# *Does Company Performance Impact CEO Total Compensation?*

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***Abstract****. "*Pay for performance"[7] is becoming increasingly more important, resulting in companies redesigning their compensation plans to place greater emphasis on incentive rewards. As these changes occur, performance metrics should become greater indicators of CEO total compensation. A regression analysis was performed to evaluate if performance metrics and/or other factors, intrinsic to the company, impact compensation. It was determined that the company's location and industry classification had the greatest impact on compensation. Although net income, a performance metric, does have a positive effect on compensation, it was not as significant as other non-performance factors. Analysis also removed the main indicator of company performance, total shareholder return, from the model. At this point, there is still controversy surrounding "pay for performance" and if it can be properly implemented to increase shareholder value [5],[7].

# Contents

## 1. Introduction

When President George Bush signed the Troubled Assets Relief Program (TARP) bill in response to the financial crisis of 2008[1], the spotlight quickly turned to the excesses of executive compensation[2]. *"If you pay peanuts, you get monkeys."*[3] was always the justification for these high salaries, but almost six years after the "Wall Street bailout"[4], the question still persists: Should CEO compensation be tied to company performance?[5] This study will investigate if indeed, Corporate America has heeded the call by activist-shareholders to make executives accountable for company performance[8],[9].

## 2. Materials and Methods

### *2.1 Materials*

Total compensation from fiscal year 2012 ("compensation") for CEOs of companies listed in the Fortune 500 was obtained from the Securities Exchange Commission (SEC) and the Main Data Group, LLC. Metrics used to determine compensation in this study included Total Shareholder Return (TSR) from December 31, 2011 to December 31, 2012, net income of the company (2012, in millions), age of the CEO, the CEO's tenure with the company, location of the company's headquarters and sector classification. For the purposes of this study, TSR and net income were considered indicators of company performance; inclusion of these two metrics in the final model could positively demonstrate that performance does impact compensation.

The SEC regulates how companies disclose their executive compensation policies in order to create uniformity and transparency for publically traded companies. Each company must provide a Summary Compensation Table in their Proxy filing for each year[7]. The Summary Compensation Table presents the company's top five highest paid executives for the past three years and must follow the following format:

SUMMARY COMPENSATION TABLE

| Name and Principal Position | Year | Salary ($) | Bonus ($) | Stock Awards ($) | Option Awards ($) | Non-Equity Incentive Plan Compen-sation ($) | Change in Pension Value and Nonquali-fied Deferred Compensa-tion Earnings ($) | All Other Compen-sation ($) | Total ($) |
|---|---|---|---|---|---|---|---|---|---|
| (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |

***Figure 1***. *Summary Compensation Table components. Obtained from the SEC website.*

Study data was primarily sourced from the Proxy filings of the Fortune 500; specifically, the response variable, compensation, was taken from column (j), "Total ($)" of the Summary Compensation table. The effect of each predictor variable on compensation was determined by means of a multiple regression analysis.

### *2.2 Exploratory Data Analysis*

***Outliers***. During exploratory data analysis, it was determined that any CEO earning a salary of $0 and $1 should be excluded. This decision was made primarily because individuals who accept such a salary do so for reasons that are difficult to quantify and investigation would be

beyond the scope of this study. Additionally, any CEO who was promoted or hired in 2012 was removed due to the fact that partial year salaries and hiring bonuses do not accurately reflect yearly compensation.

After these salary aberrations were deleted from the data set, diagnostic tests were performed to identify potential outliers. Among the thirty-two outliers found, nine were identified to be influential cases according to measures such as DFFITS, Cook's Distance and DFBetas and were subsequently dropped from the study [see figure 1 in appendix].

***Multicollinearity***. There were no serious multicollinearity issues found between the predictor variables (|Pearson Correlation Coefficient| <0.3 for all predictors). Although some relationship was observed between age and years with company [see figure 2 in appendix], this did not indicate a problem, as the corresponding Variance Inflation Factors (VIF) had values of less than 10.

