goodwill and other disallowed intangible assets (from item 7.a above) .....	B590				23.
24.	LESS: Disallowed servicing assets and purchased credit card relationships (from item 9.a above) ..	B591				24.
25.	LESS: Disallowed deferred tax assets (from item 9.b above).....	5610				25.
26.	LESS: Other deductions from assets for leverage capital purposes.....	BHCK				
		B596				26.
27.	Average total assets for leverage capital purposes (item 22 less items 23 through 26) .....	A224				27.
28.–30. Not applicable						
<b>Capital ratios</b>		BHCK	Percentage			
31.	Tier 1 leverage ratio (item 11 divided by item 27) .....	7204	—	—	—	31.
32.	Tier 1 risk-based capital ratio (item 11 divided by item 21) .....	7206	—	—	—	32.
33.	Total risk-based capital ratio (item 21 divided by item 27) .....	7205	—	—	—	33.

1. Report amount included in Schedule HC, item 26.b, "Accumulated other comprehensive income."  
2. Includes subordinated notes payable to unconsolidated trusts issuing trust preferred securities net of the bank holding company's investment in the trust, trust preferred securities issued by consolidated special purpose entities, and Class B and Class C noncontrolling (minority) interests that qualify as Tier 1 capital.

**Schedule HC-R—Continued**

Bank holding companies are not required to risk-weight each on-balance sheet asset and the credit equivalent amount of each off-balance sheet item that qualifies for a risk weight of less than 100 percent (50 percent for derivatives) at its lower risk weight. When completing items 34 through 54 of Schedule HC-R, each bank holding company should decide for itself how detailed a risk-weight analysis it wishes to perform. In other words, a bank holding company can choose from among its assets and off-balance sheet items that have a risk weight of less than 100 percent which ones to risk-weight at an appropriate lower risk weight, or it can simply risk-weight some or all of these items at a 100 percent risk weight (50 percent for derivatives).

	Dollar Amounts in Thousands												C000											
	(Column A) Totals (from Schedule HC)			(Column B) Items Not Subject to Risk-Weighting			(Column C) Allocation by Risk			(Column D) Allocation by Risk			(Column E) Weight Category			(Column F)								
	Bil	Mil	Thou	Bil	Mil	Thou	Bil	Mil	Thou	Bil	Mil	Thou	Bil	Mil	Thou	Bil	Mil	Thou	Bil	Mil	Thou			
<b>Balance Sheet Asset Categories</b>																								
34. Cash and due from depository institutions (column A equals the sum of Schedule HC, items 1.a, 1.b.(1) and 1.b.(2)).....																								
35. Held-to-maturity securities .....																								
36. Available-for-sale securities .....																								
37. Federal funds sold and securities purchased under agreements to resell.....																								
38. Loans and leases held for sale .....																								
39. Loans and leases, net of unearned income .....																								
40. LESS: Allowance for loan and lease losses .....																								
41. Trading assets .....																								
42. All other assets <sup>1</sup> .....																								
43. Total assets (sum of items 34 through 42) .....																								

1. Includes premises and fixed assets, other real estate owned, investments in unconsolidated subsidiaries and associated companies, direct and indirect investments in real estate ventures, intangible assets, and other assets.

**Schedule HC-R—Continued**

	(Column A) Face Value or Notional Amount			Credit Conversion Factor	(Column B) Credit Equivalent Amount <sup>1</sup>			(Column C) Allocation by Risk Weight Category						(Column D) Allocation by Risk Weight Category			(Column E) Allocation by Risk Weight Category			(Column F)			
	Bil	Mil	Thou		Bil	Mil	Thou	0%			20%			50%			100%						
								BHC0	BHC1	BHC2	BHC3	BHC4	BHC5	BHC6	BHC7	BHC8	BHC9						
Dollar amounts in thousands																							
<b>Derivatives and Off-Balance Sheet Items</b>																							
44. Financial standby letters of credit.....				1.00 or 12.5 <sup>2</sup>																			
45. Performance standby letters of credit.....				.50																			
46. Commercial and similar letters of credit.....				.20																			
47. Risk participations in bankers acceptance acquired by the reporting institution.....				1.00																			
48. Securities lent.....				1.00																			
49. Retained recourse on small business obligations sold with recourse.....				1.00																			
50. Recourse and direct credit substitutes (other than financial standby letters of credit) subject to the low-level exposure rule and residual interests subject to a dollar-for-dollar capital requirement.....				12.5 <sup>3</sup>																			
51. All other financial assets sold with recourse.....				1.00																			
52. All other off-balance sheet liabilities.....				1.00																			
53. Unused commitments:																							
a. With an original maturity exceeding one year.....				.50																			
b. With an original maturity of one year or less to asset-backed commercial paper conduits.....				.10																			
54. Derivative contracts.....																							

1. Column A multiplied by credit conversion factor.  
2. For financial standby letters of credit to which the low-level exposure rule applies, use a credit conversion factor of 12.5 or an institution specific factor. For other financial standby letters of credit, use a credit conversion factor of 1.00. See instructions for further information.  
3. Or institution-specific factor.

**Schedule HC-R—Continued**

	(Column A) Face Value or Notional Amount			Credit Conversion Factor	(Column B) Credit Equivalent Amount <sup>1</sup>			(Column C) Allocation by Risk Weight Category						(Column D) Allocation by Risk Weight Category			(Column E) Allocation by Risk Weight Category			(Column F)		
	Bil	Mil	Thou		Bil	Mil	Thou	0%			20%			50%			100%					
								BHC0	BHC1	BHC2	BHC3	BHC4	BHC5	BHC6	BHC7	BHC8	BHC9					
<b>Derivatives and Off-Balance Sheet Items</b>																						
44. Financial standby letters of credit.....	BHCX B546			1.00 or 12.5 <sup>2</sup>	BHCE																	
45. Performance standby letters of credit.....	BHC 6570			.50																		
46. Commercial and similar letters of credit.....	BHC 3411			.20																		
47. Risk participations in bankers acceptance acquired by the reporting institution.....	BHCX 3423			1.00																		
48. Securities lent.....	BHC 3433			1.00																		
49. Retained recourse on small business obligations sold with recourse.....	BHC A250			1.00																		
50. Recourse and direct credit substitutes (other than financial standby letters of credit) subject to the low-level exposure rule and residual interests subject to a dollar-for-dollar capital requirement.....	BHCX B541			12.5 <sup>3</sup>																		
51. All other financial assets sold with recourse.....	BHCX B675			1.00																		
52. All other off-balance sheet liabilities.....	BHCX B681			1.00																		
53. Unused commitments:																						
a. With an original maturity exceeding one year.....	BHCX 6672			.50																		
b. With an original maturity of one year or less to asset-backed commercial paper conduits.....	BHCX 6691			.10	BHCE A197																	
54. Derivative contracts.....																						

