How Can We Pay to Get Out of This? Executive Compensation and Bank Risk during the Financial Crisis

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Using a database of 164 publicly traded banking firms, we examine the link between executive compensation and bank risk from 2006-2013. We find that higher salaries in banking executives improve Tier 1 capital ratios, while higher equity and pension compensation reduce Tier 1 capital. Dividing our sample into risk quintiles, we find that low-risk banks respond the most to salary incentives and high-risk banks to equity incentives. Surprisingly, lower pension values were associated with higher Tier 1 capital ratios across all quintiles. Our paper is the first to examine the role of both CEO and non-CEO compensation ratios in determining Tier 1 capital during the financial crisis.

JEL classification: G38, G15
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1. Introduction

In 2008, the banking industry in the United States endured the worst financial crisis in recent memory. 465 banks were closed by regulators from 2008-2012[1], the US unemployment rate exceeded 10%, and the total cost to the economy is estimated to have been as high as $14 Trillion.[2] In the years following the Great Recession, researchers identified many causal factors: credit expansion[3], monetary and fiscal policy, and lax regulatory standards. Comparatively little analysis has occurred on executive compensation in banks. Prior investigations outside of the banking industry have shown how executive compensation (via salary, pension, and equity incentives) contributes to solvency[4], firm performance[5], dividend policy[6], and other firm characteristics. In this paper, we provide a link between bank behavior and executive compensation during the financial crisis.

Since Jensen and Meckling (1976), the direct relationship between compensation incentives and firm behavior has been well understood. Recent studies by Edmans and Liu (2011), Bolton et. al. (2015) and Dittmann et. al (2017) have studied the

[1] For information about the FDIC Failed Bank List, see the most recent list here: (https://www.fdic.gov/bank/individual/failed/banklist.html)
[2] This was based on the estimate given in Luttrell et. al (2013): https://www.dallasfed.org/research/eclett/2013/el1307.cfm
[3] See Mian and Sufi (2015).
[4] See Edmans and Liu (2011)
[5] See Mehran (1995)
[6] See Eisdorfer et. al. (2015)

risk-taking incentives of firms in response to executive compensation. Applying this framework to the banking industry, we examine how banks of varying risk levels respond to compensation incentives. Tier 1 capital, the primary regulatory measure of a bank's capital strength, is used a proxy for risk.[7] In addition to being an international capital standard, the Tier 1 capital ratio provides a widely accepted measure of the insulation of banks against unanticipated losses.[8] Should 'safer' banks have paid executives differently than 'risky' banks? We find strong evidence to suggest that executive response to compensation incentives differs between bank risk levels.

Using a database of 164 banks during the crisis, we use single-year lagged compensation data as a predictor of Tier 1 capital ratios. After controlling for other variables, we find that higher salaries and weaker equity and pension compensation is associated with stronger Tier 1 capital ratios. However, this relationship breaks down when we divide our samples by risk. Low-risk banks respond the most to salary incentives, whereas high-risk banks respond better to equity incentives. Pension incentives were consistently associated with lower Tier 1 capital ratios in the banking sector across all quintiles.

Our paper makes the following contributions: (1) we focus specifically on the banking sector and Tier 1 capital ratios; (2) our compensation data, inclusive of CEO and non-CEO executives alike, is complete and focused on pensions, and (3) we analyze separately both *high-risk* and *low-risk* banks. Our findings have important implications for bank boards determining executive contracts, as well as contributing to the extant literature on banking in the last financial crisis.

The paper is organized as follows: the introduction is Section 1, the literature review is Section 2, the methodology is discussed in Section 3, the results in Section 4, and Section 5 is the conclusion.

2. Literature Review

In the last ten years, there has been a great deal of literature studying the causes, effects, and consequences of the Great Recession. We begin with a discussion of regulatory papers and bank risk, and finish by synthesizing our research into the context of compensation and banking.

Banks' vulnerabilities during the financial crisis often depended on firm-level financial incentives and accounting behavior. Fahlenbrach, Prilmeier, and Stulz (2012) shows banks that rely on short-term lending with high leverage for purposes of quick growth performed worse during financial crises. The authors identified this behavior as endemic to a bank's culture rather than an isolated occurrence. Huizinga and Laeven (2012) argue that banks, during times of crisis, overinflated their balance sheets using mortgage-backed securities. Beatty & Liao (2011) find that

[7] See Jacques and Nigro (1997) and Aggarwal and Jacques (2001). Alternative measures, such as the Altman Z-Score, were considered but determined to be less appropriate for use in the banking industry.

[8] https://www.fdic.gov/regulations/safety/manual/section2-1.pdf

delayed loss recognition can have a negative effect on banks. These studies suggest the need for regulation and greater enforcement of accounting rules.

