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An Analysis of the Relative Importance of Performance Measures in Top Executive Stock-Based Compensation Contract

Yu-Shun Hung

Department of Accounting

Tamkang University

Tay-Chang Wang

Department of Accounting

National Taiwan University

Abstract

The purpose of this paper is to investigate whether the relative importance of accounting and market performance measures in executive stock-based compensation contracts would be affected by corporate characteristics, such as the growth opportunity, size, risk and financial leverage of the corporation. Our results show that the President's stock-based compensation reacts differently to accounting and market performance measures when considering corporate characteristics. We also find that the change-form and level-form of model specification may have different implications.

For firms with higher growth opportunity and larger size, the accounting performance measure would have lower sensitivity in the level of the President's stock-based compensation. Further, for firms with a more uncertain environment and higher financial leverage, the accounting performance measure would have higher sensitivity in the level of the President's stock-based compensation. Conversely, for firms with larger size and higher uncertainty, market performance measure would have lower sensitivity in the level of the President's stock-based compensation. These findings indicate that corporations would substitute the internal accounting performance measure for external market performance measure to evaluate the President's actions when they face greater uncertainty of the external environment and debtholders.

1. INTRODUCTION

In 2004, BUSINESS WEEKLY, one Taiwan's well-known magazine, surveyed 866 of Taiwan's publicly held companies and reported [1] that the average compensation of the president is NT$ 4050 thousand while the average return on net worth is 7.07%. Further, over 25% of the presidents had increasing compensation while the return on net worth was dropping. Similarly, a report by FORTUNE on April 14th, 2003 shows that "Average U.S. CEO's median compensation rose 14% to $13.2 million when the total return of the S&P 500 was down 22.1%." This phenomenon shows that the relationship between CEO compensation and firm performance is not clearly positive. Early research investigating the correlation between CEO compensation and firm performance found similar results: some were positively correlated (Jensen and Murphy 1990; Kaplan 1994; Ku 1997; Tseng 2000) and others were negatively or uncorrelated (Kerr and Bettis 1987; Lin 1989; Hsiao 1993). Thus, recent research progressively explored the reasons behind these different results. For example, these results really meant that corporate performances were not the evaluation criterion of CEO's remuneration, or some other important factors affected the relationship between them (Lambert and Larcker 1987; Sloan 1993; Aggarwal and Samwick 1999b; Baker and Hall 2004). This paper would like to explore whether the relationship between corporate performance and president remuneration[2] is affected by certain important decisive factors, such as the firm's characteristics.

What we are interested in this paper is a specific compensation system, namely, stock bonus to employees, which has promoted Taiwan's economic growth for decades. In recent years, the movement in US companies from option granting to issuances of restricted stock is similar to the bonus stock grant being made in Taiwan. For instance, Microsoft, Amazon and over 300 international enterprises, are increasing their restricted stocks for the CEO in lieu of stock options. They realize that the form of the restricted stock in CEO's compensation contract is a more effective incentive mechanism (Jenter 2001; Hall and Murphy 2002). Although restricted stock is a little different from the form of direct stock bonus in Taiwan, they both emphasize the importance of stock compensation for CEO's (or the President's) incentives. Thus, our interest is to investigate the content of the President's stock-based compensation of publicly traded companies in Taiwan. This study can help to understand the pay-performance-sensitivity of direct stock bonus

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[1] BUSINESS WEEKLY, Iss.874, pp. 94-98, written by P. S. Liu.
[2] Since the highest title holder for most Taiwan's companies is the President rather than the CEO, we use the word "President" in the rest of this paper, except in the cited literature.

for the President in Taiwanese firms, and further offer the basis for comparing the difference in pay-performance-sensitivity between the direct stock bonus in Taiwan and stock option grants in the U.S.

Recently, many scholars focus on the "corporate governance" and try to investigate corporate control mechanisms that discipline the behavior of managers in alignment with the goal of investors (Jensen and Murphy 1990; Aggarwal and Samwick 1999a, 1999b; Core, Holthausen and Larcker 1999; DeFond and Park 1999; Murphy 1999; Davila and Penalva 2005; Goldman and Slezak 2006). These control mechanisms include internal mechanisms, such as managerial incentive contracts and director monitoring, and external mechanisms, such as market for corporate control, market for managerial labor and competition in the product market (Bushman and Smith 2001). However, there is lack of a comprehensive study on how certain corporate characteristics affect the linkage between different performance measures and the President's stock-based compensation after controlling other corporate characteristics. Since many corporate features (such as corporate size and risk) will influence the incentive of the President, as mentioned by Core and Guay (2001), they need to be controlled.

In domestic research, prior literature studied the key factors of compensation for the President (Tseng 2000; Wu 2000). However, much of this research examined the President's cash-based compensation and showed inconsistent results (Lin and Liu 1997; Lin 1996; Shi 1996; Chen 2001). The probable reason is the shortage of public data on the President's compensation in the period prior to 1996. Most of the early research was conducted by using survey, case studies or single-year data, which may provide inconclusive evidence. As the public data are available, we would like to improve the research design and explore the President's stock-based compensation, an important distinctive compensation system contributing to Taiwan's economic growth. Specifically, this paper studies how the relative importance of accounting versus market performance measures in the President's stock-based compensation is affected by corporate characteristics, such as firm size, growth opportunity, risk and financial leverage.

Our results indicate that the President's stock-based compensation has different sensitivity to accounting and market performance measures when considering the corporate characteristics. We also find that the change-form and level-form of model specification may have different implications. Specifically, when firms have significant investment opportunities, current earnings cannot accurately reflect the future economic consequences of the President's current actions, and thus, the

sensitivity of the accounting performance measure on the President's stock-based compensation would be lower. In addition, the result also indicates that the market performance measure in the firms with higher growth opportunities will bring about a higher linkage to the change in the President's stock-based compensation, but will not lead to a higher level of the President's stock pay. When the firm's size is increasing, the sensitivities of both accounting and market performance measures would be lower in the level of the President's stock-based compensation. This seems that a single financial performance measure can't perfectly represent the outcomes of the President's behavior in large companies. In addition, we also find that the change-form and level-form of the President's stock remuneration have different sensitivity to the market performance measure.

