# A Canonical Correlation Analysis of CEO Compensation and Corporate Performance in the Service Industry

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**Abstract**

This paper attempts to examine a *canonical* (*simultaneous)* relationship between service industry CEOs' compensation and corporate performance with respect to accounting-based and market-based performance measures. In addition, this study examines the effect of firm size on compensation. The results of this study suggest that executive compensation depends *simultaneously* on both market-based and accounting-based performance measures. EPS, ROA, ROE and Market Rate of Return are positively associated with both cash compensation and long-term compensation. Firm size is also positively related to the long-term compensation.

**Keywords**: CEO compensation, accounting-based performance measures, market-based performance measures, service industry, canonical analysis

## Introduction

The service industry represents the most important segment of American business. The 1995 US Bureau of Census data reported that over 50% of the US GDP is derived from service output and seven out of ten workers are employed in the service sector. Most service companies have faced deregulation and stiff competition from domestic and global competitors during the last twenty years (Kaplan and Cooper, 1999). The Utility, Telecommunication and Transportation industries have become deregulated, while the Food, Apparel, Wholesale and Retail industries are challenged by the global and domestic competition. Thus managers in the service industry typically face challenges different from those in manufacturing and have managed a different set of activities. Executives at service firms are more concerned with managing fixed costs and the utilization of capacity. Service industries place emphasis on managing intangible and intellectual assets rather than tangible and physical ones. These industries must maintain higher levels of capacity utilization, since marginal costs are close to zero in most service industries.

The expectancy approach suggests that managers are motivated by the reward structure. Kaplan and Atkinson (1998) state that "pay-for-performance is an artifact that you want to motivate people to pursue organization objectives." Agency theory argues that a firm should design an incentive compensation scheme to insure that the CEO acts in a manner that maximizes organizational objectives (e.g., shareholder wealth) (Jensen and Murphy, 1990). The compensation scheme is a means of monitoring and motivating managers.

Top executive compensation in general has generated considerable debate, due to the perception of inequity in pay between top executives and workers, exces-

sive compensation for U.S. top executives as compared to those of other countries, a short-term focus of top executives, and their self-interest behavior (Sethi and Namiki, 1987). For example, in 1991, a typical US CEO at a top-30 company earned $3,200,000 on average, which is about 7 times greater than his Japanese counterpart's earnings of $525,000 (Business Week, 1992). The pay gap is even greater when CEO compensation is compared to that of an average worker. In 1991, an average US CEO made 157 times the pay of an average worker, while a Japanese CEO earned less than 32 times the pay of an average worker (Business Week, 1993; Forbes, 1993; Kaplan, 1994; Philadelphia Inquirer, 1996). Often, CEO compensation has increased even when the corporations poorly performed on earnings or stock returns (Gorenstein, 1995; McCarthy, 1995; Stock, 1994; Rundle, 1995). A recent headline in the *Wall Street Journal* special report section titled, "Pay for No Performance," begins with the claim that, " ... Now, many are getting top dollar-No matter what the results..." (WSJ, 1998). Critics argue that top executive compensation has no or at best a limited relationship to shareholders' wealth.

The literature on compensation largely ignores the service industry. Since service industry executives manage a different set of business activities, it is important to understand how service CEO compensation packages are designed and how CEOs are rewarded. Accounting research, in general, lacks studies on the service industry.

This paper attempts to fill a gap by investigating a *simultaneous (canonical)* relationship between a set of compensation variables and a set of performance measures of 125 US service companies. The major objective of this study is to explore and examine the directions and the inter-relationships between a set of compensation variables and a set of performance measures. In addition, this study critically examines the effect of firm size on compensation in the service industry. Cash Compensation, measured by Salary and Bonus (SANBO) and Long-Term Compensation (LCOMP), are examined as a set of criterion (dependent) variables. The performance measures (predictor variables) are broken into accounting-based and market-based performance measures. The accounting-based performance measures include Return on Assets (ROA), Return on Equity (ROE), and Earnings per Share (EPS), while market-based performance measures consist of Growth in Market Value (MKVAL), Market Rate of Return (MKTRN), and Tobin's Q (TOBNQ).

This study differs from previous studies in several respects. First, this study utilizes 6-year data (1990-1995) and a relatively large sample size (i.e., all of the service companies listed in the *Wall Street Journal* Special Issue, Executive Pay, except for financial institutions). This study helps us examine changes in compensation structure and performance expectations. The changes in internal and external business environments may lead to changes in the components of compensation and the performance measures. This paper will empirically examine these changes. The relatively large sample size, 125 firms or 750-firm year observations, also enhances the validity of findings and provides insights on industry-specific changes. Second, unlike other studies, this study attempts to examine simultaneity of the relationship between a set of compensation variables and a set of accounting-based and market-based performance measures. This is a potentially fruitful area of investigation because previous studies provide little empirical evidence about the simul-

taneous effects of accounting and market based performance measures on CEO compensation. This will help in explaining the presence of diverse relationships between the various components of compensation and various indices of performance measures by employing canonical analysis. Third, this study examines the relationship between compensation and performance measures that are unique to the service industry. Service executives are faced with a different set of managerial control issues and performance expectations. Examination of the service industry could reduce potentially confounding effects, which may be prevalent in the cross-sectional industry studies and may increase the validity of the findings. Very few studies have examined the relationship between compensation and performance of a specific industry .[1] Finally, this study explicitly examines the size-effect of the relationship between compensation and performance in the service industry. Prior studies have suggested that firm size is one of the most important variables in determining executive compensation. This study can provide additional evidence on the size effect in the service industry.

