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Lessening Effects of SOX on the Relationship between Executive Compensation Components and Cost of Equity Capital

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Abstract: The Sarbanes–Oxley Act of 2002 (SOX) imposed stringent requirements on corporate executives to hold them more accountable for their management decisions. This act has ramifications for executive pay as well. This study investigates the lessening effects of SOX on the association between executive compensation and cost of equity capital. The regression analyses are based on 11,649 firm-year observations of publicly listed companies in the United States from 1998 to 2014. The results show that bonuses and shareholdings are associated with a lower cost of equity capital, while the stock options are not related to the cost of equity capital. In addition, the findings indicate that SOX weakens the association between the cost of equity capital and executive bonuses, stock options for all top five executives. However, SOX lessens the association between the cost of equity capital and shareholdings, only for the three non-CEO and non-CFO executives. This is the first study to investigate how the change in regulatory environment invoked by SOX impacts the association between executive compensation and cost of equity capital. Moreover, this study examines the impacts on all top five highly paid executives and focuses on the three components of executive compensation that are involved with SOX.



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1. Introduction

Compensation can influence the executives' incentives, which affect the firm's cost of equity capital. The effect of each compensation element on the cost of equity capital can be different due to the unique features of each element. The behavioral agency model indicates that each component of compensation has a different implication for risk-taking (Devers et al. 2008; Hillier et al. 2022). Larraza-Kintana et al. (2007) find that cash and the different forms of equity-based CEO pay have different impacts on firm risk. Many researchers (e.g., Bromiley 1991; Deutsch et al. 2010; Wiseman and Bromiley 1996) argue that changes in risk-taking affect performance. The risk-taking behavior leads to higher overall firm risk and higher expected returns (Coles et al. 2006). However, a high risk level creates not only the possibility of higher returns, but also the probability of failure (Deutsch et al. 2010). Bromiley (1991) points out that the relation between performance and risk creates a negative feedback loop; even when past and industry performance factors are controlled, low performance causes a company's income stream to become more risky and this lowers future performance. Wiseman and Bromiley (1996) estimate a time-series model that addresses the issue of whether risk influences performance by controlling for firm slack resources and industry factors. Their results show that increased risk-taking among these companies decreases subsequent profitability and that reductions in profitability are positively associated with further decline. In other words, subsequent performance suffers when firms with deteriorating performance increase their risk-taking activities (Wiseman and Bromiley 1996).

The risk-taking behavior can result in a higher cost of equity capital because shareholders may also demand compensation for bearing this risk. [Chen et al. \(2015\)](#) find a significant positive relationship between CEO risk-taking incentives and the implied cost of equity capital. In terms of firm performance, better firm performance can lead to a lower cost of equity capital because there is a positive relationship between firm performance and the alignment of executives' preferences and actions with those of shareholders ([Nyberg et al. 2010](#)). Importantly, the Sarbanes–Oxley Act of 2002 (SOX) placed restrictive requirements on corporate executives, principally the CEO and CFO, to make them more responsible for their managerial decisions ([Chang et al. 2012](#)). This act also has implications for executive compensation ([Chang et al. 2012](#); [Cohen et al. 2007](#)) that may impact the cost of equity capital. [Chang et al. \(2009\)](#) find that SOX impacts earnings quality and the cost of equity. In addition, [Hillier et al. \(2022\)](#) find that SOX changes the effect of incentive compensation on managerial behavior.

To add to the previous studies, the lessening effects of SOX on the association between executive compensation and cost of equity capital are investigated. The hypotheses in this study are restricted to bonuses, stock options, and managerial shareholdings because the requirements of Section 304 of SOX are directly involved with these three components of executive compensation but not with other types of compensation. The investigations are based on a sample of 11,649 firm-year observations of publicly listed companies in the United States from 1998 to 2014. Consistent with previous research ([Botosan et al. 2011](#)), this study measures the cost of equity capital using the average value of nine alternative approaches introduced by past literature ([Botosan and Plumlee 2002](#); [Claus and Thomas 2001](#); [Dhaliwal et al. 2007](#); [Easton 2004](#); [Gebhardt et al. 2001](#); [Gode and Mohanram 2003](#); [Gordon and Gordon 1997](#); [Hail and Leuz 2006](#); [Ohlson and Juettner-Nauroth 2005](#)).

This paper creates both theoretical and practical contributions. Regarding the theoretical contributions, the paper adds to the finance literature in the following ways. First, [Chen et al. \(2015\)](#); [Devers et al. \(2008\)](#); and [Kabir et al. \(2013\)](#) only study CEO compensation. This work extends these papers to the other top five highly paid executives. Second, [Carpenter and Sanders \(2002\)](#) consider the relationship between CEO and the top five management team compensation and the relative impact of total versus long term pay to return on assets. This paper extends [Carpenter and Sanders \(2002\)](#)'s focus to three components of compensation that are bonuses, stock options, and shareholdings for the top management team and to its association with the cost of equity.

The third contribution to the literature is the consideration of SOX as a weakening effect on three important types of executive compensation. Previous studies (e.g., [Chang et al. 2012](#); [Cohen et al. 2007](#); [Hillier et al. 2022](#); [Peráček 2021](#); [Žofčinová et al. 2018](#)) investigate the laws and regulations governing compensation in different countries and their impacts on many aspects. For example, [Hillier et al. \(2022\)](#) report that SOX weakens the relation between incentive compensation and risk-taking activity. However, these prior studies do not make a connection between the potential impacts on compensation and investor's pricing. This paper extends previous studies by being the first to examine the impact of SOX on the association between executive compensation and the cost of equity capital.

