THE EFFECT OF THE FINANCIAL CRISIS ON CEO COMPENSATION IN BAD VERSUS GOOD PERFORMANCE FIRMS

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ABSTRACT

This paper investigates the relation between firm performance preceding the Financial Crisis and their CEO compensation after the Crisis. We find a significant decrease in CEO compensation for firms that had bad performance prior to the Crisis, compared to those who performed well before the Crisis. This result remains after controlling for firm size, accounting performance, and year and industry fixed effects. The decrease in compensation seems to be derived from the drop in equity-based compensation. We conclude that boards are effective and considered the performance of the firm prior to the Crisis when they considered setting the compensation following the shock of the Crisis.

Keywords: CEO compensation; Firm performance; Financial Crisis

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1. Introduction

In recent years, many scholars have paid attention to the relation between executive compensation and firm performance, and most of them find that firm performance affects executive compensation (e.g., Mehran (1995), Toshiaki, Joseph and Lee-Seok (2008), Tung and Wang (2011), Renée (2012)).

The purpose of this paper is to provide empirical evidence on the following questions: Did the Financial Crisis have a sizeable effect on CEO compensation decisions? If it did, was there a difference in compensation between firms that had bad performance before the Crisis compared with those who had good performance prior to the Crisis? We use a difference in differences method to control for the economic shock of the crises (following Lehman Brothers collapse), which should have led many companies to reconsider their compensation strategy. Hence, the premise of our analysis is that the Financial Crisis should affect all firms' CEO compensation during our analysis period; but it should probably have a stronger effect on bad performing companies. The underlying assumption of this analysis is that if governance levels are on average similar across both good and bad performing firms (prior to the crises), logic would suggest that the exogenous shock of the Crisis would lead to a more sizeable reduction in compensation for the bad performing firms if and only if, compensation is set based on performance.

We find that firms that did not performed well prior to the Crisis (based on their holding period return in the years 2006-2008) decreased their CEO compensation in the period after the Crisis, compared with good performing firms. On average, bad performing firms decreased their CEOs' total compensation by nearly $1.19 million US dollars, suggesting a 27.0% drop in the compensation. Good performing firms decreased their total compensation by $0.74 million US dollars in 2008 and 2009, suggesting a 14% drop in the compensation. Based on our regression results, the difference between good and bad performing firms is significant at the 10% level.

We also find that the reduction of CEOs' total compensation comes mostly from the drop in equity-based compensation in firms that performed bad before the Crisis. Firm performance before the Crisis has little effect on the salary and the bonus compensation after the Crisis.

The rest of the paper is as follows. Section 2 describes various views of existing empirical literature. Section 3 outlines the data, variables, t-test and hypothesis. Section 4 presents and explains the empirical results. Section 5 is the conclusions about the key findings.

2. Literature review

Many prior papers have attempted to examine the relation between executive compensation and firm performance, with various findings. The findings can be partitioned into three categories: (1) executive compensation is positively associated with firm performance; (2) executive compensation is negatively associated with firm performance; (3) there is no relation between executive compensation and firm performance.

A number of researchers got to the conclusion that there is a positive relation between pay and performance. For example, Coughlan and Schmidt (1985) use the abnormal stock return as the measure of firm stock price performance and find a significant positive relation between stock performance and salary plus bonus. Instead of using stock price performance, Takao and Katsuyuki (2006) focus on ROA (a standard accounting measure of firm profitability) and find a positive and significant relation between CEO compensation and ROA, which supports their hypothesis that Japanese CEO's cash compensation (salary and bonus) is sensitive to firm performance. Toshiaki, Joseph and Lee-Seok (2008) extend the former researches by using several short-term and long-term firm performance measures. They provide evidence that changes in CEO compensation are significantly positively related to firm performance both in Japan and US, but they don't find relation between changes in CEO compensation and the sales growth. In contrast, Takao and Chery (2006) find that sales growth is significantly related to executive compensation in China. Based on the positive relationship, Jensen and Murphy (1990) argue that it's the structure rather than the level of manager's compensation that links pay to firm performance. In particular, it may be that equity-based compensation such as incentive stock option is important for quantifying this relation. Other studies also indicate that firm value is actually motivated by the form of compensation that managers hold. Firm performance is positively related to the percentage of manger's compensation that is equity-based. Mehran (1995) finds that both ROA and Tobin's Q are positively related to equity-based compensation and to the percentage of equity held by managers.

In contrast of finding of a positive relation between firm performance and executive compensation, there have been some papers that show the opposite results. Core, Holthausen and Larcker (1999) find that a 40% increase in excess compensation is related to a decline in annual returns from stock per year of -4.97%, -2.82%, and -1.78% for 1 year, 3 year and 5 year stock return. Excess compensation is significantly related to subsequent firm performance in stock and operating return. Brick, Palmon and Wald (2006) get similar results by using excess holding period returns as the firm performance measure. They find the greater compensation received by director and CEO is associated with greater agency problems, which may lead to underperformance.

Other researches find either a low or no relation between CEO compensation and firm performance. Top managers are not motivated by compensation plan to increase firm value and shareholder wealth as many investigators indicate. Marris (1963) and Baumol (1967) argue that it is the firm size or growth rate rather than the performance that managers are concerned about. Managers' compensation may tied pay to firm size and they may get higher prestige from managing a larger firm. Loomis (1982) finds that there is no relation between top manager's compensation and firm profitability or stock return performance. Firth, Fung and Rui (2006) examine the CEO compensation in China's listed firms. They use return on sales and annual stock return to measure firm performance, both measures are positively related to CEO compensation but neither is significant. They also find a positive and significant relation between firm size and CEO compensation. Brian (1994) finds that neither firm scale nor profitability is significantly related to CEO compensation.