Moreover, the findings show that when the external environment is more uncertain, the external performance measure (i.e. market performance measure) would be replaced by the internal one (accounting performance measure) as the basis for evaluating the President's actions. In this way, accounting performance measure can reduce the market noise uncontrolled by the President. When the financial leverage of the firm is higher, debtholders would be more concerned with the solvency and profitability of the firm, and thus would prefer firms to link accounting performance measure with the level of the President's stock-based compensation. Moreover, the level and change forms of the President's stock compensation have diverse sensitivity to the accounting performance measure.

The contributions of this paper are as follows. First, a lot of related literature investigates the determinants of the President's compensation (Jensen and Murphy 1990; Kaplan 1994; Anderson, Banker and Ravindran 1999; Wu 2000; Tseng 2000), or certain factor affecting pay-performance-sensitivity (Baber, Janakiraman and Kang 1996; Schaefer 1998; Aggarwal and Samwick 1999b). However, as stated by Core and Guay (2001), some firm characteristics influence the President's incentives, such as risk, size, and other proxies for monitoring costs. Thus, this paper simultaneously includes several factors to explore the impact on the relative importance of different performance measures in the President's stock-based compensation. The main advantage is to eliminate the omitted variable bias problem of the empirical model. Second, this paper empirically investigates the existing theories to verify the application of the President's stock-based compensation contributing to successful growth of Taiwan's economy. Third, the empirical implication of this paper is to give suggestions to enterprises to flexibly apply stock-based compensation depending on the specific corporate characteristics. Finally, the results could be the foundation of theoretical research in the near future.

The rest of the paper is organized as follows. Section 2 develops the research hypotheses. Section 3 describes the variable measurement, sample selection, and empirical models. The empirical results are presented and discussed in section 4, while section 5 analyzes the sensitivity test. Finally, section 6 concludes the implication of the paper's findings and limitations.

2. HYPOTHESIS DEVELOPMENT

In this study, we would like to explore the determinants of the relationship between the President's stock-based remuneration and corporate performance. Specifically, we focus on four corporate characteristics: firm size, risk, growth opportunity, and financial leverage.

First, agency theory shows that when the corporate growth opportunity is high, the sensitivity of CEO's pay with respect to accounting numbers would be low (Smith and Watts 1992; Gaver and Gaver 1993). One possible reason is that current earnings will poorly reflect the future consequences caused by current CEO actions (Bushman and Smith 2001). Baber et al. (1996) empirically found that when the corporate growth opportunity is higher, the CEO's total and equity-based compensation are more significantly sensitive to the market performance measure, but the sensitivity of the CEO's total and equity-based compensation to the accounting performance does not significantly decrease. Their result is inconsistent with agency theory's proposition. We think the possible reason is that Baber et al.'s model simply focused on the influences of the growth variables, but other essential correlated variables were not included in the model, such as firm size. As indicated by Clinch (1991), the size of the corporation would affect the relationships between R&D (to proxy for the potential growth opportunity of the corporation), the CEO's compensation and corporate performance.

On the other hand, because of data limitations, domestic research only investigated the President's cash-based compensation using a cross-sectional study (Shi 1996; Jiang 2001). Thus, we would like to add to prior research by considering other important correlated variables, such as the size of the corporation, risk of the corporation, etc. Theoretically, according to agency theory, the relationship between CEO's compensation and accounting performance is lower when the corporation has higher potential growth opportunity. This is because stock returns can better reflect the future consequences caused by current CEO actions, whereas current accounting numbers can't (Bushman and Smith 2001).

Thus if we consider the indicators of accounting performance and market performance at the same time, then we expect a greater reliance on market performance and stock-based compensation. According to the above inference, the hypothesis H1 is as follows:

H1: The larger the growth opportunity of the corporation, the President's stock-based compensation will be relatively more sensitive to market performance as compared to accounting performance.

Second, Schaefer (1998) investigated the relationship between firm size and pay-performance sensitivity (i.e. the sensitivity of CEO compensation to change in shareholder wealth), and found that the square root of firm size seemed to be inversely related to pay-performance sensitivity. However, Schaefer only studied the market performance measure, specifically the correlation between the change in shareholder wealth and CEO compensation (including short-term and long-term incentive compensation). He didn't explore the relationship between the accounting performance measure and CEO compensation. On the other hand, domestic research only studied cash compensation with a simplistic model using a short sample period (e.g., a single year) and dummy variables to proxy for firm size (Shi 1996; Jiang 2001).

Thus, this paper explores the effect of firm size on the relationship between different performance measures and the President's stock-based compensation. Specifically, we examine whether Schaefer's findings would be applied using a different pay-performance measure. In addition, when the firm size is larger, the President is in charge of more complex jobs, and the single financial performance indicator can't completely reflect the economic consequence of the President's actions. Thus, if both accounting and market performance measures are considered, firm size will be inversely related to the relationship between both measures and the President's stock compensation. According to the above description, we propose hypothesis H2, as follows:

H2: The larger the size of the corporation, the President's stock-based compensation will be less sensitive to both market performance and accounting performance.

Third, agency theory infers the trade-off relationship between incentive and risk, and suggests that CEO's pay-performance sensitivity decreases with the variance in corporate performance (Holmstrom and Milgrom 1987). However, the managerial ownership literature infers that when the operating environment becomes more uncertain, CEOs' pay-performance sensitivity should be higher to

encourage the CEO to choose projects in favor of shareholders (Smith and Watts 1992; Prendergast 1999, 2000). The theoretical studies reach different conclusions, and do not analyze the variation in different performance measures. Thus, we would like to empirically test the linkage between different performance measures (i.e. accounting and market performance measure) and specific compensation systems (i.e. the President's stock compensation) to see whether the results would support the principal-agent model or managerial ownership research.

In empirical research, Aggarwal and Samwick (1999b) found results in favor of agency theory; however, they only examined market performance measures. We suggest that since the CEO, in general, is risk-averse, he would not like his wealth to be greatly affected by uncontrollable factors. Thus, in a more uncertain environment, the CEO would not like a high linkage between his stock compensation and market performance measures, since it contains more uncontrollable factors than the accounting performance measures.