Further studies examined the role of investor expectations concerning regulatory and enforcement changes. Bayazitova and Shivdasani (2012) examine the Capital Purchase Program (CPP) and Troubled Asset Relief Program (TARP) and find that CPP infusions did not have serious effects on investor expectations on future regulatory interventions. Discussion on future regulations have focused on establishing effective bank capital requirements, limiting contagion effects, and encouraging good governance. Different bank capital requirements have varying tradeoffs that must be considered. Repullo and Suarez (2013) compare bank capital regulations and find that Basel II, while more procyclical, is more effective at keeping banks safer than Basel I.

Contagion effects can be limited by identifying transmission pathways. For example, Mistrulli (2011) explains how interbank markets can act as avenues for bank defaults and can contaminate other banks. Improved governance beyond the scope of shareholder value can also improve bank performance during times of crisis. Beltratti and Stulz (2012) observe that banks with careful bank governance outside of shareholder participation performed best during the 2008 financial crisis. Fahlenbrach and Stulz (2011) find that high CEO compensation incentives do not influence how banks perform during financial crisis, but CEOs with incentives that are more closely aligned with shareholders performed worse during the crisis. An investigation of "bailed-out banks" discovered that government money was used to support riskier loans and securities (Duchin and Sosyura, 2014). Acharya, Schnabl, and Suarez (2013) ascribe asset-backed commercial paper conduits as a contributing factor to the recent financial crisis. Regulatory arbitrage was a key motivator for creating these conduits, which provided reduction of capital requirements, less risk transfer, and lower stock returns for exposed banks.

Laeven and Levine (2009) find that banks' risk taking depends on the structure of their corporate governance even if the banking regulations are the same. This earlier study was confirmed by Hagendorff and Vallascas (2011) who found a link between risk-taking incentives and financial stability through an analysis of acquisitions. Guo, Jalal, and Khaksari (2011) show that 'too big to fail' banks experience greater risk taking and are more likely to devolve into financial distress. Greater incentive compensation supported by short-term and long-term incentives for executives can mitigate these risks. Chen, Steiner, and Whyte (2006) conclude that the structure of executive compensation and stock-option based compensation increased bank risk-taking. DeYoung, Peng and Yan (2013) argue that the growth opportunities of banks after the year 2000 were due to deregulation of banks, which lead to increased executive compensations incentives and ultimately increased risk-taking.

Several other studies find the evidence inconclusive. Alces and Galle (2012) argue that "inside debt," such as pensions and deferred compensation, is costlier

than other tools for managing risks. The authors find that managers are more likely to hide their equity compensation from investors, increasing complexity and reducing efficacy. Acrey, McCumber, and Nguyen (2011) find evidence that bank CEO compensation structure promotes risk-taking. The authors argued that some traditional risk taking components of CEO compensation thought to be risky are insignificant or negatively correlated.

Other research has indicated a clear link between risk reduction and inside debt compensation. Wei and Yermack (2010) look at how deferred compensation affects risk, value, and debt in a financial institution in peril. They find that the higher the deferred compensation, the better the reduction in risk. Likewise, Bolton, Mehran, and Shapiro (2015) examine the relationship between executive compensation, debt-holders, shareholders, and depositors, and concludes that executives ought to be compensated at whatever level reduces risk for the company. Even more clearly, Edmans and Liu (2011) found that debt can function effectively as compensation because its value depends on the firms' ability to avoid bankruptcy.

Additional papers established a link between risk reduction and inside debt. Kabir, Li, and Veld-Merkoulova (2013) find that bondholders understand the incentives of executive compensation. Defined benefit pensions result in lower bond yield spreads, and inversely, higher spreads are due to increased share holdings. Cassell et. al. (2012) suggest, as many other articles have found, that CEOs with large inside debt holdings are less risky and provide stability for financial institutions. The authors find evidence that there is more diversification and liquidity when CEO inside debt holdings are greater.

Finally, Tung and Wang (2012) find evidence that bank performance can improve and risk-taking reduced by restructuring bank CEOs' inside debt incentives. The researchers observe no connection (or correlation) between executive compensation packages and bank risk, but posit that bank executive compensation (through equity packages) does not have the impact commonly thought on bank fragility. We utilized this argument as the premise for our own study, which further investigates this relationship.

3. Methodology

Using the compensation database provided collected from both Execucomp and Compustat, we examine the five highest-paid executives in 164 publicly traded banks between 2006 and 2013[9]. Building on prior research (notably, Edmans and Liu, 2011 and Tung and Wang, 2012), we propose the following hypothesis:

Hypothesis 1: *We expect that Tier 1 Capital and Executive Compensation are related as follows:*

[9] We began collecting all publicly traded banking firms available in the Execucomp dataset, and omitted any firms with incomplete data after merging with Compustat. Compensation information was available for the 'Top 5' executives of every firm.

