

***Executive Wages in America: Examining the Impact of Different Factors on***

***Wages***

**An Honors Thesis (ECON 424)**

**by**

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## Abstract

The United States has the largest economy in the world. This economy includes financial markets where all publicly traded companies in the US operate. Within these financial markets, the country's largest 500 companies exist. Research shows that the average CEO of a Fortune 500 company makes approximately 200 times the pay of an average worker for these companies. As a young woman in business, and potential future CEO, I plan to examine a few key factors that I believe impact CEO pay in America. I believe that being female has a negative impact on wages, and that CEO pay depends heavily on company performance. I will be using data regarding company performance and demographics of CEOs of some of the United States' largest companies to perform a regression analysis in order to determine the likelihood that these factors have an impact on CEO pay.

## **Acknowledgments**

I would like to thank Dr. Tung Liu for all of his assistance and guidance throughout this process. I appreciate all of the time and effort he put forth in order to allow me to research a topic that may one day impact me in my future career. This project allowed me to demonstrate some of the many things I have learned from Dr. Liu during our time together here at Ball State.

I would like to thank Kierra and Gerald for all of their support and encouragement throughout this adventure. Thank you for never giving up on me.

Lastly, I would like to thank Katherine for showing me that a young woman can do anything she puts her mind to.

## Process Analysis Statement

Over the summer, I did an internship with a Fortune 500 company. During this internship I was able to work very closely with an extremely powerful woman within this company. While working under her, I was able to gain an exceptionally valuable insight into the world of being a woman working for a Fortune 500 company. Throughout our time together, she taught me some highly valued information about ensuring that you capitalize on the opportunities presented before you that allow you to be properly compensated for your talents and experience. It was during this time that I realized I wanted to look into the different factors that could one day affect my own pay.

As a woman, I am constantly presented with the reality that I may not be paid as highly as my male counterparts. I have read dozens of articles addressing the gender gap within business, and was curious as to whether or not I would be able to conclude the same results within my own analysis. At that point, I was planning to examine only the impact gender had on wages. However, after further discussion with Dr. Liu, we decided that this would be nearly impossible to examine as my thesis topic due to the lack of other deciding factors on pay. From here, I decided to do some research into exactly what factors have an impact on wages in America. During this time, I was able to discover that an immense amount of factors go into determining pay including education, experience, age, tenure, and even the size of the company one works for.

It was at this point that I knew my analysis was going to include a great deal of factors, and would need solid data in order to make sound conclusions. Without the time or the resources to gather this information from executives in the work force on my own, Dr. Liu

encouraged me to look into any of this data that was public knowledge. Being a finance student, I had access to Bloomberg, a major global provider of financial data including news and information, along with historic data and analyst coverage. I was very excited to be able to apply knowledge regarding Bloomberg that I had learned from my classes in order to collect data for my project.

After examining the data that was available on Bloomberg, and further discussion with my advisor, I decided examine these factors regarding CEOs of America's largest corporations. However, because I went from examining executives to examining CEOs, it was essential that I include other factors as CEO pay is not based solely on the things a normal executive's pay is based on. Here, I decided to look at not only demographics, but also company performance as CEO pay is typically impacted by performance.

While collecting my data and researching this topic, I was able to utilize many of the skills I have learned throughout the last four years. With everything from notetaking to statistical analysis, this process helped me to get an insight into the time, dedication, and intense amount of research that goes into any type of big project. By requiring both the application of classroom learning and the advising of a seasoned faculty member, I was able to gain not only experience and confidence in my own abilities and the abilities of those above me, but also to see firsthand the willingness to support and educate those who dedicate their time to teaching the next generation.

If I could start over and go through this process again, there are a few things I would do differently. I would want to increase my sample size and number of variables. This would not necessarily alter the results of my analysis, but would increase its accuracy. It is difficult to find

all the necessary data for individuals without taking the time to conduct individual surveys.

However, by including a greater number of variables that may impact pay, but are not counted in my model, the effect on pay that the variables I have included may not be accurately represented.

