ERASMUS UNIVERSITEIT ROTTERDAM
ERASMUS SCHOOL OF ECONOMICS

BACHELOR THESIS FINANCE

The influence of the oil price on CEO compensation

Wendy Peursem 413132

Date: 24-07-2018

Supervisor: Xia Shuo

Abstract: This thesis researches the effect of changes in the oil price on the way in which CEOs are compensated. To investigate this effect, compensation and company data of the firms in industry 30 of the Fama and French Industry Classification Index are used. Results were obtained using correlations, t-tests, multi-variate regressions and difference in differences regressions. From these results, the conclusion was drawn that the oil price does not have a significant effect on the way in which CEOs are compensated.

Keywords: oil price, CEO compensation, oil industry

Table of contents

1. Introduction

CEO compensation is a subject that is in the news quite frequently. Just a few months ago there was much ado about the compensation received by the CEO of the ING bank, as people found the height of the compensation unjustifiable, leading to a withdrawal of the compensation increase (Heilbron, 2018). There have been many studies on what determines CEO pay and how it can be used to incentivize CEO. The general consensus has been that CEO pay should be based on performance, as this would incentivize CEOs to increase enterprise value. This is a different matter in lines of businesses where the actions of a CEO do not have a great impact on enterprise value, as it is mostly determined by exogenic factors. This is the case in the oil market, where one of the determining factors for enterprise value, the oil price, heavily fluctuates and is determined exogenically. Therefore, most CEOs will probably not accept a compensation that is heavily depended on enterprise value, as they cannot affect this value. In this thesis, the influence of the oil price on the CEO compensation is investigated, to see whether the compensation height and mix differ when oil prices are high or low. The following research question will be answered:

To what extent do oil prices determine the way in which CEOs of oil companies are compensated?

To help answer this question, several hypothesises will be researched.
H1: Enterprise value and the oil price are strongly, positively correlated
H2: Total pay and the oil price are positively correlated
H3: The compensation mix is different when oil prices are high compared to when oil prices are low

First, earlier research on the subject will be revised to see what factors drive CEO compensation and oil prices exactly. Next, a review of the data and methodology used to investigate the research question will be given, followed by the results of the research. Then, conclusions will be drawn by combining theory and research and lastly a discussion of possible improvements and future research subjects will be given.

2. Theoretical Framework

2.1 CEO compensation determinants

The compensation of a CEO is determined by many different factors. The reason compensation is given is that a CEO must be rewarded for the amount of effort he or she puts into the work and needs to be compensated for the level of risk and responsibility linked to the position. These factors are impacted by the firm's scale, complexity and risk of the firm's operations. These ideas are rooted in the 'Marginal Productivity' argument (Gomez-Mejia, 1994). Earlier research has found some evidence for this theory. Empirical evidence has been found for a positive impact of firm risk on CEO compensation (Cordeiro & Veliyath, 2003). A large part of earlier research has also been on the relationship between firm size and executive pay. Evidence has been found that there is a positive relationship between firm size and executive pay (Carroll & Ciscel, 1980), (Lambert, Larcker, & Weigelt, 1991).

The 'Marginal Productivity' argument does not give any indication about the type of compensation given, it only gives evidence about the total height of compensation. Compensation can be given in multiple ways. The first is a fixed salary per year. This salary is not impacted by the actions of the CEO and will always be the same, whether the firm does good or not. Another part of the compensation are possible bonusses. These can be rewarded because of great achievements or because the firm had a good year with lots of profit. It can also be the case that a bonus is given without any reason, so the bonus is not rewarded because of the actions of the CEO. Stock options can also be part of the compensation mix. These options can be changed into stocks, which is mostly done at times when prices are higher than the value of the options. This type of compensation is linked to the performance of the CEO, since stock prices will be higher when the firm does good. The last large part of compensation is stock rewards. This type of reward is directly linked to CEO performance, as stock prices will be up if the CEO makes decisions that benefit the company.

Jensen and Meckling (1976) suggested that in order to incentivize a CEO to maximize firm value, a 'pay for performance' structure should be set in place. Pay-for-performance means that the pay of a CEO is based on how he performs. This can be measured by for example firm value or share prices. This way, the CEO is more motivated to make decisions that benefit the whole firm, instead of decisions that may only benefit the CEO himself. This idea is based on the concept of 'Agency Problems', which is the problem that the interests of managers are not always aligned with the interests of the shareholders (Ross, 1973).