Hypothesis 1a:

Higher salaries and bonuses and associated with improved Tier 1 Capital Ratios for sample banks.

Hypothesis 1b:

Lower equity compensation is associated with improved Tier 1 Capital Ratios for sample banks.

Hypothesis 1c:

Higher pension-based compensation is associated with improved Tier 1 Capital Ratios for sample banks.

Extant studies have found that pensions are associated with less risk taking than equity or salary-based compensation. To provide greater resolution for banks of varying risk levels, we divide the sample into quintiles based on Tier 1 capital ratio. The least risky banks form *quintile 5*; the most risk banks form *quintile 1*. Our second hypothesis is as follows:

Hypothesis 2: *Compensation incentives will be substantially different between low-risk and high-risk banks.*

We know from studies of bank failure and related literature (see Section 2) that there is substantial support for high pension compensation improving outcomes for banks. However, we focus on the incentives that exist at both high and low risk levels for banks. Tier 1 capital is used as a risk proxy, since it forms a widely-accepted cornerstone of bank regulatory policy in the United States. In international regulation, Tier 1 capital is important determinant of capital adequacy in financial firms. Current literature generally treats banks in aggregate, ignoring structural differences that might affect the outcome of compensation incentives in these banks.

To build our models, we control for both of the driving factors behind Tier 1 capital, as well as bank size and payout ratios. Our initial OLS model is built as follows:

$$\begin{aligned} Tier1Capital = \alpha + lag1salbonus\ + lag1equity + lag1pension + lag1lnassets \\ + \mathrm{l}ag1leverage\ + lag1profitmargin + lag1payoutratio \\ + lag1nonperformingloanratio + lag1netinterestmargin \\ + \text{ and } lag1liquidassetsdeposits + \varepsilon \end{aligned}$$

Where *lag1salbonus* is the lagged sum of salary and bonus compensation, *lag1equity* is the lagged sum of stock and option awards, *lag1pension* is the lagged present value of pension compensation, *lag1lnassets* is the lagged natural log of firm assets), *lag1leverage* is the lagged ratio of debt to equity, *lag1profitmargin* is the lagged net income dividend by revenues, *lag1payoutratio* is the lagged ratio of dividend

payouts to net income, *lag1nonperformingloanratio* is the lagged ratio of non-performing loans to total gross loans, *lag1netinterestmargin* is the lagged net interest margin, and *lag1liquidassetsdeposits* is the lagged ratio of total liquid assets to deposits. All lags are single-year, reflecting the delay between the executive's contract and realization of their influence on bank financial behavior.

To account for scaling differences between bank size, we use *lag1salbonusassets* as the lagged sum of salary and bonus scaled by total firm assets, *lag1equityassets* as the lagged sum of stock and option awards scaled by total firm assets, *lag1pensionassets* as the lagged present value of pension compensation scaled by total assets. Our second model variation is as follows:

$$Tier1Capital = \alpha + lag1salbonusassets + lag1equityassets + lag1pensionassets + lag1lnassets + lag1leverage + lag1profitmargin + lag1payoutratio + lag1nonperformingloanratio + lag1netinterestmargin + \text{and } lag1liquidassetsdeposits + \varepsilon$$

This empirical framework has several endogeneity, autocorrelation, and heteroskedasticity concerns.[10] To address these issues, we perform a robust cluster fixed-effects model to control for both firm and year fixed effects.[11] All our models are run with robust standard errors. Last, we divide our sample into quintiles based on Tier 1 risk. To keep our regressions consistent, quintile bins are calculated each year, with quintile 1 representing the 20% of firms with the lowest Tier 1 capital in a given year, and quintile 5 composed of firms in the top 20% of Tier 1 capital. The use of quintiles (as opposed to deciles) was designed to give a clear and complete picture of manager incentives across the banking industry. Once quintiles were formed, we re-ran each of our fixed-effects models on the different subsamples.

4. Results

We present our summary statistics in Table I. In our sample of executives, the average executive was paid $470k in salary, $193k in bonuses, and $1,058k in equity compensation. Total pension entitlement averaged $1,235k with substantial variation. We further grouped our sample into both CEOs and CFOs only to distinguish them from other executives and provided percentile values at the 0.25, 0.50, and 0.75 levels. In Figure 1, we show the differences between compensation levels of CEOs and all executives across the different risk quintiles. Generally speaking, high-risk (low quintile) firm executives were offered less compensation than their low-risk (high quintile) counterparts.