I would likely include more variables that embody the performance of a company including other financial ratios and company financial data when assessing CEO pay. I may also consider the different categories of CEO pay (salary, bonuses, and stock options) each separately in order to determine the factors that affect each individual portion of pay. If I had gone with one of my earlier project ideas examining impacts of factors on pay of executives, I would conduct surveys that consider variables such as desire to receive promotions, marital status, family size, and number of positions held with their current company. Because my data is based on the highest position in the largest companies in the country, it may not be an accurate representation of those who work for smaller companies.

## Introduction

Chief Executive Officers are responsible for many things within a firm. As the highest-ranking executive in a company, those who hold this title are required to make all day-to-day management decisions in order to align the company with its projected long and short-term plans. As CEO, an executive is also responsible for the position of liaison between the company's Board of Directors and its corporate operations. In other words, with this title comes great responsibility. As one can expect with this amount of responsibility, the monetary incentives to reach this position are extremely attractive and have been increasing steadily over the years. CEO pay for American companies has been a controversial topic throughout history with many suggestions that CEOs are financially incentivized to boost company performance by any means necessary. Many believe CEOs are extremely overpaid for their positions. In fact, the average CEO of a Fortune 500 company brings home an astounding 200 times the pay as an average worker for these companies.

As a young woman in business, the topic of pay crosses my mind daily. Over the years, there has been a steady decline in the wage gap between men and women; however, evidence has been presented that this gap exists still today. Aside from gender, evidence has been presented that other factors including age, work experience, tenure, education, and firm size have an impact on wages as well. While these may be some of the most important factors in determining wages for an average worker, when considering the factors that affect the wages of CEOs and other executives of their stature, more research must be done.

It has been theorized that company performance and CEO pay are directly related. It is expected that if a company performs well, the CEO at the helm would be rewarded for such

performance. This theory has been examined by many researchers over time, and continues to be studied today. A company measures its performance using a multitude of financial ratios. These range from liquidity and profitability ratios to efficiency ratios, and everything in between. The key financial ratios that reflect a company's performance include Return on Equity (ROE), Return on Assets (ROA), and Profit Margin. These ratios measure performance as a percentage and provide an accurate picture of a company's performance.

It is with this information in mind that I plan to conduct an empirical project examining the impact of multiple factors on CEO wages. As an up-and-coming young business professional and potential future CEO, I believe it is essential to understand the relationships that may one day impact my pay. Therefore, I have collected data regarding the wages, gender, age, work experience, tenure, education, and firm size of CEOs of Fortune 500 companies in America. I have also collected data that includes the ROE, ROA, and Profit Margin of each CEO's respective company. I intend to examine this data in order to determine which relationships, if any, are significant, and to support or reject my hypothesis regarding the impacts each of these factors has on wages.

While many studies have been done regarding these topics separately, I plan to conduct a study that considers all of these topics. As with any study, there are problems that may occur. First, as many of these factors can be related to one another, I may run into a multicollinearity problem. As some studies have experienced in the past, being that only four percent of Fortune 500 CEOs are female, I may not be able to acquire enough data from female executives in order to provide a clear picture of the relationship between gender and wages. There may also be problems with my results due to a lack of emotional variables. Without conducting individual



surveys, there is no way to record emotional data regarding an executive's desire to work, family dynamics, or mental state that may tie into their performance which could directly impact their wages. Finally, the results I produce will be based solely on recorded data. Due to the controversy surrounding CEO pay and large corporations, it is possible that certain data has gone unreported and therefore will be unaccounted for in my analysis.

The results of this analysis will produce answers to questions I've been asking myself for the last four years and that cross the mind of every young person entering the workforce in the business world. Does the fact that I am a young woman with experience across many different companies create financial consequences that otherwise would not exist. Is it necessary to remain with a company for a long period of time in order to secure the highest possible compensation? Should executives strive for a position with a large firm, or is it possible to maximize one's earnings while working for a small firm? Does company performance affect CEO pay? Is there statistical evidence to support the theories I have read about and been informed of my entire collegiate career? While those before me have performed many studies and experiments, I am exceptionally intrigued to calculate, explain, and record my own findings.

### **Literary Review**

In order to produce an accurate experiment, one must consider a multitude of variables. While many different studies have been conducted regarding CEO pay, they each have their own uncertainties paired with differing perspectives. Much of the literature I have examined refers to diverse viewpoints when assessing these topics. The articles I read range in time from

the early 1990s to the early 2000s, providing an interesting insight into these topics throughout time.

