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Vega, Capital Ratios, and Real Estate Lending

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Abstract

The 2007 financial crisis revealed how excessive bank risk threatens financial system stability. This paper studies two aspects of the risk-taking incentives of banks– CEO compensation and capital. The vega of a bank executive's equity compensation measures how compensation changes relative to the banks' stock volatility. If CEO compensation vega is high, I expect the CEO to take more risk in areas where he exercises control. Conversely, if regulators demand that banks invest their own capital to encourage conservative behavior, then I expect risk-taking to be lower. This paper confirms that higher vega and lower capital ratios are associated with more real estate lending by bank holding companies in the U.S. between 2000 and 2014. The negative relation between capital ratios and real estate lending exists in almost all subsamples. However, the positive relation between vega and real estate lending is only significant among small well-capitalized banks, and after the financial crisis.

Keywords: Executive compensation, Vega, Capital ratio, Real estate loans
JEL Classification: G21, G31, G32, J33

1 Introduction

The 2007 financial crisis caused damages to the U.S. economy second only to the Great Depression of the 1930s. The crisis grew from the U.S. housing boom which began to burst in 2006. However, the real estate growth was only possible because banks made substantial investments in real estate. After the crisis, regulators and the public were concerned about excessive risk-taking by banks and searched for evidence of misaligned risk incentives. Executive compensation and capital requirements are at the center of these discussions.

Congress passed the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank) in 2010. One of the centerpieces of Dodd-Frank is Section 956 which requires banking authorities to draft regulations to restrict executive compensation practices that encourage risk-taking. It is well known that managerial compensation contracts influence their risk-taking and capital accumulation incentives (e.g., Bennett, Gopalan and Thakor (2016)). Several studies use the CEO's equity compensation vega (hereafter vega) as a proxy for the bank's incentive to increase volatility (Guay, 1999; Core and Guay, 2002; Coles et al., 2006; Hayes et al., 2012). Vega measures the risk-taking incentives of the manager as the sensitivity of the manager's stock options to the firm's stock return volatility. An increase in the firm's volatility increases equity value by reducing debt value (Black and Scholes, 1973; Merton, 1974). Therefore, I expect vega to be positively correlated with the risk of bank assets. This prediction is consistent with empirical work, such as Guay (1999), that generally finds a positive association between vega and stock return volatility, suggesting that vega encourages managerial risk-taking. Typically, equity-based compensation on one hand, can encourage managers to work hard, but on the other hand, it can affect their attitude towards project risk, and thus, lead to too little risk-taking (Hirshleifer and Suh, 1992).

Theories of bank capital structure do not agree on whether high bank leverage is efficient and necessary. Capital requirements are based upon the rationale that banks will take too much risk if they are highly leveraged. Thakor (2014) highlighted the contemporary thinking on capital structures. Thakor (2014) states that " bank capital structures are optimally chosen in equilibrium, so capital requirements that distort leverage choices away from these (private) optima will generate costs that we should try to avoid, or at least balance against the benefits of enhanced stability that come with higher capital." Therefore, capital requirements, especially

risk-based ones, affect the risk taking of banks indirectly.[2] For example, Mehran and Thakor (2011) and Hanson et al., (2011) provide estimates of the potential effects of higher capital requirements on bank lending, find that higher-capital banks are associated with more lending and liquidity creation, and higher bank values. Berger and Bouwman (2013) show that bank capital affects bank risk.[3] They provide empirical evidence that commercial banks with higher capital have a greater capability of surviving a financial crisis, and that small banks with higher capital are more likely to survive during normal times as well. Therefore, I expect banks with more capital to have less risky assets.

Based on the arguments above, this paper tests the following two hypotheses:
Hypothesis 1 (H1): Higher bank CEO vega is associated with higher real estate lending.
Hypothesis 2 (H2): Higher bank capital ratios are associated with lower real estate lending.

To test these hypotheses, I regress a bank's real estate loans relative to total assets against the capital ratio (either Tier 1 or risk-based) and the CEO's compensation vega. Since real estate lending is risky, I use it as a proxy for risk taking by banks. I include CEO compensation, bank asset, and financial characteristics as control variables in addition to year fixed effects. Using a sample of U.S. bank holding companies (BHCs) from 2000 to 2014, I find empirical evidence that is consistent with both hypotheses developed above. There is a significantly positive relation between CEO vega and real estate lending which holds for all subsamples. However, vega is only significant among small banks, banks with low market-to-book ratios, and during the post-crisis subsample (years 2010-2014). The relation between bank capital ratios and real estate lending is significantly negative. These results support regulating bank CEO compensation and capital to curtail bank risk.

The paper proceeds as follows. Section 2 discusses the literature and the contribution of this paper. Section 3 describes the data, defines variables, and provides summary statistics. Section 4 presents detailed empirical results and Section 5 concludes.

[2] Besides banks capital and risk, past research has also provided evidence on the relation between managerial equity-based incentives and risk choices that benefited managers but not shareholders (Bhattacharyya, S., & Purnanandam, 2011).
[3] Other determinants of bank risk include the bank's loan standards (Bushman and Williams, 2012) and securitization (Ellul and Yerramilli, 2013).

2 Literature Review

This paper is related to the extensive empirical finance literature on risk-taking incentives, executive compensation, and bank capital structure. Numerous studies provide evidence consistent with a causal effect of executives' contractual incentives on their risk taking. In that sense, this paper neither argues for nor against causality between risk-taking incentives and executive compensation. Rather, it is to show the relationship between a *specific* type of risks banks take (in real estate lending) and bank executives' risk-taking incentives provided by vega in their compensation contracts. Coles, Daniel, and Naveen (2006) examine the causal links between investments, leverage, and diversification in CEO compensation incentives, find that the direction of causality runs both ways. Therefore, equity-based compensation does not necessarily lead to increased risk-taking since it can increase the sensitivity of the manager's portfolio to firm stock price movements (Carpenter, 2000; Ross, 2004). However, Haugen and Senbet (1981) and Smith and Stulz (1985) find that when a stock's volatility increases the value of options on the stock rise. Reitman (1993) shows that the nonlinearity of executive stock options enhances stock returns compared to linear compensation contracts. A few papers published in the accounting literature have provided an agency-based conceptual framework of business unit manager compensation in diversified firms (e.g., Bushman et al., 1995). The evidence from Bushman et al. (1995) document that business unit managers are rewarded based on their own unit's performance and aggregate corporate performance. Thus, Financial measures have been criticized for being too historical and backward-looking, for encouraging dysfunctional behaviors. In this sense, accounting-based measures (ROA/ROE) are often sensitive to manipulation, the significant amount of corporate scandals, due to accounting fraud, illustrates this sensitivity (Pérez-González, 2006).

Moreover, this paper is related to academic literature deals with managerial equity-based incentives and the corresponding pay-risk sensitivities on the investment strategy, and performance, specifically in the context of the financial crisis. First, this paper follows the prior empirical risk-taking literature and focuses on bank executives' equity portfolio (i.e., stock and option) holdings, which account for the vast majority of their monetary wealth and incentives (Core and Guay, 1999; Core and Guay, 2002). Second, managerial compensation helps risk-neutral shareholders motivate risk-averse managers. Laeven and Levine (2009) find bank risk

taking varies positively with shareholders' power compared to bank directors. Chen et al. (2006) document a positive relation between the value of bank managers' options and multiple measures of bank risk, including total, systematic, and idiosyncratic stock return volatility and interest rate risk. Lastly, number of bank executive compensation papers study how managerial compensation and ownership affected bank performance during the crisis (Fahlenbrach and Stulz, 2011; Keys et al., 2009; Ellul and Yerramilli, 2013). DeYoung et al. (2013) find that the risk-taking incentives implicit in executive compensation explain CEOs pre-crisis decision to shift bank business models from traditional originate-to-hold towards originate-to-distribute model. I contribute to these literatures by documenting a positive association between compensation vega and the bank's real estate investments. Moreover, I find that the association between vega and real estate lending is only significant for small well-capitalized banks and after the 2007-09 financial crisis.

This paper is also related to the work studying how bank capital affects risk taking. Berger and Bouwman (2013) find that better capitalized banks are more likely to survive banking crises. Berger & Bouwman (2013) provide empirical evidence that commercial banks with higher capital have a greater capability of surviving a financial crisis and that small banks with higher capital are also more likely to survive during normal times. Others have looked for natural experiments that have resulted in an exogenous shock to bank capital (Rice and Rose, 2016). Some empirical evidence that the abundant availability of liquidity prior to the recent crisis may have contributed to the crisis by inducing banks to lower their credit standards has recently been provided by Dell'Ariccia et al. (2012). Among the reasons for a revised outlook cited by the rating agency were the increased risk of U.S. banks and a higher probability of another bailout. Thakor, (1996), underscore the importance of bank capital for credit origination. Thakor (2005) shows that excessive risk-taking and greater bank liquidity creation may occur off the balance sheet during economic booms, as banks shy away from exercising material adverse change clauses due to reputational concerns during such times. Cornett et al., (2011) find that US banks with more exposure to liquidity risk experienced less loan growth during the crisis. Gambacorta and Marques-Ibanez (2011) and Cornett et al. (2011) recognize the effects of bank capital during crises on loan growth. A few studies have applied the information contained in the bank lending to study the impact on loan growth, financing conditions more generally and on economic activity (see e.g.; Bayoumi and Melander, 2008). Some papers have found that tight credit

conditions may constrain consumption and investment expenditures (Bayoumi and Mellander, 2008). Therefore, I expect bank executives to select riskier portfolios when their incentives are aligned with bank shareholders. I find that higher capital ratios are associated with less real estate lending.[4]

3 Data and Summary Statistics

3.1 Data and Sample Construction

This paper uses a sample of U.S. bank holding companies with publicly traded stocks. I use quarterly data from Call Reports (FRY-9 reports) from the first quarter of 2000 to the fourth quarter of 2014 from the Wharton Research Data Services (WRDS). From the Federal Reserve Bank of New York, I collect bank stock data and a crosswalk that links stock and call report data.[5] I obtain compensation data for publicly listed BHCs from ExecuComp, CRSP, and Compustat to calculate vega and other relevant measures. ExecuComp used to obtain compensation data that consisted of the executives at U.S. publicly listed firms and complement the compensation data with stock returns from CRSP and firm financial data from Compustat. Besides, I identify whether a Chief Risk Officer (CRO) is present at the bank who may restrain the risk-taking tendencies of executives and traders.[6] Institutional ownership data is from Thomson Reuters Institutional (13f) Holdings – s34 File. Sample subsets based on only CEOs data in ExecuComp.

