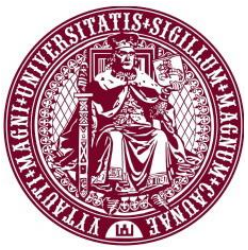

Vytautas Magnus University

and

Norwegian School of Economics

IMPACT OF OIL PRICE ON NORWEGIAN OIL COMPANIES' STOCK PRICE MOVEMENT

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Master Thesis

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Kaunas, 2018

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This Master thesis is the final result of a Double Degree Master in the Norwegian School of Economics and Vytautas Magnus University. The research paper should improve understanding of the oil industry and its relationship with oil price.

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ABSTRACT

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The aim of this master's thesis is to find out how the oil price impacts Norwegian oil companies' stock price and what kind of financial variables are relevant to investors, who are investing in Norwegian oil companies. The first pillar presents the theoretical and empirical part of oil price, company's financial performance impact on stock price and the causes of oil price movement. The second pillar presents research paper methodology research paper's object, stages, limitations of data and methods. In the third pillar we investigate regression results of the relationships. The regression results show that overall the oil price has a positive impact on Norwegian oil price movement. However, there are some outliers, who have no relationship with oil prices or the impact is negative. Moreover, the OPEC decisions and currency exchange rates do not have an impact on almost all oil companies. The regression results of relationship between oil companies stock price and their financial variables showed that nowadays investors are more interesting in company's liquidity and efficiency variables.

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INTRODUCTION

Relevance: Financial stability is a goal for every person who wants wealthy life in the modern era, but he should decide what kind of risks he is willing to take in order to get to this aforementioned goal. There are many ways for a person to create financial stability: purchasing bonds, stocks or other financial assets; creating a company and gaining profitability. The last ways are mostly profitable in the long-term and create a stable cash flow for owners if the companies are stable. However, company creation is one of the most dangerous ways to reach financial stability in the long-term. In other words, a company's owner is willing to invest their capital in risky projects, which in the future may create profitable cash flow.

Through the history, one of the most risky and profitable business has been the energy industry, which requires significant capital to earning big returns but only in the long-term. It looks quite a profitable business at first glance, but there are many variables which could negatively impact companies' stable business operations and decrease their profitability. One of the examples – the 2015 oil price collapse disrupted oil companies' expectation about the future oil price, which lead to negative profitability or even bankruptcy. The outside factors for public investors are sensitive, especially if talking about oil-related companies. There are many articles analyzing the relationship between oil price and stock markets, but there aren't many articles which analyze oil companies' stock price and oil price relationship between each other. Hence, for the previously mentioned reasons, the energy industry is very risky especially compared with other industries. Looking at the energy history perspective, the oil industry is one of the riskiest business due to outside influence by several variables, (especially oil price volatility) variables which could lead to a decrease of companies' stock price in the market. This industry also has a strong impact on countries' economies, especially for countries which are exporting oil to other countries. The companies can't control outside factors, but can companies with solid financial variables convince investors to not sell stock? Therefore, the goal of this work is to investigate whether the oil price has an impact on the stock price of Norwegian oil companies, which have different categories of business activities within the oil industry, and do positive financial variables, which show a company's profitability, efficiency, liquidity and general performance, have an impact on the stock prices of Norwegian oil companies.

Object of the research paper – Norwegian oil companies which are listed on the Oslo stock exchange market.

Problem of the research paper – How does oil price impact players in the Norwegian oil industry's stock prices and what kind of financial variables are relevant to investors?

Research objectives:

1. Through theoretical literature find out how oil price and financial variables influence stock prices of Norwegian oil companies.
2. Design methodology for investigation between oil price and stock of Norwegian oil companies.
3. Analyze relationship between oil price and stock price of Norwegian oil companies.
4. Analyze relationship between financial variables and stock price of Norwegian oil companies.
5. Compare earlier mentioned relationship with other authors results.

The structure of thesis. The master thesis has three parts. The first part presents researchers who analyzed the oil price's impact on the economy and the stock market. The analyses should show how oil price has a direct and indirect impact on oil companies. Than we analyze what variables impact oil price and what kind variables we should include in our research. After the oil price and stock price relationship, we present the relationship between stock price and financial variables and figure out which financial variables have an impact on stock price and which have a negative or positive impact. The second part of master's thesis is methodology. This part presents research object characteristics, hypothesis and methods characteristics. In last part, we are presenting Norwegian oil-related companies average returns and volatility during analyzing period and analyze the relationship between oil price and stock price of oil companies. Moreover, we analyze the relationship between financial variables and stock price of oil companies.

I. THEORETICAL AND EMPIRICAL BACKGROUND OF OIL PRICE AND FINANCIAL VARAIBLES IMPACT ON STOCK PRICE

The first chapter is separated in two parts. The first part represents analysis of authors, who analyzed three relationships: economic factors and stock price; oil price and economic factors; oil price and stock price. But before presenting and analyzing empirical results of the previously mentioned factors, we will graphicly present the relationship between oil price, countries' economy and stock price based on historical data. The second part represents literature analysis of financial variables and stock price of oil companies. These two parts will show the full scale of the relationship between oil price and stock price. Therefore, the first and second parts would show how oil price and financial variables impact the stock price of oil companies.

1.1. Theoretical and empirical background of oil price and stock price relationship

Academics and practitioners agree that oil and stock markets relate to each other, but there are arguments on whether the oil price has positive, negative or even sometimes no impact on the economy or stock market value. Therefore, some authors believe that the robustness and trend direction of correlation depends on the industries and countries economical relationship to oil production. Our object is Norwegian oil companies, so, intuitively, there should be relationship between the oil price volatility or its shocks and stock price of oil companies directly and indirectly, but authors and history some would argue that oil price does not have an impact on companies' stock price movement. Therefore, the first part graphically presents the oil price, economy and stock price movement history and analyzes the empirical research papers of relationships between economic factors, oil price and stock price to robust or denied historical correlation between the factors mentioned earlier. Moreover, the oil price has factors which impact stock price volatility and disrupts its stability, hence it is important to distinguish those factors and to find out how they impact oil price movement.

1.1.1 Theoretical and empirical review of direct and indirect relationships between oil price and stock price of oil companies

Among researchers "in the field of finance and economics" were and still are intrigued by empirical analysis between global oil price shocks and the economy on macro and micro perspectives since the 1970s (Barsky, Killan, 2004). Back then more and more countries were dependent on global price movement. The US especially was impacted by unprecedented disruptions in the global oil market (Muller, 2009). Since those disruptions, many researchers' focus was to establish a theoretical background, which relate to the oil price's impact on macroeconomics factors, and support it with

empirical analysis (Barsky, Killan, 2004). Therefore, in Figure 1, we will present historical oil price volatility and recessions from 1973 to 2004. The figure should fully show whether or not oil price has an impact on the US economy.

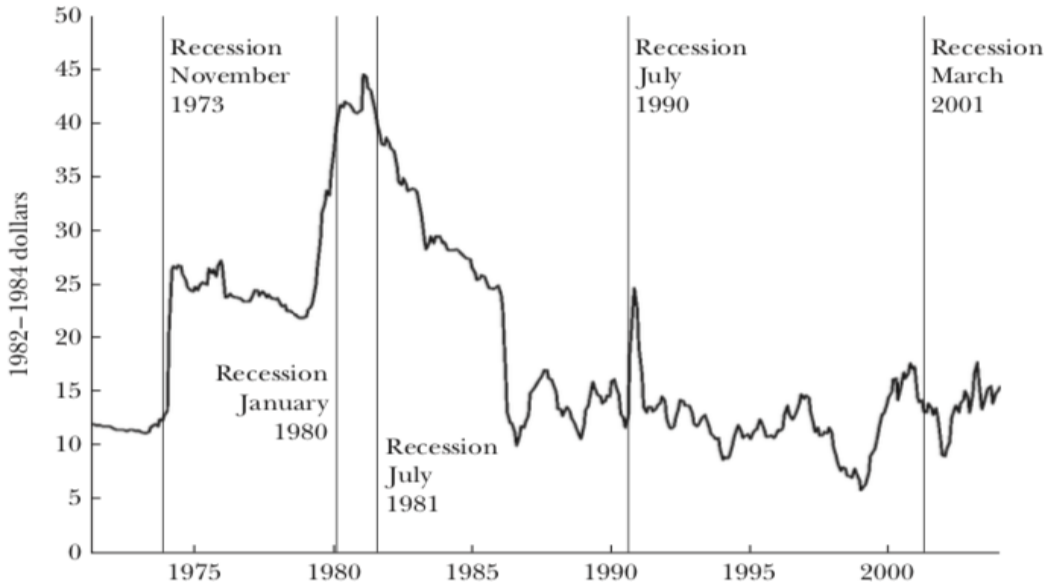

Figure 1. US Crude oil import price and Recessions

Source: Barsky and Killan (2004).

The above figure shows the real oil price and US business cycle peaks. As we can see, the major recessions since the 1970s are strongly correlated with global oil price's fast increase or decrease (Muller, 2009). For example, the recessions of November 1973 and July 1990 started just before global oil price increases (Barsky, Killan, 2004). On other hand, the recession of January 1980 occurs much later than rapid oil increase due to the Iran and Iraq war (Barsky, Killan, 2004). However, the July 1981 recession started just after the October War, which created oil embargos (Barsky, Killan, 2004). Therefore, historically the oil price and the economy had influence on each other. On other hand we find historical facts, which show that there is no correlation between the previously mentioned factors. Hence, we have to analyze the empirical results, which distinguish whether or not oil price has influence on a country's economy.

Nowadays oil price movements are one the most important factors not only for economists, but also for companies' financial managers and investors due to negative or positive correlation between oil price and companies stock price. For example, *The Financial Times* announced that the price of oil increased due to political instability in the Middle East, decreased US stock market index price (Killian, Park, 2009). Moreover, since the mid-1990's fast growth of oil demand was caused by the rapid economic growth of developing countries: India increased oil consumption about 50 percent from 2000 to 2010 and the US Energy Information Administration's annual report in 2014 announced that China became the world's largest oil importer (Ratti, Vespignani, 2015). It increased not only the global economy, but also companies' stock prices (Ratti, Vespignani, 2015). Hence, the increase or decrease of oil prices could lead not only to global economic growth, but also it could increase or

decrease companies', which are more or less related to oil prices, stock price direct or indirectly. Therefore, Figure 2 presents global oil price volatility and Dow Jones industrial average from December 26, 1990 to January 25, 2016. The data should illustrate whether or not oil price impacts the Dow Jones average stock price volatility.

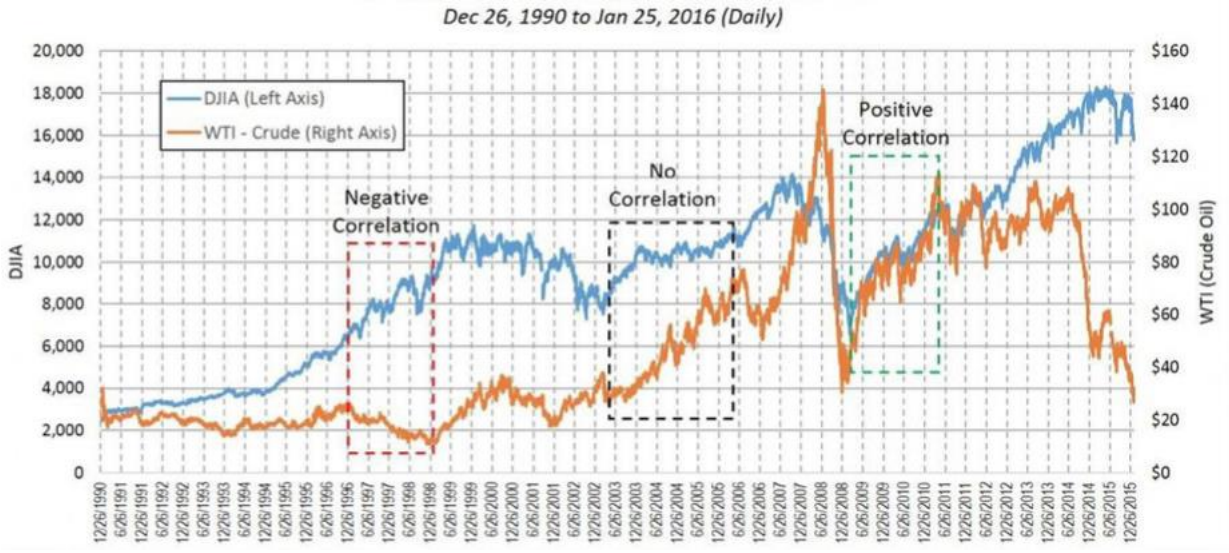

Figure 2. Dow Jones Industrial Average price and Crude oil price

Source: Patton (2016).

The above figure shows three correlation trends: the correlation is positive (+1); the correlation is negative (-1); the correlation is (-0.3 or +0.3) (Patton, 2016). The biggest negative correlation (about -0.84) between oil price and stock price is from 1997 to 1999 (red box in figure 2) (Patton, 2016). The no correlation (about 0.19) period was from 2003 to 2006 (black box in figure 2). Finally, the biggest positive correlation (about 0.94) was from 2008 to 2014 (green box in figure 2) (Patton, 2016). It is hard to determine what impacted the first two correlations, but the last correlation, which shows positive correlation between the main variables, was impacted by oil because of fast oil price increases, increased oil companies' profits and that increased company's stock price (Patton, 2016). Although some authors would argue that the Dow's fast increase from 2003 to 2008 was due to a generally good economic situation. Therefore, historically it is hard to determine whether or not oil price has a positive, negative or no impact on stock index value volatility.

Overall, it is hard to distinguish whether or not oil price has impacted stock price through the economy or how it could impact companies' stock prices directly based on historical data. Therefore, in this chapter we will analyze how indirectly and directly oil price impacts stock price based on research papers, which have analyzed the aforementioned relationships. Figure 3 represents shceme of three literature analysis parts. The first section represents relations between economic factors and stock price. These results will show how economic factors impact stock price and whether those countries are positively or negatively impacted by this trend. The second part represents the

relationship between economic factors and oil price. The results should show how indirectly oil price can impact stock price through economic factors. Finally, we analyze research papers which relate the interactions between oil price and stock price. Moreover, what kind of sectors are more impacted or less and if period has an impact on oil price and stock price relationship. These three literature analyses should show how oil price can directly and indirectly impact stock price.

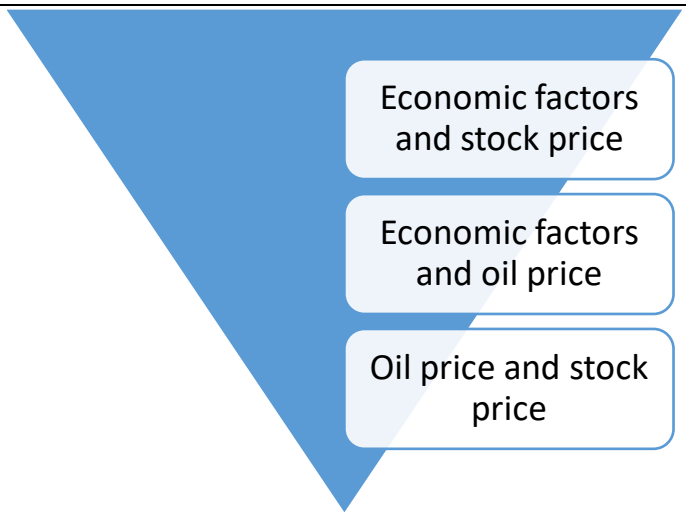

Figure 3. The structure of analysis between three factors

Source: compiled by the author.

Economic factors and stock price. In scientific literature, we can find many articles about the relationship of economic factors (inflation rate, country's economic growth, interest rate, currency exchange rate and other economic factors) and stock price (Ratanapakorn, Sharma, 2007; Fredrick, Muasya, Kipyego, 2014; Abdullah, Hayworth, 1993). But before analyzing scientific literature about the relationship between economic factors and stock price, we first present some background of economic theory about the interaction between stock price and the economic variables mentioned earlier. The first interaction could be between the monetary supply and stock price. The increase in monetary supply may robust stock price due to increase of liquidity (Ratanapakorn, Sharma, 2007). In other words, increase of liquidity reduces the interest rates, which leads to rise in stock price. The second interaction is between stock price and inflation. The negative inflation rate's impact on stock price could be explained by that an increase of the inflation rate would raise the nominal risk-free rate, which would lead to a higher discount rate (Fama, 1981). The increase of the discount rate would lead to a decrease of stock price because it could be valued by the discounted value of expected dividends (Ratanapakorn, Sharnma (2007). The third relationship is between the exchange rate and stock price. Based on macro framework, if a country is a big exporter, then the exchange rate increase, relative to a foreign country, would lower the firm's competitiveness and it would lead to decrease of the firm's stock price (Ratanaporn, Sharma, 2007). The fourth relationship is between stock price and short-term or long-term interest rates. The relationship should be negative because the increase of interest rates should increase financing costs and that would reduce the company's future

profitability, which would decrease stock price (Ratanaporn, Sharma, 2007). Therefore, theoretically some economic factors have a positive impact, such as inflation and monetary supply, on stock price, but the exchange rate and interest rate has more negative impact on stock price. Hence, theoretical perspective shows not all economic factors has positive impact on stock price.

After presenting theoretical part we can analyze empirical results of scientific papers which are related to the variables mentioned previously. Ratanapakorn and Sharma (2007) analyzed short and long-time period relations between American stock prices and six macroeconomic variables (monetary supply, inflation, the exchange rate, short-term interest rate, long-term interest rate, industrial production) using monthly data. The results show that there is negative relationship between stock prices and long-term interest rates, but positive from monetary supply, inflation rate, exchange rate and short-term interest rates (Ratanapakorn, Sharma, 2007). Moreover, Abdullah and Hayworth (1993) argue that long-term interest rates are more related to the stock price than the short-term interest rate. Fredrick, Muasya and Kipyego (2014) argue that there is a strong and negative correlation between exchange rate (ratio between the Kenyan shilling and the US dollar) and stock price. In other words, as foreign currencies increase or the Kenyan shilling decreases, the stock price should fall (Fredrick, Muasya, Kipyego, 2014). Therefore, the literature on the theoretical and empirical analysis showed that macroeconomic factors do have an impact on stock market returns, but there are different results: the theoretical part suggests that exchange rate and interest rate have a negative impact on stock price but empirical analysis shows that exchange rate and short-term interest rate have a positive impact. The reason for the different results could be due to the fact that that American stock prices could be impacted by other factors. After analyzing the relationship between economic factors and stock price, we go on to analyze the relationship between oil price and economic factors.

Economic factors and oil price. As mentioned earlier, oil has huge impact on the economy, especially for exporting or importing countries, so it is important to analyze oil prices and economic factors' (interest rate, economic growth, inflation and other factors) relationship from a theoretical and empirical perspective. Based on Adjeumo and Olomola (2006) the oil price can impact an economy through supply and demand. From a supply perspective, the oil price directly influences production costs that leads to a company having lower profits, and profits and stock price of firms is positively correlated, so stock price would decrease (Adjeumo, Olomola, 2006). The demand side could be impacted through consumption and investment (Adjeumo, Olomola, 2006). Consumption should shrink due to the increase of oil price, which lowers consumers' spending power, and investment would also decrease because manufacturers would invest less in energy-intensive capital (Adjeumo, Olomola, 2006). Although Asgari (2013) argues that countries with an oil-production based economy have a positive relationship between the oil price and the economy in general,

empirical results could be different when we compare with theories and it is important to distinguish if any given country is an oil producer or consumer. Moreover, Farhani's (2012) results show that oil price has a positive impact on the inflation rate in Nigeria. An explanation of this positive relationship could be that an increase in the oil price would lead to a similar increase of the petrol price (Farhani, 2012). Adding to previous results, Thenmozhi and Srinivasan (2016) argue that the lead-lag relationships between oil price and macroeconomic factors depend on time scale. In other words, which will be the leading or lagging variable depends on the amount of time observed. For example, the exchange rate (between euro and dollar) is leading oil prices in medium-term, but in the long-term, the exchange rate lags against the oil price (Thenmozhi, Srinivasan, 2016). In general, the increase in oil price affects countries with a large oil dependence in tradable sector, because currency depreciate due to an increase of inflation (Arora, 2017). Therefore, the literature analysis showed that oil price has huge impact on inflation rate, exchange rate and economic growth in general, especially if oil is the main driver of the economy's health. Except, there is difference between theoretical and empirical knowledge: Theory shows that oil price has more of a negative impact on an economy through inflation, consumption, exchange rates and investment, however empirical literature analysis shows that an economy in general is positively impacted by oil price. The reason for this positive impact could be that the analyzed country's economy is more based on oil production, so the increase of oil price has more positive than negative impact on that country. Hence, now we will analysis the relationship between oil price and stock price.

Oil price and stock price. There are a lot of scientific papers which show that in general there is a significant relationship between the oil price and stock price price (Themozhi, Srinivasan, 2015; Wang, Pan, Liu 2012; Arellano 1992; Shavvalpour, Khanjarpanah, Zamani, Jabbarzadeh, 2017; Kilian, Park 2009; Siddiqui, 2013; Ajmi, Montasser, 2014; Muller, 2009; Diaz, Garcia 2016; Tsai, 2015). The relationship between the oil price and stock price price is very popular among financial studies. It started with Hamilton's work in 1983 (Guesmi, Fattoum, 2014). He concluded that positive oil price shocks caused economic recessions in the US and it caused equity disruption in the US. Most of the authors have the same outcome – oil price has a positive impact on stock price, even though the object, period and methods are different, but it really depends whether a country is an exporter or importer of oil (Guesmi, Fattoum, 2014). For example, Siddiqui's (2013) results show that the oil prices, exchange rate, and foreign private portfolio investment have a positive correlation with stock market performance and democratic set up to be negatively impacted by stock market performance in Pakistan. Adding to the previous results, Narayan and Gupta (2015) argue that positive and negative oil price changes have an impact on US stock market returns. Although, Cunado and Garcia (2014) analyzed the relationship between the oil price and European stock market returns, results show that the relationship is negative. Moreover, Wei (2003) argues that an 80 percent increase in oil

price leads to a 10 percent decline in the stock market. Tsai (2015) explains that there are two factors which impact the negative outcome: an increase in the marginal production cost and a reduction in household demand for a firm's output. Therefore, we can conclude that there is a significant relationship between oil price and stock market price and the impact could be positive or negative. The results from the literature analysis show that positive impacts mostly appear in oil producing countries and the negative impacts are in oil consuming countries. But many authors argue that there is a different kind of scenario which would result in a different outcome.

Thenmozhi and Srinivasan (2016) conclude that the oil price and stock indexes of the big oil-importing countries are affecting each other in the long- and medium-terms, but not over short periods. Moreover, Onour (2007) and Arellano (1992) agree with the aforementioned statement: the relationship between oil price and stock market is significant in the long-term, but in the short-term more other variables are more effective. Onour (2007) explains that oil price changes transmit major macroeconomic indicators that affects the profitability of firms traded in GCC (Gulf Cooperation Council) stock markets. But Sarwar and Hussan (2016) argue that in general the effect has a negative impact on US stock prices. Also, the authors checked if the size of the oil price shock had the same impact on US stock prices and their results revealed that the effect of double shock of standard deviation is twice bigger as one standard deviation shock, so the oil price shocks have more of an impact on stock price the bigger the company is (Sarwar, Hussan, 2016). Hence, the choice of time period is also a huge factor for results and the company's size is also an important factor for our relationship analysis.

What kind of shock impacts oil stocks and which shocks have the most significant impact on stock price? To answer we can use Degiaanaktis, Filis, Kizys' (2014) conclusion that supply-side shocks and oil specific shocks do not affect volatility, but if the oil price is changed by aggregate demand shocks, then the European stock market becomes less volatile. Also, Abhyankar, Xu, Wang (2013) argue that there are three kinds of oil shocks:

- The first is an oil supply shock representing a fast shift of global oil supply driven by production disruptions because of political instabilities, for example changes in production quotas by OPEC countries;
- The second variable is an aggregate demand shock in which all industrial commodities, including crude oil, experience a shock driven by state of the global business cycle;
- Third variable is oil-market specific demand shock which represents changes to the demand for crude oil.

Results show that oil supply shocks do not have an impact on Japanese stock market returns. They argue that the market anticipates that Japan has oil reserves for oil supply shocks, and demand

shocks have a positive impact on the Japanese real stock returns. Also, the authors compare the impact of oil price shocks and stock market returns using US and Japanese data. The results showed that Japanese stock market returns respond more sensitively than US stock returns. Killian and Park (2009) would agree that investors don't need to focus much on oil supply shocks and focus more on demand shocks. But Cunado and Garcia (2016) would argue that most of the European stock market returns are mostly driven by oil supply shocks. Moreover, Wang (2012) argues that oil importing countries are more sensitive to oil supply shocks, but only in the short-term, and demand shocks affect both groups of countries. Therefore, as we can see, oil prices have a significant positive impact on stock market prices only in the long-term, but in the short-term, there is no significant influence effect. Also, we find that oil supply shocks have an impact on stock market prices only in oil importing countries. Only demand shocks have a significant impact on stock market price in both exporting and importing countries.

In our case the object of this work is stock price of Norwegian oil companies. Hence, we should also analyze this relationship's effect on oil companies. Shavvalpour, Khanjarpanah, Zamani (2017) argue that petrochemical products (such as oil) have a direct effect on the stock returns of all petrochemical companies, however the effect is stronger for smaller companies. Moreover, Tsai's (2015) results show that in short-term, stock returns of energy-intensive manufacturing industries react more positively to oil price shocks compared with less energy-related manufacturing industries. Also, the author checks if the firm's size, represented by assets, total revenue, and the number of employees, have an impact on oil price shock sensitivity and the results show that the bigger companies are, the more strongly they will be influenced by oil prices in post-crisis period. As we can see there are different opinions about companies' sensitivity, because one of the authors analyzes data based on the short-term and the other analyzes data based on the long-term, as well as both using different methods. Fernando and Garcia (2016) argue that oil price shocks have a significant positive impact on stock returns in the short-term and that the effect became statistically significant during the post-1986 period. Moreover, Phan, Sharma and Narayan (2014) argue that stocks, which are owned by producers, are reacting much faster to oil price changes than consumers of oil. Also, they found that if the firm's size increase, the sensitivity to crude oil price becomes stronger. Therefore, empirical literature analysis shows that relationship between oil price and stock price of oil companies is statistically significant and is more sensitive than companies which are less related to oil production. On the other hand, Asche and Dahl (2017) conclude that the price of oil has a much bigger impact on Norwegian oil companies belonging to the Operator or drill-and-well sectors, but other Norwegian companies operating in the oil industry will feel much less impact. Moreover, some authors do not agree on whether a companies' size has any influence on their sensitivity to the oil price, hence it is important to investigate if the size of oil companies is more sensitive relative to the oil price.

Therefore, whether the oil price negatively or positively influences countries' stock price indexes depends on whether the countries are producers or consumers of petrochemical products. Moreover, it also depends if companies or industries business activities are more or less sensitive to oil price. The oil companies' stock prices are impacted positively by oil price, but the robustness of the positive relationship depends on which oil segment company operates within, but an especially robust effect can be noticed in the offshore oil field.

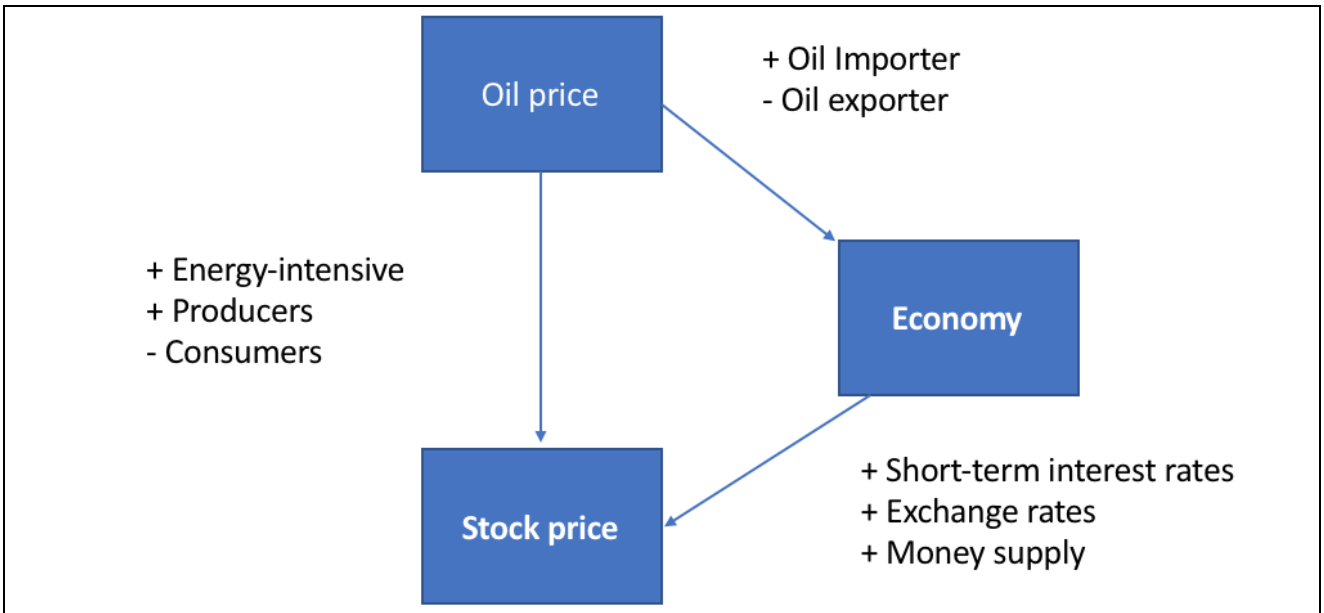

Figure 4. Review of our analyzed literature

Note: compiled by the author.

The historical data of oil price, US economy and Dow Jones Industrial Average show that it is hard to determine whether or not oil price has an impact on stock price and a country's economy. Therefore, in this chapter we analyze empirical research to find out whether or not oil price has an impact on companies' stock price and countries' economy. Therefore, Figure 4 presents the conclusions of empirical analysis of the interaction between oil price, stock price and economic factors. Economic growth could impact stock price growth through short-term interest rates, exchange rates and monetary supply, and longer-term interest rates has negative impact on companies' stock price growth. Looking at the relationship between the economy and the oil price, we can say that oil price growth has a positive impact on countries which export oil to other countries, and a negative impact on oil importing countries, but only in long-term cases. Therefore, the oil price could indirectly impact stock prices through economic factors and only the direction of the movements of stock prices depends on whether a given country is an oil consumer or oil producer. The oil price could directly positively impact those companies which are energy-intensive or are oil producers and negatively impact those companies which are more consumer than oil producers. Companies with a focus on oil production or which are energy-intensive are impacted by oil price through an increase of profits and dividends, which leads to a higher stock price, and the companies which are oil consumers are

impacted by oil prices through an increase of cost. On the other hand, the analysis results show that there is a positive relationship in the short-term only for oil producing companies and small oil companies are more sensitive to the oil price than bigger companies. Moreover, oil demand shocks are much more impactful on stock price for oil companies than oil supply shocks. To conclude the literature analysis about the relationship, we can see that the oil price is huge impactor for stock market prices, especially for oil companies, and it could impact stock price volatility directly and indirectly. Therefore, in the next chapter we will analyze what kind of events influence oil price volatility.

1.1.2. Oil price volatility causes

Back in the days oil opened opportunities for business to be much more efficient and productive (Muller, 2009). Moreover, beginning in the 20th century until present day, the global economy was and remains strongly depended on oil production, especially in emerging countries, therefore oil helped countries to increase their productivity, which eventually increased economic growth. But, as in the previous chapter, by analyzing oil price history we can see that it also has negative impacts on the global economy and even social life. For example, Car-free Sunday and wage-eroding inflation in the 1970s and record high oil prices in 2005 after Hurricane Katrina and other crises which were influenced by oil price shocks (Muller, 2009). Those shocks created instability in global economic growth and disrupted countries' stock markets. Other examples can be when the oil price falls by half in the second half of 2014. Of course, this situation gave more benefits than it did damage to the economy, but for oil companies it created a lot of problems and the oil price nowadays is remaining stable, hence the companies were forced to rethink the future investment of capital and it also impacted the countries which are oil producers and not consumers, currency and economic growth.

Overall, the collapse in the oil price gave more pros than cons, but still this kind of situation is called an oil price shock. The history of oil price shocks has been blamed for global economic recessions and for higher inflation, as well as a slowdown of global productivity, especially in the 1970s (Kilian, 2014). Also, a larger or smaller supply of oil could influence the financial system directly or indirectly because oil is an important component of production costs and it increase the product price for consumer (Siddiqui, 2013). In other words, companies which are related to oil will have smaller profits and dividends due to weak market conditions and this may result in decrease in stock price.