Regarding the practical and policy implications, this study emphasizes how investors perceive executive compensation incentives as being less effective due to the altered regulatory environment brought about by SOX. This evidence is likely to be important to researchers, remuneration committees, investors, regulators and policy makers as a useful addition to ongoing discussions on the costs and benefits of SOX.

The results show that the cost of equity capital has a negative relationship with executive bonuses and shareholdings. However, the relationship between the cost of equity capital and executive stock options is not statistically significant. In addition, this study finds that the introduction of SOX lessens the association between the cost of equity capital and all top five executives' bonuses and stock options. However, SOX weakens

the association between the cost of equity capital and shareholdings, only for the three non-CEO and non-CFO executives.

The remainder of this paper is arranged in the following manner. In Section 2, hypotheses for the impacts of three components of executive compensation on cost of equity capital and the related SOX's weakening effects are developed. Section 3 describes the data and the research methods. In Section 4, the findings are discussed. Section 5 contains the conclusions.

2. Hypotheses Development

2.1. Various Components of Executive Compensation

The key factor in aligning executive compensation with shareholder interest is to increase the sensitivity of executive compensation to firm performance (Jensen and Meckling 1976). Mostly, bonuses are linked to firm performance and can affect executive incentives in different ways. Lambert and Larcker (1987) show a positive association between bonuses and return on equity but a modest association with stock returns. In contrast, Anderson et al. (2000) document the positive impact of bonus pay levels on firm stock returns. Agha (2013) find that managers are averse to debt when offered bonus incentives, until a certain bonus incentive level, when managers start using more debt.

Prior research (e.g., Coles et al. 2006; Deutsch et al. 2010; Devers et al. 2007; Harford and Li 2007; Hillier et al. 2022; Larraza-Kintana et al. 2007; Sanders and Hambrick 2007; Williams and Rao 2006; Wright et al. 2007) show that executive stock option compensation discourages executive risk-aversion and leads to greater firm-level risk-taking. Executives are more likely to make riskier decisions when stock option compensation is awarded because stock options propose potential upside risks but restrict downside risks (Agrawal and Mandelker 1987; Devers et al. 2008; Rajgopal and Shevlin 2002; Sanders 2001; Williams and Rao 2006; Wright et al. 2002). Granting options affects executives' wealth, which can alter their motivation to take risks (Ross 2004). Rajgopal and Shevlin (2002) and Hillier et al. (2022) find that executive stock options promote CEO's risk-taking appetite. In contrast, Carpenter (2000) argues that, despite the fact that options that are deep out of the money can provide incentives for excessive risk seeking, the manager seeks less risk if options deep in the money are awarded.

Another source of incentives for executives is managerial shareholdings. Prior studies (e.g., Eisenmann 2002; Wright et al. 2002) report that CEO equity ownership has a positive impact on firms' strategic risk-taking and find abnormal returns related to those strategies. In an opposite view, Sanders (2001) finds that CEO stock options and stock ownership affect CEOs' risk behavior differently, arguing that stock options increase risk-taking because of a limited downside risk, while stock ownership reduces risk-taking because of the downside risk in stockholding. Built on agency theory, management ownership might reduce the conflict of interest between managers and stockholders (Wright et al. 2002). Executives might not be able to diversify away the risk attached with his or her wealth due to stock ownership because his or her human capital is enormously invested in a single place of employment (Smith and Watts 1992). Therefore, executives' tolerance for risk is affected by their limited ability to reduce personal risk (Bryan et al. 2000).

According to the aforementioned arguments, each component of executive compensation impacts the firm performance and risk taking. Based on prior studies (e.g., Chen et al. 2015; Nyberg et al. 2010), both firm performance and risk-taking behavior can affect the cost of equity capital. This leads to the expectation that each executive compensation component is associated with the cost of equity capital. Hence, the following set of hypotheses are developed:

H1. *The cost of equity is associated with the executive bonuses.*

H2. *The cost of equity is associated with the executive stock options.*

H3. *The cost of equity is associated with the executive shareholdings.*

2.2. Lessening Effect of SOX

Section 304 of SOX set the requirements of the cashless exercise of stock options, restrictions on the purchase or sale of company stock during blackout periods, forfeiture of certain bonuses or equity-based or other incentive-based compensation received during twelve months after the first occurrence between public issuance and filing with the Commission of the financial documents, incorporating the financial reporting required accounting restatement, forfeiture of realized gains from the sale of securities during twelve months before accounting restatements, and freeze on extraordinary payments to executives (Chang et al. 2012; Cohen et al. 2007, 2008; Zhang 2007). Based on these requirements of SOX, the possible benefit of management compensation will probably be smaller after SOX than that before SOX (Chang et al. 2012).

SOX has a significant impact on not only the executives' pay structure, but also related consequences that lead to the cost of equity capital (Carter et al. 2005; Chang et al. 2012; Cohen et al. 2007). In the post-SOX period, executives are less capable of influencing a firm's success because the firm performance is determined more by exogenous factors that are out of executives' control, such as regulation (Chang et al. 2012). The requirements under Section 304 of SOX increase executives' penalties and legal responsibilities (Chang et al. 2009; Chang et al. 2012; Lobo and Zhou 2006; Zhang 2007). The requirements explicitly set the liability up to the amount of incentive-based compensation for misconduct of either the executives or others in the organization (Chang et al. 2012; Cohen et al. 2007, 2008; Zhang 2007). Due to the additional risks, executives respond in ways to reduce their risks of liability by demanding less in incentive compensation but more in fixed compensation, avoiding investments in projects over which they have little control, and acting more conservatively than the shareholders would prefer (Chang et al. 2012; Cohen et al. 2007). Cohen et al. (2007) and Chang et al. (2012) find an unintended consequence of SOX in that it discourages an incentive alignment between CEOs and shareholders. In other words, the pay-performance sensitivity of CEO stock options to a change in shareholder wealth decreases in the post-SOX period (Chang et al. 2012; Cohen et al. 2007). The decrease in sensitivity is considerably greater for CEOs, compared with other executives, because CEOs face not only higher penalties and legal liabilities due to SOX, but also higher monitoring by the regulators (Chang et al. 2012). SOX deteriorates the relationship between managerial effort and firm performance and diminishes the marginal product of managers (Chang et al. 2012; Cohen et al. 2007). These results reveal the effects from additional liabilities on executives that were imposed by specific requirements under Section 304 of SOX (Chang et al. 2009, 2012; Cohen et al. 2007, 2008; Lobo and Zhou 2006; Zhang 2007).

