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Top Management Team Pay and Company Performance Before and After Say-on-Pay

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Top management team pay rose enough to cause an outcry that resulted in companies having to offer shareholders nonbinding say-on-pay votes to approve or disapprove pay beginning in 2011. The votes were supposed to reduce excessive pay, but tests of their efficacy have not yet appeared. This paper tests the efficacy of the votes by examining top management team pay before and after the say-on-pay mandate. Our model explains top management team pay with company characteristics using fixed effects regression and robustness checks. Results from a sample of large U.S. companies suggest that both nominal and real pay fell in the five years before say-on-pay, but do not suggest that pay either fell or rose in the five years after say-on-pay.

Keywords: Compensation, Company Performance, Say-on-Pay Votes, Corporate Governance, Managerial Power, Optimal Contracting

JEL Classification: G340, J310, J330

I. Introduction

Top management team pay become controversial due to a perceived unfairness to stakeholders, supported by evidence of a mismatch between company performance and top management team pay (Murphy, 1999; Boyer, 2005). According to an Economic Policy Institute report, from 1978 to 2016, chief executive officer pay rose over 900 percent, while typical worker pay increased just over 10 percent (Mishel and Schieder, 2017). In addition, the rise in chief executive officer pay was 70 percent higher than the rise in the stock market. This occurred while there seemed to be no scarcity of human capital for executive positions – the annual supply of executive talent reported by the Digest of Education Statistics shows increases in the number of Master's degrees awarded in business from over 57,000 in the 1980-81 academic year to over 191,000 in the 2011-2012 academic year. Adding to the controversy were studies that said top management power increased (Bayless, 2009; Benson and Davidson, 2010; Nyberg *et al.*, 2010;

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Boyer, 2005; Bebchuk and Fried, 2006), and that the power may override board governance of pay (Bebchuk and Fried, 2006). However, evidence suggests that shareholders value pay for performance (Krause *et al.*, 2014), which prompted a demand for stockholder participation in corporate governance that culminated in a say-on-pay voting requirement.

Many studies have examined executive and top management team pay compared to company performance, although none have yet examined the impact of say-on-pay voting on the pay from a sample of companies. The studies fueled a controversy, because some suggest performance does not explain pay, while others suggest that performance does explain pay. Studies that suggest performance does not explain pay say: performance is not linked to pay (Gong *et al.*, 2011); board oversight is lax (Bebchuk and Fried, 2006; Mangen and Magnan, 2012); pay from stock options creates incentives for top management to manipulate short-term stock prices (Bebchuk and Fried, 2006); shareholder intervention is needed to monitor pay (Root, 2004); pay from stock removes the link between pay and performance due to irrational stock price movements (Bogle, 2008); and pay disclosures are manipulated to get shareholder approval (Mangen and Magnan, 2012). Studies suggesting that performance explains pay say: pay attracts, retains, and motivates top management (Ellig, 2002; Valenti, 2013; Conyon, 2006; Agarwal, 2010); pay from stock and options motivates top management to increase stock values (Jayaraman and Milbourn, 2012); models capturing real-life settings explain pay (Edmans and Gabaix, 2009; Filatotchev and Allcock, 2010); pay aligns with company performance and size, compensation committees, and consultants are independent, and say-on-pay votes usually approve pay (Gong, 2011; Hemphill, 2012; Conyon, 2014); efficient labor markets control pay (Murphy and Zabojnik, 2004; Gabaix and Landier, 2008; Weiss, 2011; Cao and Wang, 2013); a moral limit prevents top management from accepting excessive pay (Moriarty, 2009); compensation programs generating shareholder value explain pay (Schneider, 2013); and institutional investors are monitoring pay (Ellig, 2014).

Even though research never settled the controversy, the outcry over excessive pay became acute during the 2009 financial crisis (Mangen and Magnan, 2012). The crisis drew attention to corporate governance and led to passage of the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010 (Dodd-Frank). Dodd-Frank made all U.S. public companies offer shareholders nonbinding say-on-pay votes that approve or disapprove top management team pay (Dodd-Frank, Subtitle E, Section 951). Enforcement of the requirement went to the Securities and Exchange Commission (SEC), which made say-on-pay votes mandatory at all shareholder meetings after January 21, 2011. In anticipation of say-on-pay votes, shareholders receive pay justifications from companies that could be biased (Mangen and Magnan, 2012). Therefore a need exists to test the extent to which say-on-pay may have produced its intended result. However, no studies were found that examined the impact of the new say-on-pay mandate on top management team pay. Our study examines the impact of say-on-pay on top management team pay after considering company performance and control variables by looking at pay from a sample of large companies both five years before and five years after the introduction of say-on-pay with fixed effects regression and robustness checks. The contribution of our study is that it could be the first look at the impact of say-on-pay on top management team pay.