In Table II, we present the results of our first robust OLS model. We find that no matter what combination of salary, equity, and pension compensation, our results find that salary has a significant *positive* relationship with Tier 1 capital and

[10] Due to the nature of how Tier 1 capital is calculated, many of our control variables are highly correlated. The correlation table, omitted for length considerations, is available on request.

[11] See Eisdorfer. et. al. (2015)

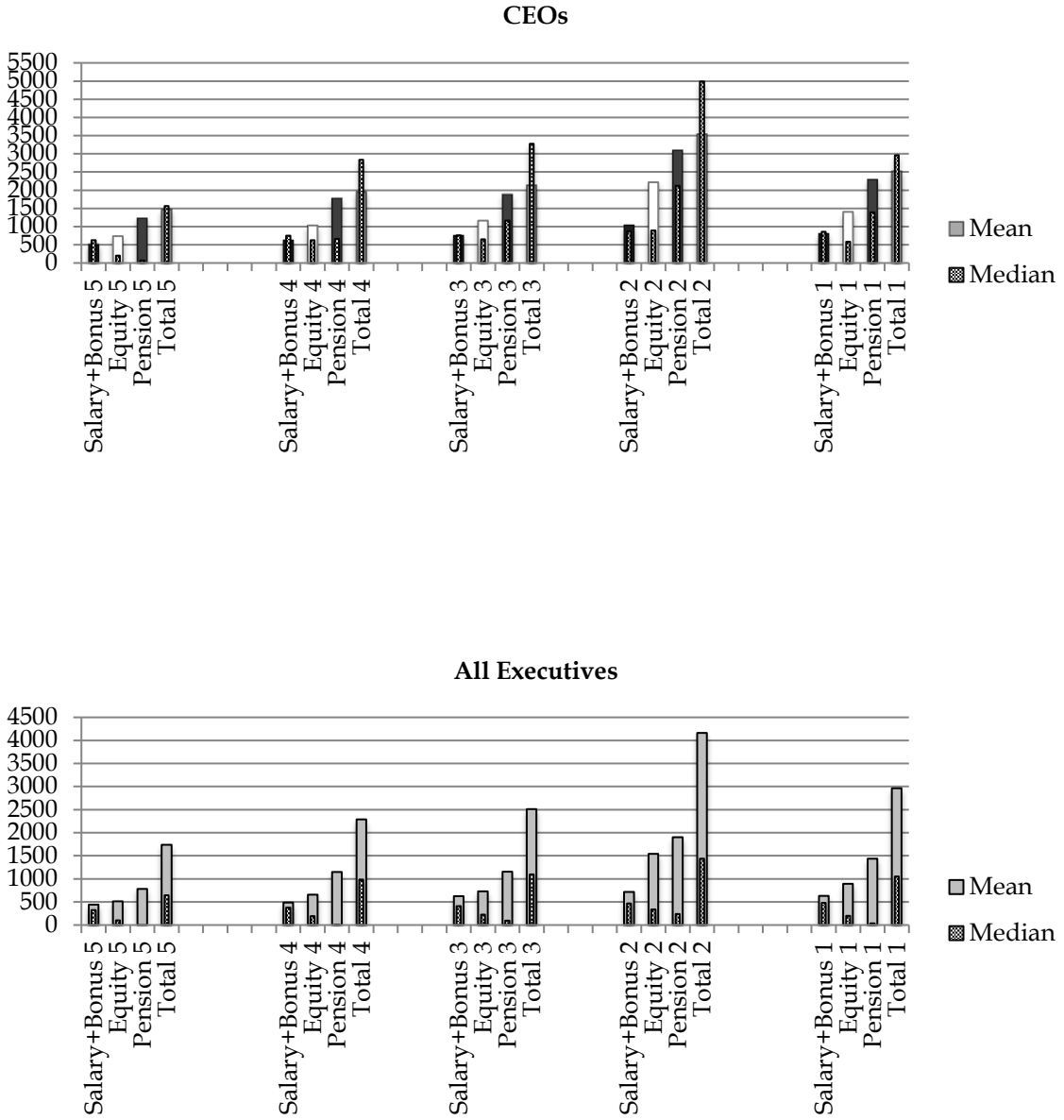
both equity and pension compensation having a significant *negative* relationship with these ratios.