More related to our question of research is looking at how compensation was affected by the financial crises. Gilson (1989) uses a sample of financially distressed firms that suffered huge decreases in stock price during the year 1979 to 1984, and finds that declines in senior managers' pay due to financial distress are associated with management turnover. During the research period, 52% of sampled firms changed their senior management, while the management turnover rate is only 19% when firms are not distressed. Stuart and Michael (1993) investigate senior managers' compensation in firms that experienced bankruptcy or private debt renegotiation during 1981-1987. Nearly one third of CEOs replaced and the new CEOs are paid 35% less than the CEOs they replace, while remaining CEOs experience large reduction in cash compensation. Overall, there is a significant relation between CEO compensation and shareholder wealth after debt renegotiation in firms. Abdullah (2006) uses a sample of 86 distressed firms and 86 non-distressed firms for the year 2001 in Malaysia

(negative EPS for distressed firms during analysis period) to study directors' pay in financially distressed firms. Abdullah finds that distressed firms pay directors less compared with non-distressed firms due to a significant and negative relation between directors' compensation and distressed situations. He also provides evidence that directors' pay is positively related to firm size and growth rate. Renée (2012) argues that reduction in CEO compensation is seen as a sign of better governance. Tung and Wang (2011) focus on the bank industry during the global Financial Crisis and the association between CEOs' inside debt compensation and bank performance. They find CEOs' inside debt holding before the Crisis are positively related to bank performance and negatively related to risk taking during the Crisis. On average, preceding the Crisis, banks that performed better in the Crisis preferred less risk and pay more the CEO more in salary and bonus, and less in equity-based compensation. In contrast, Kirkpatrick (2009) provides evidence that CEO compensation has not closely followed firm performance. He finds S&P 500 companies' median CEO compensation was approximately USD 8.4 million in 2007 and was unaffected by the weak economy that followed.

3. Source of data and methodology

3.1 Data source and time

We collected our data for annual CEO compensation in the Execucomp database on the COMPUSTAT Quarterly Updates File. We selected data items for the years 2006 to 2012: (1) ticker, (2) company ID number (GVKEY), (3) industry group (SIC code), (4) bonus, (5) options granted (Black-Scholes value), (6) restricted stock grant, (7) salary, (8) TDC1 -- total compensation. Our data for firm financial information comes from COMPUSTAT North America Annual Fundamentals File for the same periods: (9) total assets, (10) stockholders' equity -- total, (11) discontinued operations, (12) income before extraordinary items, (13) sales (net). Our data for firm performance is in the CRSP database on the Stock / Security monthly Files for the years 2006 to 2008 before the Financial Crisis: (14) holding period return. Our final sample consists of 174 good firms and 117 bad firms; the remaining 836 firms for which we collect from Execucomp database are neither of the two groups.

CEO Compensation: We use sampled firms' CEO compensation as our dependent variable in a regression model. CEO compensation is the variable TDC1 in Execucomp database. It is the total compensation that comprises salary, bonus, restricted stock granted, stock options granted (using Black-Scholes), and other pay. We also analyze separately equity-based

compensation and none equity-based compensation. Equity-base compensation is defined as the total value of restricted stock (Execucomp variable RSTKGRNT) and stock option (Execucomp variable OPTION_AWARDS_BLK_VALUE). We find the data for equity-based compensation is incomplete in the Execucomp database. So instead of using restricted stock plus stock options to get equity-based compensation, we first get none equity-based compensation, which is salary plus bonus, then calculate equity-based compensation as total compensation minus none equity-based compensation. All of the three compensations are transformed to their natural log in our multi-regression model.

Control Variables: In our quantitative analysis, we use several control variables. Two measures are used to control firm performance, return on assets (ROA) and return on equity (ROE). To remove trends in volatility and make sure data are positive, ROA is the natural log of one plus income before extraordinary items deducted by discontinued operations divided by book value of total assets. ROE is defined similarly to ROA; with the exception that book value of total assets is replaced with shareholders' total equity. Other variable used are firm size, as measured by net sales, which is defined as gross sales minus cash discounts, trade discounts, and allowances and returned sales for which credit is given to customers in COMPUSTAT. Finally, we control for unobserved firm and industry level changes that are associated with CEO compensation in different firms, industries and years by interacting firm and industry dummy with year dummy. The industry classification is based on two-digit SIC code.

3.2 Measurement of variables

Firm performance Independence: We use HPR (holding period return) as our firm performance measure. HPR is defined as a return (including dividends) for the month. We use monthly HPR to compute the annual HPR by calculating the buy and hold return over a calendar year. We then compute the industry HPR as the median (equal weighted) of annual return sampled firms of the same two-digit SIC industry group. The firm adjusted return is the firm annual HPR minus the HPR in the industry. Our analysis for HPR spans the years 2006 to 2008. If a firm's HPR is larger than its industry HPR during each of the years between 2006 and 2008, the firm is defined as having good performance prior to the Financial Crisis. If the firm's HPR is less than its industry HPR during each of the years 2006 to 2008, it is considered a firm that has bad performance prior to the Crisis. We exclude from the analysis firms whose HPR is larger than the industry HPR in at least one year (i.e., in either 2006, 2007, or 2008) and whose

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HPR is smaller than the industry HPR in at least one year. Finally, we define a dummy variable that equals one if firm have a bad performance and zero if the firm has a good performance during the years 2006 to 2008.