II. Theory and Hypotheses

The theory behind our model uses elements of both Optimal Contracting Theory and Managerial Power Theory (Conyon, 2014). Optimal Contracting Theory says boards act for shareholders in arms-length negotiations to set top management team pay (Bebchuk and Fried,

2006), but testing has mixed results (Weiss, 2011). Stock price reactions to say-on-pay voting requirements suggest some pay was excessive (Cai and Walkling, 2011), and pay should have had a stronger relationship to economic profit (Farris *et al.*, 2014). Yet pay appears related to market capitalization, earnings, and sales (Gabaix and Landier, 2008). Special recognitions explain pay but did not reveal a direct benefit to shareholders (Wade *et al.*, 2006). Some actions, such as securitizing assets, might be good for companies without showing up in performance measures (Riachi and Schwienbacher, 2013). Although company size and industry classification partially explained pay (Farris *et al.*, 2014), some pay was high enough to compel organized efforts that led to pay reductions (Ertimur *et al.*, 2011). The mixed results from testing Optimal Contracting Theory led to the development of Managerial Power Theory. Managerial Power Theory says existing corporate governance mechanisms do not allow optimal contracting due to managerial power (Bebchuk and Fried, 2006), partial ownership (Jensen and Meckling, 1976), and imperfect labor and capital markets (Mortensen, 1986). Say-on-pay voting enhances existing mechanisms because say-on-pay expands pay governance to include shareholders. After say-on-pay, shareholders were able to cast a nonbinding vote on top management team pay, strengthening optimal contracting and controlling managerial power. Of special interest is whether say-on-pay was successful in enhancing corporate governance and reducing excessive pay, which is the focus of our study. Our study uses variables that should justify top management team pay. Justification exists if there is a positive association between pay and market capitalization because management makes decisions that impact stock prices and should be paid according to the stock price impact of those decisions. Top management teams that make decisions leading to higher stock prices should get higher pay, and those that make decisions that lead to lower stock prices should get less pay. However, stock prices may not reflect all efforts by top management teams to increase company value (Dutta and Reichelstein, 2005; Bogle, 2008; Victoravich, 2010; Chen *et al.*, 2015). For example, market capitalization may not fully reflect larger operating margins through product differentiation or strong branding that increase earnings, or smaller operating margins that increase sales. Thus, shareholders should be willing to pay top management teams more for higher market capitalizations but should also be willing to pay more for decisions leading to higher intrinsic company values regardless of market capitalization. Therefore market capitalization, earnings, and sales provide opportunities to test for the alignment of top management team pay with company performance:

Hypothesis 1. Top management team pay has a positive relationship to market capitalization.
Hypothesis 2. Top management team pay has a positive relationship to earnings.
Hypothesis 3. Top management team pay has a positive relationship to sales.

In addition to examining the impact of company performance on top management team pay in the period before and the period after say-on-pay, it is especially useful to see if say-on-pay had any effect on limiting top management team pay. Evidence of a limiting effect exists if top management team pay, after considering company performance and control variables, fell or did not increase beyond the rate of inflation after say-on-pay voting was required. In addition, if the pay rose before say-on-pay but fell afterwards, strong support for the intended efficacy of say-on-pay exists. However, even a decrease in pay before say-on-pay could say something about the concern building for a governmental response to the outcry surrounding top management team pay. Therefore, the change in the base level of top management team pay before and after say-on-pay is considered to look for evidence of the impact of say-on-pay:

Hypothesis 4. The change in top management team pay after say-on-pay is less than the change in inflation.

After considering company performance and control factors, top management team pay changes below the rate of inflation after say-on-pay suggest to policymakers and investors that corporate governance is more effective because of say-on-pay. Alternatively, pay changes above the rate of inflation after say-on-pay suggest that say-on-pay was not as effective as some hoped in the effort to limit excessive pay, and more action may be necessary to strengthen corporate governance.

III. Methodology

The methodology section includes descriptions of our data samples, variable measures, and variable analyses.