Table I: Summary Statistics

Variable	N	Mean	CV	0.25	0.5	0.75
Executive Compensation Statistics						
Salary	5984	470.23	0.76	258.46	377.41	570.00
Bonus	5984	193.11	4.48	0.00	0.00	42.86
Equity	5984	1057.71	2.36	50.80	229.96	827.70
Pension	5652	1235.40	2.83	0.00	50.76	883.98
Comp. Leverage	5366	0.36	1.10	0.00	0.16	0.76
Executive Age	5568	53.59	0.13	49.00	54.00	59.00
Firm Level Statistics						
Fiscal Year	5984	2009		2007	2009	2011
Tier 1 Capital	4862	11.53	0.27	9.30	11.16	13.29
Total Assets	213	539855.80	1.56	15889.29	47403.99	374310.00
Ln (Assets)	4774	9.61	0.16	8.53	9.29	10.31
Leverage	4779	9.52	1.25	7.24	8.62	10.34
Profit Margin	4779	0.09	3.43	0.08	0.15	0.19
Payout Ratio	4779	0.36	4.40	0.08	0.35	0.58
Nonperforming Loan Ratio	4779	0.03	1.64	0.01	0.02	0.03
Net Interest Margin	4779	3.52	0.25	3.12	3.57	3.95
Liquid Assets/Deposits	4773	0.08	1.15	0.03	0.05	0.09
CEOs Only						
Salary	1051	785.98	0.63	500.00	710.00	950.00
Bonus	1051	252.90	4.30	0.00	0.00	0.00
Equity	1051	2125.74	1.95	105.00	624.39	2098.00
Pension	1045	3379.78	1.93	0.00	490.70	4104.63
Comp. Leverage	945	0.47	0.86	0.00	0.51	0.85
Executive Age	1040	56.78	0.12	52.00	57.00	61.00
CFOs Only						
Salary	1041	406.24	0.66	255.00	345.22	496.51
Bonus	1041	153.08	4.28	0.00	0.00	59.15
Equity	1041	742.10	2.07	54.43	206.86	596.39
Pension	1035	455.62	2.41	0.00	3.64	453.90
Comp. Leverage	933	0.31	1.19	0.00	0.10	0.66
Executive Age	977	51.24	0.14	46.00	51.00	56.00

Notes: Columns reflect mean, coefficient of variation, and 'N', the number of firm-years for each variable. P25, P50, and P75 indicate the 25th, 50th, and 75th percentiles of each variable. Data is on 164 publicly-traded banking firms over the period 2006-2013. In Panel B we provide the two-digit SIC industry breakdown of our sample firms. Two digit SIC codes obtained from COMPUSTAT. N refers to the number of firms in that industrial category.

Figure 1: Summary Financial Data by Risk Quintile



Notes: The summary of the mean and median values for salary and bonus, equity awards, pension compensation, and total compensation for both CEOs and All Executives are sorted by Tier 1 Capital quintile below. Low quintile firms are 'high risk', high quintile firms are 'low-risk'. Data is across 164 banking firms from 2006-2013.

The results for salaries and equity are unsurprising; for pensions, however, this is significant and unanticipated. Theoretical and empirical evidence over the last few years has suggested that pensions should incentivize executives to reduce firm risk, which would manifest in our data as higher Tier 1 capital ratios. Pension compensation, unlike equity compensation, doesn't directly change in response to firm performance. Executive pension plans are typically held in supplemental executive retirement plan (SERPs), and their value increases with executive age rather than firm performance objectives.

Table II: Determinants of Tier 1 Capital, Robust OLS Model

All Executives					
Regression Model	(1)	(2)	(3)	(4)	(5)
lag1salbonus	12.820***				
lag1equity	-0.547**				
lag1pension	-0.475***				
lag1salbonussassets		45.480***	37.720***		
lag1equityassets		-0.361***		-0.341***	
lag1pensionsassets		-0.104***			-0.096***
lag1lnassets	-0.011	0.167***	0.042***	0.157***	0.123***
lag1leverage	-0.482***	-0.207***	-0.401***	-0.270***	-0.221***
lag1profitmargin	-0.029**	-0.0352**	-0.036**	-0.023**	-0.025**
lag1payoutratio	3.634***	3.505***	3.640***	3.598***	3.619***
lag1nonperfromingloanratio	-0.076***	-0.083***	-0.085***	-0.091***	-0.079***
lag1netinterestmargin	34.310***	30.600***	33.570***	33.400***	32.660***
lag1liquidassetsdeposits	0.714***	0.500***	0.493***	0.398***	0.431***
constant	12.150***	11.430***	12.870***	12.380***	11.700***
N	4004	3978	3978	3978	3978
R-Squared	0.247	0.185	0.159	0.15705	0.149