In practice, compensation according to agency theorists should consider of mostly stock options and rewards and of less fixed salary, as this would lead to the highest firm value. However, little empirical evidence has been found to support this theory. Mehran (1995) found a positive relationship between the percentage of executives' total compensation that is equity based and the return on assets, suggesting that pay-for-performance indeed does increases firm value. Jensen and Murphy (1990), on the other hand, found a weak relationship between pay and performance, as they found a low pay-for-performance sensitivity of CEO pay.

2.2 The oil market

In theory, prices are set in the market where demand and supply are met. Prices adjust until an equilibrium between demand and supply is reached. The oil market, however, is a highly volatile market that shows price movements that cannot be explained by changes in demand and supply only. The demand for crude oil is inelastic, therefore demand will not change much as the prices change, so the price volatility cannot be explained by changes in demand. The supply of the United States, one of the largest oil suppliers, has been quite steadily decreasing until 2010 and has gone up in the recent years (U.S Field Production of Crude Oil, 2018). The supply does not show enough instability to explain the variability in oil prices. Möbert (2007) researched the determinants of oil prices and found that oil prices are not only determined by supply and demand, but also by the future markets for oil. Speculation on oil prices is high enough to influence the actual price of crude oil. Small events can lead to large speculation, which explains why the oil prices are so volatile.

3. Data

3.1 Oil prices

The data about the crude oil prices is retrieved from the Federal Reserve of Economic Data. As a base value, the monthly West Texas Intermediate crude oil prices are used, because this is the type of oil used most in the United States and this research focuses on American firms only. For this research, a time span of 20 years was chosen, because this allows room for periods where prices were high, as well as periods where prices were low.

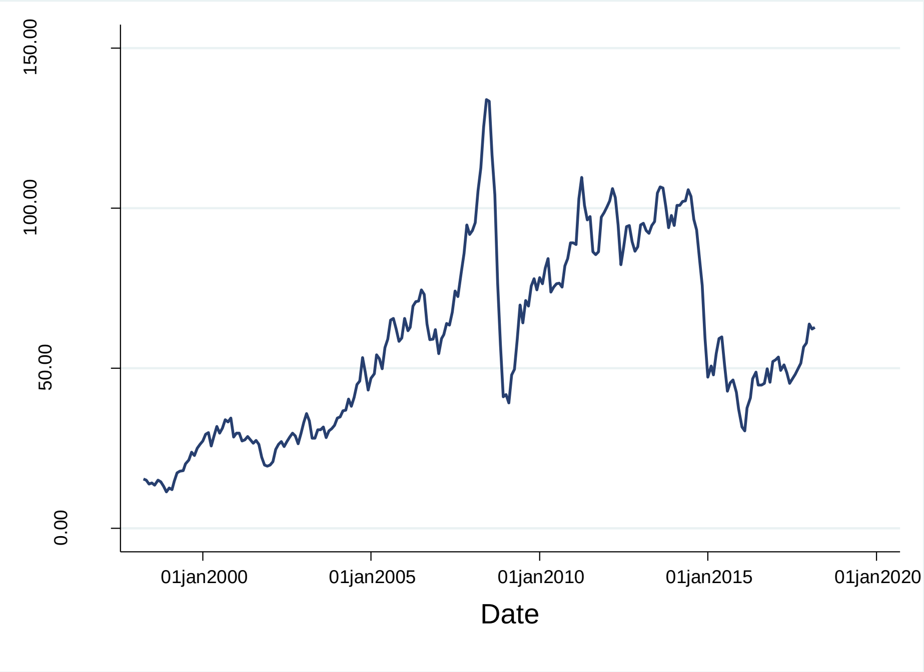

Figure 1: The prices of West Texas intermediate crude oil of the last twenty years.

Figure 1 shows the movement of the crude oil prices over the last twenty years. It shows that from 2001 until 2002 prices were down, as well as from 2015 until 2017. These two time periods will be used to investigate the compensation mix in times when prices are low. The graph also pictures that prices were booming from 2005 until 2007 and from 2011 until 2014. These two time periods will therefore be used to look at the compensation mix in good times. A large peak can also be seen in 2008, which can be accounted for by the credit crisis that started. The peak is followed by a large drop in prices. Since these extreme prices were only present during a very short time, they are not taken into account in this research, as it would be impossible to allocate them to a certain period. Also, in times of crises, markets can behave differently than normal, therefore the 2008-2009 period was not taken into account in researching the difference between booming and failing periods.

