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Financial leverage of Offshore drilling companies listed on Oslo Stock Exchange compared with other drilling companies.

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Abstract

This study aims to investigate capital structure related to the offshore drilling industry. In relation to this investigation, the potential differences between companies listed on the Oslo Stock Exchange (OSE) and companies not listed on the Oslo Stock Exchange related to capital structure are of specific interest.

The offshore drilling industry experienced an upturn in the market from 2010 until 2014. The decision by Saudi Arabia to protect their market share against the growing US Shale Oil industry and the aim of eventually forcing the shale oil industry out of the market, made the market turn into a long-lasting downturn where several drilling companies went into serious difficulties. Offshore Drilling is an important part of the offshore oil industry and is a very capital-intensive industry with high capital risk for rig owners.

OSE are the biggest shipping exchange in the world, and due to several similarities between shipping and offshore drilling, several offshore drilling companies are listed on OSE. This makes it interesting to investigate the capital structure in the offshore industry in general, and the difference between not listed and listed companies on the Oslo Stock Exchange in particular.

The data which is used in the thesis are extracted from annual reports on company websites, the US Energy Information Administration (EIA) and Federal Reserve Bank. The company data are transformed into firm specific independent variables which represent the following company characteristics: Tangibility, Operating Margin and Size. Two macroeconomic factors are also included: Oil price and interest rate. The dependent variable is defined as the debt/equity ratio, or leverage which is a common term of speak. The regression is done based on panel data and the models is built on the assumption of a least square dummy variable model for the time period from Q1 2012 until Q2 2017.

The outcome of the statistical analysis outlines the fact that leverage decreases with operating margin and increases with size and tangibility. The models show us that oil prices and interest rates influence capital structure to a very low degree.

The results vary significant however, from OSE listed companies compared to not OSE listed companies. Operating margin and especially tangibility have a much higher influence related to capital structure for OSE listed companies compared to not listed OSE companies, which are a very interesting observation.

Preface

The fall in Oil prices in 2014 led oil companies to focus strongly on cost reductions. As a result, obviously, this led to a focus on efficacy in existing production and cut in investments for new exploration and production projects. The implications of these actions resulted in a significant decrease in demand for offshore drilling rigs. The offshore industry entered a very harsh business climate with a lack of demand and Oil Companies pressing down the costs, thus the day-rates for drilling rigs. During 2017, one of the largest offshore drilling companies in the world, Seadrill Ltd. filed for chapter 11 in a bankruptcy court in the United States of America. Due to a large amount of debt and being unable to repay its creditors Seadrill saw no other option than to negotiate a restructuring of its financial responsibilities by using chapter 11. How such a big player in the offshore drilling market could go this far is the basis of my inspiration to write my master thesis about capital structure in the offshore drilling market.

I have always had an interest in the shipping industry as well as Oil and gas. Offshore Drilling is a market who follows many of the same aspects as the shipping industry, in example the tanker segment is very similar. I feel in a sense that Offshore Drilling combines my interest for the dynamics in the shipping industry as well as the energy sector.

During this process of writing the thesis I have gained more knowledge about the financial dynamics in the offshore drilling market and capital structure theories. I have also been introduced to and learned some modelling tools which I strongly believe I will use again and take advantage of later in my professional career.

I will also express my sincerely gratitude to my supervisor Kristian Støre for guidance and advice during my work with this paper. Without those advice, the results of this study and how it have been conducted would not have been as nearly as good as it has become, so thank you very much.

Isak Sebastian Karstad

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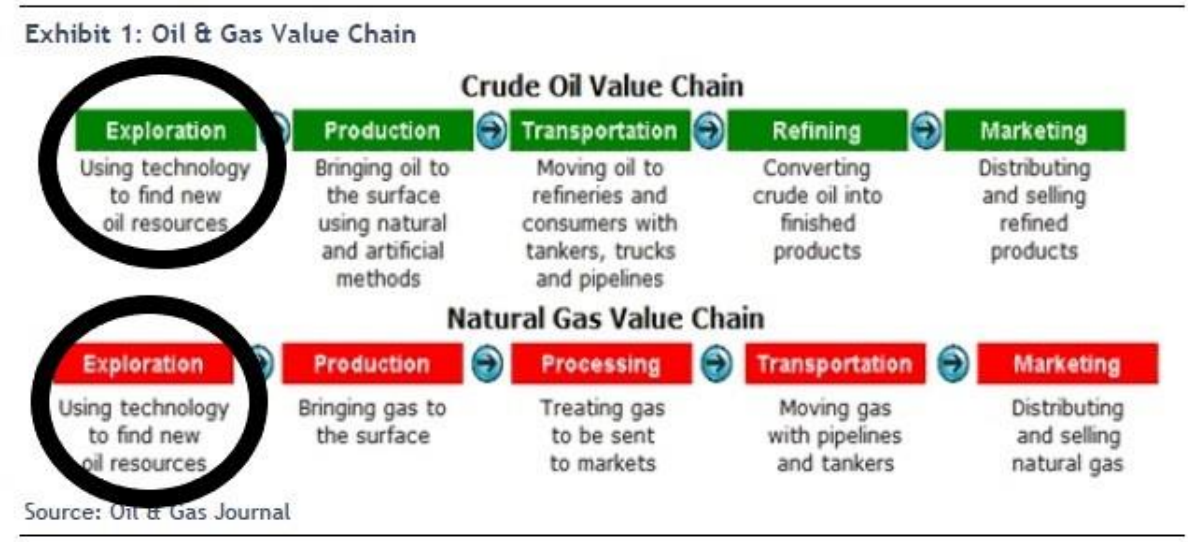
1.0Introduction