***Data Transformation***. In order to perform linear regression analysis, the residuals of the response variable must be normally distributed with constant variance. During preliminary data analysis, visual inspection of the Normality Plot revealed some skewness of the residuals, but the graph of Residuals vs Predicted values showed that the assumption of constant variance was reasonably met [see figure 3 in appendix]. Formal testing of the assumptions using the Shapiro-Wilk and Breusch–Pagan procedures determined that these assumptions could not be validated and a transformation of the response, Total Compensation, was necessary [see figure 4 in appendix].

The Box-Cox transformation procedure was performed to determine an appropriate transformation of the response variable in order to normalize the residuals. Results showed that raising compensation to the cubed root power would increase normality. However, use of this transformation would make interpretation of the final model cumbersome and non-intuitive to a lay audience. As an alternative, a natural log transformation was implemented to allow for a more robust interpretation of the final model. Residual analysis was repeated using the log-transformed response; the assumptions of normality and constant variance again failed both formal tests. Since the data set was relatively large (n=396), the requirement of normality was relaxed based on the tenets of the Central Limit Theorem[6]. Visual inspection of the residual plots showed that the residuals, after transformation, appeared to be reasonably normal and symmetric with constant variance [see figure 5 in appendix].

**2.3 Models**.

***Initial Model***. The initial model included all of the predictor variables identified as having a potential influence on CEO Compensation. The two categorical variables (region and sector) were converted into three and nine quantitative indicators, respectively, for use in the regression analysis. The West was considered the baseline for region and Utilities the baseline for industry.

$$\mathbf{Y}_i' = \beta_0 + \beta_1 TSR1 + \beta_2 NI + \beta_3 Age + \beta_4 YrHired + \beta_5 NorthEast + \beta_6 South + \beta_7 MidWest + \beta_8 IT + \beta_9 CD + \beta_{10} CS + \beta_{11} Industrial + \beta_{12} Financial + \beta_{13} Energy + \beta_{14} Material + \beta_{15} HS + \beta_{16} TS + \varepsilon_i$$

$$\text{Where } \varepsilon_i \text{ is } N(0,\sigma^2) \quad \mathbf{Y}_i' = \ln(\mathbf{Y}_i)$$

***Model Selection**:* A best subset of the predictor variables was determined by using the stepwise forward selection method, with an entry level of 0.05 and a stay level of 0.05; Mallow's C(p) criterion was also used to select model candidates. Both methods produced similar results; some models favored inclusion of CEO age as a factor, while others favored the CEO's tenure at the company. Best subsets determined by the adjusted $R^2$ criterion were not considered to be viable candidates, since these values were too low (0.0311 to .1635) to make valid comparisons. This finding is not surprising, since it would be unexpected to explain the variation of compensation given only six parameters [see figure 6 in appendix].

Subject knowledge then came to play in the selection of a final model from the best candidates. Tenure can be thought of as a measure of loyalty to a company, which, in theory, should positively impact salary. Since all models had equivalent validity, the models that included CEO tenure as a factor seemed to tell a more interesting story about the factors that determine compensation.

Once the best subset of significant main effects was identified, all two-way interactions between these variables were then incorporated into the stepwise forward selection process in order to construct the final model. The result was a model that included four main and two interaction effects. Note: The main effect of the IT industry was deemed insignificant, but since it was integrated into both of the significant interaction terms, it was retained for a more valid interpretation of the model.

***Final Model***. The final model included the CEO's Tenure with the company, Net Income, Location: Northeast region (yes/no), Industry Classification: Information Technology (yes/no) and Consumer Staples (yes/no). The interaction of the IT industry and the Northeast region, as well as the interaction of net income and the IT industry were also found to be significant [see figure 7 in appendix]. Box plots of both region and industry confirm the regression analysis results.