The first article I read was examining the gender gap in top corporate jobs. In this article, the authors conducted research based on Harvard's Standard and Poor Execucomp data, which is data from the top five executives of the top 500 companies in the United States (Bertrand and Hallock, 2001). In the article, there is mention of the difficulty of finding female executives to analyze; however, with the size of the database, the authors were able to find sufficient data. The study also considered the impact of firm size, age, and tenure on the gender gap. The model used in the article includes the percentage of women as the dependent variable with the aforementioned factors as independent and control variables. The regression concluded with a result of a 47% wage gap in the top four occupations of Chair, CEO, Vice Chair, and President (Bertrand and Hallock, 2001). In conclusion, the article mentions a "crack" in the glass ceiling for women as the participation and compensation of women has increased from the past and continues to increase.

The second article I reviewed examines the relationship between CEO pay and firm performance from Malaysia listed firms. The article examines the relationship between CEO pay and firm performance by considering ROE, ROA, and profit margin. The study uses a regression analysis to compare these things and make conclusions regarding three hypotheses. Each hypothesis entails a null hypothesis that there is no significant relationship between CEO pay and ROA, ROE, and profit margin respectively. Each of these nulls are then paired with an alternative that there is a significant relationship between CEO pay and ROA, ROE, and profit margin respectively. The models used are as follows:  $(ROA)_t = \alpha + \beta \text{LOG}(\text{CEO\_PAY})_t$ ,  $(ROE)_t = \alpha$

+  $\beta \text{LOG}(\text{CEO\_PAY})_t$ , and  $(\text{PM})_t = \alpha + \beta \text{LOG}(\text{CEO\_PAY})_t$ . In considering past studies, the authors chose to examine these three ratios due to the past significance they have presented. The results of this study concluded significant relationships between both ROE and CEO pay, and ROA and CEO pay. It was found in this article that profit margin produced the least significant relationship to CEO pay among the three variables considered. In the conclusion of the article, the authors were able to determine “that there is a relationship between CEO pay and firm performance. Firms are willing to pay a high salary to their CEO in order to motivate them to work harder for the firms to increase their performance” (Ismail, Yabai, & Hahn, 2014). With this study to learn from, I am excited to determine whether or not I come to the same conclusion regarding performance while also producing results regarding other factors.

The third article I reviewed considers ROE as a proxy for firm performance in order to understand CEO compensation. The study used firm size as a control variable and splits its data into three categories as such; these categories include small, medium, and large firms. The study uses a linear regression model with CEO compensation as the dependent variable, firm size as a control variable, and ROE as the independent variable. The study also split CEO compensation into two categories: CEO bonus and CEO salary. The results of the study conclude that ROE and CEO bonus have a relationship among small, medium, and large sized companies, and that CEO salary and ROE have a relationship among small sized companies. In order to provide an accurate picture of compensation, I plan to combine the different categories of CEO compensation into one overall variable.

In much the same manner, the fourth article I reviewed considers the relationship between CEO remuneration and size and performance of a firm (Kutum, 2015). In the article, it

is said that, "Many critics have argued both as rhetoric as well as an empirical study that high executive pays have a negative impact on the sustainability and success of a firm" (Kutum, 2015). While this view is not the popular one, the author provides sufficient literary review that produces evidence this conclusion has been made in the past. The author used a statistical analysis software called SPSS in order to investigate these topics. The models used in this study are very similar to those in the last article I reviewed in that CEO pay was considered as the dependent variable with firm size, ROE, ROA, and Profit Margin as independent variables individually in each study. The conclusions of this study are threefold: there is a strong positive relationship between CEO compensation and firm size, there is a medium positive relationship between CEO pay and ROA, and there is no relationship between CEO pay and ROE. With these results compared to some of the other articles I reviewed, I am intrigued as to the results I am going to discover as I carry out my own analysis.