Notes:With Tier 1 Capital as our dependent variable, we regress five alternative models using lagged variables. For executive-specific compensation data, we use the following independent variables: *lag1salbonus* (the lagged sum of salary and bonus compensation), *lag1equity* (the lagged sum of stock and option awards), *lag1pension* (the lagged present value of pension compensation), *lag1salbonusassets* (the lagged sum of salary and bonus scaled by total firm assets), *lag1equityassets* (the lagged sum of stock and option awards scaled by total firm assets), *lag1pensionassets* (the lagged present value of pension compensation scaled by total assets), *lag1lnassets* (the lagged natural log of firm assets), *lag1leverage* (the lagged ratio of debt to equity), *lag1profitmargin* (the lagged net income dividend by revenues), *lag1payoutratio* (the lagged ratio of dividend payouts to net income), *lag1nonperformingloanratio* (the lagged ratio of non-performing loans to total gross loans); *lag1netinterestmargin* (the lagged net interest margin), and *lag1liquidassetsdeposits* (the lagged ratio of total liquid assets to deposits. Standard errors are robust. *lag1lnassets* multiplied by 100,000 for improved presentation. *t-statistics in parentheses: * p<0.10 ** p<0.05 *** p<0.01*

The pension framework for most companies was established years before the financial crisis. Consequently, we might be observing that these firms with older, more entrenched executives were less likely to adequately respond to the capital demands of the financial crisis than other firms.

Table III: Determinants of Tier 1 Capital: Fixed Effects Models

All Executives					
Regression Model	(1)	(2)	(3)	(4)	(5)
lag1salbonus	13.770***				
lag1equity	0.235				
lag1pension	-0.105**				
lag1salbonussassets		26.360**	17.930*		
lag1equityassets		-0.209***		-0.198**	
lag1pensionsassets		-0.121**			-0.118**
lag1lnassets	0.150	-0.038	0.214**	-0.052	0.262***
lag1leverage	0.192	0.429	0.322	0.372	0.380
lag1profitmargin	-0.015	-0.019	-0.018	-0.013	-0.014
lag1payoutratio	3.434***	3.263***	3.395***	3.412***	3.362***
lag1nonperfromingloanratio	-0.062	-0.0651	-0.070	-0.071	-0.062
lag1netinterestmargin	40.300***	43.210***	46.680***	47.240***	45.930***
lag1liquidassetsdeposits	0.051	-0.017	-0.003	-0.050	-0.028
constant	7.624**	6.701**	7.221**	7.189**	7.038**
N	4004	3978	3978	3978	3978

Notes: With Tier 1 Capital as our dependent variable, we regress five alternative models using lagged variables. For executive-specific compensation data, we use the following independent variables: lag1salbonus (the lagged sum of salary and bonus compensation), lag1equity (the lagged sum of stock and option awards), lag1pension (the lagged present value of pension compensation), lag1salbonusassets (the lagged sum of salary and bonus scaled by total firm assets), lag1equityassets (the lagged sum of stock and option awards scaled by total firm assets), lag1pensionassets (the lagged present value of pension compensation scaled by total assets), lag1lnassets (the lagged natural log of firm assets), lag1leverage (the lagged ratio of debt to equity), lag1profitmargin (the lagged net income dividend by revenues), lag1payoutratio (the lagged ratio of dividend payouts to net income), lag1nonperformingloanratio (the lagged ratio of non-performing loans to total gross loans); lag1netinterestmargin (the lagged net interest margin), and lag1liquidassetsdeposits (the lagged ratio of total liquid assets to deposits. In these models, standard errors control for firm fixed effects. *lag1lnassets* multiplied by 100,000 for improved presentation. *t-statistics in parentheses: * p<0.10 ** p<0.05 *** p<0.01*

However, we observe that while some equity compensation is held by the majority of executives, pension-based compensation is only significant in a minority of executives (see Table I). We believe that given the real risks present in the financial crisis, pension compensation was neither significant nor ubiquitous

enough to counteract other compensation effects such as equity. Running the fixed effects model in Table III, we find our prior results are confirmed.

Our results can be broadly grouped by compensation type and bank quintile with fascinating implications in the second part of our empirical tests. In Table IV, we divide our sample into rolling quintiles and again use the fixed-effects model. Here, significance among our compensation variables is significantly reduced. However, we do note that firms in quintile 5 – the safest banks – are most responsive to salary and pension effects on Tier 1 capital. The lower tiers are more responsive to both equity and pension effects.