1. Column A multiplied by credit conversion factor.  
2. For financial standby letters of credit to which the low-level exposure rule applies, use a credit conversion factor of 12.5 or an institution specific factor. For other financial standby letters of credit, use a credit conversion factor of 1.00. See instructions for further information.  
3. Or institution-specific factor.

## B Summary Statistics

	Mean	St. Dev.	Min.	Max.	Num. of Obs.
Total Assets	6,632	64,348		2,366,000	101,751
Total Liabilities	6,060	59,064		2,225,000	101,751
Total Equity	553	5,310	-1,375	257,700	101,751
Real estate loans	561	5,718	-15,002	258,600	1,731,825
Mortgage-backed securities	1,732	14,161		573,900	77,367
Stock returns	0	0.03	-.92	4.00	2,042,371
Bond returns	0	1	-46.45	41.91	121,802

Table B.1. Summary statistics for entire sample (dollars in millions)

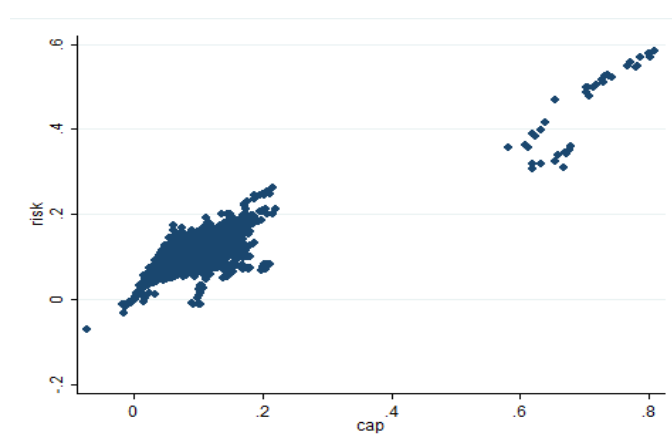


Figure B.1. Scatter plot of capital and risk-based capital ratios

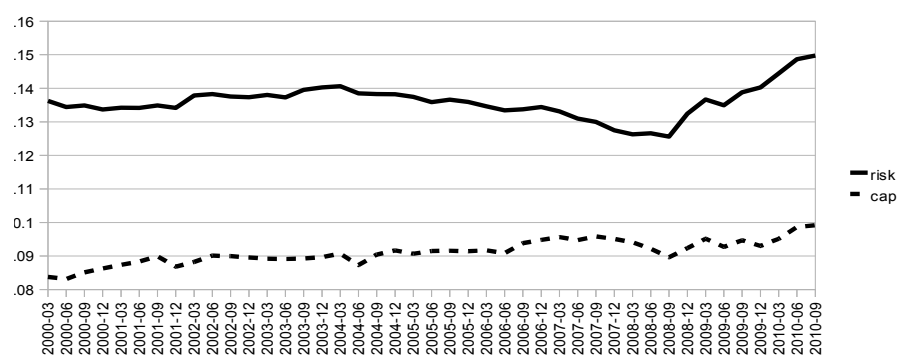


Figure B.2. Average quarterly capital risk-based capital ratios

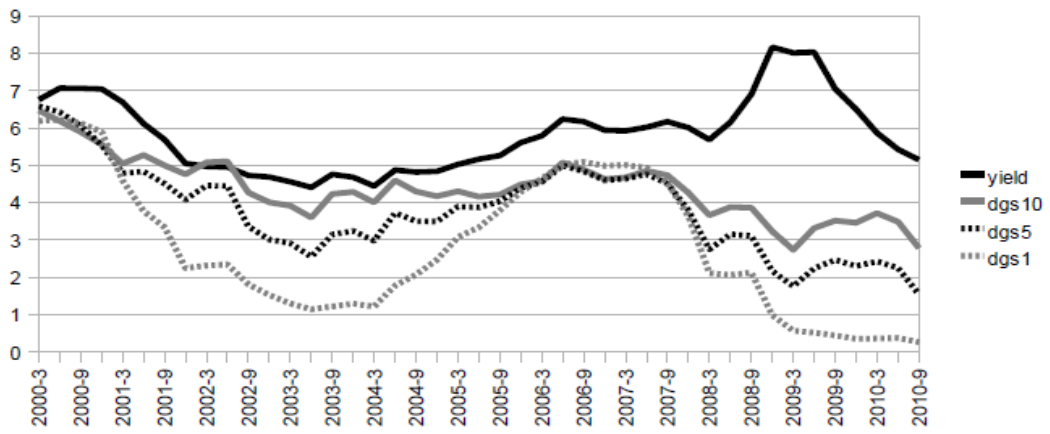


Figure B.3. Average quarterly BHC bond yields and yields on 1, 5, and 10-year treasuries