In my Master thesis in the program MSs Energy Management I have chosen to focus on one particular area in the value chain of the Oil & Gas business. First of all, Oil & Gas is a very huge and complex industry. It consists of several parts but are widely divided into three main areas, Upstream, Midstream and Downstream. Upstream consists of what is commonly known as E&P, or Exploration and Production which are the first two sections of the illustration below. Midstream is about the transportation from production facilities to refineries, which are the section number three in the illustration. The last two section gives us the downstream area of the value chain which are refining and marketing.

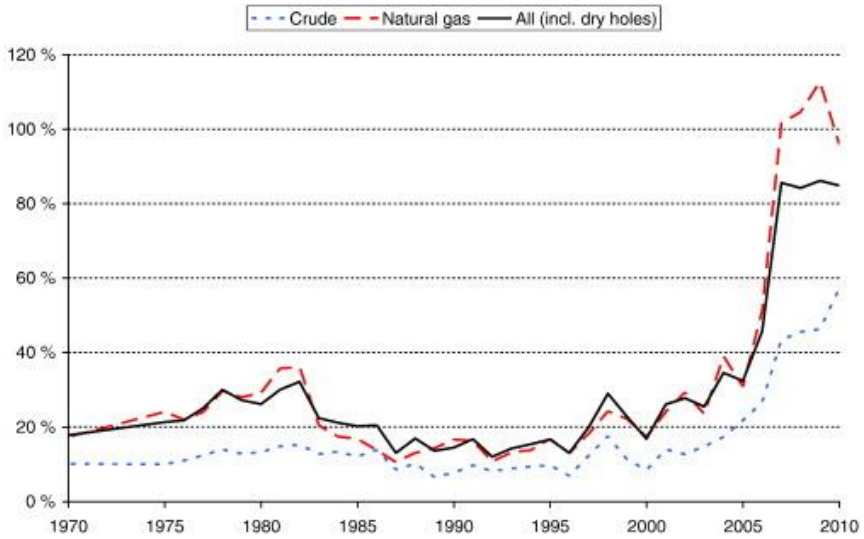


(Figure 1: investmentpedia.net)

The first aspect of exploration is to search for oil & gas. This is done by using seismic technology. Seismic waves are being shot down to the bottom of the sea from a ship and by reading the return waves, they can map the surface as well as the interior of the landmass beneath the bottom of the sea. When they find an area where they believe there is a sufficient amount of Oil-, Gas equivalents or both, they decide to drill a well to see if there are any equivalents to be extracted.

The drilling industry is all about drilling wells to struck new oil and gas fields. The drilling units' drills wells where the Oil & Gas companies believe there is recoverable reservoirs. If they drill a dry well, they seal the well and move on to a new location. While there is a lot of different specific wells, we can argue that there are three main areas for drilling namely

exploration wells, appraisal wells and development wells (ndp.no, 2009). All the different types of wells that can be requested by an Oil & Gas company tells us that there are a lot of activity that requires offshore drilling units. As we can see from the figure which illustrates the ratio of annual drillings costs to annual revenues of oil and gas production in USA from 1970-2010, drillings costs are a very significant cost for the Oil and Gas companies.



(Figure 2: Source: EIA, 2011)

The cost of drilling represents a wide spread from about 20% to above 100%, depending on the market conditions and demand & supply for oil rigs. This is just an illustration to show the importance of maintain a close eye to drilling operations. As we can understand, the drilling industry has become a huge business on its own. Especially in the west, drilling tends to be performed by companies who are specialists, divided into rig owners and operators who perform the job on oil and gas companies request, and thereby taking the risk of holding such capital-intensive assets and crucial operations. On the other hand, in the east, in example China, where the oil and gas companies tend to be fully integrated whereby the oil and gas companies take the risk upon them self.