Table IV: Determinants of Tier 1 Capital, Fixed Effects by Quintile

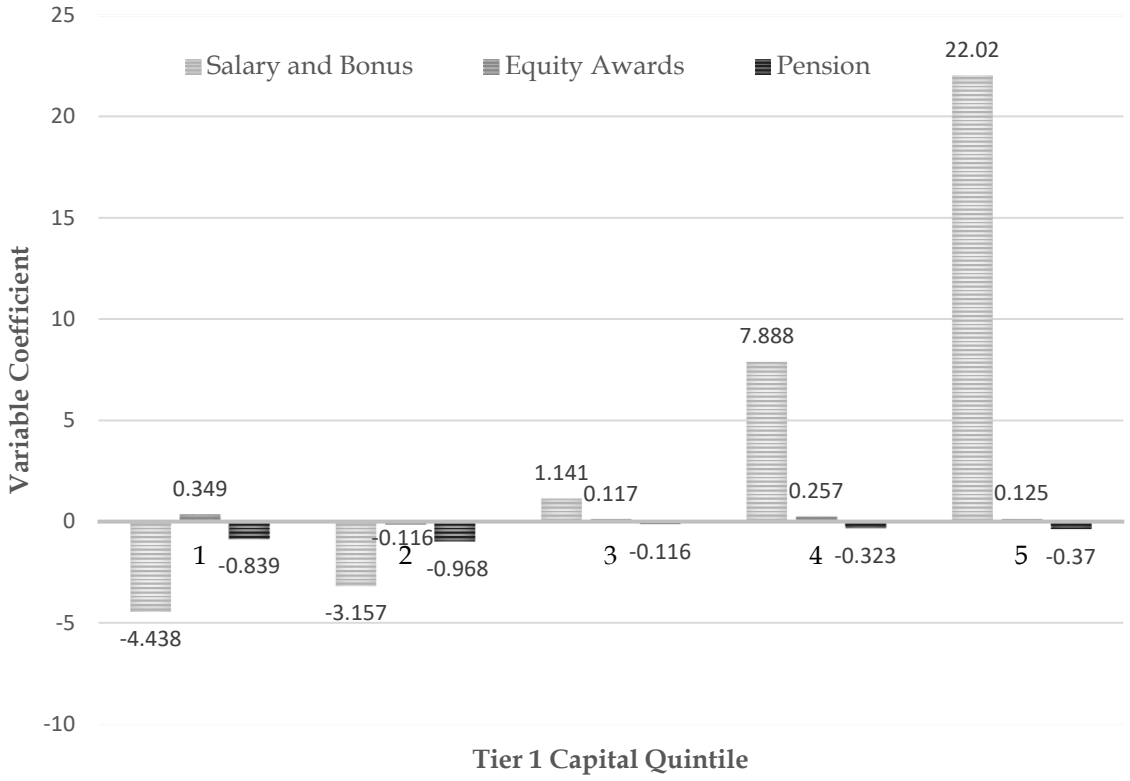
All Executives					
Quintile	1	2	3	4	5
lag1salbonus	-4.438	-3.157	1.141	7.888	22.020***
lag1equity	0.349	-0.116**	0.117	0.257	0.125
lag1pension	-0.839*	-0.968**	-0.116	-0.323	-0.370***
lag1lnassets	-0.286	0.198**	0.072	0.609	-0.524***
lag1leverage	-0.005	0.517***	0.131	-0.084	1.311
lag1profitmargin	-0.007	-0.295***	-0.584***	-0.432***	-0.054*
lag1payoutratio	1.962**	1.086**	-0.286	-0.637	4.513***
lag1nonperfromingloanratio	-0.245**	-0.216**	0.032*	0.104	0.001
lag1netinterestmargin	15.010***	33.650***	26.870**	46.420***	62.350***
lag1liquidassetsdeposits	0.688**	0.466*	-0.015	-0.846**	0.212
constant	6.028***	5.915**	14.590***	18.580***	-0.242
N	758	802	821	807	816

Notes: With Tier 1 Capital as our dependent variable, we regress five alternative models using lagged variables. For executive-specific compensation data, we use the following independent variables: lag1salbonus (the lagged sum of salary and bonus compensation), lag1equity (the lagged sum of stock and option awards), lag1pension (the lagged present value of pension compensation, lag1lnassets (the lagged natural log of firm assets), lag1leverage (the lagged ratio of debt to equity), lag1profitmargin (the lagged net income dividend by revenues), lag1payoutratio (the lagged ratio of dividend payouts to net income), lag1nonperformingloanratio (the lagged ratio of non-performing loans to total gross loans); lag1netinterestmargin (the lagged net interest margin), and lag1liquidassetsdeposits (the lagged ratio of total liquid assets to deposits. In these models, standard errors control for firm fixed effects. lag1ln(assets) multiplied by 100,000 for visibility. *t-statistics in parentheses: * p<0.10 ** p<0.05 *** p<0.01*

Scaling our compensation values by total firm assets in Table V, we see much the same – stronger firms respond positively to salary-based compensation, weaker firms respond well by reducing equity-based compensation incentives to executives. Pension-based compensation has a consistently negative relationship with each quintile with the exception of firms occupying quintile 3. In Figure 2, we show the

results of Table IV graphically: despite the low significance, a clear relationship exists in the magnitude of salary, bonus, and pension changes on overall Tier 1 capital.