In addition, since the market performance measure is more sensitive to the market-wide noise than the accounting performance measure (Sloan 1993), we infer the market performance measure is more related to market risk, and predict that the corporate risk will play a more negative role in the association between the President's stock-based compensation and market performance relative to accounting performance. Additionally, Core and Guay (2001) found that corporate size will influence the relationship between corporate risk and CEO pay-performance sensitivity. The above discussion suggests H3 as follows:

> **H3: The greater the risk of the corporation, the President's stock-based compensation will be relatively less sensitive to market performance as compared to accounting performance.**

Finally, as for the leverage ratio of the corporation, John and John (1993) inferred that when a firm is financed by both equity and risky debt, CEO's pay-to-shareholder-wealth sensitivity should be lower. The reason is that when firms have various capital providers (including stockholders and debtholders), the function of managerial compensation contract is to align managerial incentive with stockholders' interest, but also to reduce the debt agency cost as the precommitment mechanism. Thus, the design of managerial compensation is not only to align the stockholders' interests, but also to reduce the agency costs of debt. Therefore, John and John (1993) derived a negative relationship between pay-performance sensitivity and leverage.

This paper tests the theoretical work of John and John (1993) and studies how the firm's financial leverage affects the relative importance of different performance measures in the President's stock-based compensation. In particular, for a firm financed with both equity and risky debt, CEO's pay-to-shareholder-wealth sensitivity should be lower as inferred by John and John (1993). We predict that for the firm with higher financial leverage, the sensitivity of the President's stock-based compensation to the market performance measure will be relatively less, compared to accounting performance. According to the above description, we propose hypothesis H4, as follows:

H4: **The larger the financial leverage, the President's stock-based compensation will be relatively less sensitive to market performance as compared to accounting performance.**

3. METHOD OF RESEARCH

3.1 OPERATIONAL DEFINITION OF VARIABLES

3.1.1 Dependent Variables

A. The President's Stock-Based Compensation ($COMP(S)$)

According to the financial statement data of publicly-listed and over-the-counter companies, the available information of the President's compensation includes only the gross amount, which does not separately list cash-based and stock-based figures. Similar to Lin and Hu (2003), this paper uses the public data of the President's stock holdings to evaluate his stock-based compensation. First, we calculate the per-month change in the President's stock holdings. Parallel to Lin and Hu (2003)[3], we find that the change in the President's stock holdings occurs almost only on stock ex-rights dates or dividend pay-out dates. Thus, we focus on the change in the ex-rights month[4] per year. After adjusting the stock dividends, we can get the amounts which are possibly due to stock bonus granted. The possibility of over- or under-estimation is not high. Moreover, this paper evaluates the stock price of the President's compensation using the assumed

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[3] Based on the sample data of Lin and Hu (2003), on average, the per-month change in the President's stock holdings is only 1.7 times annually during research period.

[4] A small part of publicly-listed and over-the-counter companies adjusts the President's stock holdings data in stock dividend pay-out date. Thus, these data are made by handy adjustments.

ex-rights price[5]. After multiplying by the assumed ex-rights price, we get the market value of the President's stock-based compensation.

Since compensation plans often exhibit substantial nonlinearities (Bushman and Smith 2001; Murphy 1999), this paper uses log compensation (Murphy 1985; Sloan 1993; Anderson et al. 1999). In addition, Boschen and Smith (1995) and Anderson et al. (1999) found that the change in CEO compensation was not persistent over time when using the change in CEO compensation as the dependent variable[6]. Thus, similar to the specification of Anderson et al. (1999), we use the level of the President's log-transformed compensation as the dependent variable. We also include a sensitivity analysis to test the change in the President's log-transformed compensation.

3.1.2 Independent Variables

A. Accounting Performance Measure (*ACC*)

When deciding the President's compensation, the corporation usually will evaluate current performance (Ittner, Lambert and Larcker 2003). In addition, the corporation generally prescribes that the stock bonus can be a ratio of corporate distributable earnings[7]. Thus, this paper involves current earnings before interests and taxes (E_t) as the indicator of accounting performance measurement.

B. Market performance measure (*MRT*)

Referring to Jensen and Murphy (1990) and Aggarwal and Samwick (1999b), this paper uses current change in shareholder wealth (SH_t) as the indicators of market performance measurement. The formula is as follows:

Current Change in Shareholder wealth= Previous-Year Market Value of Common Stockholders' Equity × Current-Year Return on Common Stock.

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[5] This paper uses the original stock price on shareholder meeting date, multiplied by (total increasing shares/original total shares outstanding). This measurement can better reflect the stock price of the President's current stock pay.

[6] Boschen and Smith (1995) suggested that the first difference specification of the compensation variable might be overly restrictive because it assumes that the change in compensation persists over time, and their finding supported the suggestion.

[7] In Taiwan, the company law stipulates that the charter requires prescribing the distribution percentage or standard of accounting earnings for employees.

C. Growth Opportunity of the Corporate (*GROWTH*)

Similar to Gaver and Gaver (1993), this paper uses common stock equities' year-end market-to-book ratio moving averaged over the eight seasons prior to the year in which the President's compensation was paid to proxy for investment opportunities.

D. Corporate Size (*SIZE*)

Following Schaefer (1998), we use the square root of the sum of the beginning-of-period stockholder equity's market value and debt's book value to proxy for corporate sizes.

E. Corporate Risk (*RISK*)

This paper uses the standard deviation of percentage stock market return for the prior eight seasons (Core et al. 1999).

F. Leverage Ratio (*LEV*)

This paper uses the ratio of the beginning-of-period total-debt's book value to total-asset's book value.

G. Stock Holding Percentages of the President (*OWN*)

Since the percentage of the President's stock holdings would affect the board of director's grant of stock pay to the President, this paper includes the President's stock holdings as a control variable.

H. Relation between the President and the board (*Director*)

Ungson and Steers (1984) showed that when CEO is familiar with the members of the board, CEO's compensation designed by the audit committee would not only depend on CEO's performance, but also on political relations. Thus, this paper uses the information whether the President serves as the member or the chair of the board to proxy for the relation between the President and the board. If the President serves as the member (*Director*), let the dummy variable be one, and zero otherwise.