According to these arguments, SOX increases the risk exposure of executives (Chang et al. 2009, 2012; Geiger and Taylor 2003; Lobo and Zhou 2006; Salman and Carson 2009; Seetharaman et al. 2002; Zhang 2007). Following changes in this litigation environment, executives alter their managerial behavior, which may worsen firm performance (Carter et al. 2005; Chang et al. 2012; Cohen et al. 2007; Hillier et al. 2022). This leads to the expectation that SOX weakens the relationship between each executive compensation component and the cost of equity capital. To test whether there is an effect of SOX on the cost of equity capital for a given level of each compensation component, the following set of hypotheses are presented:

H4. *In the post-SOX period as opposed to the pre-SOX period, the cost of equity for a given level of executive bonuses is different.*

H5. *In the post-SOX period as opposed to the pre-SOX period, the cost of equity for a given level of executive stock options is different.*

H6. *In the post-SOX period as opposed to the pre-SOX period, the cost of equity for a given level of executive shareholdings is different.*

3. Data and Research Methods

3.1. Data and Sample

The sample includes publicly listed companies in the United States from 1998 to 2014. The ExecuComp database is used to collect data on executive compensation. This study collects the compensation data and runs the tests separately for CEOs, CFOs, and the top five highly-paid executives because the CFOs manage the financial system of the company, while CEOs have the power to replace CFOs who do not follow the CEOs' preferences (Fee and Hadlock 2004; Mian 2001). CEOs were identified based on executives' titles that include any of the following phrases: CEO, chief executive, and managing director. CFOs were identified based on executives' titles that include any of the following phrases: CFO, chief financial, finance, controller, and treasurer. I/B/E/S provides the earnings forecasts of the analysts. CRSP Daily Prices and CRSP Compustat Merged Annual data are used for stock price and financial data. If all data items are not missing, a firm-year observation is included. The banking and financial sector (SIC code 6000–6999) is omitted from this study, in line with previous research and to eliminate confounding industry effects. To reduce the influence of outliers, all continuous variables are winsorized at the 1st and 99th percentiles. There are 11,649 firm-year observations in the final sample. The number of observations varies from 485 firm-year observations in 2001 to 875 firm-year observations in 2013. The sample distribution by year is shown in Table 1.

Table 1. Sample distribution by year.

Year	Number of Observations
1998	622
1999	626
2000	591
2001	485
2002	552
2003	635
2004	685
2005	588
2006	707
2007	751
2008	630
2009	626
2010	793
2011	841
2012	805
2013	875
2014	837

This table reports the sample distribution of 11,649 firm-year observations over the sample period of 1998–2014.

3.2. Research Methods

By adding year and firm fixed effects in the regression analyses, this study utilizes the following model to evaluate the hypotheses about the cost of equity capital.

$$\begin{aligned} \text{COE} = & \beta_1 \text{BONUS} + \beta_2 \text{STOCKOPTION} + \beta_3 \text{SHAREHOLDING} + \\ & \beta_4 \text{BONUS*POSTSOX} + \beta_5 \text{STOCKOPTION*POSTSOX} + \\ & \beta_6 \text{SHAREHOLDING*POSTSOX} + \beta_7 \text{POSTSOX} + \beta_8 \text{LEVERAGE} + \\ & \beta_9 \text{BP} + \beta_{10} \text{SIZE} + \beta_{11} \text{ROA} + \beta_{12} \text{EQ} + \beta_{13} \text{GFC} + \varepsilon \end{aligned}$$

To mitigate the effects of specific assumptions that underpin each method on the results, the dependent variable is a measure of the average expected cost of equity capital from different alternative methods, as described in previous research (e.g., Boone et al. 2011; Dhaliwal et al. 2006; Hail and Leuz 2006). Boone et al. (2011) and Hail and Leuz (2006) employ an average of four approaches (r_{GLS} , r_{CT} , r_{OJN} , and r_{MPEG}), while Dhaliwal et al. (2006) uses an average of three approaches (r_{CT} , r_{GLS} , and r_{GM}). Nonetheless, this

study uses nine unique ex-ante estimates identified in Botosan et al.'s (2011) work and previously used in the literature to calculate the average value of the expected cost of equity capital. The nine estimates are r_{PEG} , r_{PEGST} , r_{MPEG} , r_{OJN} , r_{GM} , r_{BP} , r_{GG} , r_{CT} , and r_{GLS} . The r_{PEG} , r_{PEGST} , and r_{MPEG} are estimated approaches introduced by Easton (2004). The r_{OJN} is an estimated approach introduced by Ohlson and Juettner-Nauroth (2005). The r_{GM} is an estimated approach introduced by Gode and Mohanram (2003). The r_{BP} is an estimated approach introduced by Botosan and Plumlee (2002). The r_{GG} is an estimated approach introduced by Gordon and Gordon (1997). The r_{CT} is an estimated approach introduced by Claus and Thomas (2001). The r_{GLS} is an estimated approach introduced by Gebhardt et al. (2001).

