

# Major Effects on CEO Compensation

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# Abstract

The intended purpose of this paper is to identify which of our dependent variables have a significant correlation or impact on total CEO Compensation (salary + bonuses).

CEO compensation is a vastly different amount from company to company and many believe CEOs are generally overpaid. The topic of CEO Compensation has been dissected by many independent research studies with various research variables. Our study will examine the impact of the following independent variables on Total CEO Compensation (salary + bonus): CEO age, the natural log of market value per employee, return on assets, years as CEO (tenure), total percentage of shares owned, and new green score. Through the research and statistical analysis we ran, the only variable we found to be significant was a CEO's age.

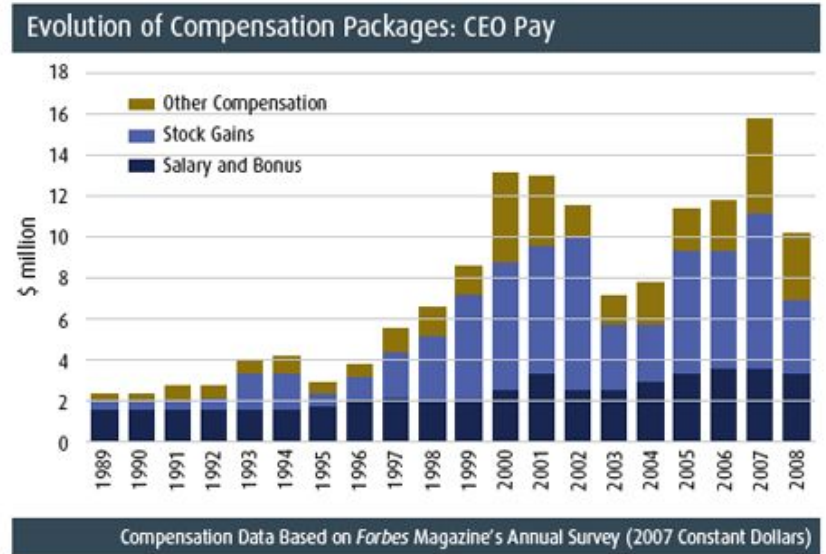
# Introduction:

## EMPIRICAL STUDY OF THE EFFECTS OF INDEPENDENT VARIABLES ON THE AMOUNT OF TOTAL CEO COMPENSATION (SALARY + BONUSES)

- The Chief Executive Officer (CEO) is the highest rating executive of any organization both private and public.
- Though a CEO's roles and responsibilities can change due to the company's size, corporate structure or culture, their overall responsibilities are often similar.
- We collected data on 100 organizations to provide us with the most accurate estimate of what is true within the population.
- Our study will focus on what factors play a significant role in how much a CEO gets compensated

# Dependent Variable: CEO Compensation

- CEO compensation inclusive of both the individuals salary and their bonus
- We will be looking at age, the natural log of market value/number of employees, return on assets (ROA), number of years as CEO, total percentage of shares owned, and the company's new green score as independent factors



# Independent Variables effects on CEO Compensation

- CEO's Age
- Market Value per Employee
- Return on Assets
- Number of Years as CEO
- Total Percentage of Shares Owned by the CEO
- The Company's New Green Score



# Variable Overview:

Dependant Variable: *Natural Log of Total CEO Compensation (salary + bonuses)*

Independent Variables:

- **CEO Age:** The Chief Executive Officers current listed age.
- **Natural Log of Market Value per Employee:** An algebraic expression of the natural log of the firm's market value divided by the listed number of the firm's number of employees.
- **Return on Assets:** Calculated by dividing the company's net income by the companies average total assets.
- **Number of Years being CEO:** The number of years that the CEO has served as the organization's CEO. Any years that the individual served as CEO at a previously company do not count towards the total number of years.
- **Total Percentage of Shares Owned:** The percentage (based out of 100%) of the shares that the CEO owns of the company.
- **Companies New Green Score:** The companies “Green Score” is based on their performance based on eight specific indicators. The eight indicators are the following; energy productivity (15%), greenhouse gas (15%), water productivity (15%), waste productivity (15%), green revenue score (20%), sustainability pay link (10%), sustainability board committee (5%), audited environmental metrics (5%).