The remainder of articles I reviewed prior to conducting my analysis involve the direct relationship between each of my independent variables and my dependent variable. Because these articles were used solely as research regarding the relationship between my independent variables and my dependent variable, I have included the results of each article in my expectations of these relationships in the next section of my paper. The exact relationships are years of work experience and wages (Altug & Miller, 1998), years with the company and wages (Hersch & Reagan, 1999), years of education and wages (Card, 1999), and firm size and wages (Schmidt & Zimmermann, 1991).

## Model

The purpose of this model is to examine the relationship between gender, age, years of work experience, years with the company, years of education, firm size, ROE, ROA, profit margin, and CEO pay. In doing so, I will be able to explore the possible realities of my future career while also observing changes (or lack of) compared to the past results from the articles I have read. The results of this model will provide either support or counter-evidence for my hypothesis, allowing a justified conclusion to be made.

I plan to observe one linear regression model with one dependent variable, eight independent variables, and one dummy variable. Wages will be the dependent variable, while age, years of work experience, years with the company, years of education, firm size, ROE, ROA, and profit margin will be the independent variables, and gender as a dummy variable to account for those male or female. For the dummy variable, I will record the gender of each individual represented by a 1 (female) or a 0 (male). The independent variables to be assessed will allow one to conclude the impact of age, experience, tenure, education, firm size, and firm performance, along with gender on wages.

One can expect a positive relationship between age and wages. Typically, level of experience increases with age. Economic theory suggests that the older one is, the more experience one has in a work place, along with better work habits, and likely more advancement in the company that would lead to higher wages. With more age comes more wisdom, responsibility, and life experience that could also explain the positive relationship between age and wages. Therefore, as age increases, I would expect wages to increase as well. This implies a positive coefficient for the independent variable age.

One can expect a positive relationship between years of work experience and wages. It is logical to conclude that the longer one has been part of the workforce, the more likely one is to perform well, be able to solve problems more easily, and be a greater asset to any company. Also, one who has been exposed to working longer likely has excellent time-management and personal skills that are necessary to perform well at work. This performance will likely lead to higher wages. This leads one to deduce that as years of work experience increases, wages will increase as well (Altug & Miller, 1998). This implies a positive coefficient for the independent variable years of work experience.

One can expect a positive relationship between years with the company and wages, as the longer one has been with the company, the more information said company has regarding talent, work ethic, dedication, and responsibility of a worker. Each of these is an essential skill when determining wages (Hersch & Reagan, 1999). Typically, companies desire to hire from within as this minimizes the outside impact an executive from a different company may have on the current company. This implies a positive coefficient for the independent variable years with the company.

One can expect a positive relationship between years of education and wages as typically, higher-level degrees imply more intelligence, dedication, and knowledge (Card, 1999). Each of these things is essential when determining how much one should be paid for doing a job. Thus, as the years of education one has completed increases, it can be logically concluded that wages will increase as well. This implies a positive coefficient for the independent variable years of education.

One can expect a positive relationship between firm size and wages. It logically makes sense that a larger company has the financial assets available to be able to pay its workers more than a smaller company with less financial assets. This has been theorized by economists and analyzed by statisticians for years that have led to the conclusion of a positive relationship between these two variables (Schmidt & Zimmermann, 1991). It has been shown through past studies, as mentioned above, that firm size has a positive relationship with CEO pay, and thus, a positive coefficient for the independent variable firm size is expected.

As past analysis has suggested, there is expected to be a positive relationship between CEO pay and company performance. While there has been some discussion of a negative relationship due to poor morals and values, I believe that there will be a positive relationship between CEO pay and company performance. This will be considered using three different variables: ROA, ROE, and profit margin. In making this conclusion, I expect there to be positive coefficients regarding each of these independent variables.

Historically, there is a negative relationship between being of the female gender and wages as women are seen to be less qualified than their male counterparts in performing the same tasks. Research shows a gender bias when discussing level of pay that can hopefully be shown in my analysis as well. Based on these observations, I expect the coefficients for both education and experience to be positive, as there is likely a positive relationship between these things and wages. However, I believe there to be a negative relationship between those who are female and wages compared to those who are male, and wages. This implies a negative coefficient for the dummy variable female.