To construct the sample, I first identifying publicly listed BHCs in the U.S. that are available in Call Reports from 2000 to 2014. I merge the Call Reports data with ExecuComp and Compustat to extract information on bank executives, assets, and other financial information. The resulting final sample consists of 1,659 distinct bank CEO-years.

[4] In this paper I find lower investment in real estate loans. But I do not find that the loans not taken were of higher risk.

[5] The FRB Chicago maintains a Bank Holding Companies Database, which collects financial data from the FRY-9 reports. The Federal Reserve crosswalk between stock PERCO and call report RSSD identifiers is available at https://www.newyorkfed.org/research/banking_research/datasets.htm. Accessed on October 16, 2019, this table includes 1,428 PERMCO/RSSD links as of 2017.

[6] Using ExecuComp data and following Ellul and Yerramilli (2013), I mark that a CRO is present at a bank if one of the bank executives in ExecuComp has a title (TITLE or TITLEANN variable) of "Chief Risk Officer," "Chief Risk Officer and Executive," "Chief Credit Officer," "Chief Lending Officer," or "CFO." The reason to include the CFO is because BHCs that do not have a designated CRO most likely have a CFO in charge of risk management. See also Keys et al. (2009) for a similar measure to capture the relative power of the CFO within the bank. The BHCs 10-K statement does not require reporting of the presence of a CRO.

3.2 Vega Calculation

I calculate the stock option value, its sensitivity to stock price (delta), and its sensitivity to stock return volatility (vega) based on Black-Scholes (1973) modified to account for dividend payouts by Merton (1973). I follow Core and Guay (2002) and apply the Black-Scholes-Merton option valuation model that incorporates dividends to calculate the following three variables:

$$Option\ Value = Se^{-dT} * N(d_1) - Xe^{-rT} * N(d_2)$$

$$Delta = \frac{\Delta(Option\ Value)}{\Delta(Stock\ Price)} * \frac{S}{100} = e^{-dT} * N(d_1)$$

$$Vega = \frac{\Delta(Option\ Value)}{\Delta(Stock\ Volatility)} * 0.01 = e^{-dT} * N'(d_1) * S * \sqrt{T} * 0.01$$

where

$$d_1 = \frac{\ln(S/X) + (r - d + \sigma^2/2)T}{\sigma\sqrt{T}}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$

In the equations above, S is the underlying stock price, X is the exercise price of the call option, σ is the annualized stock volatility during the maturity period of the option, r is the natural logarithm of the risk-free interest rate plus one (i.e., continuously compounded risk-free rate), T is the time to maturity of the option measured in years, and d is the natural logarithm of the anticipated annual dividend yield plus one (i.e. continuous dividend yield). N is the cumulative probability function for the standard normal distribution, and N' is the standard normal density function.

Coles et al. (2006) provide their delta and vega estimates and the SAS program for data replication.[7] I follow their approach exactly to calculate delta and vega of vested and unvested shares and options. Then I sum delta and vega of all vested and unvested options for each

[7] Coles et al. (2006) have fully documented their approach and code at https://sites.temple.edu/lnaveen/data/ (accessed on October 16, 2019). Before 2006, ExecuComp does not provide data XXXX needed to calculate the option's delta and vega. Therefore, I follow Coles et al. (2006) to use the approximation of proposed by Core and Guay (2002).

executive year to obtain delta and vega of the option portfolio without adjusting for the maturity of the options.[8]

I exclude unearned compensation from the executive compensation package. An executive has unearned awards when future vesting is contingent or accelerated based on achieving a stock price or accounting hurdle. ExecuComp does not provide the data to calculate values for these awards. Coles et al. (2006) point out that "these unearned shares or options will be classified as either shares or options when they are earned, and, if these grants are still held by the executive as of the end of the year, they will be included in the delta and vega calculation at that point." Ignoring the unearned awards underestimates the true delta and vega of the executive's compensation package.

I use ExecuComp's estimate of stock volatility winsorized at the 5th and 95th percentiles. ExecuComp requires data for at least 12 months of returns and uses the annualized standard deviation of stock returns estimated over the 60 months prior to the beginning of the fiscal period. I use the annual constant maturity treasury yields from the Federal Reserve as the risk-free rate.[9] Figure 1 displays the average bank CEO vega from 2000 to 2014. Vega changed considerably over time. The lowest average vega occurs in 2009 which is likely an outcome of the financial crisis.

3.3 Other Key Variables

Loans secured by residential, commercial construction, land development, and other land are reported in FR Y-9C. They exclude mortgage-backed securities. I divide real estate loans by total assets as a proxy for bank risk-taking. Figure 2 displays average bank real estate lending from the first quarter in 2000 to the fourth quarter in 2014. During this period, the average ratio of real estate loans to total assets increased from 38% to 43%. I follow Huizinga and Laeven (2012) and calculate Tier 1 and risk-based capital ratios are calculated as Tier 1 and risk-based capital divided by total risk-weighted assets, respectively.

I also use total bank assets, total loans as a ratio to total assets, non-real estate loans as a ratio to total assets, real loan growth rate, market-to-book ratio of equity, book and market

[8] ExecuComp has a 70% haircut on time to maturity for (pre-2006) calculation of Black-Scholes value. Coles et al. (2006) do not appear to make this assumption.
[9] http://www.federalreserve.gov/releases/h15/data.htm#fn11 (accessed on October 16, 2019).

leverage ratios, loan loss provisions, net loan charge-offs, institutional ownership, and annualized stock return and volatility. For bank CEOs, I include their cash and total compensation as well as tenure with the bank. All variables are winsorized at the 1st and 99th percentiles to minimize the effect of outliers. See Appendix A for a complete list of variables and their definitions and Appendix B for all the BHCs included in the empirical analysis.

3.4 Summary Statistics

Table 1 reports the summary statistics of CEO compensation, bank asset, and financial characteristics (observed at the bank CEO-year level). The average bank CEO earns total compensation of $4.3 million a year where the cash compensation from base salary and bonus is about $1.5 million. The average delta and vega of the CEO's equity compensation are $493,000 and $123,000, respectively. Delta means that a CEO's wealth increases by $493,000 on average if their banks' stock price increase by 1%. Vega means that an increase of 1% in stock volatility leads to an increase of $123,000 in CEO wealth on average. The average tenure of bank CEOs is 6.6 years. Roughly two-thirds of banks have a CRO or C-level executive responsible for risk management.

The average BHC in my sample has total assets of $121 billion, of which 58.4% are loans, 37.8% are real estate loans, and 20.6% are non-real estate loans. Tier 1 capital (resp. risk-based capital) accounts for 9.1% (resp. 15.3%) of risk-weighted assets. The mean annualized stock return is 2.7%, and the mean annualized stock volatility is 18%.

Table 2 reports Pearson's pairwise correlation between banks' lending exposures (real estate and non-real estate) and losses measured by loan loss provisions and net loan charge offs as percentages of total loans. Column (1) shows that real estate loans as a ratio to total assets have a statistically significant and positive correlation (0.08-0.09) with both loan loss provisions and net loan charge-offs at the 5% level. In contrast, non-real estate loans do not have a significant correlation with either loan loss provisions or net charge offs. The positive correlation between real estate lending and loan losses suggests that real estate loans are riskier than non-real estate loans.

4 Empirical Finding

4.1 Regression Specification

I test how CEO compensation vega and bank capital are associated with a bank's real estate lending according to the regression equation below. The dependent variable is bank *i*'s real estate loans (measured relative to total assets) at time *t*. There are two independent variables of interest: the vega and capital ratio of bank *i* at time *t*–1. The capital ratio is either the Tier 1 capital ratio or the risk-based capital ratio. Vega and capital ratio are lagged, this may shed some light on causality, even though, they do not completely remove the endogeneity issue associated with these two independent variables.

$$Real\ Estate\ Loan_{i,t} = \alpha + \beta_1 Vega_{i,t-1} + \beta_2 Capital\ Ratio_{i,t-1} + \sum_{j=1}^{K} \gamma_j Control_{i,j,t-1} + \epsilon_{i,t}$$

Based on Coles et al. (2006), I include institutional ownership, CEO cash compensation, CEO delta, and CEO tenure in the regressions to control for governance, ownership, and CEO's level of risk aversion. Besides to include the presence of a CRO (or a similar position).

Guay (1999) argues that CEOs with higher cash compensation can invest outside the firm to diversify their personal portfolio which allows them to take larger risks with the firm they control. Consistent with the existing literature, I also control for a number of bank asset and financial characteristics, including the natural logarithm of total assets, total loans as a ratio to total assets, the market-to-book ratio of equity, and stock volatility. All control variables are lagged.

4.2 Main Regression Results

Table 3 reports the main regression results relating a bank's real estate loans to its CEO vega and capital ratio. I use four slightly different regression specifications in Table 3. In columns (1) and (3) I use the Tier 1 capital ratio while in columns (2) and (4) I use the risk-based capital ratio. Year fixed effects are not included in columns (1) and (2) but included in columns (3) and (4).

Across all four regression specifications, the coefficient of vega is significantly positive at the 10% level. This indicates that a bank's investments in real estate loans increase with its

CEO vega. The capital ratio coefficient, measured by Tier 1 or risk-adjusted capital, is always negative and significant at the 1% level. So, a bank with higher capital invests less in real estate loans. These results are consistent with my hypotheses[10].

Thus far, I have established (1) the positive relation between CEO vega and real estate lending, and (2) the negative relation between capital and real estate lending. To further support the validity of these results, I estimate the regressions from Table 3 with non-real estate loans[11] as the dependent variable. Table 4 shows that the coefficient on vega is always insignificant. The capital ratio coefficient is only significant when the risk-based capital ratio is used and is 55% smaller than Table 3. So, compensation vega and capital ratios are more closely related to real estate lending.

Table 6 reports the subsample regression results for banks with low and high capital ratios. The positive relation between vega and real estate loans is significant at the 5-10% level among banks with high capital ratios in three of four regression specifications that use median Tier 1 capital ratio (Panel A) and two of four regression specifications that use the median risk-based capital ratio (Panel B). However, the vega coefficient is never significant among banks with low capital ratios. The negative relation between capital ratios and real estate lending is significant in almost all regressions at the 1-10% level for both banks with low capital ratios and banks with high capital ratios.