I. Market Competition of Product (HHI)

Alexander and Zhou (1995) showed that the degree of product competition would affect the level of CEO's compensation, and thus, we include the product market competition as a control variable. This paper uses the Herfindahl-Hirschman Index (HHI) as the variable of the product market competition, following DeFond and Park (1999). The low value of HHI represents the high degree of market competition.

J. Industry ($INDUS$)

Finkelstein and Hambrick (1989) shows that industry classification is one determinant of CEO's compensation, and thus we include it as a control variable. According to Taiwan Economic Journal (TEJ), this paper separates the sample data into 18 industries of 2-digit SIC and uses dummy variables to proxy for the high-tech industry.

The above variables are summarized in Table 1.

Table 1   Description of Variables

Variables	Description
$ln(COMP(S)_{it})$	CEO's stock-based compensation in firm i at year t (taking natural logarithm)
ACC_{it}	Accounting performance measure in firm i at year t (EBIT(E_{it}))
MRT_{it}	Market performance measure in firm i at year t (shareholder wealth change (SH_{it}))
$GROWTH_{it}$	Corporate growth opportunity in firm i at year t
OWN_{it}	CEO's stock holdings in firm i at year t
$SIZE_{it}$	Corporate size in firm i at year t
$RISK_{it}$	Corporate risk in firm i at year t
LEV_{it}	Corporate leverage ratio in firm i at year t
HHI_{it}	Degree of product competition in firm i at year t
$INDUS_i$	Dummy variable of the industry belongs to firm i. $INDUS\{H\}_i$ represents high-tech industry, relative to $INDUS\{NH\}_i$ as non high-tech one
$Director_{it}$	Dummy variable of CEO serving as an insider director in firm i at year t
$Chair_{it}$	Dummy variable of CEO serving as the board chair in firm i at year t

$i = 1...n$ represents each sample firm.

3.2 SAMPLE COLLECTION AND EMPIRICAL MODEL

Based on the modified rule in 1995, "Guidelines Governing the Preparation of Financial Reports by Securities Issuers", the public data of the Presidents in Taiwan publicly-held companies can be collected. Thus, the research period starts from 1996. In addition, the research objectives are all public-listed and over-the-counter companies in Taiwan. The samples are collected according to the following criteria: (1) the Presidents' tenure is over one year, and the sample (i.e. firm-year observation) includes only the year of corporate performance attributed to the President; (2) The specific feature and few firm-numbers of industries are not included, such as the financial services, insurance, department stores, and non-calendar companies. Total amount of 2,354 observations (firm/year) were collected from 1996 to 2002, over a period of 7 years.

The extant literature suggests various compensation-performance specifications. Our focus on compensation-to-performance sensitivity is similar to that in Aggarwal and Samwick (1999b). This research applies "pooled regression analysis" as the data analysis method, such as Jensen and Murphy (1990) and Sloan (1993). In addition, the regression analysis includes firm- and year- specific fixed effects to control for specific firm characteristics and significant time structure change. The complete specifications with regard to our hypotheses are as follows[8].

$$
\begin{aligned}
\ln(COMP(S)_{it}) = {} & a_0 + a_1 ACC_{it} + a_2 MRT_{it} + + a_3 GROWTH_{it} \\
& + a_{3a}(s) ACC_{it} \times GROWTH_{it} + a_{3b}(s) MRT_{it} \times GROWTH_{it} \\
& + a_4 OWN_{it} + a_5 SIZE_{it} + a_6 RISK_{it} + a_7 LEV_{it} \\
& + a_8 HHI_{it} + a_9 INDUS_i + a_{10} Director_{it} \\
& + \sum_{y=1}^{6} \delta_y YEAR_y + \Psi_{it},
\end{aligned}
\tag{1}
$$

where $i = 1 \dots n$ represents each sample firm; $t = 1 \dots 7$ represents year^t $YEAR_y$ represents dummy variables of year; $t = 1 \dots 6$ respectively means year 1997,..., 2002; $_{it}$ represents residual term. The variable description refers to Table 1.

In model (1), hypothesis H1 predicts that $a_{3b}(s)$, the coefficient on the interaction between market performance and the firm's investment opportunities, is positive; $a_{3a}(s)$, the coefficient on the interaction between accounting performance and the firm's investment opportunities, is negative. This indicates that the

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[8] Since there will be severe multi-collinearity econometric problem if the variables of the whole hypotheses put in one singular regression model, we separately test the hypotheses in each equation.

President's stock-based compensation is relatively more sensitive to market performance for firms with higher potential growth opportunities.

$$
\begin{aligned}
\ln(COMP(S)_{it}) = {} & a_0 + a_1 ACC_{it} + a_2 MRT_{it} + + a_3 GROWTH_{it} + a_4 OWN_{it} + a_5 SIZE_{it} \\
& + a_{5a}(s)ACC_{it} \times SIZE_{it} + a_{5b}(s)MRT_{it} \times SIZE_{it} + a_6 RISK_{it} + a_7 LEV_{it} \\
& + a_8 HHI_{it} + a_9 INDUS_i + a_{10} Director_{it} \\
& + \sum_{y=1}^{6} \delta_y YEAR_y + \Psi_{it},
\end{aligned}
\tag{2}
$$

where $i = 1...n$ represents each sample firm; $t = 1...7$ represents year t $YEAR_y$ represents dummy variables of year; $y = 1...6$ respectively means year 1997,…, 2002; Ψ_{it} represents residual term. The variable description refers to Table 1.

In model (2), hypothesis H2 predicts that $a_{5a}(s)$, the coefficient on the interaction between accounting performance and the firm's size, is negative; similarly, $a_{5b}(s)$, the coefficient on the interaction between market performance and the firm's size, is negative. This indicates that the President's stock-based compensation is less sensitive to both accounting and market performances for firms with larger size.

$$
\begin{aligned}
\ln(COMP(S)_{it}) = {} & a_0 + a_1 ACC_{it} + a_2 MRT_{it} + + a_3 GROWTH_{it} + a_4 OWN_{it} + a_5 SIZE_{it} \\
& + a_6 RISK_{it} + a_{6a}(s)ACC_{it} \times RISK_{it} + a_{6b}(s)MRT_{it} \times RISK_{it} \\
& + a_7 LEV_{it} + a_8 HHI_{it} + a_9 INDUS_i + a_{10} Director_{it} \\
& + \sum_{y=1}^{6} \delta_y YEAR_y + \Psi_{it},
\end{aligned}
\tag{3}
$$

where $i = 1...n$ represents each sample firm; $t = 1...7$ represents year t $YEAR_y$ represents dummy variables of year; $y = 1...6$ respectively means year 1997,…, 2002; Ψ_{it} represents residual term. The variable description refers to Table 1.