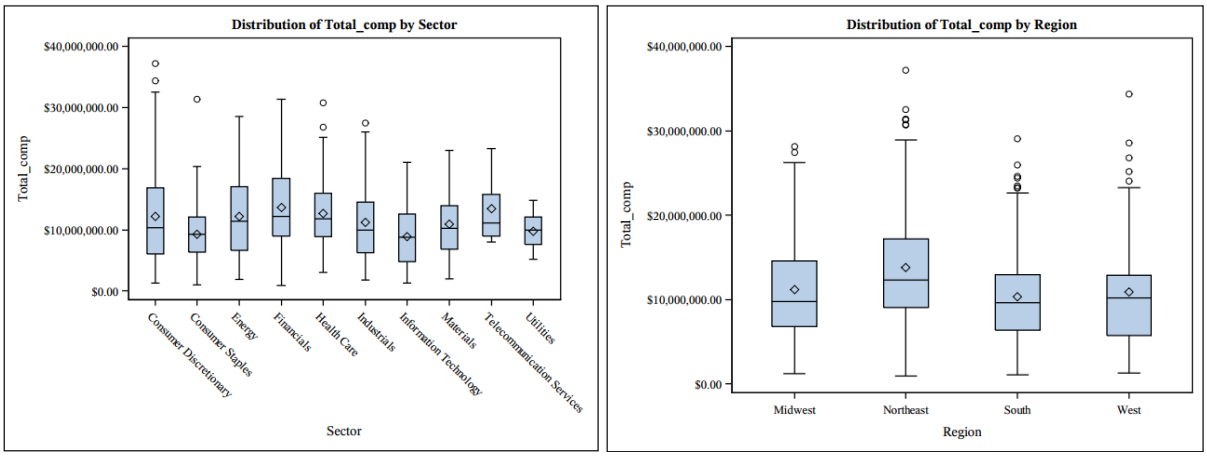


***Figure 2***. *Box plots of Industry and Region. Total compensation is less for the IT industry, and greater for the Northeast*

The assumptions of normality and constant variance were verified for the final model; residual analysis confirmed that both of these assumptions were reasonably met [see figure 8 in appendix].

$$Y_i' = 15.971 + 0.0082(\text{Years with Company}) + 0.000049\,(\text{NetInc}) + 0.26052\,(\text{Region:NE})$$
$$- 0.28513\,(\text{Industry:CS}) - 0.02108\,(\text{Industry:IT}) - 0.48758\,(\text{Industry: IT*Region:NE})$$
$$- 0.00006729\,(\text{NetInc*Industry:IT}) + \varepsilon_i$$

$$\text{Where } \varepsilon_i \text{ is } N(0,\sigma^2) \text{ and } Y_i' = \ln(Y_i)$$

## 3. Results

Based on the final model, it was determined that when all variables, except tenure, were held constant, compensation would increase by approximately one percent for every year added to the CEO's employment with the company. Although net income was found to be significant in the model, its effect was minimal; with everything else held constant, compensation would increase by 0.005 percent for every million-dollar increase in net income. In this study, the mean compensation was $11,941,777, with a standard deviation of $7,577,572; this effect represented an additional $600 for every million-dollar increase in company's net income for the "average" executive. The increase due to net income is extremely negligible in comparison to the CEO's total compensation and should be deemed insignificant.

It was also found that CEOs of companies located in the Northeast region received approximately 30 percent higher compensation compared to CEOs located in the West. CEOs of companies that belong to the Consumer Staples industry received lower compensation than those in the Utilities industry by 24.80 percent.

The study also found an interaction effect between the location of the company and whether or not it was an IT company. Data showed that executives of IT companies received approximately 39 percent lower compensation, on average, than those in non-IT industries if the company was located in the Northeast Region.