A. Data Samples

The samples for this study include companies in the Dow Jones Industrial Average (DJIA) index as of year-end 2016. The DJIA is a price-weighted index of 30 U.S. blue-chip companies, created by Charles Dow in May of 1896, and produced by S&P Dow Jones Indices LLC (S&P). S&P produces the index with three people from S&P and two from The Wall Street Journal who respond at any time to company actions and market developments with decisions to replace companies in the index. Most companies in the index are on the New York Stock Exchange; however, four companies in the index are on the NASDAQ. Companies in the index are from all sectors except transportation and utilities. Companies chosen for the DJIA do not meet specific quantitative rules; however, they must pass standards for reputation, growth, investor interest, sector representation, and a headquarters, incorporation, and revenue base in the United States (S&P Dow Jones Indices, 2017). The DJIA stands for a much larger group of U.S. stocks because correlations between movements in the DJIA and larger stock indexes are high (CME Group, 2017). Therefore, companies in the DJIA give insight for many other companies. Also, the DJIA group of companies has a sample size adequate for making inferences.

The DJIA company data in our study are in two samples, one spanning five years before, and the other spanning five years after say-on-pay was first required in 2011. Using those samples allows for an analysis before, and another analysis after say-on-pay, looking at relationships between company performance and pay, and changes in the base level of top management team pay. Top management team pay data are from Execucomp. Data used to explain top management team pay are from Compustat, with a few missing observations extracted from Edgar. All data are from the same companies in the DJIA at the end of 2016 with data going back to 2006. Only one company of the 30 was excluded from our sample, Visa Inc., because it did not publicly trade until 2008 and therefore did not have complete data going back to 2006. Our sample includes seven companies that replaced others in the DJIA index over the time span of this study: Apple Inc. (entered the DJIA in 2015); The Goldman Sachs Group, Inc., Nike, Inc., UnitedHealth Group Incorporated (entered the DJIA in 2012); Cisco Systems, Inc. and The Travelers Companies, Inc. (entered the DJIA in 2009); and Chevron Corporation (entered the DJIA in 2008). All companies that entered the DJIA during the period of study have complete data sets for both samples. Companies removed from the DJIA are not in either sample. Company data are from the year in

which a fiscal year ends. For example, Wal-Mart Stores, Inc.'s fiscal year ends in January, so the fiscal year ending January 2016 provided data identified as 2016.

B. Variable Measures

B.1. Dependent Variable

The dependent variable in the model for this study is *TMT Pay*. *TMT Pay* is pay to the top management team reported to the SEC in company DEF 14-A filings. Those filings usually show fiscal year compensation paid to five members of the top management team. Compensation includes salary, bonus, stock, options, retirement plan contributions, and perquisites, which captures the most extensive set of pay components publicly available. The top management team includes the chief executive officer, the chief financial officer, and the three other highest-paid executives. Analyzing pay from the top management team is better than analyzing pay to only the chief executive officer, because pay for the team is less likely to have outliers than pay to a single executive. The dependent variable is not adjusted for inflation over the period of study because the test and control variables should be impacted by inflation in roughly the same way as the dependent variable.

B.2. Test Variables

The test variables in our model are *Market Cap*, *Earnings*, and *Sales* obtained from Compustat. *Market Cap* is market capitalization, the market price of company common stock multiplied by the number of shares outstanding at fiscal year-end (Bayless, 2009; Gabaix and Landier, 2008; Cao and Wang, 2013). Market capitalizations are as of each company's fiscal year-end. *Earnings* is the net income for a company's fiscal year (Gabaix and Landier, 2008). *Sales* is gross revenue for the company's fiscal year (Benson and Davidson, 2010; Balsam *et al.*, 2011; Gong, 2011; Cao and Wang, 2013; Conyon 2014). All three test variables indicate better performance for shareholders when they increase, so positive associations are expected between *TMT Pay* and each test variable. Test variables are also unadjusted for inflation because all three variables should be impacted approximately the same by changes in inflation.

B.3. Control Variables

The control variables in our model are *Financing Costs, Company Size,* and *Market Risk*. These variables control rather than produce pay. *Financing Costs* are cash dividends on stock plus interest on debt, extracted from Compustat. Cash dividends may directly increase market capitalizations by the discounted value of expected dividends, but dividends could also limit executive pay by forcing executives to conserve cash for dividends (Easterbrook, 1984; Bhattacharyya *et al.*, 2008). In a similar way, interest on debt may also limit executive pay to conserve cash for interest payments (Jensen, 1986). Therefore dividends and interest are financing costs that might control pay and have a negative association to pay. *Company Size* is total company assets at fiscal year-end, also extracted from Compustat. Total company assets controls pay because top management should expect pay in direct proportion to the dollar value of assets managed, but greater total assets do not always signal greater performance (Cao and Wang, 2013; Waldron *et al.*, 2013; Fong *et al.*, 2015). Thus, total assets should have a positive association to

pay. *Market Risk* is the annual Scholes-Williams beta for each company, taken from CRSP (Lippert and Porter, 1997), which should have a positive association to pay since it may take additional pay for executives to work for a riskier company. Some studies have also used an industry variable as a control variable (Lippert and Porter, 1997; Firth *et al.*, 2007). However, the fixed effects specification employed in our study makes an industry control variable unnecessary, since industry does not change for companies in our study, which was verified for our samples. In addition, *Financing Costs* and *Company Size* are not adjusted for inflation because both are denominated in dollars and should change approximately the same as the dependent and test variables. *Market Risk* was not adjusted for inflation because the market risk premium in the betas should account for inflation.