Table 7 reports the subsample regression results for small and large banks. The positive relation between vega and real estate loans is significant at the 10% level among small banks in three of four regression specifications, but it is insignificant among large banks in all regressions. The relation between capital ratios and real estate loans is significantly negative in almost all regressions at the 1% level for both small and large banks. So higher capital ratios are consistently associated with less real estate lending, but the relation between vega and real estate lending is concentrated among small banks.

Table 8 reports the subsample regression results for banks with low and high market-to-book ratios. The positive relation between vega and real estate loans is uniformly significant at the 5-10% level among banks with low market-to-book ratios but it is never significant for banks

[10] Also, noteworthy that large banks may originate a large number of real estate secured loans. However, small banks are more likely to hold these loans on their balance sheet instead of securitizing them.
[11] The variable "non-real estate loans" is the difference between total loans and real estate loans, measured as a ratio to total assets.

with high market-to-book ratios. The negative relation between capital ratios and real estate loans is strongly significant in all regressions at the 1% level among banks with both low and high market-to-book ratios. While capital ratios can be adopted as a policy tool to affect real estate lending among all banks, the effect of vega seems concentrated only among banks with low market-to-book ratios.

Table 9 reports the subsample regression results for banks with low and high stock volatility. The negative relation between capital ratios and real estate loans is significant at the 1% level among banks with high stock volatility in all regressions and for low stock volatility banks in two regressions. Vega has a significantly positive relation with real estate loans at the 5% level only among banks whose stock volatility is high.

Table 5 reports summary statistics by subsample on key CEO compensation, bank asset and financial characteristics to provide profiles of these subsamples. Table 5 shows that banks with above median capital ratios have lower real loan growth rates.[12] Banks with high Tier 1 capital ratios have an average of 37.3% real loan growth rate while it is only 8.3% among banks with low Tier 1 capital ratios. Similarly, the contrast is 31.9% versus 15.4% in real loan growth rate between banks with high and low risk-based capital ratios. A high loan growth rate may indicate lower loan standards and a higher percentage of future nonperforming loans (e.g. Kaminsky and Reinhart (1999), Espinoza and Prasad (2010), and Louzis, Vouldis and Metaxas (2010)). So the significant relation between vega and real estate lending stems primarily from small and well-capitalized banks that are expanding quickly. Likewise, Table 5 shows that small banks make more real estate loans (45.1% vs. 30.4%). Meanwhile at small banks the majority of the growth in broader money supply is going to come from credit creation via new loans made by banks.[13] Given that small banks tend to be better capitalized, the results of this section complement the results state above that the significant relation between vega and real estate lending is concentrated among small and well-capitalized banks. Furthermore, Table 5 shows that banks with low market-to-book ratios have an average of 49.6% real loan growth rate compared to 1.6% among high market-to-book banks. Banks with low market-to-book ratios also

[12] The claim is that a higher loan growth rate in the banking industry usually drove by bank size. The low capitalization banks are vastly larger. It is hard for a large bank to grow quickly.
[13] We should also recognize that for part of time period there may be a capital requirement surcharge for large banks. So size partially determines the capitalization due to regulation.

invest more in real estate loans (40.3% versus 35.2%). So, the significant relation between vega and real estate lending stems from banks with low market-to-book ratios which tend to focus on real estate lending and are growing quickly. Additionally, Table 5 shows that among banks with higher stock volatility, CEO compensation tends to have higher vega, delta, cash and total compensation, banks are on average smaller, invest more of their assets into loans, in particular real estate loans, and report higher loan loss provisions and net loan charge-offs. Higher average stock returns (5% vs. 0.4%) compensate investors for the risk of high-volatility banks.

The results in Table 5 and in Tables 6 through Table 9 split the sample into bank-years above and below the median capital ratios, total assets, market-to-book ratio, and stock volatility. This allows me to investigate when the relationships of vega and capital to real estate lending are stronger. I find that vega is significantly associated with real estate lending primarily for small banks that are well capitalized. These banks tend to focus on real estate lending and have rapid loan growth.

Lastly, I also study sample periods before, during, and after the 2007-09 financial crisis. Table 10 divides the sample into three periods: 1) before the 2007-09 financial crisis (years 2000-2006), 2) during the crisis (years 2007-2009), and 3) after the crisis (years 2010-2014). Since the crisis, bank executive compensation has been criticized for providing incentives for excessive risk taking. However, regression results for the subsample periods show that high vega is not associated with high real estate loans before or during the crisis. Instead, the relationship between vega and real estate loans is significantly positive at the 5-10% level only after the crisis (Panel A and Panel B). This may be because vega may not have been used much prior to the crisis when lending was booming anyway, and banks relied more on vega after the crisis to encourage employees to reignite lending which slowed down during the crisis. In contrast, capital ratios always have a significant negative correlation with real estate loans at the 1% level.

5 Conclusion

This paper studies the association between bank risk taking and bank incentives from (1) CEO compensation vega and (2) capital structure. I use real estate lending to measure bank risk-taking. There is a significant positive relation between vega and the amount of real estate lending. There is also a significant negative relation between bank capital and real estate lending.

In other words, banks which offer high CEO vega and have lower capital ratios tend to allocate a larger portion of their loan portfolio to real estate lending.

Subsample tests show that the positive relation between vega and real estate lending is statistically significant among small and well-capitalized banks, banks with low market-to-book ratios, and high stock volatility. These banks have high exposure to real estate lending and rapid loan portfolios growth. The positive association between vega and real estate lending is only significant after the financial crisis. These findings suggest that smaller growth focused banks use vega to motivate executives during recessions. If banks only use vega to motivate executives during a recession, then regulators cannot use vega to limit bank risk during a boom.

In contrast, the negative relation between a bank's capital ratio and real estate lending is significant for all subsamples of banks and all time periods considered. Banks with more capital conduct less real estate lending. Bank capital creates a strong incentive to manage risks (Mehran and Thakor (2011)).

Coles et al. (2006) find that higher managerial compensation vega prompts executives to both invest in riskier assets and implement more aggressive debt policy. The marginal contribution of this paper is that CEO compensation vega is associated with a *specific* type of risky investment, real estate lending, which has attracted more attention from bank regulators since the Great Recession. Furthermore, this paper verifies that a higher capital ratio is associated with lower real estate lending and risk taking.

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Appendix A: Variable Definitions

Appendix A lists all the variables examined in the empirical analyses presented in this paper, their descriptions, and data sources.

Variable	Description	Source
CEO Compensation Characteristics		
Vega	Sensitivity of CEO compensation to stock return volatility, measured in thousands of U.S. dollars	ExecuComp, calculated by the method described in Core and Guay (2002)
Delta	Sensitivity of CEO compensation to share price, measured in thousands of U.S. dollars	ExecuComp, calculated by the method described in Core and Guay (2002)
Cash compensation	CEO cash compensation including salary and bonus, measured in thousands of U.S. dollars	ExecuComp
Total compensation	CEO total compensation including salary, bonus, equity, and value of options grants, measured in thousands of U.S. dollars	ExecuComp
Tenure (years)	Number of years that the CEO has been with the bank	ExecuComp
CRO present	A dummy variable indicating the presence of a Chief Risk Officer (CRO) or positions with risk management responsibilities (such as Chief Credit Officer, Chief Lending Officer, or Chief Compliance Officer) in ExecuComp	ExecuComp, positions similar to CRO defined by Ellul and Yerramilli (2013)
Bank Asset and Financial Characteristics		
Total assets	Book value of total assets, measured in millions of U.S. dollars	Call Report
Risk-weighted assets	Risk-weighted assets / Total assets	Call Report
Total loans	Total loans / Total assets	Call Report
Real estate loans	Real estate loans / Total assets	Call Report
Non-real estate loans	Non-real estate loans / Total assets	Call Report

Variable	Description	Source
Bank Asset and Financial Characteristics (Continued)		
Real loan growth	Growth rate in bank lending	Call Report
Market-to-book ratio	Market value to book value of equity	Call Report, Compustat, CRSP
Book leverage	Book value of total liabilities / Book value of total assets	Call report
Market leverage	Book value of total liabilities / Market value of total assets (= Book value of total liabilities + Market value of equity)	Call Report, Compustat, CRSP
Tier 1 capital ratio	Tier 1 capital / Risk-weighted assets	Call Report
Risk-based capital ratio	Risk-based capital / Risk-weighted assets	Call Report
Institutional ownership	Total 13-F institutional ownership / Number of shares outstanding.	Thomson's Reuters
Loan loss provisions	Loan loss provisioning / Total loans	Call Report
Net loan charge-offs	Loan charge-offs minus recoveries / Total loan	Call Report
Stock return	The annualized stock return of the bank	CRSP
Stock volatility	The annualized volatility of daily stock returns of the bank	CRSP

Appendix B: Bank Holding Companies Included in the Empirical Analysis

Appendix B lists all the bank holding companies (BHCs) that are included in the empirical analysis presented in this paper. BHCs are ranked by their most recently reported asset size. The most recent report year is the last year a BHC appears in the dataset that combines Call Report, ExecuComp, Compustat, and CRSP.