In model (3), hypothesis H3 predicts that $a_{6b}(s)$, the coefficient on the interaction between market performance and the firm's risk, is significantly negative; $a_{6a}(s)$, the coefficient on the interaction between accounting performance and the firm's investment opportunity is insignificantly negative or even significantly positive. This indicates that the President's stock-based compensation is relatively less sensitive to market performance for firms with greater risk.

$$\ln(COMP(S)_{it}) = a_0 + a_1 ACC_{it} + a_2 MRT_{it} + + a_3 GROWTH_{it} + a_4 OWN_{it}$$
$$+ a_5 SIZE_{it} + a_6 RISK_{it} + a_7 LEV_{it} + a_{7a}(s)ACC_{it} \times LEV_{it}$$
$$+ a_{7b}(s)MRT_{it} \times LEV_{it} + a_8 HHI_{it} + a_9 INDUS_i$$
$$+ a_{10} Director_{it} + \sum_{y=1}^{6} \delta_y YEAR_y + \Psi_{it}, \tag{4}$$

where $i = 1...n$ represents each sample firm; $t = 1...7$ represents year t $YEAR_y$ represents dummy variables of year; $y = 1...6$ respectively means year 1997,…, 2002; Ψ_{it} represents residual term. The variable description refers to Table 1.

In model (4), hypothesis H4 predicts that $a_{7b}(s)$, the coefficient on the interaction between market performance and the firm's financial leverage, is significantly negative; $a_{7a}(s)$, the coefficient on the interaction between accounting performance and the firm's financial leverage is insignificantly negative or even significantly positive. This indicates that the President's stock-based compensation is relatively less sensitive to market performance for firms with higher financial leverage.

As for the sample of the President's stock compensation belongs to lower-tail censored data, this paper applies the Tobit model as the research model, and uses the 'robust' covariance matrix estimation, typically called the "sandwich" estimator (Huber 1967; Liang and Zeger 1986), to provide the needed correction of model specification problem, as follows:

Latent Underlying Regression:

$$y_i^* = \beta' x_i + \varepsilon_i, \varepsilon_i \sim N[0, \sigma^2].$$

Observed Dependent Variable:

If $y_i^* \le L_i,$ *then* $y_i = L_i$ (lower tail censoring)

Let $L_i = 0$.

On the other hand, since the data contains "0", the logarithmic transformation of stock-based compensation would raise problems at the zero value. Thus, under the situation of almost unaffected original sample, we assume that

$$COMP(S)' = COMP(S) + \alpha, \quad 0 < \alpha \le 1$$

Here, assume that $\alpha = 1$. In addition, among the sample of having a stock bonus for the President, the minimum value of stock compensation is \$13,914. Thus, we replace $\ln(COMP(S))$ with $\ln(COMP(S)')$ without affecting the sample nature.

4. ANALYSIS OF EMPIRICAL RESULTS

4.1 DESCRIPTIVE STATISTICS AND CORRELATION ANALYSIS

Table 2 presents the descriptive analysis of the main variables in the study. The average value of the President's stock-based compensation is about \$1.26 million per year, and the maximum value is about \$328 million. We also find that more than 3/4 of sample firms do not grant a stock bonus to the Presidents, and the granted stock bonus is much higher in the high-tech industry. The mean value of earnings prior to interests and taxes is about \$630 million per year, but the average shareholder wealth loss is about \$7 million. This means that during the research period (1997~2002), shareholders on average lost money while the earnings before interest and taxes of the firms were positive on average. The large variance in the market-to-book ratio indicates that the growth rate of the biggest growth company is more than 100 times the non-growth one. The average value of the President's stock holdings is 5.9 percent. The Presidents of some firms are purely professional managers, but some Presidents totally control the company.

Table 3 presents the correlation analysis of the main variables. The President's stock-based compensation is almost significantly correlated with all independent variables, except the President's stock holdings. The President's stock pay is positively correlated with performance measures, firm's growth opportunity, firm's size, firm's risk, and the degree of market competition. The President's stock pay is negatively correlated with firm's financial leverage. As shown in Table 3, firm's growth opportunity, size, risk, and leverage are also mutually correlated. Thus, we should include these variables to eliminate the omitted variable bias of the empirical model.

Table 2 Descriptive Statistics[b]

Variable [a]	Mean	Standard Deviation	Median	Minimum	Q1	Q3	Maximum
COMP (S) (unit NT$)	1,263,401.66	9487812.87	0	0	0	0	328,032,453
E_t (unit NT$1,000)	630,397	2716557.92	177,481	-17,125,914	14,679	548,560	55,916,268
SH_t (unit NT$1,000)	-7,322.50	306402.701	-2,049.11	-6,841,378.96	-16,086.16	6,481.59	8,128,005.92
GROWTH (%)	222.98	145.2892	193.74	15.96	130.04	278.61	1633.41
OWN (%)	5.865	8.4682	2.850	0.000	0.569	7.760	94.206
SIZE	105025.6	89622.5246	80832.5	14318.6	55143.9	121172.7	1237493.4
RISK (%)	28.878	21.6488	22.405	3.950	15.140	34.780	289.990
LEV (%)	39.42	15.7705	39.28	3.95	27.81	49.71	188.68
HHI	0.0883	0.0755	0.06	0.02	0.03	0.14	0.49

[a] Definition of each variable: COMP(S) is CEO's stock-based compensation; E_t is current accounting performance indicator, measured by EBIT; SH_t is current market performance indicator, measured by stockholder wealth change; GROWTH is corporate growth opportunity, measured by common stock equities' year-end market-to-book ratio moving averaged over the eight seasons prior to the year in which CEO compensation was paid; OWN is CEO's stock holding percentages; SIZE is corporate size, measured by positive square root of the sum of stockholder equity's market value and debt's book value; RISK is corporate risk, measured by the standard deviation of percentage stock market return for the prior eight seasons; LEV is corporate leverage ratio, measured by the ratio of total debt's book value to total asset's book value; HHI is the competition degree of the product market.