Table I, Panel A, shows the trend in compensation for good and bad performing firms between 2006 and 2012, the HPR performance of good and bad firms is partitioned based on two-digit SIC code. We put the raw data of two graphs in Appendix 1.

The first graph shows that both good performing firms and bad performing firms decreased their CEOs' total compensation after the Crisis (for the years 2008 to 2009). The bad performing firms decreased from $6.278 million to $3.825 million between 2007 and 2009, dropped almost $2.5 million. The good performing firms decreased from $7.333 million in 2008 to $6.235 million in 2009, dropped about $1.1 million, which is much less than the firm that performed badly. Moreover, the total compensation in good performing firms is higher than that of the bad performing firms in all years from 2006 to 2012. The equity portion of compensation in two groups show a similar pattern, suggesting that the level and trend in total compensation are determined to a large extend by the equity-based compensation.

The second graph shows that the salary for good performing firms increased steadily from 2006 to 2012, while salary for bad performing firms increased in 2010 then decreased in 2011and 2012. Bonus for good performing firms decreased before 2010 and then steadily increased, while Bonus for bad performing firms has big fluctuation before and after the Crisis.

The results perhaps indicate the relation between compensation incentive and firm performance; bad performing firms get less compensation compared with good performing firms. The drop in the compensation after the Crisis seems to be related with resetting of incentive compensation by the firms' boards, which appear to be effective.

To ensure that the total compensation is set based on performance, we use t-test to check whether the difference of average total compensation is significant between good and bad performing firms after the Crisis. Table I, panel B shows that the difference of average total compensation between good and bad performing firms is statistically significant at the 1% level for the years 2008 to 2009 while insignificant in other years. In 2008, CEO compensation in good performing firms shows a slight increase compared with the total compensation in 2007. While CEO compensation in bad performing firms revealed a huge drop from $6.278 million to $4.538 million in the corresponding period. It drags the difference of compensation from $0.901

Table I

Summary Statistics

The table shows compensation and financial characteristics of North America public firms between 2006 and 2012. The data of 1127 sampled firms that have executive compensation information and financial information comes from the COMPUSTAT, the Execucomp and the CRSP databases. In Panel A, a good performing firm is defined as a firm whose HPR (holding period return) is larger than its industry HPR during for each of the years between 2006 and 2008, and a bad performing firm is defined as a firm whose HPR is less than its industry HPR during each of the years 2006 to 2008. HPR is defined as a return (including dividends) for the change in an investment's total value in a common stock over monthly period of time per dollar of initial investment in CRSP database. The firm annual HPR is the buy and hold return over a calendar year. The industry HPR is the median (equal weighted) of annual return sampled firms of the same two-digit SIC industry group. In Panel B, t-value is compared to 1.96 at level 5% significant level. N is the number of observations, and df is the degree of freedom. In Panels C and D, numbers without parentheses are averages, and numbers within parentheses are medians. In Panel A, B and C, total compensation is the variable TDC1 in Execucomp that comprises salary, bonus, total value of restricted stock granted, total value of stock options granted (using Black-Scholes), and other pay. None equity-based compensation consists of salary and bonus. The equity-based compensation is total compensation (TDC1) minus none equity-based compensation. In Panel D, sales is defined as gross sales minus cash discounts, trade discounts, and allowances and returned sales for which credit is given to customers in COMPUSTAT. ROA is the natural log of one plus income before extraordinary items deducted by discontinued operations divided by book value of total assets, and ROE is the natural log of one plus income before extraordinary items deducted by discontinued operations divided by shareholders' total equity.

Panel A: CEO Average Compensation of Good/Bad Firm ($thousands)

(continued)

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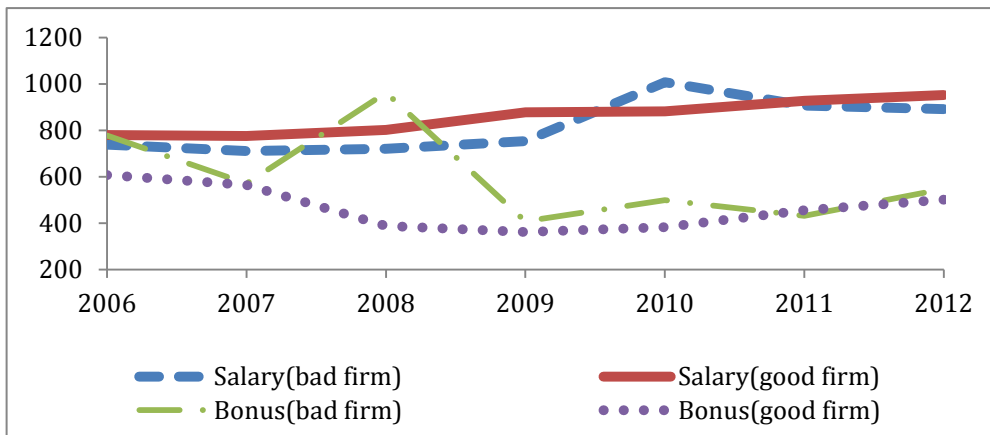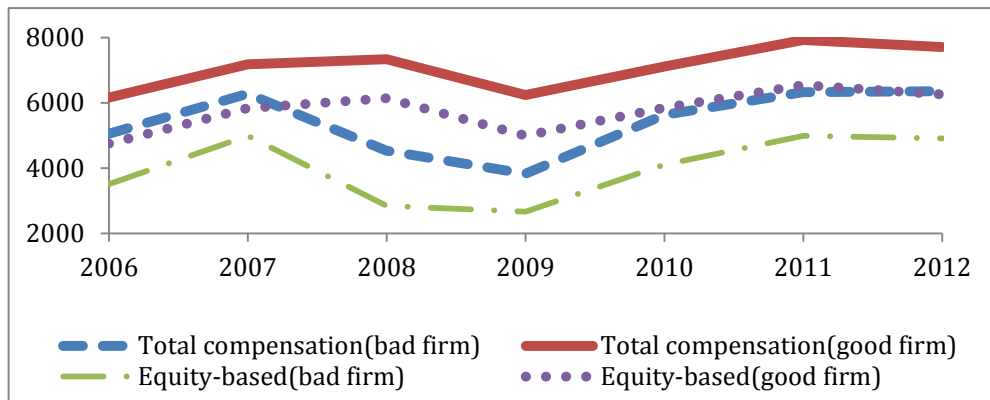
Table I-*Continued*