Therefore, the oil created huge opportunities for countries to grow their economies through productivity, efficiency and other factors. Nowadays oil is a huge stimulator for the global economy, especially for developing countries, and oil price fluctuations have huge positive or negative consequences for countries' economy and overall financial health. Hence, it is important to find out

which of the factors have an influence on oil price volatility and if they have a positive or negative impact on oil price volatility.

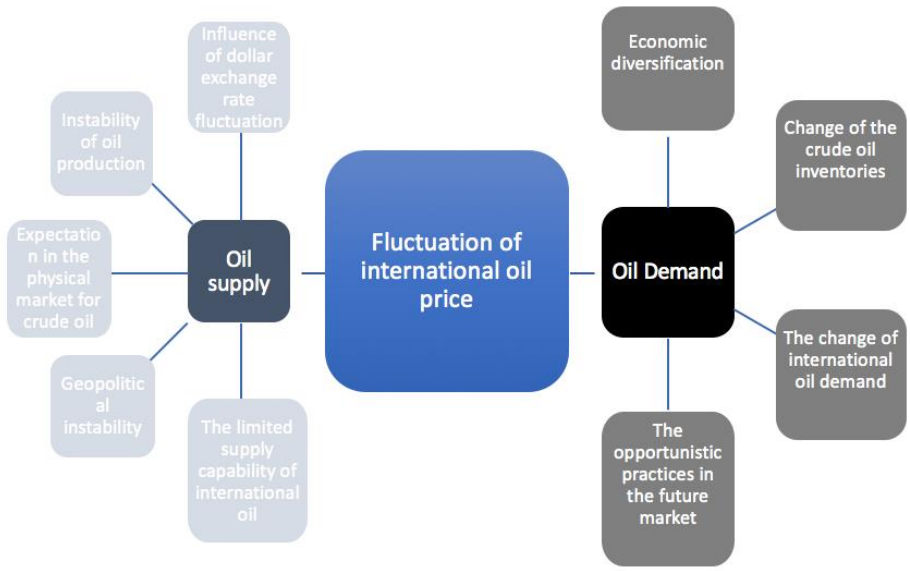

Figure 5. Fluctuation of international oil price causes.

Source: Yan (2012).

Figure 5 represents the main factors which influence the oil price: oil demand (the opportunistic practices in the futures market, economic diversification, change in crude oil inventories, change of international oil demand) and oil supply (geopolitical instability, influence of dollar exchange rate fluctuation, the role of expectation in the physical market for crude oil, limited oil supply capability of international oil, instability of production) (Yan, 2012).

Supply. Supply is one of the direct factors which influences the international oil market. Yan (2012) believes there are several arguments as to why the oil price is influenced by supply. The first one is that production capacity of crude oil is limited. On one hand, everyone knows that oil isn't a renewable resource, so eventually petroleum resources will run out (Yan, 2012). Especially when considering that in the last decade oil companies were unable to find a large oil field (Yan, 2012). Therefore, if oil reserves remain constant, then the oil price will increase in each period. On the other hand, oil production capacity (e.g. exploration, development, transportation, refining) isn't catching up fast enough to the oil consumption (Yan, 2012). This condition could compound with the previous situation which would increase oil prices even faster as a lowering of production capacity meets an annual increase in consumption capacity. However, the oil production, consumption, and distribution is different all around the world due to production inequality, and countries differing focuses on economy structure. Also, supply quantity could be affected by oil production cost (Yan, 2012). In other words, the oil corporations would lower their oil production volume due to low oil price.

The second argument is instability of oil production in Organization of the Petroleum Exporting Countries. Since the early 1970's oil producing countries play a more and more important role in the international oil market because they have united themselves under one organization: Organization of the Petroleum Exporting Countries (Forward – OPEC) (Yan, 2012). The organization has been controlling the price of oil since late 1973 (Kilian, 2014). The OPEC countries have about a 45 percent share of the market and also hold about 76 percent of the current total global reserves (BP, 2009). On one hand, such a big concentration created instability in the oil market. For example, in the long-term, if the organization increased production volume by 1 percent, then the oil price drops about 1,23 percent (Yan, 2012). In other words, OPEC decisions on oil production amounts have a negative impact on oil price movements. On the other hand, Kilian (2014) argues that there is no evidence of OPEC ever having been able to raise the price of oil. Although, Olimb and Ødegård (2010) believe that the organization only can influence price movements towards specific target levels or a target zone. Therefore, it is hard to say whether OPEC has an impact or not, but Yan (2012) argues that there is negative correlation between oil prices and OPEC decisions. Moreover, Guidi (2006) concludes that in non-conflict periods OPEC decisions are able to affect the UK and US stock markets. Hence, it important to include OPEC decisions as a control variable for the oil price in our model because it would increase the model's quality as well as its efficiency.

Geopolitical instability. Looking at oil price history, we can see that from the last century the oil price is strongly influenced by the political situation in oil exporting countries (Yan, 2012). Throughout history, there was many periods of geopolitical instability, which created oil price shocks. Nowadays, the riskiest geopolitical situation we can see is in the Middle East and other oil producing areas in Asia (Yan, 2012). For example, Gause (2015) believes that the real driver of the 2014 oil price collapse in Saudi Arabia had to be their geopolitical rivalry with Iran. The constant oil production had a huge negative impact on the Saudi Arabian economy, but the biggest effect was felt by their rival Iran. Moreover, Iran had had 150bn barrels of proven reserves, which is about 11.4 percent of all global reserves, but the relationship between Iran and the West, especially the US, remains very instable due to Iran's nuclear ambitions and political instability (Yan, 2012). Therefore, history shows that there is huge interdependence between oil price and geopolitical instability, especially in Asian areas. But some authors argue that it is hard to measure how the oil price is impacted by geopolitical instability. There are three arguments for this explanation. Firstly, the relationship doesn't fit the data (Kilian, 2014). For example, the Arab and Israel wars were not fought on the territory of oil producing countries and none of the oil production supply was damaged (Kilian, 2014). Secondly, the results of many regression analyses show that the relationship between the two variables mentioned earlier is very low or that there is no statistical relationship (Killian, 2008). Finally, most of the oil shock in the 1970s has been created by global oil business cycle (Kilian,

2014). Therefore, we would not put geopolitical instability as a control variable in our model due to other authors' failures to find a statistical relationship between oil prices and political instability. Also, it is hard to distinguish whether or not we determine if a specific situation is created by political instability or not.

Influence of dollar exchange rate fluctuation. The US dollar is used most of the time by oil companies due to its status as a global reserve currency (Zhang, Fan, Tsai, Wei, 2008). Hence, many financial scientists are analyzing the relationship between oil prices and dollar exchange rates. Intuitively, a decrease of the US dollar against other currency should increase the international oil price because oil importers would increase demand for a lower oil price, which was created by depreciation against an importer's currency. For example, Sadorsky (2000) concludes that there is a significant relationship between oil prices and the dollar exchange rate in short and long periods. Yan (2012) argues that if the dollar became weaker compared with other currencies than the oil price would increase. In the long run, if the dollar increases 1 percent, then the oil price drops about 3,06 percent. In the short run, the oil price drops about 1,82 percent. Moreover, Zhang, Fan, Tsai, and Wei (2008) conclude that the US dollar decrease was a negative key factor for the international oil price. In other words, if the US dollar increases, then oil prices would decrease and vice versa. But they also conclude that significant changes in US dollars don't create negative or positive oil price shocks and that other factors creates those oil price shocks. Therefore, oil companies should focus much more on exchange rate risk due to high significance on the relationship. Moreover, the literature analysis show that there is a significant relationship between oil price and exchange rate and that the relationship trend depends on time period: in the short-term, the relationship is positive and in the long-term, the relationship is negative. Hence, we will include the exchange rate as a control variable in our model.

Demand. In this part, we will present oil demand factors which are influencing international oil price. Yan (2012) presents the following factors:

- Economic diversification in OPEC countries;
- The change in international oil demand;
- Changes in the crude oil inventories in all countries.

Now the author will try to present each argument in detail. Nowadays, countries are trying to reduce their over-dependence on oil markets (Yan, 2012). Although currently the oil demand in the Western world is going down, oil consumption in emerging market economies, like in the Middle East and Latin America is increasing rapidly, so overall total oil consumption increases constantly (Yan, 2012). Therefore, this rapid increase in demand causes the oil price to increase because the supply wasn't able to catch oil demand.

Demand volatilities would directly affect changes in the oil market. For example, the global economy started to recover in 2002 and in 2003 due to newly industrialized countries like China, therefore the global oil consumption increased and that lead to growth in the oil price (Yan, 2012). But, the Financial Crisis in 2008 created the demand shock, which influenced the oil price to drop significantly in a short period.

Finally, changes in the crude oil price due to oil inventories. The inventory shows the financial health of a market and you can compare to the amount of debt on a company's balance sheet (Stahl, Clausen, 2016). First of all, the inventories include conventional inventory and unconventional inventory (Yan, 2012). Conventional inventory presents as an inventory which guarantees the normal running of the world's oil production and supply system and unconventional inventory refers to the commercial inventory (Yan, 2012). When the oil price is low, all exporting countries try to increase their oil inventories, so with that oil price should increase, but oil inventories could impact the oil price only in the short-term (Yan, 2012).

Opportunistic practices in the futures market. Oil is the most traded commodity in the world: in 2008 about 500 million barrels were traded daily on the NYMEX futures exchange, while the daily consumption is 84 million barrels (Trondheim, 2010). Hence, many social scientists are interested in this phenomenon. For example, Muller (2009) argues that very small fractions can influence oil price changes. Moreover, Yan (2012) argues that the oil price changes are influenced only in the short-term and in the long-term there is no impact on oil price. Intuitively, a speculator can influence oil price when the future price is above the spot price, so the investor would hold the commodity in the future for profit expectations and that would diminish the supply Olimb and Ødegård (2010). In other words, it could create virtual demand which could mislead the future oil supply and in the end this would create demand shocks. To conclude this paragraph, we could say that the future oil market doesn't have a huge impact on present oil price and it only influences oil price in the short-term, but not in the long-term.

Therefore, oil price is influenced by several factors: supply and demand, future oil market, geopolitical instability and exchange rates. Demand and supply can create instability in the oil market, especially OPEC decisions, hence our model will put OPEC decisions as a control variable. Also, the literature analysis provides that the dollar has huge impact on oil price volatility, so it also will be a control variable for the oil price. Geopolitical instability has an impact on oil prices based on historical analysis but based on scientific literature we do not find any strong evidence, so we will not include instability in our model. Therefore, the three control variables should create better quality for our model.

1.2. Theoretical background of financial variables and stock price relationship

The main goal of a company's management team is to maximize shareholder welfare, which usually is represented by the stock price or enterprise value. However, increasing global competition increases the difficulty of reaching a main goal of the company – stability and growth, especially in oil companies who mainly focus on global perspectives. Mostly a company's successes or failures in meeting their main goal reflects on company's stock price because it shows the shareholder's (public or private) well-being. Hence, the management team is motivated to increase stock price by showing and measuring their company's performance based on financial and managerial measurements. There are many parameters to measure a company's value and the most important parameter varies due to different business environments. For example, the oil and gas-based companies in our analyses have different kind of operating characteristics, which are the risk of drilling a dry well, the length of time between discovery and sale of reserves and other characteristics that are unique to the oil and gas industry (Osmundsen, Aschem Misund, Mohn 2006). Hence the importance of financial, managerial or risk measurement tools for managers, shareholders, stakeholders and investors who, based on those measurements, make decisions to invest or not invest in a company. In our case, we focus on the relationship between financial measurement and stock price due to data limitation of management and risk measurement.

Osmundsen, Asche, Misund and Mohn (2006) believe that the successful and stable stock price growth of a company is based on cash flow, growth and risk characteristics. However, Bhaskaran and Sukumaran (2016) argue that stock price growth of oil companies is influenced by efficiencies and growth characteristics rather than by marketing, sales, cash flow, or production characteristics. There are many variables which determine the aforementioned characteristics, but it requires a great deal of resources and time for continuous updates on the variables which have an influence on stock prices, therefore, it is important to use relative measurements which require less time to obtain and that the interpretation of those variables are understandable (Damodaran, 2002). However, it is hard to determine what kind of measurements are suitable for the previously mentioned relationship. Literature analysis show that most authors are using variables which represent performance, financing, investment, dividend policy variables and multiples (measurements of companies' financial well-being by dividing one figure, which represents the company's financial performance by another figure, which represents the company's value in the market). Therefore, the model, which represents a relationship between the stock price of oil-related companies and financial measurements will be created based on financial variables and multiples.

First of all, we will present a literature review about the relationship between the financial variables and stock price. Financial ratios show companies' performance on past and present periods, and they also help to detect future financial problems. The relationship between financial performance

and valuation of oil companies is not a new topic and remains a very popular one among scholars. There are many articles which analyze the relationship between financial variables and stock price. But there aren't many articles which investigate correlation between finance variables and stock price of oil-based companies. Hence, Table 1 presents four authors who analyze the previously mentioned relationship, but they used different time periods, objects and methodologies.

Table 1

Researchers who focus on the relationship between stock price and financial variables

Author	**Financial Variables**	**Period and Object**
Osmundsen, Asche, Mohn (2006)	RoACE, RRR, UPC, FDC, oil price, OGP.	14 years and 14 international oil companies
Bhaskaran and Sukumaran (2016)	CAPEXSA, Cash Ratio, COGSTA, CR, DPO, EVEBIT, EVEBITDA, FAT, FCFESA, FCFETA, GR, LTDTC, NPM, NWCT, PE, PS, QR, ROA, ROCE, TAT.	5 years and 82 oil companies
Haque, Datta, Dey, Rahman (2013)	ROA, DPR, EPS, P/E, BVPS, CDPS, ROE, CFPS.	8 years and top 10 manufacture companies of Bangladesh.
Fard (2011)	PFT, ORGES.	10 years and 5 oil companies.

Source: compiled by the author.

Table 1 represents 4 authors who analyzed the relationship between stock price and financial variables (Osmundsen, Asche, Mohn, 2006; Bhaskaran and Sukumaran, 2016; Haque, Datta, Dey, Rahman, 2013; Fard 2011). Osmundsen, Asche and Mohn (2006) analyzed the relationship between multiples (EV/DACF) and financial variables. Findings show the following results:

- the oil price has negative impact on valuation multiple (EV/DACF);
- The production and the multiple don't show a significant relationship, because many oil companies can control oil production due to reserves;
- The valuation of the oil company more depend on its size and reputation;
- The reserves can positively influence multiples of oil companies;
- Return on Average Capital Employed (RoACE) doesn't show any relationship with multiples of oil companies (Osmundsen, Asche, Mohn 2006).

The author has some arguments regarding the results: the effect could be influenced by explanatory factors and RoACE numbers used in external analyses are not adjusted to mid-cycle market conditions (Osmundsen, Asche, Mohn, 2006). Finally, results show that reserves, company size and reputation have a huge impact on the multiple and that RoACE didn't have an influence on the dependent variable. Therefore, in our case, we shouldn't implement reserves in our model because

the Norwegian oil industry has different oil categories, which we will discuss our methodology section. But this focus is more on the multiple as a dependent variable and not stock price.

Bhaskaran and Sukumaran (2016) analyzed the relationship between the share price of oil companies and financial variables (performance, the financing, investment and dividend policy). The work fully represents almost all financial variables which are known and popular for an investor. They concluded that the liquidity, profitability, fixed capital investment, working capital ratios and dividend payments have a positive and significant impact on the share price of oil companies (Bhaskaran, Sukumaran, 2016). Intuitionally, the results are logical because as profitability increases, companies can distribute the increased profit to investors, which leads to a higher share price. Moreover, liquidity and working capital ratios show that companies are efficient and manage their companies well, so good results of efficiency should lead to higher stock prices. Likewise, the dividend payment policy shows that companies whether not they want or can to distribute profit with public and private investors, so the existence of dividend payments should increase the share price of oil-related companies. Only cost of goods sold has a significant and negative impact on the stock price of oil companies (Bhaskaran, Sukumaran, 2016). However, Haque, Datta, Dey, Rahman (2013) argue that cash flow per share and price to earnings is the most important variable for investors and stockholders, but their sample was companies listed on the Dhaka stock exchange (Bhaskaran, Sukumaran, 2016). On the other hand, Frad (2011) concluded that the most significant factors which influence stock prices are profitability and reserves for oil companies. Therefore, it is hard to determine the best financial variables for an oil company's valuation purposes due to different results from the literature analysis. Hence, the results show that it is important to use financial variables which are related to efficiency, liquidity, profitability, investments and dividend policy. We will not put ratios such as reserves, oil production and so on because our work objective is to analyze the Norwegian oil supply and production industry, and companies who represent later parts of the oil supply chain don't have any reserves or oil production.

In the previous chapter, we found several authors who concluded that multiples are more important for an oil company's valuation. Fard (2011) believes the one of the most important factors for evaluating a company's performance is the market value of the company and that it is best described by multiples. Fei (2011) using five multiples (price-to-earnings, price-to-book value, price-to-cash flow, price-to-sales) was looking for best valuation multiples. The results show that price to earnings is the best multiple in plantation sector and price to sales is the worst valuation method. On the other hand, Lee (2003) found that price-to-book is the most accurate multiple on the Japanese stock market. Also, the results show that constructing a portfolio based on price-to-sales multiple can generate the highest return while the price-to-earnings multiple is only suitable in a bear market period. Howard and Harp (2009) suggest that for the valuation of oil companies the best suitable

multiples are a mix between enterprise value and production and reserve quantities. Those multiples better represent oil companies when oil production and reserves are put into the mix of those multiples. For example, Fard (2011) estimates the effect on value based on two variables: profit and oil reserve volume. The results show that a 1 million dollar increase in profit could increase oil companies' value about 8.5 million dollars and if a company's proven reserves increase by 1 million barrels, then it would increase the market value about 14.5 million dollars. Therefore, it seems that there is no universal multiple which is suitable to our object, so we will use the five most popular multiples as well as multiples which are strongly correlated with each other, so we will also use the ratio between stock price and profitability price.

Finally, the literature analysis shows that many authors find a different outcome due to differences of object, period and methodology. However, many authors agree that it is important to use financial variables which present a company's characteristics of liquidity, profitability, investment and dividend policy. Those variables should show which variables have an impact on the stock price of oil-related companies and how significant is it if we compare with different industry categories. Moreover, the authors agree to use multiples, which helps to compare with other companies who have the same or almost the same characteristics as our selected oil companies and the results of most of our analyzed research papers show that there are two ratios which are suitable for measuring the relationship between stock price and multiples. Therefore, the author will use price-to-earnings and price-to-book ratios for checking if those ratios have the same impact on Norwegian oil companies and which are statistically significant to stock price. Moreover, we will use financial variables which, as mentioned earlier, have an effect on a company's characteristics, as well as an independent model.

Overall, the oil price has a direct and indirect influence on stock price, and financial variables have positive and negative impacts on oil companies' stock price movements. Moreover, we will find out whether Norwegian oil industry players are impacted differently by the oil price when we compare them with each other. Therefore, in the methodology section, we will distinguish our selected oil companies on specific oil offshore segments. Moreover, we will present two regressions characteristics and assumptions for successful and unbiased regression results of the aforementioned relationships.

II. METHODOLOGY OF OIL PRICE AND FINANCIAL VARAIBLES IMPACT ON STOCK PRICE

Methodology is a research tool for successfully reaching the goals of a research paper, hence it is important to create a suitable methodology for our empirical analysis. This chapter is separated into 4 categories. The first category presents the research objective and its characteristics: the Norwegian oil production amounts compared with other oil-producing countries; An overall assessment of the Norwegian economy and its sectors; The Norwegian oil industry sectors and their characteristics; selected companies and to which Norwegian oil sector they belong. In the second part, the author creates and presents hypotheses based on the literature review and explains the logic of those hypotheses and their relevance to our research paper. The third part presents the empirical research stage and data information. In fourth stage, we will present methods, characteristics, and assumptions for creating an unbiased and efficient model.

2.1. Characteristic of the Empirical Research Objective: Norwegian Oil Companies

The theoretical section of the analysis shows that the oil industry is strongly impacted by global oil prices and a company's success is related to a stable financial environment. Moreover, the impact of the oil price on a country's economy depends on whether or not said country is an oil producer or oil consumer. Also considered is that different sectors of the oil industry are impacted differently by oil prices. Hence in this part, we will talk about our empirical research objective and its characteristics. But before analyzing our selected companies and their sectors, we briefly present Norwegian oil production capacity and its global exports volume. In general, the Norwegian economy is heavily dependent on its oil and gas production industry. After presenting the Norwegian economy and its dependency on oil production, we will analyze the Norwegian offshore oil industry and its main players. After presenting an assessment of the Norwegian economy and oil industry, we will present selected companies.

The Norwegian oil industry's development started more than 50 years ago (Norwegian Petroleum, 2018). At the time, nobody thought that the oil industry would be very important for Norway's economy and on the 13th of April 1965, production licenses oil companies were issued for the first time in Norway. Nowadays, production quantities are 6 times higher than 50 years ago (Norwegian Petroleum, 2018). Moreover, there are more than 30 listed Norwegian companies, more or less related to oil industry, and there are 1.100 companies related to the oil industry and carrying out their activities in Norway (Norwegian Petroleum, 2018). Relatedly, successful government participation in the oil industry and rapid growth of the global oil price was a significant factor in

raising Norwegian public welfare (Norwegian Petroleum, 2018). The public welfare is so high in Norway thanks to the government's ability to generate about 30 percent of its revenues solely from the oil industry in 2012 (Hansen, Rasen, 2012). Overall, the oil industry added more than NOK 9.000 billion to Norwegian economy (Hansen, Rasen, 2012). Therefore, it is important to analyze Norwegian oil exports in a global context and how the oil sector impacts the larger Norwegian economy, hence Figures 6 and 7 present Norwegian oil's current situation in the world and its standing in Norway's economy relative to other economic sectors.

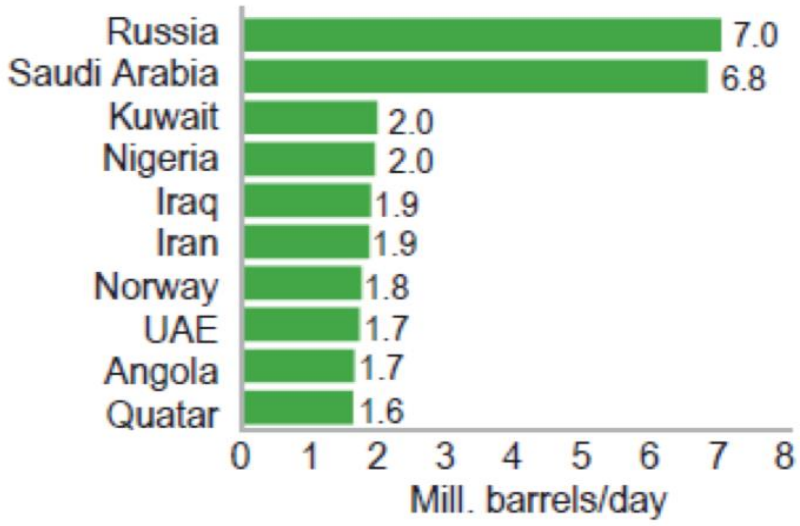

Figure 6. The largest exporters in the world in 2011

Source: Hansen and Rasen (2012).

The figure above presents the daily exports of the world's 10 largest oil exporting countries (ca. 2011) expressed in millions of barrels per day. As we can see, Norway exports almost the same amount oil as other major oil-producing countries. The only outliers are Russia and Saudi Arabia, each producing more than 3 times more than the other 8 countries listed, including Norway. Norway has 76 oil fields in its North Sea production zone, and together they manage to produce about 1.8 million barrels per day (Hansen, Rasen, 2012). Moreover, we can see that Norway is the only developed country which is able to produce the same amount of oil as other countries in this figure. Moreover, the most oil production came from the Middle East region and Norway and Russian represents Europe area. The dominance among developed countries gave them a huge advantage against developing countries and Norway was the seventh largest oil exporters in the world (Hansen, Rasen, 2012). In addition, Norway is only country listed which does not belong to OPEC. Therefore, we can see that Norway is a significant player in global oil production, even though the country does not belong to OPEC, it is still the seventh largest oil exporter in the world. Hence based information from Figure 6 we can conclude that Norway is the only listed country from the developed world and their production volume is the same as other OPEC countries, with the exception of Russia and Saudi Arabia, the largest exporters in the world in 2011. After presenting Norway's role in global oil

industry, we can analyze the Norwegian economy and its sectors and find out how important the oil industry is to the Norwegian economy.

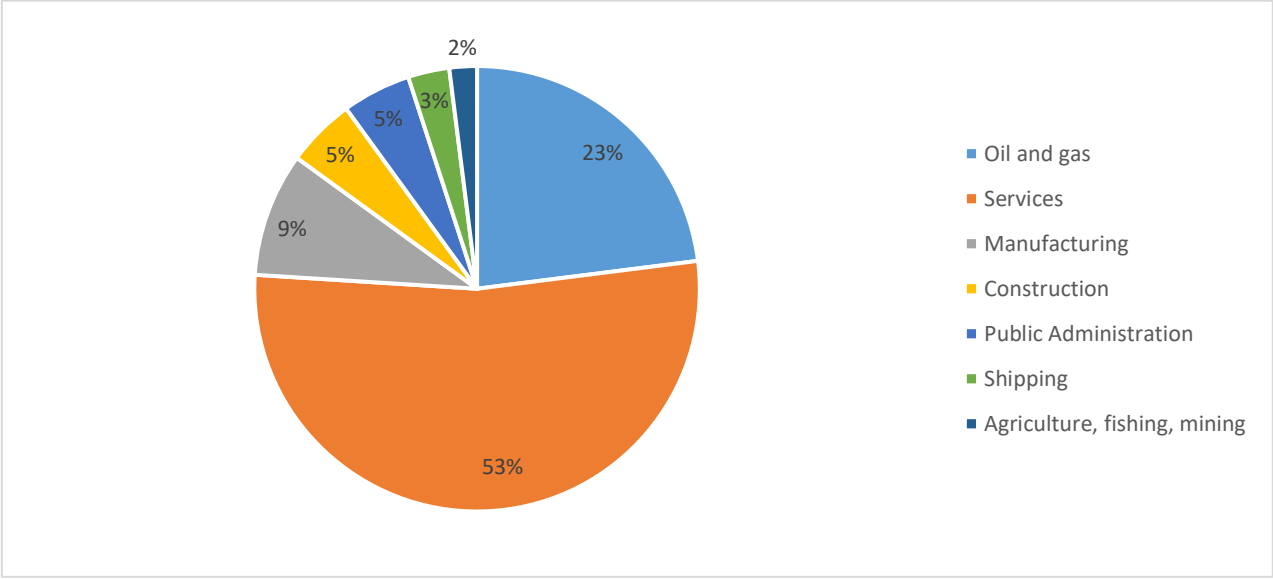

Figure 7. GDP per sector in 2010

Note: Created by author based on Leskinen, Bekken et al. (2012).

The figure above presents the sectors of the Norwegian economy. Overall, there are 7 sectors: Oil and gas; Services; Manufacturing; Construction; Public Administration; Shipping; Agriculture, fishing, mining. Figure 7 shows that the biggest industry is the services sector and second biggest sector is oil and gas. Combined, they generate about 86 percent of total Norwegian GDP. The Norwegian oil industry increased their GDP per capita significantly: from 9.551 dollars in 1978 to 56.648 dollars in 2010 (OCED,2012). Moreover, the oil industry generates about 29 percent of total Norwegian investments and 52 percent of total Norwegian exports (Hansen, Rasen, 2012). The remaining industries only generate about 14 percent of total Norwegian GDP. Therefore, we can see that the oil industry has an influence on the economy and is second biggest sector in Norway's overall economy. Moreover, the industry is very important for other industries, and directly or indirectly the oil industry created about 206.000 jobs in Norway in 2009 (Hansen, Rasen, 2012). Hence, we can conclude that oil industry is important for Norway's success and economic growth.

In the theoretical section we found out that several authors who analyzed Norwegian oil companies concluded that some oil sectors are much more influenced by the global oil price than other oil sectors. Therefore, it is important to distinguish Norwegian oil sectors. As mentioned earlier, offshore oil production started in early 1970 (Hylleberg, Pederson, 2011). From that time, the industry significantly increased growth and competition in the offshore field industry. There are several factors which helped to increase the industry's growth: low levels of corruption, low levels of bureaucracy, and high knowledge of shipping (Hylleberg, Pederson. 2011). However, the industry has also some weakness: the oilfield resource is low, political dilemmas between environmental preservation and continuity of oil production, and a relatively low level of outsourcing and investment as well as other

factors which are related to the Norwegian oil industry (Hylleberg, Pederson. 2011). The next step is to present the Norwegian offshore oil sector and its characteristics. Therefore, Figure 8 presents the interaction between all oil industry companies and other players in Norwegian oil industry.

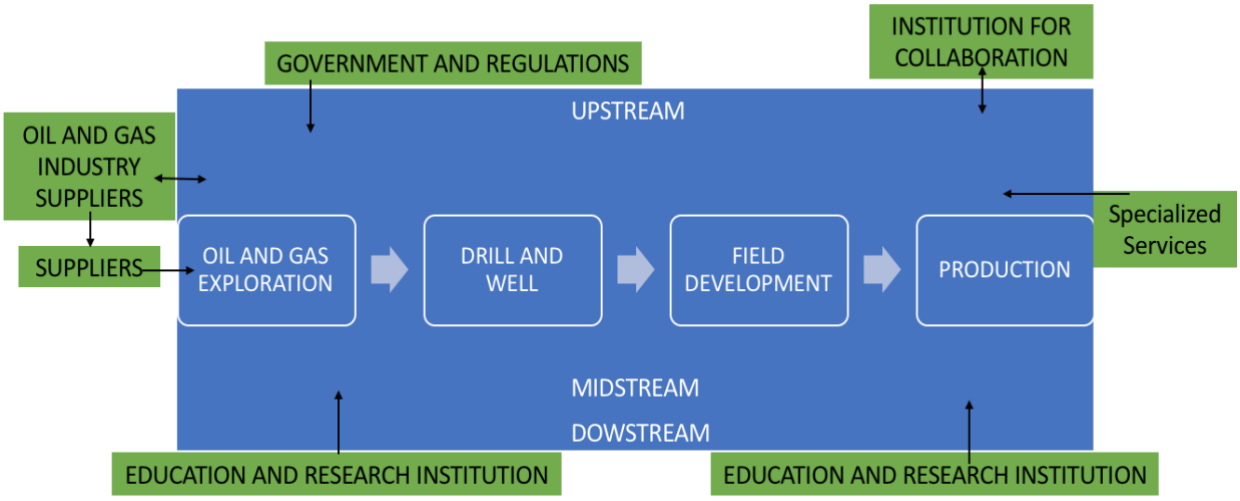

Figure 8. Norwegian oil industry's structure

Note: Created by author based on Leskinen, Bekken et al. (2012).

There are many important actors in Norwegian oil industry such as educational institutions, government, specialized services companies, suppliers and institutions for collaboration, but the main actors are upstream companies (exploring fields for oil and getting oil and gas out of the ground), midstream companies (transportation and storage of oil), and downstream (distributing, selling, refining, marketing oil products) (Garcia, Leskinen, Bekken, et al., 2012). The previously mentioned organizations or companies help oil companies to operate more efficiently and ethically in the industry. For example, suppliers support production by renting or providing Subsea and geology services, drilling technology and operational support to oil companies (Garcia, Leskinen, Bekken, et al., 2012). In addition, special services companies are law firms, accounting firms, banks and other companies (Garcia, Leskinen, Bekken, et al., 2012). Therefore, without those companies and institutions the industry would be neither efficient nor productive. However, based on Garcia et al. (2012), the main actors mentioned earlier generate the most profit from the industry. Going more in to details, we could add that the biggest competition is in upstream sector and the sector could be divided in two into segments: Operators and suppliers. Operators are responsible for production or have production rights in specific fields; the biggest Operator is Statoil, which is responsible for about 70 percent of production (Sasson, Blomgren, 2011). Moreover, Statoil export about 46 percent of total Norwegian export (Sasson, Blomgren, 2011). Suppliers are responsible for supporting Operators in producing oil. Based on conclusions by Garcia et al., there are five oil supplier sub-sectors: Topside; Drill and well; Subsea; Operation support; Geology and seismology (Garcia, Leskinen, Bekken et al., 2012).