The three components of executive compensation and the interactions of SOX with these three compensation items are the variables of interest. According to previous research (e.g., Meek et al. 2007; Mehran 1995; Vafeas and Waageleijn 2007), each component of executive compensation is scaled by total compensation, apart from executive shareholdings, which is scaled by total outstanding shares. BONUS is the percentage of compensation in the form of bonuses earned by the executives during the current financial year. STOCK-OPTION is the percentage of compensation in the form of value of stock options to the executives during the current financial year. SHAREHOLDING is the percentage of total shares outstanding held by the executives at the balance sheet date, excluding options.

Commonly used control variables are included, as in previous research, to capture the effects of other factors that influence the cost of equity capital. Prior research (e.g., Fama and French 1992; Gebhardt et al. 2001) finds a positive relationship between cost of equity capital and the perceived risk associated with leverage (LEVERAGE). Previous research (e.g., Boone et al. 2008; Fama and French 1992, 1997; Khurana and Raman 2004) finds a positive relationship between book-to-price ratios (BP) and the cost of equity capital. Firm size (SIZE), as measured by market capitalization, is incorporated in the model, as it has shown in previous studies (e.g., Boone et al. 2008; Botosan and Plumlee 2005; Brennan and Subrahmanyam 1996; Fama and French 1997; Gebhardt et al. 2001; Khurana and Raman 2004). The financial health of a company is affected by return on assets (ROA), as reported earnings have a direct impact on the cost of capital due to investors' expectations of returns (Gebhardt et al. 2001; Gode and Mohanram 2003). Firms with higher earnings quality (EQ) have a lower cost of capital, according to Francis et al. (2005). This study follows Francis et al. (2005) and utilizes accruals quality, which is the standard deviation of the residual from the Dechow and Dichev (2002) model, as the earnings quality proxy. The GFC dummy is included in the model to account for the impact of the global financial crisis on the outcomes.

4. Results and Discussion

4.1. Descriptive Statistics

Table 2 shows descriptive statistics for the entire sample. The mean (median) cost of equity capital for the average value of nine estimates is 0.10 (0.09) with a standard deviation of 0.04, and the values range from 0.02 in the lowest quartile to 0.26 in the highest quartile. These statistics are similar to those of Chen et al. (2015), which report the mean (median) for the average of the four cost of equity capital estimates of 0.095 (0.09).

Table 2. Descriptive statistics for variables.

	Mean	SD	Min	25%	Median	75%	Max
<i>Dependent variable</i>							
COE	0.10	0.04	0.02	0.08	0.09	0.12	0.26
<i>Executive compensation components</i>							
Top five highly paid executives:							
BONUS	0.10	0.13	0.00	0.00	0.04	0.18	0.53
STOCKOPTION	0.21	0.19	0.00	0.03	0.18	0.33	0.76
SHAREHOLDING	0.62	1.37	0.00	0.00	0.10	0.43	7.90
CEO:							
BONUS	0.10	0.15	0.00	0.00	0.00	0.17	0.63
STOCKOPTION	0.25	0.25	0.00	0.00	0.19	0.41	0.90
SHAREHOLDING	1.69	4.47	0.00	0.00	0.14	0.85	26.14
CFO:							
BONUS	0.10	0.13	0.00	0.00	0.02	0.17	0.56
STOCKOPTION	0.21	0.23	0.00	0.00	0.16	0.34	0.85
SHAREHOLDING	0.07	0.20	0.00	0.00	0.00	0.04	1.36
Other executives (Non-CEO and Non-CFO):							
BONUS	0.10	0.13	0.00	0.00	0.04	0.18	0.54
STOCKOPTION	0.20	0.19	0.00	0.00	0.16	0.31	0.78
SHAREHOLDING	0.37	1.18	0.00	0.00	0.01	0.14	8.22
<i>Control variables</i>							
POSTSOX	0.80	0.40	0.00	1.00	1.00	1.00	1.00
LEVERAGE	0.49	0.20	0.08	0.34	0.50	0.64	0.97
BP	0.46	0.29	0.01	0.26	0.41	0.61	1.53
SIZE	7.60	1.46	4.72	6.55	7.41	8.51	11.69
ROA	0.12	0.07	0.01	0.07	0.10	0.15	0.37
EQ	0.02	0.01	0.00	0.01	0.01	0.02	0.04
GFC	0.12	0.32	0.00	0.00	0.00	0.00	1.00

This table reports the descriptive statistics of variables for the sample of 11,649 firm-year observations. COE = cost of equity capital; BONUS = percentage of compensation in the form of bonuses earned by the executives during the current financial year; STOCKOPTION = percentage of compensation in the form of value of stock options to the executives during the current financial year; SHAREHOLDING = percentage of total shares outstanding held by the executives at the balance sheet date, excluding options; POSTSOX = 1 if the year is 2002–2014, and 0 otherwise; LEVERAGE = financial leverage measured by the ratio of total debt to total assets at the end of the fiscal year; BP = ratio of book value of equity to market value of equity at the end of the fiscal year; SIZE = size measured by the natural logarithm of the market value of common equity at the end of the fiscal year; ROA = return on assets calculated as the ratio of earnings before interest and tax divided by total assets; EQ = earnings quality measured as the standard deviation of the residual using the [Dechow and Dichev \(2002\)](#) approach; GFC = 1 if the year is 2007–2008, and 0 otherwise.