To be able to compare the oil prices with the company and compensation data, the average oil price per year is calculated. This is done because the company and compensation data are only available per year and comparing monthly data to yearly data does not give a reliable outcome.

3.2 Company data

The firms used in the research are selected using the Fama and French 48 industries classification index, which classifies all industries in 48 sectors. Of these 48 sectors, industry number 30 is the oil industry. Next, company data over the last 20 years of these firms is retrieved from the Compustat database through the Wharton Research Data Service. This data includes the market value and the highest-, lowest- and closing share price per year, which is needed to investigate the link between the enterprise value and the oil prices.

3.3 Compensation data

Furthermore, the CEO compensation data was retrieved from Wharton Research Data Services. This data was matched with the company data retrieved from Compustat. This data includes the salary, bonus, other annual compensation, restricted stock awards, stock grants, long term incentive plan, all other compensation and the total compensation. Since not all companies had information on the height of some of these compensation measurements, these were added to all other compensation, leaving the variables salary, bonus, restricted stock awards, all other compensation and total compensation. The variables salary, bonus, restricted stock awards and all other compensation are divided by total compensation, creating new variables which indicate the proportion of total compensation of each of the compensation methods.

4. Methodology

4.1 Correlation

To research the effect of oil prices on CEO compensation, different research methods are used. First of all, the correlation between market value and the oil price is investigated, to see how much companies are affected by changes in the oil prices. Correlation between two variables is calculated by this formula:

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}}$$

In this formula, r is the correlation, x and y are the two variables and n is the number of data points. The correlation is always between -1 and 1. A correlation of 0 means that there is no relationship between two variables. A correlation between 0 and 0.25/-0.25 means that there is no significant relationship, a correlation between 0.25/-0.25 and 0.5/-0.5 is a weak relationship, between 0.5/-0.5 and 0.75/-0.75 is a moderate relationship and between 0.75/-0.75 and 1/-1 is a strong relationship. The correlation between oil prices and total compensation is also calculated, to see whether CEO compensation is influenced by the oil prices. Lastly, the correlation between the oil prices and the different compensation methods is calculated. This is done to investigate whether there is a relationship between the oil prices and the different compensation methods and to see whether some compensation methods are influenced more by the oil prices than others.

4.2 T-test

To research whether there was a difference in compensation mix between times when prices were up and when they were down, t-test are used. In order to test on differences, all data from 2001-2002 and 2015-2017 were placed in group 0 and all data from 2005-2007 and 2011-2014 were placed in group 1, to indicate whether the data came from bad or good times. Next, a variance ratio test is executed to see whether the variables 'Salary', 'Bonus', 'RestrictedStockAwards' and 'AllOtherCompensation' have equal variances between the two groups. This is done to investigate which t-test should be used. From the variance ratio test, it could be concluded that 'Salary' is the only variable that has equal variances. Therefore, a two sample t-test with equal variances is used to research whether there is a difference between the average salary in good and bad times. The t-statistic is then calculated using the following formula:

$$t = \frac{X_1 - X_2}{S_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$S_p = \sqrt{\frac{(n_1 - 1){S_1}^2 + (n_2 - 1){S_2}^2}{n_1 + n_2 - 2}}$$

In this formula, t is the t-statistic, X_1 and X_2 are the variables during the different times, n_1 and n_2 are the amount of observations for the different groups, S_1 and S_2 are the variances of the groups and S_p is the pooled variance.

The other three variables do not have equal variances between the two periods and therefore a two sample t-test with unequal variances is used to calculate the t-statistic. The following formula is used to compute this statistic:

$$t = \frac{X_1 - X_2}{\sqrt{\frac{{S_1}^2}{n_1} + \frac{{S_2}^2}{n_2}}}$$

In this formula, t is the t-statistic, X_1 and X_2 are the variables during the different times, n_1 and n_2 are the amount of observations for the different groups, S_1 and S_2 are the variances of the groups This same method was also used to test whether there was a difference in proportion of total compensation of the separate compensation methods. For these t-tests, only two sample t-tests with equal variances were used, as the variance ratio test showed that there was no significant difference in variance between the different groups.