## CEO Age:

$H_0$ : *There is a significant linear relationship between the natural log of CEO compensation (salary + bonus) and CEO age.*

- P-value = 0.007
- Pearson correlation value = -0.246
- After reviewing our data and literature sources, we can conclude that our hypothesis is correct as there is a significant linear relationship between the two variables.



## Market Value:

$H_0$ : *The natural log of market value per employee will have a positive significance on the natural log of CEO compensation (salary + bonuses).*

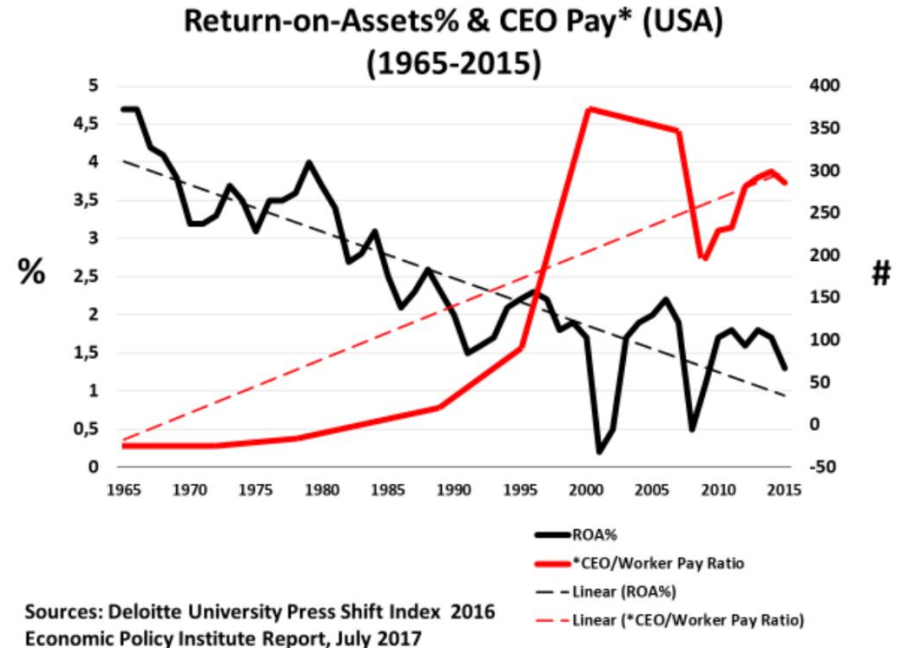
- P-value = 0.218
- Pearson correlation = 0.079
- Based on our findings from the statistical test, we can conclude that our hypothesis is incorrect in the Natural Log of Market Value / Employee having a positive significant relationship with the Natural Log of CEO Compensation.
- The test is positive, but not significant.



## Return on Assets:

$H_3$ : A higher Return on Assets is positively correlated with natural log of CEO compensation (salary + bonus.)

- P-value = 0.301
- Pearson correlation = 0.053
- While our research shows there is no correlation between the two variables, most other studies will disagree.
- We can conclude that our hypothesis is incorrect in that a higher ROA will be positively correlated with CEO Compensation as the data is not statistically significant.