4.2. Regressions

Table 3 reports the regression results of association between the cost of equity capital and three components of executive compensation (BONUS, STOCKOPTION, and SHAREHOLDING). In addition, this table presents the lessening effects of SOX on the relationship between the cost of equity capital and three types of executive compensation (BONUS*POSTSOX, STOCKOPTION*POSTSOX, and SHAREHOLDING*POSTSOX). Separate analyses are performed for the top five highest-paid executives, CEO, CFO, and non-CEO and non-CFO executives.

Table 3. Regression analysis of the lessening effects of SOX on the relationship between cost of equity capital and executive compensation components.

Variables	Top Five Highly Paid Executives	CEO	CFO	Other Executives (Non-CEO and Non-CFO)
BONUS	−0.087 *** (−11.25)	−0.065 *** (−10.52)	−0.060 *** (−8.81)	−0.075 *** (−10.20)
STOCKOPTION	−0.003 (−0.59)	−0.003 (−0.71)	0.001 (0.21)	−0.002 (−0.51)
SHAREHOLDING	−0.001 ** (−1.76)	−0.001 ** (−1.73)	−0.006 * (−1.27)	−0.001 *** (−2.21)
BONUS*POSTSOX	0.040 *** (4.74)	0.033 *** (4.86)	0.024 *** (3.24)	0.034 *** (4.25)
STOCKOPTION*POSTSOX	0.017 *** (3.37)	0.013 *** (3.40)	0.010 *** (2.57)	0.015 *** (3.21)
SHAREHOLDING*POSTSOX	0.001 (0.21)	−0.001 (−0.10)	−0.001 (−0.04)	0.001 ** (1.71)
POSTSOX	−0.004 (−1.24)	−0.002 (−0.56)	0.001 (0.30)	−0.003 (−0.99)
LEVERAGE	0.052 *** (13.67)	0.050 *** (13.11)	0.052 *** (13.53)	0.052 *** (13.50)
BP	0.063 *** (27.88)	0.064 *** (27.95)	0.064 *** (28.26)	0.064 *** (27.92)
SIZE	0.004 *** (4.49)	0.004 *** (4.04)	0.004 *** (4.14)	0.004 *** (4.40)
ROA	−0.019 *** (−2.24)	−0.025 *** (−2.88)	−0.025 *** (−2.96)	−0.024 *** (−2.82)
EQ	0.043 (0.52)	0.053 (0.63)	0.038 (0.45)	0.053 (0.64)
GFC	0.014 *** (6.70)	0.014 *** (6.51)	0.013 *** (6.25)	0.014 *** (6.65)
Constant	0.026 *** (2.85)	0.028 *** (3.18)	0.025 *** (2.73)	0.026 *** (2.79)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Adjusted R ²	0.536	0.532	0.530	0.533

This table reports the results from regressions of cost of equity capital on each type of executive compensations and the lessening effects of SOX, including year and firm fixed effects. For each variable, the regression coefficient is reported, followed by the *t*-statistic and *p*-value (two-tailed). *, **, and *** denote significance at 10 percent, 5 percent, and 1 percent levels, respectively. COE = cost of equity capital; BONUS = percentage of compensation in the form of bonuses earned by the executives during the current financial year; STOCKOPTION = percentage of compensation in the form of value of stock options to the executives during the current financial year; SHAREHOLDING = percentage of total shares outstanding held by the executives at the balance sheet date, excluding options; BONUS*POSTSOX = an interaction term between BONUS and POSTSOX; STOCKOPTION*POSTSOX = an interaction term between STOCKOPTION and POSTSOX; SHAREHOLDING*POSTSOX = an interaction term between SHAREHOLDING and POSTSOX; POSTSOX = 1 if the year is 2002–2014, and 0 otherwise; LEVERAGE = financial leverage measured by the ratio of total debt to total assets at the end of the fiscal year; BP = ratio of book value of equity to market value of equity at the end of the fiscal year; SIZE = size measured by the natural logarithm of the market value of common equity at the end of the fiscal year; ROA = return on assets calculated as the ratio of earnings before interest and tax divided by total assets; EQ = earnings quality measured as the standard deviation of the residual using the [Dechow and Dichev \(2002\)](#) approach; GFC = 1 if the year is 2007–2008, and 0 otherwise.

Each model of Table 3 shows the adjusted R-squared value higher than 0.530. The coefficients of BONUS and SHAREHOLDING are negative and significant, showing that bonus and shareholdings of the top five highly paid executives, CEO, CFO, and other executives (non-CEO and non-CFO) are associated with a lower cost of equity capital. Therefore, the results support H1 and H3. The coefficient of STOCKOPTION is not statistically significant, suggesting that the stock options of the top five highly paid executives, CEO, CFO, and other executives (non-CEO and non-CFO) are not related to the cost of equity capital. Therefore, H2 is not supported by the results.

Remarkably, the coefficients of BONUS*POSTSOX are significant with a positive sign. These results indicate that SOX lessens the association between the cost of equity capital and the bonuses of all top five highly paid executives, CEO, CFO, and other executives (non-CEO and non-CFO). The coefficients of STOCK OPTION*POSTSOX are significant with a positive sign. These results indicate that SOX weakens the association between the cost of equity capital and the stock options of the top five highly paid executives, CEO, CFO, and other executives (non-CEO and non-CFO). The coefficients of SHAREHOLDING*POSTSOX for all top five highly paid executives, CEO, and CFO are not statistically significant. However, the coefficient of SHAREHOLDING*POSTSOX for other executives (non-CEO and non-CFO) is significant with a positive sign. These results indicate that SOX lessens the relationship between the cost of equity capital and other three executives (non-CEO and non-CFO) shareholdings, but not the top two, CEO and CFO shareholdings. This evidence is consistent with the findings of [Hillier et al. \(2022\)](#) that find no significant differences in the CEO's risky investment decisions between the pre- and post-SOX periods in relation to common stock grants. Taken together, overall, the positive and significant sign in the interaction variables support the argument that SOX weakens the relationship between the three components of executive compensation and the cost of equity capital. Therefore, the results support H4, H5, and H6.