The Geology and Seismology companies are responsible for gathering and analyzing geological and seismological data, interpreting, and presenting the data results (Ernst and Young, 2016). Moreover, Operators could engage their services to find the location of oil within a specific field (Garcia, Leskinen, Bekken, et al., 2012). Our collected data shows that we have 4 Geology and Seismology companies (Table 2). The other upstream supplier could be Drill and Well firms. The companies are responsible for safely and efficiently pumping oil from the sea (Ernst and Young, 2016). Out of 22 companies we have 5 Drill and Well companies (Table 2). Topside and Subsea companies are responsible for equipment supply, manufacturing, installation and construction of offshore platforms (Garcia, Leskinen, Bekken et al., 2012). Combining both subsegments, we will analyze 3 Subsea and 4 Topside companies (table 2). Operations companies have production licenses and employ suppliers for all upstream activities (Garcia, Leskinen, Bekken et al., 2012). These companies should gain the most profits compared to other industries' companies, but in this paper, we will analyze only 3 Operators (Table 2). Operation support companies are those which support Operators and other sub-segment companies in all upstream activities and we will analyze 3 operation support companies in the Norwegian oil industry (Garcia, Leskinen, Bekken et al., 2012).

Table 2.

Selected Norwegian oil companies and their sectors

Norwegian oil companies	Short name	Sector
Bonheur	BON	Drill and Well
Fred. Olsen Energy	FOE	Drill and Well
Petrolia drilling	PDR	Drill and Well
Seadrill	SDRL	Drill and Well
Aker Solutions	AKSO	Topside
BW Offshore Limited	BWO	Drill and Well
DOF	DOF	Subsea
Eidesvik Offshore	EIOF	Subsea
Electromagnetic Geoservices	EMGS	Geology and seismology
Havila Shipping	HAVI	Operation support
Petroleum Geo-Services	PGS	Geology and seismology
Prosafe	PRS	Operator
Reach Subsea	REACH	Subsea
SeaBird Exploration	SBX	Geology and seismology
Sevan Marine	SEVAN	Topside
Siem Offshore	SIOFF	Topside
Solstad Farstad	SOFF	Operation support
Subsea 7	SUBC	Subsea
TGS-NOPEC Geophysical Company	TGS	Geology and seismology
DNO	DNO	Operator
InterOil Exploration and Production	IOX	Operator
I.M. Skaugen	IMSK	Operation support

Note: Created by author based on sources, which disclose company's activity.

Therefore, the Norwegian oil industry is seventh in overall oil exporters in the world and only country which do not belong to OPEC organization among top 10 exporters in 2011. Moreover, the oil industry generates about 23 percent of total Norway's economy. Due to previously mentioned

factors and government participation, the offshore oil industry has become a very competitive one, with many players. Upstream sectors are very competitive and other sectors are mostly controlled by Statoil. The sector could be separated in two groups: Operators and suppliers. The suppliers part is very competitive, and it could be separated into 5 sub-groups: Topside, operation support, Geology and Seismology, Subsea, Drill and Well. Based on information from Table 2, our selected companies are diverse and should fully present an overview of the Norwegian oil industry. However, it should be mentioned that some companies are global companies and have diverse business activities and some operate in different geographical regions.

2.2. The Empirical Research Hypotheses

Every researcher has their own hypothesis, or the research hypothesis could be very close to other authors, the only differences could be the research objective or time period. Therefore, it is important to distinguish and create our empirical research hypothesis. The hypothesis should help to answer the main question: How financial variables and oil prices impact Norwegian oil companies' stock prices? Therefore, this chapter presents the hypotheses for research. First three hypotheses present an analysis of the oil price and stock price relationship and last seven hypotheses present an analysis of the financial variable and stock price relationship.

The approval or denial of the first hypothesis is intended to distinguish a positive relationship between oil price and stock price or in other words:

Hypothesis 1: There is a strong positive relationship between oil price and stock price.

Intuitively, the oil business is very strongly impacted by the price of oil, because the price of oil is the main driver for success in business, but companies cannot control the price, especially small companies and especially when Norway do not belong to OPEC. Moreover, all companies related to oil base their investments on oil price, and when the oil falls by half like in 2015, the companies will experience big losses due to misleading information about high oil prices. The scientific literature raises the same hypothesis: the oil price leads to higher returns for oil companies. For example, oil price growth leads to higher expectations about cash flow from oil-related companies and that in turn increases expectations from investors about oil-related companies (Abhyankar, Xu, Wang, 2013). Moreover, usually oil industry companies pay dividends to investors, hence an oil price increase creates expectations about higher dividends due to higher profitability from the rise in the oil price (Abhyankar, Xu, Wang, 2013). Therefore, the relationship should be positive to Norwegian oil companies, although our analyzed companies are from different sectors of the industry, so oil companies might not have the same positive relationship with oil price as other sectors in the same industry. This hypothesis is approved if there is a positive relationship and the coefficients are statistically significant at 0.01, 0.05, 0.1 levels of confidence.

The second hypothesis is related to OPEC and that the organization has a statistically significant impact on the stock price of oil companies:

Hypothesis 2: OPEC has an impact on the stock price of oil companies.

First of all, the relationship between OPEC and stock price should be indirect. For example, if the organization lowers supply than the oil price should increase if demand remains constant. A positive impact on oil price should increase stock price of oil-related companies. However, Norway is not in OPEC and the impact could lag between OPEC decisions and stock returns on oil-related companies. Giudi (2006) analyzes two markets (US and UK) in search of relationships with OPEC decisions: OPEC has positive impact in general on the US market and the UK market is impacted negatively by OPEC countries' decision on increasing oil production volume. But we didn't find information regarding how the stock price of oil-related companies are impacted by OPEC decisions. Therefore, it is important to investigate whether there exists a relationship between OPEC decisions and stock price, or whether the relationship is statistically insignificant. This hypothesis is accepted if there is positive relationship and the coefficients are statistically significant at 0.01, 0.05, 0.1 levels of confidence.

The third hypothesis, like second, is strongly related to the price of oil. The third hypothesis relates to the dollar and euro exchange rate and stock price of oil companies:

Hypothesis 3: The relationship between the dollar/euro exchange rate and stock price is negative.

The relationship between the exchange rate and oil price is very popular among authors who study the interaction of economy and business. There are not many research papers about the relationship between the exchange rate and stock price in the context of oil-related companies. More researchers focus on analyzing how the dollar, or other currencies, can impact the oil price. Yan (2012) concludes that in the short run, an appreciation of 1 percent of the dollar decreases the international oil price by 1.82 percent. Therefore, we assume that if the relationship between the oil price and stock of oil companies is positive, then dollar rate appreciation will have negative impact on stock returns of oil companies. The author believes that one of the reasons why there exists correlation between the two previously mentioned variables is because the dollar is used by oil companies in international oil price market. Hence, the correlation between the dollar exchange rate and stock returns should be negative. The third hypothesis should be accepted if the coefficient has negative value and coefficient is statistically significant at 0.01, 0.05, 0.1 levels of confidence.

The final seven hypotheses will be related to companies' financial variables (ratios) and stock price. The first hypothesis relates to the relationship between financial ratios and oil companies' stock price expressed in the context of liquidity:

Hypothesis 4: There exists a positive relationship between the liquidity position of energy firms and value creation in the market

The liquidity ratios such as cash ratio, current ratio, and others show how oil companies are able to operate in day-to-day operations. High liquidity benchmark of oil companies shows investors that they are able to operate well on a daily basis. On the other hand, a high liquidity ratio shows that companies have too much money and they don't have any opportunities to invest, thus an investor would not invest his or her money in that stock. Bhaskaran and Sukumaran (2016) conclude that current ratio, cash ratio, and quick ratio were significant at a 10 per cent level and positively impacts the average share price of 82 oil companies. Therefore, there is some proof that liquidity ratios have a relation to stock price, hence the hypothesis is accepted if the significant value is lower than 1, 5, 10 percent level and coefficient is positive to the dependent variable.

The fifth hypothesis relates to dividend payment policy and stock price:

Hypothesis 5: Companies can have a positive impact on their own stock price by paying dividends

Some financial experts believe that one of the most important variables of oil companies for investors is their dividend policy. In other words, dividend payments for investors is beneficial because the payment to investors creates extra profit from holding the stocks in which he invests. Paying dividends is especially important in the oil industry, as companies often cannot grow as quickly as those in other industries, for example technology. They may also have reached their maximum potential in the oil industry, thus paying a dividend is an ideal way to provide their investors an above-market return. Bhaskaran and Sukumaran (2016) would agree with previous statement because they concluded that the dividend payment variable has a positive impact on stock price and is an important variable in the valuation of energy companies. Therefore, we would be interested to see if the same conclusion can be drawn if companies not only produce oil, but also carry out other operations which help to creates extra value for the oil industry, and if the coefficient is significant and positive, then hypothesis will be accepted.

The sixth hypothesis is created on the principal that profitability ratios impacts positively stock return on oil companies:

Hypothesis 6: Higher profitability leads to higher stock returns

Profitability for companies is a very important tool for future growth and shareholder returns, especially as negative profitability leads companies to bankruptcy. Moreover, the profit represents the results of a company's financial year and the positive growth of profit increases dividend payments for its investors, so a positive profitability rate should increase stock price. On the other hand, Mohan (2006) argues that the relationship between stock price and profitability rates are irrelevant. But Bhaskaran and Sukumaran (2016) disagree with aforementioned author and in fact they believe that profitability and growth rates are the most important determinants in a firm's value. Moreover, Behaskaran and Sukumaran's results (2016) show that profitability rates such as ROE, ROCE and ROA leads to a higher stock price in oil-related companies. Therefore, the hypothesis will

be accepted if the coefficient is positive and the significance value is equal to or lower than 1, 5, 10 percent.

The seventh hypothesis, which is related to financial variables, represents positive correlation between efficiency variables and stock price:

Hypothesis 7: The relationship between efficiency variables and stock returns is positive

The efficiency ratios help to determine a company's capability to manage cost and time. Lower efficiency creates bigger costs and consumes more time, which in the end creates even bigger costs or can even create liquidity problems. Hence, an investor would likely not invest in those companies which are inefficient compared with other companies, or those who have such low efficiency that the company's financial statements show losses. Behaskaran and Sukumaran (2016) concluded that efficiency rates lead to a higher stock price for oil-related firms. Therefore, this hypothesis can be confirmed if the significant value of coefficient is lower than 1, 5, 10 percent and the coefficient is positive.

The eighth hypothesis is related to market value and stock price of oil industry companies. This hypothesis shows positive correlation between market value and stock price:

Hypothesis 8: The increase of market value ratios increases the stock price returns

The market value ratios are one the most important factors for investors and even for companies who are planning to buy companies, as well as for analytics when they want to know a company's share price in the market. Overvalue ratios show that company's stock price is too high, and it is better to invest when market value is low. On other hand, Haque (2013) argues that the stock price of oil-related firms has been impacted by performance market value. Therefore, the hypothesis accepted will be if the significant value will be lower than 1, 5, 10 percent and the coefficient is positive.

The ninth hypothesis is related to the relationship between stock price and capital expenditure:

Hypothesis 9: There exists a positive relationship between capital expenditures and stock price.

A company's managers who want to create successful business, need to focus on three areas: investment, dividend policy and financial decisions. We will discuss investment decisions. Bhaskaran and Sukumaran (2016) conclude that capital expenditures have a positive impact on stock price. Wachanga (2003) explains that there are two types of investment which helps to maintain and increase stock price. The first type of expenditure increases the volume of a company's operations (Wachanga, 2003). The second investment type relates to expenditures with regard to maintaining existing assets. With these investments companies should increase their profits in the future and that should increase stock price. Moreover, capital expenditures are very important for oil companies for maintaining successful businesses. Therefore, the hypothesis accepted will be if the significant value will be lower than 5 percent and the coefficient is positive.

The tenth hypothesis should present overall companies performance:

Hypothesis 10: Enterprise value positively impacts stock price of oil-related companies.

The overall value of any company should be important for investors, especially for investors who are thinking of buying a whole oil company. Even for small investors, the enterprise value would be at least as important as profitability rates (Bhaskaran and Sukumaran, 2016). In other words, the small investor would prefer to have the knowledge to compute a company's enterprise value and compare that figure with other oil companies. The value should represent a company's efficiency, profitability, liquidity, financial leverage and other factors related to financial performance. Hence, enterprise value should correlate with other previously mentioned ratios and should positively impact oil companies' stock prices. Although based on Bhaskaran and Sukumaran's (2016) conclusions it can be surmised that the ratio between enterprise value and cashflows have a negative impact on stock price. However, based on Howard and Harp's (2009) conclusions, enterprise value has positive impact on stock price. Therefore, it is important to find out whether or not enterprise value has positive impact on stock price. Hence, the hypothesis accepted will be if the significant value is lower than 1, 5, 10 percent and the coefficient is positive.

2.3. The Empirical Research Methods, Stage and Logic

Before presenting the empirical analysis of this research paper, it is important to show stages of research at each step to better disclose results. The logical order should help the reader better understand the author's purpose in this research paper. Table 3 presents the logical order and the stages of this paper.

Table 3

Research stage and methods used for hypothesis testing

Stage	Content of the stage	Hyp. T.	Method used
Prep.	Choice of research period; Collection and systematization of data; Methods' characteristics.	-	-
1	Norwegian oil industry analysis.	-	Graphical comparison
2	Calculation of monthly returns and oil price growth for time series model; Evaluation of their volatility.	-	Durbin-Watson; Graphical comparison.
3	Checking of autocorrelation problem; Relationship between stock returns and selected dependent variables.	H1 H2 H3	Time series model.
4	Checking of homoscedasticity; Relationship between stock price and dependent variables	H4; H5; H6; H7.	Breusch-Pagan test; Panel data model.
5	Compering companies' average financial ratios for 10 years	-	Comparison with average value of overall companies.
6	Compare results with other research papers	-	-

Note: complied by the author.

In Table 3, we present our empirical research stages, which are based on: the stage content; hypothesis; methods of each stage. There are six stages, not including a preparation stage, which focuses on choice of research period, data collection and systematization. The other stages help to reach the research goal and help to reject or approve previously mentioned hypotheses.

The first stage presents an analysis of the Norwegian oil industry. We could separate the first stage into three parts. Firstly, we will conduct a general analysis of the Oslo Stock Exchange Energy Index from 2013 to 2017. Secondly, we will analyze our selected oil companies' stock prices, which we will divide by the previously mentioned sectors, from 2007 to 2017. Finally, we will present selected companies' enterprise value and their profitability performance from 2007 to 2017. The industry analysis will better show the current situation and will show how each subsector and Operator is performing in the industry.

The second and third stages are more related to each of the selected companies and time series regressions, whose characteristics will be discussed in the next section. Firstly, we graphicly analyze the oil prices and stock prices from 2007 to 2016. The graph should primary show the time series result trend as well as which the companies are more or less impacted by oil price. Secondly, we will check if our analyzed data is affected by an autocorrelation problem or not. To do this, we will use the Durbin Watson test, which we will discuss in the next section. The results of the test will show which of the selected companies' data violates test results. Finally, we will analyze the time series model results, which are created from the dependent variable (monthly stock return) and independent variables (OPEC decisions, monthly euro and dollar average exchange rate and monthly oil price growth). The model should help answer whether we need to accept or reject first three hypotheses which are related with previously mentioned variables.

The fourth and fifth stages present the companies' financial performance and its impact on the companies' stock price volatility. Firstly, we analyze the relationship between the dependent variable (yearly stock price) and independent variables (liquidity, efficiency, profitability ratio, dividend payments, market value ratios, enterprise value and investment). The coefficient results and interpretation will help us to investigate whether we accept and reject last seven hypotheses. After investigating the relationship between the previously mentioned variables, we will present each company's average over 10 years financial variables, which should be statistically significant. We would compare each company average financial performance with overall average of all companies' financial variables. The analysis results should show which companies are performing better than other companies and what the current situation is in the industry.

The last stage should conclude the results of earlier stages. Moreover, we will compare with authors who have analyzed the relationship between oil price and stock price, and the relationship

between financial variables and stock price. The comparison of our results and those of other authors should show what kind of factors are still relative and what kind of new trends can be found.

Overall, all previously mentioned stages should help readers better understand the author's research paper. The first stage should show the Norwegian oil industry's current situation. The second and third should show relationship trend between oil price and stock price of oil companies. The fourth and fifth stages should help show the relationship trend between stock price and financial variables. Moreover, the two models (time series and panel data model) help investigate hypothesis and would show which of them will be rejected and accepted. The last stage compares both model results with other research paper results and also explain why the results are the same or different.

2.4. Research paper's methods and its characteristics

In previous paragraphs we presented this research paper's objective, the research hypothesis and stages of empirical analysis. Hence, in this paragraph we will present the research paper's methods and its characteristics. This part represents the aforementioned preparation stage. The paragraph is separated in two parts. The first part represents time series characteristics and general assumptions for efficient and unbiased models such as a zero condition means, no perfect collinearity and other assumptions and logarithmic dependent and independent variables. The second part will present panel data model and their dependent and independent variables, and homoscedastic violation.

Before discussing two different regression models, we have to shortly present our selected method – ordinary least square, selected period and data source. The method is the most basic and most commonly used around scientific researchers. In our case we will present ordinary least square different groups: panel data regression and time series data regression. Moreover, our selected period is about 10 years - to be more precise it is from January 2007 to December 2016. This period was selected based on two factors: 1. Overall, most analyzed authors selected roughly 10 years periods, they believe that this period would fully represent any country's oil industry; 2. We wanted to consider about 20 companies from the Oslo Stock Exchange and there were companies with much longer stock price market industry but adjusting to requirements of 20 companies we decide to select a 10 year period. The data of oil price and companies stock price were collected from the Yahoo Finance database and financial variables were collected from the Bloomberg database.

2.4.1. Time series characteristics

This chapter represents the nature of time series data and its characteristics. Regression analysis of time series data is used to trace the value taken by a variable over a period of time, such as monthly or yearly data (Wooldridge, 2015). Regression analysis of time series data is used by researchers in an economics or financial context (Verbeek, 2012). In our case researchers mostly used

monthly data over periods of 10 years when they analyzed the relationship between the stock price or return of oil-related companies or stock market and oil price (Abhyankar, Xu, Wang 2013; Alsalman, 2015; Degiannakis, Filis, Kizys, 2014; Oskooe, 2012). Therefore, in time series, the research period starts in January 2007 and ends in December 2016. Moreover, if a majority of selected companies' regression findings illustrate positive and significant relationships between oil price growth and stock price growth, then we can accept first hypothesis. With 10 years of monthly observation, we have 120 observations for times series analysis on each oil-related company. Based on Hanke and Wichern (2014) the observation number is suitable for getting a high-quality model. Moreover, it is important to present time series analysis assumptions:

- Linear in parameters;
- No perfect collinearity;
- Zero condition mean;
- No serial correlation;
- Normality (Wooldridge, 2014).

The first assumption *(Linear in parameters)* states that the model of time series data is linear in variable parameters (Verbeek, 2012). In our case, the model contains variables which doesn't create a linear model, hence it is important to logarithmize variables, such as stock price return and oil price and exchange rates. Moreover, it is important to calculate their growth (Formula 2). With logarithmic and growth transformation of the previously mentioned variables, we would not fail in our first assumption. The violation of this assumption would create unbiased estimators and the regression's results would be misleading (Uriel, 2013). Therefore, it is important to use a natural logarithm so as to not violate this assumption.

The second assumption *(No perfect Collinearity)* represents the statement that there isn't perfect correlation between each independent variable (Wooldridge, 2014). The violation of this assumption is not very usual, it only occurs when the model is wrongly designed (Uriel, 2013). It is important to point out that there should be some correlation between the independent variables, only that it should not be perfectly correlated. If there would be any correlation between the independent variables, then multiple regression would not have been used sufficiently in a time series analysis context (Wooldridge, 2014). In addition, the assumption could be detected when Good-fit measurement value is "close" to 1 (Uriel, 2013). Therefore, a violation of the assumption could mislead true coefficient values and standard errors would also be misleading.

The *Zero condition mean* assumes that the independent variables are contemporaneously exogenous (Verbeek, 2012). In other words, it means that independent variables such as oil price have been impacted by unknown variables, which we did include in our model (Verbeek,2012). Therefore, one of the reason we include variables such as currency fluctuations and OPEC decisions, because

they strongly correlated with oil price. In other words, without those variables, the model would violate our third assumption. Moreover, based on previous authors in the literature analysis section, we find that OPEC and exchange rates have an impact on the oil price, hence we include those variables due to their relevance (Uriel, 2013). Therefore, it is important to include those variables as to not violate this assumption.

The most important assumption for time series analysis is *No serial correlation.* This statement means that conditional on variables (oil price, OPEC decisions, euro and dollar currency, stock return), errors in two different time periods are not correlated with each other (Wooldridge, 2014). The failure of this assumption is very common among stock price because a previously growing stock price could influence current stock price. This kind of situation creates a failure for the fourth assumption. The failure of the assumption would mislead results. Therefore, it is important to check if the model fails to confirm the fourth assumption. The Durbin-Watson test is one of the most popular tools for checking if there is any threat of autocorrelation. The test value could show volatility from 0 to 4 and there is no autocorrelation threat is when the test value is close to two. Another technique is just checking the Durbin-Watson table. Based on independent variables and number of observations, the critical value for no autocorrelation threat interval is from 1.704 to 2.357 for our model case. The regression data, which is below 1643, is called negative autocorrelation and positive correlation would be when the test results of specific regressions would be higher when the value higher than 2.3 (Durbin-Watson, 2009). if the test value is between 1.643 to 1.704 and from 2.296 to 2.357, then it is hard to determine whether our model violates the assumption or not (Durbin-Watson, 2009). If the Durbin-Watson test would show that regression analysis results are impact by positive or negative autocorrelation, then we have to use Prais-Winten estimators. The Prais-Winten method is used with robust standard errors and can fix autocorrelation problems on specific models (Wooldrige, 2014). Moreover, the fixed standard errors could be used not only for the appearance of autocorrelation, but also for cases of heteroskedasticity (Uriel, 2013). Moreover, this case we also use autoregression conditional heteroskedasticity (Forward – ARCH) test which determines whether or not the error terms impact our selected dependent variable by unknow economic factors (Kiviet, 2009). Especially when we analyze stock price, which could be impact by previous stock price (Chand, Kamal, Ali, 2012). Therefore, if ARCH test result would show that stock price are impact by previous stock price, than we use generalized autoregressive heteroscedasticity model (Forward – GARCH) (Chand, Kamali, Ali, 2012).

The fifth assumption (*Normality)* shows that the errors are independent of variables and are identically and independently distributed normally (Wooldridge, 2014). It other words, normality is the random errors in the relationship between our independent variables (oil price, the currency ratio, OPEC decisions) and dependent variable (stock return of oil-related companies) in a time series

analysis model (Verbeek, 2012). With these all assumptions, the model of time series data should be unbiased and efficient.

After presenting our model's assumptions, it is important to present our model characteristics (Formula 1):

$$R = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + U \quad (1)$$

- R – return of oil-related companies
- X_1 – oil price growth
- X_2 - euro and dollar currency ratio
- X_3 – OPEC decision to increase or decrease supply of oil
- β_n - coefficient of each X_n variable
- U – error of our model

The model represented by three independent variables (oil price volatility, euro and dollar currency ratio and OPEC decisions to increase or decrease supply of oil production) and dependent variable (return of Norwegian oil companies). The data of those variables (except OPEC decisions to increase or decrease supply of oil) was collected from the Yahoo Finance database. Most researchers transform oil price and stock price into percentage growth and logarithmize it (Formula 2). The second formula helps to avoid failure of the second assumption. Moreover, the exchange between dollar and euro was selected because many referenced authors select those currencies for checking if the exchange rate has impact on oil price. Therefore, we will also use the exchange rate between the dollar and the euro, and if companies' regressions results show a positive and statistically significant relationship between exchange rate and stock price, then third hypothesis will be accepted.

$$Y = LN(X_t) - LN(X_{t-1}) \quad (2)$$

Working with time series data and finance data, it is important to use logarithmic returns (Løvbrekke, 2017). The second formula will help to avoid second assumption failure because the variables such as oil price and stock price would be closer to a linear function and would eliminate problems of autocorrelation (Løvbrekke, 2017). The interpretation of logarithmic returns could be expressed as: if oil price increases by 1 unit, then return on a specific company would increase 1 percent (Løvbrekke, 2017). The next variable is OPEC decisions. The variable is dummy, hence it has only two values: zero and one. If OPEC decide to decrease the supply of oil production, then the value would be zero and vice versa. OPEC's decisions on supply volume are adjusted to the timeline of OPEC, which show when the OPEC countries decided to decrease or increase production of oil (OPEC, 2018). Therefore, if a majority of selected companies' regression findings show positive and statistically significant interaction between OPEC's decision to increase volume, then we will accept second hypothesis.

2.4.2. Panel data characteristics

Panel data is data which is multi-dimensional, including measurement over time (Verbeek, 2012). In our case, each object has their own specific characteristics, but all of them are from the Norwegian oil industry. Based on the literature analyzed, most analyses take place over 20 years, but we focus on a 10 year period because many of our listed companies only began issuing stocks 10 years ago, hence our focus on the period between 2007 and 2016 and the 21 companies chosen (from Table 1). We do not include Aker Solutions in this model due to lack of financial variable data. Moreover, some financial variables (To be discussed) are transformed by using natural logarithms and calculating their growth (Formula 2). Overall, the number of observations is 178 and based on Park (2011), our observation number is suitable for significant panel data analysis. Therefore, the panel data should fully represent our selected objective.

The assumptions for regression analysis of panel data are almost the same assumptions as those previously mentioned: normality, linear in parameters, no perfect collinearity, zero condition mean, no serial correlation. The violation of those assumption would disrupt efficiency of our model and our selected variables would be biased. However, there is one assumption not mentioned in the previous section – *homoscedasticity*. This assumption means that random distribution in the relationship between the independent factors and the dependent factors is the same among all values of the independent factors (Wooldridge, 2014). If there is failure of the homoscedasticity assumption, then we say that the errors are heteroskedastic (Wooldridge, 2014). To avoid this kind of problem, we should use generalized method of moments (Forward – GMM) (Newey, 2007). The violation of that assumption could mislead the result we would get from regression analysis of our panel data. So, we will use the Breusch-Pagan test for checking if the error term is homoscedastic or heteroscedastic (Schmidheiny, 2016). If the value p is higher than 5 percent, then the error term is homoscedastic, and we do not need any adjustments to fix the problem. Otherwise, we need to use robust standard errors for fixing heteroscedasticity problem in our model (Williams, 2015). The robust standard errors would decrease the model's efficiency, but it would remain unbiased. Moreover, the panel face problems with *zero conditional mean* violation. Therefore we will use generalized method of moments (Forward – GMM) to fix this issue (Newey, 2007).

$$Returns = \beta_0 + \beta_1 \text{Cash} + \frac{\beta_2 \text{P}}{\text{B}} + \frac{\beta_3 \text{P}}{\text{E}} + +\beta_4 \text{ROE} + \beta_5 \text{ROA} + +\beta_6 \text{FAT} + \beta_7 \text{CAPEX} + \beta_8 \text{Dividends} + \text{EG} + \text{U} \quad (3)$$

- Returns – Companies' average yearly returns
- Cash – Cash ratio
- P/B – Price to book value
- P/E – Price to earnings

- ROE – Return of equity
- ROA – Return of assets
- FAT – Fixed assets turnover
- CAPEX – Capital expenditure to sales
- Dividends – Dummy variable of dividends
- EG – Enterprise value growth

The model includes 8 independent variables and one dependent variable (oil companies average yearly returns). The price to book value and price to earnings presents companies' business value. Additionally, the ratio helps to reject or to accept the 8 hypotheses which relate to stock price and book value or price to earnings ratio. Price to book ratio is transformed by using natural logarithms and calculating percentage change during the analyzed period due to acceptance of previously mentioned assumptions. The price to earnings is transformed into a dummy variable because many companies had negative profits, therefore the ratios are a dummy variable. The zero values have data on which companies in that period do not have any information about their ratio value and one value show scenarios when the ratio is positive. Positive interaction between price to book or price to earnings and stock price would help to accept eight hypotheses.

Return on equity and assets (ROE and ROA) represents companies' profitability. The ROE indicates how a profitable company is relative to that company's total assets. In other words, it shows the company's management efficiency in using its assets to get earnings. ROE ratio shows companies' investment efficiency in using its capital to get profits. Both of those variables are transformed using natural logarithms and calculating percentage change. Therefore, a strong statistical and positive relationship between ROE or ROA and stock price would help to approve or deny the sixth hypothesis.

Cash ratio represents companies' liquidity. The ratios are calculated by dividing cash or near to cash times (such as a short-term government bonds and other short-term financial assets) and the company's current liabilities. Fixed asset turnover represents companies' efficiency, and the ratio of net sales to net fixed assets. In other words, this ratio shows how companies are able to generate net sales from their net fixed assets. Both of those ratios are transformed by using natural logarithm and calculating percentage change. Therefore, the relationship between cash ratio and stock price should show if the fourth and seventh hypotheses are accepted or rejected in our case.

Capital expenditure to sales (CAPEX) is calculated by dividing capital expenditure by sales. This measurement should also be transformed by using natural logarithm and calculation of percentage change over the analyzed period. Hence, a positive and statistical relationship between stock price and capital expenditure to sales with stock price growth will help to accept or deny the ninth hypothesis.

Enterprise values were found in the Bloomberg database and they measure specific companies' theoretical takeover price. Enterprise value has to be transformed to enterprise value growth and which is accomplished by using natural logarithms. The positive statistical value of enterprise growth and stock price should help to accept the tenth hypothesis.

Finally, the dummy variable distinguishes between companies paying and not paying dividends and as such it has only two values – 0 and 1. The value of 1 unit means that a company in a given year paid dividends and 0 means that company did not pay any dividends. In other words, the dummy variable would deny or approve the hypothesis that companies which pay dividends increase their stock value. Again, a positive and statistically significant interaction of stock price and dividend payment shows that we can accept the fifth hypothesis.

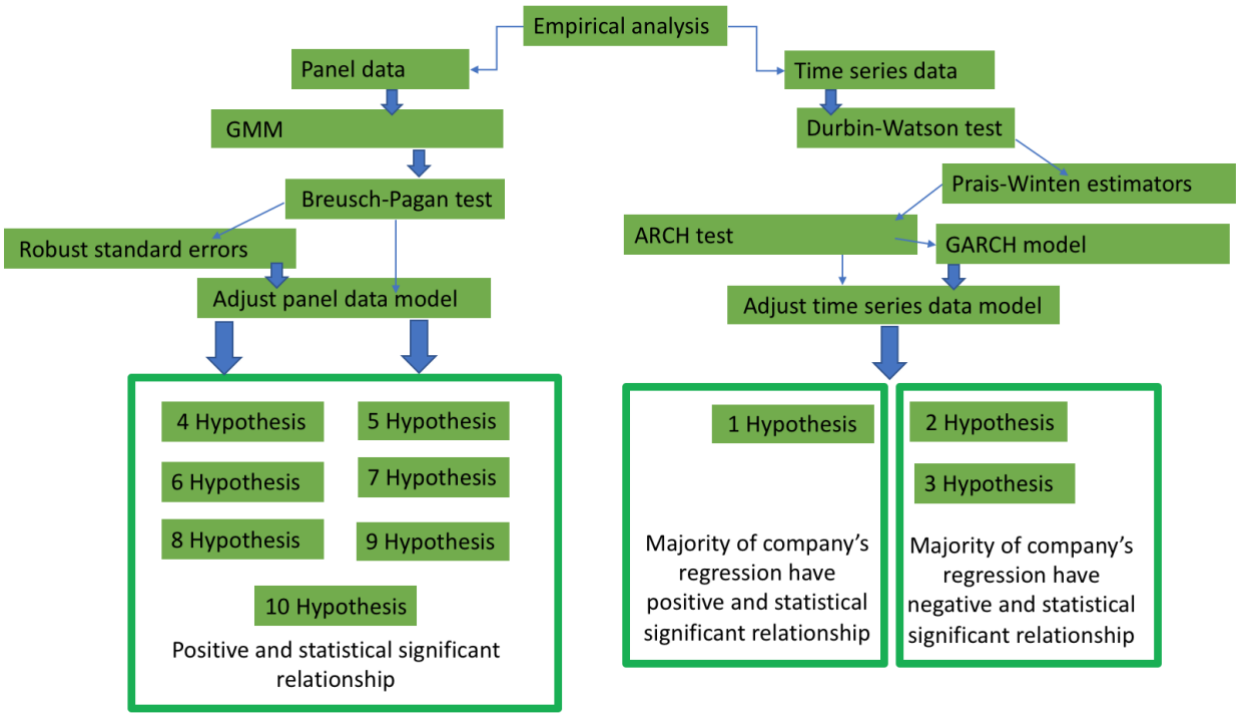

Figure 9. Scheme of empirical analysis goals

Note: complied by the author.