Rank by Asset Size	Bank Holding Company (BHC)	Report Year	Asset Size ($millions)
1	Wells Fargo & Company	2014	1,488,055
2	Citigroup Inc.	2011	1,396,568
3	Goldman Sachs Group, Inc.	2014	911,330
4	Morgan Stanley	2014	841,372
5	JPMorgan Chase & Co.	2014	817,763
6	Wachovia Corporation	2007	760,558
7	Bank Of America Corporation	2014	660,499
8	American International Group	2014	547,111
9	PNC Financial Services Group, Inc.	2014	362,137
10	Bank Of New York Mellon Corporation	2013	355,984
11	Capital One Financial Corporation	2014	348,549
12	U.S. Bancorp	2014	282,428
13	Metlife, Inc.	2014	267,934
14	BankNorth Group, Inc.	2006	253,196
15	FleetBoston Financial Corporation	2003	199,426
16	Countrywide Financial Corporation	2007	193,195
17	BB&T Corporation	2014	183,010
18	SunTrust Banks, Inc.	2014	179,713
19	Charles Schwab Corporation	2014	163,627
20	Principal Financial Group, Inc.	2014	159,193
21	American Express Company	2014	159,103
22	National City Corporation	2007	153,679
23	Ameriprise Financial, Inc.	2014	136,758
24	Regions Financial Corporation	2014	121,967
25	Northern Trust Corporation	2014	94,456
26	Bank Of New York Company, Inc.	2014	89,537
27	Fifth Third Bancorp	2014	89,422
28	Compass Bankcshares, Inc.	2006	89,357
29	Keycorp	2014	83,454
30	State Street Corporation	2014	79,342
31	Discover Financial Services	2014	60,722
32	North Fork Bancorporation, Inc.	2005	60,386
33	Comerica Incorporated	2014	55,903
34	Marshall & Ilsley Corporation	2010	52,003
35	Southtrust Corporation	2003	51,718
36	Zions Bancorporation	2014	51,036
37	UnionBanCal Corporation	2007	49,433
38	New York Community Bancorp, Inc.	2014	48,516

Rank by Asset Size	Bank Holding Company (BHC)	Report Year	Asset Size ($millions)
39	Cit Group Inc.	2014	48,178
40	Mellon Financial Corporation	2006	47,744
41	Regions Financial Corporation	2011	46,597
42	E*Trade Financial Corporation	2014	46,280
43	Popular, Inc.	2014	45,168
44	Charter One Financial, Inc.	2003	37,818
45	People's United Financial, Inc.	2014	37,155
46	MBNA Corporation	2004	36,354
47	East West Bancorp, Inc.	2014	35,927
48	Union Planters Corporation	2003	34,263
49	M&T Bank Corporation	2014	34,148
50	Cullen/Frost Bankers, Inc.	2014	28,197
51	Huntington Bancshares Incorporated	2014	27,915
52	Hancock Holding Company	2013	26,642
53	Synovus Financial Corp.	2014	26,519
54	Raymond James Financial, Inc.	2014	26,474
55	Colonial Bancgroup, Inc.	2008	26,263
56	Associated Banc-Corp	2014	24,227
57	First Horizon National Corporation	2014	24,224
58	Commerce Bancorp, LLC	2007	21,391
59	National Commerce Financial Corp.	2002	20,140
60	Greenpoint Financial Corp.	2003	20,103
61	Tcf Financial Corporation	2014	18,816
62	Webster Financial Corporation	2014	18,719
63	Hibernia Corporation	2004	18,560
64	Wintrust Financial Corporation	2014	18,098
65	Commerce Bancshares, Inc.	2014	17,733
66	Mercantile Bankshares Corporation	2006	17,575
67	Provident Bancorp, Inc.	2003	16,542
68	Astoria Financial Corporation	2014	16,497
69	Privatebancorp, Inc.	2014	14,602
70	Washington Federal, Inc.	2014	14,370
71	Flagstar Bancorp, Inc.	2014	14,368
72	City National Corporation	2014	13,925
73	Carolina First Corporation	2009	13,650
74	First Bancorp	2014	12,714
75	Whitney Holding Corporation	2010	12,385
76	Valley National Bancorp	2014	12,267
77	Bank Of Hawaii Corporation	2014	12,195
78	International Bancshares Corporation	2014	12,128
79	Ucbh Holdings, Inc.	2008	11,804
80	Cathay General Bancorp	2014	11,517
81	Bancorpsouth, Inc.	2014	10,834
82	People's Mutual Holdings	2013	10,696
83	Firstmerit Corporation	2014	10,560
84	Banner Corporation	2014	9,916

Rank by Asset Size	Bank Holding Company (BHC)	Report Year	Asset Size ($millions)
85	Corus Bankshares, Inc.	2008	9,572
86	Fulton Financial Corporation	2014	9,280
87	Pinnacle Financial Partners, Inc.	2014	9,262
88	Sterling Financial Corporation	2013	9,203
89	Franklin Resources, Inc.	2014	9,185
90	UMB Financial Corporation	2014	8,916
91	Wilmington Trust Corporation	2010	8,874
92	First American Financial Corporation	2014	8,837
93	MB Financial, Inc.	2014	8,820
94	Old National Bancorp	2014	8,795
95	Hudson City Bancorp, Inc.	2014	8,778
96	National Penn Bancshares, Inc.	2014	8,557
97	Viewpoint Financial Group, Inc.	2014	8,440
98	Trustmark Corporation	2014	8,329
99	United Bankshares, Inc.	2014	8,314
100	Newalliance Bancshares, Inc.	2010	8,300
101	Bofi Holding, Inc.	2014	8,168
102	Umpqua Holdings Corporation	2014	8,151
103	Northwest Bancshares Inc.	2014	7,937
104	Provident New York Bancorp, Inc.	2014	7,734
105	Texas Capital Bancshares, Inc.	2014	7,706
106	Greater Bay Bancorp	2006	7,657
107	United Community Banks, Inc.	2014	7,652
108	Simmons First National Corporation	2014	7,554
109	Community Bank System, Inc.	2014	7,503
110	Susquehanna Bancshares, Inc.	2014	7,466
111	Hudson United Bancorp	2004	6,738
112	Amegy Bancorporation, Inc.	2004	6,633
113	Brookline Bancorp, Inc.	2014	6,512
114	Provident Financial Services, Inc.	2014	6,359
115	First Commonwealth Financial Corporation	2014	6,198
116	F.N.B. Corporation	2014	6,016
117	First Midwest Bancorp, Inc.	2014	5,965
118	Independent Bank Corp.	2014	5,895
119	SVB Financial Group	2014	5,684
120	Community First Bankshares, Inc.	2003	5,483
121	Riggs National Corporation	2004	5,473
122	NBT Bancorp Inc.	2014	5,336
123	Provident Bankshares Corporation	2008	5,145
124	T. Rowe Price Group, Inc.	2014	5,127
125	Boston Private Financial Holdings, Inc.	2014	5,115
126	Westamerica Bancorporation	2014	5,053
127	Republic Bancorp Inc.	2005	5,031
128	Irwin Financial Corporation	2008	4,964
129	Dime Community Bancshares	2014	4,832
130	Stifel Financial Corp.	2014	4,514

Rank by Asset Size	Bank Holding Company (BHC)	Report Year	Asset Size ($millions)
131	Seacoast Financial Services Corporation	2003	4,477
132	Sterling Bancshares, Inc.	2010	4,443
133	Taylor Capital Group, Inc.	2013	4,404
134	Chittenden Corporation	2006	4,366
135	Texas Regional Bancshares, Inc.	2005	4,186
136	Oritani Financial Corp	2014	4,127
137	SWS Group, Inc.	2014	3,996
138	Bank Of The Ozarks Inc.	2014	3,765
139	Glacier Bancorp, Inc.	2014	3,707
140	PacWest Bancorp	2014	3,677
141	Frontier Financial Corporation	2008	3,579
142	Prosperity Bancshares, Inc.	2014	3,506
143	Wilshire Bancorp, Inc.	2014	3,437
144	Hanmi Financial Corporation	2014	3,414
145	First Financial Bancorp	2014	3,323
146	Oriental Financial Group Inc.	2014	3,039
147	Tompkins Financial Corporation	2014	2,968
148	City Holding Company	2014	2,848
149	S & T Bancorp, Inc.	2014	2,840
150	Bank Mutual Corp New	2014	2,694
151	TrustCo Bank Corp NY	2014	2,584
152	Concord EFS, Inc.	2002	2,559
153	First Financial Bankshares, Inc.	2014	2,478
154	First NBC Bank Holding Co	2014	2,430
155	Anchor Bancorp Wisconsin Inc.	2010	2,344
156	Columbia Banking System, Inc.	2014	2,245
157	First Indiana Corporation	2006	2,131
158	CVB Financial Corp.	2014	2,016
159	Home Bancshares, Inc.	2014	1,911
160	Central Pacific Financial Corp.	2014	1,863
161	First Niagara Financial Group, Inc.	2014	1,801
162	Independent Bank Corporation	2014	1,744
163	SEI Investments Company	2014	1,332
164	Cascade Bancorp	2014	1,297
165	Nara Bancorp, Inc.	2014	1,278
166	Sterling Bancorp	2012	1,277
167	Southside Bancshares, Inc.	2014	1,063

Figure 1: Time Series of Bank CEO Compensation Vega

Figure 1 shows the time series of average bank CEO vega from 2000 to 2014 based on annual data from ExecuComp, Compustat, and CRSP. Vega is measured in thousands of U.S. dollars.

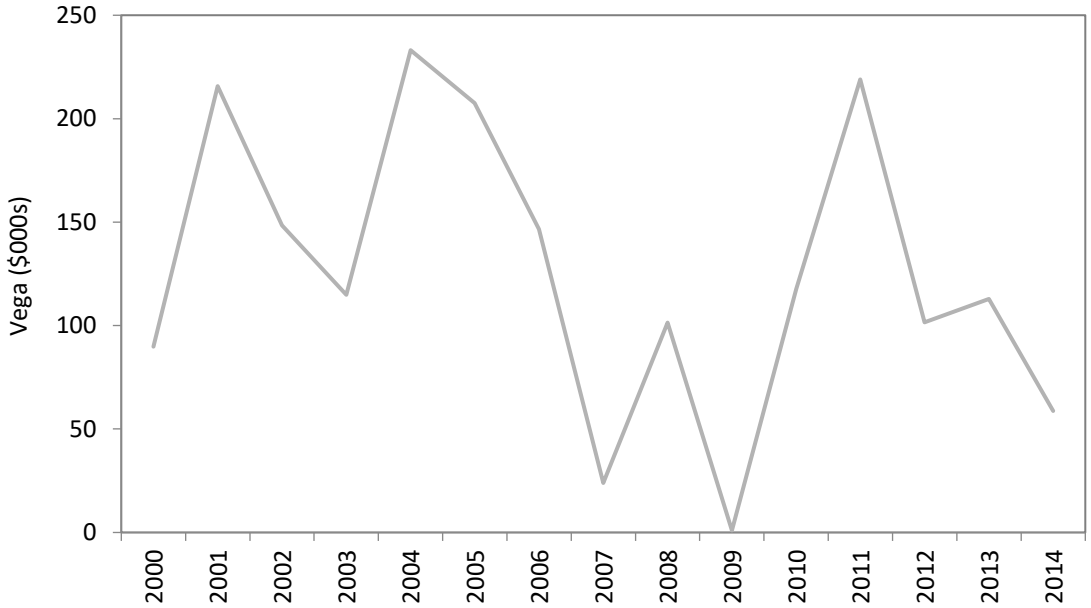

Figure 2: Time Series of Real Estate Loans

Figure 2 shows the time series of banks' average direct exposure to real estate loans from the first quarter of 2000 to the fourth quarter of 2014 based on quarterly data from FRY-9 reports (Call Reports). Real estate loans are measured as the ratio to total assets of the bank.