These assumptions lead to the formation of the following model:

$$WAGE_e = \beta_0 + \beta_1 AGE_e + \beta_2 EXPER_e + \beta_3 TENURE_e + \beta_4 EDUC_e + \beta_5 FSIZE_e + \beta_6 ROE_e + \beta_7 ROA_e + \beta_8 PMARGIN_e + \delta_0 FEMALE_e + u_e$$

Where:

<i>e</i>	Executive
<i>WAGE</i>	Annual salary including bonuses and stock options in 2017 (in millions)
<i>AGE</i>	Age
<i>EXPER</i>	Years of work experience in professional business world
<i>TENURE</i>	Years working for current company
<i>EDUC</i>	Years of education after high school
<i>FSIZE</i>	Market cap of company (in billions)
<i>ROE</i>	Return on Equity for FYE 2017 for the company said executive is CEO
<i>ROA</i>	Return on Assets for the company said executive is CEO
<i>PMARGIN</i>	Profit margin for the company said executive is CEO
<i>FEMALE</i>	= 1 if female, 0 if male

This model is to be tested in order to determine if there is a significant correlation between any of the variables and to determine if any of the variables are statistically significant with regard to executive wages. As with any sound statistical analysis, I will be testing for multicollinearity, heteroscedasticity, and serial correlation.

I collected my data using multiple financial software systems that report financial information for companies across the country. I chose to use data regarding the Fortune 500



companies in the United States as these represent the most successful companies in the country. After reviewing the data I could find, I was left with 110 executives from 110 different companies. The majority of my information was pulled directly from Bloomberg with the remainder coming from Yahoo Finance. I chose to use annual salary including bonuses and stock options as these provide a much more accurate image of the true wages each of the executives studied were rewarded. While collecting my data, I discovered that a very heavy majority of the annual wages of executives comes from other sources besides annual salary so in order to provide the most accurate results possible, I have included these additional sources of income.

## Empirical Results

Summary Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
<i>WAGE</i>	15.799	16.666	3.600	156.100
<i>AGE</i>	58.309	4.949	49.000	72.000
<i>EXPER</i>	34.055	6.253	20.000	49.000
<i>TENURE</i>	20.391	10.905	1.000	44.000
<i>EDUC</i>	5.973	1.860	3.000	12.000
<i>FSIZE</i>	23.228	62.705	2.510	338.522
<i>ROE</i>	28.074	56.445	-5.430	523.120
<i>ROA</i>	6.532	5.595	-1.710	24.450
<i>PMARGIN</i>	12.282	9.659	-5.320	50.430
<i>FEMALE</i>	0.236	0.427	0.000	1.000
Number of Observations = 110				

	<i>WAGE</i>	<i>AGE</i>	<i>EDUC</i>	<i>EXPER</i>	<i>FEMALE</i>	<i>FSIZE</i>	<i>PMARGIN</i>	<i>ROA</i>	<i>ROE</i>	<i>TENURE</i>
<i>WAGE</i>	1.000	0.187	0.035	0.142	-0.009	0.148	0.021	-0.015	-0.031	0.029
<i>AGE</i>	0.187	1.000	-0.183	0.798	-0.052	0.007	0.060	0.183	0.164	0.238
<i>EDUC</i>	0.035	-0.183	1.000	-0.403	0.124	0.019	0.052	-0.071	-0.081	-0.191
<i>EXPER</i>	0.142	0.798	-0.403	1.000	0.040	-0.073	-0.019	0.141	0.211	0.373
<i>FEMALE</i>	-0.009	-0.052	0.124	0.040	1.000	-0.068	-0.014	-0.026	0.012	-0.069
<i>FSIZE</i>	0.148	0.007	0.019	-0.073	-0.068	1.000	0.061	-0.081	0.047	0.203
<i>PMARGIN</i>	0.021	0.060	0.052	-0.019	-0.014	0.061	1.000	0.302	0.067	0.022
<i>ROA</i>	-0.015	0.183	-0.071	0.141	-0.026	-0.081	0.302	1.000	0.366	0.034
<i>ROE</i>	-0.031	0.164	-0.081	0.211	0.012	0.047	0.067	0.366	1.000	0.207
<i>TENURE</i>	0.029	0.238	-0.191	0.373	-0.069	0.203	0.022	0.034	0.207	1.000