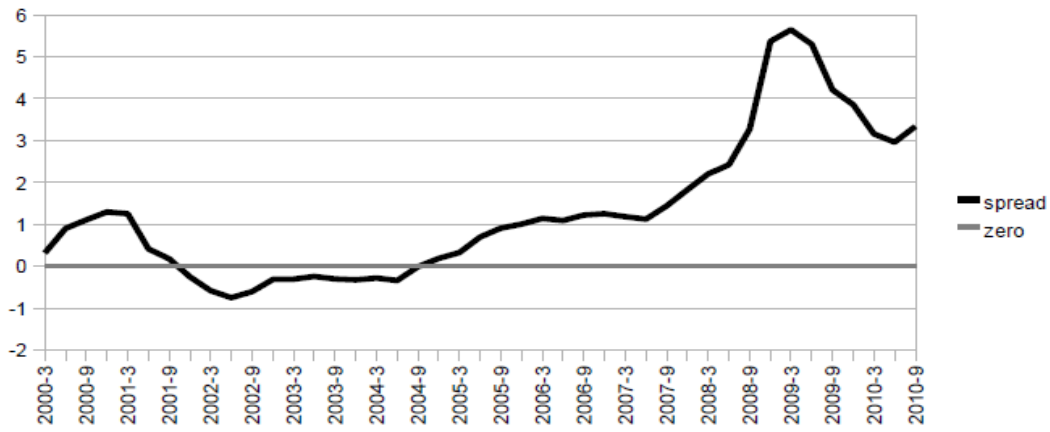


Figure B.4. Average quarterly BHC bond yield spread

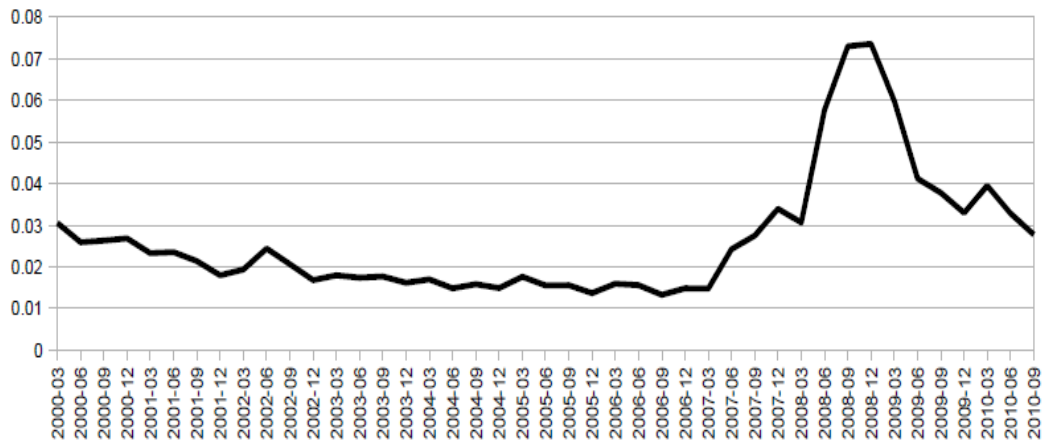


Figure B.5. Quarterly standard deviation of stock returns

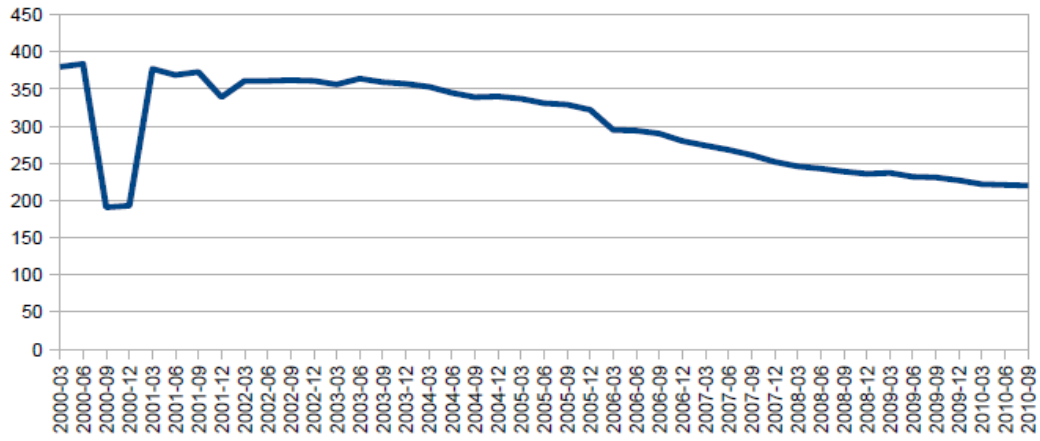


Figure B.6. Quarterly number of stock observations



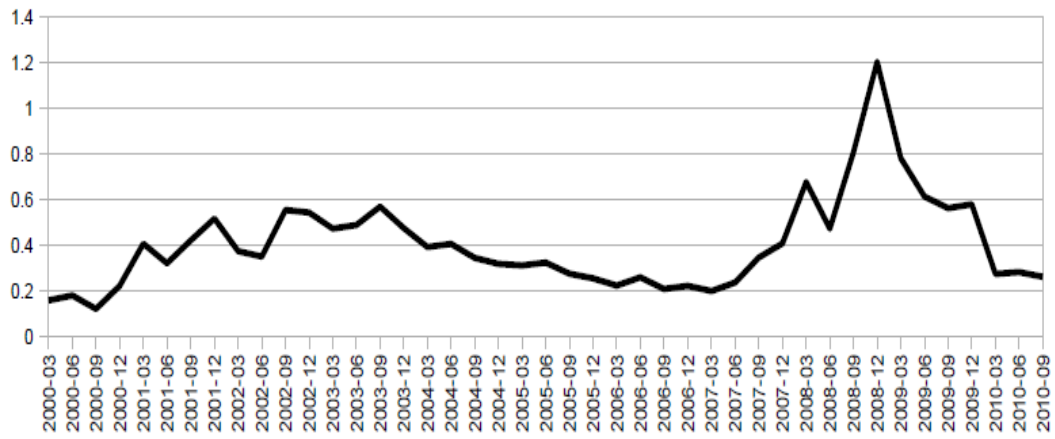


Figure B.7. Quarterly standard deviation of bond returns

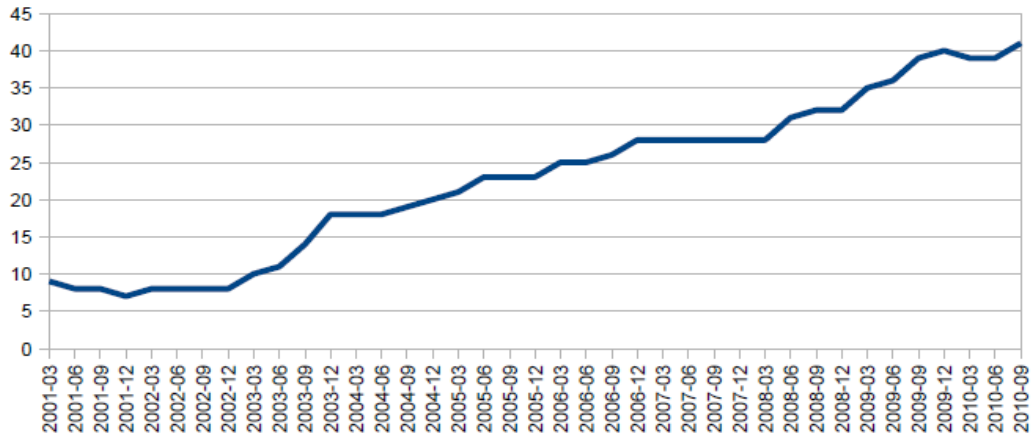


Figure B.8. Quarterly number of bond observations

## C Regression Results

Table C.1. Quarterly regressions of absolute stock returns on capital

Quarter	Beta(debt)	Beta(real)	Beta(mbs)	N	Quarter	Beta(debt)	Beta(real)	Beta(mbs)	N
2000-03	-2.9699* (1.7546)	-0.2347 (0.2197)	-0.2208 (0.1633)	190	2006-03	-0.0238 (0.323)	-0.0073 (0.101)	-0.0852 (0.0865)	295
2000-06	-1.4373 (1.3853)	-0.001 (0.168)	0.1515 (0.1288)	192	2006-06	-0.0444 (0.3839)	0.2031* (0.1208)	0.0287 (0.1047)	294
2000-09	-0.3625 (1.6201)	-0.7166*** (0.2065)	0.0323 (0.1566)	192	2006-09	-0.1632 (0.317)	0.1521 (0.1009)	-0.0363 (0.089)	290
2000-12	0.5173 (1.3542)	-0.5546*** (0.1787)	0.1627 (0.1325)	194	2006-12	-0.0856 (0.4292)	0.1913 (0.1442)	0.0736 (0.126)	280
2001-03	-1.4436 (1.033)	0.1209 (0.1613)	-0.0484 (0.1226)	378	2007-03	-0.1779 (0.4165)	0.1646 (0.1397)	-0.0673 (0.1313)	274
2001-06	-1.0915* (0.5909)	0.1601 (0.16)	0.0986 (0.1186)	370	2007-06	-0.0444 (0.58)	0.1028 (0.1984)	0.2109 (0.2035)	268
2001-09	-1.2998*** (0.6457)	-0.1109 (0.1723)	-0.148 (0.124)	374	2007-09	0.7375 (0.6318)	0.3617* (0.2131)	0.1953 (0.2223)	261
2001-12	-2.0041*** (0.8272)	0.1419 (0.1153)	0.0114 (0.0892)	340	2007-12	0.0119 (0.8151)	0.5287*** (0.271)	-0.0488 (0.2803)	252
2002-03	-0.2251 (0.4536)	0.4251*** (0.1239)	0.0174 (0.0865)	362	2008-03	-0.1046 (0.7717)	0.6891*** (0.2467)	-0.3821 (0.2446)	246