4.3 Multivariate regression

Multivariate regression are used to investigate whether there is a difference in compensation mix when the oil price is the same in both periods. To do this, two multivariate regressions are executed for the two different periods. A multivariate regression can be used if there are multiple dependent factors and only one independent factor. In this case, the dependent factors are the compensation methods and the independent factor is the oil price. This type of regression follows the following model:

$$Y_{n*p} = Z_{n*(r+1)}\beta_{(r+1)*p} + \epsilon_{n*p}$$

In this model Y_{n*p} is the response matrix with dimensions n*p, $Z_{n*(r+1)}$ is a n*(r+1) matrix containing the predicting values, $\beta_{(r+1)*P}$ is the coefficient matrix with dimensions (r+1)*p. N is the number of observations, r is the amount of predictors and p is the amount of responses.

4.4 Difference in differences regression

Finally, difference in differences regressions are used to investigate the effect of low and high prices on the different compensation measures. A difference in differences regression can calculate the effect of a measure on an outcome. In this case, the measures are low/high prices and the outcome are the compensation measures. To compare the effect, a control group, existing of American firms, is used to investigate whether the low/high prices have a different effect on oil companies compared to other American firms. This effect is captured in the difference in differences estimator. Below is the formula for the difference in differences regression.

$$y = C + \delta_0 d1 + \delta_1 d2 + \delta_2 (d1 * d2)$$

In this model, y is the response variable, in this case the different compensation measures. D1 is a dummy variable indicating whether the company is an oil firm or not. D2 is a dummy variable indicating whether prices were up/down or normal. δ_2 is the difference in differences estimator.

The regressions are conducted separately for times when prices were high and when prices were down, to be able to compare whether high and low prices have different effect on the compensation measures.

5. Results

5.1 Correlations

First of all, the correlations between the oil price and market value, total compensation and the different compensation methods are researched. The results can be found in table 1. The correlation between the oil price and market value is very low, 0.0191, which means that there is no linear association between the oil prices and the market value of the companies. The correlation-coefficient between oil price and total compensation is slightly higher, 0.1342, but this correlation is not high enough to speak of a significant statistical relationship between the two variables. The same goes for the correlation between the oil prices and the separate compensation methods, the coefficients are not high enough to conclude there is a statistical relationship between the variables.

	Market Value	Total Compensation	Salary	Bonus	Restricted Stock Awards	All Other Compensation
Average oil price	0.0191	0.1342	0.076	-0.001	0.1214	0.1207

Table 1: The correlation between the average oil price and market value and different compensation measures

The correlation between total compensation and the different compensation methods is also researched and can be seen in table 2. The relationship between total compensation and bonus is weakly positive, which means there is a small correlation between the two variables. The correlation coefficients of salary and all other compensation and the total compensation are both moderate positive. The correlation between total compensation and restricted stock awards is strongly positive.

	Salary	Bonus	Restricted Stock Awards	All Other Compensation
Total Compensation	0.6602	0.4464	0.8631	0.6988

Table 2: The correlation between total compensation and the different compensation methods

5.2 T-tests

To see whether there is a difference in means of the different compensation methods between the booming and the failing periods, t-test are used. The results show that there are no significant differences in the average height of the compensation measures when comparing booming and failing times.

	T-statistic	P-value
Salary	1.9107	0.0563
Bonus	-1.356	0.125
Restricted Stock Awards	-1.1197	0.263
All Other Compensation	-0.9339	0.3507

Table 3: The results for the t-tests comparing the means of the compensation measures between the booming and failing periods

T-tests are also used to test whether there is a difference in the means of the proportions of the compensation methods divided by the total pay. There is no significant difference in the bonus proportion and the restricted stock awards proportion. However, significant differences in the proportion of salary and all other compensation are found using the t-tests.

	T-statistic	P-value
Salary	2.2970	0.0218
Bonus	-0.0084	0.9933
Restricted Stock Awards	-0.2937	0.7690
All Other Compensation	-2.5448	0.0110

Table 4: The results for the t-tests testing the difference in mean of the proportions of the compensation measures between the booming and failing period

5.3 Multivariate regression

Two multivariate regressions are carried out to see how each factor reacts to changes in the oil price in the different periods. In table 5 the corresponding coefficients can be found.