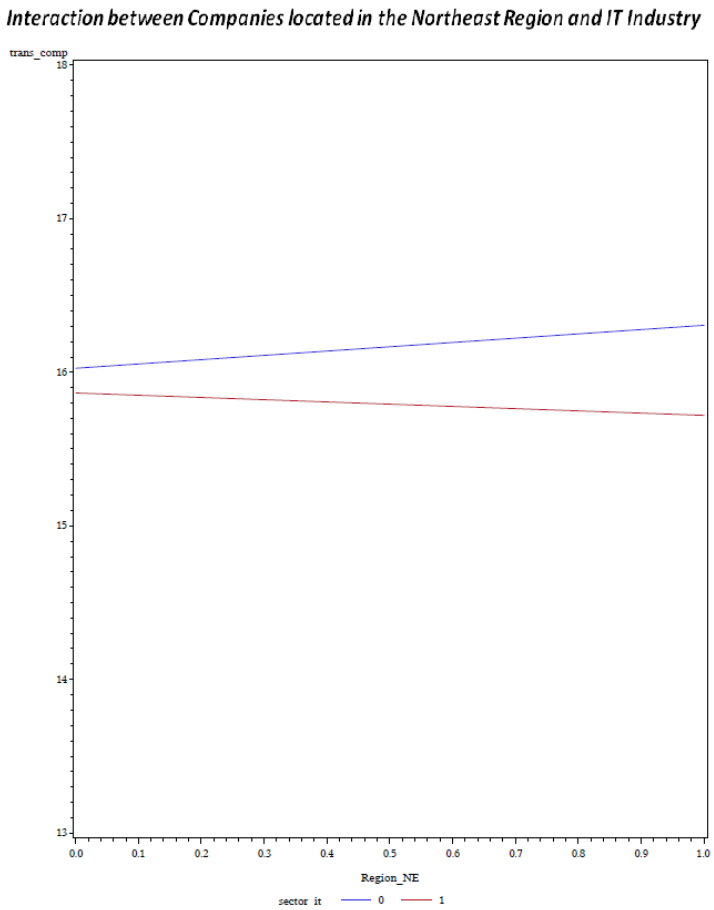


***Figure 3***. *IT Companies located in the Northeast have lower compensation than non-IT companies.*

The study concluded that company performance was not the most significant factor in the determination of compensation. Although net income does have a small positive effect on total compensation, TSR was found not to be significant at all.

## 4. Conclusion and Discussion

The study determined that in the year 2012, CEO total compensation was not influenced by company performance. If stockholders continue to demand justification for large salaries[3], fiscal performance metrics[7] should become increasingly more important when determining compensation in the years to come.

***Further Study***. It is suggested that in a future study, CEOs who are company founders should be excluded, since they do not accurately reflect the "traits" of a typical CEO of a Fortune 500 company. These founder/CEOs are typically majority stakeholders and take compensation different from that of non-founders. By removing all founder/CEOs, the model might have a greater ability to predict the total compensation of CEOs of Fortune 500 companies.

Moreover, additional explanatory variables, such as characteristics of the CEO (previous experience, education, etc.) and other company performance metrics (total assets, return on equity, etc.) should be included in future analysis. Incorporation of these factors may control and reduce the variability in the model, and help determine if company performance has any significant impact on CEO compensation.

## References


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## Appendix

| Obs | Company_Name | Total_comp | sdr | lev | cookd | dffits | outlier | lev_flag | dff_flag | percent |
|---|---|---|---|---|---|---|---|---|---|---|
| 35 | Apple | $4,252,727.00 | -2.70531 | 0.20798 | 0.11120 | -1.3863 | 0 | 1 | 0 | .001900902 |
| 67 | CBS | $62,157,026.00 | 2.35531 | 0.02994 | 0.00995 | 0.4138 | 0 | 0 | 1 | 1.6531E-10 |
| 104 | Computer Sciences | $21,288,188.00 | 1.96833 | 0.05168 | 0.01233 | 0.4595 | 0 | 0 | 1 | 7.2844E-10 |
| 148 | Estée Lauder | $31,598,679.00 | 2.40466 | 0.03832 | 0.01338 | 0.4800 | 0 | 0 | 1 | .000000001 |
| 234 | Level 3 Communications | $40,708,970.00 | 1.45820 | 0.22037 | 0.03525 | 0.7753 | 0 | 1 | 1 | .000000985 |
| 254 | McKesson | $51,744,999.00 | 2.15548 | 0.03028 | 0.00845 | 0.3809 | 0 | 0 | 1 | 5.319E-11 |
| 263 | Mondelez International | $28,811,314.00 | 2.15289 | 0.04205 | 0.01186 | 0.4511 | 0 | 0 | 1 | 5.5623E-10 |
| 398 | Visa | $24,201,851.00 | 1.71407 | 0.05192 | 0.00942 | 0.4011 | 0 | 0 | 1 | 1.1263E-10 |
| 422 | eBay | $29,705,081.00 | 2.20152 | 0.03605 | 0.01055 | 0.4257 | 0 | 0 | 1 | 2.4857E-10 |