2002-06	-0.0733 (0.6405)	-0.3434* (0.1808)	0.1208 (0.1294)	362	2008-06	-1.338 (1.4774)	0.0081 (0.52)	-0.8993* (0.4893)	243
2002-09	-0.5005 (0.5419)	-0.6629*** (0.1508)	-0.0286 (0.1073)	363	2008-09	-0.5441 (1.7107)	0.2749 (0.6083)	-1.0679* (0.5673)	239
2002-12	-0.2838 (0.4118)	-0.1485 (0.1134)	-0.0329 (0.0805)	361	2008-12	-3.9581*** (1.9082)	-0.0642 (0.706)	-1.6943*** (0.6393)	236
2003-03	-0.1736 (0.4563)	-0.2108* (0.1263)	-0.1909*** (0.0856)	356	2009-03	-3.5327*** (1.4288)	1.1884*** (0.5466)	-1.1862*** (0.4688)	237
2003-06	-0.2119 (0.4606)	0.0288 (0.1205)	-0.0873 (0.0832)	364	2009-06	-3.1213*** (1.1164)	1.552*** (0.4289)	-0.5751 (0.3669)	232
2003-09	-0.0997 (0.5194)	0.0543 (0.133)	-0.0716 (0.0938)	359	2009-09	-4.6064*** (1.1278)	1.9484*** (0.455)	-0.3711 (0.3715)	231
2003-12	-0.0601 (0.371)	-0.0215 (0.096)	-0.1023 (0.066)	357	2009-12	-4.7056*** (1.0465)	1.82*** (0.4306)	-0.3855 (0.3346)	227
2004-03	-0.0097 (0.4578)	0.1428 (0.1172)	0.0707 (0.0807)	353	2010-03	-4.6284*** (1.0529)	1.2953*** (0.4273)	-0.3747 (0.3364)	222
2004-06	-0.8118 (0.5175)	0.0313 (0.1329)	-0.0284 (0.0951)	345	2010-06	-3.3379*** (0.9348)	1.2356*** (0.3604)	-0.346 (0.284)	221
2004-09	-0.7783* (0.4423)	0.0771 (0.1153)	-0.0245 (0.0855)	339	2010-09	-3.9168*** (0.9266)	1.2037*** (0.3552)	-0.4046 (0.2714)	220
2004-12	-0.1195 (0.3532)	0.1491 (0.0917)	0.0073 (0.0706)	340					
2005-03	-0.045 (0.4643)	0.3089*** (0.1174)	0.0549 (0.091)	337					
2005-06	0.2718 (0.4382)	0.2983*** (0.1163)	0.0485 (0.0926)	331					
2005-09	-0.138 (0.3804)	0.1884* (0.1043)	0.0637 (0.0872)	329					
2005-12	0.0479 (0.2878)	0.1082 (0.088)	0.0259 (0.074)	322					

\*\*\* Significant at the 1% level.

\*\* Significant at the 5% level.

\* Significant at the 10% level.