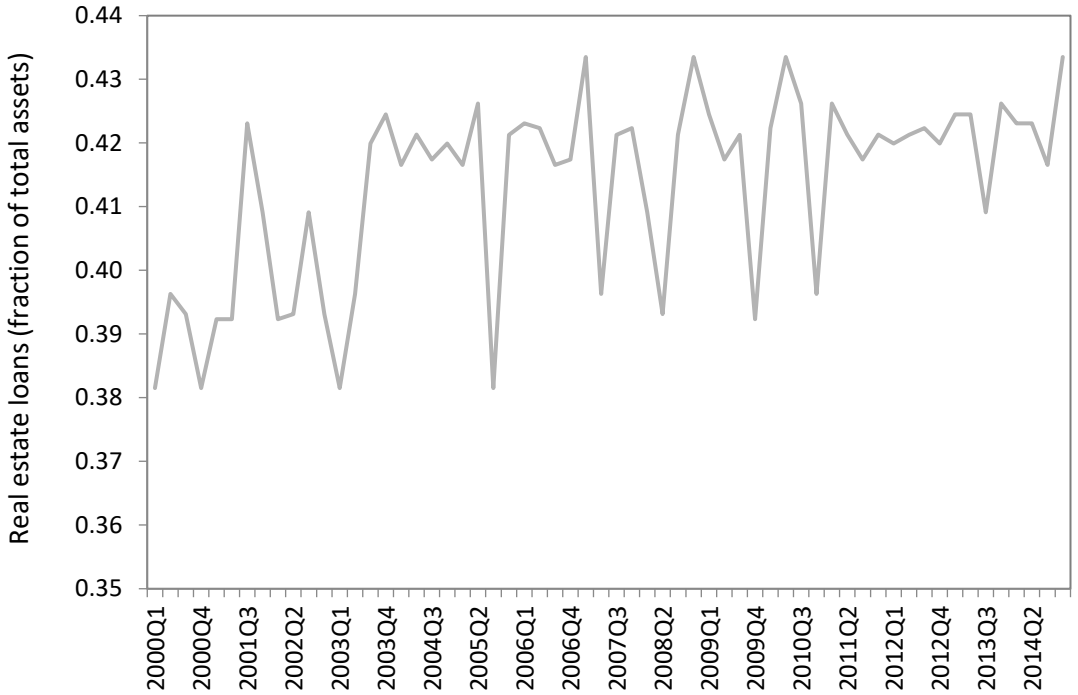

Table 1: Summary Statistics

Table 1 reports the summary statistics of CEO compensation, assets and financial characteristics for a sample of U.S. bank holding companies that are stock-listed during fiscal years 2000-2014. CEO compensation data is reported annually, whereas bank assets and financial data are reported quarterly. Vega, delta, cash and total compensation are measured in thousands of U.S. dollars, and total assets are in millions of U.S. dollars. Risk-weighted assets, total loans, real estate loans, non-real estate loans are all ratios to total assets. Tier 1 and risk-based capital ratios are a bank's Tier 1 and risk-based capital to its total risk-weighted assets. Loan loss provisions and net loan charge-offs are reported as ratios to the total amount of loans made previously and measured in percentage points. Variables are winsorized at the 1st and 99th percentiles. See Appendix A for detailed variable definitions and data sources.

Variable	Obs.	Mean	STD	Min.	25th	Median	75th	Max.
Bank CEO Compensation Characteristics								
Vega	1611	123	164	0.000	8	39	180	501
Delta	1567	493	626	1.000	59	196	657	1953
Cash compensation	1659	1489	1882	256	647	900	1377	12151
Total compensation	1659	4284	4193	365	1192	2415	5944	13524
Tenure (years)	1658	4.375	3.210	2	4	6	1	20
CRO present	1659	0.656	0.475	0	0	1	1	1
Bank Asset and Financial Characteristics								
Total assets	1132	121031	314664	1332	6309	14480	59490	1954877
Risk-weighted assets	1214	0.732	0.141	0.363	0.649	0.742	0.826	1.077
Total loans	1653	0.584	0.220	0.000	0.524	0.657	0.730	0.881
Real estate loans	1653	0.378	0.208	0.000	0.247	0.406	0.528	0.858
Non-real estate loans	1653	0.206	0.139	0.000	0.105	0.198	0.277	0.730
Real loan growth	1580	0.265	1.195	-0.857	-0.187	0.000	0.255	8.635
Market-to-book ratio	1646	2.099	1.881	-1.617	0.937	1.617	2.671	11.431
Book leverage	1647	0.867	0.144	0.114	0.876	0.898	0.915	1.011
Market leverage	1652	0.463	0.051	0.149	0.467	0.473	0.478	0.488
Tier 1 capital ratio	1196	0.091	0.057	0.003	0.070	0.082	0.095	0.642
Risk-based capital ratio	1112	0.153	0.106	0.009	0.118	0.136	0.156	1.447
Institutional ownership	1528	0.071	0.132	0.000	0.011	0.040	0.083	3.371
Stock return	1659	0.027	0.080	-0.028	0.001	0.003	0.012	0.730
Stock volatility	1656	0.180	0.565	0.000	0.005	0.016	0.074	5.637
Loan loss provisions	1623	0.420	0.767	-0.991	0.055	0.174	0.395	8.768
Net loan charge-offs	1622	0.397	0.711	-0.140	0.039	0.159	0.406	7.053

Table 2: Correlations between Real Estate Loans and Loan Loss Measures

Table 2 reports Pearson's pairwise correlation between banks' lending exposures (real estate and non-real estate loans) and loans loss measures. Real estate and non-real estate loans are measures as ratios to total assets. Loan loss measures are loan loss provisions and net loan charge-offs as percentages of total loans. * indicates that Pearson's correlation coefficient is significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level.

	(1)	(2)
Variable	Real estate loans	Non-real estate loans
Loan loss provisions	0.081**	-0.023
Net loan charge-offs	0.091***	-0.044
N	1653	1653

Table 3: Real Estate Loans Related to Vega and Capital Ratios

Table 3 reports results from regressions relating a bank's real estate loans to its CEO vega and capital ratio. Real estate loans are measured as a ratio to total assets. Vega, delta, and cash compensation are measured in thousands of U.S. dollars, and total assets are in millions of U.S. dollars. Tier 1 and risk-based capital ratios are a bank's Tier 1 and risk-based capital to its total risk-weighted assets. The capital ratio used in columns (1) and (3) is Tier 1 capital ratio, and that in columns (2) and (4) is the risk-based capital ratio. Year fixed effects are not included in columns (1) and (2) but included in columns (3) and (4). Standard errors are reported in parentheses. * indicates that the estimated coefficient is significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level.

Variable	**Real Estate Loans**			
	(1)	(2)	(3)	(4)
Vega	0.0000492*	0.0000497*	0.0000516*	0.0000526*
	(1.99)	(2.00)	(2.06)	(2.09)
Delta	-0.00000225	-0.00000254	-0.00000240	-0.00000270
	(-1.55)	(-1.77)	(-1.64)	(-1.87)
Cash compensation	-0.00000110	-0.00000115	-0.00000134	-0.00000133
	(-0.84)	(-0.88)	(-1.01)	(-1.00)
Tenure (years)	0.0193	0.0240	0.0202	0.0242
	(1.48)	(1.70)	(1.51)	(1.66)
CRO present	-0.00705	-0.00856	0.0145	0.00928
	(-0.69)	(-0.82)	(0.68)	(0.43)
Log (total assets)	-0.0460***	-0.0451***	-0.0460***	-0.0451***
	(-14.86)	(-14.45)	(-14.72)	(-14.35)
Total loans	0.0228	0.0136	0.0200	0.0118
	(0.90)	(0.53)	(0.78)	(0.45)
Market-to-book ratio	0.000973	0.00127	0.00129	0.00155
	(0.39)	(0.51)	(0.51)	(0.61)
Stock volatility	-0.00000237*	-0.00000223*	-0.00000236*	-0.00000224*
	(-2.53)	(-2.40)	(-2.50)	(-2.39)
Institutional ownership	-0.0000688	-0.000317	0.0000177	-0.000222
	(-0.13)	(-0.59)	(0.03)	(-0.41)
Tier 1 capital ratio	-0.886***		-0.885***	
	(-9.52)		(-9.47)	
Risk-based capital ratio		-0.658***		-0.660***
		(-12.32)		(-12.31)
Year fixed-effects	No	No	Yes	Yes
N	1023	955	1023	955
Adj. R^2	0.256	0.305	0.252	0.302

Table 4: Non-Real Estate Loans Related to Vega and Capital Ratios

Table 4 reports results from regressions relating a bank's non-real estate loans to its CEO vega and capital ratio. Non-real estate loans are measured as a ratio to total assets. Vega, delta, and cash compensation are measured in thousands of U.S. dollars, and total assets are in millions of U.S. dollars. Tier 1 and risk-based capital ratios are a bank's Tier 1 and risk-based capital to its total risk-weighted assets. The capital ratio used in columns (1) and (3) is Tier 1 capital ratio, and that in columns (2) and (4) is the risk-based capital ratio. Year fixed effects are not included in columns (1) and (2) but included in columns (3) and (4). Standard errors are reported in parentheses. * indicates that the estimated coefficient is significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level.