		Coefficients	
		Bad times	Good times
Salary	Constant	205159*	311480*
	Oil price	9655*	2653*
Bonus	Constant	735429*	915607*
	Oil price	-11596*	-6740*
Restricted Stock Awards	Constant	-1869393*	-518023*
	Oil price	96266*	31980
All Other Compensation	Constant	-1140068*	762653
	Oil price	65751	10727

Table 5: The results of the multivariate regressions

Table 5 shows that the regression coefficients for the different periods are quite different. The constant factor of salary is higher during good times, but fixed salary will rise more when the oil price increases during bad times than during good times. For the bonus part of the compensation, the constant is higher, but both coefficients related to the oil price are negative, indicating that the received bonus decreases as the oil price rises. The results for restricted stock awards cannot be fully interpreted, as the coefficient for oil price during good times is not significant. Also, the constants are negative, which does not make sense in reality, as it would mean that CEO's have to pay to work at a certain company. The coefficients for all other compensation also cannot be interpreted further, as only the constant during bad times is significant.

5.4 Difference in differences regression

5.4.1 Difference in differences regressions for booming times

	Coefficient	P-Value
Oil Company	208039.1	0.000
High Oil Price	77535.2	0.000
Oil Company + High Oil Price	-26110.0	0.176
Constant	279381.4	0.000

Table 6: The results of the difference in differences regression of fixed salary during booming times

The difference in differences regression of salary shows that salary is higher for oil companies compared to other American firms and that salary is higher for all companies when the oil prices are up. However, the difference-in-difference estimator is insignificant and therefore the hypothesis that high oil prices have an effect on the fixed salary of CEOs of oil companies is rejected.

	Coefficient	P-Value
Oil Company	260285.7	0.000
High Oil Price	-4816.0	0.672
Oil Company + High Oil Price	-95661.4	0.046
Constant	178247.9	0.000

Table 7: The results of the difference in differences regression of bonuses during booming times

The regression above shows that bonuses are overall higher at oil companies, but that there is no significant effect of the high oil prices on the height of the bonus. The difference in differences estimator is significant in the regression and shows that bonuses are lower at oil companies during times where prices are up.

	Coefficient	P-Value
Oil Company	981267.5	0.678
High Oil Price	1009278.0	0.153
Oil Company + High Oil Price	-36145.4	0.990
Constant	267808.5	0.607

Table 8: The results of the difference in differences regression of restricted stock awards during booming times

The difference in differences regression of restricted stock awards has no significant coefficients. Therefore no inferences can be made about the effect of high oil prices on the height of restricted stock awards.

	Coefficient	P-Value
Oil Company	634161.7	0.000
High Oil Price	375706.8	0.000
Oil Company + High Oil Price	308157.3	0.021
Constant	363820.2	0.000

Table 9: The results of the difference in differences regression of all other compensation during booming times

The table above shows the results of the difference in differences regression of all other compensation. All other compensation is higher at oil companies compared to other firms and is higher for all companies when oil prices are up. Also, the regression shows that the 'all other compensation' part of the pay is higher at oil companies when prices are up.

	Coefficient	P-Value
Oil Company	2077514.0	0.380
High Oil Price	1463697.0	0.039
Oil Company + High Oil Price	144247.1	0.961
Constant	1095498.0	0.036

Table 10: The results of the difference in differences regression of total compensation during booming times

The regression of total compensation shows that compensation is higher at all American companies when oil prices are up. Nothing can be said about the height of total compensation at oil companies compared to other companies, as this coefficient is insignificant. The same is true for the difference in differences estimator, as this coefficient is also insignificant in the regression.

5.4.2 Difference in differences regression for failing times

	Coefficient	P-Value
Oil Company	208039.1	0.000
Low Oil Price	64324.8	0.000
Oil Company + Low Oil Price	35044.1	0.100
Constant	279381.4	0.000

Table 11: The results of the difference in differences regression of salary during failing times

The regression of salary shows that CEOs at oil companies have higher fixed salaries than CEOs at other American companies. Also, fixed salary is higher when oil prices are low for all firms. The difference in differences estimator is insignificant, therefore no conclusions can be made about the effect of low oil prices on fixed salary of CEOs of oil companies.