The remainder of the paper is organized as follows. The second section reviews current literature and presents the research hypotheses. The third section describes the sample, data, and research methodology. The fourth section discusses results and provides analysis. The final section presents a summary, conclusions, and further research issues.

**Literature Review and Hypothesis**

Prior studies have examined the compensation and performance relationships between a specific compensation variable (e.g., cash compensation or total compensation) and a specific performance indicator [e.g., an accounting performance measure (ROA or ROE or EPS) or a stock return measure]. Many studies have investigated the relationship between cash compensation and (1) ROA, ROE, and stock returns (Abowd, 1990); (2) EPS and stock returns (Barro and Barro, 1990); (3) changes in shareholder returns and changes in ROA (Gibbons and Murphy, 1990); (4) sales and profits (Leonard, 1990); (5) earnings, ROE and Relative ROE (Lanen and Larcker, 1992); (6) earnings and stock returns (Janakiraman, Lambert and Larcker, 1992) and (7) accounting income (Chen and Lee, 1995). In general, these studies show a strong association between compensation level and profitability (accounting-based performance measure) and a moderate or weak relationship between compensation level and stock returns (market-based performance measure). Jensen and Murphy (1990) studied changes in shareholder wealth, accounting profits, and sales and found a significant correlation for changes in shareholder wealth and little explanatory power with regard to relative measures of performance. Belkaoui (1992) showed that compensation is positively related to profit and sales, and negatively related to social performance.

Other studies have examined CEO compensation and managerial performance by including market-based performance measures. Market-based performance measures are considered to be consistent with the outlook of stockholders and provide a long-term view of profitability. Lambert and Larcker (1987) examined the relationship between salary and bonus and accounting-based performance (e.g., ROE) and stock returns and found that both accounting and stock returns moder-

ately explain compensation. Murphy (1985) and Jensen and Murphy (1990) used stock returns as a measure of performance and argued that "it seems more appropriate to define performance in terms of shareholder returns rather than in terms of accounting profits" The Relative Performance Evaluation (RPE) hypothesis has also been extensively researched. The RPE hypothesis suggests that the relative performance measures show a stronger relationship to executive compensation than to absolute performance measures (Antle & Smith, 1986; Holmstrom, 1979; Janakiraman, Lambert and Larcker, 1992; Lanen and Larcker, 1992).

A profitability measure alone cannot fully explain the levels of CEO compensation. Accounting and market-based performance measures should be simultaneously incorporated into the model to fully understand the complex relationship. CEO compensation is dependent upon or can be explained by the multiple factors of performance measures. A set of compensation variables (Cash Compensation and Long-Term Compensation) should be simultaneously examined with a set of performance measures. Since the levels of Cash Compensation may be dependent upon the levels of Long-Term Compensation or vice versa, both Cash and Long-Term Compensation should be *simultaneously* examined rather than *separately* tested. Most previous studies have examined either Cash Compensation or Long-Term Compensation but have not tested them simultaneously. This study attempts to fill this gap by examining a *simultaneous (canonical)* relationship between a set of compensation (dependent) variables and a set of performance (independent) measures. That is, this study not only investigates the linear relationship, but also examines the multivariate (*simultaneous and interdependent)* relationships between variables and among variables. The hypotheses are presented as follows:

**$H_{10}$:** There is no canonical relationship between a set of compensation variables and a set of performance measures. ($R_c = 0$, where, $R_c$ is canonical correlation)

**$H_{1a}$:** A set of CEO compensation variables is positively related to a set of performance measures. ($R_c > 0$)

**$H_2$:** CEO compensation is directly related to firm size.

**Sample and Methodology**

*Sample and Data Collection*

The sample consists of 125 service companies, excluding financial institutions which were reported in the *Wall Street Journal*'s Special Issues. Compensation data (i.e., salary and bonus and long-term compensation) are gathered from the *Wall Street Journal*'s Special Issues for the period 1990 to 1995 (6 years). The *Wall Street Journal* compensation data are supplemented with the *Business Week, Compensation Survey.* The financial data on firm performance for the same period were collected from *COMPUSTAT.*

The sample distributions by SIC (Standard Industry Classification) codes and sales revenues are presented in Table 1-A and Table 1-B. Electric, Gas and Sanitary Services (SIC 4900 – 4991) represent 36% of the total sample or 45 companies. The second and the third largest industries include Communications (19 firms,

15.2%) and Business services (10 firms, 8%), respectively. The sample SIC codes range from Transportation (SIC code 4000) to Motion Pictures (SIC code up to 7999). All financial institutions (SIC codes 6,000 – 6,999) are eliminated from the sample.[2] The largest percentage (78.4%) of the sample is made up of firms with between $1 billion and $10 billion in annual sales (see Table 1-B). This indicates that the sample represents relatively large companies. Companies with less than $1 billion in sales represent 5.6% of the sample and companies with more than $10 billion in sales represent 16% of the sample.