5. Conclusions

Each component of executive compensation differs in its nature, which leads to differences in the executive incentives and investor's pricing. However, these relationships might be weakened by SOX. Therefore, this study examines the association between executive compensation components and cost of equity capital. In addition, the lessening effects of SOX are investigated in this study. The requirements of Section 304 of SOX are directly involved with executive bonuses, stock options, and shareholdings, but not with other components of executive remuneration. Therefore, the investigations in this study are limited to these three components of executive compensation. Based on 11,649 firm-year observations of publicly listed companies in the United States from 1998 to 2014, the results reveal that the cost of equity capital is negatively related to executive bonuses and shareholdings, but not executive stock options. Moreover, SOX significantly lessens the association between the cost of equity capital and executive bonuses and stock options for all top five executives. However, SOX weakens the association between the cost of equity capital and shareholdings, only for the three non-CEO and non-CFO executives. This study underlines how investors perceive managerial compensation incentives as less effective in their pricing, due to the change in regulatory environment invoked by SOX. Despite these results from the United States, it would be useful to further investigate how regulatory regimes have changed in other business environments, such as those in Europe and Asia, and how this has affected the correlation between executive pay and the cost of equity capital. Furthermore, as documented in prior studies (e.g., [Belkhir and Boubaker 2013](#); [Belkhir et al. 2018](#); [Boubaker et al. 2020](#); [Wei and Yermack 2011](#)), it would be fruitful for future research to address the limitation of this paper by expanding the investigation to include another important component of executive compensation, that is executive inside debt.

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References

- Agha, Mahmoud. 2013. Leverage, executive incentives and corporate governance. *Accounting & Finance* 53: 1–30. [CrossRef]
- Agrawal, Anup, and Gershon N. Mandelker. 1987. Managerial incentives and corporate investment and financing decisions. *The Journal of Finance* 42: 823–37. [CrossRef]
- Anderson, Mark C., Rajiv D. Banker, and Sury Ravindran. 2000. Executive compensation in the information technology industry. *Management Science* 46: 530–47. [CrossRef]
- Belkhir, Mohamed, and Sabri Boubaker. 2013. CEO inside debt and hedging decisions: Lessons from the U.S. banking industry. *Journal of International Financial Markets, Institutions and Money* 24: 223–46. [CrossRef]
- Belkhir, Mohamed, Sabri Boubaker, and Kaouther Chebbi. 2018. CEO inside debt and the value of excess cash. *Journal of Applied Accounting Research* 19: 225–44. [CrossRef]
- Boone, Jeff P., Inder K. Khurana, and Kris K. Raman. 2008. Audit firm tenure and the equity risk premium. *Journal of Accounting, Auditing & Finance* 23: 115–40. [CrossRef]
- Boone, Jeff P., Inder K. Khurana, and K. Raman. 2011. Investor pricing of CEO equity incentives. *Review of Quantitative Finance and Accounting* 36: 417–35. [CrossRef]
- Botosan, Christine A., and Marlene A. Plumlee. 2002. A re-examination of disclosure level and the expected cost of equity capital. *Journal of Accounting Research* 40: 21–40. [CrossRef]
- Botosan, Christine A., and Marlene A. Plumlee. 2005. Assessing alternative proxies for the expected risk premium. *The Accounting Review* 80: 21–53. [CrossRef]
- Botosan, Christine A., Marlene A. Plumlee, and He Wen. 2011. The relation between expected returns, realized returns, and firm risk characteristics. *Contemporary Accounting Research* 28: 1085–122. [CrossRef]
- Boubaker, Sabri, Kaouther Chebbi, and Jocelyn Grira. 2020. Top management inside debt and corporate social responsibility? Evidence from the US. *The Quarterly Review of Economics and Finance* 78: 98–115. [CrossRef]
- Brennan, Michael J., and Avanidhar Subrahmanyam. 1996. Market microstructure and asset pricing: On the compensation for illiquidity in stock returns. *Journal of Financial Economics* 41: 441–64. [CrossRef]
- Bromiley, Philip. 1991. Testing a causal model of corporate risk taking and performance. *Academy of Management Journal* 34: 37–59. [CrossRef]
- Bryan, Stephen, LeeSeok Hwang, and Steven Lilien. 2000. CEO stock-based compensation: An empirical analysis of incentive-intensity, relative mix, and economic determinants. *The Journal of Business* 73: 661–93. [CrossRef]
- Carpenter, Jennifer N. 2000. Does option compensation increase in managerial risk appetite? *Journal of Finance* 55: 2311–31. [CrossRef]
- Carpenter, Mason A., and Wm Gerard Sanders. 2002. Top management team compensation: The missing link between CEO pay and firm performance? *Strategic Management Journal* 23: 367–75. [CrossRef]
- Carter, Mary Ellen, Luann J. Lynch, and Sarah L. C. Zechman. 2005. The Relation between Executive Compensation and Earnings Management: Changes in the Post-Sarbanes-Oxley Era. Working Paper. pp. 1–33. Available online: http://w4.stern.nyu.edu/accounting/docs/speaker_papers/fall2005/Carter_Changes_PostSarbanesOxley.pdf (accessed on 9 June 2022).
- Chang, Hsihui, Guy D. Fernando, and Woody Liao. 2009. Sarbanes-Oxley Act, perceived earnings quality and cost of capital. *Review of Accounting & Finance* 8: 216–31. [CrossRef]
- Chang, Hsihui, Hiu Lam Choy, and Kam-Ming Wan. 2012. Effect of the Sarbanes–Oxley Act on CEOs’ stock ownership and pay-performance sensitivity. *Review of Quantitative Finance and Accounting* 38: 177–207. [CrossRef]
- Chen, Yangyang, Cameron Truong, and Madhu Veeraraghavan. 2015. CEO risk-taking incentives and the cost of equity capital. *Journal of Business Finance & Accounting* 42: 915–46. [CrossRef]
- Claus, James, and Jacob Thomas. 2001. Equity premia as low as three percent? Evidence from analysts’ earnings forecasts for domestic and international stock markets. *The Journal of Finance* 56: 1629–66. [CrossRef]
- Cohen, Daniel A., Aiysha Dey, and Thomas Z. Lys. 2007. The Sarbanes Oxley Act of 2002: Implications for Compensation Contracts and Managerial Risk-Taking. Working Paper. pp. 1–43. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1027448 (accessed on 9 June 2022).
- Cohen, Daniel A., Aiysha Dey, and Thomas Z. Lys. 2008. Real and accrual-based earnings management in the pre- and post-Sarbanes-Oxley periods. *The Accounting Review* 83: 757–87. [CrossRef]
- Coles, Jeffrey L., Naveen D. Daniel, and Lalitha Naveen. 2006. Managerial incentives and risk-taking. *Journal of Financial Economics* 79: 431–68. [CrossRef]
- Dechow, Patricia M., and Ilia D. Dichev. 2002. The quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review* 77: 35–59. [CrossRef]
- Deutsch, Yuval, Thomas Keil, and Tomi Laamanen. 2010. A dual agency view of board compensation: The joint effects of outside director and CEO stock options on firm risk. *Strategic Management Journal* 32: 212–27. [CrossRef]
- Devers, Cynthia E., Albert A. Cannella, Gregory P. Reilly, and Michele E. Yoder. 2007. Executive compensation: A multidisciplinary review of recent developments. *Journal of Management* 33: 1016–72. [CrossRef]
- Devers, Cynthia E., Gerry McNamara, Robert M. Wiseman, and Mathias Arrfelt. 2008. Moving closer to the action: Examining compensation design effects on firm risk. *Organization Science* 19: 548–66. [CrossRef]