C. Variable Analyses

All four hypotheses are best suited for testing using a fixed-effects regression because so many company-specific variables, such as industry, are difficult to explicitly include in the analysis, and are implicitly considered in the fixed-effects specification (Benson and Davidson, 2010; Conyon, 2014). However, cross-correlation of the errors might not allow the use of a fixed-effects specification. Therefore a Pesaran test was applied to all nominal values of the variables in a combined sample spanning 2006 through 2016 to test for cross-sectional correlation (dependence) of the errors and produced a CD statistic of -0.008 with an insignificant *p*-value (0.994), suggesting that cross-sectional correlation of the errors is not a problem. In addition, a Hausman (1978) specification test applied to the same sample to compare the need for a random-effects specification to the need for a fixed-effects specification resulted in a Chi-square statistic of 6.95 with a significant *p*-value (0.0084), suggesting the rejection of a random-effects specification in favor of a fixed-effects specification. The fixed effects specification is used with two samples: one spans five years before say-on-pay and requires changes in variables from 2006 to 2010, and the other spans five years after say-on-pay and requires changes in variables from 2012 to 2016. Variable changes were transformed to percentage changes in decimal form because nominal changes had more outliers. The coefficients on the three test variables are tests of the first three hypotheses by giving estimates of how changes in company performance predict changes in top management team pay. The intercepts in the fixed effects regressions test the fourth hypothesis by giving an estimate of the change in base pay with no change in a performance or control variable. All regressions test for outliers with Cook's D statistic using a common critical value of 0.80. All regressions check for multicollinearity by reporting variance inflation factors that show the potential for a problem, and address multicollinearity with a final regression for each sample using the stepwise procedure to reduce the influence of multicollinearity on the estimated coefficients.

IV. Results

Results are from two different samples examining top management pay and looking for changes in the base levels of pay during two different time periods. The first time period covers five years before say-on-pay, and the second time period covers five years after say-on-pay. Neither sample includes 2011, the year say-on-pay was first required to be offered to shareholders. For both samples, descriptive statistics are in Table 1, correlations are in Table 2, fixed effects regressions are in Table 3, robustness checks using nominal value regressions are in Table 4, and nonparametric robustness checks are in Table 5.

Descriptive statistics in Table 1 show means, trimmed means, standard deviations, minimums, medians, and maximums for each variable, in both the sample before say-on-pay (Period = Before) and the sample after say-on-pay (Period = After). The means for the *TMT Pay* variable suggest that top management team pay increased more after say-on-pay (22.0 percent increase) than it did before say-on-pay (16.5 percent increase). However, the trimmed means (without the top and bottom five percent of values) and medians suggest something different. The *TMT Pay* trimmed means and medians are smaller after say-on-pay. In addition, all variables have trimmed means and medians that are smaller than their means, and standard deviations are greater than their respective means for all variables, which suggests the presence of outliers and the need to identify them for removal, which is done in each regression using Cook's D test.

Table 1: Descriptive Statistics Before and After Say-on-Pay

Variable	Period	Mean	Trimmed Mean	Standard Deviation	Minimum	Median	Maximum
TMT Pay	Before	16.5%	15.4%	52.9%	-86.2%	11.2%	149%
	After	22.0%	12.2%	78.7%	-66.2%	9.2%	374%
Market Cap	Before	9.5%	1.1%	60.8%	-49.2%	-0.8%	295%
	After	39.9%	37.4%	41.2%	-26.6%	34.2%	176%
Earnings	Before	33.7%	16.8%	120%	-80.6%	17.2%	605%
	After	45.2%	0.5%	264%	-102%	-1.1%	1,400%
Sales	Before	24.2%	18.5%	47.8%	-33.7%	15.7%	238%
	After	-0.9%	-1.5%	26.7%	-53.6%	0.0%	67.1%
Financing Costs	Before	39.2%	33.0%	70.8%	-75.5%	32.8%	321%
	After	49.9%	38.2%	87.4%	-29.8%	24.0%	447%
Company Size	Before	44.7%	36.4%	67.2%	-23.2%	27.2%	337%
	After	8.0%	7.3%	26.0%	-46.7%	1.2%	82.7%
Market Risk	Before	10.5%	6.2%	56.7%	-59.5%	-3.5%	196%
	After	0.0%	-0.5%	24.7%	-40.6%	-5.1%	55.2%

Note: N = 29 for all variables in each period.
Period Before is before say-on-pay (2006 to 2010); After is after say-on-pay (2012 to 2016).
Trimmed Mean is the mean after removing the smallest and largest five percent of observations.