Figure 2: Compensation Magnitude by Compensation Variable



Notes: Using the results from Table IV, we focus on the magnitude of the coefficients for Salary and Bonus (*lag1salbonus*), Equity Awards (*lag1equity)*, and pension compensation (*lag1pension*). Although not all these variables were significant, we can see how different quintiles related to different compensation regimes.

How can banks use executive compensation to improve Tier 1 capital ratios in times of crisis? Our results find that higher salaries and bonuses effectively increase Tier 1 capital ratios among banks *with already high Tier 1 capital ratios*. Lower equity and pension compensation resulted in safer banks across the entire sample (see Table II and Table III). However, lower equity compensation was found to be beneficial in raising Tier 1 ratios when the banks already had *low Tier 1 capital ratios*. This relationship did not hold in higher capital quintiles. Likewise, pension effects were more widely distributed, but particularly prevalent among banks with both unusually high and unusually low Tier 1 capital ratios (see Table V).

Table V: Determinants of Tier 1 Capital, Fixed Effects by Quintile (Scaled Compensation)

All Executives					
Quintile	1	2	3	4	5
lag1salbonussassets	-63.840	-42.510	-24.600	48.610	118.400**
lag1equityassets	-0.940	-0.949**	-0.385	-0.586	-0.186
lag1pensionsassets	-0.121***	-0.817**	0.159	-0.218**	-0.347***
lag1lnassets	0.478	0.106	0.116*	0.788**	-0.463***
lag1leverage	0.218	0.503***	0.180	0.312	2.205***
lag1profitmargin	-0.007	-0.260**	-0.570***	-0.437***	-0.136
lag1payoutratio	1.848*	1.068*	-0.262	-1.109**	2.927***
lag1nonperfromingloanratio	-0.345***	-0.194*	0.026*	0.113	0.139
lag1netinterestmargin	16.570***	34.490***	30.850**	42.620***	64.690***
lag1liquidassetsdeposits	0.541*	0.398*	-0.003	-0.803**	0.107
constant	5.040***	6.010**	14.180***	15.920***	-5.167
N	743	802	815	802	816

Notes: With Tier 1 Capital as our dependent variable, we regress five alternative models using lagged variables. For executive-specific compensation data, we use the following independent variables: lag1salbonusassets (the lagged sum of salary and bonus scaled by total firm assets), lag1equityassets (the lagged sum of stock and option awards scaled by total firm assets), lag1pensionassets (the lagged present value of pension compensation scaled by total assets), lag1lnassets (the lagged natural log of firm assets), lag1leverage (the lagged ratio of debt to equity), lag1profitmargin (the lagged net income dividend by revenues), lag1payoutratio (the lagged ratio of dividend payouts to net income), lag1nonperformingloanratio (the lagged ratio of non-performing loans to total gross loans); lag1netinterestmargin (the lagged net interest margin), and lag1liquidassetsdeposits (the lagged ratio of total liquid assets to deposits. In these models, standard errors control for firm fixed effects. lag1ln(assets) multiplied by 100,000 for visibility. *t-statistics in parentheses: * p<0.10 ** p<0.05 *** p<0.01*

5. Conclusion

Our results have some interesting implications for bank boards, particularly as they determine compensation for executives in preparation for the next financial crisis. By studying all executive compensation in 164 banks during the last financial crisis, we were able to learn much about executive compensation and bank behavior. High salary and bonus compensation was associated across the entire sample with greater Tier 1 capital, making these banks safer. Interestingly, we find robust proof that both pension and equity compensation had the effect of reducing Tier 1 capital ratios. High equity compensation and greater risk taking is anticipated by literature, but we were surprised to find high pension compensation associated with greater risk. Pension values are lower in banking than in many other sectors, giving equity-based compensation a clear advantage.

We further examined how compensation effects were different across banks of varying risk. Dividing the sample into quintiles, we found that higher salary

compensation only increased Tier 1 capital among banks with already high capital levels. Further, lower equity compensation increased Tier 1 capital only among the riskiest banks. Lower pension compensation improved bank risk across nearly all quintiles.

Following the bank regulatory changes after the last crisis, it's clear that board members of financial institutions have significant sway in managerial incentives *even during a crisis*. This is an important note: where previous literature has identified the strong role of increasing pensions to executives, our research has found that the reduction of equity awards is the most compelling way for incentivize executives to improve Tier 1 capital. We expect follow-up studies to examine the role of deferred compensation, legal structure, and governance framework on these models.

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