- Dhaliwal, Dan, Linda Krull, and Oliver Zhen Li. 2007. Did the 2003 tax act reduce the cost of equity capital? *Journal of Accounting and Economics* 43: 121–50. [\[CrossRef\]](#)
- Dhaliwal, Dan, Shane Heitzman, and Oliver Zhen Li. 2006. Taxes, leverage, and the cost of equity capital. *Journal of Accounting Research* 44: 691–723. [\[CrossRef\]](#)
- Easton, Peter D. 2004. PE ratios, PEG ratios, and estimating the implied expected rate of return on equity capital. *The Accounting Review* 79: 73–95. [\[CrossRef\]](#)
- Eisenmann, Thomas R. 2002. The effects of CEO equity ownership and firm diversification on risk taking. *Strategic Management Journal* 23: 513–34. [\[CrossRef\]](#)
- Fama, Eugene F., and Kenneth R. French. 1992. The cross-section of expected stock returns. *The Journal of Finance* 47: 427–65. [\[CrossRef\]](#)
- Fama, Eugene F., and Kenneth R. French. 1997. Industry costs of equity. *Journal of Financial Economics* 43: 153–93. [\[CrossRef\]](#)
- Fee, C. Edward, and Charles J. Hadlock. 2004. Management turnover across the corporate hierarchy. *Journal of Accounting and Economics* 37: 3–38. [\[CrossRef\]](#)
- Francis, Jennifer, Ryan LaFond, Per Olsson, and Katherine Schipper. 2005. The market pricing of accruals quality. *Journal of Accounting and Economics* 39: 295–327. [\[CrossRef\]](#)
- Gebhardt, William R., Charles M. C. Lee, and Bhaskaran Swaminathan. 2001. Toward an implied cost of capital. *Journal of Accounting Research* 39: 135–76. [\[CrossRef\]](#)
- Geiger, Marshall A., and Porcher L. Taylor III. 2003. CEO and CFO certifications of financial information. *Accounting Horizons* 17: 357–68. [\[CrossRef\]](#)
- Gode, Dan, and Partha Mohanram. 2003. Inferring the cost of capital using the Ohlson–Juettner model. *Review of Accounting Studies* 8: 399–431. [\[CrossRef\]](#)
- Gordon, Joseph R., and Myron J. Gordon. 1997. The finite horizon expected return model. *Financial Analysts Journal* 53: 52–61. [\[CrossRef\]](#)
- Hail, Luzi, and Christian Leuz. 2006. International differences in the cost of equity capital: Do legal institutions and securities regulation matter? *Journal of Accounting Research* 44: 485–531. [\[CrossRef\]](#)
- Harford, Jarrad, and Kai Li. 2007. Decoupling CEO wealth and firm performance: The case of acquiring CEOs. *The Journal of Finance* 62: 917–49. [\[CrossRef\]](#)
- Hillier, David, Patrick McColgan, and Athanasios Tsekeris. 2022. How did the Sarbanes–Oxley Act affect managerial incentives? Evidence from corporate acquisitions. *Review of Quantitative Finance and Accounting* 58: 1395–450. [\[CrossRef\]](#)
- Jensen, Michael C., and William H. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3: 305–60. [\[CrossRef\]](#)
- Kabir, Rezaul, Hao Li, and Yulia V. Veld-Merkoulova. 2013. Executive compensation and the cost of debt. *Journal of Banking & Finance* 37: 2893–907. [\[CrossRef\]](#)
- Khurana, Inder K., and Karthik Raman. 2004. Litigation risk and the financial reporting credibility of Big 4 versus non-Big 4 audits: Evidence from Anglo-American countries. *The Accounting Review* 79: 473–95. [\[CrossRef\]](#)
- Lambert, Richard A., and David F. Larcker. 1987. An analysis of the use of accounting and market measures of performance in executive compensation contracts. *Journal of Accounting Research* 25: 85–125. [\[CrossRef\]](#)
- Larrazza-Kintana, Martin, Robert M. Wiseman, Luis R. Gomez-Mejia, and Theresa M. Welbourne. 2007. Disentangling compensation and employment risks using the behavioral agency model. *Strategic Management Journal* 28: 1001–19. [\[CrossRef\]](#)
- Lobo, Gerald J., and Jian Zhou. 2006. Did conservatism in financial reporting increase after the Sarbanes-Oxley Act? Initial evidence. *Accounting Horizons* 20: 57–73. [\[CrossRef\]](#)
- Meek, Gary K., Ramesh P. Rao, and Christopher J. Skousen. 2007. Evidence on factors affecting the relationship between CEO stock option compensation and earnings management. *Review of Accounting and Finance* 6: 304–23. [\[CrossRef\]](#)
- Mehran, Hamid. 1995. Executive compensation structure, ownership, and firm performance. *Journal of Financial Economics* 38: 163–84. [\[CrossRef\]](#)
- Mian, Shehzad. 2001. On the choice and replacement of chief financial officers. *Journal of Financial Economics* 60: 143–75. [\[CrossRef\]](#)
- Nyberg, Anthony J., Ingrid Smithey Fulmer, Barry Gerhart, and Mason A. Carpenter. 2010. Agency theory revisited: CEO return and shareholder interest alignment. *Academy of Management Journal* 53: 1029–49. [\[CrossRef\]](#)
- Ohlson, James A., and Beate E. Juettner-Nauroth. 2005. Expected EPS and EPS growth as determinants of value. *Review of Accounting Studies* 10: 349–65. [\[CrossRef\]](#)
- Peráček, Tomáš. 2021. Flexibility of creating and changing employment in the options of the Slovak Labor Code. *Problems and Perspectives in Management* 19: 373–82. [\[CrossRef\]](#)
- Rajgopal, Shivaram, and Terry Shevlin. 2002. Empirical evidence on the relation between stock option compensation and risk taking. *Journal of Accounting and Economics* 33: 145–71. [\[CrossRef\]](#)
- Ross, Stephen A. 2004. Compensation, incentives, and the duality of risk aversion and riskiness. *The Journal of Finance* 59: 207–25. [\[CrossRef\]](#)
- Salman, Fazlina Mohd, and Elizabeth Carson. 2009. The impact of the Sarbanes-Oxley Act on the audit fees of Australian listed firms. *International Journal of Auditing* 13: 127–40. [\[CrossRef\]](#)
- Sanders, Wm Gerard. 2001. Behavioral responses of CEOs to stock ownership and stock option pay. *Academy of Management Journal* 44: 477–92. [\[CrossRef\]](#)