Pearson correlations of variable pairs are in Table 2a for the sample before say-on-pay and in Table 2b for the sample after say-on-pay. The tables have correlations that show relationships between all pairs of variables, starting with the dependent variable, *TMT Pay,* which is in the first column. The first column of correlations for the sample from before say-on-pay shows that all explanatory variables are significantly correlated to *TMT Pay.* However, the first column in the sample from after say-on-pay shows that no explanatory variables are significantly correlated to *TMT Pay*. This suggests that more variation in *TMT Pay* is likely to be explained by regressions in the sample from before say-on-pay than in the sample from after say-on-pay. In addition, correlations from both samples show many highly significant correlations between the test and control variables, which calls for measuring and addressing multicollinearity. Multicollinearity is measured by monitoring variance inflation factors in the regression output and addressed with the Stepwise technique to reduce the factors and the influence of multicollinearity on coefficient estimates.

Table 2a: Correlations of Variables Before Say-on-Pay

	TMT Pay	**Market Cap**	**Earnings**	**Sales**	**Financing Costs**	**Company Size**
Market Cap	0.443 (0.016)					
Earnings	0.514 (0.004)	0.880 (0.000)				
Sales	0.583 (0.001)	0.827 (0.000)	0.796 (0.000)			
Financing Costs	0.500 (0.006)	0.224 (0.242)	0.253 (0.186)	0.320 (0.091)		
Company Size	0.556 (0.002)	0.834 (0.000)	0.793 (0.000)	0.934 (0.000)	0.276 (0.148)	
Market Risk	0.156 (0.418)	-0.107 (0.581)	-0.019 (0.920)	-0.046 (0.814)	0.062 (0.747)	-0.052 (0.787)

N = 29. Pearson correlations with *p*-values below them in parentheses.

Table 2b: Correlations of Variables After Say-on-Pay

	TMT Pay	Market Cap	Earnings	Sales	Financing Costs	Company Size
Market Cap	-0.030 (0.877)					
Earnings	0.018 (0.927)	0.261 (0.172)				
Sales	0.048 (0.803)	0.634 (0.000)	0.204 (0.288)			
Financing Costs	-0.209 (0.276)	0.117 (0.545)	0.102 (0.597)	0.533 (0.003)		
Company Size	-0.107 (0.582)	0.337 (0.074)	0.066 (0.733)	0.645 (0.000)	0.786 (0.000)	
Market Risk	-0.080 (0.680)	0.399 (0.032)	0.021 (0.914)	0.509 (0.005)	-0.023 (0.906)	0.165 (0.392)

N = 29. Pearson correlations with *p*-values below them in parentheses.

Fixed effects regression results are in Table 3a for the five-year sample from before say-on-pay was required, and results are in Table 3b for the five-year sample from after say-on-pay was required. The results for each sample include output from three fixed effects regressions using maximum likelihood estimation (MLE). MLE is used because it is asymptotically more efficient than the minimum distance estimator as discussed in Hsiao *et al.* (2002). The results from using all sample observations are in the first column of both tables 3a and 3b; results that used observations after removing outliers that had Cook's D values that exceeded 0.80 are in the second column; and results that applied the Stepwise technique to observations after removing outliers are in the third column.

Results from using the sample of companies before say-on-pay reveal potential distortions from outliers and multicollinearity. Results from using all observations cast doubt on the first three hypotheses: significant positive relationships between top management team pay (*TMT* Pay) and market capitalization (*Market Cap*), earnings (*Earnings*), and sales (*Sales*) are not evident, even though the F-statistic of the regression is significant at a 0.05 percent confidence level. However, by removing outliers and limiting the impact of multicollinearity using the Stepwise technique, the second hypothesis is supported: top management team pay and company earnings are significantly and positively related. Another example of distortion appears in testing Hypothesis 4. Testing Hypothesis 4 looks at the intercept terms from the fixed effects regressions that estimate the change in top management team pay without the impact of explanatory variables. In the results from the sample before say-on-pay, the intercept using all observations is insignificant. However, after removing outliers and using the Stepwise procedure, the intercept is significant at the 0.05 percent confidence level, and negative, showing an estimated drop in the base level of top management pay of 21.7 percent, without considering the impact of performance or control variables. A look at the reductions in the variance inflation factors from removing outliers, and additional reductions from using the Stepwise technique, show the reduction of potential multicollinearity distortions and increase the usefulness of the results.