As a huge part in the oil and gas industry and a crucial part of the value chain, I have chosen in this thesis to focus on the Offshore drilling segment from a financial management point of view. When interpret Energy Management, the value of knowledge of how companies in the drilling industry are financially structured is important. The balance of bargaining power between oil & gas companies and drilling companies are influenced by how the company are financially structured. However, the most important thing for a company executive, simplified, is to maximize shareholder value. The optimal capital structure, and why there is

so much research about it is because it is a very important tool to maximize the value of the firm, and thereby shareholder value. The goal to maximize the value of the firm may be a reason for why several companies in the drilling industry chose to be listed on the Oslo Stock Exchange. Norway has a great history as a shipping nation and as we will discuss in the next chapter, the offshore drilling business actually have several similarities with the shipping industry. Although, all the Oil which are located on the Norwegian continental shelf are offshore. Therefore, Norway is also a big player as well as an attractive market in the offshore drilling industry and several companies who operates in this business are, as already mentioned, listed on the Oslo Stock Exchange (OSE).

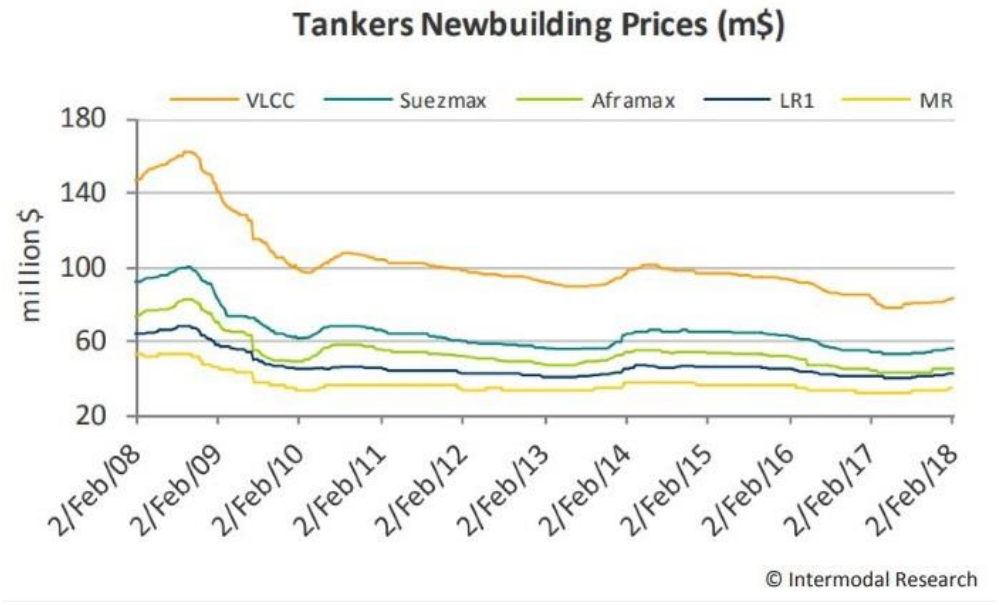
2.0Offshore Drilling Market

The offshore drilling industry is a very cyclical industry and have many similarities with the shipping industry. In example, offshore drilling rig owners are very often also shipowners. Two examples are John Fredriksen, who are a big player in shipping markets like tanker (Frontline) and dry bulk (Golden Ocean), are also a huge player in the offshore drilling market with companies like Seadrill, Northern Offshore and North Atlantic Drilling. The other example is the world's largest container shipping company, AP Møller-Maersk who also have a company called Maersk Drilling who own and operate offshore drilling units. Therefore, when giving a short introduction to the drilling industry I will use shipping as a base of doing so. The chapter consist of a short introduction of the risk for rig owners and their place in the value chain. Then I will present a short description of the different steps in the cycle that can be very similar to how a shipping cycle is broken down and analysed. Finally, I will take a quick look at the different segments that sums up the offshore rig industry.

2.1 Rig owners

When we look at the big oil companies today, there is a common pattern between the oil & gas companies from the west (example US, Norway, Britain) to not invest and own their own offshore drilling fleet. The Oil companies chose to focus their asset investments around production activities. This is instalments that are going to last for many years, often over one or several decades. Drilling wells are often done over a shorter period of time. The oil

companies contract an offshore drilling rig for the number of wells it wants to drill. They must then decide if a time charter contract or a contract for a specific number of wells is best suited to their needs. Therefore, the time period a rig operates for a specific oil company can varies from as short as 15 days to as long as 2-3 years. Contracts for 2-3 years are what we call time charter contracts and are more often signed when the market is tight and oil companies see a risk in lack of supply of drilling rigs over the coming years. Contracts for specific wells, from example 1-10 wells is more comparable to what is called the spot market. With such shorter time period for drilling rigs, for oil companies to own and operate their own it can be argued that they will take upon their own a great amount of risks. For sure, when you need to drill a well it could be pleasant to just insert your own asset. But when you don't, then you have to put the unit on the market to secure job and revenue stream for the asset. The alternative is to put it off work for a while, which of course is very costly. Therefore, they just outsource that part of the value chain. They did the same with oil tankers several years ago (some oil companies own tankers of their own). However, where prices for new oil tankers in recent years varies from approximately 40-100 million dollars pr. Ship (up to 160 million dollars in its peak for a Very Large Crude Carrier (VLCC) before the financial crisis) (Figure 3), Offshore drilling rigs demands heavily more investments and therefore it brings more risk for the oil companies as already mentioned. As shown in figure 4, prices for new drilling units can varies from around 190 million dollars (jack-ups) and up to around 1 150 million dollars (drill ships)