Figure 9 presents conclusions of all methodological parts and presents the scheme of empirical analysis. In this work, we will use two regression models. Panel data regression results could be misleading due to heteroskedasticity. Hence, we will use the Breusch-Pagan test, which shows if our analyzed data is heteroskedastic or homoscedastic, and GMM method for fixing zero conditional mean voilation. If the data is not homoscedastic, then we use robust standard errors to fix data. The same situation could be present in our time series data regression, except that it would be impacted by autocorrelation. Therefore, we will use the Durbin-Watson test for checking if selected variables are impacted by autocorrelation or not. If we find out that some regressions violate the no serial correlation assumption, then we would use Prais-Winten estimators, which fix regression's standard errors. Moreover, we use ARCH and GARCH for increasing less consequences from autocorrelation.

After using tests for better quality of our selected regressions, we can accept or reject our selected hypothesis. The time series 1st hypothesis would be accepted if a majority of company's regressions have a positive and statistically significant relationship between oil price and stock price and the 2nd and 3rd hypotheses would be accepted if the relationship between stock price and exchange rate or OPEC decisions would be negative and statistically significant. Panel data regression will show if we accept or reject the last seven hypotheses. We would accept the hypotheses if the regression results would show positive and statistically significant relationships between stock price and selected financial variables. Therefore, the scheme fully presents the research paper's empirical analysis goals.

However, our research paper has some limitation as all other research papers. Hence, we will present several limitations. First limitation could be that OPEC increase their oil supply amount only 18 times in overall all data. Moreover, the effect on oil price could be before or after announcement of oil production increment. The second limitation could be that oil price has lagging or leading impact on oil price. Therefore, the regressions results could be misleading. The third limitation could be that yearly financial variables has impact on stock price only on that day, which they announcement of those financial variables, and not on yearly stock price. the final limitation would be failure of one the assumption of regression analysis. Overall, those limitation could disrupt regression results and therefore interpretation of those results would be misleading.

III. EMPIRICAL RESULTS OF OIL PRICE AND FINANCIAL VARAIBLES IMPACT ON STOCK PRICE

The third chapter presents empirical results of the relationship between financial variables or oil price and stock price of oil companies. There are four main parts which fully represent the research paper's empirical results. The first part presents a general perspective of the Oslo Stock Market Energy Index - selected companies' general stock price volatility and the sector's enterprise value and their profits from January 2007 to December 2016. The second part's main purpose is to show and interpret results, which we get from our aforementioned time series model. The third part will distinguish what kind of financial variables have an impact on our selected companies. The fourth part summarizes the first and second parts, and compares research paper's results with other author's conclusions, based on their research papers.

3.1. Norwegian oil industry analysis

As we determined earlier, the Norwegian oil industry is a competitive one, especially in the upstream oil segment. Moreover, this industry is important for the greater Norwegian economy. Therefore, it is important to analyze the industry and its sectors, so in this part we will analyze the general Norwegian oil industry stock situation and our selected companies' stock price volatility from January 2007 to December 2016. Moreover, we will calculate the upstream sector's enterprise values and their profitability. These analyses will show what kind of situation exists in the Norwegian oil industry and their subsectors.

Figure 10. Oslo Stock Exchange Energy Index from 2013 to 2017
Source: Oslo Børs (2018).

Figure 10 presents Oslo Stock Exchange Energy Index, which is based on 15 exploration and

production companies, 11 offshore supply companies, 13 drilling companies and 20 equipment and services companies (Oslo Børs, 2018). The graph shows 5 years average of 50 Norwegian oil companies' stock prices. Looking at the full scale in the graph, we can see that the index trend is positive. In other words, the oil industry is growing. Although there was sharp decline (about 38 percent) from January 2014 to December 2015 due to the collapse of the global oil price. There are two main aspects of the oil collapse. The first is that China, the biggest oil consumer, experienced a slowdown in their economic growth, so the general oil demand decreased (Sungurov, 2015). The second is that oil supply began to increase due to Saudi Arabia's actions, which led to the US and Canada increasing their production of oil (Sungurov, 2015). The index was growing (about 58 percent), and in December 2017 reached the level of the January 2014 value. Therefore, the Oslo Stock Exchange Energy Index during the analyzed years was faced with a sharp price decrease due to the oil collapse, which caused a drop of roughly 40 percent just in 1 year, but it managed to bounce back and reach 2014 levels, which shows that even though oil prices decreased about 50 percent, the oil companies were able to regain investor confidence.

We only focus on those oil companies which were listed on the Oslo Stock Exchange from January 2007 to December 2016. Hence, Table 2 represents the oil companies which we will analyze. Overall there are 22 companies which have trading history from January 2007 to December 2016. Those companies are separated in six sectors: Drill and Well, Subsea, Topside, Operation support, Geology and Seismology and Operators. The companies are equally distributed into the previously mentioned sectors.

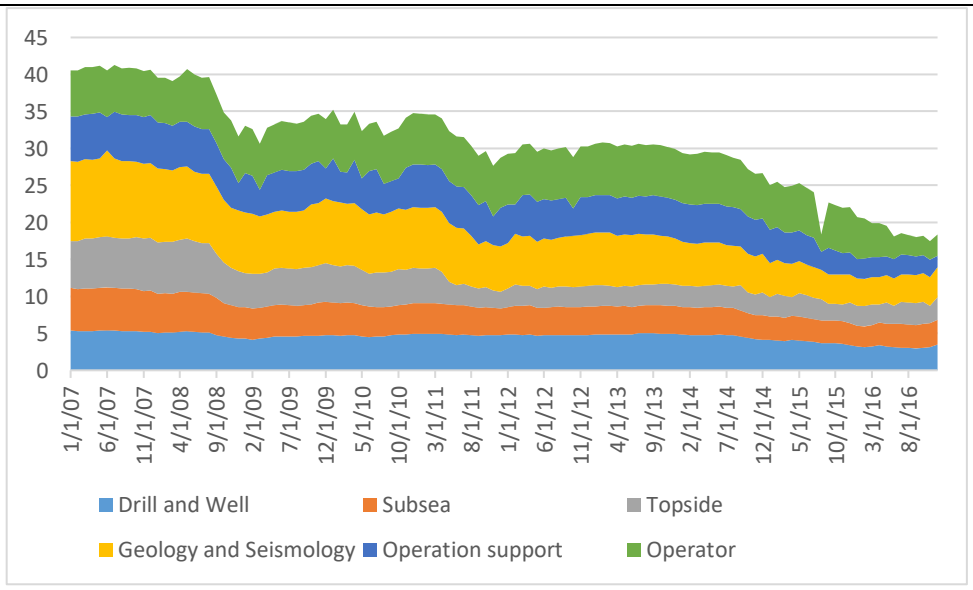

Figure 11. Logarithmic stock price of all selected oil companies

Note: complied by the author based on table 1 in appendix 5.

The objective of this part is to present our objective and its characteristics, hence we present 22 companies (5 Drill and Well, 4 Subsea, 3 Topside, 4 Geology and Seismology, 2 Operators and 3 Operation support companies) which we will analyze, and we will present the current situation on the stock market based on our companies' average stock price from 2007 to 2017 (Appendix 2). The graph shows that our selected general stock price in decreasing every year and from 2007 to 2017 the stocks shrank about 2 times. The stock price could have been impacted by the 2007 Financial Crisis and oil collapse of 2015. Only difference between the periods mentioned earlier is that the oil price had a much more significant influence on our selected companies stock prices and 2007/2008 Financial Crisis. Moreover, the general stock value is equally distributed to our selected sectors.

In next two figures, we will present each subsector and Operators' enterprise value and how the Financial Crisis and oil collapse impacted each of them in 2007-2016 (Figure 12). Figure 13 presents companies' upstream suppliers' and Operators' profitability in the 2007-2016 period. Those two graphs should show what kind of current financial situation is present among Norwegian upstream suppliers and Operators based on their profitability and enterprise values.

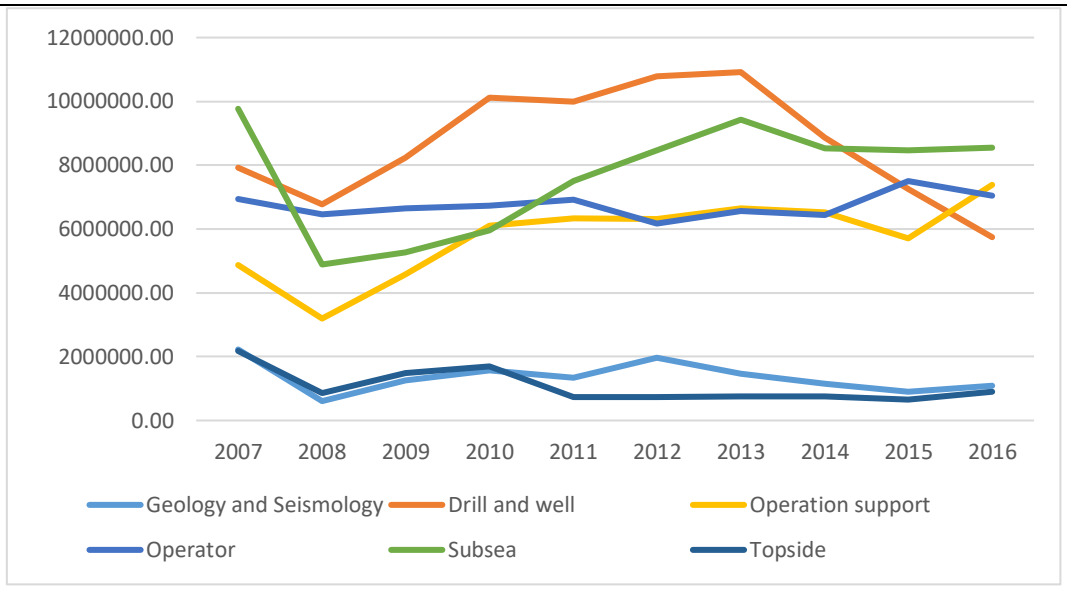

Figure 12. Norwegian oil sector's enterprise value

Note: complied by the author based on table 1 appendix 3.

Figure 12 presents the average enterprise value of the 5 upstream suppliers and Operators from January 2007 to December 2016 (Appendix 3). The figure shows that Drill and Well companies have the highest enterprise value and Topside companies have the lowest business value, amongst our chosen subsectors. Other companies' enterprise values are more or less linked to Drill and Well companies' enterprise value. The analyzed period show two main trends. The 2008/2009 Financial Crisis decreased Norwegian oil companies' values, but the after the crisis the value increased and indeed grew until 2014, expect for Geology and Seismology companies. The sector's enterprise value

started to fall faster due to increase in amortization in 2011. Based on Ernst and Yuong's (2016) research, the main reason for the sharper collapse in 2015 was the oil price collapse. The biggest lost was felt by two subsectors (Geology and Seismology, and Drill and Well). The most valuable sector in 2016 is the Subsea sector, due to length contract with Operators. Other subsectors managed to stop the fall of their enterprise value or even to slightly increase it. Therefore, it seems that the oil mostly impacts those companies which belong to the Geology and Seismology or Drill and Well subsectors.

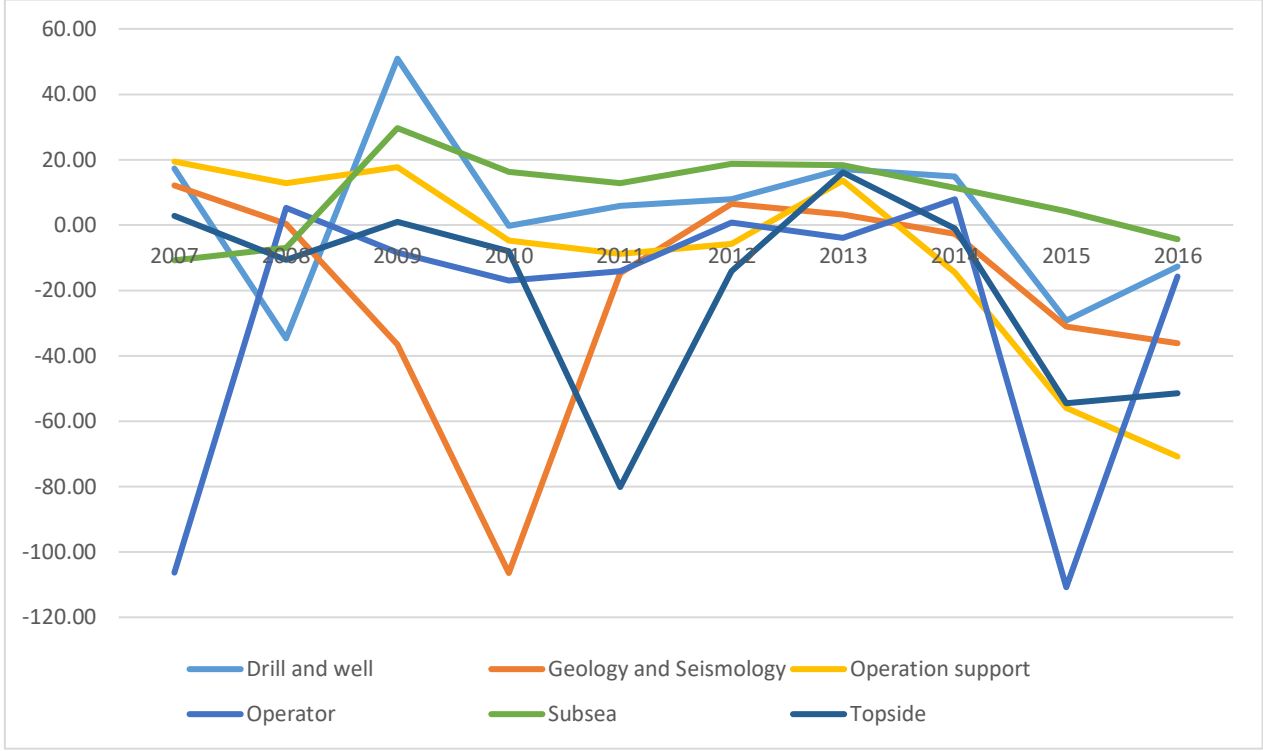

Figure 13. Norwegian oil sector's Return on Equity values

Note: complied by the author based on table 1 in appendix 3.

Figure 13 presents upstream suppliers' and Operators' Return on Equity values between January 2007 and December 2016 (Appendix 3). Most of the subsectors' Return on Equity is very volatile during the analyzed period; only Subsea companies' values are more stable than others. Upstream companies remain more or less at the same level, except that several companies had significant decreases during the analyzed period. For example, the Geology and Seismology companies on average from 2009 to 2010 decrease their ROE by more than 60 percentage points and Operators from 2014 to 2015 decrease their ROE by 100 percentage points. More interesting is that almost none of the companies' ROE was impacted by 2008 Financial Crisis. However, the 2015 oil price collapse did impact all analyzed companies' ROE, only several subsectors such as Subsea and Drill and Well companies manage to lower losses. One of the reasons could be that sectors such as Subsea had long contracts in which they get fixed revenues per year, even during an oil price collapse.

The Norwegian upstream oil sector is very competitive and there are groups that could be separate: suppliers of upstream oil and Operators. The Operators employ upstream suppliers for finding, pumping, and transporting oil in addition to other supply activities. The analysis of the Oslo

Stock Exchange Energy Index and our selected companies' general stock prices show that the Financial Crisis of 2007/2008 and the 2014/2015 rapid oil price collapse decreased their values, the index only managed to bounce back to the values of 2014 and our selected companies were not able to reach the 2014 value. Moreover, enterprise value and profitability of upstream suppliers and Operators shows that oil companies were impacted by the oil price collapse in 2015 based on their profitability and enterprise value, and that their enterprise value was impacted not only by the 2015 oil price collapse, but also 2008/2009 Financial Crisis. Some companies did manage to mitigate the damage to their profitability by having contracts from which they were getting fixed revenues. Oil operations companies managed to lower their costs by cutting jobs and being more efficient at their business activities. Overall, we can see significant correlation between oil price and companies' profitability/enterprise value/stock price, only some subsectors suffer more than others. Therefore, the current market situation is quite weak in the Norwegian oil industry due to the collapse in 2014. Thus, it is important to analyze the relationships by using regression analysis.

3.2. Results of relationship between oil price and stock price of Norwegian oil companies

The figure mentioned earlier shows that a decrease in the price of oil significantly impacts the Norwegian oil industry. Intuitionally, the oil price has to be the main driver for oil companies' profitability and sustainability, but does this influence lead to the same outcome for all Norwegian oil companies? This paragraph should help to answer the aforementioned question and distinguish which oil segments have a stronger relationship with the oil price. The first step graphically shows how the oil price interacted with Norwegian oil companies between January 2007 and December 2016. Moreover, the graph also shows which of the companies bounced back after the 2008 Financial Crisis. The second segment is more related with time series data model quality. In other words, we will check if any of the 22 models violates the *no serial correlation* assumption, which is the most usual violation for time series data. The third part represents the results of the regression analysis. The results are separated into 4 tables and the tables present the relationship between the price of oil and Norwegian oil companies. Also present in the model are two control variables: OPEC decisions, and exchange rate between euro and dollar. Moreover, we will discuss if we accept or reject three hypotheses, each related to a regression variable. As we find out from literature analysis these variables correlated with oil price and increase the model's efficiency and unbiasedness. Overall, the parts should show what kind of companies are more sensitive and which of them are less sensitive, as well as which segments are more or less sensitive to changes in the price of oil.

Figure 14 presents the oil price and stock price volatility of oil company stocks from January 2007 to December 2016. The main objective of the graph is to provide a first impression of the relationship between the price of oil and oil company stocks, hence January of 2007 is the base year.

In other words, we will compare oil companies' stock prices and the oil price in January 2007 as well as further months. The expression mentioned earlier showed how the oil price interacts with stock price graphically and if today's stock value is the same as the value in January 2007.

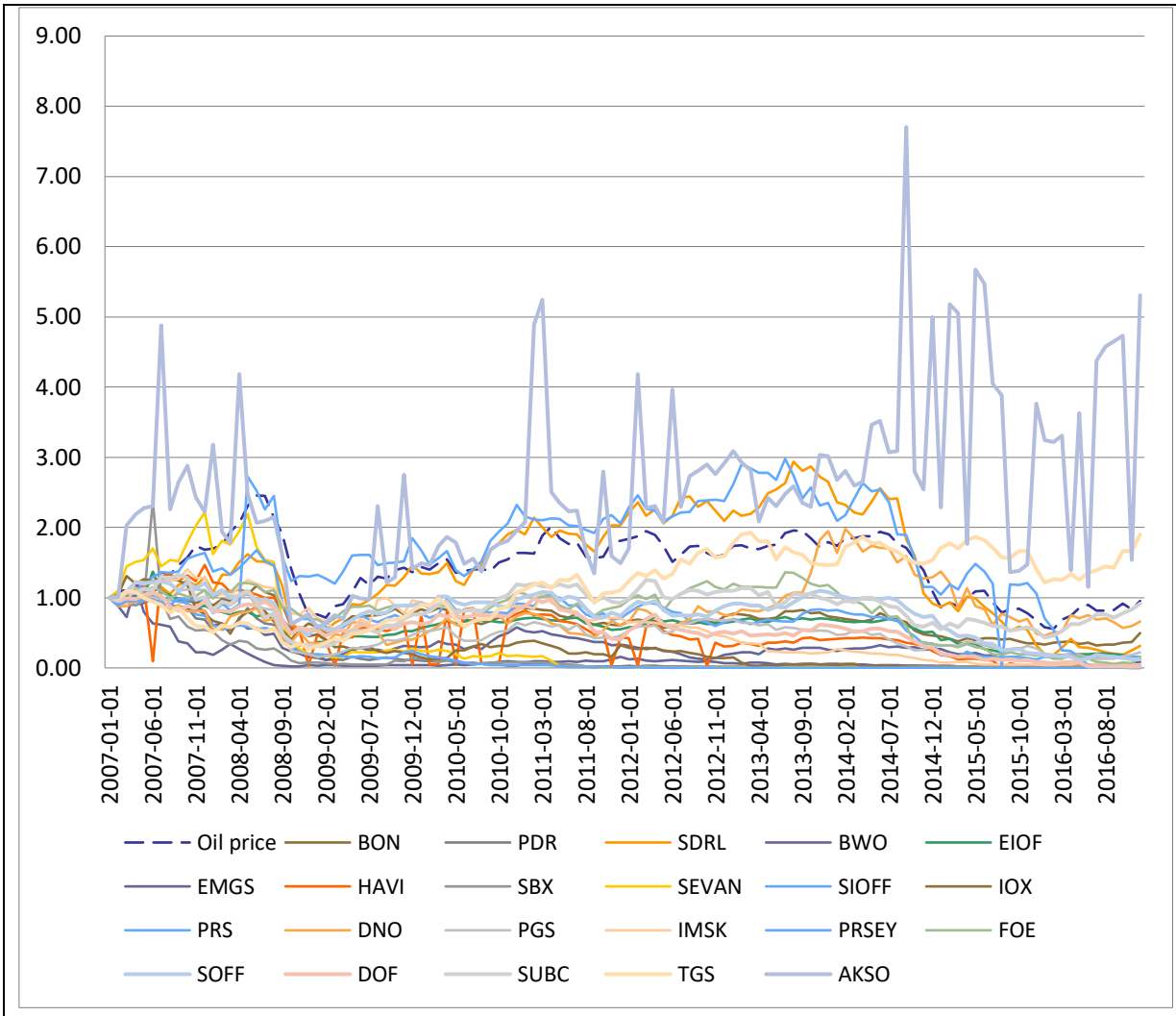

Figure 14. oil price and stock price of oil companies from January 2007 to December 2016

Note: complied by the author based on table 1, 2, 3 and 4 in appendix 5.

As mentioned earlier, the graph provides a visual representation of the volatility of oil prices and stock prices during the analyzed period (Appendix 5). The oil price's highest peak was in August 2008/2009. At that time the price was 2.5 times higher than 2007, but in the first quarter of 2009, the price returned to the 2007 value. The same situation was present in the summer of 2014, when the oil price was double the price of 2007, but at present the price of oil has decreased to January 2007 levels.

With companies we can see different situation. A majority of companies experienced a drop in stock value after January 2007, and only a few of them were able to recover and exceed their starting prices after the Financial Crisis of 2008/2009, for example: Fred Oslen Energy (Forward – FOE), Prosafe (Forward – SPREY), Seadrill (Forward – SDRL), and Aker Solutions (Forward – AKSO). It is interesting that only Drill and Well companies and Operators were able to regain their 2007 stock prices. However, after the oil collapse of 2014, almost none of our analyzed companies were able to bounce back to their 2007 values. Only three companies manage to increase their stock

value after the 2015 oil crisis. These companies are AKSO, Subsea 7 (Forward – SUBC) and TGS-NOPEC Geophysical Company (Forward – TGS). In addition, we notice that AKSO's stock price does not follow the movement of the oil price, especially after the 2015 oil crisis this seems to indicate that the stock price was impacted by unknown factors.

The graph shows that both oil price and stock price have the same negative movement during the 2007 Financial Crisis and during the 2014-2015 period. Therefore, we can notice that the oil price and oil companies' stock prices have the same trends in the graph. The changes to oil and stock prices in 2008 was also influenced by the Financial Crisis, but also other factors which in turn contributed to the Crisis. Almost none of our selected companies were able to return to their 2007 levels, in fact as the chart shows, only two managed this feat: TGS and AKSO. However, in the period of Summer 2014 we can see that after oil collapse the market value of almost all analyzed oil companies did not bounce back to 2007 levels. Therefore, it is important to analyze each company's individual perspective on the oil price.

First of all, we need to ensure that our 22 regression models do not violate the *no serial correlation* assumption and check that there is no autocorrelation problem, so we are using the Durbin-Watson test. This test should help us to find out if any regression model coefficients and standard error values are influenced by autocorrelation. Hence, Figure 15 shows the Durbin-Watson results for each analyzed regression. The test should show which of the companies are impact by positive or negative autocorrelation or whether there is no impact.

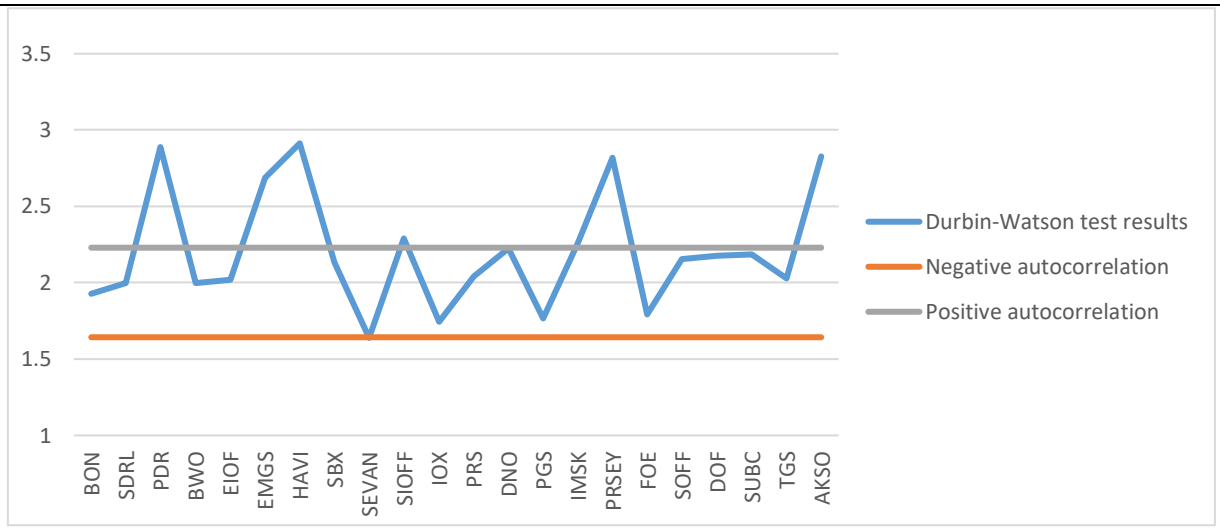

Figure 15. The Durbin-Watson results of 22 oil companies.

Note: complied by the author based on table 1 in appendix 4.

Figure 15 represents the Durbin-Watson results of 22 oil companies. As mentioned earlier the critical value for negative correlation, which means that error has a negative impact on dependent variables, is when the test value is lower than 1.643 (the orange line) (Appendix 4). Positive correlation, which means that error has a positive impact on dependent variables, is when the test value is higher than 2.357 (the grey line). Based on graph we can see that there are several regression

models which show the influence of autocorrelation on the model's coefficient. There are 8 companies which violate the *no serial correlation* assumption. The only negative impact is with Sevan Marine (Forward – SEVAN) data; a positive impact is present in data from AKSO, PRS and other 5 Norwegian oil companies. Overall, the test results of each different regression show that there are several which failed the *No serial correlation* assumption. Therefore, for these regressions we will use the Prais-Winten estimator. The estimator should fix the standard errors misleading values and should increase the quality of these regressions. Moreover, we find out that 5 regression models (REACH, PRS, FOE, SOFF, TGS) fail ARCH test, therefore we will use GARCH for fixing issues.

Table 4

Time series regression analysis results

	BON	PDR	FOE	SDRL	DNO	IOX	IMSK
OIL PRICE	0.233***	0.609**	0.408***	0.719***	0.478***	0.501*	0.256**
	(0.085)	(0.270)	(0.127)	(0.140)	(0.164)	(0.289)	(0.124)
EXCHANGE RATE	-0.847**	0.758	-0.299**	-0.432	0.099	2.264*	-0.457
	(0.339)	(1.115)	(0.471)	(0.560)	(0.655)	(1.154)	(0.500)
OPEC	-0.007	-0.052	0.001	0.001	-0.003	-0.015	-0.006
	(0.021)	(0.055)	(0.028)	(0.034)	(0.040)	(0.071)	(0.028)
Constant	-0.003	-0.029	-0.017	-0.009	-0.003	-0.037	-0.023**
	(0.008)	(0.021)	(0.014)	(0.013)	(0.016)	(0.028)	(0.011)
ARCH	PASS	PASS	FAIL	PASS	FAIL	PASS	PASS
Observations	119	119	119	119	119	119	119
R^2	0.172	0.055	0.137	0.242	0.080	0.041	0.070

Note: complied by the author based on Stata results. Standard errors in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

The Table 4 presents 7 regressions whose data is based on 7 different oil companies' data (Appendix 5). These companies can be segmented in 3 groups: Drill and Well, Operator and Operation support. The results show how each company's stock price is influenced by oil price volatility, exchange rate between dollar and euro, and OPEC decisions. Additionally, the table represents the amount of observations and good fit value based on each oil companies' data.

As we can see the oil price is statistically significant for each of the companies. When we compare each company, only the significant value levels differ. Only InterOil Exploration (Forward – IOX), I.M. Skaugen (Forward – IMSK) and Petrolia Drilling (Forward – PDR) do not reach 1 percent significance level and other companies' significant value is lower than 1 percent. Looking at the coefficient value of oil price, we can see that oil price has the biggest influence on Seadrill's (Forward – SDRL) stock price. The 1 percent increase in the price of oil raises the stock price of SDRL by 0.719 percent. The other companies' relationships with oil price is not that large – a 1 percent increase in oil price, leads to an increase in PDR, FOE, DNO and IOX stock prices from

0.479 to 0.609 percent. The smallest effect is on companies such as Bonheur (Forward – BON) and IMSK. These stocks are increased about 0.24 percent, when oil price increased by 1 percent.

The independent variable is exchange rate between dollar and euro. The findings show that the exchange rate is statistically significant in the first and fifth regression and the value is only lower than 5 percent for BON stock and 10 percent for IOX stock price. More interesting is that for IOX stock the exchange rate effect has a positive relationship, even though from previous research papers we found out that the dollar exchange rate has negative impact on oil price. In other words, an increase in the exchange rate of 1 percent, leads to an increase in stock price of about 2.3 percent. However, the BON stock reacts differently, and its stock price would decrease by 0.8 percent.

OPEC decisions do not impact any of our selected companies' stock price, so we can say that there is not relationship between stock price of these companies and OPEC decision on oil supply and Operators. As mentioned earlier, there were many articles which conclude that oil supply does not have an influence on stock price. However, we did not find any articles relating oil supply increase or decrease and stock price of oil companies. Intuitively, oil supply should have an impact on stock price due to the close relationship between oil supply and oil companies' revenues, but in this case, there is no interaction between the two. On other hand, Norway is not a member of OPEC, so in general, it should be impacted by oil price movement.

Overall, oil price movement has a strong impact on our companies' stock price volatility, only the impact level is different. For example, an increase of 1 percent in oil price increased SDRL stock price by 0.719 percent and BON stock price by 0.233 percent. Moreover, comparing the groups mentioned earlier, we can see that the relationship is more or less the same. However, there is different case for exchange rate of euro and dollar, and OPEC decisions. The exchange rate only has an impact on two oil companies and the trend of these companies are different. For example, the movement of BON stock price shrinks (by about 0.8 percent) due to an exchange rate growth of 1 percent and IOX stock price is increased (about 2.2 percent) by a 1 percent increase in the exchange rate. It is interesting that IOX is an Operator and has a positive relationship instead of a negative one. Furthermore, OPEC decisions to increase or decrease oil supply do not have any impact on our analyzed companies' stock prices likely due to Norway's lack of membership.

Table 5

Time series regression analysis results

	BWO	EIOF	EMGS	HAVI	SBX
OIL PRICE	0.510***	0.291***	-0.795*	2.031**	0.716**
	(0.173)	(0.092)	(0.408)	(0.877)	(0.330)
EXCHANGE RATE	-0.066	-0.650*	-1.880	2.617	-1.595
	(0.688)	(0.366)	(1.682)	(3.625)	(1.317)
OPEC	-0.035	-0.019	-0.083	0.041	-0.040
	(0.042)	(0.022)	(0.084)	(0.176)	(0.081)
Constant	-0.015	-0.013	-0.040	-0.059	-0.075**
	(0.016)	(0.009)	(0.033)	(0.068)	(0.031)
ARCH	PASS	PASS	PASS	PASS	PASS
Observations	119	119	117	119	119
R^2	0.094	0.167	0.038	0.047	0.084

Note: complied by the author based on Stata results. Standard errors in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

Table 5 represents 5 regression analysis results based on data from 5 Norwegian oil companies. These companies belong to Drill and Well, Subsea, Geology and Seismology, and Operation support subsectors (Appendix 5). These regressions' results should show how stock price interacts with oil price, exchange rate and OPEC decision on oil supply. In addition, the table presents the amount of regression observations and the good fit results of each regression.