Table C.2. Quarterly regressions of the standard deviation of stock returns on capital

Quarter	Beta(debt)	Beta(real)	Beta(mbs)	N	Quarter	Beta(debt)	Beta(real)	Beta(mbs)	N
2000-03	-5.1119* (2.8916)	4.9159*** (1.5496)	0.1618 (0.5703)	376	2006-03	0.1458 (0.7353)	1.3054 (1.0973)	0.3512 (0.2938)	295
2000-06	-4.7613* (2.8273)	4.8229*** (1.4525)	0.7715 (0.532)	376	2006-06	0.2553 (1.0015)	2.2293 (1.7966)	1.1425*** (0.4073)	294
2000-09	-2.6071 (2.8113)	4.3932*** (1.658)	-0.1136 (0.5356)	377	2006-09	-0.205 (0.7441)	0.3769 (1.4579)	0.2524 (0.3072)	290
2000-12	-0.3366 (2.9066)	3.8913*** (1.5479)	0.1327 (0.5638)	370	2006-12	-1.383 (1.2779)	10.9427*** (2.5083)	-0.1276 (0.5401)	280
2001-03	-2.7257 (2.7878)	3.1862*** (1.3035)	1.1652*** (0.5307)	365	2007-03	-0.5013 (1.1861)	14.9306*** (3.1416)	0.5296 (0.5145)	274
2001-06	-2.7969* (1.5506)	4.8404*** (1.1328)	0.4538 (0.4807)	362	2007-06	-2.1653 (1.5845)	-0.3267 (4.566)	-0.9812 (0.6904)	268
2001-09	-1.6304 (1.641)	2.5641** (1.3374)	1.0962*** (0.4989)	368	2007-09	0.4436 (1.5569)	6.1944 (5.493)	0.1095 (0.6816)	261
2001-12	-4.0185*** (1.8916)	3.462*** (0.6501)	0.3384 (0.3186)	335	2007-12	-3.3728 (2.206)	13.2335* (7.8897)	-1.9988*** (1.0127)	252
2002-03	-0.7106 (1.0442)	4.2314*** (0.8102)	0.8294*** (0.3203)	356	2008-03	-1.4671 (2.1404)	10.2057*** (5.037)	0.4823 (0.9212)	246
2002-06	-1.5689 (1.4312)	3.7086*** (1.2763)	-0.9807*** (0.4605)	362	2008-06	-3.1214 (4.4214)	39.6293*** (12.3399)	-0.7146 (2.0155)	243
2002-09	-1.5268 (1.1347)	1.7539*** (0.8026)	-1.3928*** (0.363)	363	2008-09	-2.7854 (3.9354)	40.532*** (9.9434)	-1.276 (1.8368)	239
2002-12	-0.8984 (1.165)	2.0896*** (0.7467)	-0.0309 (0.3738)	356	2008-12	-11.2633*** (4.6107)	16.9114 (11.4396)	-0.4099 (2.2862)	236
2003-03	0.4491 (1.1429)	1.5244*** (0.7667)	0.5976* (0.3619)	356	2009-03	-9.3847*** (4.129)	25.9002*** (11.2488)	3.0028 (2.0759)	237
2003-06	0.2357 (0.9732)	1.4259*** (0.6148)	0.7932*** (0.2959)	364	2009-06	-7.8051*** (2.9907)	9.5474 (8.4616)	3.2184*** (1.502)	232
2003-09	0.3794 (1.1041)	0.9793 (0.9046)	1.0462*** (0.3276)	359	2009-09	-10.8666*** (3.0517)	5.9644 (10.9038)	4.0795*** (1.6253)	231
2003-12	-0.5971 (0.8691)	1.2193 (0.8867)	0.4331 (0.2655)	357	2009-12	-13.0399*** (3.6972)	3.1911 (10.6445)	3.9328*** (1.9783)	227
2004-03	-0.1485 (1.0806)	0.2663 (1.2123)	0.4098 (0.3234)	353	2010-03	-12.1302*** (2.8253)	5.49 (10.7496)	2.104 (1.5205)	222
2004-06	-2.4337*** (1.1919)	-1.1123 (1.3726)	0.0886 (0.3617)	345	2010-06	-8.4495*** (2.5535)	1.4755 (6.8711)	2.8198*** (1.2676)	221
2004-09	-1.9891* (1.0756)	0.5762 (1.2666)	0.4296 (0.3314)	339	2010-09	-11.7612*** (2.8543)	3.19 (7.6118)	1.089 (1.4232)	220
2004-12	-0.7145 (0.8363)	1.0272 (1.0154)	-0.0442 (0.2664)	340					
2005-03	-0.0909 (1.293)	0.3345 (1.6805)	0.3571 (0.3918)	337					
2005-06	0.7204 (0.9011)	-0.4573 (1.1764)	0.5503** (0.2875)	331					
2005-09	-1.2456 (0.9893)	-0.3525 (1.2388)	-0.2026 (0.3321)	329					
2005-12	-0.0549 (0.694)	0.3539 (0.9302)	0.1764 (0.2619)	322					

\*\*\* Significant at the 1% level.

\*\* Significant at the 5% level.

\* Significant at the 10% level.