(Figure 3: Source: Hellenic Shipping News, 2017)

** LR1 is a product tanker which are an Aframax, MR are a medium range tanker, normally of the type Panamax and VLCC stands for Very Large Crude Carrier.*

When we take into consideration that the oil and gas business is a very cyclical industry, it becomes even more risky for the oil companies itself to invest in drilling assets. As we can see, drilling units costs up to over a billion dollars. When the market experiences a downturn, the oil companies would have not only to deal with low oil prices for their production of oil and suppliers, but a downturn in asset value of their drilling units. This would result in even more risk for the company and even more difficulties. One consequence could be that they may be forced to fire more people then needed. Another one is that they have to say no to needed investments in new oil fields because they would have significant losses due to drilling units without any work. And not to forget about the potential issue of having to sell drilling assets to low prices in order to finance other aspects of their business and as a consequence report a great value of losses on their assets. All these things would most probably lead to a downturn in stock prices for the oil company and maybe hinder the payment of dividends to shareholders. As we can understand, holding the assets on their own would maybe just increase the oil company's exposure to market cycles. However, there is companies that are fully integrated like the Chinese national oil companies such as CNPC and Sinopec. Those companies are however fully controlled by the state and are not exposed to the public market as is often the case for oil companies from the western culture, such as Shell, Exxon, Total, Conoco Phillips, BP and Chevron to mention a few.

Jackup design class properties and newbuild cost (2011).

Design	Number	Price (million $)	Water depth (ft)	Harsh	VDL (tons)
Friede & Goldman JU-2000E	11	190-220	400	Y	7,000
LeTourneau Super 116E Class	12	159-210	200-375	N	3,750
KFELS B Class	20	180-210	350-400	N	4,500
PPL Shipyard Pacific Class 400	3	190	400	N	3,750
Friede & Goldman JU-2000A	4	220-229	350	Y	4,500
Friede & Goldman JU-3000N	6	220-245	400	N	7,000
KFELS Super A Class	5	230-260	400	Y	7,000
LeTourneau 240-C Workhorse	3	194-257	400	N	3,000
GustoMSC CJ70	3	500-530	492	Y	7,000

Source: Bailey and Sullivan, 2011; Industry press.

Semisubmersible design class properties and newbuild cost (2011).

Design	Number	Price (million $)	Water depth (ft)	Harsh	VDL (tons)	Displacement (tons)
GVA 7500-N	2	526-709	10,000	Y	8,250	62,000
F&G ExD	3	599-771	7,500-10,000	N	10,000	58,000
Ensco 8500	2	537-560	8,500	N	8,000	
CS-50 MkII (N)	2	510-526	9,843-10,000	Y	6,800	47,000
Sevan Drilling 650	3	526-685	10,000	N	22,000	61,000
GM 4000	2	460-560	1,640-4,000	Y	5,000	42,000
GVA 4000 NCS	2	565	1,640	Y		60,000

Source: Bailey and Sullivan, 2011; Industry press.

Drillship design class properties and newbuild cost (2011).

Design	Number	Price (million $)	Water depth (ft)	Harsh	VDL (tons)	Displacement (tons)
DSME 10000	2	579	10000	N	24,000	112,000
DSME 12000	6	590-782	10,000-12,000	N	24,000	112,000
GustoMSC P10000	11	590-630	10,000-12,000	N	20,000	75,000
GustoMSC PRD12,000	1	632	12,000	N	15,000	45,000
Samsung 10000	17	638-820	10,000-12,000	N	22,000	105,000
Samsung 12000	8	550-650	10,000-12,000	N	22,000	105,000
Stena/Samsung	1	1,150	7,500	Y	19,000	108,000
Huisman GT-10000	2	550-585	10,000	N	20,000	60,000

Source: Bailey and Sullivan, 2011; Industry press.

(Figure 4: Source: Offshore-mag.com, 2012)