In each regression, oil price has significant impact on stock price of each selected company. The only significant value lower than 5 percent is Havila Shipping's (Forward – HAVI) stock price and 10 percent for Electromagnetic Geoservices's (Forward – EMGS) stock price. Analyzing coefficients of oil price on each model, we can see that the oil price has the most influence on HAVI stock price. It increases the stock price by 2.031 percent for a 1 percent oil price rise. However, EMGS' data regression shows a negative relationship between stock price and oil price - if it increases by 1 percent, then stock price decreases about 0.8 percent. The EMGS case is particularly interesting as conclusions from other research papers have shown that oil price should only interact positively with stock price, not negatively. As mentioned earlier, other companies are less influenced by the oil price.

Exchange rate and OPEC decisions don't have the same significance as oil price. The exchange rates only influence Eidesvik Offshore's (Forward – EIOF) stock price. If the exchange rate increases by 1 percent, then EIOF's stock price would decrease by 0.65 percent. In addition, the rate's significant value is lower than 10 percent. However, the OPEC decisions do not influence any of our companies' stock prices. As with the previous table, we can see that OPEC doesn't hold any influence over Norwegian oil companies, even though the empirical results of other research papers found different results.

To conclude the fifth table, we can see that the HAVI stock price is influenced by oil price and that means that company is heavily dependent on the oil price. The strong relationship could be beneficial, but at the same time it could have negative consequences due to an inability for the oil company to control their risk. Moreover, the company belongs to the Operation support subgroup and focuses only on that business. Therefore, their sole concentration on the oil business could explain why they are influenced by the price of oil. The second interesting result is that EMGS' stock price is impacted negatively by oil price, although almost all analyzed research papers conclude that oil price and stock price have positive relationship, especially for oil-related businesses. Moreover, the other company present in the same subsegment has a positive, not negative relationship, thus it is hard to determine whether or not Geology and Seismology companies tend towards positive or negative relationships with the exchange rate. In other words, an exchange rate increase of 1 percent leads to a decrease of approximately 0.7 percent in EIOF stock price. However, OEPC decisions do not have any influence on any of our selected companies' stock price volatility. Therefore, it conforms to our previously mentioned factors: due to Norway's lack of OPEC membership, the decision on fix oil supply volume has no impact on Norwegian oil companies' stock price movement.

Table 6

Times series regression analysis results

	SEVAN	SIOFF	REACH	PGS	PRS
OIL PRICE	0.540**	0.338***	0.345*	0.592***	1.709***
	(0.241)	(0.114)	(0.199)	(0.138)	(0.107)
EXCHANG ERATE	-0.598	-1.395***	-0.307	-0.449	-0.712**
	(0.938)	(0.464)	(0.652)	(0.551)	(0.359)
OPEC	-0.101	-0.025	-0.057	-0.065*	0.096***
	(0.069)	(0.026)	(0.061)	(0.034)	(0.010)
Constant	-0.022	-0.009	-0.024	-0.002	-0.045
	(0.027)	(0.010)	(0.024)	(0.013)	(0.038)
ARCH	PASS	PASS	FAIL	PASS	FAIL
Observations	119	119	119	119	119
R^2	0.079	0.230	0.044	0.216	0.056

Note: complied by the author based on Stata results. Standard errors in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

The above table presents the relationship between dependent (oil companies stock growth) and independent variables (oil price, exchange rate, OPEC decisions) on 5 different Norwegian oil companies' stock volatility (Appendix 5). The oil companies are from the Topside, Geology and Seismology, Drill and Well, Subsea subsegments and one Operator. Moreover, the table presents regression coefficients, standard errors in parentheses, observation amount and good fit measurement (R^2). As in previous tables, oil price is statistically significant for all Norwegian oil companies' stock prices. However, the significant value is much lower than in previous tables. Only two companies have a significant value lower than 1 percent and other stock has lower upper value than 1 percent.

PRS stock price is influenced the most, 1 percent of oil price growth will increase the stock price by 1.136 percent. However, other stock prices do not have the same outcomes as the stocks mentioned earlier and if the oil price increases by 1 percent, then the stocks' prices will grow from 0.4 to 0.6, approximately.

Exchange rate and OPEC decisions are in the same situation as in Table 6. The only difference is that exchange rate has strong negative influence on SIOFF stock price. The appreciation of the dollar or depreciation of the euro by 1 percent, shrinks the stock's value by 1.395 percent. In addition, OPEC decisions have a negative influence on PGS stock price and when the decision is made to lower supply of oil production, then stock price should decrease by 0.065 percent. For other stocks OPEC decisions do not have any statistical significance. But PRS stock are impacted positively by OPEC decisions.

The overall, the oil price has significant influence on all of the aforementioned stocks. However, PRS stock price is very impacted by oil price volatility, and even though the company does its business in multiple countries, all of their business sectors are strongly correlated with oil activities. In addition, the exchange rate has strong negative influence on only one stock and Topside companies (SIOFF) stock price is decreased about 1.4 percent if the dollar appreciates or the euro depreciates by 1 percent. The other interesting fact could be that OPEC decisions on increasing or decreasing oil supply has impact on PGS stock price, but not a very large one. Moreover, the OPEC decisions has positive impact on PRS. The explanation of this statistically significant relationship could be due to the company is doing their business in multiple countries, one of which could belong to OPEC. However, other tables show that even companies which work in multiple countries do not have a statistical relationship between the decision on oil supply volume and stock price volatility.

Table 7

Time series regression analysis results

	SOFF	DOF	SUBC	TGS	AKSO
OIL PRICE	0.409**	0.306*	0.388***	0.378***	0.056
	(0.127)	(0.171)	(0.107)	(0.09)	(0.369)
EXCHANGE RATE	-0.299	-0.562	-0.428	0.168	-2.634*
	(0.471)	(0.684)	(0.428)	(0.345)	(1.524)
OPEC	-0.001	0.015	-0.034	-0.018	-0.070
	(0.028)	(0.042)	(0.026)	(0.024)	(0.075)
Constant	-0.016	-0.033**	0.005	0.008	0.026
	(0.010)	(0.016)	(0.010)	(0.01)	(0.029)
ARCH	FAIL	PASS	PASS	FAIL	PASS
Observations	119	119	119	119	119
R^2	0.122	0.051	0.168	0.094	0.044

Note: complied by the author based on Stata results. Standard errors in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

The above table presents the regression results of 5 oil companies' stock price volatility. The table presents findings of oil price, exchange rate, OPEC, constant coefficients and standard errors in parentheses. Regression analysis results are based on last 5 selected oil companies (Appendix 5). These companies represent Operations support, Subsea, Geology and Seismology, Topside upstream suppliers.

The oil price is statistically significant on stock price for nearly all companies, except AKSO. The stock price doesn't have any relationship with AKSO stock price movement. The explanation could be that AKSO belongs the Aker Group, which focuses on many business activities, and due their diversification, are not depended on the oil price. Other companies' data shows that the relationship is significant only in deferent significance levels. Moreover, the relationship is positive, but not very strong relative to other analyzed oil companies. In other words, a 1 percent increase in the price of oil leads to a rise in all other companies from 0.263 to 0.388 percent. The other variables do not impact stock price like oil price. Exchange rates only impacts two stocks. The first one is AKSO where an increase of the exchange rate by 1 percent, shrinks the stock's value by 2.634 percent, but the coefficient is statistically significant only at the 10 percent level. OPEC decisions on oil production volume do not have any relationship with any stock price. Hence, we can conclude that these oil companies are not impacted by OPEC decisions.

The Table 7 presents the relationship between the stock price of 5 oil companies and independent variables such as oil price, exchange rate between euro and dollar and OPEC decisions on oil production volume. The results show that oil price is statistically significant, although one of the regression analyses results show that there is no relationship between stock price of AKSO and oil price and that other companies have quite a weak relationship when we compare with other tables. Moreover, the same companies show a strong negative correlation with exchange rates. In other words, as the dollar increases by 1 percent, the stocks decrease by about 2.6 percent. Comparing with other tables' results we can see that this is the strongest relationship between exchange rate and stock price. The other variable in regressions is OPEC decisions. The results of regression analyses show that there is no statistical relationship between OPEC decisions on oil production volume and analyzed stock price growth.

This section presents empirical results, which are related with the relationship between 22 Norwegian oil companies and three independent variables (OPEC decisions, exchange rate and oil price). However, first we graphically presented oil price and stock price of 22 selected oil companies. The graph showed that the 2008 Crisis impacted both the oil price and the 22 oil companies and only a few companies were able to recover after the crisis. Moreover, we can notice that that rapid oil price collapse in 2014-2015 directly impacted the stock price of oil companies. Therefore, to conclude the graph, we can see that there is a direct relationship between oil price and stock price. Hence, the

second step is to investigate how much impact oil price has on stock price. But first we used the Durbin-Watson test for checking if any of our regression models violated the *no serial correlation* assumption. The test results show that several regression models are impacted by autocorrelation, hence for these models we used the Prais-Winten estimator which helps to adjust to autocorrelation problems. After fixing the autocorrelation problem we can conclude and accept or reject the previously mentioned hypotheses.

The first hypothesis was about a positive relationship between stock price and oil price. The regression analyses results showed that almost all selected companies are influenced by oil price, but there are several exceptions. The regressions results show that there is no relationship between AKSO stock price and oil price. There could be several explanations:

1) Fast reaction on adjusting company's capacity to fit market conditions;
2) The company was able to increase their growth outside of Norway;
3) AKSO has belongs to a large corporation and their focus is on different business activities (Aker Solutions, 2015).

Other situation exists with EMGS' regression results. The results show that oil price has negative impact on the company's stock price volatility. Based on the company's annual report the EMGS increased their revenues after the oil price collapse. Apparently, the company invested in EM (Effective Microorganisms) technology, which helps to find oil more efficiently and helps to provide better valuation of oil fields. Due to new technology the company signed contract with 15 oil companies in 2014 and 7 oil companies in 2015 (Electromagnetic Geoservices, 2015). Generally speaking, almost all companies had the same outcome: oil price had an impact on their stock price movements and their movements varied from 0.2 to 0.75 percent if the oil price increased by 1 percent. However, there are two regression results which show that two companies' stock prices are impacted by oil price much more than the relationships mentioned earlier. For example, HAVI's stock price would increase about 2 percent and PRS's stock price would increase by 1.1 percent if the oil price increased by 1 percent. There could be several reasons why these stock prices are impacted by oil price:

1) HAVI was strongly focusing on increasing their growth and building new ships, but after the oil crisis the demand for vessels went down, which created oversupply of ships and thus decreased the company's profits (Havila Shipping, 2015);
2) PRS, as an Operator, had a lot of long-term contracts with upstream suppliers and due to the oil price collapse, their profits whet down even more than other companies (Prosafe, 2015).

Overall, the oil price has a positive impact on oil companies' stock prices but, it really depends on the company's position in the industry. What is more important is how oil companies manage

costs and that they invest in new technologies, which creates more efficiency for the industry, and other factors, which lead to better management of the company's activities.

The second hypothesis represents the exchange rate's positive influence on stock price. To sum up all the regressions, we can conclude that several regression analyses show a significant relationship between exchange rate and stock price. To be more precise, only 5 companies' stock prices are impacted by exchange rate and only two companies' standard errors are reaching the 1 or 5 percent significance level. Therefore, the second hypothesis is rejected because only 5 companies' data shows any statistical significance in the previously mentioned relationship. But, there are several companies which are impacted by exchange rates. One is IOX, it shows a positive relationship between stock price and oil price, although from other research the relationship should be different. However, the company is carries out multiple business activities in different geographical areas and due to diversification of business activities, IOX is more dependent on dollar and euro exchange rates. AKSO, SIOFF, PRS are another important companies to notice. The strong negative relationship between its stock price and exchange rates could be due to the company's foreign debt, which they borrowed in 2014 (Aker Solution, Siem Offshore, Prosafe 2015).

The third hypothesis relates to a negative relationship between OPEC decisions on oil price production volume and selected Norwegian oil companies' stock prices. The results show that only one company's stock price is impacted by OPEC decisions. Other companies showed no statistical relationship between the previously mentioned factors. Therefore, as with the second, the third hypothesis should be rejected because only one company's data shows a significant value between stock price and OEPC decisions.

3.3. Results of the relationship between financial variables and stock price of Norwegian oil companies

The analyzed results of interaction between oil price or its characteristics and oil companies' stock prices showed that almost all selected companies are dependent on oil price volatility, the impact only differs due to different business strategies and different business activities in the Norwegian oil industry. Hence, now it is important to analyze the relationship between companies' financial performance and stock price. Table 8 presents the relationship between stock growth and growth of financial variables such as capital expenditure to sales, cash ratio, net fixed assets turnover and ROA, ROE ratios and enterprise value. Moreover, in our model there are two dummy variables. The first dummy distinguishes companies which pay dividends and which do not through our analyzed period. The results should show if paying dividends somehow impacts stock price or not. The second dummy distinguishes which companies have a positive price to return ratio and which have a negative ratio. To addition, there is one more performance ratio (price to book) which should show if the increase of the price to book ratio has positive or negative impact on oil price volatility.

After interpretation of the interaction between financial variables and stock price movements, we analyze and compare each company's financial performance, and based on those variables we determine which have a significant impact on stock price. But, before analyzing the table's results, we should also discuss the Breaush-Pagen results for heteroskedasticity problem. The test findings show that model data is heteroskedastic. Therefore, we are forced to use robust standard errors for fixing heteroskedasticity and after fixing the issue we should get an unbiased and efficient model.

Table 8

Relationship between oil companies stock price and their financial variable

	growth
GRofCAPEX	-0.078**
	(0.035)
CRgrowth	0.158**
	(0.078)
dummyofdividend	-0.049
	(0.121)
FIXEDgrowth	0.247**
	(0.125)
dummyofPE	0.280*
	(0.160)
ROAgrowth	**-0.019***
	(0.012)
ROEgrowth	0.016*
	(0.008)
Pbgrowth	0.584***
	(0.106)
ENTgrowth	0.330**
	(0.128)
Constant	-0.198*
	(0.103)
Observations	178
R^2	0.467

Note: complied by the author based on Stata results Standard errors in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$)

As mentioned earlier, Table 8 presents the relationship between oil companies' stock prices and their financial variables, (Appendix 6). There are 9 financial variables and only one (dividends) of them is statistically irrelevant with companies' stock price volatility. Therefore, we have to reject the fifth hypothesis, because regression results show that there is no correlation between dividend paying companies and those that pay none companies. The reason for the failure to accept the fifth hypothesis could be that from 178 observations, there are only 68 observations of companies paying dividends. Moreover, the in analyzed period companies showed poor profitability or even losses, so due to negative profitability companies were not able to pay any dividends to investors. Four financial variables such as cash, net fixed assets turnover, price to equity and ROE ratios have less impact on companies' stock price, but they reach the statistically significant interval from 5 percent to 10 percent while the others are lower than 5 or 1 percent.

The growth of CAPEX to sales ratio has a negative influence on stock price. In other words, if the CAPEX to sales ration increase by one percent, then stock price would decrease by 0.078 percent. In previous research papers, other authors found that CAPEX in general has a positive impact on stock price but in our case the relationship is negative. Therefore, we fail to accept the ninth hypothesis due to a negative relationship between CAPEX and oil companies' stock price movements.

Other variables show a positive impact, and one of the strongest impacts shown is enterprise value growth. For example, if company somehow managed to increase their enterprise value by 1 percent, then the oil companies' stock prices would increase 0.33 percent. Moreover, price to book value shows an even stronger impact on oil price and if it increases by 1 percent, than it would increase the stock price about 0.6 percent. However, the other performance ratio shows a lower impact, or to be more precise, if the companies managed somehow to have a positive price to equity ratio, then their stock price would increase about 0.3 percent more than those companies which have negative ratios. Other financial variables also have a positive impact on the selected stocks prices, but the impact is much lower. Therefore, the fourth, seventh and eighth hypotheses are accepted due to positive interaction with oil price and statistical significance. However, the sixth hypothesis shows that there is negative correlation between stock price and ROA, but ROE has positive impact, although the profitability rate has a very low impact on stock price. Therefore, it is hard to determine whether or not profitability rates have any influence on stock price. ROE's low impact could be due to a general trend Norwegian oil companies having low profits or even loses in our analyzed period due to the oil price collapse. Moreover, ROA negative correlation could be also due to weak market condtions.

Overall, in this model we analyzed the relationship between oil companies' stock prices and their financial performance from 2007 to 2016. The amount of observations was 178 and 9 variables were able to explain about 50 percent of total variables which impacted the oil price. The regression findings show that only two variables are statistically insignificant, and all other variables are statistically significant. Therefore, the next step is to analyze the companies' financial performance, so we will analyze each company's financial performance by selecting those variables which have an influence on the stock price. Hence, Tables 9 and 10 present oil companies' 7 financial ratios, which represents the companies' efficiency, investment capacity and efficiency, liquidity, profitability, performance ratios and general enterprise value. Overall, those variables should fully distinguish between companies with high financial performance and low financial performance.

Table 9

Eleven companies' average financial variables of analyzed period

Company	Cash Ratio	Capital Expenditure to Sales	Net Fixed Asset Turnover	(P/E)	ROE	Enterprise Value	(P/B)
BON	1.3	36.0	0.5	9.7	6.2	19009755	0.7
BWO	0.2	63.4	0.4	112.7	-5.8	2318777	0.7
DNO	1.3	42.5	0.5	9.8	8.4	19390125	0.9
DOF	0.7	59.7	0.4	25.1	-0.9	21625533	0.8
EIOF	0.7	63.5	0.2	6.1	-0.5	3610248	0.5
EMGS	0.8	9.3	3.0	26.7	-81.3	258716	16.7
FOE	1.0	34.2	0.6	8.0	19.7	2771067	1.9
HAVI	0.6	50.8	0.2	442.6	-14.0	4964504	0.6
IOX	0.4	24.8	0.8	7.1	-223.0	144788	6.0
REACH	1.5	26.8	1.9	42.7	-20.3	693211	1.2
PDR	0.7	69.1	0.9	15.5	-21.0	240783	0.8
Average	**0.8**	**50.0**	**3.0**	**40.8**	**-15.8**	**5673285**	**2.3**

Note: complied by the author based on based on table 1 and 2 in appendix 6.

Table 9 presents 11 companies' average financial variables, which were significant on stock price volatility (Appendix 6). Cash ratio and net fixed asset turnover ratio represents company's liquidity capacity and their efficiency. Moreover, ROE, capital expenditure to sales, price to equity and price to book presents a company's profitability and its forward investment and performance on the equity market. Finally, enterprise value should present a company's general business success and its value.

Starting to analyze companies' liquidity and capacity, we can say that the most liquid companies are NOS, DNO and BON, and EMGS is the most efficient company compared with other companies. However, some companies (BWO, IOX) have a below average cash ratio, and EIOF and HAVI are the most inefficient companies, based on net fixed asset turnover ratio value. Moreover, looking at companies' profitability, investment and performance ratios, we can see that only FOE overall positive ROE, but their investment and performance ratios are pretty low and below the average. The average negative ROE shows that companies' shareholders are losing capital, instead of gaining capital in the oil business. IOX especially is suffering huge negative ROE, and checking their financial statements, we notice that the company's equity is negative, and company survives only due to shareholder sponsorship of IOX capital. The companies which invest the most are PDR, BWO and EIOF; lowest investment is by EMGS, IOX and NOS. The performance ratios value results show that HAVI and BWO are very overrated based on price to equity ratio values and only EMGS shows high performance, based on price to book ratio values. Finally, the enterprise value results show that IOX, NOS and PDR have the lowest value and companies such as BON, DNO, DOF have the highest values, but those companies do not perform well in other financial ratios.

Table 10

Ten companies' average financial variables of analyzed period

Company	Cash Ratio	Capital Expenditure to Sales	Net Fixed Asset Turnover	(P/E)	ROE	Enterprise Value	(P/B)
PGS	0.5	23.1	1.0	21.4	10.5	3177699	1.8
PRS	0.9	69.1	0.4	11.4	31.3	2364698	3.2
SBX	0.2	24.2	0.9	1.0	-28.1	181035	0.7
SDRL	0.4	61.5	0.3	10.6	19.3	18965028	1.8
SEVAN	0.7	180.3	21.9	6.9	-40.6	887836	1.9
SIOFF	0.9	108.7	0.3	24.2	0.5	1261600	0.8
IMSK	1.3	3.9	1.7	12.9	-15.4	208149	1.3
SOFF	0.7	58.5	0.3	27.2	0.1	12124597	0.8
SUBC	0.3	10.7	2.6	16.4	5.7	3127296	3.2
TGS	1.0	30.4	24.4	18.4	16.7	1813548	2.0
Average	**0.8**	**50.0**	**3.0**	**40.8**	**-15.8**	**5673285**	**2.3**

Note: Complied by author based on table 1 and 2 in appendix 6.

Table 10 presents 10 companies' financial variables, which are statistically significant on stock price (Appendix 6). There are 7 financial variables and we will present and compare each of the financial variables, both between companies and with the general average. The cash ratio and net fixed assets turnover presents the outcome of companies' efficiency and liquidity. Several companies, such as SKAUGEN, TGS, SIOFF and PRS, are able to reach the average company liquidity and the efficiency ratio shows that there are two companies (TGS and SIOFF) which are able to use their assets very efficiently and other analyzed companies are below the average of net fixed asset turnover ratio in Table 10. In the second step we would present companies profitability, investment and performance ratios. The profitability ratio shows that all companies are able to gain positive profits and some of the companies (PGS, SDRL, PRS and TGS) show very high profits, even after the 2015 oil price collapse. Almost the same exists situation with performance ratios; we can see that companies such as SIOFF, PGS, SOLSTAD and TGS show good performance ratios, although their ratios are below average, especially if we are talking about price to book ratio. Looking at investment ratio, we can see that several companies (SEVAN, SIOFF and PRS) with a high profitability rate are able to invest much more than companies with low or negative profits. General financial variables, like enterprise value, show that only two companies have an above average value and that although those companies' profitability, investment rates are above average, their efficiency and liquidity ratios are quite low.

Therefore, the regression analysis shows that there are 7 significant financial variables which have an impact on stock price volatility and only two variables (dividend payments and ROA) show irrelevance on selected companies' stock prices. Those 7 variables more or less have influence on oil companies' stock prices. For example, an increase of 1 percent in price to book ratio could increase

stock price about 0.6 percent. The opposite situation exists with ROE, when the ratio increases by 1 percent, then stock price would increase only about 0.02 percent. Moreover, the CAPEX to sales ratio shows a negative impact on stock price volatility. In other words, if the ratio would increase by 1 percent, then stock price would decrease by 0.07 percent. Therefore, the regression results show that we can reject two regressions because the dummy variables don't have any influence on stock price and CAPEX shows a negative impact on stock price. Based on Chung, Wright, Charoenwong (1997) we conclude that companies which already had high technology and are planning to increase their investment will have a negative impact on their stock price volatility. Moreover, negative profitability rates such as ROE are negative, and an increase of investment could negatively impact investors' perceptions toward that company's stock price. Hence, the ninth hypothesis is rejected due to the aforementioned factors. Other hypothesis acceptance failures could be the relationship between stock price and dividend payments. The regression results show that dividend payments are irrelevant to stock price volatility. There are several reasons for this. The first reason could be that on a total 178 observations, only companies paid dividends only 68 times. The number is lower than 50 percent of total observations, hence the data does not fully represent the relationship. Another argument could be that most of the time the companies had very low or even negative profits, so in this period dividends could not have had any impact on stock price. Other hypotheses are accepted, but only the hypothesis of relationship between oil price and profitability. There several factors: 1) Companies mostly earned very low or negative profits in this period; 2) Robustness of standard errors of the relationship between stock price and ROA shows that statistically ROA is irrelevant to stock price. Overall, the we found out that the 7 financial variables have an influence on stock price in our case. Hence in next step we will analyze companies' financial results based on those financial variables. We find out that companies which have high enterprise value also have high profitability rates, performance rates, investment, but low efficiency and liquidity ratios. The statistically significant ratios show that companies which were not spending as much on CAPEX relative to other analyzed companies, have better profitability rates, efficiency and performance ratios. In other words, the less conservative companies managed to lower their capacity levels more rapidly in response to weak market conditions. Although since these companies have high enterprise value and they might not focus as much on being more aggressive in the market.

3.4. Result comparison with other research paper's results

The oil industry is one of the riskiest business and the riskiness relates to rapid movements in the price of oil. Hence, our paper's objective is to find out if the oil price impacted players in the Norwegian oil industry or if the impact would vary for different players in the industry, and maybe a company's "good" financial performance could change an investor mind about selling stock due to weak market conditions. Therefore, we analyzed interactions between 22 oil companies' stock prices and oil price movements and the relationship between selected companies' stock prices and their financial performance, so in this part, we will present research results and compare them with other research results.

The graphical results of oil price and analyzed companies' stock prices shows that a majority of selected companies are strongly correlated with oil price, except for a few companies which show no relationship to the oil price. Going deeper and analyzing the regression results we can see that a majority of the companies' stock price are strongly impacted by the oil price. Diaz and Garcia's (2017) robust results and conclusions about the positive relationship between oil price and stock price of companies which are operating in oil industry. However, there are outliers whose regression results show that there is no interaction between their stock prices and oil price. For example, regression results of AKSO data shows that AKSO stoke price is irrelevant with stock price. Moreover, EMGS's regressions results show that the company's stock price negatively interacts with the oil price. Apparently, these companies are able to adjust much faster to changing market conditions and have different kind of business activities not related to the oil industry (in the case of AKSO) or having new technologies, which creates better conditions to attract customers then opponents (the case of EMGS). In speaking about the oil industry segments' interaction with oil price, we cannot distinguish any specific industry segment which was impacted by oil price more or less than other segments. Although, based on Asche and Dahl's (2017) conclusions, integrated oil companies (Operators) and Geology and Seismology, Drill and Well are more highly dependent on oil price volatility than other oil industry players. There could be several reasons why our results are different from Asche and Dahl's results. First, the authors are using much bigger set of data for research analysis because they include not only companies which are listed on the Oslo exchange market, but also use companies which are from different exchange markets. Second, the difference could be that authors where using different methods for finding results (vector error correlation model). Finally, the authors distinguished only oil industry players and did not focus on specific companies. On the other hand, our selected Operators, such as PRS, have the strongest relationship with oil price due to long contracts with upstream suppliers.

Moreover, in first part of this analysis, we also had control variables for oil price: exchange rate and OPEC decisions regarding oil supply volume. The results show that the exchange rate has

an influence on only a few oil companies, even if those companies operate in different countries. Therefore, the second hypothesis was rejected because there are only 5 companies' data which shows that there is any sort of relationship between the aforementioned factors. Although Yan (2012) concludes that in the short run the dollar appreciating by 1 percent would decrease the international oil price by 1.82 percent, and we found that the oil price has a strong correlation between stock price and oil price. Moreover, Sanberg and Longva (2017) analyze the relationship between exchange rate and Norwegian stock market value. The results show that the relationship is significant in the short-term. There could be a difference due to different methods of finding interactions and different objectives. The aforementioned author focused on Norwegian companies in general, and in this research paper we focus specifically on Norwegian oil companies. However, we found that several companies are impacted by fluctuations in the exchange rate. Several company (AKSO, PRS, SIOFF) is negatively impacted due to foreign debt and other company (IOX) is positively impacted due to businesses activities in different geographical locations.

The other control variable was OPEC decisions on oil supply quantity. The time series regression results that show that OPEC's decisions to increase or decrease oil production could impact Norwegian oil companies are statistically significant, and only one company's regression analysis shows statistical significance between the decisions and stock price movement. But based on Guidi, Russell and Tarbet (2006), OPEC decisions have an influence on stock prices in the US and the United Kingdom. One the main reason why there could be a difference in the results is that Norway does not belong to the organization, but then again, neither do the US or the United Kingdom. Moreover, it could be that the previously mentioned authors used different methods and time periods.

The other regression analysis is related to the relationship between stock price and companies' financial performance ratios. We used 9 financial variables, which presented companies' efficiency, liquidity, investment, performance against other companies and profitability. Bhaskaran and Sukumaran (2016) conclude that all 9 financial variables should increase market value. However, the regression results show that two of the selected financial variables do not have an impact on companies' stock price and the other variables have varying impacts on companies' market value. dividend payments have no influence on Norwegian oil companies' stock prices. There could be several different regression results. First of all, the authors analyzed different time period than us and therefore, companies may have had better market conditions and thus better profits, which lead to higher profitability rates. In our case the market conditions were very weak and we collect only 68 occurrences of any selected company paying specific amount dividends, hence the dividend data results could be misleading. Secondly, the CAPEX to sale ratio shows a negative impact on stock price, instead of a positive impact. The impact could be negative due to weaker market conditions, and companies, which did not adjust to the weaker market conditions, were spending more in

CAPEX. Moreover, Chung, Wright, and Charoenwong (1997) argue that companies, which already had high technology, but were planning to increase their investment created a negative impact on stock price volatility. ROA as a profitability ratio shows that it does not impact oil companies stock price. Although, Bhaskaran and Sukumaran (2016) argue that ROA and ROE ratios have an influence on stock price volatility. However, Anghel and Man (2014) conclude that ROA and even ROE does not have an impact on companies increasing stock market value. Moreover, our regression results show that ROE only has influence by a very small margin. Therefore, in that way we reject the hypothesis which is related to dividends and profitability rate. The case could be that due to weak market conditions, profitability rates were very low and average industry ROE is negative, so it could be the reason why there is no relationship between dividends or profitability and selected companies stock prices.

Other financial ratios have significant influence and robustness. Bhaskaran and Sukumaran's (2016) arguments that companies' efficiency, liquidity and performance ratios have significant impact on companies stock price movement. Analyzing each company's average financial variables, which have an impact on stock price, we can conclude two facts. Firstly, the company's liquidity and efficiency are important factors in the case of weak market conditions. Secondly, the big companies, which have high enterprise value, have better performance ratios and their profitability rate are close to zero or even very high. Finally, the companies, which had, on average, higher CAPEX rates, had lower profitability and performance ratios, which have the most significant effect on stock price, than low-investment companies. Therefore, the biggest factor was that these companies, which were able to adjust more quickly to weak market condition and to decrease expenses on administration, employment wages and other stuff in the industry.

CONCLUSIONS

The main goals of this research paper were to find out how the price of oil impacts Norwegian oil companies and which of the financial variables are relevant for investors. Therefore, to answers this question we conclude several facts:

1. Firstly, we analyzed theoretical and empirical literature of the oil price impact on oil companies' stock price movement and companies' financial variables impact on their stock prices. First of all, we visually analyzed if oil price has influence on the stock exchange market and the economy. The results show graphicly that it is hard to determine whether or not the oil price has an influence on oil companies' stock price and on countries' economies. Therefore, we analyzed empirical and theoretical literature to find out if oil price has any impact on stock price. The results show that oil price can impact a stock price directly and indirectly. There is an indirect impact through economic factors, but they vary based on whether a given country is an importer or exporter of oil. The economy could impact stock price through short-term interest rates, monetary supply, and exchange rates. Stock price is directly impacted positively if a company is an oil producer and negatively if the company is a consumer or if the company's cost of goods is strongly energy-intensive. Moreover, we analyzed what kind of factors influence oil price movement and we found out that OPEC decisions on oil production volume, exchange rates between the dollar and euro, and political instability in Middle East has influence on oil price movements or even shocks. Therefore, in our regressions analysis between oil price and stock price, we had also included OPEC decisions and the exchange rate. However, we did not consider political instability events because it is difficult to find information about their specific effects. Other parts we analyzed were empirical and theoretical literature of the relationship between companies' financial variables and oil companies' stock prices. The literature analysis showed that financial variables, which are related to investment, profitability, liquidity, performance in the market, efficiency have an impact on a company's stock price. Therefore, we used those variables to check if they are relevant to our selected companies' stock price.
2. After analyzing and presenting theoretical and empirical literature results, we can analyze our methodology parts. But before presenting our paper's regression method, we will present our conclusions on the Norwegian oil industry. The most competitive area is the upstream oil industry. The sector could be separated into two groups: Operators and Suppliers and those suppliers could be separated into 5 more groups (Well and Drill, Geology and Seismology, Subsea, Topside, and Operation supporter companies). Moreover, we found that Norway is the seventh largest oil exporter in the world in 2012 and that the oil industry generates more

than 20 percent of total Norwegian GDP. Hence, these facts show that Norway is an oil exporter and not importer. For empirical analysis we use two regression models. The first regression model presented is based on time series data and present relationship between oil price and stock price (we also included two control variables in this relationship). Moreover, we also used the Durbin-Watson and ARCH test to detect if our selected companies' stock prices are impacted by autocorrelation. As the data are impacted, we the use Prais-Winten and GARCH estimators to fix that problem. The regression results helped find out if our first 3 hypotheses are rejected or accepted. The second regression is related to panel data regressions and it presented the relationship between companies' financial variables and their stock prices. These relationships present the last 7 hypotheses. We also check if our panel data is heteroskedastic or homoscedastic by using the Breusch-Pagan test. If we would have found data to be heteroskedastic, then we would use robust standard errors to fix the data.