Variable	**Non-Real Estate Loans**			
	(1)	(2)	(3)	(4)
Vega	0.0000521	0.0000485	0.0000508	0.0000438
	(1.84)	(1.76)	(1.76)	(1.55)
Delta	0.00000206	0.00000216	0.00000190	0.00000206
	(1.19)	(1.29)	(1.09)	(1.22)
Cash compensation	0.00000303	0.00000323*	0.00000336*	0.00000363*
	(1.85)	(2.02)	(2.02)	(2.25)
Tenure (years)	-0.0171	-0.0369	-0.0196	-0.0367
	(-1.04)	(-1.92)	(-1.17)	(-1.88)
CRO present	0.00448	0.00612	0.0183	0.0211
	(0.41)	(0.56)	(0.75)	(0.88)
Log (total assets)	0.00122	-0.00162	0.000966	-0.00204
	(0.38)	(-0.50)	(0.30)	(-0.63)
Total loans	-0.0168	-0.0161	-0.0131	-0.0106
	(-0.68)	(-0.65)	(-0.53)	(-0.43)
Market-to-book ratio	-0.00471*	-0.00449	-0.00516*	-0.00508*
	(-1.98)	(-1.91)	(-2.14)	(-2.13)
Stock volatility	-0.00000190*	-0.00000176	-0.00000195*	-0.00000173
	(-1.97)	(-1.88)	(-1.99)	(-1.81)
Institutional ownership	0.00144*	0.00165**	0.00149**	0.00167**
	(2.56)	(2.99)	(2.61)	(3.00)
Tier 1 capital ratio	-0.157		-0.167	
	(-1.75)		(-1.84)	
Risk-based capital ratio		-0.287***		-0.290***
		(-5.85)		(-5.89)
Year fixed-effects	No	No	Yes	Yes
N	635	605	635	605
Adj. R^2	0.042	0.093	0.040	0.094

Table 5: Summary Statistics by Subsample

Table 5 reports the summary statistics by subsample. The subsamples include (1) banks with low and high Tier 1 capital ratios, (2) banks with low and high risk-based capital ratio, (3) small and large banks, (4) banks with low and high market-to-book ratios, and (5) banks with low and high stock volatility. Low and high Tier 1 (risk-based) capital ratios are defined as below and above the median Tier 1 (risk-based) capital ratio, respectively. Small banks and large banks are defined as banks with total assets below and above the median total assets, respectively. Low and high market-to-book ratios are defined as below and above the median market-to-book ratio, respectively. Low and high stock volatility are defined as below and above the median stock volatility, respectively. Summary statistics on the same variables as in Table 1 are reported in this table. Data about CEO compensation are reported annually, whereas bank assets and financial data are reported quarterly. Vega, delta, cash and total compensation are measured in thousands of U.S. dollars, and total assets are in millions of U.S. dollars. Risk-weighted assets, total loans, real estate loans, non-real estate loans are all ratios to total assets. Tier 1 and risk-based capital ratios are a bank's Tier 1 and risk-based capital to its total risk-weighted assets. Loan loss provisions and net loan charge-offs are reported as ratios to the total amount of loans made previously and measured in percentage points. Variables are winsorized at the 1^{st} and 99^{th} percentiles. See Appendix A for detailed variable definitions and data sources.

	Tier 1 Capital Ratio		Risk-based Capital ratio		Asset Size		Market-to -book Ratio		Stock Volatility	
Variable	Low	High	Low	High	Small	Large	Low	High	Low	High
Bank CEO Compensation Characteristics										
Vega	160	101	118	126	42	190	111	136	66	180
Delta	555	453	411	536	289	691	432	554	283	696
Cash compensation	1867	1282	1422	1528	820	2089	1520	1463	956	2023
Total compensation	5082	3818	3937	4470	1908	6592	4110	4461	2437	6135
Tenure (years)	4.272	4.409	4.271	4.444	4.593	4.605	4.459	4.281	4.195	4.556
CRO present	0.644	0.665	0.648	0.661	0.705	0.718	0.652	0.659	0.653	0.660
Bank Asset and Financial Characteristics										
Total assets	256426	78076	94662	130200	7423	233044	138481	90042	19951	213578
Risk-weighted assets	0.700	0.763	0.774	0.696	0.722	0.724	0.725	0.737	0.723	0.741
Total loans	0.571	0.592	0.655	0.547	0.607	0.535	0.598	0.570	0.638	0.530
Real estate loans	0.359	0.388	0.428	0.352	0.451	0.304	0.403	0.352	0.455	0.301
Non-real estate loans	0.212	0.202	0.228	0.194	0.156	0.230	0.194	0.217	0.183	0.229
Real loan growth	0.083	0.373	0.154	0.319	0.466	0.478	0.496	0.016	0.258	0.273
Market-to-book ratio	2.128	2.078	2.166	2.069	2.064	2.175	2.051	2.153	2.080	2.126
Book leverage	0.872	0.864	0.871	0.865	0.870	0.856	0.853	0.881	0.878	0.855
Market leverage	0.462	0.464	0.465	0.462	0.464	0.464	0.465	0.462	0.462	0.465
Tier 1 capital ratio	0.069	0.112	0.075	0.104	0.106	0.086	0.090	0.091	0.087	0.094
Risk-based capital ratio	0.128	0.177	0.118	0.188	0.170	0.146	0.148	0.158	0.145	0.161
Institutional ownership	0.073	0.070	0.070	0.071	0.060	0.076	0.073	0.068	0.063	0.078
Stock return	0.047	0.016	0.029	0.027	0.002	0.052	0.027	0.028	0.004	0.050
Stock volatility	0.284	0.120	0.194	0.175	0.019	0.352	0.176	0.184	0.006	0.354
Loan loss provisions	0.396	0.436	0.429	0.418	0.431	0.527	0.399	0.443	0.362	0.478
Net loan charge-offs	0.347	0.427	0.356	0.422	0.398	0.527	0.384	0.412	0.332	0.463

Table 6: Low vs. High Capital Ratios

Table 6 reports results from subsample regressions relating a bank's real estate loans to its CEO vega and capital ratio. The two subsamples in this table are banks with low capital ratios and banks with high capital ratios. Low and high capital ratios are defined as below and above the median capital ratio, respectively. Panel A defines the two subsamples based on Tier 1 capital ratio, and Panel B defines them based on the risk-based capital ratio. Real estate loans are measured as a ratio to total assets. Vega, delta, and cash compensation are measured in thousands of U.S. dollars, and total assets are in millions of U.S. dollars. Tier 1 and risk-based capital ratios are a bank's Tier 1 and risk-based capital to its total risk-weighted assets. In both panels, columns (1), (3), (5), and (7) report results for banks with low capital ratios, and columns (2), (4), (6), and (8) report for banks with high capital ratio. The capital ratio used in columns (1), (2), (5), and (6) is Tier 1 capital ratio, and that in columns (3), (4), (7), and (8) is the risk-based capital ratio. Year fixed effects are not included in columns (1)-(4) but included in columns (5)-(8). Standard errors are reported in parentheses. * indicates that the estimated coefficient is significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level.

A. Low vs. High Tier 1 Capital Ratio

	Real Estate Loans							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Vega	0.0000572	0.000232**	0.0000327	0.000146*	0.0000529	0.000245**	0.0000371	0.000150
	(1.46)	(2.94)	(0.82)	(2.01)	(1.32)	(2.93)	(0.91)	(1.94)
Delta	0.000000351	-0.0000103*	0.00000110	-0.00000556	0.000000605	-0.0000104*	0.00000140	-0.00000506
	(0.20)	(-2.46)	(0.63)	(-1.44)	(0.33)	(-2.40)	(0.78)	(-1.27)
Cash compensation	0.00000219	-0.00000978*	0.000000197	-0.00000779*	0.00000203	-0.0000100*	0.000000101	-0.00000810*
	(1.16)	(-2.38)	(0.11)	(-2.07)	(1.04)	(-2.35)	(0.05)	(-2.07)
Tenure (years)	0.0557	0.0388	0.125*	0.0417*	0.0709	0.0411	0.125*	0.0493*
	(1.37)	(1.78)	(2.10)	(1.97)	(1.59)	(1.76)	(2.02)	(2.19)
CRO present	0.0285	-0.0273	0.0229	-0.0313	0.108*	-0.0293	0.0580	-0.0573
	(1.49)	(-1.35)	(1.16)	(-1.67)	(2.17)	(-0.71)	(1.12)	(-1.44)
Log (total assets)	-0.0310***	-0.0314***	-0.0265***	-0.0277***	-0.0295***	-0.0311**	-0.0256***	-0.0258**
	(-4.42)	(-3.54)	(-3.64)	(-3.38)	(-4.08)	(-3.30)	(-3.41)	(-2.99)
Total loans	0.0607	-0.00614	0.0595	0.00310	0.0619	-0.00725	0.0711	0.00954
	(1.36)	(-0.14)	(1.31)	(0.07)	(1.35)	(-0.16)	(1.51)	(0.22)
Market-to-book ratio	-0.0147*	0.000434	-0.0149*	0.00305	-0.0133*	0.000428	-0.0139*	0.00296
	(-2.31)	(0.06)	(-2.39)	(0.49)	(-2.02)	(0.06)	(-2.15)	(0.47)
Stock volatility	-0.00000254	0.00000471	-0.00000186	0.00000354	-0.00000231	0.00000475	-0.00000179	0.00000346
	(-1.83)	(1.84)	(-1.37)	(1.52)	(-1.62)	(1.81)	(-1.27)	(1.45)
Institutional ownership	-0.000196	0.000211	0.0000404	0.0000537	-0.000317	0.000437	0.00000720	0.000499
	(-0.21)	(0.18)	(0.05)	(0.05)	(-0.34)	(0.36)	(0.01)	(0.45)
Tier 1 capital ratio	-0.00547***	-0.00399			-0.00559***	-0.00473		
	(-4.14)	(-1.10)			(-4.14)	(-1.27)		
Risk-based capital ratio			-2.633***	-0.702***			-2.577***	-0.721***
			(-7.37)	(-8.47)			(-6.98)	(-8.50)
Year fixed-effects	No	No	No	No	Yes	Yes	Yes	Yes
N	346	351	312	342	346	351	312	342
Adj. R^2	0.166	0.092	0.272	0.158	0.078	0.258	0.239	0.247