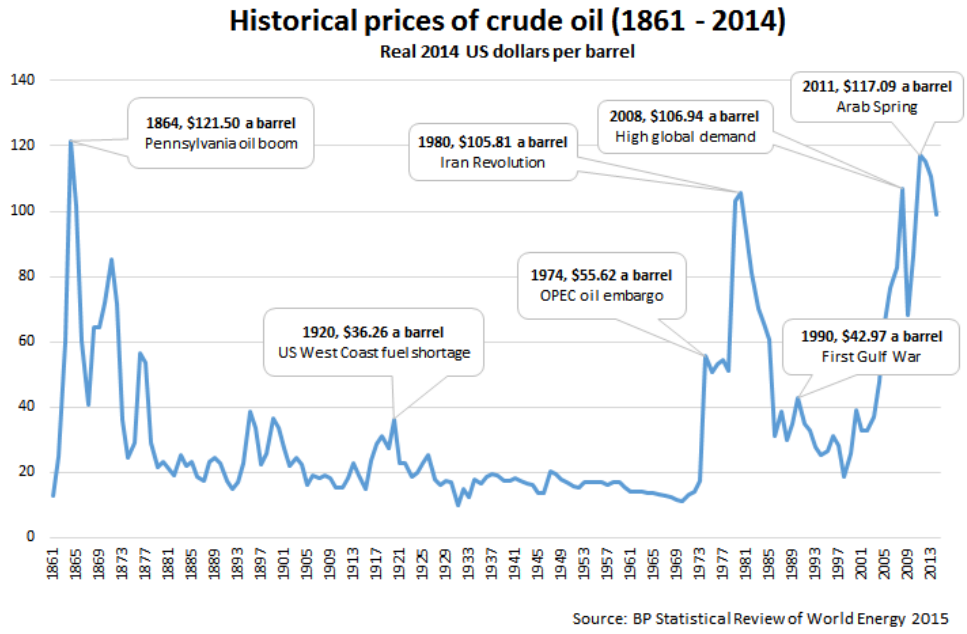
So, if not the oil companies take upon the risk of investing and owning these assets, who does? As mentioned above, a large number of players in the conventional shipping business are also heavily invested in the offshore drilling rig business. Some reasons for this can be

that they have the knowledge and experience of operating in the maritime industry, have established connections towards financial institutions and have good relations with shipyards and broker firms. To get more knowledge of the rig business, behaviour of rig owners and how they deal with risk we must take a look at the different stages of the industry cycle. As mentioned, the oil industry is a cyclical industry and therefore, obviously the drilling industry are of no difference.

2.2 Cycles

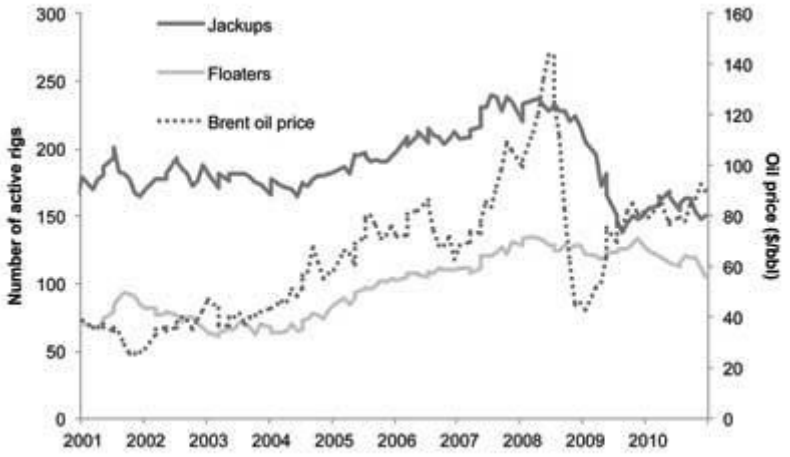
There are several factors, both market-related and rig specific factors which influence the offshore drilling market. However, it is recognized that the main driving force of the drilling industry is widely argued to be the oil prices. The upstream business of the oil industry may be the most sensitive to shift in oil prices due to its large capital requirements. In example, over the last 4 years we have experienced a significant downturn in investments from the oil companies in the E&P area of business with both the seismic and drilling industry taking hits. Although, if the oil companies don't invest in E&P, then the company will decrease their total production with time because wells will run out. This goes without saying.

The oil prices have experienced significant fluctuations over the last 150 years with major situations with the likes of the Pennsylvanian Oil boom, OPEC's oil embargo and the shale oil revolution to mention a few impacts. However, as shown in figure 5, the oil prices historically have been lying in the interval between 15-40 dollars pr. Barrel making it more predictable for managers and executives to navigate their businesses. However, the oil market is exploit for sudden changes which have huge impact on the market, with some historical event already mentioned. This impact can happen over a very short period of time, leaving the industry in a huge after math because of the time needed to adjust. The shale revolution is a good and fresh example. The revolution began around 2010 and in hit for full impact in 2014 sending the oil prices from a level above 110 dollars pr. Barrel in the summer of 2014 to 30 dollars pr. barrel at its lowest in early 2016. Players like OPEC with its protagonist, Saudi Arabia which historically acted like a swing producer to maintain stable oil prices, made a shift in its strategy to focus on protecting market share rather than maintain oil prices among others.



(Figure 5: BP Statistical Review of World Energy, 2015)

So, after taking a short look at how the oil prices influence the industry in general, how does it influence the drilling market? As mentioned, the oil price is one of the main factors for the drilling industry.



(Figure 6: Rig logix, EIA 2011)

As shown in figure 6, the utilization of drillings rigs follows the shape of the oil prices. According to this figure, Jack-up rigs are more sensitive to shifts in oil prices compared to floaters. This can be explained by the significant difference in cost as shown in figure 4. This matter will be attended to and discussed in the next paragraph.