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
<i>AGE</i>	0.110	671.940	2.936
<i>EDUC</i>	0.518	32.137	2.238
<i>EXPER</i>	0.099	215.793	5.251
<i>FEMALE</i>	10.189	3.911	2.225
<i>FSIZE</i>	0.000	3.878	1.664
<i>PMARGIN</i>	0.017	5.566	1.932
<i>ROA</i>	0.018	3.790	1.303
<i>ROE</i>	0.000	2.668	1.605
<i>TENURE</i>	0.020	26.228	2.938
<i>C</i>	197.643	355.898	NA

When observing the correlation table above, it is clear that the highest correlation is between age and experience. However, because this correlation is less than what we consider to be too high, it is very unlikely that there is a multicollinearity problem. That being said, I ran a Variance Inflation Factors test and, in agreement with my initial conclusion, the highest VIF was significantly below 10, leading to the final observation that there is not a multicollinearity problem. When testing for heteroscedasticity using the White test, I was unable to reject the

null hypothesis. However, to ensure heteroscedasticity was not present, I chose to produce the White heteroscedasticity-consistent standard errors. This resulted in my initial model (Model (1)).

I found that in each of my models, both firm size and ROE were significant at the five percent level. I concluded that Model (4) was the best model to fit my regression as this model resulted in the highest adjusted R-squared value. With this model we can see that the estimated coefficient for age is 0.467701 which implies that as age increases by one year, CEO wage increases by \$0.467701million when all other variables hold constant. In the same manner, the estimated coefficient for education was 0.80435, which implies as years of education increases by one, CEO wage increases by \$0.80435million when all other variables hold constant. Also, the estimated coefficient for experience was 0.250986, which implies that as years of work experience increases by one, CEO wage increases by \$0.250986million when all other variables hold constant. Unfortunately, I found that none of these variables is significant at the five percent level. However, firm size produced an estimated coefficient of 0.041431. This implies that as firm size increases by 1 billion, CEO wage increases by \$0.041431million when all other variables hold constant. I found this to be significant at the five percent level. Lastly, ROE had an estimated coefficient of -0.021660. This implies that as ROE increases by one, CEO wage decreases by \$.021660million when all other variables hold the same. I found this to be significant at the five percent level as well.

These results allow me to make a conclusion regarding ROE and CEO pay, along with firm size and CEO pay. Without the significance at five percent, however, I am unable to

conclude whether or not the remaining variables are valid. Along with testing for multicollinearity and heteroscedasticity, I tested for serial correlation. As expected, because this data is not time-series data, there were no serial correlation problems.

**Results Table**

<b>Independent Variables</b>	<b>Model (1)</b>	<b>Model (2)</b>	<b>Model (3)</b>	<b>Model (4)</b>
<b>CONSTANT</b>	-25.29257	-25.58017	-25.46361	-26.42103
	14.05854	14.0527	13.91196	13.7044
<b>AGE</b>	0.427047	0.443142	0.434729	0.467701
	0.332389	0.312754	0.302873	0.288254
<b>EXPER</b>	0.331077	0.314885	0.318881	0.250986
	0.314552	0.269015	0.266008	0.212442
<b>TENURE</b>	-0.077857	-0.075414	-0.074839	
	0.141396	0.130485	0.130632	
<b>EDUC</b>	0.809807	0.793058	0.798806	0.80435
	0.71961	0.651279	0.640791	0.62973
<b>FSIZE</b>	0.043974	0.044227	0.044518	0.041431
	0.017307	0.016427	0.016322	0.018069
<b>ROE</b>	-0.018569	-0.018801	-0.019956	-0.02166
	0.007314	0.007727	0.008273	0.008876
<b>ROA</b>	-0.04289	-0.031959		
	0.135702	0.151058		
<b>PMARGIN</b>	0.018455			
	0.131074			
<b>FEMALE</b>	-0.419118			
	3.191946			
<b>Adjusted R Squared</b>	<b>-0.01371</b>	<b>0.005946</b>	<b>0.015496</b>	<b>0.023005</b>

## Conclusion

In conclusion, determining the impact of different factors on wages requires a great deal of research and analysis. From the tests I performed, I can conclude that both ROE and firm size have a significant impact on CEO pay. Based on the results from my regression, we can estimate the relationships between each of the independent variables and wages, without statistical significance. Based on Model (1), we can estimate that age, experience, education, and profit margin all have a positive impact on wages, and tenure, ROA, and being female negatively impact wages. The significance of each of these estimations cannot be concluded based on my analysis.

