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Who Can Earn more? Some Factors Affect CEOs' Income

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Abstract: This research focuses on the three factors that affect CEOs' income, including age, gender, and network size. We find that age has a significantly negative corre-lation with CEOs' income for CEOs with older age, while the correlation is insig-nificant for younger than 52 years old. Gender also significantly affects income, and male CEOs tend to earn more than female CEOs. The last factor is network size. We find that network size is negatively correlated with the CEOs' income. Last, we put forward some potential theoretical mechanisms to explain the empir-ical results.

Keywords: CEOs' Performance, Gender Pay Gap, Age Range, CEO's Income.

1. Introduction

CEOs (chief executive officers) play an essential role in companies' development; the CEO's action can save a company or damage it. In this case, a successful CEO can even change the whole industry and affect consumers' welfare and the whole economy. For example, Jobs Steve, an American entrepreneur who founded his own phone company and changed the whole industry by letting the whole world love the iPhone, affected the leading position of other companies like Nokia. We can even say that he started a new generation of smartphones.

There is already much research about the performance of the CEO. Among these research, income is always considered. Income measures CEOs' performance and plays a relatively large part in companies' operation costs. Thus, it will bring some interesting topics like which factors will influence the income. For example, the gender gap is one of the exciting topics. There are many examples of successful female CEOs and male CEOs, for example, a top female CEO Virginia M. Rometty who found IBM competing with those top male CEOs like Bill Gates. Do these female CEOs are rewarded with what they deserve like male CEOs? Whether the income unfairness exist? It is an important question that asks for more evidence. Moreover, other factors like age and network size can also play a significant role in the CEO's income, which will be analyzed in this research.

In this research, I investigate both internal and external factors that influence the income of CEOs of different companies, and I put forward some potential mechanisms to explain how such factors work. Since I want to study more about the inside of the famous company globally, I focus on the income of CEOs in the company from SP500. Overall, I find that several factors like age, gender, and network size can significantly affect income. First of all, the income of CEOs has a peak age at 52. Before the age of 52, income is not significantly correlated with age. However, after 52, age is significantly negatively correlated with income. While the age increases, the income of

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the CEO decreases. It is fascinating to notice such a turn point in the effects of age on income; one potential mechanism is that age affects income in two ways in opposite directions. When we combine them, the income will reach the highest point at the peak age of 52 years old. We will explain the detail later.

Then for the gender, consistent with some previous research, which claims that gender is an essential factor influencing a CEO's income, I have additional empirical evidence to support that male CEOs tend to earn more than female CEOs [1].

Last, I notice there is a variable that is hardly analyzed. Network size, which measures the number of overlaps through employment, other activities, and education of selected individuals， is always ignored. People usually believe more networks will bring about higher income. Counterintuitively, we find that the network size negatively correlates with the income of CEOs. This finding can be explained considering that different companies at different stages vary in the value of network size. In detail, the companies at the early stage seek network size to capture the expansion chance. However, the CEOs at these companies tend to have relatively low incomes. Comparatively, for mature companies that pay more attention to development stability, the CEOs who have higher income may value the network size less.

The following sections cover the related literature, then show the data and model, the empirical results, and our theoretical mechanisms. In conclusion, we summarize the findings from the data and model and discuss some potential applications and extensions.

2. Literature Review

There are many types of research about CEOs' performance. One important field is how CEOs affect firms' performance. For example, Kato and Long find that the CEO turnover-performance link is more vital for firms with a majority shareholder for stock market performance and accounting measures [2]. Also, Cassar uses the Kauffman Firm Survey and shows that industry experience is associated with more accurate and less biased entrepreneur expectations [3]. Similarly, Brickley focuses on the relation between CEO turnover and firm performance measures and analyzes age-related issues as one example [4]. As for the performance persistence, Gompers et al. conjecture that the very best and the very worst entrepreneurs do not become serial entrepreneurs [5].

Some paper talks about the gender-based gap in CEOs' income. For example, Peni indicates a positive relationship between the presence of female CEOs or Chairs and firm performance, thus suggesting that gender-based differences may affect the CEO's/Chairperson's success [6]. An updated paper is from Malladi and Mean, which states that there is a significant difference between the income of female CEO and male CEO [1]. That indicates that gender is one of the critical factors that influence the income of a CEO, which is consistent with our findings. Besides that, our work analyzes the effect of gender on income in different age groups to offer more robust evidence.

As for age, Nulla discusses the effect of a CEO's age on the CEO's compensation [7]. She found that there are different trends between different age groups. By dividing the CEO into three groups, she found that the oldest group have started to earn less. Her results are consistent with our research. Different from her work, we put forward the potential mechanisms to explain why there are such trends.

Some other factors affect CEOs' performance that is analyzed. For example, Van der Sluis et al. analyzes the role of education in CEOs' performance [8]. Similar to education, Bhagat et al. show that CEO education does not play a significant role in the decision by a firm to replace its current CEO; however, it does play a significant role in selecting the replacement CEO [9]. To the most of my knowledge, there is not much research about the network size we use in this research. Thus, this research can work as an excellent complement to the previous studies.

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3. Data and Result

3.1. Data and Methods

The source of data is WRDS. Wharton Research Data Services: https://wrdswww.wharton.upenn.edu/

And the length of data is from 1997 to 2020. The total size of data is 3392. I restrict the sample to the companies on SP500 and choose the variables including income, network size, age, and gender. The income I use in this research includes salary and bonus. Gender is a binary variable; we set male for a gender equal to 1 while female for gender equals 0. Since age would change according to the reporting year, I use the reporting year in the data minus the year of birth to calculate the age of those CEOs. Specially, we consider network size, which captures the network size of a selected individual (number of overlaps through employment, other activities, and education). Because the income and network size variance are significant, we will take the natural logarithm and use ln(income) and ln (network size) to further investigate the topic. The summary of statistics is shown in Table 1.