As Kaiser and Snyder explains, when utilization is low the supply of stacked drilling units are high, resulting in the rig owners and operators to bid aggressively for contracts which in turn

decreases rig rates (Kaiser, M. J., Snyder, B.F., 2012). When utilization is high, off course the opposite happens. Rig owners and operators can negotiate out of position of strengths and the Exploration and Production companies have to compete to win contracts rigs for their operations. As a result, the rig rates will increase, and the market will get the knowledge that the available capacity can be absorbed.

As we understand, the aspects we now have discussed gives us a more understanding of how the cycles in the industry are driven in general by oil prices and how it influences the drilling industry. Now we are going to take a deeper look on how exactly the cycle can be analysed to better understand the different stages a player in the industry must know in order to navigate properly.

As shown in figure 7, Martin Stopford (Stopford, M., 2009) have developed a model to explain the dynamics of a cycle for the shipping industry. As mentioned above, the shipping industry and rig industry have several similarities with the likes of newbuilding's, second hand market, structure, supply and demand, operators etc. Therefore, his model to better understand the cycles in the shipping industry also can be advocated to get an understanding of the dynamics which influence and drive a cycle in the rig industry as well. When it comes to make decision concerning a rig owners company's capital structure, awareness of this dynamics is crucial. By better understanding where you are in the cycle, the better the choice of capital sources you make. In an article from the Norwegian business newspaper "Dagens Næringsliv", Rig owner John Fredriksen blamed the financial difficulties Seadrill was suffering due to the financial activities and funding operations organized by Tor Olav Trøim and his team. (DN, 2017)

A cycle can be derived into 3 different levels. Long cycle ("secular trend") last in example for 60 years (Stopford, M. 2009). A long period of time and not the essence of our objective here. However, the important thing to understand from this level is whether it is changing. Whether the underlying cycle are moving upwards or downwards, providing a shift in the long-term cycle is worth knowing, but are not a directly issue for the purpose of this thesis. The second level, however, is very interesting. This is called short cycle or "business cycle" and last for approximately 5-10 years. This cycle consists of 4 stages, through, recovery, Peak/Plateau and collapse and will be explained in more detail beneath.
When it comes to capital structure, knowledge about this dynamic and where in its landscape you are is crucial to understand, and yet so hard to predict what comes next.

The last level of the cycle is what is called the seasonal cycle. This cycle last for a year and attend to matters for supply and demand that shifts throughout the year. In example, the demand for oil are higher during the winter than during the summer. In the rig industry one example are harsh environment drilling rigs made do be used in example the arctic area. Some periods of the year, this area is covered by ice and not sufficient enough for drilling. In general, however, this level does not apply that much for the drilling industry.

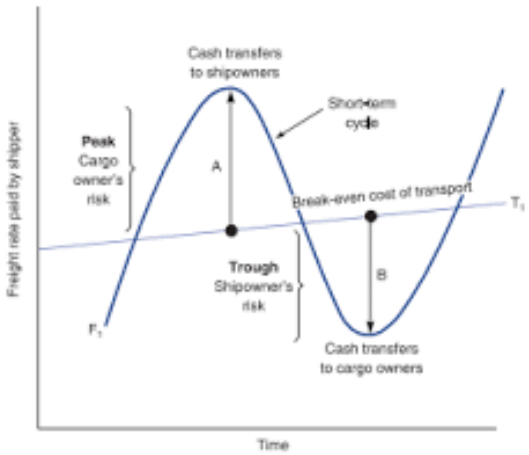
As mentioned, the short cycle aspect is the one we must analyse and understand, and it consist of four stages (Stopford, M., 2009). First, we have the stage which is called **Through**. This stage has three characteristics. First there is the event of being a surplus of drilling rigs in the market because of less demand. Then, secondly, those forces reduce the rig rates to operational cost are equal or below the least efficient drilling rigs, forcing the least efficient and old rigs into lay-out. As a result of this events, the third characteristic hits in as financial pressure build up. The market experience stagnation, tough decisions has to me made and finally distress. In very bad cycles, the banks are stricter on their financing and rig owners are forced to sell of their assets in order to raise cash. This means that rigs drop dramatically in value and rig owners must take huge losses. The value of the oldest assets falls to scrap value and the seeds for the next stage, recovery has been sown. **Recovery** is the stage were demand and supply are moving towards balance and day rates move above the edge of operating costs. As a result, more of the assets tied up in lay-out are returning to the market and we see more cash being invested in the industry. Recovery, however, is the stage were most rig owners tend to make mistakes. Recovery can easily fall back to a recession if over optimistic behaviour kicks in and destroy the market again. Over and over again, a recovery period has been kicked back into the through stage. When a recovery gets sustainable, we will in turn enter the **plateau** or **peak** stage of the cycle. This stage can last for a month or several years and is described as a “hallelujah mood”. Day rates arrives at a level of 2-3 times operating cost, sometimes even as much as 10 times and the asset owners are making huge profits. The excitement rises, the surplus is absorbed, and modern second-hand values rises above newbuilding’s because rig owners have no patient to wait in their eager to cash in on the high rates. Eventually, the shipyards are fulfilling their orderbooks and owners have to order rigs with 3-4 years delivery time or use less sufficient and more costly ship yards. Eventually this excitement and investing eager in the industry will lead to a surplus of supply again and the market will experience a **collapse** which is the final stage of the cycle. Because of the oversupply, rates fall dramatically. The delivery of newbuilding’s ordered in the peak time

increases the impact and make the collapse happen faster and then the market gets even harder. There is still liquidity, but rig owners are reluctant to sell their assets on a discount.