*Definition of Variables*

Executive's total compensation is normally separated into Cash Compensation (Salary and Bonus) and Long-Term Compensation. Cash Compensation (SANBO) includes annual salary and bonus earned in a fiscal year. Long-term compensation (LCOMP) includes: (1) gain from the exercise of stock options, (2) the value of payouts, (3) the value of dividends, and (4) the value of shares of restricted stock.

The performance measures (predictor or independent variables) are divided into accounting-based and market-based performance measures. The accounting-based performance measures include Return on Assets (ROA), Return on Equity (ROE), and Earnings per Share (EPS), while market-based performance measures include Growth in Market Value (MKVAL), Market Rate of Return (MKTRN) and Tobin's Q (TOBNQ).

Accounting-based Performance Measures:

ROA = [Net Income after Taxes] / [(Beginning Balance of Assets) + (Ending Balance of Assets) / 2]

ROE = [Net Income after Taxes] / [(Beginning Balance of Common Stockholder's Equity) + (Ending Balance of Common Stockholder's Equity) / 2]

EPS = [Net Income after Taxes] / [No. Of Common Share Outstanding]

Market-based Performance Measures:

Tobin's Q[3] = [MVE + PS + DEBT] / [TA]

where MVE is the market value of shareholder equity (product of a firm's closing stock price and the number of common stock shares outstanding), PS is the liquidating value of the firm's outstanding preferred stock, DEBT is the value of the firm's short-term liabilities net of its short-term assets, plus the book value of the firm's long term debt, and TA is the book value of the total assets of the firm.

**Table 1-A**
**Standard Industry Classification of Sample**

| Industry | SIC | Number of Companies |
|---|---|---|
| Transportationby Railroad & Water | 4000 - 4400 | 6 |
| Transportation by Air | 4500 - 4581 | 4 |
| Communication | 4800 – 4899 | 19 |
| Electric, Gas, Sanitary Service | 4900 – 4991 | 45 |
| Wholesale – Durable Goods | 5000 – 5099 | 3 |
| Wholesale - Non-Durable Goods | 5100 – 5199 | 7 |
| General Merchandise Store | 5300 – 5399 | 8 |
| Food Store | 5400 – 5499 | 4 |
| Apparel & Accessory Store | 5600 – 5699 | 3 |
| Eating & Drinking Store | 5800 – 5813 | 2 |
| Miscellaneous Retail | 5900 – 5999 | 3 |
| Hotels, Other Lodging Places | 7000 – 7041 | 3 |
| Business Services | 7300 – 7389 | 10 |
| Motion Pictures | 7800 – 7999 | 3 |
| Other Services (Auto Repair, Home Furniture, Auto Dealer) | | 5 |
| Total | | 125 |

**Table 1-B**
***Sample Classification by Sales (in million dollars)***

| Sale Volume | | Number of Companies |
|---|---|---|
| Less than | $1,000 million | 7 |
| $1,001 - | 1,500 | 13 |
| 1,501 - | 2,000 | 9 |
| 2,001 - | 2,500 | 9 |
| 2,501 - | 3,000 | 10 |
| 3,001 - | 3,500 | 9 |
| 3,501 - | 4,000 | 6 |
| 4,001 - | 5,000 | 12 |
| 5,001 - | 6,000 | 7 |
| 6,001 - | 7,000 | 7 |
| 7,001 - | 9,000 | 10 |
| 9,001 - | 10,000 | 6 |
| 10,001 - | 15,000 | 13 |
| More than 15,001 | | 7 |
| Total | | 125 |

Market Rate of Return = [{(Monthly closing stock price + Monthly Dividends per Share by Ex-date + Monthly Cash Equivalent Distributions by Ex-Date for the current month) / (The previous month's close price)} – 1] x 100

Growth in Market Value = [Market Value (t) -Market value (t-1)] / [Market value (t-1)] where market value is the product of a firm's closing stock price and the number of common stock share outstanding.

Firm Size (FSIZE) = Natural log value of total assets

*Research Methodology*

In order to analyze data, descriptive statistics are prepared first. Then, *Pearson's Correlation* table is prepared to identify the intercorrelation between the compensation variables and various measures of performance. Finally, a canonical correlation analysis is conducted to examine the significance and the relationships between various performance measures and CEO compensation. In order to compare and confirm the results, an OLS multiple regression analysis is also performed to separately test the linear relationships between each compensation variable and various indices of performance measures.