3. Before discussing the regressions results, we presented Norway's current situation and we find that current market situation is weak, because oil companies profitability rates and growth ratios are very low. Moreover, the selected companies' stock prices dropped significantly after the 2015 oil collapse most did not manage to recover. Some stock did not manage to bounce back after the Financial Crisis, although several did manage. Therefore, the graphical results show that the oil price has an impact on our selected companies' stock prices. But some companies' stock prices are not impacted by oil price. The regression results show that a majority of selected oil companies are influenced positively by the oil price. However, there are some outliers, which would show negative or no relationship with the oil price. The negative relationship for EMGS company could be due to the fact that in 2015 they got new technology which helps to find oil more efficiently and with this technology likelihood of finding new oil fields is significant. Hence their technology helps more to increase revenues and provides better results than other Geology and Seismology companies. The lack of a relationship for AKSO could be because that company belongs to a larger group (Aker Holdings), which are involved in different kinds of businesses. Other oil companies show a positive relationship, but some companies have a stronger relationship than other companies and the level of relationship differences are not related with companies' different activities in the industry. Overall, we can accept the first hypothesis. The control variables show that they do not have impact on companies' stock price and only few of them were impacted. But, we find that several companies are impact by exchange rates. AKSO, PRS, SIOFF is negatively impacted due to foreign debt and another, IOX, is positively impacted due to businesses activities in different geographical locations. Overall, we reject second and third hypotheses.

4. The regression analysis of relationship between a company's financial variables and its stock price show that profitability, investment, dividend payments is irrelevant to investors who are interested in Norwegian oil companies. ROE show very low significance level on stock price (about 0.02 percent) and ROA has negative influence on a company's stock price. Likewise, the CAPEX to sales ratios has a negative impact on a company's stock price. However, the results show that investors are more interested in companies' liquidity, efficiency and general performance ratios. Based on analysis of the financial ratio results of each company, we can say that currently the market has very weak conditions. Although profitability is negative on average, several companies manage to have positive profitability ratios. Moreover, companies with bigger investments in our 10 years period had much bigger negative profitability rates, hence it seems that oil companies which were more aggressive in their growth were losing the most after 2015 oil collapse.
5. Compering results with other authors' works on relationship between our selected independent variables and oil price, we can say that difference occurs due to object. In other words, the other authors focus more on stock indexes or on overall country's stock exchange and we were focus more on specific oil companies. Moreover, it could be due to different time period. Other regression results show that investors are more interesting in company's liquidity, efficiency and performance in the market, but not investment and profitability. However, other authors conclude that investors are more interesting in company's profitability and investment than on company's efficiency and liquidity. the differences could be that current market situation is weak and when other authors analyze the relationship the industry was very strong.

Based on conclusions, the author would suggest to the companies to become more efficient and lower their general costs. Moreover, the companies should not invest in capital, or investment should be equal to deprecation and investment should be on new technology, an example could be EMGS. Based on company annual reports and general information, companies are trying to lower their costs or even merge with each other. Therefore, due to weak market conditions companies mostly should focus on lowering of costs and trying to be more efficient. However, there are also some limitations found in this research. First of all, not all Norwegian companies were analyzed, and we do not analyze international companies which operate in the Norwegian oil industry. Finally, we only analyze short-term interactions between oil price and selected companies' stock prices, but we do not analyze long-term interaction. Finally, the financial variables could have a lagging impact on stock price. Therefore, those factors could be used in future research papers, which would be related to analysis of interaction between oil price and Norwegian oil companies.

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APPENDIXES

Appendix 1

The Vocabulary of Terms

Topside – Construction of offshore-related vessels, the construction of surface installations, and the maintenance and modification of onshore and offshore production facilities. (Leskinen, Bekken, Razafinjatovo, Garcia, 2012).
Drill and well – Running drill and well operations, manufacturing of drill and well equipment, equipment supply, administration of rigs (Leskinen, Bekken, Razafinjatovo, Garcia, 2012).
Subsea – Technology for exploration, drilling and development of oil and gas fields in underwater locations (Leskinen, Bekken, Razafinjatovo, Garcia, 2012).
Operation support – Engineering-based services, consisting of firms providing operational support and firms offering personnel for operations support (Leskinen, Bekken, Razafinjatovo, Garcia, 2012).
Geology and seismic – Computer-assisted modeling of reservoir data and acquisition and processing of seismic data (Leskinen, Bekken, Razafinjatovo, Garcia, 2012).
Operators – Hold production licenses or have operating rights for oil and gas fields: operators employ the suppliers listed below for products and services for Upstream activities (Leskinen, Bekken, Razafinjatovo, Garcia, 2012).
Hypothesis test – a statistical test of the null, or maintained, hypothesis against alternative hypothesis (Wooldridge, 2016).
Durbin-Watson – a statistic used to test for first order serial correlation in the errors of a time series regression model under the classical linear model assumption (Wooldridge, 2016).
Breusch-Pagan Test: a test for heteroskedasticity where the square OLS residuals are regressed on the explanatory variables in the model (Wooldridge, 2016).
Homoscedasticity – The errors in a regression model have constant variance conditional on the explanatory variables (Wooldridge, 2016).
Heteroskedasticity – the variance of the error term, given the explanatory variables, is not constant (Wooldridge, 2016).
Panel data – a data set consists of a time series for each cross-sectional member in the data set (Wooldridge, 2016).
Time series data – a data set consists of observations on a variable or several variables over time (Wooldridge, 2016).

Appendix 2.

Table 1

Norwegian oil sectors' oil price

Data	Drill and Well	Subsea	Topside	Geology and Seismology	Operation support	Operator
01/01/2007	5.35218651	5.75616137	6.39766222	10.7343358	6.03926193	6.29368705
01/02/2007	5.30380459	5.6945812	6.48694779	10.7190477	6.07849711	6.22090803
01/03/2007	5.33113748	5.69829632	6.76601809	10.7169284	6.11415386	6.33323095
01/04/2007	5.33041428	5.7169419	6.80784259	10.6250191	6.17204382	6.30449326
01/05/2007	5.37757245	5.7571339	6.82628736	10.6820622	6.19883304	6.32712543
01/06/2007	5.4127244	5.78632917	6.9299038	11.5898384	4.53793361	6.32732922
01/07/2007	5.36556835	5.79053233	6.77661705	10.7311883	6.30354196	6.31092291
01/08/2007	5.27913966	5.75715727	6.82675054	10.3755811	6.31613169	6.28624924
01/09/2007	5.29787857	5.73282165	6.81921844	10.4233914	6.25067795	6.34204171
01/10/2007	5.28664998	5.7128662	6.98577641	10.1954202	6.31313493	6.31855325
01/11/2007	5.22531757	5.5166061	7.10047994	10.1010563	6.244008	6.22918021
01/12/2007	5.24334596	5.50510505	7.19179683	10.1159267	6.40500369	6.20903902
01/01/2008	5.04815859	5.31643292	6.88438803	10.0533741	6.22153447	6.01234148
01/02/2008	5.14939712	5.245835	6.99034075	9.80735919	6.20890473	6.13220287
01/03/2008	5.09326603	5.29152333	6.95964507	9.63909296	6.1103708	5.98721192
01/04/2008	5.24301847	5.34353246	7.06681543	9.7838548	6.14721024	6.14053217
01/05/2008	5.27341453	5.32719031	7.18294271	9.73590172	6.12410778	7.09836401
01/06/2008	5.23304555	5.26178701	6.93856069	9.4502703	6.07829734	7.03832324
01/07/2008	5.13887096	5.25545569	6.8312905	9.37332006	6.04079318	6.92791359
01/08/2008	5.13012896	5.20955839	6.813763	9.45438011	6.03640694	6.98494513
01/09/2008	4.78351022	4.9798928	5.95353058	9.1243398	5.91185846	6.56793695
01/10/2008	4.55533121	4.55620382	5.49424103	8.41976406	5.49944224	6.3178242
01/11/2008	4.41623087	4.39020539	5.09147826	8.04220495	5.43306329	6.40513601
01/12/2008	4.32221212	4.25004688	4.81650178	8.21660123	3.65706135	6.37375481
01/01/2009	4.2987085	4.25433482	4.59812918	8.21507714	5.32989006	6.3963664
01/02/2009	4.14250737	4.20567739	4.69144265	8.07571151	5.14379211	6.346445
01/03/2009	4.27131842	4.19551844	4.5519635	7.76890108	3.6088405	6.26728809
01/04/2009	4.41698449	4.19315358	4.6010901	7.81624413	5.35385585	6.39124155
01/05/2009	4.58821653	4.18990873	4.94407085	7.72981344	5.26008236	6.52783227
01/06/2009	4.59157327	4.28663273	4.94368052	7.80692339	5.49695914	6.53816061
01/07/2009	4.58737478	4.24481402	4.91095472	7.65775347	5.53646179	6.5388698
01/08/2009	4.5874439	4.15698672	4.94374186	7.74887368	5.49929982	6.43779927
01/09/2009	4.63416956	4.18364015	5.02414928	7.81274147	5.45948193	6.44653343
01/10/2009	4.67419325	4.23050185	5.06175682	8.4539057	5.5345969	6.4596711
01/11/2009	4.68173811	4.51607489	5.0057985	8.41557963	5.62476612	6.46630658
01/12/2009	4.71006571	4.59022927	5.14978937	8.74620974	4.13034719	6.64892332
01/01/2010	4.70938732	4.47505112	4.99419386	8.70713832	5.77638478	6.5479505
01/02/2010	4.66886712	4.40159266	4.95561304	8.6872474	4.10112259	6.41741288
01/03/2010	4.75666401	4.41044917	5.07066346	8.30698179	4.21052818	6.47687664
01/04/2010	4.74212903	4.35811649	5.0113408	8.50707781	5.83477211	6.53871789
01/05/2010	4.60589419	4.18120423	4.81374873	8.23324975	4.07272289	6.39370529
01/06/2010	4.51753246	4.09321372	4.440881	8.04097958	5.86470547	6.33638709
01/07/2010	4.58310653	3.94669512	4.68198191	8.12201659	5.88088273	6.41806939
01/08/2010	4.56867751	4.00979242	4.63563175	7.88322761	4.10433247	6.49193147
01/09/2010	4.71903304	3.9456562	4.6609362	8.12307538	4.10707886	6.65241727
01/10/2010	4.81130738	3.99107291	4.91661342	8.17204906	4.0715435	6.71628923
01/11/2010	4.86883313	4.0126961	4.67784934	8.12416212	5.72203461	6.77284136
01/12/2010	4.97611591	4.12130594	4.74399163	8.20076427	5.79890415	6.89655927

Data	Drill and Well	Subsea	Topside	Geology and Seismology	Operation support	Operator
01/01/2011	4.94067041	4.12272018	4.68953715	8.252488	5.85806014	6.82767114
01/02/2011	4.939312	4.15765411	4.71324853	8.1701547	5.79071856	6.81118763
01/03/2011	4.932912	4.15969261	4.76171767	8.16334658	5.81112242	6.8010528
01/04/2011	4.88987008	4.12652493	4.2649241	8.13202377	5.78964876	6.80846405
01/05/2011	4.83366221	4.03807566	3.12264901	7.86760827	5.68546246	6.79717989
01/06/2011	4.78614232	4.00040802	2.75855012	7.68592557	5.66248259	6.7437517
01/07/2011	4.81755232	3.9976161	2.9038846	7.46524563	5.62117936	6.73689693
01/08/2011	4.72067496	3.86665033	2.71054617	6.89989811	5.48601291	6.71547615
01/09/2011	4.63961337	3.76811576	2.65186755	5.9171249	5.34715005	6.69012132
01/10/2011	4.71677252	3.7822004	2.71131489	6.23654915	5.43201445	6.78462213
01/11/2011	4.71449627	3.70724714	2.36633646	6.14480796	3.88312068	6.80500168
01/12/2011	4.73047417	3.67217048	2.2350922	6.06290459	5.27027538	6.77383794
01/01/2012	4.80097787	3.76728841	2.47551247	6.11123146	5.27221917	6.8683041
01/02/2012	4.83185744	3.87575946	2.91672335	6.87037228	3.93862464	6.9377232
01/03/2012	4.77214341	3.97788176	2.6903368	6.68917415	5.55126729	6.86486592
01/04/2012	4.81210308	3.9956132	2.64003559	6.73471369	5.62475397	6.84995323
01/05/2012	4.65103448	3.77884332	2.5301329	6.40681162	5.44035207	6.77823921
01/06/2012	4.7265283	3.74818442	2.8539385	6.5014313	5.33647802	6.80802292
01/07/2012	4.78587321	3.79493307	2.5999387	6.42990966	5.31261834	6.83361141
01/08/2012	4.78794696	3.81739353	2.72670444	6.62350906	5.21278825	6.83356514
01/09/2012	4.77055603	3.81193047	2.70963326	6.77135406	5.22678085	6.8952754
01/10/2012	4.78990625	3.7560303	2.71097796	6.93583369	3.72000342	6.89431619
01/11/2012	4.76007064	3.81674187	2.75063902	6.93939534	5.12367879	6.89624628
01/12/2012	4.76559146	3.82307705	2.81798695	7.02402591	4.9901887	6.88834789
01/01/2013	4.83795893	3.83437049	2.87344512	7.08511228	5.0291648	6.98154696
01/02/2013	4.81902186	3.87074371	2.79299315	7.11840588	5.12138527	7.07505568
01/03/2013	4.82260207	3.85937087	2.76234354	7.17153603	5.0746877	7.05011331
01/04/2013	4.80969834	3.78548146	2.61478832	6.97962762	5.00955409	7.02890389
01/05/2013	4.87985927	3.81750595	2.73663641	6.95857793	5.10071084	7.02914859
01/06/2013	4.88464951	3.67407009	2.76166437	6.92076023	5.10114852	6.99357216
01/07/2013	4.98277542	3.72228624	2.81586648	6.89836609	5.14040309	7.09948801
01/08/2013	5.01215063	3.79025425	2.80823006	6.73899059	5.11201829	7.01924033
01/09/2013	4.99305167	3.81003559	2.81490686	6.75658506	5.26779892	6.8919742
01/10/2013	4.9712147	3.80659158	2.8753506	6.55713952	5.29460379	6.95475401
01/11/2013	4.93802877	3.79622946	2.94841022	6.37929945	5.23163149	6.85497988
01/12/2013	4.91136202	3.77145389	2.95426366	6.14332121	5.24472452	6.87092925
01/01/2014	4.83211771	3.71368817	2.85177516	5.97785156	5.25271195	6.75570862
01/02/2014	4.78730375	3.741405	2.92704489	5.69300997	5.26854012	6.79569768
01/03/2014	4.78181328	3.70891473	2.8584427	5.73386164	5.26187914	6.89621128
01/04/2014	4.75350303	3.75735139	2.86817	5.87674199	5.27853932	6.97674205
01/05/2014	4.75724944	3.77089225	2.99883092	5.75854956	5.25680522	6.93366201
01/06/2014	4.85514838	3.73982509	3.00644738	5.64354125	5.26928229	6.94527156
01/07/2014	4.75742088	3.68880164	2.94203434	5.56249463	5.23428782	6.86962018
01/08/2014	4.7589892	3.66498228	2.92445576	5.52562181	5.20545046	6.65306066
01/09/2014	4.57708444	3.52023069	3.43087363	5.20592281	5.09599935	6.64880106
01/10/2014	4.39213057	3.35523286	2.8079806	5.2008362	5.02842485	6.45151187
01/11/2014	4.20514194	3.28174867	2.73367567	5.20074006	4.95921285	6.15904212
01/12/2014	4.14402223	3.33528925	3.06442108	5.22118484	4.753133	6.15892129
01/01/2015	4.11638908	3.15141541	2.58662647	4.64150241	4.48970683	6.05698748
01/02/2015	4.06775466	3.25126576	3.03623374	4.56865063	4.41529536	6.18456451

Data	Drill and Well	Subsea	Topside	Geology and Seismology	Operation support	Operator
01/03/2015	3.94655725	3.14212834	3.01394524	4.38893197	4.13303603	6.12117794
01/04/2015	4.07804548	3.29183993	2.50475394	4.55884778	4.15788038	6.30991934
01/05/2015	4.04650827	3.26243825	3.10473614	4.31258942	4.17229114	6.40323383
01/06/2015	3.95709287	3.16275839	3.07238463	4.15540464	3.96655601	6.32228584
01/07/2015	3.85103953	3.10848047	2.86581341	4.1218554	3.93777263	6.18767986
01/08/2015	3.67906496	3.07005572	2.83144708	4.02280858	2.3904067	2.35670522
01/09/2015	3.68214747	3.01467424	2.31517221	3.98021746	3.52442535	6.18453373
01/10/2015	3.65701928	3.0382067	2.26141582	4.04251006	3.1808319	6.17560735
01/11/2015	3.57523311	3.04503364	2.28170188	4.04621985	2.8507412	6.19795688
01/12/2015	3.39813126	2.94559422	2.79320797	3.85390241	2.9680304	6.06281183
01/01/2016	3.25501024	2.76338036	2.72785283	3.69140494	2.59424176	5.66390216
01/02/2016	3.13814339	2.82750814	2.7308983	3.66058222	2.73384356	5.4036304
01/03/2016	3.21230985	2.92956443	2.76589973	3.67360239	2.67483118	4.62391671
01/04/2016	3.4224775	3.07539669	2.38876282	3.75148577	2.65488615	4.63134783
01/05/2016	3.21926971	3.0807133	2.85953067	3.66786408	2.54264345	4.17560189
01/06/2016	3.15410454	3.12653357	2.42598197	3.68459359	2.62890598	3.02953932
01/07/2016	3.02318764	3.22662066	2.97824694	3.69803046	2.74754654	2.87652258
01/08/2016	3.00634842	3.22957764	2.95820346	3.72992694	2.6376826	2.70374762
01/09/2016	2.97471422	3.17397964	2.96973051	3.71893869	2.59186838	2.61003303
01/10/2016	3.04022968	3.24264535	2.94145205	3.88126374	2.46979019	2.56914059
01/11/2016	3.12366867	3.28915461	2.32238772	3.86419832	2.36825426	2.53950005
01/12/2016	3.48805669	3.37705284	3.02107506	4.02517451	1.59601489	2.83732254

Appendix 3

Table 1

Norwegian oil sectors' enterprise value and Return on Common Equity

Drill and well	Enterprise Value	Return on Common Equity	Geology and Seismology	Enterprise Value	Return on Common Equity
2007	7927929.15	17.3273906	2007	2225536.5	12.0997655
2008	6777344.59	-34.689532	2008	607458.164	0.445196
2009	8230654.06	50.8809204	2009	1265425.14	-36.661442
2010	10113526.4	-0.2426848	2010	1574733.19	-106.46185
2011	9988830.84	5.9202362	2011	1336852.67	-14.674129
2012	10788911.3	7.889738	2012	1970241.06	6.42758725
2013	10917765.4	17.0907182	2013	1459976.63	3.18407375
2014	8871409.18	14.7466192	2014	1144958.61	-2.7056244
2015	7250678.93	-29.300284	2015	900300.927	-31.155584
2016	5743772.82	-12.794447	2016	1092012.65	-36.075052
Operation support	Enterprise Value	Return on Common Equity	Operator	Enterprise Value	Return on Common Equity
2007	4879805.65	19.3976727	2007	6943717.25	-106.36571
2008	3194757.71	12.8417137	2008	6462752.32	5.29430933
2009	4583467.73	17.6419977	2009	6653513.35	-8.368238
2010	6096838.5	-4.7838313	2010	6726816.71	-16.897108
2011	6335724.01	-8.7907287	2011	6921263.02	-14.163045
2012	6313184.4	-5.855826	2012	6171512.14	0.706657
2013	6645554.1	13.5151137	2013	6555511.42	-3.998411
2014	6515068.09	-14.614256	2014	6437728.97	7.867837
2015	5707797.09	-56.05651	2015	7502638.45	-110.80631
2016	7385301.3	-70.831305	2016	7051627.75	-15.751433
Subsea	Enterprise Value	Return on Common Equity	Topside	Enterprise Value	Return on Common Equity
2007	9767994.25	-10.8123	2007	2178970.93	2.744705
2008	4887870.05	-6.9485118	2008	868909.385	-10.673753
2009	5264149.52	29.6361775	2009	1492980.16	0.888958
2010	5964881.07	16.331129	2010	1693772.65	-8.1053175
2011	7511085.97	12.7130463	2011	731077.499	-80.150842
2012	8471571.17	18.7611623	2012	724625.834	-14.06003
2013	9420610.3	18.195161	2013	747487.135	16.0847305
2014	8523358.9	11.4073183	2014	752790.847	-1.10189
2015	8468614.74	4.130972	2015	653901.008	-54.450447
2016	8539300.39	-4.4218055	2016	902664.437	-51.374847

Appendix 4

Table 1

Durbin-Watson test results

Company	Durbin-Watson	negative correlation	Positive correlation
BON	1.93	1.643	2.2296
SDRL	1.996998	1.643	2.2296
PDR	2.89	1.643	2.2296
BWO	1.997	1.643	2.2296
EIOF	2.018958	1.643	2.2296
EMGS	2.688845	1.643	2.2296
HAVI	2.912925	1.643	2.2296
SBX	2.13346	1.643	2.2296
SEVAN	1.639105	1.643	2.2296
SIOFF	2.29156	1.643	2.2296
IOX	1.74605	1.643	2.2296
REACH	2.042648	1.643	2.2296
DNO	2.226726	1.643	2.2296
PGS	1.76802	1.643	2.2296
IMSK	2.260683	1.643	2.2296
PRS	2.818862	1.643	2.2296
FOE	1.791697	1.643	2.2296
SOFF	2.153003	1.643	2.2296
DOF	2.178024	1.643	2.2296
SUBC	2.185956	1.643	2.2296
TGS	2.028643	1.643	2.2296
AKSO	2.827425	1.643	2.2296

Appendix 5

Table 1

Data for time series regression

Observation_date	Oil price	BON	PDR	SDRL	BWO	EIOF	EMGS
2007-01-01	54.51	142.898315	292.622986	94.255913	327.950745	37.780567	2759.48999
2007-02-01	59.28	137.989563	270.299011	86.963135	305.854523	37.780567	2418.11011
2007-03-01	60.44	147.261612	280.580994	91.733276	296.551025	36.996792	2010.34998
2007-04-01	63.98	149.988663	284.007996	90.632454	295.388031	38.877991	3246.83008
2007-05-01	63.46	159.806107	294.290985	106.6399	302.365448	39.191486	2190.53003
2007-06-01	67.49	155.98822	298.644012	116.730568	323.298401	51.803543	1754.31995
2007-07-01	74.12	163.124832	288.269012	108.933228	291.898865	40.800957	1706.90002
2007-08-01	72.36	145.124863	266.037994	99.530579	272.128845	39.040936	1621.56006
2007-09-01	79.92	141.749878	249.735001	111.226585	287.24762	36.320843	1043.10999
2007-10-01	85.80	137.812363	253.162003	117.189232	279.107117	34.560814	967.244995
2007-11-01	94.77	132.187393	206.753998	110.538582	276.781128	32.000748	606.898987
2007-12-01	91.69	137.812363	201.658997	121.54657	266.314484	33.760773	605.002991
2008-01-01	92.97	127.034981	156.177002	101.365242	198.86412	30.976738	512.070984
2008-02-01	95.39	139.592453	173.313995	124.757263	207.004501	30.144726	726.382019
2008-03-01	105.45	136.672119	163.031998	125.215881	176.76799	28.864695	948.280029
2008-04-01	112.58	148.937592	202.492996	142.454803	213.981842	30.20867	732.072021
2008-05-01	125.40	148.937592	250.567993	153.024048	184.908386	30.080702	572.760986
2008-06-01	133.88	167.445404	205.919998	143.144104	186.071457	27.658518	392.588013
2008-07-01	133.37	155.042053	186.188995	142.745728	155.252914	28.775297	248.197006
2008-08-01	116.67	147.600021	181.001999	137.211166	161.068207	28.5783	119.414001
2008-09-01	104.11	98.916832	123.570999	110.230125	95.477745	19.052143	80.938103
2008-10-01	76.61	79.381531	94.391602	59.296993	75.475136	14.321969	69.7742
2008-11-01	57.31	75.970612	68.639999	52.162823	68.381172	12.285326	71.767799
2008-12-01	41.12	89.924393	46.3158	51.050991	50.006634	12.022604	109.644997
2009-01-01	41.71	82.287994	40.294701	53.552586	55.821335	13.993524	87.716202
2009-02-01	39.09	70.301163	32.6063	50.031834	38.493465	13.796439	111.639
2009-03-01	47.94	73.864807	36.867401	60.594109	46.517765	13.796439	121.607002
2009-04-01	49.65	90.063232	31.7726	66.338501	66.8694	14.97894	90.706497
2009-05-01	59.03	104.317856	47.149502	85.239418	83.383133	17.081221	81.735497
2009-06-01	69.64	104.796768	37.793701	85.054115	93.035629	17.147068	78.545898
2009-07-01	64.15	106.148964	34.273701	91.169098	83.499451	16.676353	75.754898
2009-08-01	71.05	107.501205	37.793701	99.137138	85.825356	16.810806	93.098801
2009-09-01	69.41	111.219788	44.648399	111.73774	76.98703	17.684965	103.067001
2009-10-01	75.72	120.34726	39.460999	110.811241	89.779373	18.088493	104.980003
2009-11-01	77.99	109.191467	32.6063	121.558815	103.153038	19.836811	123.023003
2009-12-01	74.47	110.881744	32.6063	137.627319	98.850334	19.702272	107.644997
2010-01-01	78.33	118.995033	29.1789	126.747314	96.059273	21.383406	105.595001
2010-02-01	76.39	114.262268	27.4189	126.375328	100.71151	22.392017	118.306999
2010-03-01	81.20	121.699471	28.345301	128.793137	123.272278	23.736887	75.864403

Observation_date	Oil price	BON	PDR	SDRL	BWO	EIOF	EMGS
2010-04-01	84.29	117.304764	31.7726	140.399078	112.689316	25.149027	107.644997
2010-05-01	73.74	103.7826	23.1579	116.501404	107.572464	23.871424	136.761002
2010-06-01	75.34	99.014267	19.637899	111.087051	88.383789	25.084545	108.670998
2010-07-01	76.32	93.356316	16.3032	132.190674	98.850334	25.769917	126.098999
2010-08-01	76.60	89.820076	15.9326	137.815826	87.220924	25.564314	188.225998
2010-09-01	75.24	95.12442	14.7284	159.285065	120.946152	25.427275	174.283005
2010-10-01	81.89	102.550484	14.08	166.97403	148.275513	24.741901	246.046997
2010-11-01	84.25	108.915695	8.8	179.021759	162.812271	24.67334	261.424988
2010-12-01	89.15	125.889565	9.54105	185.610352	189.559662	26.044085	227.593002
2011-01-01	89.17	121.999702	17.970501	179.423752	172.115738	26.523855	221.442001
2011-02-01	88.58	120.231598	16.117901	201.521179	165.138397	27.209229	264.5
2011-03-01	102.86	118.109901	13.1537	188.867096	172.115738	26.181211	266.550995
2011-04-01	109.53	116.695404	12.8758	176.110321	158.161026	25.632879	237.845001
2011-05-01	100.90	105.733078	12.5053	184.067978	151.182724	25.358713	234.770004
2011-06-01	96.26	102.263252	8.47	179.899673	143.042267	26.711403	266.550995
2011-07-01	97.30	111.155701	9.24	178.938217	137.845871	26.923952	232.718994
2011-08-01	86.33	94.111832	5.94	165.341965	129.703217	23.877293	280.903015
2011-09-01	85.52	88.183525	5.94	156.309448	120.397308	23.239645	265.524994
2011-10-01	86.32	92.259232	6.16	175.841202	121.600136	22.24769	272.701996
2011-11-01	97.16	87.44249	5.61	191.600983	105.425148	20.476416	338.313995
2011-12-01	98.56	86.330925	5.06	191.027908	109.963638	20.972305	426.480988
2012-01-01	100.27	95.964424	8.25	208.992966	103.13868	21.964262	344.464996
2012-02-01	102.20	98.187538	7.59	222.126892	95.455887	22.10602	371.121002
2012-03-01	106.16	95.964424	8.25	204.583008	88.354988	23.948174	275.777008
2012-04-01	103.32	95.593895	7.81	213.126892	92.565575	27.632481	268.601013
2012-05-01	94.66	81.514175	6.71	194.075378	79.641342	24.79837	280.903015
2012-06-01	82.30	85.573196	6.71	203.883789	75.100449	25.505571	317.809998
2012-07-01	87.90	91.38134	6.6	228.318939	64.638092	24.626011	288.079987
2012-08-01	94.13	90.219711	6.49	230.154022	49.381187	23.819862	254.248001
2012-09-01	94.51	91.768555	7.04	216.05307	41.927391	24.552784	243.996002
2012-10-01	89.49	94.479004	0.65	223.690033	39.023445	23.453356	267.781006
2012-11-01	86.53	92.155762	5.3	211.284363	47.177589	24.039732	229.643997
2012-12-01	87.86	105.320862	4.45	197.037201	59.991207	24.186277	196.735001
2013-01-01	94.76	110.741783	5.75	211.280563	65.596527	24.992516	175.923004
2013-02-01	95.31	109.192947	5.25	204.052277	73.053246	25.871984	171.207993
2013-03-01	92.94	105.708069	9.54	206.982666	71.538643	26.604904	219.186996
2013-04-01	92.02	99.512726	6.4	215.578461	63.400131	25.065838	210.164993
2013-05-01	94.51	99.125519	7.01	234.821289	91.254257	24.479464	190.686005
2013-06-01	95.77	102.13781	7.55	239.509888	84.960838	26.238489	144.962997
2013-07-01	104.67	114.80291	6.7	247.940704	90.692169	27.374189	154.598999

Observation_date	Oil price	BON	PDR	SDRL	BWO	EIOF	EMGS
2013-08-01	106.57	115.211472	6.5	276.862244	84.630478	26.157576	140.964005
2013-09-01	106.29	118.479866	6.21	264.509308	95.121902	26.841902	164.031006
2013-10-01	100.54	111.5345	6.07	270.950684	95.269348	25.853395	161.365997
2013-11-01	93.86	112.760155	6.25	256.690155	92.820518	26.613794	142.501999
2013-12-01	97.63	104.997681	5.99	250.002411	84.541298	26.233643	152.343994
2014-01-01	94.62	101.729263	8.5	222.187057	80.486717	25.549219	151.729004
2014-02-01	100.82	99.686508	8.5	218.534943	86.785713	25.017027	145.578003
2014-03-01	100.80	96.418098	11.9	208.664337	90.401817	24.78882	142.912003
2014-04-01	102.07	94.375343	10.4	205.718872	90.549301	25.093	131.020004
2014-05-01	102.18	98.052315	9.7	223.46521	96.033531	24.560711	114.821999
2014-06-01	105.79	111.068398	10.7	241.211578	105.01873	25.302299	90.627197
2014-07-01	103.59	103.844421	11.7	226.318573	97.463074	26.2512	80.170197
2014-08-01	96.54	98.87796	11.6	227.214691	100.14724	25.381399	73.814003
2014-09-01	93.21	92.556992	9	172.75087	93.844635	22.8512	73.403999
2014-10-01	84.40	76.303078	8.05	151.199997	96.55899	21.2698	82.425697
2014-11-01	75.79	68.853371	7.08	100.5	85.817184	18.9767	82.835701
2014-12-01	59.29	66.144386	6.85	86.449997	87.685303	19.372101	84.681099
2015-01-01	47.22	64.789894	8.3	82.349998	86.546898	15.1023	69.713203
2015-02-01	50.58	59.597672	8.5	88.5	71.830475	15.7349	61.5117
2015-03-01	47.82	53.72821	6.6	75.699997	65.05616	13.0465	36.907001
2015-04-01	54.45	60.274918	6.5	95.449997	65.424995	13.4419	37.522099
2015-05-01	59.27	56.888687	6	93.699997	70.098267	12.8884	30.140699
2015-06-01	59.82	60.075939	6.1	81.699997	58.999298	10.2	0.85
2015-07-01	50.90	60.075939	6	73.849998	57.26376	9.36977	12.7124
2015-08-01	42.87	58.198566	5.45	62	36.228138	8.30232	13.1225
2015-09-01	45.48	59.606594	4.85	49.650002	40.20153	10.2791	9.01788
2015-10-01	46.22	53.739803	4.01	55.25	41.378601	10.3581	10.2203
2015-11-01	42.44	49.515713	4.4	51.5	34.598999	7.7093	10.8215
2015-12-01	37.19	49.750385	4.8	30.549999	30.0404	7.58279	7.5149
2016-01-01	31.68	47.168999	4.85	18.4	24.780399	7.03721	7.5149
2016-02-01	30.32	51.627758	4.67	17.93	14.3773	7.06093	6.91371
2016-03-01	37.55	52.566444	4.31	26.809999	15.1955	7.11628	5.41073
2016-04-01	40.75	54.443821	4.25	39.060001	20.572399	7.14791	5.11013
2016-05-01	46.71	49.281044	4.22	27.809999	11.3382	7.40884	4.65924
2016-06-01	48.76	51.880226	4.42	26.76	9	7.29023	2.5701
2016-07-01	44.65	45.693573	3.4	24.690001	12.5	7.82	2.96839
2016-08-01	44.72	47.447269	3.25	20.620001	15.5	7.66186	3.50195
2016-09-01	45.18	46.960129	3.54	19.32	17	7.28232	3.23141
2016-10-01	49.78	51.880226	3.69	17.73	17	7.06093	5.05
2016-11-01	45.66	53.098072	3.9	23.65	19.5	5.17907	5.06
2016-12-01	51.97	70.391479	4	29.82	27.700001	4.89442	5.5