Table C.3. Quarterly regressions of absolute stock returns on risk-based capital

Quarter	Beta(debt)	Beta(real)	Beta(mbs)	N	Quarter	Beta(debt)	Beta(real)	Beta(mbs)	N
2000-03	-0.3868 (1.2757)	-0.2277 (0.2228)	-0.1287 (0.1561)	190	2006-03	0.1252 (0.2391)	0.0107 (0.1014)	-0.0792 (0.084)	295
2000-06	0.3905 (0.9449)	0.0244 (0.1704)	0.1945 (0.1215)	192	2006-06	0.117 (0.2697)	0.2224* (0.1208)	0.0369 (0.1015)	294
2000-09	1.4029 (1.1149)	-0.6617*** (0.2072)	0.019 (0.1484)	191	2006-09	0.2625 (0.2565)	0.195** (0.1014)	-0.0231 (0.0873)	290
2000-12	0.6884 (0.9979)	-0.5258*** (0.1799)	0.1318 (0.1262)	193	2006-12	0.3961 (0.3354)	0.2455* (0.1443)	0.0893 (0.1233)	280
2001-03	-1.2364* (0.688)	0.1096 (0.1614)	0.0002 (0.1174)	377	2007-03	0.1616 (0.331)	0.2023 (0.1406)	-0.0469 (0.1289)	274
2001-06	-0.7851* (0.4517)	0.1628 (0.1605)	0.1392 (0.115)	369	2007-06	0.1094 (0.5091)	0.1199 (0.1999)	0.2197 (0.1992)	268
2001-09	-1.1096*** (0.5256)	-0.1201 (0.173)	-0.1092 (0.1203)	373	2007-09	0.4734 (0.5391)	0.3497 (0.2149)	0.1534 (0.2174)	261
2001-12	0.0723 (0.5668)	0.1819 (0.1167)	0.0761 (0.086)	339	2007-12	0.0497 (0.6816)	0.5335*** (0.2734)	-0.0475 (0.2746)	252
2002-03	0.2183 (0.3463)	0.4633*** (0.1248)	0.0324 (0.0834)	361	2008-03	-0.119 (0.6278)	0.683*** (0.2507)	-0.3805 (0.2408)	246
2002-06	-0.179 (0.5013)	-0.35** (0.1821)	0.1198 (0.125)	361	2008-06	-1.7592 (1.0941)	-0.1182 (0.5217)	-0.8808* (0.4784)	243
2002-09	-0.6268 (0.4903)	-0.6747*** (0.1508)	-0.0127 (0.1033)	362	2008-09	-0.7844 (1.3862)	0.218 (0.6163)	-1.0645** (0.5584)	239
2002-12	0.0835 (0.3698)	-0.1246 (0.114)	-0.0189 (0.0783)	361	2008-12	-2.723* (1.6319)	-0.0568 (0.7271)	-1.5893*** (0.6358)	236
2003-03	0.027 (0.4164)	-0.1981 (0.1275)	-0.1825*** (0.0831)	356	2009-03	-2.8248*** (1.2252)	1.1665*** (0.5544)	-1.0933*** (0.4649)	237
2003-06	0.2455 (0.3936)	0.0593 (0.1219)	-0.0757 (0.0808)	364	2009-06	-2.1172*** (0.9601)	1.6067*** (0.4356)	-0.4772 (0.3654)	232
2003-09	0.4455 (0.4382)	0.093 (0.1341)	-0.0659 (0.0904)	359	2009-09	-3.2866*** (1.0073)	2.012*** (0.4671)	-0.2513 (0.3733)	231
2003-12	0.4638 (0.3118)	0.0183 (0.0971)	-0.1006 (0.0638)	357	2009-12	-3.4304*** (0.9011)	1.8599*** (0.4415)	-0.2362 (0.3347)	227
2004-03	0.2974 (0.3705)	0.1675 (0.1183)	0.0674 (0.0787)	353	2010-03	-3.1818*** (0.9162)	1.333*** (0.4425)	-0.2183 (0.3377)	222
2004-06	-0.1722 (0.406)	0.0588 (0.1355)	0.0087 (0.0925)	345	2010-06	-4.5337*** (1.0363)	1.0606*** (0.3624)	-0.2181 (0.2773)	221
2004-09	-0.2184 (0.3394)	0.1028 (0.1177)	0.0088 (0.0837)	339	2010-09	-5.2637*** (0.9789)	1.0083*** (0.3519)	-0.223 (0.2624)	220
2004-12	0.0931 (0.2608)	0.1685* (0.0931)	0.0146 (0.0683)	340					
2005-03	0.537 (0.3537)	0.3732*** (0.1192)	0.0652 (0.0872)	337					
2005-06	0.1704 (0.3216)	0.297*** (0.1174)	0.0367 (0.0896)	331					
2005-09	0.3105 (0.285)	0.2344*** (0.1049)	0.0798 (0.0842)	329					
2005-12	0.1793 (0.2156)	0.1248 (0.0886)	0.0272 (0.072)	322					

\*\*\* Significant at the 1% level.

\*\* Significant at the 5% level.

\* Significant at the 10% level.

Table C.4. Quarterly regressions of the standard deviation of stock returns on risk-based capital