Panel B: Total compensation t-test results							
		Mean	Std. Dev.	Std. Err.	*N*	t-value	df
2006	Good	6159.47	6070.33	568.54	114	1.29	211
	Bad	5055.20	7914.10	639.78	99		
	Diff	1104.27		853.02			
2007	Good	7179.14	8540.35	692.71	152	0.80	268
	Bad	6278.11	9848.45	906.62	118		
	Diff	901.03		1120.74			
2008	Good	7332.82	10700.09	867.89	152	2.13	271
	Bad	4537.55	10869.08	988.10	121		
	Diff	2795.26		1312.79			
2009	Good	6235.06	7888.41	623.63	160	2.86	270
	Bad	3825.16	4961.34	468.80	112		
	Diff	2409.90		842.50			
2010	Good	7112.76	8413.65	647.20	169	1.55	275
	Bad	5628.38	6630.06	637.98	108		
	Diff	1484.38		957.02			
2011	Good	7923.76	6761.75	736.51	177	1.51	295
	Bad	6326.54	6775.07	689.59	120		
	Diff	1597.22		1059.65			
2012	Good	7711.30	10700.09	512.61	174	1.68	289
	Bad	6354.05	10869.08	626.36	117		
	Diff	1357.25		809.06			

Panel C: CEO Compensation ($thousands)					
Year	Total Compensation	Salary	Bonus	Equity	Non-equity
2006	5188.57	671.30	560.00	4572.92	615.65
	(3144.00)	(603.08)	(0)	(758.14)	(2099.28)
2007	5418.25	733.10	406.57	4848.42	569.84
	(2944.94)	(639.22)	(0)	(715.79)	(2028.66)
2008	5014.14	733.10	298.02	4498.58	515.56
	(2684.57)	(697.85)	(0)	(758.14)	(1885.79)
2009	4487.64	771.68	225.86	3988.87	498.77
	(2937.37)	(700.33)	(0)	(785.00)	(2036.56)
2010	5889.33	832.53	274.33	5335.90	553.43
	(3756.50)	(750.00)	(0)	(825.03)	(2833.61)
2011	6166.03	869.88	247.80	5607.19	558.84
	(4299.21)	(823.46)	(0)	(872.99)	(3367.94)
2012	6566.51	896.45	285.60	5975.49	591.02
	(4763.20)	(857.90)	(0)	(927.50)	(3812.16)

Table I-*Continued*

				Panel D: Financial Characteristics			
Year	2006	2007	2008	2009	2010	2011	2012
Sales	9173.77	9120.64	9691.51	8976.82	9220.55	10348.44	9949.99
	(2205.32)	(2157.23)	(2229.90)	(2054.31)	(2217.83)	(2505.00)	(2525.83)
ROE (%)	5.2	4.3	1.5	3.1	4.5	4.5	4.3
	(4.0)	(3.6)	(2.4)	(2.3)	(3.3)	(3.3)	(3.1)
ROA (%)	12.5	11.7	9.10	8.40	9.60	10.1	9.9
	(13.0)	(11.5)	(4.2)	(6.8)	(10.8)	(11.0)	(11.6)

Sales ($thousands)

million to $2.795 million. The t-test results suggest that bad performing firms drop their CEO compensation more than good performing firms after the Crisis. For the post crisis period from 2010 to 2012, CEO compensation in good and bad performing firms recovers slowly from the shock of the Crisis. The differences between two groups shrink from $2.410 million to $1.357 million.

In summary, by comparing the average CEO compensation in two groups, we find that the Crisis had an impact on CEO compensation, and firms that had bad performance prior to the Crisis had a significant drop in their compensation after the Crisis, compared to good performing firms. Moreover, the differences between the two groups narrowed. We believe the possible reasons are that the influence of the Financial Crisis has become less as time passed by; the criteria we use to distinguish good and bad performing firms is their HPR from 2006 to 2008, and this prior crisis measure may not still hold after the Crisis.