Table 2

Data for time series regression

Observation_date	HAVI	SBX	SEVAN	SIOFF	IOX	REACH
2007-01-01	1119.440796	180633	1781.737915	11.538655	401	1060.890015
2007-02-01	1171.107422	178192	1950.279541	11.147514	420	992.645996
2007-03-01	1212.434814	178192	2576.286133	10.951943	525	982.30603
2007-04-01	1267.544678	161105	2684.64209	12.5654	480	1002.98999
2007-05-01	1308.881836	171845	2732.792725	14.178856	505	1044.349976
2007-06-01	110.495796	430000	3033.760742	14.863353	495	1069.160034
2007-07-01	1467.324951	181121	2576.286133	15.74342	512.5	1065.030029
2007-08-01	1491.330688	126443	2732.792725	15.645635	510	1034.01001
2007-09-01	1394.66748	133278	2708.712646	15.841206	500	1002.98999
2007-10-01	1477.517456	105939	3202.30249	17.992479	474	982.30603
2007-11-01	1380.854126	96662.89844	3599.581543	18.481405	333	806.525024
2007-12-01	1643.217651	98127.5	3948.709717	18.872545	310	785.844971
2008-01-01	1367.050659	92269.10156	2889.299072	15.841206	270	649.356018
2008-02-01	1339.43396	71764.89844	3226.382568	16.330132	255	579.04303
2008-03-01	1211.297485	60292.30078	3130.071533	15.352278	194	620.403992
2008-04-01	1253.060425	70056.20313	3467.155273	16.427916	286	641.083984
2008-05-01	1211.297485	66882.89844	3912.594482	17.796909	320	620.403992
2008-06-01	1166.099976	50284.19922	3057.84082	19.361471	350	589.382996
2008-07-01	1117.219971	46671.60156	2744.827881	17.503553	325	607.995972
2008-08-01	1117.219971	50772.39844	2696.677246	16.916842	265	570.770996
2008-09-01	1002.01001	36517.10156	1131.641479	10.756373	217	475.643005
2008-10-01	653.572998	18014.40039	717.508301	7.304555	160	299.862
2008-11-01	600.505981	12302.5	474.325806	8.018388	225	244.024994
2008-12-01	34.5	14645.90039	356.346619	8.018388	180	204.733002
2009-01-01	530.679016	14645.90039	286.521881	6.844965	190	204.733002
2009-02-01	432.923004	12693.09961	314.933594	6.835186	163	196.460999
2009-03-01	35	9275.730469	272.557343	5.867113	119	186.121002
2009-04-01	551.627014	9763.929688	286.521881	6.668952	122	173.712997
2009-05-01	488.783997	8933.990234	404.982697	7.773924	106	161.304993
2009-06-01	628.435974	9666.290039	404.174957	8.702884	115	181.985001
2009-07-01	656.367004	8299.339844	391.453033	7.949938	120	169.576996
2009-08-01	617.263977	9080.450195	394.878601	7.500126	98	150.964996
2009-09-01	586.539978	9666.290039	438.18277	8.165066	85.199997	144.761002
2009-10-01	636.815002	18551.5	454.575348	8.644213	94.900002	159.237
2009-11-01	712.228027	17819.19922	417.631195	8.086838	86	233.731995
2009-12-01	59.5	24898	497.145172	8.702884	77.900002	253.210007
2010-01-01	837.914978	23921.59961	421.791107	8.849563	59	209.925995
2010-02-01	60	23433.40039	405.887756	8.26285	50.5	177.462997
2010-03-01	66	15964	455.064606	8.800669	52.5	162.313995
2010-04-01	890.283997	19527.90039	423.993134	11.343085	55.5	140.671997
2010-05-01	50.5	14792.40039	345.701782	9.563394	102	110.374001
2010-06-01	935.671021	12204.90039	233.208038	9.387382	99	84.403297
2010-07-01	949.637024	13230.09961	302.152527	9.289596	122	47.612099
2010-08-01	61	10300.90039	288.941376	9.289596	135.5	63.088299
2010-09-01	60	13181.29981	294.56897	9.094026	119.5	39.430199
2010-10-01	55	13767.09961	386.315643	9.13314	127	39.430199
2010-11-01	796.018982	13083.7002	298.972046	9.045132	127.5	39.430199
2010-12-01	858.862976	14157.7002	318.300018	10.609696	143.5	39.430199
2011-01-01	914.723999	14938.79981	299.217133	10.51191	151	39.430199

Observation_date	HAVI	SBX	SEVAN	SIOFF	IOX	REACH
2011-02-01	844.896973	13669.5	284.78241	10.169662	155	39.430199
2011-03-01	851.880005	13571.90039	296.525879	12.174259	142	47.3162
2011-04-01	837.914978	13181.29981	181.438187	11.929795	125	39.430199
2011-05-01	754.122986	10008	37.677418	11.538655	110	20.5037
2011-06-01	729.684021	8250.519531	19.083372	10.267447	81.400002	16.757799
2011-07-01	698.262024	6541.830078	26.423088	10.267447	81.5	13.2091
2011-08-01	613.073975	3515.01001	22.997892	8.790891	90	11.0405
2011-09-01	530.679016	1074.030029	23.487221	8.233516	78.800003	13.2091
2011-10-01	586.539978	1611.050049	13.700871	8.947346	77.5	9.2661
2011-11-01	39.299999	1366.949951	11.254235	7.910823	64.800003	10.449
2011-12-01	481.800995	1122.849976	7.944054	8.116173	128	6.90028
2012-01-01	474.817993	1269.310059	12.874517	9.094026	113.5	8.08319
2012-02-01	34.5	3270.919922	11.682432	10.071877	106	9.06894
2012-03-01	656.367004	2733.899902	15.16332	10.70748	115	7.29459
2012-04-01	712.228027	2880.360107	12.969884	10.560803	111	6.90028
2012-05-01	585.143982	1952.790039	10.967181	9.974092	101.5	1.77436
2012-06-01	525.093018	2148.060059	10.967181	9.240703	93.300003	1.18291
2012-07-01	509.730988	1957.670044	12.969884	8.947346	95.699997	1.97151
2012-08-01	453.869995	2528.860107	16.212355	7.627247	87.099998	1.77436
2012-09-01	460.852997	2997.530029	14.59112	7.910823	79	1.57721
2012-10-01	30	3588.23999	14.305019	7.529461	65	2.56296
2012-11-01	404.992004	3656.590088	17.928957	6.854744	55.5	5.91453
2012-12-01	336.562012	4052.030029	19.264093	7.480569	57	3.45014
2013-01-01	351.924011	4335.180176	20.21776	8.018388	60	5.77652
2013-02-01	398.01001	4496.290039	17.738224	7.725032	29.1	6.58484
2013-03-01	378.458008	4715.97998	17.642857	7.236106	11	5.91453
2013-04-01	349.131012	3832.340088	16.689188	7.558797	11.4	5.71738
2013-05-01	402.199005	3759.110107	18.882624	7.920603	14.8	5.81595
2013-06-01	398.01001	3685.879883	21.266794	7.695696	13.6	3.74587
2013-07-01	418.957001	3563.830078	22.601931	7.627247	18.4	3.79516
2013-08-01	398.01001	3002.409912	21.362162	7.578354	20.4	3.84444
2013-09-01	474.817993	3046.350098	22.31583	8.839784	20.1	3.55858
2013-10-01	485.990997	2440.97998	25.2722	9.485166	22.4	3.38114
2013-11-01	445.490997	2001.609985	23.269497	9.582951	18.5	3.54872
2013-12-01	453.869995	1498.76001	23.841698	9.436273	19.9	3.30228
2014-01-01	460.852997	1220.48999	20.885328	9.563394	17.5	3.15442
2014-02-01	473.421997	810.406006	24.318533	9.094026	22.9	2.92769
2014-03-01	474.817993	849.461975	22.601931	8.810449	22.4	3.00655
2014-04-01	483.197998	1044.73999	22.697296	8.800669	10.4	3.11499
2014-05-01	472.024994	917.809021	24.032433	8.311744	10.8	3.51914
2014-06-01	479.007996	800.642029	24	8.38	13.6	4.33732
2014-07-01	458.059998	742.059021	24.1	8.05	11.7	4.23875
2014-08-01	445.490997	722.531006	23.200001	7.8	9	3.95288
2014-09-01	400.803009	463.786987	24.6	6.15	6.9	3.25299
2014-10-01	377.062012	463.786987	22	5.22	2.4	3.2037
2014-11-01	351.924011	463.786987	21.799999	3.95	2.2	3.05584
2014-12-01	270.925995	463.786987	20	4.04	1.6	3.15442
2015-01-01	207.384003	136.695007	19.299999	2.16	3.2	3.15442
2015-02-01	192.720001	107.403	18.799999	2.05	2.9	2.85869
2015-03-01	139.651993	78.111397	18.6	1.87	2.9	2.84883

Observation_date	HAVI	SBX	SEVAN	SIOFF	IOX	REACH
2015-04-01	143.841995	117.167	19.799999	2.69	2.8	2.71083
2015-05-01	150.126007	39.055698	19.200001	2.09	2.9	2.57282
2015-06-01	122.195999	34.173801	19	1.78	2.4	2.26724
2015-07-01	118.705002	29.2918	18.4	1.75	2	2.50382
2015-08-01	6	19.527901	17.9	1.77	1.95	2.07009
2015-09-01	74.714104	19.527901	17.6	1.78	1.62	2.07009
2015-10-01	44.549099	19.527901	15.9	1.79	1.73	2.1588
2015-11-01	29.187401	14.6459	15.9	1.63	3.39	1.99122
2015-12-01	36.169998	7.4694	17.299999	1.4	2.4	1.47863
2016-01-01	21.3668	7.27413	18	1.8	2.47	1.45892
2016-02-01	27.7908	5.12606	18.4	1.74	1.89	2.05037
2016-03-01	25.2771	6.29773	19.4	1.68	1.78	1.7645
2016-04-01	25.1374	5.85836	19.700001	1.8	1.75	1.58707
2016-05-01	24.5788	5.63867	21.4	1.76	1.75	1.77436
2016-06-01	26.534	4.66716	22.9	1.75	2.15	1.57721
2016-07-01	26.9529	5.56544	21.9	1.85	1.98	1.55749
2016-08-01	23.182301	4.35959	18.9	2.05	1.9	1.79407
2016-09-01	22.4841	4.15455	19.200001	1.88	1.6	1.56735
2016-10-01	20.1099	3.88116	17	1.8	1.6	1.7645
2016-11-01	17.596201	3.11957	16.4	1.8	1.62	1.96165
2016-12-01	1.06	8.54344	17	1.85	6.02	1.87293

Table 3

Data for time series regression

Observation_date	DNO	PGS	IMSK	PRS	FOE	SOFF
2007-01-01	12.42	130.938293	42.129688	1210.01465	197.61853	97.179237
2007-02-01	10.88	128.018616	40.101563	1078.59973	204.396072	97.90966
2007-03-01	10.93	142.61705	38.257809	1152.98779	217.237732	105.947121
2007-04-01	11.8	149.130051	51.945652	1149.27295	212.600433	118.00296
2007-05-01	11.97	136.10405	51.464672	1161.66748	219.377975	116.176559
2007-06-01	12.39	132.285583	50.983696	1171.5896	226.547195	119.012703
2007-07-01	10.97	128.823975	52.426628	1128.18848	217.337952	119.760963
2007-08-01	10.4	126.51516	52.186142	1091.00464	198.182739	116.76722
2007-09-01	11.2	143.599701	53.388584	1192.66419	209.602219	107.036324
2007-10-01	10.05	145.908493	59.160324	1180.2594	201.1297	118.638237
2007-11-01	9.99	146.832352	53.869564	1179.0282	203.33992	110.030823
2007-12-01	10.08	145.677979	53.869564	1171.5896	219.179794	117.504875
2008-01-01	6.89	105.275948	42.326088	948.425659	195.235794	101.048882
2008-02-01	6.83	117.050423	44.25	1119.51807	216.96962	107.785332
2008-03-01	9.09	116.357048	43.288044	991.817688	212.917511	96.931664
2008-04-01	9.7	128.362946	48.5	1097.20178	238.335052	100.674377
2008-05-01	9.96	138.751602	53	3299.9978	237.96666	105.913582
2008-06-01	10.63	115.434082	50.5	3057.79614	234.231827	92.257172
2008-07-01	8.29	110.816498	48.5	2727.79858	213.385971	94.958679
2008-08-01	8.77	108.277191	48	2966.97144	218.313187	89.941147
2008-09-01	5.3	70.276169	39	1913.39893	169.420135	67.166039
2008-10-01	4.47	30.613077	33	1498.62647	167.146042	47.093472
2008-11-01	6.44	28.950815	32	1583.39221	148.763763	54.04163
2008-12-01	4.45	25.534008	36	1574.31494	139.477875	45.741932
2009-01-01	4.4	21.008995	29.700001	1604.58643	136.066742	58.866821
2009-02-01	4.35	21.563051	28	1544.03333	123.369682	53.170109
2009-03-01	5.9	26.041864	22.5	1456.2384	140.235886	53.269646
2009-04-01	5.68	29.920433	23	1662.11047	159.186691	59.638802
2009-05-01	8.13	37.308296	22.700001	1937.61218	171.504715	66.008034
2009-06-01	8	36.800335	29.5	1950.04309	172.567337	73.910995
2009-07-01	7.5	39.718548	26.5	1947.01379	176.089783	78.46846
2009-08-01	6.31	44.04961	41	1770.7793	160.95755	75.298012
2009-09-01	4.061	52.037636	41.900002	1802.27734	170.119019	76.487
2009-10-01	4.5	50.144497	37.5	1817.15271	175.331589	85.601974
2009-11-01	4.958	54.484825	33	1838.35425	173.278137	86.394302
2009-12-01	5.07	61.410828	40.400002	2232.88818	175.331589	86.69854
2010-01-01	5.76	69.075668	39.5	2028.67761	183.940186	90.357552
2010-02-01	6.5	69.121864	38	1780.25	164.116669	83.22419
2010-03-01	7.39	71.892235	37.099998	1889.92334	179.675369	99.076378
2010-04-01	8.805	76.001678	36.599998	2009.89368	171.224716	99.076378
2010-05-01	7.695	59.563892	34.5	1684.5105	149.347763	91.149872
2010-06-01	7.17	50.883327	33.900002	1588.08667	139.92334	87.564041
2010-07-01	8.35	50.329182	34	1708.10657	148.388458	90.73867
2010-08-01	8.495	52.360809	30	1835.39453	151.293152	90.806831
2010-09-01	9.02	61.918789	31.5	2195.44385	170.215179	90.806831
2010-10-01	9.2	67.598091	35	2341.04297	182.580872	85.942245
2010-11-01	7.92	69.62973	36.799999	2485.95337	191.294968	83.758774

Observation_date	DNO	PGS	IMSK	PRS	FOE	SOFF
2010-12-01	9.07	83.8974	36.900002	2814.0293	213.951584	94.050423
2011-01-01	9.68	78.956833	36.900002	2608.43604	207.810226	98.509346
2011-02-01	9.54	85.282578	35.5	2559.30542	195.361526	101.34729
2011-03-01	9.02	81.865768	44.700001	2545.35913	201.668869	105.401382
2011-04-01	7.87	76.509636	39	2583.5669	200.838959	103.779579
2011-05-01	7.55	80.24971	36.299999	2568.40649	174.862671	93.239113
2011-06-01	6.18	71.199684	34.799999	2458.63696	165.515701	99.10318
2011-07-01	6.09	81.034637	33.799999	2441.23291	181.130386	96.582825
2011-08-01	5.88	62.426647	28.5	2379.34961	166.122925	82.30571
2011-09-01	5.46	55.315948	28.799999	2328.99951	146.69133	70.547775
2011-10-01	6.565	56.331764	30	2568.3728	163.173508	69.287933
2011-11-01	8.335	55.038872	30	2633.91284	167.684402	76.426704
2011-12-01	7.48	60.441216	29.799999	2488.50708	174.364014	71.807533
2012-01-01	8.145	69.352745	27	2762.30566	191.800415	82.725655
2012-02-01	10.47	78.679756	28	2974.79443	203.858429	91.543793
2012-03-01	10.1	76.878998	27.299999	2748.95215	193.708893	89.024269
2012-04-01	9.085	79.741753	27	2711.42529	205.853653	92.384201
2012-05-01	7.85	65.427986	25.799999	2526.21143	161.525269	80.626007
2012-06-01	6.86	67.55838	25.799999	2615.07886	193.247147	72.445854
2012-07-01	8.01	83.184753	25.4	2681.9043	208.091293	73.511246
2012-08-01	8.59	82.436134	24.5	2689.79541	224.028275	72.445854
2012-09-01	10.94	88.611893	24	2872.85303	233.135117	73.724373
2012-10-01	9.95	91.980469	22.200001	2885.00244	243.607971	71.593605
2012-11-01	9.98	88.845833	19.6	2900.19092	227.853149	79.264282
2012-12-01	9.315	89.2201	19.1	2876.02417	220.2034	85.230446
2013-01-01	9.29	90.670448	17	3160.45752	237.688538	89.491997
2013-02-01	10.33	84.681915	15.2	3506.89795	227.671005	89.491997
2013-03-01	10.11	83.980095	14.8	3437.85815	227.671005	86.508713
2013-04-01	10.07	78.974037	14.3	3364.90796	228.58168	86.08271
2013-05-01	10.54	82.155479	10.1	3361.8667	225.84964	80.116623
2013-06-01	11.1	70.578377	9.8	3244.12036	227.061996	84.821182
2013-07-01	12.75	75.681	9.45	3602.89014	269.25769	83.946785
2013-08-01	13.28	74.870224	9.5	3320.1311	267.933167	90.50518
2013-09-01	13.36	70.864433	9.21	2919.56836	252.606476	97.937531
2013-10-01	16.870001	68.861595	8.6	3105.09204	237.185181	103.18499
2013-11-01	22.66	70.006042	9.12	2804.61914	228.954178	106.682411
2013-12-01	24.200001	68.14624	9.45	2847.4314	233.590027	105.370766
2014-01-01	20.379999	61.851448	11.4	2538.9646	214.478973	100.998329
2014-02-01	24.59	62.471382	10.6	2634.48828	186.380051	98.375038
2014-03-01	22.85	69.529236	9.71	2920.31714	189.218323	94.002602
2014-04-01	20.610001	68.336975	9.3	3183.2561	178.90593	95.751755
2014-05-01	21.620001	61.517578	8.7	3046.31567	154.875198	94.877617
2014-06-01	21.2971437	64.013527	8.49	3079.78955	174	95.331436
2014-07-01	21.18	53.113594	8.02	2854.86865	142.899994	96.706375
2014-08-01	18.68	45.932201	7.8	2297.77954	145.300003	93.497871
2014-09-01	19.73	40.082302	6.8	2288.94507	118	82.498062
2014-10-01	16.5	32.942371	5.85	1882.07874	71.949997	75.164917

Observation_date	DNO	PGS	IMSK	PRS	FOE	SOFF
2014-11-01	15.83	33.858238	4.71	1400.89441	72.900002	70.810783
2014-12-01	15.98	41.69743	4.5	1401.17297	68.150002	72.41494
2015-01-01	17	41.382301	3.07	1261.06067	64.699997	56.831963
2015-02-01	14.98	42.846283	3.15	1437.72485	63.700001	52.248795
2015-03-01	10.55	40.840603	3.45	1352.75244	57.700001	43.998959
2015-04-01	14.15	49.122967	3.6	1633.05176	67.5	44.365582
2015-05-01	10.91	46.976109	2.3	1797.57336	59.299999	42.165676
2015-06-01	10.36	42.0867	1.95	1657.77319	54.650002	34.261101
2015-07-01	7.595	37.188702	2.23	1450.55164	38.02	32.9776
2015-08-01	9.525	36.8894	2.07	20.193342	36.169998	24.6838
2015-09-01	9.01	32.649799	2.01	1444.93005	44.349998	25.078699
2015-10-01	8.155	35.2934	1.98	1432.73999	39.349998	25.6712
2015-11-01	8.62	40.810001	1.98	1463.21997	38.5	20.7344
2015-12-01	6.025	36.261002	1.95	1280.31995	34.400002	20.2407
2016-01-01	5.75	26.2356	1.81	856.593994	34.400002	16.9825
2016-02-01	6.295	19.741501	1.6	658.450012	26.700001	16.785
2016-03-01	6.375	23.0833	2.06	297.522003	25.299999	16.1926
2016-04-01	9.295	28.4202	2.13	296.911987	34.900002	15.4027
2016-05-01	8.755	23.9811	2.7	184.731995	32.400002	10.8609
2016-06-01	9.31	19.6717	1.91	50.6031	25.1	13.1318
2016-07-01	8.6	16.738899	2.16	42.677299	16.5	17.700001
2016-08-01	8.765	17.6866	2.36	34.1418	14.25	16.4
2016-09-01	8.105	17.507	2.08	31.0935	11.1	15.5
2016-10-01	7.08	22.1756	2	30.483801	14.25	13.35
2016-11-01	7.4	24.9	2.14	29	13.5	12.3
2016-12-01	8.19	29.200001	2.24	37	31.700001	11.5

Table 4

Data for time series regression

Observation_date	DOF	SUBC	TGS	AKSO	EXCHANGERATE	OPEC
2007-01-01	46.615776	119.243561	97.764153	8.042536	-	0
2007-02-01	44.512764	114.069786	97.190193	8.12237	-0.0126818	0
2007-03-01	46.265274	127.866547	107.521439	16.309837	-0.0195245	0
2007-04-01	45.914772	128.112915	105.608223	17.541788	-0.0010332	0
2007-05-01	48.193031	134.025818	97.572838	18.31526	0.00717649	0
2007-06-01	50.049858	132.245834	92.598534	18.562754	-0.0221837	0
2007-07-01	47.726158	155.191452	87.432907	39.260014	0.00708713	0
2007-08-01	40.754955	151.983994	76.719025	18.129604	-0.0193899	0
2007-09-01	37.894901	158.152176	84.563126	21.254339	-0.0239164	0
2007-10-01	41.11237	152.970917	68.874947	23.141556	-0.0305537	0
2007-11-01	39.682434	116.948738	58.314117	19.583723	0.0071831	0
2007-12-01	44.508686	119.662735	57.089672	17.882111	-0.0097909	0
2008-01-01	37.179886	97.11187	49.743008	25.570663	-0.0008561	1
2008-02-01	37.894901	112.014183	59.462029	15.561791	-0.0505601	1
2008-03-01	37.001228	108.313278	56.707031	14.355164	-0.0184727	1
2008-04-01	41.11237	124.597282	63.058834	33.642216	0.01436403	1
2008-05-01	42.184895	130.765457	61.910919	19.940985	-0.0003871	1
2008-06-01	41.570446	112.691101	54.181622	16.652136	-0.0127936	1
2008-07-01	44.157009	85.506844	49.896065	16.825205	0.04804657	1
2008-08-01	40.277119	92.426468	55.712173	17.27528	0.04338317	1
2008-09-01	30.300196	56.839806	35.432323	12.933959	0.07088113	1
2008-10-01	22.909931	43.791363	28.544836	5.047568	0.05016928	1
2008-11-01	26.974586	39.343029	34.628784	5.546089	-0.0571908	1
2008-12-01	25.126972	38.552219	26.516853	6.231566	0.0111795	1
2009-01-01	25.053087	37.860252	30.419769	4.52827	0.0403454	1
2009-02-01	21.579708	36.426903	35.355804	5.262211	-0.0189403	1
2009-03-01	24.018499	41.616623	40.100525	6.030749	-0.0107462	1
2009-04-01	25.126972	51.106403	37.728165	5.587634	-0.0327503	1
2009-05-01	22.909931	62.770916	47.676765	8.26456	-0.0292801	1
2009-06-01	29.0518	62.700867	48.595097	7.979033	-0.0026141	1
2009-07-01	27.874001	64.843803	53.171455	7.903951	-0.0129973	0
2009-08-01	27.716999	60.02219	58.237583	18.503962	-0.0206083	0
2009-09-01	27.7955	72.175446	66.19648	9.774734	-0.0171435	0
2009-10-01	25.754	71.927414	66.846962	10.383293	-0.0059711	0
2009-11-01	29.444401	82.890152	70.864647	22.110664	0.02114637	0
2009-12-01	30.229601	90.926178	80.20105	11.337471	0.02125393	0
2010-01-01	29.208799	90.678154	87.394646	12.021177	0.04395143	0
2010-02-01	29.837	96.630768	86.552834	11.758233	0.00642094	0
2010-03-01	35.333302	107.841515	96.501434	13.974631	0.00992915	0
2010-04-01	34.3125	112.305977	87.16507	14.981372	0.06331832	0
2010-05-01	34.077	93.456039	67.459183	14.312529	0.03236605	0
2010-06-01	33.213299	97.027611	58.161068	11.953565	-0.044403	0
2010-07-01	34.469601	99.204422	64.693726	12.509503	-0.0106041	0
2010-08-01	35.568802	96.320282	68.191788	11.048107	-0.0101244	0
2010-09-01	34.077	107.906563	67.990746	13.542078	-0.063579	0
2010-10-01	34.626598	117.652969	81.621048	14.169499	0.01621963	0

Observation_date	DOF	SUBC	TGS	AKSO	EXCHANGERATE	OPEC
2010-11-01	34.155499	122.923973	85.400536	14.598456	0.03381234	0
2010-12-01	38.8666	142.217865	105.745506	15.765967	-0.0103148	0
2011-01-01	41.222099	139.731537	109.44458	16.679384	-0.0218819	0
2011-02-01	45.933201	143.112946	116.279854	39.288437	-0.0276267	0
2011-03-01	43.773998	138.935913	119.335602	42.139748	-0.029161	0
2011-04-01	45.5406	137.245224	111.052879	20.110575	0.00768321	0
2011-05-01	38.788101	142.217865	122.230553	18.903276	-0.0035551	0
2011-06-01	37.7673	137.245224	121.667633	17.980036	0.00533227	0
2011-07-01	36.118401	141.62114	129.554062	18.044111	-0.0013716	0
2011-08-01	32.192501	124.01796	110.354805	13.323676	0.03802269	0
2011-09-01	23.965099	112.77977	90.499146	10.820753	0.00573777	0
2011-10-01	23.698799	120.437653	104.283234	22.498934	0.01008203	0
2011-11-01	19.260799	112.77977	104.857552	12.809763	0.03004417	0
2011-12-01	19.0833	110.392891	108.713829	11.981804	0.02173673	0
2012-01-01	24.852699	118.15023	120.446724	13.69485	-0.0255289	0
2012-02-01	28.136801	133.56546	132.507797	33.687592	0.00098737	0
2012-03-01	32.397202	149.975204	128.077209	18.339115	0.00299316	0
2012-04-01	35.415001	147.488892	135.707672	18.51042	0.0267941	0
2012-05-01	28.8468	119.642029	124.713242	16.724251	0.02251164	0
2012-06-01	26.6278	116.459526	130.948898	31.860128	0.01892657	0
2012-07-01	25.296499	126.007019	151.536911	18.471508	-0.0069941	0
2012-08-01	23.876301	132.471466	144.781052	22.007717	-0.0373233	0
2012-09-01	23.3438	131.476944	159.832092	22.569351	-0.0087525	0
2012-10-01	20.681	124.415771	165.903839	23.297462	0.01133155	0
2012-11-01	23.077499	128.791702	153.503815	22.174192	-0.0215366	0
2012-12-01	23.965099	131.377487	155.214172	23.484674	-0.0134736	0
2013-01-01	22.811199	131.476944	174.455566	24.857506	-0.0069573	0
2013-02-01	24.497601	134.957794	185.743881	23.526217	0.03135956	0
2013-03-01	21.5686	135.653961	188.223892	22.631779	-0.0041923	0
2013-04-01	21.923599	123.520691	176.593536	16.744986	0.00268605	0
2013-05-01	22.278601	129.388428	176.593536	19.501715	-0.0148871	0
2013-06-01	21.746099	105.917503	150.938278	18.515995	0.00805379	0
2013-07-01	23.077499	111.188522	168.508942	19.893761	-0.018899	0
2013-08-01	21.5686	125.5	160.586441	20.801121	-0.0018602	0
2013-09-01	25.207701	125	157.559875	18.919249	-0.0216574	0
2013-10-01	24.852699	125.900002	145.809647	18.437553	0.01090083	0
2013-11-01	28.6693	119.300003	143.940277	24.374363	-0.0153229	0
2013-12-01	28.136801	116.099998	143.13916	24.284796	0.005191	0
2014-01-01	27.5154	107.800003	144.296356	21.506771	-0.0013461	0
2014-02-01	26.184	114.5	168.686981	22.604551	-0.0132417	0
2014-03-01	24.142599	111.300003	174.740128	20.890686	0.00169538	0
2014-04-01	24.2313	118.900002	182.484604	21.316351	0.00492609	0
2014-05-01	26.095301	119.5	173.404877	27.84203	0.01012954	0
2014-06-01	26.184	112.53889	174.562103	28.266363	0.00390894	0
2014-07-01	24.497601	105	166.544418	24.7131	0.01621138	0

Observation_date	DOF	SUBC	TGS	AKSO	EXCHANGERATE	OPEC
2014-08-01	23.7875	103.099998	161.892349	24.872261	0.0322282	0
2014-09-01	20.4147	88.650002	152.122986	61.960888	0.01841359	0
2014-10-01	17.4856	72.650002	146.540482	22.50923	0.01558019	0
2014-11-01	14.5566	69.900002	145.144852	20.418049	0.01246	0
2014-12-01	13.2695	76.550003	150.448212	40.22617	0.05968142	0
2015-01-01	9.31975	65.900002	167.009613	18.394638	0.02233535	0
2015-02-01	8.69843	76	173.894714	41.629971	0.04690021	0
2015-03-01	7.36704	69.349998	166.358353	40.63279	0.00223601	0
2015-04-01	7.76646	83.650002	178.081573	14.231641	-0.0328733	0
2015-05-01	7.4913	81.5	182.361481	45.619999	-0.0049434	0
2015-06-01	5.32557	76.75	178.000565	44	0.01929958	0
2015-07-01	6.12441	71.550003	167.501358	32.540001	-0.0107236	0
2015-08-01	5.4	70.400002	153.891266	31.24	-0.0100022	0
2015-09-01	5.68061	63.5	152.919113	11	0.00096039	0
2015-10-01	4.70425	66.25	162.835037	11.1	0.04482224	0
2015-11-01	5.19243	69.150002	162.446182	11.85	-0.0145462	0
2015-12-01	3.97643	63.049999	137.461929	30.299999	0.00307455	0
2016-01-01	3.41724	51.5	119.379959	26.1	-0.0219839	0
2016-02-01	3.30185	55.200001	123.754631	25.9	-0.0015697	0
2016-03-01	3.49712	62.5	122.782486	26.6	-0.0197386	0
2016-04-01	3.79891	74.099998	130.948532	11.2	0.00281953	0
2016-05-01	3.61251	74.300003	122.393616	29.200001	0.00564344	0
2016-06-01	1.01186	81.300003	132.406769	9.29	0.01643317	0
2016-07-01	1.15	90.25	136.198151	35.209999	-0.0127912	0
2016-08-01	1.02	90.599998	141.156113	36.84	1.7925E-05	0
2016-09-01	0.96	85.800003	139.989532	37.380001	0.01532941	0
2016-10-01	0.88	92.699997	162.835037	38.029999	0.02294138	0
2016-11-01	0.74	99.400002	162.64061	12.4	0.02297178	0
2016-12-01	1.07	109.300003	186.216873	42.689999	0.01558019	0