A canonical model is a generalized form of multiple regression. Thus, a canonical model with a single dependent variable is equivalent to the regression model (Fornell and Larcker, 1980).[4] It is a well-suited methodology for the multiple dependent (criterion) and multiple independent (predictor) variables. In general, the objective function of canonical analysis is to maximize the correlation between two sets of variables (Fornell and Larcker; 1980; Van Auken and Holman, 1995). A canonical correlation analysis allows us to find a linear composite of one set of variables (criterion variables) and a linear composite of another set of variables (predictor variables) (Alpert and Peterson, 1972; Johnson and Wichern, 1988; Snodgrass and Szewczak, 1990).

The canonical correlation analysis requires a complex process and careful interpretation of results. The model first derives a linear combination of criterion variables that is maximally correlated with predictor variables (*Canonical Function or Pair* 1). Next, it determines the pair of linear combinations having the largest correlation among all pairs uncorrelated with the initially selected pair (*Canonical Function or Pair 2*). The process continues. The maximum number of canonical functions (pairs) is equal to the fewest number of variables in the sets. The pairs of linear combinations are called the *canonical functions (pairs).*

To interpret the results, Bartlett's test is conducted first to examine the significance of the canonical function (pair). If Bartlett's test is significant and canonical correlation is reasonably high, then *canonical weights* and *canonical loadings* are further examined and interpreted. *Canonical correlation*, $R_C$, is a measure of the strength of the overall relationship between the linear composites of the predictor and the criterion sets of variables. In effect, it represents the bivariate correlation between the two linear composites. Canonical correlation is equivalent to the correlation coefficient (r) in a multiple regression model. The *Eigenvalue (total*

*redundancy)*, $R^2_C$ is the squared canonical correlation, which provides an estimate of the amount of shared variance between the respective optimally weighted linear composites (canonical function) of criterion and predictor variables. It is similar to the coefficient of determination ($r^2$) in a multiple regression analysis.

The *Canonical Weight (Coefficient)* is the magnitude of the weight, indicating the importance of a variable from one set of variables with regard to the other set of variables. Canonical weight is an equivalent measure to the regression coefficient (beta,) in a multiple regression model, but requires careful interpretation. Fornell and Larcker (1980) cautioned that the presence of multicolinearity poses a problem of ambiguity in interpretation. Canonical loadings, unlike canonical weights, are typically more useful in interpreting the results. *Canonical loadings* measure the simple linear correlation between the independent variables and their respective linear composites. The larger the loadings, the greater the contribution of the variables to its composite (Haslem et al.,1992). In order to determine and interpret the significance of association, an acceptable lower bound of loadings should be selected. The range typically selected lies between 0.30 and 0.50[5]. Another important measure in a canonical analysis is the redundancy index. The *Redundancy index* is the percentage of variances in one set of variables explained by its corresponding canonical variate for the other set of variables (i.e., a linear composite of the other set of variables). This provides shared variance or explanatory power of one set of variables (criterion variables) and another set of variables (predictor variables), or vice versa.

The use of canonical analysis is methodologically superior to other models and is well suited for this study in three respects. First, this study not only tests the individual effects and correlations of each variable, but also describes parsimoniously the association of compensation variables with the various measures of performance. That is, a compensation package is not solely determined by a certain performance measure; rather, it is determined by a combination of various performance measures. The canonical correlation analysis will help to examine simultaneous relationships between the set of dependent variables (i.e., compensation measures) and the set of independent variables (i.e., performance measures). The criterion (dependent) variables are Cash Compensation (Salary and Bonus) and Long-Term Compensation, while the predictor (independent) variables are EPS, ROA, ROE, Growth in Market Value, Market Rate of Return and Tobin's Q. Second, this model facilitates the study of interdependent (canonical) relationships among variables without specific causality assumptions. Unlike this study, some researchers have theorized that compensation precedes the performance of a manager. That is, the level of compensation will influence the performance of a manager, not vice versa. The canonical analysis complements and supplements the lack of causality on the direction between compensation and performance relationship (Haslem et al., 1992). Finally, the canonical analysis can provide a meaningful interpretation, even when variables are highly correlated (Fornell and Larcker, 1980). Since performance variables are highly correlated in this study (see Table 4), the canonical correlation analysis is most appropriate. For example, ROA and ROE are highly correlated. Fornell and Larcker (1980) state that "canonical loadings are separately computed for each single variable and variate so multicolinearity presents no prob-

lem." Canonical correlation analysis enables us to analyze these complex interactions simultaneously and provides summary statistics for the underlying relationships between a set of compensation variables and a set of performance measures.