**Figure 1** – List of Influential Cases

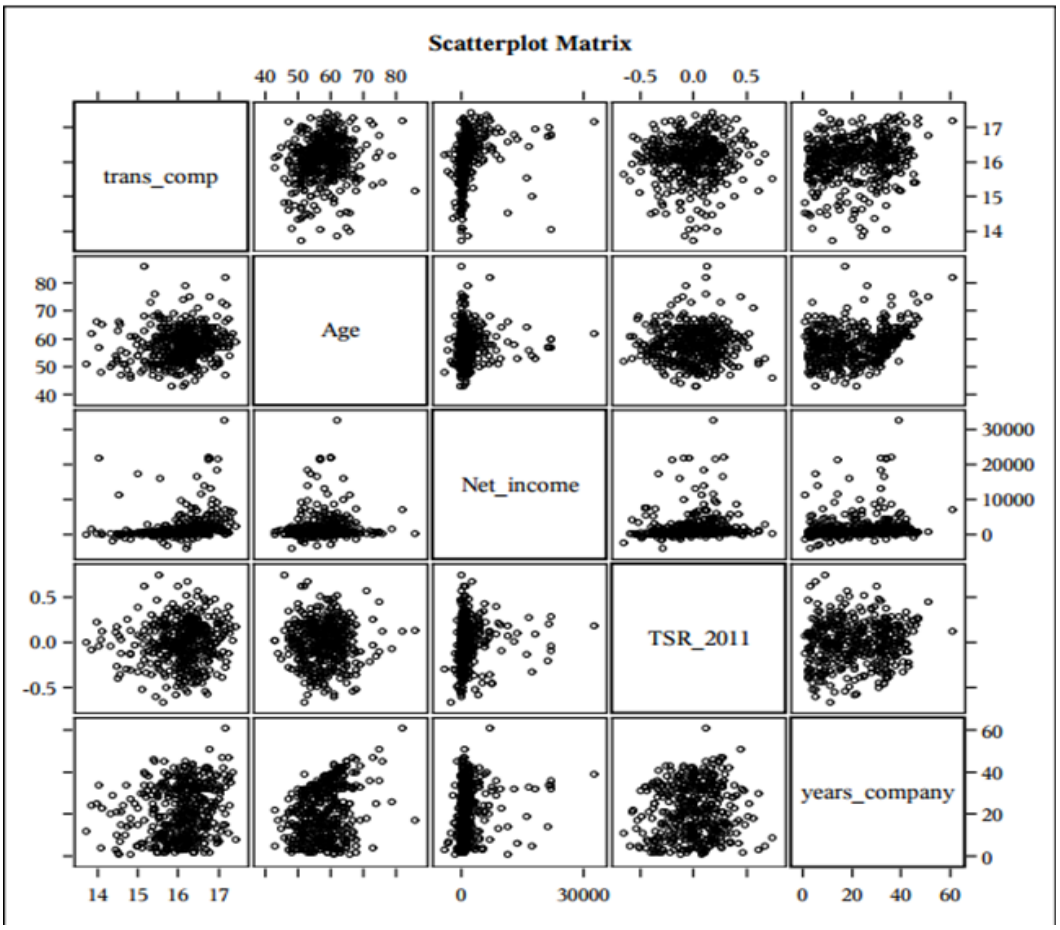


**Figure 2** - Scatterplot Matrix

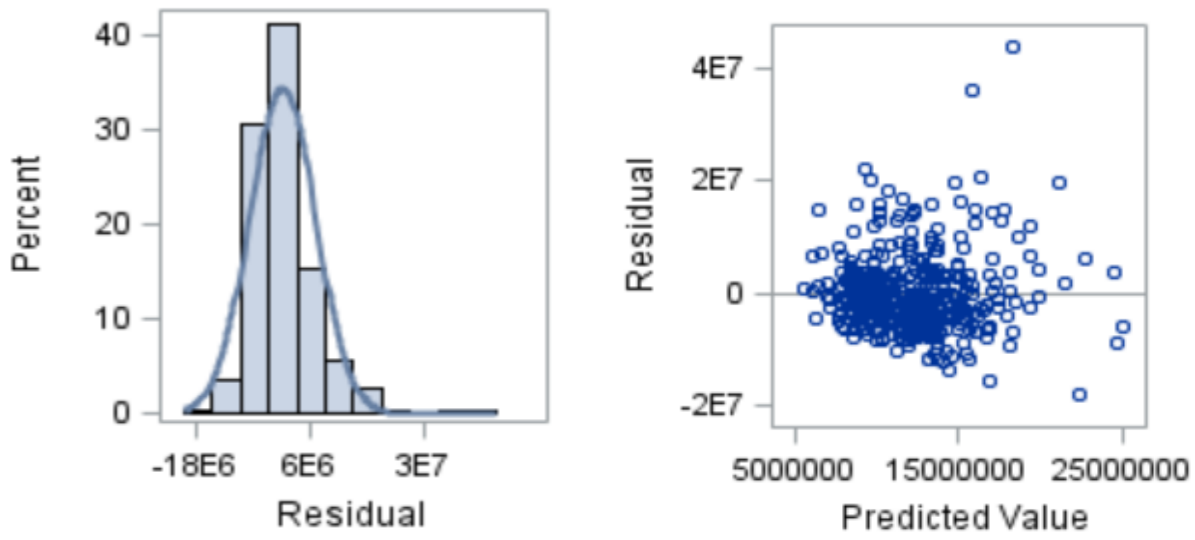


**Figure 3** – Histogram of Residual and Residuals vs. Predicted value (Before Transformation).

| Tests for Normality | | | | |
|---|---|---|---|---|
| **Test** | **Statistic** | | **p Value** | |
| **Shapiro-Wilk** | **W** | 0.901294 | **Pr < W** | <0.0001 |
| **Kolmogorov-Smirnov** | **D** | 0.104163 | **Pr > D** | <0.0100 |
| **Cramer-von Mises** | **W-Sq** | 1.336915 | **Pr > W-Sq** | <0.0050 |
| **Anderson-Darling** | **A-Sq** | 7.918039 | **Pr > A-Sq** | <0.0050 |

| Heteroscedasticity Test | | | | | |
|---|---|---|---|---|---|
| **Equation** | **Test** | **Statistic** | **DF** | **Pr > ChiSq** | **Variables** |
| **Total_comp** | White's Test | 72.86 | 85 | 0.8232 | Cross of all vars |
| | Breusch-Pagan | 5.95 | 1 | 0.0148 | TSR_2011, inc_age, inc_years_company, inc_Net_income, inc_Region_MW, inc_Region_NE, inc_Region_S, inc_sector_cd, inc_sector_cs, inc_sector_energy, inc_sector_financials, inc_sector_hc, inc_sector_industrial, inc_sector_it, inc_sector_material, inc_sector_ |