Results from using the sample of companies after say-on-pay show distortions from outliers and multicollinearity severe enough to render insignificant both the regression from all observations and the regression from the observations without outliers. However, after mitigating the impact of multicollinearity by applying the Stepwise technique, the regression is significant at the 0.05 confidence level. Without outliers and using the Stepwise technique, support exists for Hypothesis 1, from a significant and positive relationship between top management team pay (*TMT Pay*) and company market capitalization (*Market Cap*). Support for Hypothesis 2 and Hypothesis 3 is not evident. However, Hypothesis 4 is supported because the intercept fails to show that the base level of top management team pay rose above the inflation rate in the sample after say-on-pay.

Table 3a: MLE Fixed Effects Regressions Explaining TMT Pay Before Say-on-Pay

Predictors	All Observations	Outliers Removed	Outliers Removed Stepwise
Intercept	-0.115	-0.229	-0.217
	(0.338)	(0.056)	(0.045)
Market Cap	-0.247	-0.094	
	(0.453)	(0.763)	
	[6.00]	[1.20]	
Earnings	-0.123	0.508	0.593
	(0.413)	(0.015)	(0.001)
	[4.88]	[1.32]	[1.04]
Sales	0.350	0.304	
	(0.487)	(0.556)	
	[8.74]	[2.90]	
Financing Costs	0.247	0.123	
	(0.052)	(0.304)	
	[1.13]	[1.30]	
Company Size	0.150	0.656	0.938
	(0.672)	(0.127)	(0.000)
	[8.69]	[3.09]	[1.04]
Market Risk	0.126	0.101	
	(0.391)	(0.443)	
	[1.04]	[1.05]	
F	3.60	4.35	12.49
	(0.012)	(0.006)	(0.000)
Adj. r-square	35.80%	43.61%	46.91%
N	29	27	27

Variables are changes from 2006 to 2010 in decimals.
Outliers removed were AAPL and KO which had Cook's D statistics exceeding 0.80.
p-values are in parentheses below coefficient estimates.
Variance Inflation Factors are in brackets below *p*-values.

Table 3b: MLE Fixed Effects Regressions Explaining TMT Pay After Say-on-Pay

Predictors	All Observations	Outliers Removed	Outliers Removed Stepwise
Intercept	0.698	-0.039	0.002
	(0.037)	(0.835)	(0.986)
Market Cap	-0.534	0.447	0.389
	(0.319)	(0.139)	(0.044)
	[2.02]	[2.24]	[1.01]
Earnings	0.0062	0.256	
	(0.919)	(0.446)	
	[1.11]	[3.70]	
Sales	1.92	-0.582	
	(0.091)	(0.520)	
	[3.67]	[9.63]	
Financing Costs	-0.554	-0.164	-0.1436
	(0.096)	(0.348)	(0.097)
	[3.37]	[3.77]	[1.01]
Company Size	0.32	0.323	
	(0.771)	(0.565)	
	[3.37]	[3.47]	
Market Risk	-1.060	-0.123	
	(0.191)	(0.778)	
	[1.64]	[1.91]	
F	0.83	1.23	3.44
	(0.560)	(0.334)	(0.049)
Adj. r-square	0.00%	4.98%	15.78%
N	29	27	27

Variables are changes from 2012 to 2016 in decimals.
Outliers removed were VZ and WMT which had Cook's D statistics exceeding 0.80.
p-values are in parentheses below coefficient estimates.
Variance Inflation Factors are in brackets below *p*-values.

As a check for robustness of the fixed effects regression results, nominal values from both samples were used in an MLE regression that contained a binary variable to test for a change in top management team pay from the five years before to the five years after say-on-pay votes were required to be offered. This approach involved using 290 observations, since there are 29 companies in each year of the two five-year samples. The results are in Table 4 and show three regressions: one with all observations, another after removing several outliers, and still another that applied the Stepwise technique to the subsample after removing the outliers. The significance of the regression (F-statistic), explanatory ability of the regression (adjusted r-square), and variance inflation factors (VIF) all improve by removing outliers and applying the Stepwise technique. The Stepwise technique results support Hypothesis 2 with a significantly positive

relationship between top management pay (*TMT Pay*) and company earnings (*Earnings*) and support the result found for the fixed effects regression done in the sample of companies from before say-on-pay. The Stepwise technique results also support Hypothesis 4, due to the absence of the binary variable *Period*. *Period* was coded zero for company data in the five years before say-on-pay (2006 through 2010), and one for company data in the five years after say-on-pay (2012 through 2016). The insignificance of the *Period* variable is consistent with the insignificance of the intercept term in the fixed effects regression using the sample from after say-on-pay. Both MLE regression and fixed effects MLE regression results suggest that base level top management team pay did not increase at a rate greater than inflation in the five years after say-on-pay was required to be offered to company shareholders.