	Coefficient	P-Value
Oil Company	260285.7	0.000
Low Oil Price	-4553.1	0.729
Oil Company + Low Oil Price	-156877.1	0.005
Constant	178247.9	0.000

Table 12: The results of the difference in differences regression of bonuses during failing times

Bonuses are higher at oil companies than at other American companies according to the regression. The 'Low Oil Price'-coefficient is insignificant, therefore no inferences can be made about the effect of low oil prices on bonus compensation. The difference in differences-estimator is significant and shows that bonuses at oil companies are lower when prices are down.

	Coefficient	P-Value
Oil Company	981267.5	0.000
Low Oil Price	355916.0	0.000
Oil Company + Low Oil Price	330630.4	0.020
Constant	267808.5	0.000

Table 13: The results of the difference in differences regression of restricted stock awards during failing times

From the regression follows that CEOs of oil companies receive more restricted stock awards than other CEOs. Also, more stock awards are given when prices are down at all companies. Lastly, the regression shows that stock awards at oil companies are higher when prices are down.

	Coefficient	P-Value
Oil Company	634161.7	0.000
Low Oil Price	231693.7	0.000
Oil Company + Low Oil Price	229133.8	0.125
Constant	363820.2	0.000

Table 14: The results of the difference in differences regression of all other compensation during failing times

The regression in table 14 shows that all other compensation is higher at oil companies compared to other firms and that this component of pay is also higher when prices are down. The difference in differences estimator in insignificant, therefore no conclusions can be made about the effect of low oil prices on the 'all other compensation' part of CEO pay at oil companies.

	Coefficient	P-Value
Oil Company	2077514.0	0.000
Low Oil Price	645726.3	0.000
Oil Company + Low Oil Price	439586.2	0.091
Constant	1095498.0	0.000

Table 15: The results of the difference in differences regression of total compensation during failing times

The regression of total compensation shows that compensation is higher at oil companies and that total compensation is higher when prices are down. No inferences can be made about the specific effect of low prices on total compensation of CEOs of oil companies, as this coefficient is insignificant.

6. Conclusion

To conclude this research, first the findings for each of the different hypotheses will be addressed, followed by a general answer to the research question.

6.1 Hypothesis 1: Enterprise value and the oil price are strongly, positively correlated

The correlation between enterprise value and the oil price was only 0.0191, which is such a low correlation that there is no significant relationship between the two variables. Since there is no significant relationship, enterprise value is not solely determined by the oil price and is actually mostly determined by other factors.

6.2 Hypothesis 2: Total pay and the oil price are positively correlated

From the results can be concluded that there is no significant correlation between total pay and the oil price. The correlation found was only 0.1342, which is not high enough to conclude there is a positive correlation between total pay. This means that total pay does not necessarily rise as the oil prices rise.

6.3 Hypothesis 3: The compensation mix is different when oil prices are high compared to when oil prices are low

The results show that there is no significant difference between the compensation mix in times when oil prices are up compared to when prices were down. The t-tests showed that there was no difference in the average height of the different compensation methods and there was only a difference in the fixed salary proportion of total pay between the two periods. The difference in differences regression showed that the height of most compensation measures were not significantly different in times when prices were up or down. The only measure that was significantly different during both times when prices up as well as when prices were down was the amount of bonuses given. For both these periods the effect of extreme prices was negative, as the height of bonuses decreases during extreme times. Therefore, the conclusion is that there is no significant difference in compensation mix during the two periods.

6.4 General Conclusion

After researching the compensation mix for CEOs active at American oil companies, this research draws the conclusion that the oil prices do not have a significant effect on the way CEOs are compensated. This follows first of all from the low correlations between the oil prices and the height of the total compensation and the different compensation methods. The low, not significant, correlation between total pay and the oil price shows that the oil price has no effect on the height of compensation. The low correlations between the oil price and the different compensation measures show the first evidence that the oil price has no significant effect on the way in which CEOs are compensated.

More evidence for this statement was found using t-test, which showed that there was no difference between the average height of the compensation measures when prices were up and when prices were down. The multivariate regression did show some differences between these two periods, but since not all coefficients were significant, no further conclusions can be made in respect to differences in compensation mix between the two periods. Using difference in differences regression, the results for the difference in differences estimator were mostly insignificant, which also contributed to the conclusion that there is no difference in compensation when prices are up and down. All this evidence leads to the conclusion of this research, which is that the oil prices do not affect the way in which CEO's are compensated.