Results in Panel C of Table I present descriptive statistics of sampled firms' CEO compensation. Average total compensation increased from $5.189 million to $5.418 million between 2006 and 2007, then decreased to $4.488 million in 2009, and again increased to $6.567 million in 2012, most of which is explained by the similar trend in equity compensation, which took nearly 90% of the total compensation. Interestingly, the median compensation decreased from $3.144 million to $2.945 million from 2006 to 2007. The opposite trend between average and median compensation suggests that the increase in compensation is due to the increase in the amount paid to the highly compensated CEOs before the Crisis. The average salary increased steadily from $0.671 million in 2006 to $0.896 million in 2012, but the bonus declined from $0.56 million to $0.286 million between 2006 and 2012 and median bonus was zero during the whole period because more than a half of the firms didn't pay bonus to their

CEO. The average none equity-based compensation did not change much from the year 2006 to 2012, mainly because of the offset of changes in salary and bonus.

Results in Panel D of Table I are descriptive statistics of sampled firms' financial variables. Average sales increased from $9.174 million in 2006 to $9.950 million in 2012. Median sales are much lower ($2.27 million on average). This result suggests that some very large firms skew our sample. ROE decreased between 2006 and 2008, and then increased from 2009 to 2011. ROA shows a similar trend. Both of them are consist with the economic trend between the year 2006 and 2011.

3.3 Methodology

Based on most prior studies, one expects to find a relation between compensation incentives and firm performance. We hypothesize that if the Global Financial Crisis affects CEO compensation, then firms that did not performed well before the Crisis should pay to their CEOs less than firms that did well preceding the Crisis. Our measure of firm performance prior to the Crisis is whether the firm's annual HPR (holding period return) was above the corresponding industry's average annual HPR consecutively from the year 2006 to 2008 before the Financial Crisis. A multi-regression analysis of 291 firms during 2006 to 2012 is set up to test our hypothesis. That is,

Ln(Total compensation)= α + β1*Dummy(good/bad firm performance before '09)i
dummy ('09-'12)t + β2 ROA*dummy('06-'08)t + β3* ROA *dummy('09-'12)t
+ β4* ROE *dummy('06-'08)t + β5* ROE *dummy('09-'12)t
+ β6* Sales*dummy('06-'08)t + β7* Sales*dummy('09-'12)t
+ Industry_Effects + Year_Effects + Firm_Effects + εit.
ε: error term; i: state of firm; t: time.

Table II

Variable definitions and descriptions

Variable name	Variable description and comments
Total compensation	*The sum of salary, bonus, total value of restricted stock granted, total value of stock options granted (using Black-Scholes), and other compensation.*
ROA	*The natural log of one plus income before extraordinary items deducted by discontinued operations divided by book value of total assets.*

(continued)

Table II-*Continued*

ROE	*The natural log of one plus income before extraordinary items deducted by discontinued operations divided by shareholders' total equity.*
Firm_Effects	*A firm dummy variable that is used to control for unobserved firm heterogeneities that are correlated with compensation.*
Industry_Effects	*An industry dummy variable that is used to control for unobserved industry heterogeneities that are correlated with compensation.*
Year_Effects	*A year dummy variable that is used to control for unobserved year heterogeneities that are correlated with compensation.*
Dummy (good/bad firm performance before '09)	*A dummy variable that equals 1 if firm had a good performance before 2009 and 0 otherwise.*
Dummy('06-'08)	*A dummy variable that equals 1 if observation is in the period 2006 to 2008 and 0 otherwise.*
Dummy('09-'12)	*A dummy variable that equals 1 if observation is in the period 2009 to 2012 and 0 otherwise.*

This regression model follows the method carried out by Chhaochharia and Grinstein (2009) and is commonly used for analyzing the difference in differences approach. We have two groups – good performing firms and bad performing firms, and we expect to find that bad performing firms reacted more vigorously to the shock by reducing the compensation to a larger degree compared to good performing firms. This should be the case, if there are not substantial differences between good and bad firms in terms of performance (captured by the control variables), and governance (which we do not control for).

$\beta 1$ in the above model catches the CEO compensation changes of firms that had bad performance prior to Crisis in the post-crisis period (year 2009 to 2012) compared with firms that performed well before the Crisis. In order to make sure that the changes in compensation for all firms are mainly caused by the exogenous shock of the Financial Crisis, two performance control variables and one size control variable are included in the model and summarized in table II. All of the controls are multiplied by dummy variables for whether the year belongs to the period preceding the Crisis or after the Crisis. We also include industry fixed effects, year fixed effects and firm fixed effects to control for unobserved industry, year and firm heterogeneities that are correlated with compensation.

4. Results

4.1. Total Compensation and Firm performance

Table III shows the results of regressions for the sample of 291 firms between 2006 and 2012 (a total of 2037 firm-years), after adding the control variables, the sample is reduced to 1438 observations. In the first column we show the results that include no fixed effects in the regression, in the second column we show the results that include only year fixed effect, and in the last column we show the results that include both year and industry fixed effects in our regression. We put the regression results with raw data in Appendix 2.

All the columns show that the coefficients on the interaction dummy of firms that had a bad performance before the Crisis are negative and significant at the 10% level, with magnitudes of −0.357, -0.374 and -0.255, respectively. The magnitudes of the coefficient separately suggest a 37.8% drop, a 39.6% drop and a 27.0% drop in the total compensation of firms that did not perform well before the Crisis, compared to good performing firms.