## Results and Analysis

*Descriptive Statistics*

Cash Compensation (Salary and Bonus) has steadily increased over the 6-year period, 1990-1995, for the service companies included in this study (see Table 2). In 1995, the average cash compensation of service executives increased to $1,375,415 (or 38%) from $999,152 in 1990. In 1995 Long-Term Compensation reached to $1,094,842 and increased at an even greater rate, 48%, than Cash Compensation. During the same period, the revenues of these companies increased, on average, by 26% to $7.3 billion from $5.8 billion. These statistics provide evidence that the increase in the level of compensation exceeded the increase in revenues between 1990 and 1995.

**Table 2**
**Trend in Compensation and Sales Revenue (1990 - 1995)**

| Variables | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|
| Cash Compensation ($) | | | | | | |
| Mean | 999,152 | 928,868 | 1,150,496 | 1,260,442 | 1,352,459 | 1,375,415 |
| Median | 785,000 | 756,500 | 846,900 | 903,800 | 968,250 | 1,040,300 |
| Std.Dev. | 1,127,734 | 619,710 | 1,066,584 | 1,461,900 | 1,347,095 | 1,156,278 |
| Long-term Compensation ($) | | | | | | |
| Mean | 743,175 | 1,059,594 | 1,642,139 | 1,758,735 | 1,234,513 | 1,094,842 |
| Median | 599,200 | 695,300 | 778,450 | 871,000 | 894,600 | 316,500 |
| Std.Dev. | 1,253,660 | 3,149,879 | 3,453,071 | 3,664,953 | 1,323,385 | 1,828,061 |
| Total Compensation ($) | | | | | | |
| Mean | 1,451,466 | 1,726,507 | 2,528,475 | 2,606,458 | 2,191,865 | 2,116,784 |
| Median | 1,158,400 | 1,290,000 | 1,500,000 | 1,560,600 | 1,514,900 | 1,215,500 |
| Std.Dev. | 2,223,620 | 3,187,745 | 3,954,309 | 4,066,348 | 2,212,452 | 2,563,698 |
| Sales Revenues ($1,000) | | | | | | |
| Mean | 5,815,582 | 6,099,787 | 6,288,994 | 6,620,028 | 7,103,555 | 7,344,179 |
| Median | 3,705,161 | 3,860,614 | 3,962,469 | 3,908,129 | 4,488,910 | 4,701,640 |
| Std.Dev. | 7,894,651 | 8,412,252 | 8,337,716 | 8,665,347 | 9,312,168 | 9,110,301 |

Descriptive statistics and correlations for compensation and performance variables are presented in Tables 3 and 4. Cash Compensation shows a significantly high correlation with ROA, ROE, and Tobin's Q. Long-term Compensation shows a high correlation with ROA, ROE, Market Rate of Returns and Tobin's Q. Compensation variables (SANBO and LCOMP), in general, show a significantly positive correlation with both accounting-based and market-based performance measures. In order to detect the multicolinearity problems among the performance

**Table 3**
**Descriptive Statistics of Variables (n=125)**

| Variables | Mean | Median | Stand. Dev. |
|---|---|---|---|
| Salary & Bonus (SANBO) | 6.6789 | 6.6855 | 0.6845 |
| Long-term Compensation (LCOMP) | 6.4587 | 6.6341 | 1.3121 |
| Total Compensation (TCOMP) | 7.0369 | 7.3112 | 0.8612 |
| | | | |
| Firm Size (FSIZE) | 8.3217 | 8.5840 | 1.5678 |
| Earnings per Share (EPS) ($) | 1.2317 | 1.2933 | 1.1856 |
| Return on Assets (ROA) (%) | 4.5444 | 3.8515 | 3.1776 |
| Return on Equity (ROE) (%) | 10.1388 | 9.3256 | 5.6652 |
| Market Return (MKRTN) (%) | 3.1374 | 2.5698 | 2.6420 |
| Growth in Market Value (MKVAL) (%) | -0.1769 | -0.2487 | 0.3977 |
| Tobin's Q (TOBNQ) | 1.3481 | 0.9798 | 1.0382 |

Note: SANBO (Natural log value of salary and bonus), LCOMP (Natural log value of Long-term Compensation), TCOMP (Natural log value of Total Compensation), FSIZE (Natural log value of Total Assets), EPS (Earnings per Share), ROA (Return on Assets), ROE (Return on Shareholder's Equity), MKRTN (Dividend adjusted Market Return by Ex-Month), MKVAL (Growth in Market Value), TOBNQ (Tobin's Q)