Appendix 6

Table 1

Data for panel regression

COMP	YEAR	CRgrowth	GRofCAPEX	dummyofdividend	FIXEDgrowth	GRofAT
BON	2008	0.217866	-0.06476	1	0.036368	0
BON	2009	-0.20479	-0.41121	1	0	0.029853
BON	2010	-0.03301	0.183093	1	-0.07411	0
BON	2011	-0.17563	-0.4962	1	0.019048	0.057158
BON	2012	-0.56563	0.501581	1	-0.09909	-0.08701
BON	2013	-0.02857	-0.50793	1	-0.02105	0
BON	2014	0.109699	0.886803	1	0	0
BON	2015	0.435318	-0.51445	0	0.101096	0.058841
BON	2016	0.457318	-1.27871	0	0.019048	-0.05884
BWO	2008	1.041873	0.714579	0	-0.66812	-0.58912
BWO	2009	0.533121	0.896501	0	-1.10501	-0.64536
BWO	2010	-0.85911	-1.34186	0	0.166921	0.552582
BWO	2011	1.298213	-0.12134	0	0.209889	0.327163
BWO	2012	-0.80647	-0.5825	1	0.035337	0.060639
BWO	2013	0.2733	-0.90803	1	0.127611	0.147794
BWO	2014	0.151563	1.170734	1	0.088235	0.062457
BWO	2015	-0.42545	0.53126	0	-0.28756	-0.26742
BWO	2016	0.197214	0.033212	0	-0.19542	-0.17252
DNO	2008	-0.17397	-0.36525	1	0.717237	0.886551
DNO	2009	0.215687	-0.06481	1	0.038311	-0.0064
DNO	2010	-0.20117	-0.41126	1	-0.00216	0.03155
DNO	2011	-0.03569	0.183262	1	-0.06805	-0.00609
DNO	2012	-0.17487	-0.4962	1	0.025925	0.061258
DNO	2013	-0.56843	0.501398	1	-0.10419	-0.07088
DNO	2014	-0.02786	-0.50771	1	-0.02385	-0.0059
DNO	2015	0.104976	0.886684	1	-0.00081	0.010606
DNO	2016	0.444447	-0.51434	0	0.107185	0.050322
DOF	2008	-0.49819	2.43116	1	-0.45091	-0.32707
DOF	2009	-0.19362	-0.0989	0	-0.13288	-0.10025
DOF	2010	-0.24624	-0.16484	0	-0.11359	-0.05894
DOF	2011	0.054947	0.239912	0	0.044506	0.077432
DOF	2012	-0.45996	-0.24691	0	-0.01073	0.015512
DOF	2013	-0.30061	-0.79015	0	0.124159	0.14643
DOF	2014	-0.1232	-0.88516	0	0.180995	0.147509
DOF	2015	-0.23334	0.23895	0	0.135405	0.0705
DOF	2016	0.112019	0.658312	0	0.02404	-0.00463
EIOF	2008	0.502498	-0.88113	0	0.103407	0.135159
EIOF	2009	0.643294	0.551807	1	0.060247	0.053902
EIOF	2010	-0.26621	-1.51199	0	-0.10002	-0.09587
EIOF	2011	-0.21037	0.096663	0	-0.03978	-0.03785

COMP	YEAR	CRgrowth	GRofCAPEX	dummyofdividend	FIXEDgrowth	GRofAT
EIOF	2012	0.067296	1.509636	1	-0.13802	-0.15059
EIOF	2013	0.918178	-1.66093	1	0.017307	-0.01296
EIOF	2014	-0.46048	-0.19726	0	0.08443	0.044012
EIOF	2015	0.680835	1.527619	0	0.127784	0.100075
EIOF	2016	-0.1981	-2.18248	0	-0.33774	-0.36322
EMGS	2008	0.10413	-1.53573	0	-0.42829	-0.33475
EMGS	2009	-0.5723	0.664255	0	-0.61379	-0.43996
EMGS	2010	-0.55976	-0.87966	0	0.37676	0.287682
EMGS	2011	1.790156	-0.86381	0	0.93702	0.532042
EMGS	2012	-0.32958	1.728824	0	0.001443	-0.09285
EMGS	2013	0.005967	-0.35323	0	-0.47199	-0.41845
EMGS	2014	-0.68542	0.302125	0	0.236598	0.230704
EMGS	2015	0.416456	-0.05949	0	-0.8551	-0.77668
EMGS	2016	-0.29611	-0.21248	0	-0.50791	-0.2295
FOE	2008	1.3841	-0.6589	1	0.026506	-0.09295
FOE	2009	-0.55512	-0.01942	1	-0.01806	-0.03445
FOE	2010	-0.06894	-0.01281	1	-0.07732	0.01708
FOE	2011	0.327211	-0.33576	1	0.049439	0.03678
FOE	2012	-0.98813	0.612802	1	-0.05696	-0.02002
FOE	2013	-0.4336	-0.73287	1	-0.16109	-0.09523
FOE	2014	0.169668	1.49474	0	-0.14073	-0.11596
FOE	2015	0.328454	-0.62636	0	0.064027	0.021208
FOE	2016	2.363373	-2.68527	0	0.08818	0.000335
HAVI	2008	0.254143	#VALUE!	1	0.092183	0.194351
HAVI	2009	-0.82125	#VALUE!	1	-0.31251	-0.14476
HAVI	2010	-0.12594	#VALUE!	0	-0.08436	-0.0592
HAVI	2011	-0.16621	#VALUE!	0	0.014778	0.033823
HAVI	2012	-0.11338	-0.91958	0	-0.12802	-0.08752
HAVI	2013	-0.55922	-1.07261	0	0.036577	0.051445
HAVI	2014	-0.01922	0.365383	0	0.180404	0.186483
HAVI	2015	-2.12224	-0.83113	0	0.023069	0.018849
HAVI	2016	0.962687	-1.83469	0	-0.13191	-0.15815
IOX	2008	-1.10336	-0.52079	0	0.450942	0.282644
IOX	2009	-0.91549	-0.75795	0	-0.06705	-0.15047
IOX	2010	0.58422	0.213643	0	0.074519	0.23336
IOX	2011	0.208085	-0.92902	0	0.444356	0.478912
IOX	2012	-0.53752	-0.12959	0	0.284441	0.196079
IOX	2013	1.657765	1.468373	0	-0.42975	-0.57966
IOX	2014	-0.53241	-7.54878	0	-0.1119	-0.06945
IOX	2015	1.647315	4.489456	0	-0.66123	-0.6062
IOX	2016	-0.5205	1.454955	0	-0.10217	-0.08261
REACH	2008	0.340418	-1.55602	0	0.078116	0.074821
REACH	2009	0.097033	0.004453	0	-0.15911	-0.18582
REACH	2010	0.691077	-0.00693	0	-0.28194	-0.30702
REACH	2011	-0.11443	0.000665	0	-0.30245	#NUM!

COMP	YEAR	CRgrowth	GRofCAPEX	dummyofdividend	FIXEDgrowth	GRofAT
REACH	2012	2.400836	-0.00124	0	-0.47009	#NUM!
REACH	2013	-0.6992	3.074723	0	2.953321	4.187757
REACH	2014	-1.06375	-2.87049	0	-0.3054	1.018693
REACH	2015	-0.66535	0.241662	0	0.451543	0.473639
REACH	2016	-0.45725	-3.25501	0	-0.73973	-0.71864
PDR	2008	-2.39649	1.298126	0	-1.10361	-0.80963
PDR	2009	0.975546	-2.96438	0	0.501014	0.535554
PDR	2010	-0.15349	-0.23455	0	1.407231	0.861836
PDR	2011	-0.94057	0.321029	0	0.327338	0.415203
PDR	2012	-0.55767	-0.53951	0	0.268929	0.280534
PDR	2013	1.003995	-0.47481	0	0.227223	0.170471
PDR	2014	0.597527	0.912206	0	-0.00165	0.057265
PDR	2015	-0.12921	-0.14976	0	-0.35708	-0.29551
PDR	2016	0.612509	-1.21479	0	0.019758	0.063315
PGS	2008	0.097431	0.422382	0	-0.4076	-0.28993
PGS	2009	0.34314	-0.44262	0	-0.2082	-0.20807
PGS	2010	1.441061	0.123093	0	-0.04259	-0.16852
PGS	2011	-0.32898	0.192159	1	0.095383	0.064788
PGS	2012	0.27499	-0.01053	1	0.106009	0.153567
PGS	2013	-0.44124	0.212491	1	-0.12742	-0.07261
PGS	2014	-1.63662	-0.10193	0	-0.10341	-0.07363
PGS	2015	0.717196	-0.43619	0	-0.33997	-0.32018
PGS	2016	-0.08806	0.515496	0	-0.13686	-0.10759
PRS	2008	0.570812	-0.46072	0	0.436346	0.45391
PRS	2009	0.282401	-0.9954	1	0.389716	0.41399
PRS	2010	0.073401	-1.21312	1	0.066259	0.123969
PRS	2011	-0.25019	0.915802	1	0.026961	0.008319
PRS	2012	-0.47123	0.330174	1	0.055113	0.046587
PRS	2013	0.830682	0.163515	1	-0.11956	-0.05637
PRS	2014	-0.80382	-0.12099	1	-0.08169	-0.05381
PRS	2015	-1.27911	1.345091	0	-0.36011	-0.29765
PRS	2016	1.978037	-0.36873	0	-0.23006	-0.19812
SBX	2008	-0.06639	-1.60507	0	0.633096	0.624281
SBX	2009	0.069724	-0.35364	0	-0.28023	-0.29548
SBX	2010	-2.4302	-1.18712	0	-0.44327	-0.44651
SBX	2011	2.621901	0.901555	0	0.258743	0.17508
SBX	2012	0.44051	-0.47078	0	1.129671	1.020222
SBX	2013	-0.36416	0.047371	0	0.136302	0.156269
SBX	2014	-1.68572	-0.46436	0	-0.08683	-0.15823
SBX	2015	1.270637	-0.02577	0	0.00384	-0.02931
SBX	2016	1.407878	-0.2508	0	-0.02593	0.058122
SDRL	2008	-1.47477	0.138054	0	-0.01156	0.028991
SDRL	2009	0.86701	-1.17475	1	0.263761	0.280454
SDRL	2010	-0.09373	0.331035	1	0.019095	0.035422
SDRL	2011	-1.0789	0.034613	1	-0.16376	-0.09677

COMP	YEAR	CRgrowth	GRofCAPEX	dummyofdividend	FIXEDgrowth	GRofAT
SDRL	2012	-0.01533	-0.55658	1	-0.02994	0.008076
SDRL	2013	0.520644	0.844427	1	-0.05053	-0.02613
SDRL	2014	-0.0893	-0.34149	1	-0.12106	-0.19096
SDRL	2015	0.206894	-0.98045	0	-0.02443	-0.08619
SDRL	2016	-0.08621	-1.61459	0	-0.27168	-0.21556
SEVAN	2008	-1.92097	-0.53228	0	-0.17612	0.012402
SEVAN	2009	-0.55489	-0.92081	0	0.222841	0.26359
SEVAN	2010	0.51702	0.325547	0	-1.11407	-1.14191
SEVAN	2011	-0.65242	-5.31717	0	0.928428	0.774435
SEVAN	2012	-0.08377	-0.34406	0	2.883292	0.979118
SEVAN	2013	2.421921	-1.47336	1	1.121225	0.371147
SEVAN	2014	-0.30235	0.91824	0	3.344438	0.999056
SEVAN	2015	0.158498	-0.32341	0	-1.21703	-0.99457
SEVAN	2016	0.394712	6.235762	0	-0.14419	-0.12024
SIOFF	2008	-1.26513	-0.67007	0	-0.21684	-0.15276
SIOFF	2009	0.187724	0.768818	0	-0.39767	-0.24315
SIOFF	2010	-0.02812	0.126373	0	-0.18128	-0.1145
SIOFF	2011	-0.07644	-1.29736	0	0.186802	0.224088
SIOFF	2012	-0.23607	-1.4384	0	0.082404	0.070177
SIOFF	2013	-0.13942	1.831751	0	-0.02721	-0.02328
SIOFF	2014	-0.3356	0.16732	0	0.142667	0.166219
SIOFF	2015	0.437368	-1.1055	0	-0.1519	-0.18232
SIOFF	2016	-0.78665	0.914833	0	0.073863	0.069843
SOFF	2008	-2.0755	-2.72119	0	1.033095	0.435789
SOFF	2009	0.725056	1.239621	0	-0.1115	-0.24541
SOFF	2010	-1.1497	-1.46655	0	0.095735	0.032856
SOFF	2011	-0.02549	0.451103	0	0.305449	0.317335
SOFF	2012	0.611684	-0.7496	0	-0.12255	-0.1918
SOFF	2013	1.103841	1.316596	0	-0.85327	0.076399
SOFF	2014	-1.38872	-0.30401	0	-0.5137	-0.16204
SOFF	2015	-1.37051	0.178277	0	0.122175	0.060555
SOFF	2016	-1.13613	-3.11565	0	0.191427	0.287942
IMSK	2008	0.139445	-0.28151	1	-0.13974	-0.0853
IMSK	2009	0.709669	-0.40806	1	-0.03956	0.074444
IMSK	2010	-1.41692	1.135312	1	-0.26953	-0.17656
IMSK	2011	0.2702	-0.98754	0	-0.0034	0.037021
IMSK	2012	-0.3078	-0.65353	1	0.117873	0.10427
IMSK	2013	0.647037	-1.0481	1	0.128878	0.082658
IMSK	2014	0.144239	2.131238	1	-0.01457	-0.02961
IMSK	2015	-0.66186	-2.13446	0	-0.11121	-0.08873
IMSK	2016	1.678958	2.676995	0	-0.48468	-0.48807
SUBC	2008	0.406311	-3.02852	0	-0.07119	-0.32676
SUBC	2009	0.424084	-0.32106	0	1.182535	-0.70739
SUBC	2010	-0.09913	2.348523	0	0.526797	#VALUE!
SUBC	2011	-0.81782	0.540728	0	-0.21679	#VALUE!

COMP	YEAR	CRgrowth	GRofCAPEX	dummyofdividend	FIXEDgrowth	GRofAT
SUBC	2012	0.421945	0.621817	0	-0.05558	0.030819
SUBC	2013	0.396252	0.099756	0	-0.21123	-0.1083
SUBC	2014	0.093704	0.076247	0	-0.16511	-0.12754
SUBC	2015	1.055499	-0.62842	0	-0.11147	-0.12646
SUBC	2016	-0.40856	0.019413	0	-0.29919	-0.29486
TGS	2008	-0.47942	-1.8909	0	0.035564	0.055757
TGS	2009	0.330748	1.158749	1	-0.06905	-0.31887
TGS	2010	0.248642	-0.78767	1	0.359772	0.055712
TGS	2011	0.082855	0.853556	1	0.113303	-0.00844
TGS	2012	-0.57713	3.234285	1	0.033039	0.266034
TGS	2013	-0.09271	-0.04394	1	-0.55112	-0.18007
TGS	2014	-0.24328	-0.02996	1	-0.08866	0.003878
TGS	2015	0.132566	0.498878	0	-0.13265	-0.31779
TGS	2016	-0.02465	-0.455	1	0.026387	-0.20018

Table 2

Data for panel regression

COMP	Data	dummyofPE	ROAgrowth	ROEgrowth	ENTgrowth	Pbgrowth	lastgrowth
BON	2008	1	-0.66887	-0.60933	0.044329	-0.86222	-0.52452
BON	2009	1	0.24	0.337284	0.017633	0.146603	0.123133
BON	2010	1	-0.41613	-0.4499	0.050952	0.033523	0.081917
BON	2011	1	-0.20994	-0.24783	-0.08796	-0.46781	-0.42389
BON	2012	1	-0.02098	0.021417	0.054382	0.191055	0.154764
BON	2013	1	-0.05714	-0.02258	-0.01596	-0.15657	-0.05673
BON	2014	1	-0.75758	-0.73762	0.159119	-0.67634	-0.56205
BON	2015	0	-10.4688	-10.3145	-0.067	-0.45676	-0.32359
BON	2016	0	-0.56436	-0.64416	-0.33649	0.521297	0.30984
BWO	2008	0	-8.8685	-9.2044	-1.01689	-1.44676	-1.93131
BWO	2009	1	-0.98131	-0.97822	0.385473	0.873912	0.871202
BWO	2010	0	-2.80454	-2.8732	0.701215	0.648226	0.634496
BWO	2011	0	-5.68807	-6.07839	-0.18535	-0.39212	-0.55841
BWO	2012	1	-1.01164	-1.01244	-0.20044	-0.51167	-0.53987
BWO	2013	1	64.17165	62.9427	0.022975	0.264128	0.258539
BWO	2014	1	1.219337	1.232709	-0.02625	-0.23125	-0.1675
BWO	2015	0	-2.13931	-2.25236	-0.22762	-1.00369	-1.24188
BWO	2016	0	-0.35841	-0.29389	0.198505	1.115316	2.399414
DNO	2008	1	0.052421	0.609277	-0.04652	-0.15737	-0.08973
DNO	2009	1	-0.66842	-0.60931	0.044329	-0.86768	-0.52452
DNO	2010	1	0.238011	0.337345	0.017633	0.146798	0.123133
DNO	2011	1	-0.41519	-0.45023	0.050952	0.033364	0.081917
DNO	2012	1	-0.21293	-0.2474	-0.08796	-0.47269	-0.42389
DNO	2013	1	-0.01763	0.020757	0.054382	0.197529	0.154764
DNO	2014	1	-0.05921	-0.02216	-0.01596	-0.16246	-0.05673
DNO	2015	1	-0.75479	-0.7382	0.159119	-0.67345	-0.56205
DNO	2016	0	-10.3762	-10.3385	-0.067	-0.46127	-0.32359

COMP	Data	dummyofPE	ROAgrowth	ROEgrowth	ENTgrowth	Pbgrowth	lastgrowth
DOF	2008	1	-1.96442	-2.19109	-0.03598	1.642889	-0.14897
DOF	2009	1	-0.71956	-0.66212	0.028132	-0.60522	-0.6048
DOF	2010	1	7.126624	6.992814	0.144608	-0.05308	0.124298
DOF	2011	0	-1.1979	-1.20603	0.281875	0.264724	0.251314
DOF	2012	0	1.145754	1.541494	0.076424	-0.64968	-0.83392
DOF	2013	1	-1.29371	-1.32587	0.12581	0.295963	0.227784
DOF	2014	0	-2.69281	-2.84509	0.018666	0.269383	0.16048
DOF	2015	1	-1.4202	-1.4467	-0.0743	-0.75956	-0.75161
DOF	2016	0	-6.39361	-8.00698	-0.00861	-0.61607	-1.20509
EIOF	2008	0	10.24662	15.97146	-0.14387	-0.48593	-1.05866
EIOF	2009	1	-2.62486	-2.5092	0.124696	-0.26703	0.470686
EIOF	2010	0	-1.04869	-1.03729	0.01794	0.292809	0.259999
EIOF	2011	1	-2.27902	-2.26179	-0.07907	-0.27749	-0.24981
EIOF	2012	1	2.796301	2.733561	0.104846	-0.00195	0.108733
EIOF	2013	1	-0.5244	-0.53883	0.01141	-0.01719	0.044452
EIOF	2014	0	-2.23574	-2.23662	-0.21283	-0.26541	-0.34229
EIOF	2015	0	0.09588	0.203548	0.078321	-0.89304	-0.93795
EIOF	2016	0	1.931412	2.356296	-0.10682	-0.09799	-0.43779
EMGS	2008	0	0.838192	0.374053	-3.25805	-2.51334	-2.93785
EMGS	2009	0	0.568193	1.128206	1.514408	2.05689	0.570144
EMGS	2010	0	-0.29181	1.699023	1.164428	3.480939	0.835149
EMGS	2011	1	-1.13693	-1.05333	0.127686	-3.37106	0.0896
EMGS	2012	1	-0.08339	-0.46785	0.10814	-0.17131	0.048941
EMGS	2013	0	-2.15986	-2.20178	-0.57514	-0.47699	-0.58996
EMGS	2014	1	-2.57715	-2.62266	-0.70435	-1.08541	-0.8745
EMGS	2015	0	-4.32651	-4.31546	-0.8403	-0.27584	-2.63964
EMGS	2016	0	-0.00242	0.2707	-0.02682	0.432528	3.252465
FOE	2008	1	0.012522	0.254614	-0.48531	-0.80114	-0.73927
FOE	2009	1	0.112802	0.128025	0.242595	0.167801	0.377492
FOE	2010	1	-0.2135	-0.37355	0.0665	-0.06078	0.132904
FOE	2011	1	0.038674	-0.09033	-0.23675	-0.37858	-0.26214
FOE	2012	1	-0.1945	-0.16428	0.21574	0.227839	0.251956
FOE	2013	1	-0.15017	-0.08999	-0.06638	-0.11514	-0.06259
FOE	2014	1	-0.64365	-0.59885	-0.56496	-1.38594	-1.49
FOE	2015	0	-4.23911	-4.61671	-0.30483	-0.55614	-0.8532
FOE	2016	0	-0.59627	-0.62719	-0.50658	0.070246	-0.05985
HAVI	2008	1	-0.00426	0.188817	-0.50641	-1.56274	-1.23816
HAVI	2009	1	0.433078	0.2769	0.517901	0.189126	0.545017
HAVI	2010	0	-1.01361	-1.0139	0.14804	0.046997	0.033061
HAVI	2011	0	10.68697	12.53523	0.271598	-0.35851	-0.57808
HAVI	2012	1	-1.00144	-1.0015	0.129958	-0.13143	-0.35875
HAVI	2013	1	62.60305	60.68612	0.039952	0.30409	0.299028
HAVI	2014	1	-0.72847	-0.73475	-0.09263	-0.51623	-0.51597
HAVI	2015	0	-477.46	-681.595	-0.10837	-0.62111	-2.01362
HAVI	2016	0	-0.02207	-0.12358	-0.08151	-0.08506	-0.66648

COMP	Data	dummyofPE	ROAgrowth	ROEgrowth	ENTgrowth	Pbgrowth	lastgrowth
IOX	2008	1	-1.30622	-1	-0.37053	0.189246	-0.8024
IOX	2009	0	-4.16546	#DIV/0!	-0.08025	-0.23968	-0.64778
IOX	2010	0	0.083806	#DIV/0!	0.292637	-0.25378	0.594306
IOX	2011	1	-1.21249	#DIV/0!	-0.23672	0.575364	-0.12756
IOX	2012	0	-5.01386	#DIV/0!	-0.45653	-1.56184	-0.74183
IOX	2013	1	-2.20094	#DIV/0!	0.226439	1.001254	-1.1358
IOX	2014	0	-0.91901	#DIV/0!	-1.06311	-2.02968	-2.72343
IOX	2015	1	3.238322	#DIV/0!	-0.05884	2.050139	2.53849
IOX	2016	0	-1.98162	-0.9464	0.547047	1.326709	0.941506
REACH	2008	0	-0.32263	-0.40627	-0.31867	-1.45407	-1.34505
REACH	2009	0	1.720123	1.957127	-0.17816	0.835567	0.167054
REACH	2010	0	0.59976	0.811831	-0.16055	-0.40621	-3.15274
REACH	2011	0	-0.33621	-0.22655	-0.46537	-1.22345	1.94591
REACH	2012	0	-0.919	-0.92185	-1.73276	3.273006	2.302585
REACH	2013	0	9.831287	3.604557	0.660661	-0.56415	-0.0438
REACH	2014	1	-1.8709	-1.96437	0.195984	-0.22067	-0.04581
REACH	2015	1	-0.9558	-0.949	-0.38618	-0.77865	-0.75769
REACH	2016	0	-16.7213	-17.1955	0.288887	0.381626	0.236389
PDR	2008	1	-31.8322	-67.2654	-0.26253	1.377225	-1.72939
PDR	2009	1	-1.89703	-1.86402	-1.99025	-2.58879	-0.16165
PDR	2010	0	-2.30836	-1.42156	-0.49261	-0.67459	0.980543
PDR	2011	0	-0.72921	-0.69303	-0.57302	-0.1877	-0.81935
PDR	2012	0	-0.49957	-0.52262	0.759327	0.450279	2.336585
PDR	2013	1	-2.18564	-2.06088	0.001219	0.096242	0.213721
PDR	2014	1	-0.82922	-0.85962	-1.16831	-0.0563	-0.06857
PDR	2015	0	-54.0539	-53.07	0.03893	0.197029	-0.52518
PDR	2016	0	-0.63205	-0.58088	-0.5225	0.311352	-0.12603
PGS	2008	1	-0.38692	-0.44011	-1.2582	-2.43108	-2.00017
PGS	2009	1	-0.60631	-0.71133	0.504094	0.923033	1.067327
PGS	2010	0	-1.08497	-1.0683	0.188056	0.198437	0.295405
PGS	2011	1	-3.32217	-3.1828	-0.24707	-0.35038	-0.34118
PGS	2012	1	4.299327	4.272361	0.390529	0.367355	0.443418
PGS	2013	1	0.207948	0.189639	-0.33183	-0.44956	-0.37202
PGS	2014	0	-1.20496	-1.21413	-0.24583	-0.66033	-0.726
PGS	2015	0	10.38041	11.22627	-0.15502	0.046178	-0.32208
PGS	2016	0	-0.3708	-0.33634	0.082595	0.185687	-0.19714
PRS	2008	1	0.709448	1.582199	-1.12596	0.540785	-1.54929
PRS	2009	1	-0.07473	0.877944	0.278134	-0.21192	0.53851
PRS	2010	1	0.588806	-0.10076	0.07685	-0.22745	0.213841
PRS	2011	1	-0.21024	-0.38465	-0.0711	-0.25542	-0.13723
PRS	2012	1	0.036787	0.001669	0.166306	0.099253	0.210755
PRS	2013	1	0.033676	-0.12649	-0.07252	-0.39741	-0.09452
PRS	2014	1	-0.18809	-0.24208	-0.53621	-0.92494	-0.91312
PRS	2015	0	-1.2429	-1.28773	0.229388	-0.1197	-0.26052
PRS	2016	1	-3.80214	-3.70655	-0.1956	-1.15943	0.588282

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SBX	2008	1	-2.87077	-3.09631	-0.89803	-2.35054	-2.16089
SBX	2009	0	-4.04429	-3.89103	0.428199	1.457001	0.720379
SBX	2010	0	5.07E-05	0.132242	-0.22774	-0.15601	-0.58113
SBX	2011	0	1.236535	2.02337	-0.80571	-0.9697	-2.54763
SBX	2012	0	-0.82561	-0.77573	0.270204	1.616802	3.65307
SBX	2013	0	-0.6302	-0.6827	-0.37545	-0.89549	-1.07804
SBX	2014	0	28.25981	5.610487	-0.18193	-0.16634	-1.2296
SBX	2015	1	-1.52052	-0.66442	-0.95856	-0.87849	2.463502
SBX	2016	0	-1.28385	0.914092	-0.41301	0.462454	0.156234
SDRL	2008	0	-1.24315	-1.33219	-0.22228	-0.81582	-1.13622
SDRL	2009	1	-7.33943	-8.04525	0.4723	0.715945	1.177813
SDRL	2010	1	-0.26113	-0.37039	0.324983	0.119282	0.270403
SDRL	2011	1	0.097559	0.055998	0.097993	-0.04692	0.000842
SDRL	2012	1	-0.25365	-0.21637	0.101016	0.169142	0.083516
SDRL	2013	1	0.977578	1.112006	0.038383	-0.19797	0.113666
SDRL	2014	1	0.309758	0.129894	-0.51258	-1.46771	-1.25498
SDRL	2015	0	-1.1685	-1.14324	-0.38416	-1.17737	-1.20975
SDRL	2016	0	-0.6852	-0.71085	-0.12392	0.013965	-0.0023
SEVAN	2008	0	-0.42488	-0.39254	-1.04057	-2.7784	-2.66403
SEVAN	2009	0	0.216224	0.141993	0.54245	1.163207	0.506729
SEVAN	2010	0	-0.04645	0.034441	-0.05139	-0.2752	-0.46249
SEVAN	2011	0	6.345098	8.033239	-4.40111	-0.18198	0.234035
SEVAN	2012	0	-0.88935	-0.80947	1.738008	1.236037	0.952969
SEVAN	2013	1	-2.44417	-1.96357	0.212154	-0.15823	0.129727
SEVAN	2014	0	-1.9502	-1.33327	-0.28128	-0.24371	-0.42587
SEVAN	2015	0	6.312395	7.469387	-0.50453	0.555068	-0.31457
SEVAN	2016	0	-0.20967	-0.04748	0.07774	0.57101	0.004393
SIOFF	2008	0	-1.22305	-1.21346	-0.62626	-1.01347	-1.11476
SIOFF	2009	1	-4.05863	-3.93358	0.539002	0.109164	0.271668
SIOFF	2010	1	-0.92884	-0.92426	0.40527	0.184888	0.181511
SIOFF	2011	0	-1.60159	-1.69079	-0.04374	-0.26633	-0.28117
SIOFF	2012	1	-3.25636	-3.26752	-0.08797	-0.03935	-0.0144
SIOFF	2013	1	0.311851	0.307907	0.011071	0.123008	0.148786
SIOFF	2014	1	1.311974	1.582079	0.037149	-1.11023	-1.07344
SIOFF	2015	0	-4.11163	-4.49246	-0.11416	-0.23703	-1.22931
SIOFF	2016	0	-0.26324	-0.08469	0.335333	0.441536	0.300597
IMSK	2008	1	-0.45554	-0.44893	-0.46711	-0.50272	-0.70062
IMSK	2009	0	-2.26722	-2.45427	0.184799	0.38241	0.305062
IMSK	2010	0	0.384867	0.434883	0.077164	0.049179	-0.10722
IMSK	2011	0	-0.21465	-0.25252	-0.31151	-0.10399	-0.22696
IMSK	2012	0	1.193585	1.330034	-0.08428	-0.08446	-0.37767
IMSK	2013	1	-2.08449	-2.1475	-0.33335	-1.08947	-0.78714
IMSK	2014	0	-2.60172	-2.58167	-0.56737	-0.46421	-0.94467
IMSK	2015	0	-0.75967	-0.74883	-0.03025	-0.88758	-1.00579

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IMSK	2016	0	4.289677	6.011276	0.018656	1.035411	0.154742
SOFF	2008	1	-0.93929	-0.93778	-0.39464	-0.97423	-0.9744
SOFF	2009	1	19.59317	19.02261	0.312059	0.39082	0.613104
SOFF	2010	1	-0.96194	-0.95741	0.338817	0.076659	0.071459
SOFF	2011	0	-7.66176	-8.5885	-0.04131	-0.25795	-0.30507
SOFF	2012	1	-2.07999	-2.03925	-0.0662	0.115683	0.156654
SOFF	2013	1	0.318507	0.220153	0.06273	0.110544	0.18648
SOFF	2014	1	-0.71958	-0.70573	0.020532	-0.4567	-0.4222
SOFF	2015	0	-11.0543	-12.8517	-0.14422	-1.03939	-1.34902
SOFF	2016	0	-0.51707	-0.33053	0.387933	0.333376	-0.57808
SUBC	2008	0	-0.58839	-0.67357	-4.49438	-0.62675	-2.61234
SUBC	2009	0	2.20236	0.856417	0.505841	0.516012	0.288947
SUBC	2010	0	-0.81088	-0.74278	0.652588	-0.25592	0.566707
SUBC	2011	1	-2.73366	-2.90273	1.103024	0.958646	0.837276
SUBC	2012	1	1.652121	1.339154	0.570097	-0.17275	0.443679
SUBC	2013	1	0.066203	-0.05541	0.207537	-0.23736	0.197925
SUBC	2014	1	0.000289	0.104096	-1.07382	-1.18418	-1.3574
SUBC	2015	1	-0.06355	-0.12163	0.677141	0.511211	1.053838
SUBC	2016	0	-0.49477	-0.5838	0.404255	0.064191	0.44123
TGS	2008	1	-0.2869	-0.2834	-1.25711	-1.18941	-1.02563
TGS	2009	1	0.229372	0.16902	1.486916	1.072595	1.296507
TGS	2010	1	-0.1478	-0.17699	0.233798	0.125932	0.21035
TGS	2011	1	0.013723	0.017421	-0.02905	-0.09217	-0.00568
TGS	2012	1	0.420578	0.465761	0.442163	0.203888	0.381823
TGS	2013	1	-0.16598	-0.17673	-0.21768	-0.30607	-0.20456
TGS	2014	1	-0.22321	-0.25068	-0.20268	-0.2395	-0.19715
TGS	2015	0	-1.143	-1.13647	-0.29663	-0.19108	-0.30369
TGS	2016	1	-2.09354	-2.06604	0.343189	0.351604	0.326225