We find that the sensitivity of total compensation to the interaction dummy of firms that performed bad before the Crisis increased when we considered year fixed effect in the regression, but then decreased when we added industry fixed effect. It suggests that the difference of compensation between good and bad performing firms may have little relation with unobservable year specific characteristics, but could be partially caused by some specific industry events that cannot be observed.

We also find that firm size has a positive and very significant effect (at the 1% level) on compensation, this coincide with what most of the prior empirical paper proved. In our regression, ROA has less effect on compensation during the whole analysis period. However, the sensitivity of compensation to ROA becomes significant when we include year and industry fixed effects in our regression, and the magnitudes of the coefficient also become larger compared with column 1 and 2.

4.2. The Components of Compensation and firm performance

The results showed in the previous part suggest that firms that had bad performance prior to the Crisis decreased their CEO compensation after the Crisis, compared to those who performed well before the Crisis. We now explore which parts of the compensation are responsible for the drop.

Table III

Total Compensation and Firm Performance

The table shows the results of three panel regressions, where the dependent variable is the natural log of total CEO compensation (variable TDC1 in Execucomp). The sample consists of 291 firms that exist in Execucomp between 2006 and 2012. ROA is the natural log of one plus income before extraordinary items deducted by discontinued operations divided by book value of total assets. ROE is the natural log of one plus income before extraordinary items deducted by discontinued operations divided by shareholders' total equity. Sales is defined as gross sales minus cash discounts, trade discounts, and allowances and returned sales for which credit is given to customers in COMPUSTAT. Dummy (good/bad firm performance before '08) is dummy variable that equals one if the firm had a good performance before the Financial Crisis and zero otherwise. A good performing firm is defined as a firm whose HPR (holding period return) is larger than its industry HPR during for each of the years between 2006 and 2008, and a bad performing firm is defined as a firm whose HPR is less than its industry HPR during each of the years 2006 to 2008. HPR is defined as a return (including dividends) for the change in an investment's total value in a common stock over monthly period of time per dollar of initial investment in CRSP database. The firm annual HPR is the buy and hold return over a calendar year. The industry HPR is the median (equal weighted) of annual return sampled firms of the same two-digit SIC industry group. Dummy ('06–'08) is a dummy variable that equals one if the observation is in the period 2006 to 2008 and zero otherwise. Dummy ('09–'12) is a dummy variable that equals one if the observation is in the period 2009 to 2012 and zero otherwise. Industry and year fixed effects are dummy variables that are used to control for unobserved industry and year heterogeneities that are correlated with compensation. The numbers in parentheses are robust standard errors. + indicates we include that fixed effect in the regression. N is the number of observations. *, **, and***indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable	(1)	(2)	(3)
Ln (Total Compensation)			
Dummy(Good/Bad firm performance before'09 *dummy('09-'12)	-0.357* (0.194)	-0.374* (0.198)	-0.255* (0.135)
ROA*dummy('06-'08)	0.051 (0.130)	0.024 (0.131)	0.077 (0.119)
ROA*dummy('09-'12)	0.060 (0.089)	0.035 (0.090)	0.102 (0.086)
ROE*dummy('06-'08)	0.755 (0.781)	0.871 (0.811)	1.062* (0.626)
ROE*dummy('09-'12)	0.985* (0.579)	0.781 (0.583)	1.029* (0.604)
Size*dummy('06-'08)	0.418*** (0.039)	0.440*** (0.039)	0.467*** (0.034)
Size*dummy('09-'12)	0.452*** (0.037)	0.437*** (0.040)	0.463*** (0.040)
Intercept	4.802 (0.286)	4.932 (0.316)	5.810 (0.367)
Adjusted R-squared	27.7%	28.2%	41.5%
Year Fixed Effect		+	+
Industry Fixed Effect			+
N	1438	1438	1438

Table IV

Equity and Non-equity Compensation and Firm Performance

The table shows the results of six panel regressions with two dependent variables. The dependent variables are: the natural log of equity-based compensation and the natural log of none equity-based compensation. None equity-based compensation consists of salary (Execucomp variable SALARY) and bonus (Execucomp variable BONUS). The equity-based compensation is total compensation (Execucomp variable TDC1) minus none equity-based compensation. The sample consists of 289 firms that exist in Execucomp between 2006 and 2012. The definition of variables appears in Table III. The numbers in parentheses are robust standard errors. + indicates we include that fixed effect in the regression. N is the number of observations. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable	LnEquity	LnNon	LnEquity	LnNon	LnEquity	LnNon
	(1)		(2)		(3)	
Dummy(Good/Bad firm	-0.194	-0.055	-0.233*	-0.071	-0.166	0.176
performance before'09	(0.125)	(0.213)	(0.125)	(0.21)	(0.142)	(0.191)
*dummy('09-'12)						
ROA*dummy('06-'08)	0.194	0.168	0.162	0.110	0.161	0.054
	(0.226)	(0.166)	(0.225)	(0.157)	(0.203)	(0.169)
ROA*dummy('09-'12)	0.016	0.303	-0.013	0.312	0.045	0.352
	(0.115)	(0.221)	(0.116)	(0.234)	(0.119)	(0.243)
ROE*dummy('06-'08)	-1.279	-0.318	-0.901	-0.120	-0.611	0.566
	(1.828)	(0.812)	(1.687)	(0.821)	(1.472)	(0.803)
ROE*dummy('09-'12)	-0.084	0.664	-0.495	0.550	-0.662	1.198
	(0.927)	(0.852)	(0.953)	(0.854)	(1.001)	(0.865)
Size*dummy('06-'08)	0.584***	0.139***	0.644***	0.183***	0.675***	0.162***
	(0.043)	(0.048)	(0.064)	(0.043)	(0.065)	(0.042)
Size*dummy('09-'12)	0.627***	0.135**	0.588***	0.107	0.627***	0.077
	(0.041)	(0.055)	(0.036)	(0.069)	(0.039)	(0.084)
Intercept	3.029***	5.650	3.412***	5.316	4.399***	5.923
	(0.354)	(0.330)	(0.332)	(0.242)	(0.362)	(0.546)
Adjusted R-squared	29.8%	3.45%	30.8%	3.7%	42.9%	17.54%
Year Fixed Effect			+	+	+	+
Industry Fixed Effect					+	+
N	1410	1429	1410	1429	1410	1429