The tests conducted resulted in the following conclusions: there is no multicollinearity problem among the independent variables; while the White test suggests there is not heteroscedasticity problem, generating White heteroscedasticity-consistent standard errors resulted in a model with different standard errors; there is no serial correlation problem among the independent variables; and lastly, that ROE has a negative impact on CEO pay while firm size has a positive impact on CEO pay. Concluding that ROE has a negative impact on CEO pay represents the relationship between company performance and CEO pay. I find it interesting that I was able to conclude a negative relationship between the two, and would be interested to conduct further research on this topic.

Another interesting discovery is the negative impact of tenure on wages. While I cannot conclude its significance, this result is the opposite of what I had hypothesized, and what I had read from other studies that were conducted. Aside from tenure, ROA, and ROE, each of the hypothesized relationships were evident in my model. Age, experience, education, and profit

margin all positively impact wages, while tenure, performance, and gender being female negatively impact wages.

The implications of this analysis are threefold: first, that both ROA and ROE, two significant measures of company performance, have negative impacts on CEO pay; second, that tenure, or being with the company for a long amount of time does not necessarily imply higher wages than a newcomer may receive; and lastly, that further analysis, potentially with a larger sample size, is necessary to conclude the significance of the remaining variables.

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## Appendix

### Test for Heteroscedasticity

Heteroskedasticity Test: White

F-statistic	0.192476	Prob. F(53,56)	1.0000
Obs*R-squared	16.95038	Prob. Chi-Square(53)	1.0000
Scaled explained SS	373.8462	Prob. Chi-Square(53)	0.0000

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 04/26/18 Time: 10:38

Sample: 1 110

Included observations: 110

Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-86062.71	54160.99	-1.589017	0.1177
AGE^2	-34.80258	32.48624	-1.071302	0.2886
AGE*EDUC	-50.20641	99.81924	-0.502973	0.6170
AGE*EXPER	22.93965	47.01108	0.487963	0.6275
AGE*FEMALE	-76.44730	272.7372	-0.280297	0.7803
AGE*FSIZE	-0.148473	2.945283	-0.050410	0.9600
AGE*PMARGIN	17.42950	18.63675	0.935222	0.3537
AGE*ROA	-24.57713	55.73568	-0.440959	0.6609
AGE*ROE	7.153612	11.28336	0.633997	0.5287
AGE*TENURE	0.585051	12.17655	0.048047	0.9618
AGE	3377.958	2456.003	1.375388	0.1745
EDUC^2	-19.49151	93.32906	-0.208847	0.8353
EDUC*EXPER	60.26701	98.61136	0.611157	0.5436
EDUC*FEMALE	-334.3114	651.7510	-0.512943	0.6100
EDUC*FSIZE	0.288254	4.870888	0.059179	0.9530
EDUC*PMARGIN	-23.25604	31.92688	-0.728416	0.4694
EDUC*ROA	21.28853	80.82846	0.263379	0.7932
EDUC*ROE	-6.935851	21.63385	-0.320602	0.7497
EDUC*TENURE	-21.69225	25.42964	-0.853030	0.3973
EDUC	2007.046	3035.752	0.661136	0.5112
EXPER^2	-2.703378	24.11383	-0.112109	0.9111
EXPER*FEMALE	-52.54153	238.0949	-0.220675	0.8261
EXPER*FSIZE	-0.279884	2.382565	-0.117472	0.9069
EXPER*PMARGIN	-18.49052	18.98427	-0.973992	0.3342
EXPER*ROA	31.23111	46.72292	0.668432	0.5066
EXPER*ROE	-11.50861	11.89846	-0.967235	0.3376
EXPER*TENURE	0.249446	13.43284	0.018570	0.9853
EXPER	-1210.428	1433.094	-0.844626	0.4019
FEMALE^2	7252.186	11601.80	0.625091	0.5345
FEMALE*FSIZE	1.609589	19.21280	0.083777	0.9335
FEMALE*PMARGIN	-70.97344	97.50347	-0.727907	0.4697
FEMALE*ROA	81.97466	219.6254	0.373248	0.7104
FEMALE*ROE	13.26398	47.41335	0.279752	0.7807
FEMALE*TENURE	19.56641	78.74321	0.248484	0.8047