Quarter	Beta(debt)	Beta(real)	Beta(mbs)	N	Quarter	Beta(debt)	Beta(real)	Beta(mbs)	N
2000-03	0.7298 (2.9195)	0.0365 (0.51)	-0.3529 (0.3573)	190	2006-03	0.2141 (0.5338)	0.0237 (0.2265)	-0.1942 (0.1874)	295
2000-06	1.6988 (2.3917)	0.3805 (0.4312)	0.324 (0.3075)	192	2006-06	0.2645 (0.7028)	0.5127 (0.3147)	-0.0546 (0.2645)	294
2000-09	4.4855* (2.6035)	-1.3504*** (0.4839)	-0.1056 (0.3467)	191	2006-09	0.5673 (0.5854)	0.3506 (0.2315)	-0.0548 (0.1993)	290
2000-12	2.7995 (2.2378)	-0.9068*** (0.4036)	0.1476 (0.2831)	193	2006-12	1.1659 (0.9948)	0.9687*** (0.4279)	0.5653 (0.3657)	280
2001-03	-2.6433 (1.9185)	0.2404 (0.4501)	-0.2292 (0.3274)	377	2007-03	0.2412 (0.9414)	0.4254 (0.3999)	-0.2777 (0.3665)	274
2001-06	-2.1551* (1.236)	0.5155 (0.439)	0.0754 (0.3147)	369	2007-06	-0.361 (1.358)	0.3255 (0.5332)	0.3224 (0.5313)	268
2001-09	-2.3313* (1.36)	-0.1199 (0.4477)	-0.4511 (0.3113)	373	2007-09	1.5793 (1.2918)	1.2335*** (0.5149)	0.4425 (0.5208)	261
2001-12	0.9868 (1.3988)	0.8069*** (0.2879)	0.1249 (0.2121)	339	2007-12	0.1796 (1.806)	1.5531*** (0.7243)	-0.1382 (0.7276)	252
2002-03	0.3291 (0.8208)	1.2449*** (0.2957)	0.0032 (0.1978)	361	2008-03	-0.0177 (1.6452)	1.6937*** (0.657)	-1.1071* (0.6311)	246
2002-06	-0.3653 (1.1657)	-0.4528 (0.4233)	0.3123 (0.2907)	361	2008-06	-4.5668 (3.2319)	-0.224 (1.541)	-2.4033* (1.4131)	243
2002-09	-1.3449 (1.0475)	-1.2592*** (0.3222)	-0.1771 (0.2208)	362	2008-09	-2.0954 (3.175)	1.0085 (1.4116)	-2.4397** (1.279)	239
2002-12	0.8544 (1.0655)	0.0838 (0.3285)	0.0178 (0.2256)	361	2008-12	-7.2206** (3.7616)	0.6066 (1.676)	-3.4341*** (1.4656)	236
2003-03	-0.0072 (1.0562)	-0.024 (0.3234)	-0.4302*** (0.2107)	356	2009-03	-7.992*** (3.2743)	3.0312*** (1.4817)	-2.6871*** (1.2424)	237
2003-06	0.8609 (0.8443)	0.4189 (0.2615)	-0.1223 (0.1732)	364	2009-06	-5.502*** (2.3216)	3.8679*** (1.0533)	-1.3249 (0.8834)	232
2003-09	1.1244 (0.953)	0.3913 (0.2917)	-0.1752 (0.1967)	359	2009-09	-7.6723*** (2.429)	4.8825*** (1.1264)	-0.4975 (0.9002)	231
2003-12	0.6743 (0.7402)	0.0579 (0.2304)	-0.2285 (0.1515)	357	2009-12	-8.9989*** (2.8283)	5.3762*** (1.3857)	-0.8337 (1.0506)	227
2004-03	0.5394 (0.8762)	0.3059 (0.2798)	0.0614 (0.1862)	353	2010-03	-7.8691*** (2.2233)	3.4445*** (1.0739)	-0.4316 (0.8195)	222
2004-06	-0.7478 (0.9419)	0.0831 (0.3144)	-0.0387 (0.2147)	345	2010-06	-11.626*** (2.5384)	2.6238*** (0.8878)	-0.4432 (0.6792)	221
2004-09	-0.6956 (0.828)	0.1741 (0.2872)	-0.0581 (0.2041)	339	2010-09	-13.4271*** (2.7037)	2.5099*** (0.9719)	-0.5906 (0.7249)	220
2004-12	0.5276 (0.6167)	0.5262*** (0.22)	0.088 (0.1615)	340					
2005-03	3.2062*** (0.9799)	0.9518*** (0.3303)	0.2326 (0.2416)	337					
2005-06	0.7989 (0.667)	0.5272*** (0.2435)	0.0956 (0.1859)	331					
2005-09	1.2947* (0.7351)	0.7805*** (0.2706)	0.3731* (0.2173)	329					
2005-12	0.3035 (0.5102)	0.2474 (0.2097)	0.2249 (0.1704)	322					

\*\*\* Significant at the 1% level.

\*\* Significant at the 5% level.

\* Significant at the 10% level.

Table C.5. Quarterly regressions of bond yield spreads on capital

Quarter	Beta(debt)	Beta(real)	Beta(mbs)	N	Quarter	Beta(debt)	Beta(real)	Beta(mbs)	N
2001-03	-43.1549 (31.1088)	0.7957 (2.8984)	-11.2978*** (5.7911)	9	2006-03	-17.8174*** (7.8419)	0.0463 (1.1678)	-2.6248* (1.4189)	26
2001-06	-50.4799 (51.1048)	1.9431 (4.6166)	-12.163 (9.2258)	8	2006-06	-14.6793*** (6.6985)	0.1478 (1.0429)	-2.3535* (1.3188)	27
2001-09	-19.5735 (73.7491)	-0.6459 (6.4236)	-12.558 (11.194)	8	2006-09	-14.4033*** (7.2791)	0.6789 (1.0624)	-1.4689 (1.3928)	28
2001-12	3.6632 (68.5147)	6.088 (6.5234)	-16.2425* (9.547)	7	2006-12	-16.2876*** (7.7976)	1.2091 (1.1527)	-1.1412 (1.4995)	29
2002-03	-2.5645 (84.1943)	-1.7193 (8.3106)	-11.7747 (12.9858)	8	2007-03	-13.7151** (7.102)	1.1405 (1.1378)	-0.4136 (1.471)	29
2002-06	-176.85*** (39.5565)	-7.64*** (2.1702)	-31.9473*** (4.6674)	5	2007-06	-12.1949* (6.6816)	1.0392 (1.0056)	-0.5131 (1.3885)	30
2002-09	-128.0512 (86.9827)	-7.19 (5.5794)	-23.8462*** (10.0286)	5	2007-09	-6.1542 (6.1024)	0.7889 (1.3015)	-0.1948 (1.9648)	30
2002-12	-22.1429 (45.4512)	-7.7805 (5.0065)	-9.7838 (6.8886)	7	2007-12	-2.0448 (6.9739)	0.8352 (1.5783)	-1.1348 (2.4214)	29
2003-03	-10.5498 (54.962)	-6.6242 (5.8606)	-5.9312 (7.1129)	7	2008-03	3.2981 (10.0316)	2.3449 (2.2089)	-0.5708 (3.2039)	29
2003-06	3.4378 (55.1853)	-0.7071 (5.4851)	1.8192 (4.0295)	11	2008-06	1.7738 (10.4953)	2.9541 (2.0206)	-1.0816 (3.2702)	32
2003-09	37.0473 (47.3164)	-0.9562 (4.8903)	3.4488 (4.3042)	15	2008-09	7.3517 (12.7857)	3.947 (2.5022)	-0.846 (4.0468)	33
2003-12	55.265 (43.5301)	-1.9146 (4.156)	3.1706 (3.8714)	16	2008-12	-5.4642 (25.3796)	3.1838 (4.6034)	1.3132 (6.8954)	34
2004-03	65.2534* (37.4446)	-2.7598 (3.7089)	1.3649 (3.3954)	16	2009-03	-47.0606 (30.0592)	6.2913 (5.2699)	15.6307*** (6.9018)	37
2004-06	-6.5996 (50.2612)	1.3385 (4.5098)	2.6876 (4.1423)	17	2009-06	-20.1836 (23.3574)	7.4945 (4.6571)	7.5852 (5.5699)	37
2004-09	40.1146 (43.0519)	0.0415 (2.8672)	3.0977 (3.1581)	18	2009-09	-4.8208 (22.0208)	9.2032*** (4.3188)	6.3852 (5.2093)	40
2004-12	21.3872 (19.0544)	1.2161 (1.8829)	1.8692 (2.6794)	19	2009-12	15.0696 (20.5275)	9.3786*** (3.7965)	5.0968 (4.8132)	41
2005-03	15.9919 (13.9686)	1.3458 (1.4657)	2.6288 (1.9582)	21	2010-03	4.7832 (21.3591)	11.1557*** (3.7408)	4.8535 (4.3358)	40
2005-06	-11.5891 (12.9256)	0.4477 (1.8542)	-1.0623 (2.1284)	22	2010-06	3.6272 (5.2934)	9.9792*** (3.3012)	4.5538 (3.9447)	41
2005-09	-14.5503 (10.3189)	-0.0065 (1.5343)	-1.8822 (1.8668)	22	2010-09	1.353 (5.854)	8.9115*** (3.5684)	3.38 (4.0357)	42
2005-12	-21.2361*** (9.7878)	-0.1104 (1.3525)	-2.079 (1.6428)	23					