Table V

Total Compensation and Equity and Firm Performance include firm fixed effect

The table shows the results of four panel regressions with four dependent variables. The dependent variables are: total compensation and the natural log of total compensation, equity-based compensation and the natural log of equity-based compensation. The sample consists of 291 firms that exist in Execucomp between 2006 and 2012. The definition of variables appears in Table III. The numbers in parentheses are robust standard errors. + indicates we include that fixed effect in the regression. N is the number of observations. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variables	Total Compensation	Lntotal Compensation	Equity	Lnequity
Dummy(Good/Bad firm performance before'09 *dummy('09-'12)	-248.70 (587)	0.037 (0.081)	-80.927 (481.126)	0.071 (0.146)
ROA*dummy('06-'08)	511 (1131)	-0.057 (0.156)	-388.913 (926.400)	0.078 (0.279)
ROA*dummy('09-'12)	-0.667 (819)	-0.023 (0.113)	-250.582 -671.058	-0.075 (0.201)
ROE*dummy('06-'08)	5226 (4705)	0.478 (0.647)	8028** (3854)	0.354 (1.162)
ROE*dummy('09-'12)	8243* (4541)	0.522 (0.625)	7641** (3721)	1.030 (1.119)
Size*dummy('06-'08)	1577** (633)	0.346*** (0.087)	1224** (518.346)	0.288* (0.157)
Size*dummy('09-'12)	1707*** (640)	0.332*** (0.088)	1444*** (524.241)	0.239 (0.158)
Intercept	-6173 (5079)	5.773*** (0.699)	-5585 (4161)	6.252*** (1.258)
Adjusted R-squared	4.9%	8.4%	6.3%	7.8%
Year Fixed Effect	+	+	+	+
Firm Fixed Effect	+	+	+	+
N	1438	1438	1438	1410
Number of Groups	291	291	291	291

To test which components may have effects on total compensation, we do the analysis in the previous part again, but this time we replace the total compensation with the equity-based portion and none equity-based portion of compensation as our dependent variables.

Table IV shows the results of six panel regressions. In columns 1 and 2, the dependent variables are the natural log of the equity-based compensation and the natural log of none equity-based compensation on the situation of no fixed effects included. In column 3 and 4, we include only year fixed effect for two dependent variables. In column 5 and 6, both year and industry fixed effects are considered for two dependent variables. We put the regression results with raw data in appendix 3.

The coefficient on the equity-based portion is negative, but it is statistically significant from zero and of larger magnitude only when we include only year fixed effect. The magnitude of the coefficient suggests that the reduction of equity-based compensation is about 22.4%.

The coefficients on none equity-base portion are not statistically significant from zero in all panels. Interesting, the coefficient changes from negative to positive after we include year and industry fixed effects in the regression, suggesting that the bad performing firms increased their none equity-based compensation about 16.4% after the Crisis, compared to good performing firms. This result may be caused by unobservable specific industry characteristics that exist during our analysis period.

Table V shows the results of the regression that include year and firm fixed effects. We find that all the coefficients on the interaction dummy of firms that had a bad performance before the Crisis are not significant. This result may suggest that the reduction in equity compensation may be associated with unobservable firm characteristics and not with the crises per se. However, it is important to note that using firm fixed-effect reduces the power of the tests and it is not common to control for firm fixed-effect in such short panels. Chhaochharia and Grinstein (2009) run their regression with firm fixed effects to capture the tenure effect for most sampled firms.

The insignificant coefficient $\beta 1$ could be also because of the difference between good and bad performing firms diminished during the Crisis. That is, the difference in differences approach is contaminated because the untreated sample (the good performing firms) actually was exposed to the Crisis. This works against us finding a significant coefficient in the regression.

Overall, the results suggest that firms performed badly before the Crisis decreased both the equity-based portion and non-equity-based portion of compensation after the Crisis. The reduction in compensation seems to be derived from the drop in equity-based compensation.

5. Conclusion

This paper studies the relation between firm performance prior to the Financial Crisis and their CEO compensation after the Crisis. Firstly, we compare the compensation characteristics between good and bad performing firms and do a simple t-test for them. We find that the Global Financial Crisis had an effect on CEO compensation, and firms that performed badly before the Crisis had a significant decrease in their compensation after the Crisis compared with good performing firms. Then we set up a multi-regression model to test our hypothesis.

By using the difference in differences method to control for the economic shock of the Financial Crisis and including year and industry fixed effects in our regression, we find a large decrease in CEO compensation for firms that had bad performance before the Crisis, compared to those who performed well prior to the Crisis. The reduction of the CEO compensation was 1.19 million US dollars for bad performing firms, suggesting a drop of 27.0% after the Crisis. We also find that the reduction in compensation seems to be derived from the drop in equity portion of the compensation.