B. Low vs. High Risk-based Capital Ratio

	Real Estate Loans							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Vega	0.0000391	0.000132*	0.0000342	0.000114	0.0000429	0.000133*	0.0000392	0.000121
	(0.98)	(2.19)	(0.84)	(1.77)	(1.04)	(2.13)	(0.93)	(1.80)
Delta	0.000000432	-0.00000432	0.000000937	-0.00000355	0.000000151	-0.00000446	0.000000779	-0.00000329
	(0.21)	(-1.74)	(0.45)	(-1.43)	(0.07)	(-1.77)	(0.36)	(-1.30)
Cash compensation	-0.00000110	-0.000000660	-0.00000205	-0.00000209	-0.00000145	-0.000000675	-0.00000234	-0.00000179
	(-0.58)	(-0.23)	(-1.07)	(-0.75)	(-0.74)	(-0.23)	(-1.19)	(-0.61)
Tenure (years)	0.0560	0.0446*	0.0599	0.0532*	0.0618	0.0374	0.0626	0.0513
	(1.58)	(1.98)	(1.66)	(2.07)	(1.56)	(1.58)	(1.56)	(1.87)
CRO present	0.00683	-0.0100	-0.00169	-0.0283	-0.00359	0.0561	0.000951	0.0141
	(0.39)	(-0.50)	(-0.10)	(-1.34)	(-0.08)	(1.36)	(0.02)	(0.31)
Log (total assets)	-0.0142*	-0.0450***	-0.0153*	-0.0505***	-0.0114	-0.0448***	-0.0132	-0.0518***
	(-2.18)	(-5.48)	(-2.33)	(-5.75)	(-1.66)	(-5.32)	(-1.90)	(-5.71)
Total loans	-0.00232	0.0800	0.00760	0.0565	-0.00625	0.0788	0.00750	0.0656
	(-0.06)	(1.65)	(0.20)	(1.10)	(-0.16)	(1.60)	(0.19)	(1.26)
Market-to-book ratio	-0.0125*	-0.000766	-0.0143**	0.000306	-0.0112	0.000659	-0.0129*	0.00104
	(-2.29)	(-0.10)	(-2.63)	(0.04)	(-1.96)	(0.09)	(-2.26)	(0.14)
Stock volatility	-0.00000373*	0.00000212	-0.00000352*	0.00000215	-0.00000410*	0.00000227	-0.00000386*	0.00000226
	(-2.39)	(1.19)	(-2.22)	(1.22)	(-2.52)	(1.26)	(-2.33)	(1.25)
Institutional ownership	-0.00101	-0.000507	-0.000933	0.000218	-0.00111	-0.000562	-0.00111	0.000325
	(-1.17)	(-0.45)	(-1.07)	(0.20)	(-1.23)	(-0.49)	(-1.22)	(0.28)
Tier 1 capital ratio	-0.00769**	-0.00359*			-0.00770**	-0.00321*		
	(-3.00)	(-2.38)			(-2.90)	(-2.07)		
Risk-based capital ratio			0.995	-0.607***			0.950	-0.607***
			(1.68)	(-6.53)			(1.51)	(-6.33)
Year fixed-effects	No	No	No	No	Yes	Yes	Yes	Yes
N	322	371	323	327	322	371	323	327
Adj. R^2	0.130	0.159	0.116	0.258	0.109	0.150	0.093	0.244

Table7: Small vs. Large Banks

Table 7 reports results from subsample regressions relating a bank's real estate loans to its CEO vega and capital ratio. The two subsamples in this table are small banks and large banks defined as banks with total assets below and above the median total assets, respectively. Real estate loans are measured as a ratio to total assets. Vega, delta, and cash compensation are measured in thousands of U.S. dollars, and total assets are in millions of U.S. dollars. Tier 1 and risk-based capital ratios are a bank's Tier 1 and risk-based capital to its total risk-weighted assets. Columns (1), (3), (5), and (7) report results for small banks, and columns (2), (4), (6), and (8) report for large banks. The capital ratio used in columns (1), (2), (5), and (6) is Tier 1 capital ratio, and that in columns (3), (4), (7), and (8) is the risk-based capital ratio. Year fixed effects are not included in columns (1)-(4) but included in columns (5)-(8). Standard errors are reported in parentheses. * indicates that the estimated coefficient is significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level.

	Real Estate Loans							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	**Small**	**Large**	**Small**	**Large**	**Small**	**Large**	**Small**	**Large**
Vega	0.000318	0.000112	0.000330*	0.0000855	0.000398*	0.000110	0.000384*	0.0000884
	(1.85)	(1.72)	(2.00)	(1.39)	(2.18)	(1.64)	(2.18)	(1.40)
Delta	0.00000260	-2.88e-08	-0.00000135	-0.00000100	0.00000250	0.000000164	-0.000000904	-0.000000691
	(0.36)	(-0.01)	(-0.21)	(-0.42)	(0.33)	(0.06)	(-0.13)	(-0.28)
Cash compensation	0.00000416	-0.00000547	0.00000166	-0.00000463	0.00000103	-0.00000474	-0.000000337	-0.00000401
	(0.49)	(-1.47)	(0.21)	(-1.32)	(0.11)	(-1.23)	(-0.04)	(-1.10)
Tenure (years)	0.0255	0.103	0.0255	0.0998	0.0330	0.0912	0.0346	0.0918
	(1.14)	(1.64)	(1.17)	(1.68)	(1.32)	(1.30)	(1.43)	(1.38)
CRO present	0.0181	-0.0175	0.0214	-0.00631	-0.0138	0.0892	-0.00248	0.0566
	(0.73)	(-0.58)	(0.89)	(-0.22)	(-0.30)	(1.09)	(-0.06)	(0.73)
Log (total assets)	-0.00950	-0.0267*	-0.00866	-0.0279*	-0.0109	-0.0254*	-0.00889	-0.0263*
	(-0.83)	(-2.27)	(-0.78)	(-2.54)	(-0.89)	(-2.13)	(-0.75)	(-2.35)
Total loans	0.0113	0.0879	-0.00551	0.0696	-0.00172	0.0956	-0.0122	0.0816
	(0.19)	(1.44)	(-0.10)	(1.21)	(-0.03)	(1.54)	(-0.20)	(1.39)
Market-to-book ratio	0.00996	0.000988	0.00855	0.00255	0.00894	0.000893	0.00809	0.00314
	(1.39)	(0.10)	(1.23)	(0.26)	(1.20)	(0.08)	(1.13)	(0.31)
Stock volatility	-0.0000227	0.000000267	-0.0000201	0.000000777	-0.0000204	-0.000000131	-0.0000181	0.000000436
	(-1.44)	(0.12)	(-1.32)	(0.36)	(-1.20)	(-0.06)	(-1.11)	(0.20)
Institutional ownership	-0.000422	0.000430	-0.0000985	0.000481	-0.000291	0.000302	-0.0000572	0.000279
	(-0.36)	(0.26)	(-0.09)	(0.31)	(-0.23)	(0.17)	(-0.05)	(0.17)
Tier 1 capital ratio	-1.120***	-0.752			-1.104***	-0.846*		
	(-6.13)	(-1.82)			(-5.81)	(-2.00)		
Risk-based capital ratio			-0.779***	-1.795***			-0.785***	-1.757***
			(-7.32)	(-5.30)			(-7.09)	(-5.06)
Year fixed-effects	No	No	No	No	Yes	Yes	Yes	Yes
N	218	205	218	205	218	205	218	205
Adj. R^2	0.191	0.074	0.241	0.178	0.169	0.088	0.225	0.184

Table 8: Low vs. High Market-to-Book Ratio

Table 8 reports results from subsample regressions relating a bank's real estate loans to its CEO vega and capital ratio. The two subsamples in this table are banks with low market-to-book ratios and banks with high market-to-book ratios. Low and high market-to-book ratios are defined as below and above the median market-to-book ratio, respectively. Real estate loans are measured as a ratio to total assets. Vega, delta, and cash compensation are measured in thousands of U.S. dollars, and total assets are in millions of U.S. dollars. Tier 1 and risk-based capital ratios are a bank's Tier 1 and risk-based capital to its total risk-weighted assets. Columns (1), (3), (5), and (7) report results for banks with low market-to-book ratio, and columns (2), (4), (6), and (8) report for banks with high market-to-book ratio. The capital ratio used in columns (1), (2), (5), and (6) is Tier 1 capital ratio, and that in columns (3), (4), (7), and (8) is the risk-based capital ratio. Year fixed effects are not included in columns (1)-(4) but included in columns (5)-(8). Standard errors are reported in parentheses. * indicates that the estimated coefficient is significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level.

	Real Estate Loans							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Vega	0.000181*	0.0000306	0.000167*	0.0000278	0.000220**	0.0000355	0.000203**	0.0000316
	(2.37)	(0.80)	(2.34)	(0.69)	(2.80)	(0.91)	(2.74)	(0.77)
Delta	0.00000125	-0.00000262	0.00000247	-0.00000253	0.00000153	-0.00000272	0.00000267	-0.00000219
	(0.50)	(-1.19)	(1.06)	(-1.13)	(0.60)	(-1.20)	(1.13)	(-0.95)
Cash compensation	-0.00000651	0.000000442	-0.00000703*	0.000000322	-0.00000758*	0.000000498	-0.00000802*	0.000000674
	(-1.74)	(0.26)	(-2.01)	(0.18)	(-2.00)	(0.28)	(-2.26)	(0.36)
Tenure (years)	0.0489	0.0433	0.0541*	0.0758*	0.0569*	0.0482	0.0614*	0.0815*
	(1.80)	(1.76)	(2.13)	(2.29)	(1.98)	(1.82)	(2.28)	(2.36)
CRO present	-0.0232	0.0124	-0.0190	0.00872	-0.0445	0.0325	-0.0327	0.0242
	(-1.03)	(0.74)	(-0.89)	(0.48)	(-0.72)	(0.96)	(-0.57)	(0.64)
Log (total assets)	-0.0341***	-0.0341***	-0.0374***	-0.0315***	-0.0365***	-0.0337***	-0.0398***	-0.0313***
	(-3.62)	(-5.32)	(-4.24)	(-4.53)	(-3.74)	(-5.11)	(-4.36)	(-4.37)
Total loans	0.0230	0.0960*	-0.00493	0.101*	0.0184	0.0978*	-0.00589	0.115*
	(0.46)	(2.39)	(-0.11)	(2.35)	(0.37)	(2.36)	(-0.13)	(2.59)
Market-to-book ratio	-0.00614	-0.00881	-0.00878	-0.00921	-0.00961	-0.00797	-0.0115	-0.00836
	(-0.74)	(-1.68)	(-1.13)	(-1.71)	(-1.14)	(-1.48)	(-1.45)	(-1.50)
Stock volatility	0.000000653	-0.00000116	0.00000146	-0.00000111	0.00000118	-0.00000119	0.00000196	-0.00000117
	(0.28)	(-0.84)	(0.68)	(-0.78)	(0.50)	(-0.85)	(0.89)	(-0.81)
Institutional ownership	-0.000417	-0.0000762	-0.000235	-0.0000697	0.0000729	0.0000926	0.000257	0.000249
	(-0.30)	(-0.09)	(-0.18)	(-0.08)	(0.05)	(0.11)	(0.19)	(0.28)
Tier 1 capital ratio	-0.901**	-0.867***			-0.925**	-0.873***		
	(-2.98)	(-6.35)			(-2.95)	(-6.23)		
Risk-based capital ratio			-1.575***	-0.587***			-1.568***	-0.598***
			(-7.15)	(-7.20)			(-6.96)	(-7.14)
Year fixed-effects	No	No	No	No	Yes	Yes	Yes	Yes
N	307	396	303	353	307	396	303	353
Adj. R^2	0.094	0.225	0.208	0.259	0.102	0.210	0.214	0.250

Table 9: Low vs. High Stock Volatility

Table 9 reports results from subsample regressions relating a bank's real estate loans to its CEO vega and capital ratio. The two subsamples in this table are banks with low stock volatility and banks with high stock volatility. Low and high stock volatility are defined as below and above the median stock volatility, respectively. Real estate loans are measured as a ratio to total assets. Vega, delta, and cash compensation are measured in thousands of U.S. dollars, and total assets are in millions of U.S. dollars. Tier 1 and risk-based capital ratios are a bank's Tier 1 and risk-based capital to its total risk-weighted assets. Columns (1), (3), (5), and (7) report results for banks with low stock volatility, and columns (2), (4), (6), and (8) report for banks with high stock volatility. The capital ratio used in columns (1), (2), (5), and (6) is Tier 1 capital ratio, and that in columns (3), (4), (7), and (8) is the risk-based capital ratio. Year fixed effects are not included in columns (1)-(4) but included in columns (5)-(8). Standard errors are reported in parentheses. * indicates that the estimated coefficient is significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level.