**Figure 4** – Results of Formal Normality and Breusch Pagan Tests

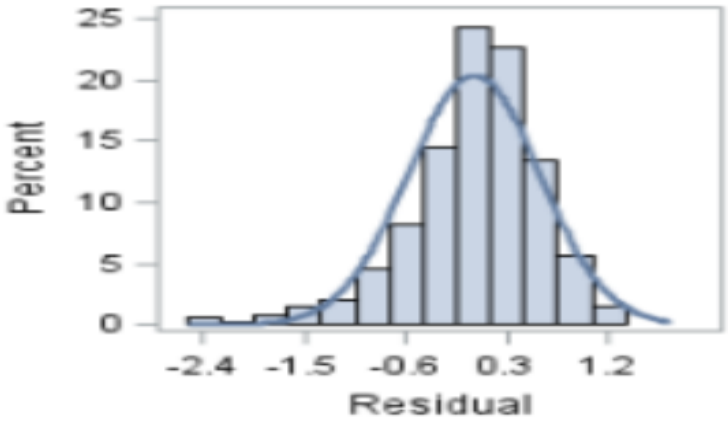


**Figure 5** – Histogram of residual after transformation

| Parameter Estimates | | | | | | |
|---|---|---|---|---|---|---|
| Variable | Label | DF | Parameter Estimate | Standard Error | t Value | Pr > \|t\| |
| Intercept | Intercept | 1 | 15.83509 | 0.06433 | 246.15 | <.0001 |
| Net_income | Net_income | 1 | 0.00004099 | 0.00000805 | 5.09 | <.0001 |
| years_company | years_company | 1 | 0.00746 | 0.00243 | 3.07 | 0.0023 |
| Region_NE | | 1 | 0.23850 | 0.06850 | 3.48 | 0.0006 |
| sector_cs | | 1 | -0.28442 | 0.10216 | -2.78 | 0.0056 |
| sector_it | | 1 | -0.27004 | 0.10765 | -2.51 | 0.0125 |

**Figure 6** – Best Subset of Main Effects

| Parameter Estimates | | | | | | |
|---|---|---|---|---|---|---|
| Variable | Label | DF | Parameter Estimate | Standard Error | t Value | Pr > \|t\| |
| Intercept | Intercept | 1 | 15.79911 | 0.06467 | 244.30 | <.0001 |
| years_company | years_company | 1 | 0.00821 | 0.00242 | 3.39 | 0.0008 |
| Net_income | Net_income | 1 | 0.00004919 | 0.00000855 | 5.76 | <.0001 |
| Region_NE | | 1 | 0.26052 | 0.07013 | 3.72 | 0.0002 |
| sector_cs | | 1 | -0.28513 | 0.10111 | -2.82 | 0.0050 |
| sector_it | | 1 | -0.02108 | 0.13249 | -0.16 | 0.8737 |
| income_it | | 1 | -0.00006729 | 0.00002283 | -2.95 | 0.0034 |
| NE_it | | 1 | -0.48758 | 0.27896 | -1.75 | 0.0813 |

**Figure 7** – Final Model Including Interaction Terms

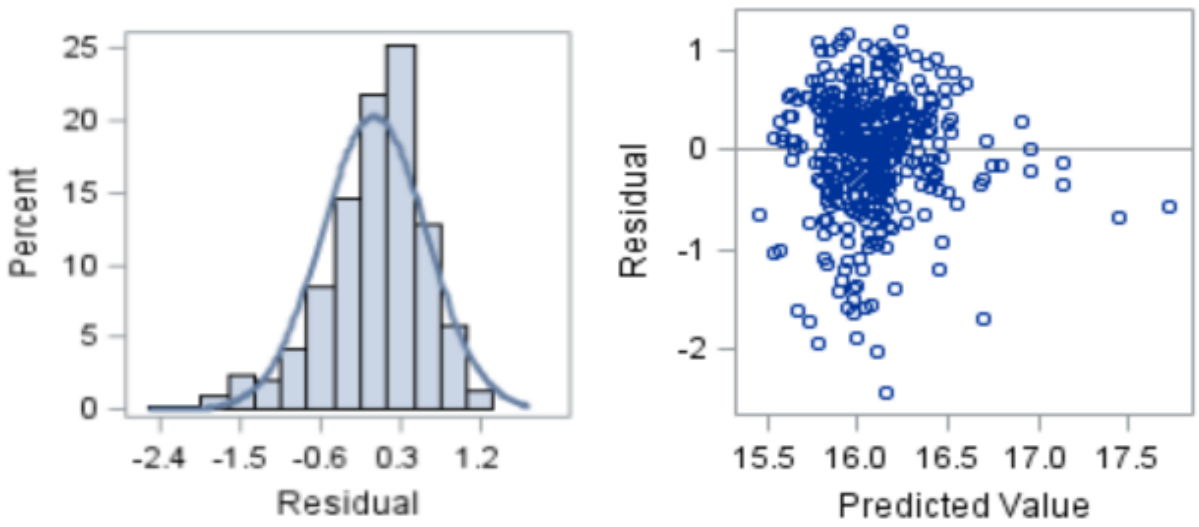


**Figure 8** – Histogram of the Residuals and the Predicted Value vs. Residuals (Final Model)