[b] Testing period includes year 1996~2002, consisting of 2,354 firm/year observations.

Table 3   The Matirx of the Correlation Coefficient [a b c]

(Left-down side is Spearman rank correlation coefficient; right-up side is Pearson correlation coefficient)

	COMP(S)	E	SH	GROWTH	OWN	SIZE	RISK	LEV	HHI
COMP(S)	1	0.31***	0.38***	0.23***	-0.03	0.28***	0.08***	-0.08***	-0.1***
E	0.3***	1	-0.08***	0.2***	0.17***	0.7***	-0.04**	-0.07***	0.05**
SH	0.07***	0.15***	1	0.001	0.02	-0.19***	-0.01	0.01	0.02
GROWTH	0.29***	0.33***	-0.1***	1	0.08***	0.3***	0.23***	-0.19***	-0.15***
OWN	0.02	-0.05**	0.05**	0.09***	1	0.05**	0.03	-0.03	-0.01
SIZE	0.11***	0.53***	-0.22***	0.34***	-0.19***	1	-0.02	0.04**	0.05***
RISK	0.2***	-0.15***	-0.02	0.17***	0.1***	-0.1***	1	0.03*	-0.33***
LEV	-0.11***	-0.12***	-0.005	-0.25***	-0.08***	0.11***	0.06***	1	-0.004
HHI	-0.31***	0.07***	0.02	-0.21***	-0.11***	0.09***	-0.51***	0.03	1

[a] Definition of each variable: $COMP(S)$ is CEO's stock-based compensation; E_t is current accounting performance indicator, measured by EBIT; SH_t is current market performance indicator, measured by stockholder wealth change; $GROWTH$ is corporate growth opportunity, measured by common stock equities' year-end market-to-book ratio moving averaged over the eight seasons prior to the year in which CEO compensation was paid; OWN is CEO's stock holding percentages; $SIZE$ is corporate size, measured by positive square root of the sum of stockholder equity's market value and debt's book value; $RISK$ is corporate risk, measured by the standard deviation of percentage stock market return for the prior eight seasons; LEV is corporate leverage ratio, measured by the ratio of total debt's book value to total asset's book value; HHI is the competition degree of the product market.

[b] Testing period includes year 1996~2002, consisting of 2,354 firm/year observations.

[c] *** represents 1% level of significance; ** represents 5% level of significance; * represents 10% level of significance.

4.2 THE IMPACT OF THE CORPORATE CHARACTERISTICS

Table 4 summarizes the empirical results of testing hypotheses H1 to H4.

Table 4   The Sensitivity of CEO's Compensation with Market Performance relative to CEO's Compensation with Accounting Performance [b c d] Testing for Hypotheses H1~H4 (year 1996~2002; 2,354 firm/year obs.)

Dependent: $\ln(COMP(S)_{it})$	Expected Sign	Model (1) [a]	Model (2) [a]	Model (3) [a]	Model (4) [a]
$ACC_{it}\ (= E_{it})$		2.13E-06***	5.26E-06***	5.04E-07	-4.16E-07
		(<.0001)	(<.0001)	(0.2595)	(0.4452)
$MRT_{it}\ (= SH_{it})$		2.89E-06	9.35E-06**	1.73E-05***	1.21E-06
		(0.6325)	(0.0422)	(0.0013)	(0.8)
$GROWTH_{it}$		0.0294***	0.0176***	0.0218***	0.0235***
		(<.0001)	(0.0001)	(<.0001)	(<.0001)
$ACC_{it} \times GROWTH_{it}$	$a_{3a}(s)$	-3.36E-09***			
		(0.0001)			
$MRT_{it} \times GROWTH_{it}$	$a_{3b}(s)$	-1.59E-09			
		(0.8804)			
OWN_{it}		-0.1734**	-0.0413	-0.069	-0.1109
		(0.0408)	(0.6036)	(0.4079)	(0.1731)
$SIZE_{it}$		-4.31E-06	-2.50E-05**	-1.31E-05	-1.59E-05
		(0.6666)	(0.0276)	(0.2073)	(0.1316)
$ACC_{it} \times SIZE_{it}$	$a_{5a}(s)$		-6.02E-12***		
			(<.0001)		
$MRT_{it} \times SIZE_{it}$	$a_{5b}(s)$		-1.84E-11***		
			(0.0026)		
$RISK_{it}$		0.0091	0.0272	-0.0076	0.0123
		(0.7776)	(0.3892)	(0.8195)	(0.7019)
$ACC_{it} \times RISK_{it}$	$a_{6a}(s)$			2.79E-08**	
				(0.0436)	
$MRT_{it} \times RISK_{it}$	$a_{6b}(s)$			-3.50E-07***	
				(0.0022)	
LEV_{it}		-0.128***	-0.1155***	-0.1232***	-0.1527***
		(0.0035)	(0.0076)	(0.0048)	(0.0007)
$ACC_{it} \times LEV_{it}$	$a_{7a}(s)$				5.44E-08***
					(0.0009)
$MRT_{it} \times LEV_{it}$	$a_{7b}(s)$				-4.72E-08
					(0.7787)
HHI_{it}		-55.4795***	-53.5029***	-46.7738***	-54.9675***
		(0.0002)	(0.0002)	(0.0011)	(0.0002)
$INDUS\{H\}_i$		13.1887***	13.1805***	13.9134***	13.6437***
		(<.0001)	(<.0001)	(<.0001)	(<.0001)
$Director_{it}$		-0.6321	-0.9252	-1.197	-0.775
		(0.7432)	(0.628)	(0.5337)	(0.6898)

[a] Definition of each variable in models (1)~(4) refers to Table 1. Besides, *GROWTH* is measured by common stock equities' year-end market-to-book ratio moving averaged over the eight seasons prior to the year in which CEO compensation was paid; *SIZE* is measured by positive square root of the sum of year-start stockholder equity's market value and debt's book value; *RISK* is measured by the standard deviation of percentage stock market return for the prior eight seasons; *LEV* is measured by the ratio of year-start total debt's book value to total asset's book value.