**Table 4**
**Inter-correlations for all Variables (N= 125)**

| Variable | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | SANBO | 1.00 | | | | | | | | | |
| 2 | LCOMP | .598*** | 1.00 | | | | | | | | |
| 3 | TCOMP | 7.821*** | 8.906*** | 1.00 | | | | | | | |
| 4 | FSIZE | .238** | .058 | .108 | 1.00 | | | | | | |
| 5 | EPS | .237** | .158 | .324*** | .105 | 1.00 | | | | | |
| 6 | ROA | .356*** | .396*** | .506*** | .186* | .318*** | 1.00 | | | | |
| 7 | ROE | .439*** | .338*** | .402*** | .036 | .435*** | .472*** | 1.00 | | | |
| 8 | MKRTN | .253** | .348*** | .341*** | .212** | .149 | .060 | .009 | 1.00 | | |
| 9 | MKVAL | .178* | .318** | .249** | .319** | -.150 | -.043 | -.071 | .069 | 1.00 | |
| 10 | TOBNQ | .364*** | .404*** | .428*** | .282** | .158* | .398*** | .320*** | .093 | .241** | 1.00 |
| | VIF | | | 1.093 | .661 | .233 | 3.550 | 2.754 | 1.953 | 2.503 | |

Note: (1) SANBO (Natural log value of salary and bonus), LCOMP (Natural log value of Long-term Compensation), TCOMP (Natural log value of Total Compensation), FSIZE (Natural log value of Total Assets), EPS (Earnings per Share), ROA (Return on Assets), ROE (Return on Shareholder's Equity), MKRTN (Dividend adjusted Market Return by Ex-Month), MKVAL (Growth in Market Value), TOBNQ (Tobin's Q)

(2) Significance level: * P < 0.05; ** P< .01; *** P < 0.001 (3) V.I.F. indicates Variance Inflation Factor.

variables, the variance inflation factor (VIF) is also computed (see also Table 4). However, the variance inflation factor of each variable does not appear to be strong enough to indicate a serious threat of multicolinearity (i.e., VIF for all variables).

*Results of Canonical Correlation Analysis*

A canonical correlation analysis was performed between a set of compensation variables and a set of various indices of performance measures. The CEO compensation set includes Cash Compensation (SANBO) and Long-term Compensation (LCOM). The performance measures include EPS, ROA, ROE, Market rate of return, Growth in market value, and Tobin's Q. Firm Size is also employed as a control variable. To interpret the results, two canonical functions (pairs) were extracted from a set of compensation variables and a set of performance variables. The significance of the relationships between the two sets of variables (i.e., number and importance of canonical variates) is presented in Table 5.

The results of the canonical correlation analysis reveal that the first canonical function (Function 1) is statistically significant at the 0.001 level (÷2 =97.48, p.001). The second canonical function (Function 2) is also statistically significant at 0.01 level (÷2 =16.23, p.012). Thus, all pairs of canonical functions are significant enough to have meaningful interpretation. That is, two pairs of canonical functions accounted for the significant relationships between the two sets of variables. The results suggest that the null hypothesis of no canonical relationship should be rejected. This means that there is a statistically significant relationship between the set of compensation variables and the set of performance measures.

In addition, the first canonical function (pair) accounted for 56.7 % (Canonical correlation is 0.75) of shared variance between a set of compensation variables and a set of performance variables. The second canonical function also shows a statistically significant relationship at 0.05 level and accounted for 15.4% of shared variance. The first and second canonical functions are statistically significant and accounted for 72.1% of shared variance of the model. The results indicate that a high amount of variance is shared between the predictor (performance measures) and criterion (compensation measures) variables and warrant further interpretation of canonical loadings (Fornell and Larcker, 1980).

The canonical weights, canonical loadings, and the redundancy indices for each canonical function are presented in Table 6. To interpret the results, a conservative canonical weight cutoff point, 0.50 in absolute value, is selected (see Note 4 for discussions and Fornell and Larcker, 1980). Canonical function (pair) 1 suggests that both Cash Compensation and Long-Term Compensation are positively related to Tobin's Q (t = 0.689), ROE (t = 0.672), ROA (t = 0.621) and EPS (t = 0.503). These results mean that higher performance of Tobin's Q, ROE, ROA and EPS in combination leads to higher CEO compensation. These results not only confirm the findings of previous studies but suggest that compensation packages are determined by a combination of performance measures, not by a single performance measure. The redundancy index of compensation variables, 0.458, indicates that the set of performance variables accounted for 45.8% of the variation on compensation variables, which is a reasonably large proportion. The redundancy index of performance measures, 0.15, indicates that compensation variables accounted for 15% of the

**Table 5**
**Significance Levels for Sets of Canonical Correlations Derived from Sets of Compensation and Market Performance**

| | | | Bartlett's Test* | | |
|---|---|---|---|---|---|
| Canonical Function | Canonical Correlation ($R_c$) | ($R^2_c$) | Chi-square | F-ratio | Significance |
| Function 1 | 0.7531 | 0.5678 | 8.772 | 97.48 | 0.0000 |
| Function 2 | 0.3926 | 0.1542 | 2.881 | 16.23 | 0.0125 |

Note 1) *Canonical Function (pair)* is the relationship of two linear composites. Each canonical function has two separate linear composites (canonical variates), one for the set of criterion variables and one for the set of predictor variables. The strength of the relationship is given by canonical correlation.