	Real Estate Loans							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Vega	-0.000130	0.000121**	-0.000120	0.000114**	-0.000138	0.000125**	-0.000119	0.000116**
	(-1.52)	(3.01)	(-1.41)	(2.73)	(-1.56)	(3.02)	(-1.33)	(2.70)
Delta	-0.0000101*	0.000000818	-0.00000909	0.000000484	-0.00000885	0.000000805	-0.00000829	0.000000537
	(-2.09)	(0.44)	(-1.95)	(0.26)	(-1.78)	(0.43)	(-1.73)	(0.28)
Cash compensation	-0.00000117	-0.00000252	-0.00000324	-0.00000279	-0.00000137	-0.00000211	-0.00000315	-0.00000224
	(-0.35)	(-1.23)	(-0.94)	(-1.32)	(-0.40)	(-1.00)	(-0.89)	(-1.03)
Tenure (years)	0.0411*	0.0139	0.0536**	0.0351	0.0476*	0.0351	0.0613**	0.0561
	(2.25)	(0.37)	(2.84)	(0.71)	(2.42)	(0.87)	(3.05)	(1.10)
CRO present	-0.0250	0.00329	-0.0159	-0.000138	-0.0693	0.0647	-0.0683	0.0451
	(-1.43)	(0.17)	(-0.90)	(-0.01)	(-1.88)	(1.37)	(-1.75)	(0.91)
Log (total assets)	-0.0105	-0.0342***	-0.0104	-0.0312***	-0.00949	-0.0348***	-0.00976	-0.0318***
	(-1.43)	(-4.22)	(-1.38)	(-3.70)	(-1.24)	(-4.19)	(-1.25)	(-3.70)
Total loans	0.0267	0.0610	-0.000725	0.0559	0.0129	0.0655	-0.0115	0.0631
	(0.66)	(1.37)	(-0.02)	(1.22)	(0.31)	(1.45)	(-0.27)	(1.36)
Market-to-book ratio	0.00398	-0.0163	0.00209	-0.0135	0.00313	-0.0153	0.00155	-0.0125
	(0.79)	(-1.93)	(0.43)	(-1.57)	(0.61)	(-1.79)	(0.31)	(-1.44)
Stock volatility	0.00000225	-0.00000114	0.00000373	-0.00000106	0.00000115	-0.00000120	0.00000245	-0.00000118
	(0.60)	(-0.85)	(0.96)	(-0.78)	(0.30)	(-0.87)	(0.61)	(-0.85)
Institutional ownership	-0.000770	0.000855	-0.000874	0.000878	-0.000652	0.000675	-0.000589	0.000678
	(-0.90)	(0.79)	(-1.04)	(0.79)	(-0.73)	(0.61)	(-0.67)	(0.60)
Tier 1 capital ratio	-0.592	-0.818***			-0.510	-0.780***		
	(-1.60)	(-5.59)			(-1.35)	(-5.23)		
Risk-based capital ratio			-1.294***	-0.616***			-1.246***	-0.599***
			(-5.82)	(-6.73)			(-5.45)	(-6.42)
Year fixed-effects	No	No	No	No	Yes	Yes	Yes	Yes
N	334	370	314	343	334	370	314	343
Adj. R^2	0.059	0.147	0.149	0.183	0.051	0.139	0.143	0.179

Table 10: Before, During, and After the 2007-09 Financial Crisis

Table 10 reports results from regressions relating a bank's real estate loans to its CEO vega and capital ratio of three subsample periods. The three subsample periods are before the 2007-09 financial crisis (years 2000-2006), during the crisis (years 2007-2009), and after the crisis (years 2010-2014). Real estate loans are measured as a ratio to total assets. Vega, delta, and cash compensation are measured in thousands of U.S. dollars, and total assets are in millions of U.S. dollars. Tier 1 and risk-based capital ratios are a bank's Tier 1 and risk-based capital to its total risk-weighted assets. Panel A and Panel B use Tier 1 capital ratio and the risk-based capital ratio, respectively, in the regressions. In both panels, columns (1) and (4) report results before the crisis, columns (2) and (5) during the crisis, and columns (3) and (6) after the crisis. Year fixed effects are not included in columns (1)-(3) but included in columns (4)-(6). Standard errors are reported in parentheses. * indicates that the estimated coefficient is significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level.

A. Tier 1 Capital Ratio

Variable	Real Estate Loans					
	(1)	(2)	(3)	(4)	(5)	(6)
	Before	**During**	**After**	**Before**	**Crisis**	**After**
Vega	0.0000721	-0.0000345	0.000224*	0.0000766	-0.0000336	0.000251**
	(1.38)	(-0.49)	(2.45)	(1.42)	(-0.48)	(2.71)
Delta	0.000000247	-0.000000857	-0.00000344	0.000000199	-0.00000105	-0.00000339
	(0.11)	(-0.23)	(-1.10)	(0.08)	(-0.29)	(-1.08)
Cash compensation	-0.00000102	-0.00000136	-0.0000112	-0.00000119	-0.00000101	-0.0000124*
	(-0.42)	(-0.50)	(-1.82)	(-0.48)	(-0.36)	(-2.01)
Tenure (years)	0.0422*	0.0716	0.0138	0.0451*	0.0773	0.0284
	(2.09)	(1.36)	(0.18)	(2.15)	(1.44)	(0.38)
CRO present	0.0237	0.0371	-0.107	0.0553	0.0379	-0.131
	(0.97)	(0.37)	(-0.64)	(0.67)	(0.38)	(-0.78)
Log (total assets)	-0.0273**	-0.0312**	-0.0368***	-0.0255**	-0.0317**	-0.0369***
	(-3.25)	(-2.76)	(-3.73)	(-2.89)	(-2.78)	(-3.73)
Total loans	0.0603	-0.0143	0.0279	0.0607	-0.0125	0.0307
	(1.28)	(-0.19)	(0.52)	(1.28)	(-0.16)	(0.58)
Market-to-book ratio	-0.0118	-0.000223	-0.00950	-0.00993	-0.0000941	-0.00951
	(-1.42)	(-0.03)	(-1.21)	(-1.16)	(-0.01)	(-1.20)
Stock volatility	-0.00000297	0.00000157	0.000000763	-0.00000323	0.00000154	0.000000908
	(-1.60)	(0.41)	(0.42)	(-1.71)	(0.40)	(0.50)
Institutional ownership	-0.000104	-0.000593	-0.000480	0.000154	-0.000466	-0.000374
	(-0.10)	(-0.37)	(-0.37)	(0.14)	(-0.29)	(-0.29)
Tier 1 capital ratio	-0.841***	-0.837**	-1.033***	-0.835***	-0.846**	-1.029***
	(-4.63)	(-3.19)	(-3.81)	(-4.55)	(-3.21)	(-3.79)
Year fixed-effects	No	No	No	Yes	Yes	Yes
N	264	173	270	264	173	270
Adj. R^2	0.182	0.100	0.154	0.175	0.092	0.155

B. Risk-based Capital Ratio

	Real Estate Loans					
Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Before	**During**	**After**	**Before**	**Crisis**	**After**
Vega	0.0000713	-0.0000311	0.000258**	0.0000792	-0.0000353	0.000282**
	(1.35)	(-0.42)	(2.70)	(1.44)	(-0.47)	(2.91)
Delta	9.06e-08	-0.000000755	-0.00000400	0.000000188	-0.00000103	-0.00000394
	(0.04)	(-0.21)	(-1.30)	(0.08)	(-0.28)	(-1.28)
Cash compensation	-0.00000111	-0.000000935	-0.0000147*	-0.00000116	-0.000000603	-0.0000157*
	(-0.45)	(-0.32)	(-2.39)	(-0.47)	(-0.20)	(-2.54)
Tenure (years)	0.0560*	0.0726	0.0149	0.0578*	0.0799	0.0312
	(2.41)	(1.38)	(0.20)	(2.44)	(1.49)	(0.42)
CRO present	0.0170	0.0338	-0.0928	0.0426	0.0346	-0.110
	(0.66)	(0.34)	(-0.57)	(0.45)	(0.35)	(-0.67)
Log (total assets)	-0.0268**	-0.0314**	-0.0305**	-0.0254**	-0.0313*	-0.0305**
	(-3.02)	(-2.63)	(-3.07)	(-2.76)	(-2.60)	(-3.07)
Total loans	0.0439	-0.00786	0.0103	0.0489	-0.00583	0.0131
	(0.89)	(-0.10)	(0.20)	(0.99)	(-0.07)	(0.25)
Market-to-book ratio	-0.0115	0.000115	-0.00980	-0.00910	0.000345	-0.0101
	(-1.34)	(0.01)	(-1.26)	(-1.04)	(0.04)	(-1.29)
Stock volatility	-0.00000299	0.00000148	0.00000103	-0.00000338	0.00000174	0.00000120
	(-1.59)	(0.37)	(0.59)	(-1.78)	(0.43)	(0.68)
Institutional ownership	-0.000125	-0.000342	-0.000524	0.000172	-0.000212	-0.000438
	(-0.12)	(-0.21)	(-0.41)	(0.16)	(-0.13)	(-0.34)
Risk-based capital ratio	-0.740***	-0.621***	-0.839***	-0.743***	-0.646***	-0.837***
	(-5.89)	(-3.78)	(-6.07)	(-5.86)	(-3.88)	(-6.03)
Year fixed-effects	No	No	No	Yes	Yes	Yes
N	238	166	256	238	166	256
Adj. R^2	0.228	0.119	0.224	0.226	0.115	0.228