When we look at the risk involved in the rig business it can be argued that offshore drilling rigs cycle lies at the heart of the risk in the offshore drilling rig business. As Stopford, M states: *Technically, the risk in this industry can be defined as the measurable liability for any financial loss arising from events that have not been foreseen in regard of imbalance between supply and demand in the industry (Stopford, M. 2009),* which is the definition of shipping risk and also applies for offshore drilling rig business risk. One example is the downfall in oil prices in 2014 due to the sudden impact of the shale oil and gas revolution which in turn led the oil companies to decrease their investments in offshore drilling. This situation shifted the financial burden from the oil companies who were paying high day rates, over to the rig owners who gained a financial capital cost above the new break-even levels resulted by the new market equilibrium.

The main risk takers in this industry as we understand from above are the rig owners, who owns the equity of the drilling rigs offered for hire, and the oil and gas companies who determine the demand for drilling rigs by how active they want to be in the search for new oil reserves etc. These are the two actors, standing on opposite sides, who between them perform the balancing act of adjusting demand and supply (Stopford, 09). When supply and demand leave equilibrium and get out of balance, one or the other will take on financial losses. Figure 7 shows how rig rates (model uses freight, but mechanism is the same) develop over time and determine who pays when the market is unbalanced.

Risk – Cycles0



(Figure 7: Risk features, Stopford, M 2009)

The linear line shows the break-even curve. If we apply in a perfect market, with perfect supply and demand, the rate figure should follow the break-even curve. However, we rarely see perfect balance, so rig rates will fluctuate around the break-even curve.

When oil and gas companies get it wrong, and have to drill more exploration and production wells, the demand for drilling rigs increases and rates rise above the break-even curve, resulting in rig owners making money and oil and gas companies paying too much. When the opposite happens, and rig owners invests and builds too many drilling units creating an oversupply in the market, then rates eventually fall below break-even levels and the rig owning companies have to take the losses. As a conclusion, we can derive from what we have discussed that cycles exert financial pressure to correct fluctuations in the balance of supply and demand. Over a longer period of time cash flow should average out at the break-even levels, meaning that the market risk in the drilling business is primarily about the timing of receipts.

2.3 Demand for drilling rigs

As we have discussed above, the balance between demand and supply in the drilling market are mainly determined by the Oil and Gas companies. We understand that the rig owners will build and supply the market with drilling units based on the demand, but what determines demand? As mentioned earlier, oil and gas companies use drilling rigs when they are out exploring for oil and gas reserves, whether it be new unexplored fields or exploring for additional reserves in already established fields or drill new production wells. Typically, the different projects they consider executing provides different projected cashflows, and the cash flow increases if the price for oil or gas increases. Both prices are not necessarily considered in every project, but often when drilling for Oil reserves, those fields also include some level of gas reserve. From this reflection as we understand the importance of Price for oil (P^O), price for gas (P^G) and rig rates (π) we can understand the demand (D) for drilling rigs as the following equation:

$$D = (P^G, P^O, \pi) \text{ where } D_P{}^G, D_P{}^O > 0 \text{ and } D_\pi < 0$$

(Equation 1, Osmundsen, Rosendahl, Skjerpen, 2012)

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As we can see, this equation follows the mechanism we have discussed. If the Oil prices rises, demand for drilling rigs rises. If the price for gas rises, the demand for drilling rigs rises. Rig rates however does not follow that same simple conclusion because higher rig rates will decrease demand and lower rig rates will increase demand. However, the main factors are the prices for Oil and Gas which in turn also influence the level of rig rates.