Note 2) *Canonical Correlation*, $R_c$, is the measure of the strength of the overall relationship between the linear composites of the predictor and the criterion sets of variables. In effect, it represents the bivariate correlation between the two linear composites (e.g., equivalent to correlation coefficient, r, in multiple regression).

Note 3) *Eigenvalue or total redundancy*, $R^2_c$, is squared canonical correlation, which provides an estimate of the amount of shared variance between the respective optimally weighted linear composites (canonical function) of criterion and predictor variables (e.g., equivalent to coefficient of determination, $r^2$, in multiple regression)

Note 4) *Bartlett's test* for remaining eigenvalue is used to indicate the number of canonical variables necessary to express the dependency between the two sets of variables.

variation in performance measures. These results imply that the set of performance measures explains more adequately the variation in compensation, not vice versa. These indices also support previous research by demonstrating that performance measures impact the level of compensation, not vice versa.

The second canonical function shows high loadings on Growth in Market Value (t = 0.610), Market Rate of Return (t = 0.543) and Firm Size (t = 0.538). It indicates that Long-term Compensation is affected by the Growth in Market Value, Market Rate of Return and Firm Size. The redundancy indices in the second function are relatively small (0.030), and therefore do not add significant explanatory power. Taken together, the results of canonical correlation analysis suggest that CEO compensation (Cash and Long-term compensation) is significantly and positively related to both accounting-based and market-based performance. Thus, hypothesis 1(H1) is supported. Hypothesis 2 is also supported. But the effect of firm size on CEO compensation in the service industry (H2) is more significantly linked to long-term compensation than to Cash compensation.

Table 7 presents the results of an ordinary least square regression model. It is prepared for comparison and confirmation of the results of canonical analysis. Cash Compensation (Salary and Bonus) shows a significantly positive relationship with all the performance measures except ROA. The results are almost identical if we use a canonical loading cutoff point of the 0.30 level (see Note 4 for discussions). Long-Term Compensation also shows a significantly positive relationship with all of the performance measures except EPS and ROA. In addition the firm size is significantly and positively related to both cash compensation and long-term compensa-

tion. Overall, the results of OLS multiple regression analysis confirm the findings of the canonical correlation analysis. The explanatory power, however, in canonical correlation analysis (The eigenvalue of canonical function 1 and 2 is 72.1%) is substantially greater than that of the regression analysis (54.3% or 45.1%). This indicates that canonical analysis provides stronger explanatory power and a more comprehensive analytic approach.

**Table 6**
**Results of Canonical Correlation Analysis and the Corresponding Canonical Functions (n=125)**

| | Function 1 | | Function 2 | |
|---|---|---|---|---|
| | Weight [a] | Loading [b] | Weight | Loading |
| Compensation (Criterion) Variables Set | | | | |
| SANBO | 0.681 | **0.945** | -1.092 | -0.326 |
| LCOMP | 0.420 | **0.849** | 1.217 | **0.529** |
| Percent of Variance [c] | 0.193 | | 0.807 | |
| Redundancy [d] | 0.458 | | 0.030 | |
| | | | | |
| Performance (predictor) Variables Set | | | | |
| FS I ZE | 0.319 | 0.195 | 0.247 | **0.538** |
| EPS | 0.166 | **0.503** | -0.294 | -0.361 |
| ROA | 0.203 | **0.621** | 0.050 | -0.007 |
| ROE | 0.377 | **0.672** | -0.346 | -0.309 |
| MKRTN | 0.345 | 0.411 | 0.432 | **0.543** |
| MKVAL | 0.307 | 0.349 | 0.208 | **0.610** |
| TOBNQ | 0.336 | **0.689** | 0.379 | 0.320 |
| Percent of Variance | 0.265 | | 0.175 | |
| Redundancy | 0.150 | | 0.027 | |

Note 1)
a) ***Canonical Coefficient (Weight)*** is the magnitude of the weight, indicating the importance of a variable from one set of variables with regard to the other set of variables and is equivalent to the regression coefficient,.
b) ***Canonical Loading*** measures the simple linear correlation between the independent variables and their respective linear composites and is equivalent to the significance of in the multiple regression.
c) ***Percentage of Variance*** is the variance of a canonical function extracted from its set of variables. That is, the variability in its own set of variables that are accounted for by its corresponding variates.
d) ***Redundancy index*** is the percentage of variances in one set of variables explained by its corresponding canonical variate for the other set of variables. (i.e., a linear composite of the other set of variables)
Note 2) SANBO (Salary and Bonus), LCOMP (Long-term Compensation), FSIZE (Natural log value of total assets; size), EPS (Earning per Share), ROA (Return on assets), ROE (Return on shareholder's equity), MKRTN (Market return), MKVAL (Growth in Market Value of Equity), TOBNQ (Tobin's q)
Note 3) Bold-type numbers in the canonical weights column represent a statistically significant relationship. (i.e..,Cutoff point 0.5)