FSIZE^2	-0.000598	0.066390	-0.009007	0.9928
FSIZE*PMARGIN	-0.488862	0.597018	-0.818840	0.4163
FSIZE*ROA	0.691699	2.865018	0.241429	0.8101
FSIZE*ROE	-0.009705	1.028836	-0.009433	0.9925
FSIZE*TENURE	0.264294	0.749987	0.352398	0.7259
FSIZE	11.44336	109.9977	0.104033	0.9175
PMARGIN^2	-2.063710	3.308467	-0.623766	0.5353
PMARGIN*ROA	10.18084	10.55461	0.964587	0.3389
PMARGIN*ROE	-3.999720	4.174414	-0.958151	0.3421
PMARGIN*TENURE	-2.764679	3.473543	-0.795925	0.4294
PMARGIN	-37.59679	574.4633	-0.065447	0.9481
ROA^2	-17.21376	17.48895	-0.984265	0.3292
ROA*ROE	5.372123	7.431356	0.722899	0.4728
ROA*TENURE	-4.582142	8.042968	-0.569708	0.5712
ROA	378.5885	1831.731	0.206683	0.8370
ROE^2	0.042430	0.253912	0.167104	0.8679
ROE*TENURE	1.362311	2.280381	0.597405	0.5526
ROE	-33.37572	404.1246	-0.082588	0.9345
TENURE^2	-2.707106	4.054795	-0.667631	0.5071
TENURE	178.9059	488.4482	0.366274	0.7155
<hr/>				
R-squared	0.154094	Mean dependent var	255.9546	
Adjusted R-squared	-0.646495	S.D. dependent var	1878.497	
S.E. of regression	2410.408	Akaike info criterion	18.71967	
Sum squared resid	3.25E+08	Schwarz criterion	20.04536	
Log likelihood	-975.5818	Hannan-Quinn criter.	19.25738	
F-statistic	0.192476	Durbin-Watson stat	2.039441	
Prob(F-statistic)	1.000000			

## Test for Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.080959	Prob. F(2,102)	0.9223
Obs*R-squared	0.174340	Prob. Chi-Square(2)	0.9165

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 04/26/18 Time: 11:41

Sample: 1 110

Included observations: 110

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGE	0.008253	0.558083	0.014788	0.9882
EDUC	-0.011158	0.970012	-0.011503	0.9908
EXPER	-0.001329	0.477549	-0.002783	0.9978
FSIZE	2.67E-05	0.025835	0.001033	0.9992
ROE	0.000805	0.028986	0.027774	0.9779
C	-0.398334	22.30838	-0.017856	0.9858
RESID(-1)	0.040124	0.099828	0.401933	0.6886
RESID(-2)	0.000701	0.101166	0.006927	0.9945

R-squared	0.001585	Mean dependent var	-3.81E-15
Adjusted R-squared	-0.066934	S.D. dependent var	16.09054
S.E. of regression	16.62032	Akaike info criterion	8.529076
Sum squared resid	28175.96	Schwarz criterion	8.725474
Log likelihood	-461.0992	Hannan-Quinn criter.	8.608736
F-statistic	0.023131	Durbin-Watson stat	1.991552
Prob(F-statistic)	0.999987		

### Test for Multicollinearity

Variance Inflation Factors

Date: 04/26/18 Time: 11:43

Sample: 1 110

Included observations: 110

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
AGE	0.110483	671.9404	2.936449
EDUC	0.517839	32.13687	2.237578
EXPER	0.098943	215.7927	5.251492
FEMALE	10.18852	3.910700	2.225425
FSIZE	0.000300	3.877922	1.664167
PMARGIN	0.017180	5.565550	1.932439
ROA	0.018415	3.790141	1.303307
ROE	5.35E-05	2.667880	1.605488
TENURE	0.019993	26.22784	2.937620
C	197.6426	355.8982	NA