7. Discussion

This research leaves room for improvements and further research. First of all, the selection criteria for this research were not extremely specific, all firms in sector 30 of the Fama and French 48 industries classification index were used. Between these firms, there are a lot of difference in the exact field of work and therefore they possibly have different uses of oil. This can cause a change in oil price to have various effects on the companies, as some are more reliant on the oil price than others. Therefore, a line of further research that could be followed should make a distinction between the companies, as this could possibly lead to a more significant effect of oil price on compensation criteria. Another improvement could be to classify the firms based on value and investigate whether there are differences between small-, mid- and large cap companies in the way they compensate their CEO. It seems logical that the height of compensation depends on the size of the company, as a larger company means more risks for the CEO. Possibly there is also a relationship between the way CEOs are compensated and the size of the company.

Lastly, an interesting line of inquiry could be to investigate further whether there is a difference in compensation mix between oil companies and other companies. This research was based on the idea that CEOs would not accept compensation that was mostly determined by firm performance, as CEOs would have little impact on firm performance. This research concluded that the oil price did not affect the compensation mix, but that does not necessarily mean that the compensation mix is the same as in other industries. Therefore, a research with multiple industries could be interesting to see if there are difference in compensation mix between these industries.

Bibliography

Carroll, D. H., & Ciscel, T. M. (1980, February). The Determinants of Executive Salaries: An Econometric Survey. *The Review of Economics and Statistics*(62), 7-13.

Cordeiro, J. J., & Veliyath, R. (2003, January). Beyond pay for performance: A panel study of the determinants of CEO compensation. *American Business Review*, 56-67.

Gomez-Mejia, L. R. (1994). Executive compensation: A reassesment and a future research agenda. *Research in Personnel and Human Resources Management*(12), 161-222.

Heilbron, B. (2018, Maart 13). ING trekt salarisverhoging topman in. *NRC*.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 305-360.

Jensen, M. C., & Murphy, K. J. (1990). Performance pay and top management incentives. *Journal of Political Economy*, 225-264.

Lambert, R. A., Larcker, D. F., & Weigelt, K. (1991, July). How sensitive is executive compensation to organizational size? *Strategic Management Journal*, *12*(5), 395-402.

Mehran, H. (1995). Executive compensation structure, ownership, and firm performance. *Journal of Financial Economics, 38*, 163-184.

Möbert, J. (2007). Crude oil price determinants. *Darmstadt Discussion Papers in Economics*.

Ross, S. (1973). The economic theory of agency: The principal's problem. *The American Economic Review, 63*(2), 134-139.

U.S Field Production of Crude Oil. (2018, May 31). Retrieved from U.S. Energy Information Administration: https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MCRFPUS1&f=M

Appendix

Appendix A: Variance ratio test for the variable 'Salary'

Variance ratio test

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	434	586789.4	21819.55	454559.5	543904	629674.9
1	876	538845.7	13967.52	413400.7	511432	566259.5
combined	1,310	554729.4	11822.36	427897.6	531536.5	577922.2

```
    ratio = sd(0) / sd(1)                                          f =   1.2090
Ho: ratio = 1                                  degrees of freedom = 433, 875

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.9897         2*Pr(F > f) = 0.0206           Pr(F > f) = 0.0103
```

Appendix B: Variance ratio test for the variable 'Bonus'

Variance ratio test

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	434	277103.4	30627.24	638047	216906.9	337300
1	876	338056.2	25249.79	747325.5	288499	387613.4
combined	1,310	317862.7	19708.06	713312.1	279199.9	356525.5

```
    ratio = sd(0) / sd(1)                                          f =   0.7289
Ho: ratio = 1                                  degrees of freedom = 433, 875

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.0001         2*Pr(F < f) = 0.0002           Pr(F > f) = 0.9999
```

Appendix C: Variance ratio test for the variable 'Restricted Stock Awards'

Variance ratio test

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	434	1935622	155241.1	3234086	1630503	2240742
1	876	2222208	203494.7	6022892	1822814	2621603
combined	1,310	2127263	145482	5265563	1841860	2412666

```
    ratio = sd(0) / sd(1)                                          f =   0.2883
Ho: ratio = 1                                  degrees of freedom = 433, 875

    Ha: ratio < 1               Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.0000         2*Pr(F < f) = 0.0000           Pr(F > f) = 1.0000
```

Appendix D: Variance ratio test for the variable 'All other compensation'