**Table 7**
**Results of Standardized OLS Multiple Regression Model**

| | OLS Regression Model | |
|---|---|---|
| Variables | SANBO | LCOMP |
| Firm Size | 0.244 (3.51)*** | 0.166 (2.06)* |
| EPS | 0.203 (2.66)** | -0.01 (-.19) |
| ROA | 0.131 (1.23) | 0.140 (1.14) |
| ROE | 0.309 (3.55)*** | 0.169 (1.72)* |
| MKRTN | 0.186 (2.75)** | 0.310 (3.99)*** |
| MKVAL | 0.181 (2.50)** | 0.239 (2.87)*** |
| TOBNQ | 0.194 (1.95)* | 0.293 (2.56)** |
| | | |
| $R^2$ | 0.5432 | 0.4516 |
| F-statistics | 17.606*** | 11.175*** |

Note: (1) T-statistics are in parentheses
(2) Standard beta weights reported.
(3) Significance level: + p<0.1, * p<.05, ** p<.01, *** p<.001
(4) SANBO is Salary & Bonus, LCOMP is Long-term Compensation
(5) SANBO (Salary and Bonus), LCOMP (Long-term Compensation), FSIZE (Natural log value of total assets; size), EPS (Earning per Share), ROA (Return on assets), ROE (Return on shareholder's equity), MKRTN (Market return), MKVAL (Growth in Market Value of Equity), TOBNQ (Tobin's q)

## Summary, Conclusion and Further Research Issues

This paper examined a *canonical* (*simultaneous)* relationship between service industry CEOs' compensation and corporate performance. In addition, this study examines the effect of firm size on compensation. The results suggest that CEO compensation depends *simultaneously* on both market-based and accounting-based performance measures. Firm size also shows a significant positive relationship with cash and long-term compensation.

The findings indicate that Cash Compensation in service companies is directly and simultaneously linked to ROE, ROA, EPS and Tobin's Q. This means that firms with a high ROE, ROA, EPS and Tobin's Q tend to pay high Cash compensation. Long-term Compensation, however, is directly related to Firm Size, Market Rate of Return and Growth in market value. It means that large firms with high Market rates of return and high Growth in market value pay significantly higher Long-term compensation. Overall, these results illustrate that the CEO compensation in the service industry is dependent not only upon accounting-based performance (particularly with respect to ROE), but also upon market-based performance measures.

One important finding of this study is that it provides evidence for changes in the compensation structure. Unlike previous findings, the evidence suggests that CEO compensation in the service industry is more closely tied to market-based performance measures (e.g., Market rate of return, Growth in market value and Tobin's Q) than those of accounting-based performance measures. These results indicate an important change in compensation schemes which attempts to tie CEO's com-

pensation to the long-term and market-based performance of a corporation. Perhaps the systematic efforts by stockholders, institutional investors, and other stakeholder rights' groups are gradually paying off. This study shows that CEOs in the service industry focus not only on short-term results (i.e., accounting profit) but also on long-term performance measures (i.e., market-based performance measures).

This research can be extended to other industries. With other industry-specific samples, we can compare the differences in compensation packages and examine the relationships between compensation and performance across industries. Comparative studies with Japan or Germany could also help us understand the linkage between CEO compensation and performance in different economic environments and could possibly render some explanation to the criticism of perceived excessive compensation of American executives.

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**Endnotes**

1. Chen and Lee (1995) examined executive compensation plans and accounting trade-offs in the Oil and Gas Industry. Lanen and Larcker (1992) and Agrawal et al. (1991) examined executive compensation contract in the Electric and Gas Utility Industry.

2. Executive compensation and performance expectation of financial institutions are substantially different from that of a typical service industry. Therefore, the financial institution sample is eliminated.

3. We employed the approximation of Tobin's Q as in Chung and Pruitt (1994), because it only requires data from COMPUSTAT. The Chung and Pruitt (1994) study revealed that this approximation of Tobin's Q has extremely high predictive accuracy when compared to the original formulation (Finkelstein and Boyd, 1988).

4. Fornell and Larcker (1980) provide an excellent discussion of the canonical correlation analysis. They have stated that "... all parametric tests of significance are special cases of the canonical model. Through the use of dummy variables, the canonical model can perform analysis of variance, analysis of covariance, and discriminant analysis as well as their multivariate counter parts..." Other accounting related articles that applied and discussed the canonical correlation methodology include Adams (1995), Cheng (1995), Haslem, Scheraga and Bedingfield (1992), Lee, Shim and Lee (1995), and Van Auken and Holman (1995).

5. For example, Fornell and Larcker (1980), Van Auken and Holman (1995) and Adams (1995), used 0.50 for the threshold in interpreting the canonical loadings. Haslem et al. (1992) used .35 and Tabachnick and Fidell (1989), Comrey (1973), Lee, Shim and Lee (1995) and Cheng (1995) used 0.30 respectively.

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