\*\*\* Significant at the 1% level.

\*\* Significant at the 5% level.

\* Significant at the 10% level.

Table C.6. Quarterly regressions bond yield spreads on risk-based capital

Quarter	Beta(debt)	Beta(real)	Beta(mbs)	N	Quarter	Beta(debt)	Beta(real)	Beta(mbs)	N
2001-03	-32.8087 (21.8005)	-1.5083 (2.0965)	-14.167*** (5.5728)	9	2006-03	-2.9027 (10.2941)	0.3313 (1.2879)	-2.076 (1.5508)	26
2001-06	-61.0421*** (22.4663)	-1.0208 (2.1597)	-16.8752*** (6.2205)	8	2006-06	-5.1662 (8.6711)	0.3863 (1.1356)	-1.8809 (1.4177)	27
2001-09	-97.7899*** (40.5734)	1.0119 (3.3104)	-13.5202** (7.108)	8	2006-09	0.5603 (8.1852)	0.7728 (1.1614)	-1.2593 (1.4986)	28
2001-12	-154.6541*** (72.0116)	1.7298 (4.2567)	-23.7314*** (6.9109)	7	2006-12	9.5542 (11.3397)	0.6416 (1.2205)	-1.6521 (1.6654)	29
2002-03	-129.8197*** (33.6672)	-1.5957 (3.1577)	-21.2475*** (6.454)	8	2007-03	4.2032 (11.0932)	0.6302 (1.2121)	-1.104 (1.5987)	29
2002-06	-118.1711*** (23.2709)	-3.3741 (2.3318)	-11.4243*** (2.5475)	5	2007-06	1.9898 (8.7736)	0.5217 (1.0468)	-1.1155 (1.4751)	30
2002-09	-88.4667 (60.8588)	-3.3367 (6.7199)	-11.0371 (6.8546)	5	2007-09	6.855 (10.0405)	0.2099 (1.27)	-1.2911 (1.9112)	30
2002-12	-97.2741*** (40.652)	-2.829 (3.6654)	-5.191 (4.5762)	7	2007-12	11.9271 (11.2572)	0.7225 (1.4948)	-1.7062 (2.2262)	29
2003-03	-80.621* (48.2919)	-2.6218 (4.492)	-3.9735 (5.2684)	7	2008-03	15.2626 (17.9773)	2.5614 (2.1257)	-1.3222 (3.2761)	29
2003-06	-75.9329*** (26.392)	1.359 (2.4573)	1.9746 (2.6202)	11	2008-06	-17.171 (17.4014)	2.6311 (2.0118)	0.5219 (3.3563)	32
2003-09	-44.6937 (51.9621)	2.0424 (3.6516)	4.293 (4.259)	15	2008-09	-7.8485 (19.873)	4.1021* (2.4825)	0.3295 (3.8513)	33
2003-12	-61.5921 (38.3118)	2.1145 (3.1222)	4.3792 (3.6617)	16	2008-12	-4.2947 (36.5261)	2.8071 (5.098)	1.0382 (6.7813)	34
2004-03	-57.5971 (41.9045)	1.517 (3.1152)	1.6327 (3.5235)	16	2009-03	-33.7913 (51.8577)	4.0879 (6.1059)	13.9422*** (7.0023)	37
2004-06	-67.0188* (37.3037)	1.5322 (3.0444)	2.3377 (3.6841)	17	2009-06	-28.1705 (37.0692)	5.7689 (5.4118)	7.7707 (5.6262)	37
2004-09	-47.8042* (28.7352)	1.9543 (2.4518)	1.0218 (3.0298)	18	2009-09	-15.2812 (29.645)	7.986 (4.9737)	6.5064 (5.1895)	40
2004-12	-7.1106 (17.7106)	0.6527 (2.037)	0.6305 (2.8168)	19	2009-12	-2.3721 (27.7904)	8.9759*** (4.4539)	5.7588 (4.8525)	41
2005-03	6.9254 (11.0978)	1.1537 (1.4941)	1.5872 (1.7323)	21	2010-03	-16.2028 (29.8166)	10.6118*** (3.8853)	4.6706 (4.3344)	40
2005-06	4.3447 (11.264)	0.9791 (1.8662)	-0.2968 (2.0566)	22	2010-06	4.233 (7.2582)	10.0488*** (3.4695)	4.4978 (3.9796)	41
2005-09	0.7081 (9.2075)	0.5525 (1.596)	-0.9014 (1.8688)	22	2010-09	-1.3565 (7.525)	8.2935*** (3.6148)	2.967 (4.0067)	42
2005-12	-0.6936 (11.4948)	0.1653 (1.5044)	-1.0635 (1.7591)	23					

\*\*\* Significant at the 1% level.

\*\* Significant at the 5% level.

\* Significant at the 10% level.

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