Variance ratio test

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	434	1458809	208549.7	4344647	1048914	1868705
1	876	1681846	116385.6	3444700	1453419	1910274
combined	1,310	1607955	104065.2	3766528	1403802	1812107

```
    ratio = sd(0) / sd(1)                                     f =   1.5908
Ho: ratio = 1                                  degrees of freedom = 433, 875

    Ha: ratio < 1              Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 1.0000         2*Pr(F > f) = 0.0000           Pr(F > f) = 0.0000
```

Appendix E: Variance ratio test for the variable 'Proportion Salary'

Variance ratio test

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	434	.4011488	.0154333	.3215168	.3708153	.4314823
1	876	.3576432	.010921	.3232329	.3362087	.3790777
combined	1,310	.3720565	.0089295	.3231924	.3545389	.3895742

```
    ratio = sd(0) / sd(1)                                     f =   0.9894
Ho: ratio = 1                                  degrees of freedom = 433, 875

    Ha: ratio < 1              Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.4528         2*Pr(F < f) = 0.9056           Pr(F > f) = 0.5472
```

Appendix F: Variance ratio test for the variable 'Proportion Bonus'

Variance ratio test

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	434	.1050197	.0080884	.1685028	.0891223	.1209171
1	876	.1051049	.0059524	.1761745	.0934223	.1167876
combined	1,310	.1050767	.0047966	.173606	.0956669	.1144865

```
    ratio = sd(0) / sd(1)                                     f =   0.9148
Ho: ratio = 1                                  degrees of freedom = 433, 875

    Ha: ratio < 1              Ha: ratio != 1                 Ha: ratio > 1
  Pr(F < f) = 0.1454         2*Pr(F < f) = 0.2908           Pr(F > f) = 0.8546
```

Appendix G: Variance ratio test for the variable 'Proportion Restricted Stock Awards'

Variance ratio test

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	434	.2758174	.0140352	.2923907	.2482318	.303403
1	876	.280811	.0097381	.2882229	.2616981	.2999238
combined	1,310	.2791566	.0079988	.2895082	.2634647	.2948485

```
    ratio = sd(0) / sd(1)                                     f =   1.0291
Ho: ratio = 1                                degrees of freedom = 433, 875

    Ha: ratio < 1             Ha: ratio != 1               Ha: ratio > 1
  Pr(F < f) = 0.6388        2*Pr(F > f) = 0.7223          Pr(F > f) = 0.3612
```

Appendix H: Variance ratio test for the variable 'Proportion All other compensation'

Variance ratio test

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	434	.2180141	.0123331	.2569307	.1937739	.2422542
1	876	.2564409	.0086965	.2573939	.2393724	.2735094
combined	1,310	.2437102	.0071221	.2577782	.2297381	.2576822

```
    ratio = sd(0) / sd(1)                                     f =   0.9964
Ho: ratio = 1                                degrees of freedom = 433, 875

    Ha: ratio < 1             Ha: ratio != 1               Ha: ratio > 1
  Pr(F < f) = 0.4865        2*Pr(F < f) = 0.9729          Pr(F > f) = 0.5135
```

Appendix I: The MANOVA results for the failing times

```
W = Wilks' lambda      L = Lawley-Hotelling trace
P = Pillai's trace     R = Roy's largest root
```

Source	Statistic		df	F(df1,	df2) =	F	Prob>F	
AverageOi~e	W	0.8426	1	4.0	429.0	20.03	0.0000	e
	P	0.1574		4.0	429.0	20.03	0.0000	e
	L	0.1868		4.0	429.0	20.03	0.0000	e
	R	0.1868		4.0	429.0	20.03	0.0000	e
Residual			432					
Total			433					

e = exact, a = approximate, u = upper bound on F

Appendix J: The MANOVA results for the booming times

W = Wilks' lambda L = Lawley-Hotelling trace
P = Pillai's trace R = Roy's largest root

Source	Statistic		df	F(df1,	df2) =	F	Prob>F	
AverageOi~e	W	0.9535	1	4.0	871.0	10.62	0.0000	e
	P	0.0465		4.0	871.0	10.62	0.0000	e
	L	0.0488		4.0	871.0	10.62	0.0000	e
	R	0.0488		4.0	871.0	10.62	0.0000	e
Residual			874					
Total			875					

e = exact, a = approximate, u = upper bound on F