[b] The fixed effect of the intercept term and year in models is not the point in this paper, so they don't include in the table.

[c] The number in the parenthesis represents p-value of each estimated coefficient, where models (1)~(4) are estimated by Tobit model with Robust covariance matrix;

[d] *** represents 1% level of significance; ** represents 5% level of significance; * represents 10% level of significance.

First, the results in Model 1 indicate that when the growth opportunity of the company is larger, the relation between earning-based performance measure and the President's stock-based compensation is significantly negative. The finding supports the principal-agent-based compensation theory (Smith and Watts 1992), which shows that for firms with significant investment opportunities, the sensitivity of the President's stock pay to accounting performance is dropping. This displays that the noise of earnings relative to the market performance measures increases and thus current earnings poorly reflect the future consequences of current managerial actions (Bushman and Smith 2001).

Next, the results in Model 2 indicate that when the size of the firm is larger, the association between both performance measures, including accounting and market measures, and the President's stock-based compensation would significantly decrease. This finding appears to display that with the President's responsibility for larger company, one single performance measure might not perfectly reflect the economic consequences of the President's actions.

The results in Model 3 also present that when the firm's risk is greater, the linkage between the market performance measure and the President's stock-based compensation would significantly decline, which is similar to the results of Aggarwal and Samwick (1999b). Relatively, for firms with higher risk, the relation between the accounting performance measure and the President's stock-based compensation would increase. The results exhibit that when the uncertainty of the environment is higher, the President would be relatively more concerned with the risk factor compared to the incentive factor. Further, since market performance measure contains more noise uncontrollable by the President (Sloan 1993), firms require decreasing association between the President's stock-based compensation and external performance measures, such as the market performance, and replace it with internal performance measures, such as accounting performance.

Finally, as for the leverage ratio of the corporation, the results in Model 4 show that for firms with greater leverage ratio, the relationship between the market performance measure and the President's stock-based compensation insignificantly decline whereas the sensitivity of the President's stock pay to the accounting performance measure is significantly positive. This finding seems to show that when the company has various investors (including shareholders and debtholders), debtholders would pay more attention to the profit indicators of financial statement than on market performance. Thus, the company requires emphasis on the

sensitivity of the President's stock-based compensation with the accounting performance measure as the mechanism of pre-commitment.

As shown in Table 4, the results demonstrate that when the company confronts higher product market competition, the Presidents would obtain more stock-based compensation. Similarly, when the company belongs to the high-tech industry, the President's would obtain more stock bonus. Consistent with Ittner et al. (2003), these findings indicate that firms with higher market competition or in high-tech industry have more motivation to retain professional managers.

5. SENSITIVITY ANALYSIS

In this section, we test the sensitivity of the result to an alternative specification: using the change in the President's log-transformed stock-based compensation as the dependent variable. In addition, the change in corporate accounting earnings before interests and taxes (EBIT) is used to proxy for the change in accounting performance measure, and the current-year change in shareholder wealth relative to previous-year change in shareholder wealth is used for the change in market performance measure. Based on the data distribution of the change-form variable, the regression model we use is weighted least square. The results of the sensitivity tests are summarized in Table 5.

First, in contrast to the result in Table 4, the estimated coefficient $a_{3b}(s)$ of the interactive term ($MRT_{it} \times GROWTH_{it}$) is positive. This result appears to indicate that when the firm has more potential growth opportunity, the change in the President's stock-based compensation has more positive linkage to the change in market performance measure, which is similar to the result of Baber et al. (1996). However, the level of the President's stock-based compensation doesn't significantly vary with the market performance measure.

Next, the second column of Table 5 shows that the larger the size of the corporation, the more the sensitivity of the change in the President's stock-based compensation to the change in accounting performance measure will significantly decrease, while the linkage between the change in the President's stock-based compensation and the change in market performance measure will increase significantly. This result seems to indicate that when a firm has a larger size, the change in the President's stock-based compensation has more positive linkage to the change in market performance measure. However, in Table 4, the level of the President's stock-based compensation has less sensitive to the market performance

measure. These display that the results of the change- and level-forms of the President stock pay may have different economic implications in the firm's size.

Table 5   The Sensitivity of Change in the President's Compensation with Market Performance relative to those with Accounting Performance [b c d]
Testing for Hypotheses H1~H4 (year 1996~2002; 1,437 firm/year obs.)

Dependent: $\Delta \ln(COMP(S)_{it})$	Expected Sign	Model (1)[a]	Model (2)[a]	Model (3)[a]	Model (4)[a]
$ACC_{it}\ (= \Delta E_{it})$		3.07E-07*** (<.0001)	6.00E-07*** (<.0001)	-7.69E-08*** (0.0065)	1.70E-07*** (0.0014)
$MRT_{it}\ (= \Delta SH_{it})$		-1.50E-06*** (<.0001)	-9.60E-07*** (0.0012)	6.17E-08 (0.7513)	8.80E-08 (0.8038)
$GROWTH_{it}$		4.71E-05 (0.7931)	-0.0003 (0.1982)	-0.0002 (0.3804)	-0.0003** (0.0436)
$ACC_{it} \times GROWTH_{it}$	$a_{3a}(s)$	-8.69E-10*** (<.0001)			
$MRT_{it} \times GROWTH_{it}$	$a_{3b}(s)$	4.70E-09*** (<.0001)			
OWN_{it}		0.0065*** (0.0094)	0.0027 (0.3544)	0.004 (0.1232)	0.0044** (0.0307)
$SIZE_{it}$		3.34E-07 (0.1793)	2.06E-07 (0.477)	1.77E-07 (0.4791)	5.62E-07*** (0.0061)
$ACC_{it} \times SIZE_{it}$	$a_{5a}(s)$		-8.51E-13*** (<.0001)		
$MRT_{it} \times SIZE_{it}$	$a_{5b}(s)$		1.53E-12** (0.0136)		
$RISK_{it}$		-0.0027* (0.0586)	-0.0019 (0.2496)	-0.0016 (0.3024)	-0.0002 (0.8647)
$ACC_{it} \times RISK_{it}$	$a_{6a}(s)$			9.83E-09*** (<.0001)	
$MRT_{it} \times RISK_{it}$	$a_{6b}(s)$			-9.15E-09* (0.0579)	
LEV_{it}		0.0021* (0.098)	0.0017 (0.2471)	0.0014 (0.303)	0.0007 (0.5228)
$ACC_{it} \times LEV_{it}$	$a_{7a}(s)$				-2.58E-09** (0.028)
$MRT_{it} \times LEV_{it}$	$a_{7b}(s)$				-2.82E-10 (0.9716)
HHI_{it}		0.0339 (0.9089)	0.2446 (0.4761)	0.1148 (0.7102)	0.12 (0.6191)
$INDUS\{H\}_i$		-0.0839 (0.2002)	-0.1237 (0.1035)	-0.1656** (0.0155)	-0.0923* (0.0833)
$Director_{it}$		0.0176 (0.7681)	0.0213 (0.7581)	-0.0462 (0.4589)	-0.0476 (0.3277)