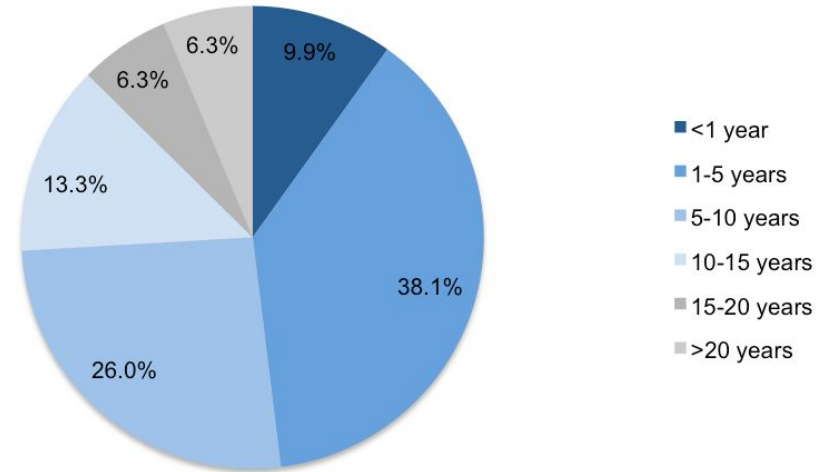


## Number of Years as CEO:

$H_0$ : *The longer a person is a CEO of a company (number of years as CEO) the higher their natural log of CEO compensation (salary + bonus) will be.*

- P-Value = 0.301
- Pearson correlation = 0.053
- While our research shows there is no correlation between the two variables, most other studies will disagree.
- We can conclude that our hypothesis is incorrect in that a higher ROA will be positively correlated with CEO Compensation as the data is not statistically significant.

Large-Cap CEO Tenure, Percentage of Total



## Percentage of Shares Owned by the CEO:

$H_0$ : *There is a significant relationship between the natural log of CEO compensation (salary + bonus) and the total percentage of shares owned.*

- P-value of our correlation = 0.160
- Pearson Correlation value = -0.100
- Based on our statistical test, we can conclude that our hypothesis was incorrect as there is no statistical significance with a CEO's number of years at a company and their total compensation.



## New Green Score:

$H_0$ : *Companies with an emphasis on sustainability environment (New Green Score) are positively associated with the natural log of ceo compensation (salary + bonus).*

- P-value = 0.093
- Pearson correlation = 0.133
- The conclusion we gather from the test we ran was that our hypothesis was incorrect, even though they are positively correlated, there is no significance to the test, meaning there is no consideration in the New Green Score on CEO compensation.



# Descriptive Statics

## Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
DV: Natural Log Total Compensation	100	3.258	11.396	6.95191	.804941
IV: Age	100	33	87	57.67	7.214
IV: Percentage of Total Shares Owned- As Reported	100	.000	.941	.23167	.242448
IV:Return on Assets	100	-44.760	24.103	6.38039	8.183221
IV: Number of Years as CEO	100	3	49	10.95	7.823
IV: Natural Log of Market Value/Number of Employees	100	-3.029	13.600	6.36835	2.336675
IV: New Green Score	100	.1150	.8190	.393400	.1734604
Valid N (listwise)	100				





# Regression

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.304 <sup>a</sup>	.092	.034	.791308	.092	1.573	6	93	.164

a. Predictors: (Constant), IV: New Green Score , IV: Age, IV: Natural Log of Market Value/Number of Employees, IV: Percentage of Total Shares Owned- As Reported, IV:Return on Assets , IV: Number of Years as CEO

b. Dependent Variable: DV: Natural Log Total Compensation

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.911	6	.985	1.573	.164 <sup>b</sup>
	Residual	58.234	93	.626		
	Total	64.145	99			

a. Dependent Variable: DV: Natural Log Total Compensation

b. Predictors: (Constant), IV: New Green Score , IV: Age, IV: Natural Log of Market Value/Number of Employees, IV: Percentage of Total Shares Owned- As Reported, IV:Return on Assets , IV: Number of Years as CEO

# Regression

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	8.149	.726		11.223	.000	6.707	9.591					
	IV: Age	-.028	.012	-.251	-2.250	.027	-.053	-.003	-.246	-.227	-.222	.784	1.275
	IV: Percentage of Total Shares Owned- As Reported	-.191	.341	-.058	-.560	.577	-.869	.487	-.100	-.058	-.055	.923	1.084
	IV: Return on Assets	.003	.010	.035	.329	.743	-.017	.024	.053	.034	.033	.879	1.138
	IV: Number of Years as CEO	.001	.012	.007	.065	.948	-.022	.024	-.110	.007	.006	.779	1.284
	IV: Natural Log of Market Value/Number of Employees	.033	.034	.097	.969	.335	-.035	.102	.079	.100	.096	.978	1.023
	IV: New Green Score	.560	.480	.121	1.166	.246	-.393	1.512	.133	.120	.115	.913	1.095