- Sanders, Wm Gerard, and Donald C. Hambrick. 2007. Swinging for the fences: The effects of CEO stock options on company risk taking and performance. *Academy of Management Journal* 50: 1055–78. [[CrossRef](#)]
- Seetharaman, Ananth, Ferdinand A. Gul, and Stephen G. Lynn. 2002. Litigation risk and audit fees: Evidence from UK firms cross-listed on US markets. *Journal of Accounting and Economics* 33: 91–115. [[CrossRef](#)]
- Smith, Clifford W., and Ross L. Watts. 1992. The investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Financial Economics* 32: 263–92. [[CrossRef](#)]
- Vafeas, Nikos, and James Waagelein. 2007. The association between audit committees, compensation incentives, and corporate audit fees. *Review of Quantitative Finance and Accounting* 28: 241–55. [[CrossRef](#)]
- Wei, Chenyang, and David Yermack. 2011. Investor reactions to CEOs' inside debt incentives. *The Review of Financial Studies* 24: 3813–40. [[CrossRef](#)]
- Williams, Mellisa A., and Ramesh P. Rao. 2006. CEO stock options and equity risk incentives. *Journal of Business Finance & Accounting* 33: 26–44. [[CrossRef](#)]
- Wiseman, Robert M., and Philip Bromiley. 1996. Toward a model of risk in declining organizations: An empirical examination of risk, performance and decline. *Organization Science* 7: 524–43. [[CrossRef](#)]
- Wright, Peter, Mark Kroll, Augustine Lado, and Bonnie Van Ness. 2002. The structure of ownership and corporate acquisition strategies. *Strategic Management Journal* 23: 41–53. [[CrossRef](#)]
- Wright, Peter, Mark Kroll, Jeffrey A. Krug, and Michael Pettus. 2007. Influences of top management team incentives on firm risk taking. *Strategic Management Journal* 28: 81–89. [[CrossRef](#)]
- Zhang, Ivy Xiyang. 2007. Economic consequences of the Sarbanes–Oxley Act of 2002. *Journal of Accounting and Economics* 44: 74–115. [[CrossRef](#)]
- Žofčinová, Vladimíra, Zuzana Horváthová, and Andrea Čajková. 2018. Selected social policy instruments in relation to tax policy. *Social Sciences* 7: 241. [[CrossRef](#)]