[a] Definition of each variable in models (1)~(4) refers to Table 1. Besides, *GROWTH* is measured by common stock equities' year-end market-to-book ratio moving averaged over the eight seasons prior to the year in which CEO compensation was paid; *SIZE* is measured by positive square root of the sum of year-start stockholder equity's market value and debt's book value; *RISK* is measured by the standard deviation of percentage stock market return for the prior eight seasons; *LEV* is measured by the ratio of year-start total debt's book value to total asset's book value.

[b] The fixed effect of the intercept term and year in models is not the point in this paper, so they don't include in the table.

[c] The number in the parenthesis represents p-value of each estimated coefficient, where models (1)~(4) are estimated by weighted least square model;

[d] *** represents 1% level of significance; ** represents 5% level of significance; * represents 10% level of significance.

Then, for the aspect of the corporation risk, the result in Table 5 is similar to that in Table 4. They both show that the higher the uncertainty of the external environment, the more the board of directors would like to decrease the sensitivity of the President's stock-based compensation (no matter whether it is the level-form or change-form) to the (external) market performance measure, and instead they seek to increase the linkage between the President's stock-based compensation and the (internal) accounting performance measure.

Finally, the fourth column of Table 5 indicates that when the firm has a higher degree of the financial leverage, the change in the President's stock-based compensation is less sensitive to the change in accounting performance measure, while Table 4 shows that the level of the President's stock-based compensation is more sensitive to the accounting measure. Thus, the implication of using the President's stock-based compensation to test our hypotheses is quite different to that from using the change in the President's stock-based compensation as the dependent variable.

In addition to the model specification difference and the omitted variables, the results may offer some specific differences between firm stock-based compensation in the form of the direct stock bonus (in Taiwan) and equity-based compensation in the form of stock options (in the U.S.). Schaefer (1998) found that with large firms, the change in CEO cash-based compensation is more negatively sensitive to change in shareholder wealth, whereas the change in total compensation is not significantly sensitive to change in shareholder wealth. Conversely, our finding indicates that the change in the President's equity-based compensation is more positively sensitive to the market performance measure in larger firms.

6. CONCLUSION

In recent years, many papers study the issue of "Corporate Governance" and the field is gaining popularity. This paper focuses on studying the incentive contract for the top management level.

Most research concerning the incentive contract for management study the determinants of CEO's compensation (Jensen and Murphy 1990; Lippert and Moore 1994; Anderson et al. 1999; Ittner et al. 2003), but this paper attempts to explore the linkage between pay-performance-sensitivity and contextual factors. Specifically, we would like to investigate a specific compensation, particularly one that leads to Taiwan's economic growth for decades to come, that is, "stock bonus". It's

important to understand the relationship between the Presidents of Taiwan's companies and corporate performance, and particularly, to realize how corporate characteristics affect the above relationship.

Our results indicate that the President's stock-based compensation has different sensitivity to accounting and market performance measures when considering corporate characteristics. We also find that the change-form and level-form of model specification may have different implications. When the growth opportunity of the company is larger, the accounting performance measure is likely to exhibit low sensitivity in the President's stock-based compensation contracts. Although the level of the President's stock pay will not have higher sensitivity to the market performance measure, the change in the President's stock pay will have. This finding supports the theory of principal-agent-based compensation research. When the size of the firm is larger, the linkage between both performance measures (including accounting- and market-based) and the level of the President's stock compensation significantly decreases. We also find that the change-form and level-form of the President's stock remuneration have different sensitivity to the market performance measure.

Other results also show that when the environment is more uncertain, the firm would decrease the link between the President's stock-based compensation and external performance measures, such as the market performance, and replace it with internal performance measures, such as the accounting performance. In addition, when the financial leverage is higher, the firm would require a decreasing of the agency cost of debt and thus, strengthen the sensitivity of the level of the President's stock-based compensation with the accounting performance measure as the mechanism of pre-commitment. Moreover, we also find that the level and change forms of the President's stock compensation have different sensitivity to the accounting performance measure.

According to the empirical results, each of the corporate characteristics has a distinct impact on stock-pay-performance-sensitivity. Therefore, when the board of director designs the President's stock-based compensation, it should completely consider its own corporate characteristics. Thus, each corporate performance measure can play a useful role in evaluating the President's actions.

The limitations of this paper are as follows. First, there is a difference in the empirical results from the literature derived from studies in the U.S. CEOs' compensation may result from the diverse compensation structure since most of

Taiwan's firms grant the President a stock bonus, whereas for U.S firms it is in the form of stock options. Next, the public data of the President's compensation only reports the summary of amounts during the research period. Since 2005, the financial reports of companies disclose the detailed items of directors' compensation. However, top management level's compensation has been poorly condensed to one number, and thus we have limited understanding concerning the different layers of management. If the financial report could disclose more details such as short-term and long-term incentive compensation and distinguish different management levels, investors would have a clear idea about the President compensation and be better able to monitor the strategy of compensation of the Board.

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