a. Dependent Variable: DV: Natural Log Total Compensation

**Collinearity Diagnostics<sup>a</sup>**

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions							
				(Constant)	IV: Age	IV: Percentage of Total Shares Owned- As Reported	IV: Return on Assets	IV: Number of Years as CEO	IV: Natural Log of Market Value/Number of Employees	IV: New Green Score	
1	1	5.417	1.000	.00	.00	.01	.01	.01	.00	.00	
	2	.723	2.738	.00	.00	.26	.44	.00	.00	.00	
	3	.385	3.751	.00	.00	.55	.29	.22	.00	.00	
	4	.276	4.429	.00	.00	.10	.23	.43	.01	.14	
	5	.134	6.366	.00	.00	.02	.00	.11	.45	.44	
	6	.059	9.552	.05	.06	.06	.00	.10	.49	.39	
	7	.006	29.337	.94	.94	.00	.02	.13	.03	.02	

a. Dependent Variable: DV: Natural Log Total Compensation

### Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	8.149	.726		11.223	.000		
	IV: Age	-.028	.012	-.251	-2.250	.027	.784	1.275
	IV: Percentage of Total Shares Owned- As Reported	-.191	.341	-.058	-.560	.577	.923	1.084
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a. Dependent Variable: DV: Natural Log Total Compensation

### Collinearity Diagnostics<sup>a</sup>

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions							
				(Constant)	IV: Age	IV: Percentage of Total Shares Owned- As Reported	IV: Return on Assets	IV: Number of Years as CEO	IV: Natural Log of Market Value/Number of Employees	IV: New Green Score	
1	1	5.417	1.000	.00	.00	.01	.01	.01	.00	.00	
	2	.723	2.738	.00	.00	.26	.44	.00	.00	.00	
	3	.385	3.751	.00	.00	.55	.29	.22	.00	.00	
	4	.276	4.429	.00	.00	.10	.23	.43	.01	.14	
	5	.134	6.366	.00	.00	.02	.00	.11	.45	.44	
	6	.059	9.552	.05	.06	.06	.00	.10	.49	.39	
	7	.006	29.337	.94	.94	.00	.02	.13	.03	.02	

a. Dependent Variable: DV: Natural Log Total Compensation

# Conclusion

## Overall Regression Equation:

**Natural Log of Total Compensation = 8.149 - 0.028 (CEO Age) - 0.191 (Percentage of Total Shares Owned) + 0.003 (Return on Assets) + 0.001 (Number of Years as CEO (*Tenure*)) + 0.033 (Natural Log of Market Value/Employee) + 0.560 (New Green Score)**

- The overall purpose of this research paper was to illustrate if there is any correlation between a Chief Executive Officers total compensation and multiple independent variables.
- CEO Age was the only variable to have any significance with a p-value of 0.007.

## APPLICATION OF DATA

- After thoroughly reviewing the data analyzed in our set and the research conducted from separate literature, we do not recommend the usage of our hypothesis when determining a CEO's total compensation (salary + bonuses). Due to many statistical tests proving insignificant and the small data size, our empirical regression formula for determining total CEO compensation could prove to be ineffective in awarding the correct amount.

# Sources

## Images:

- <http://www.ftijournal.com/article/Executive-Compensation-A-New-Solution-to-an-Old-Problem>
- <https://corpgov.law.harvard.edu/2018/02/12/ceo-tenure-rates/>
- <https://portal.iocbc.com/products-services/company-shares.html>
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- <https://mhscattalk.com/5292/features/becoming-more-environmentally-friendly-in-2019/>
- <https://qz.com/1074326/how-the-average-age-of-ceos-and-cfos-has-changed-since-2012/>
- <https://www.youtube.com/watch?v=ieR5FVz-kR0>