A final check for robustness of the fixed effects regression results used several rudimentary nonparametric tests on the top management pay variable, *TMT Pay*. The results from the nonparametric robustness checks are in Table 5. The first test was a Mood's Median test, chosen for its minimal sensitivity to outliers, that looked for a significant difference in the median of the *TMT Pay* variable before say-on-pay compared to the median of the *TMT Pay* variable after say-on-pay. Although the *TMT Pay* median after say-on-pay is lower than the median before say-on-pay, the difference in the medians is not significant. This supports the fixed effects regression results which did not have evidence that top management pay was higher after say-on-pay was required.

Another robustness check involved two Runs tests, chosen because the test looks merely at the number of changes showing up in the sample data above or below a predetermined cutoff. The first Runs test was on *TMT Pay* from the sample using observations before say-on-pay, and the second Runs test was on *TMT Pay* from the sample using observations after say-on-pay. A Runs test attempts to reject randomness in the data, which in this case compared the number of variable values above a prescribed cutoff to the number below a cutoff. The prescribed cutoffs for the two tests are the increase in the CPI in the time period covered by each sample. In the sample before say-on-pay, the period is January 2006 to December 2010, and the cutoff is 0.1053, obtained using the CPI Inflation Calculator found at the U.S. Bureau of Labor Statistics website. For the sample after say-on-pay, the period is January 2012 to December 2016, and using the same CPT Inflation Calculator, the cutoff is 0.0651. Thus the Runs tests looked for evidence of nonrandom occurrences of *TMT Pay* values above and below the inflation change cutoffs for each sample. Nonrandom occurrences could not be rejected in either sample by the Runs tests. This does not support the fixed effect regression results from before say-on-pay that suggested a decrease in top management pay, but it does support the findings of the fixed effect regression using the sample after say-on-pay where no change in pay was evident.

Table 4: MLE Regression Robustness Check

Predictors	All Observations	Outliers Removed	Outliers Removed Stepwise
Intercept	17,167,342	23,295,697	24,106,969
	(0.012)	(0.000)	(0.000)
Market Cap	0.000045	-0.000000	
	(0.252)	(0.997)	
	[4.82]	[4.68]	
Earnings	0.000125	0.000360	0.000464
	(0.798)	(0.363)	(0.022)
	[4.86]	[4.64]	[1.21]
Sales	0.000046	0.000010	
	(0.084)	(0.666)	
	[1.70]	[1.76]	
Financing Costs	0.001124	0.001501	0.001642
	(0.004)	(0.000)	(0.000)
	[2.18]	[2.22]	[1.26]
Company Size	0.000005	0.000004	
	(0.415)	(0.448)	
	[2.12]	[2.12]	
Market Risk	16,385,124	14,457,401	15,331,276
	(0.009)	(0.005)	(0.001)
	[1.21]	[1.22]	[1.07]
Period	4,414,661	3,405,724	
	(0.270)	(0.293)	
	[1.12]	[1.12]	
F	11.78	14.92	34.37
	(0.000)	(0.000)	(0.000)
Adj. r-square	20.70%	25.35%	25.86%
N	290	288	288

Variables are nominal values for 2006 thru 2010 and 2012 thru 2016.
Outliers removed were AAPL in 2012 and WMT in 2016 which had Cook's D statistics exceeding 0.80.
p-values are in parentheses below coefficient estimates.
Variance Inflation Factors are in brackets below *p*-values.