Table 1: Summary of statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
ln(income)	2933	5.128	1.563	0	10.477
ln(network)	3331	7.395	.888	3.951	9.813
age	3385	59.642	10.184	29	96
gender	3392	.812	.39	0	1

We suppose to analyze the factors that affect the income of the CEO. Thus, we take ln(income) as dependent variables while taking network size and some demographic variables like gender and age as independent variables. Since the dataset is unbalanced due to the long period, we use pooled OLS to deal with the panel data.

3.2. Results

Firstly, we divide the sample into two groups and do the pooled OLS regression of network size, age, and gender on income. Tables 2 and 3 show the regression results for entities younger than 52 and ages equal to or larger than 52.

Table 2: Pooled OLS results for CEOs that have age younger than fifty-two.

ln(income)	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
ln(network)	-.443	.063	-7.08	0	-.566	-.32	***
age	.011	.012	0.90	.369	-.013	.035	
gender	.984	.14	7.01	0	.708	1.26	***
Constant	7.665	.734	10.44	0	6.223	9.107	***

Mean dependent var	5.638	SD dependent var	1.573
R-squared	0.149	Number of obs	634
F-test	36.216	Prob > F	0.000
Akaike crit. (AIC)	2278.574	Bayesian crit. (BIC)	2296.382

*** p<.01, ** p<.05, * p<.1

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Table 3: CEO that has age equal to or older than fifty-two.

ln(income)	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
ln(network)	-.239	.04	-6.04	0	-.316	-.161	***
age	-.042	.005	-8.80	0	-.051	-.032	***
gender	.478	.074	6.43	0	.332	.624	***
Constant	9.015	.413	21.84	0	8.206	9.824	***

Mean dependent var	5.000	SD dependent var	1.521
R-squared	0.075	Number of obs	2254
F-test	54.027	Prob > F	0.000
Akaike crit. (AIC)	8117.587	Bayesian crit. (BIC)	8140.469

*** p<.01, ** p<.05, * p<.1

For both Table 2 and Table 3, network size and gender are significantly correlated with income. For network size, it is negatively correlated with income. We explain that compared to the CEOs of big companies who focus on running the business, the CEOs of small companies usually pay more attention to enlarging their network size. However, the CEOs of small companies tend to have less income than big companies, which may negatively correlate network size and CEOs' income.

As for gender, we find that there is a significant gap between female CEOs and male CEOs. Since the gender dummy variable is significantly positively correlated with income, we conclude that the income of male CEOs is significantly higher than female CEO. This finding is consistent with some previous research like Peni(2012).

The mechanism of age seems to be more complicated. From Table 2 with younger CEOs, age has no significant effects on income. However, age is significantly correlated with income for these older CEOs. For this, we propose that the effect of age is non-linear. It does not affect the significance with younger age, but it will affect the significance with older age. I believe it happens because there are two potential mechanisms of how age affects income.

For one thing, age can increase income since old CEOs can be more experienced and more skilled compared to young CEOs. However, there can be a negative correlation between age and income since young CEOs can be more energetic to deal with heavy tasks with more pressure. When the two mechanisms work simultaneously, the effect of age on young CEOs' income is insignificantly positive since the two mechanisms offset each other. However, for older CEOs, the negative mechanism surpasses the positive mechanism. Learning new skills may reach its threshold, while the loss of energy will not stop at a certain point. The age of 52 may be the peak point that combines the wealthiest skills and highest energy level.

4. Conclusion

In this paper, we mainly investigated the factors that affect the income of a CEO, including age, gender, and network size. Furthermore, I draw some conclusions according to the findings through the data I analyze.

Firstly, we find that age is one of the factors that can influence the income of a CEO. Through the data table, we discovered a positive correlation between income and age before the age of 52, but the coefficient is not significant. After 52, there is a negative and significant correlation between

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income and age, and the relationship is not linear. Intuitively, older people tend to have more experience but, at the same time, may suffer from lacking energy. Before age reaches a turning point, the experience reaches a threshold. Alternatively, we find that 52 is the peak point of age.

We also discovered a difference in income between the gender of the CEO. Since there is a positive correlation in the data of male CEO income and female CEO income, that means the male CEO earns more than the female CEO. The gender pays gap in the workplace is still an important issue.

Network size is also one factor that influences the income of the CEO. This is an uncommon independent factor in this topic since the network size is more qualitative. Intuitively, a more extensive network size may increase the chance of success. However, we find that in the data, the network size negatively correlates with the CEO's income. That is the opposite finding of what we forecast. The potential explanation is that due to the different types of organizations, the work of the CEO is also different. For example, the CEOs from the small company focus on expanding the market and establishing network size, while CEOs from larger companies might focus on company management rather than expanding their network size. Moreover, CEOs from larger companies tend to have higher incomes.

There are some potential applications of this research. Firstly, the income gap in gender can be considered in related policy. We can also consider the effects of age on income when a retirement policy is designed. Last, the firms can consider whether they should pay attention to the development of network size. For example, the firms can evaluate the benefits of sending their CEOs to programs like MBA to enhance the network sizes.

One potential disadvantage of our findings is that we only focus on parts of factors that affect income; there are many other variables that we did not consider. Moreover, we believe the fixed effects like personality may not significantly affect salary since salary is part of the results of company rules. Next time I will be considered more comprehensive the data sources.

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