Together, our findings suggest that firms' boards are effective and considered the firm performance prior to the Crisis when they decided the compensation plan following the economic shock of the Crisis.

Appendix 1: Summary of CEO compensation of good/bad firms

CEO Compensation of Good/Bad Company						
Bad Company						
Year	2006	2007	2008	2009	2010	2011	2012
Total Compensation	5055.20 (2908.58)	6278.11 (2522.08)	4537.55 (2409.65)	3825.16 (2460.10)	5628.38 (3292.86)	6326.54 (4516.79)	6354.05 (4334.77)
Salary	738.86 (600)	711.32 (629.09)	719.94 (700)	754.12 (703.35)	1006.82 (760.63)	906.77 (823.27)	890.79 (868.23)
Bonus	778.34 (0)	570.47 (0)	962.92 (0)	407.58 (0)	499.29 (0)	431.06 (0)	548.05 (0)
Equity	3510.82 (674.60)	4989.08 (673.08)	2841.28 (712.69)	2663.45 (718.02)	4108.46 (809.01)	4988.71 (874.81)	4915.21 (900.00)

Good Company						
Year	2006	2007	2008	2009	2010	2011	2012
Total Compensation	6159.47 (3995.41)	7179.14 (4003.34)	7332.82 (3929.12)	6235.06 (3693.43)	7112.76 (4116.16)	7923.76 (5077.07)	7711.30 (5848.19)
Salary	779.35 (687.50)	774.92 (655.00)	802.38 (682.50)	877.16 (696.00)	881.16 (728.00)	927.49 (825.00)	952.45 (850.00)
Bonus	608.04 (0)	564.96 (0)	387.77 (0)	362.39 (0)	382.59 (0)	455.68 (0)	500.75 (0)
Equity	4751.33 (3227.13)	5839.26 (3177.69)	6138.43 (2945.98)	4991.33 (2861.01)	5849.01 (2955.49)	6540.59 (4010.62)	6258.10 (4277.45)

Appendix 2: Regression results with raw data

Dependent Variable **Total Compensation**	(1)	(2)	(3)
Dummy(Good/Bad firm performance before'09 *dummy('09-'12)	-1645.719**	-1685.29**	-1191.629
	(805.652)	(799.967)	(1067.776)
ROA*dummy('06-'08)	623.387	715.084	703.9795*
	(1327.196)	(1366.286)	(1496.954)
ROA*dummy('09-'12)	1069.264**	968.569*	976.6701*
	(512.854)	(504.945)	(557.291)
ROE*dummy('06-'08)	4530.788	4835.659	8463.703
	(5821.103)	(5934.353)	(5949.997)
ROE*dummy('09-'12)	4793.533	4129.006	7574.095**
	(3341.975)	(3541.159)	(3212.221)
Size*dummy('06-'08)	2676.958***	2685.629***	2914.937***
	(294.0189)	(353.6122)	(387.105)
Size*dummy('09-'12)	2779.186***	2767.194***	3010.86***
	(294.019)	(297.860)	-409.180
Intercept	-14559.450	-14398.350	-10585.26
Adjusted R-squared	27.99%	29.47%	28.31%
Year Fixed Effect		+	+
Industry Fixed Effect			+
N	1438	1438	1438

Appendix 3: Comparison of regression results of equity& nonequity

Dependent Variable	Equity	Non-equity	Equity	Non-equity	Equity	Non-equity
		(1)		(2)		(3)
Dummy(Good/Bad firm performance before'09 *dummy('09-'12)	-0.194 (0.125)	-0.055 (0.213)	-0.233* (0.125)	-0.071 (0.21)	-0.166 (0.142)	0.176 (0.191)
ROA*dummy('06-'08)	0.194 (0.226)	0.168 (0.166)	0.162 (0.225)	0.110 (0.157)	0.161 (0.203)	0.054 (0.169)
ROA*dummy('09-'12)	0.016 (0.115)	0.303 (0.221)	-0.013 (0.116)	0.312 (0.234)	0.045 (0.119)	0.352 (0.243)
ROE*dummy('06-'08)	-1.279 (1.828)	-0.318 (0.812)	-0.901 (1.687)	-0.120 (0.821)	-0.611 (1.472)	0.566 (0.803)
ROE*dummy('09-'12)	-0.084 (0.927)	0.664 (0.852)	-0.495 (0.953)	0.550 (0.854)	-0.662 (1.001)	1.198 (0.865)
Size*dummy('06-'08)	0.584*** (0.043)	0.139*** (0.048)	0.644*** (0.064)	0.183*** (0.043)	0.675*** (0.0645)	0.162*** (0.042)
Size*dummy('09-'12)	0.627*** (0.041)	0.135** (0.055)	0.588*** (0.036)	0.107 (0.069)	0.627*** (0.0392)	0.077 (0.084)
Intercept	3.029*** (0.354)	5.650 (0.330)	3.412*** (0.332)	5.316 (0.242)	4.399*** (0.362)	5.923 (0.546)
Adjusted R-squared	29.8%	3.45%	30.8%	3.7%	42.9%	17.54%
Year Fixed Effect			+	+	+	+
Industry Fixed Effect					+	+
N	1410	1429	1410	1429	1410	1429

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