Table 5: Nonparametric Robustness Checks

Mood's Median Test: *TMT Pay* Before and After Say-on-Pay

Period	Median	N <= Overall Median	N > Overall Median	95% Median CI
Before	0.112	14	15	(-0.022, 0.345)
After	0.092	15	14	(-0.103, 0.258)
Overall	0.107			

Null hypothesis: H_0: The population medians are all equal

Alternative hypothesis: H_1: The population medians are not all equal

DF	Chi-Square	*p*-Value
1	0.07	0.793

Note: Period is Before for *TMT Pay* before Say-on-Pay, and After for *TMT Pay* after Say-on-Pay

Runs Test: TMT Pay Before Say-on-Pay

		Number of Observations	
N	K	≤ K	> K
29	0.1053	14	15

Null hypothesis: H_0: The order of the data is random

Alternative hypothesis: H_1: The order of the data is not random

Number of Runs		
Observed	Expected	*p*-Value
12	15.48	0.187

Note: K is the increase in the CPI from January 2006 to December 2010 calculated using the CPI Inflation Calculator found at the U.S. Bureau of Labor Statistics website.

Runs Test: TMT Pay After Say-on-Pay

		Number of Observations	
N	K	≤ K	> K
29	0.0651	14	15

Null hypothesis: H_0: The order of the data is random

Alternative hypothesis: H_1: The order of the data is not random

Number of Runs		
Observed	Expected	*p*-Value
14	15.48	0.574

Note: K is the increase in the CPI from January 2012 to December 2016 calculated using the CPI Inflation Calculator found at the U.S. Bureau of Labor Statistics website.

V. Discussions

Discussions are necessary to examine our results based on theory, interpret our results as having some policy implications for corporate governance, and qualify our results by suggesting some limitations of the study that call for more research.

The Optimal Contracting Theory suggests that mechanisms already existed to control top management pay. This theory has support from our findings that company performance measured by market capitalization and earnings are positively associated with top management team pay. The theory also has support from our findings that the control variables of company size measured by total assets and company risk measured by beta are positively associated with pay. Still further support for the theory comes from our findings that show company cash flow commitments measured by interest and dividend expense are negatively associated with pay. However, all these measures together only explain a small fraction of the variation in top management team pay during either period in our study. Therefore say-on-pay seems justified as another corporate governance mechanism helping to control excessive top management pay. The issue then is if say-on-pay was an effective corporate governance mechanism.

A conclusion about the effectiveness of say-on-pay should consider Managerial Power Theory and our results. Our results support the Managerial Power Theory because after say-on-pay voting was required to be offered to shareholders, top management pay becomes more of a mystery. The ability of the fixed effects regression model to explain top management team pay is much greater before the say-on-pay voting requirement than after the requirement. The only performance measure significant after the requirement is market capitalization, and the only control measure significant after the requirement is financing costs. Performance factors thought to justify pay, such as earnings and sales, do not explain pay after say-on-pay. Factors thought to control pay, such as company size and market risk, do not explain pay after say-on-pay. In addition, while correlations of top management pay with all three company performance measures and two of the three control measures are significant before say-on-pay, after say-on-pay no company performance variable nor any control variable is significantly correlated with top management pay. More support for the Managerial Power Theory comes from the fact that our results suggest that base level top management team pay did not increase after the say-on-pay requirement was instituted. This is surprising given that the Consumer Price Index rose by over six and a half percent in the study period after the say-on-pay requirement, which is the increase necessary for top management teams to maintain the value of their pay. Thus it is possible that say-on-pay prevented an increase in top management team pay, even one that would have maintained the value of pay, by curbing managerial power.

The policy implications of finding no evidence that top management pay increased after the say-on-pay requirement are straightforward. The nonbinding say-on-pay vote could have been successful in controlling top management team pay. Of course, we cannot conclude that the vote had any effect on pay, since no evidence of a pay increase in the five years after say-on-pay could have occurred without say-on-pay. Our results simply suggest that an undetected increase is a step in the right direction for those who believe pay is excessive. Of course, those who believe pay is still excessive might want to see say-on-pay become a binding vote in the hopes that pay reductions will ensue through greater shareholder participation.

An important limitation of our study is that our regressions do not explain most of the variation in top management team pay in our samples. This suggests that some explanatory variables may be missing from our model, which calls for more research to look for other variables

that explain top management team pay. Another possible limitation is that economies of scale could justify *nonlinear* relationships between executive pay and some explanatory variables that would increase the explanation of variation in pay. For example, as some explanatory variables increase, top management team pay might increase, but at a decreasing rate. Finally, samples from other time periods should be used to check for robustness across different economic conditions and regulatory climates. Therefore our results are only suggestive since this is the first known study to explore the impact of say-on-pay on top management team pay, requiring more research to verify our results.

In conclusion, while our study hardly settles the executive pay controversy, it offers some evidence to suggest that say-on-pay did have the intended impact on top management team pay. Our results suggest keeping say-on-pay at least as a non-binding vote, and giving consideration to making the vote binding. In addition, our results suggest the need to find other factors that explain top management team pay in the period after say-on-pay.

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