2.4 Segments

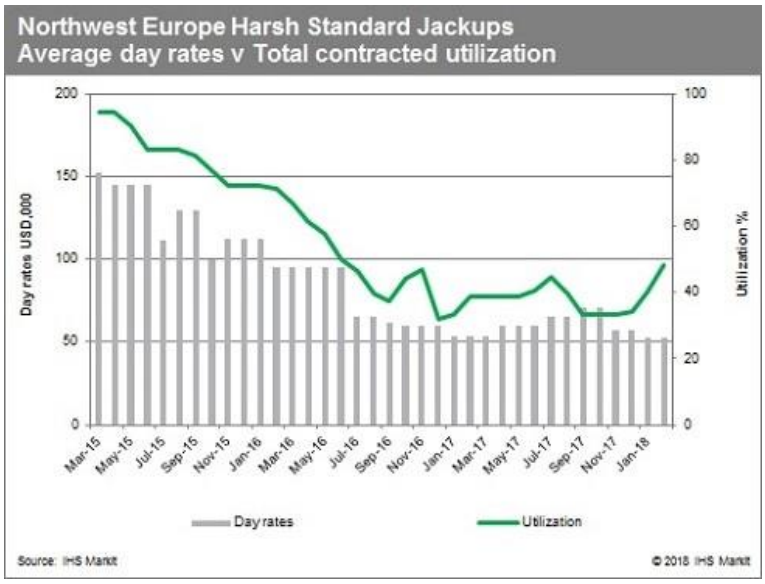
The drilling rig industry are a large industry that has to operate in different environments. The ocean's we find in the world have a different characteristic inside their own borders as well as between the oceans. The main aspects I am talking about here are at what water depth and in which surface climate the drilling unit operates. Therefore, we understand that drilling units are high technology units and may consist of various specs, depending on the operating requirements. However, the drilling industry are divided into four main segments, namely the two Jack-up segments harsh and moderate, semi-submersible and drill ships.

2.4.1 Jack-up

Jack-up rigs are the least expensive, least heavy and the type of unit with highest building frequency (figure 4) out of the three main segments. In other words, the Jack-up rigs are the most popular type of mobile offshore drilling units (MODU) in use today. The way Jack-up rigs function is that the rig has three to four legs which are being placed on the bottom of the ocean, similar to production platforms. However, the legs for the Jack-up rig can be raised and lowered from the rig itself, meaning it is easy to transport the rig to a location, lower the legs down to the bottom and lift the rig above sea level and start drilling. When the job is done the drilling, rig raises its leg and moves on to a new location. Thereby the name Jack-up.

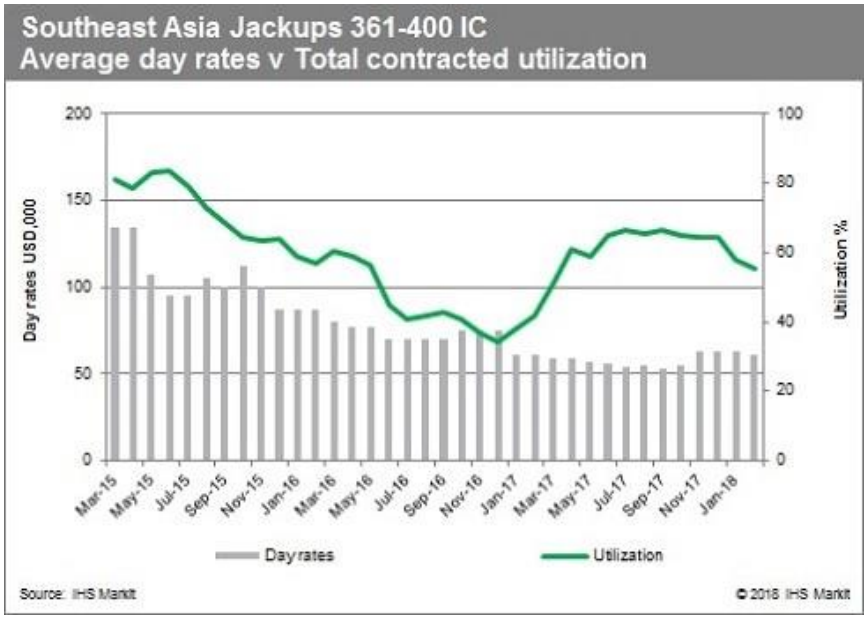
Jack-up rigs are divided into two categories, Moderate and harsh. Harsh means that they are suited to work in areas where the environment is more challenging and harder. Examples are the northern sea where the climate like weather conditions, especially during the winter can be very challenging. The arctic area is extreme and requires more specs to perform drilling operation

s.



(Figure 8: ihsmarkit.com)

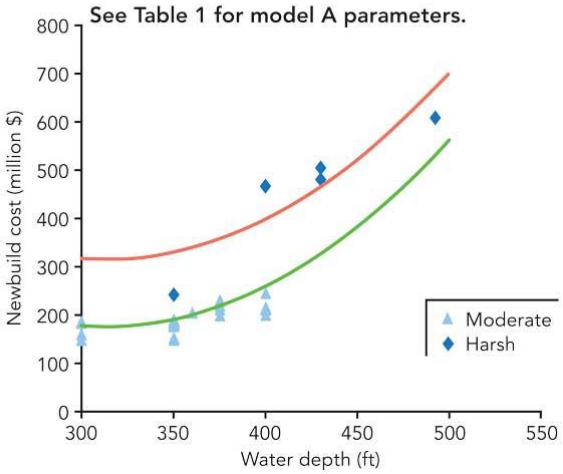
Moderate Jack-up rigs are used in areas where the climate obviously is not as challenging. This means that the material used to build those rigs do not require the same solidity and therefore in general are cheaper and faster to build. If we compare figure 8 and 9, we also see that the rig rates levels on the two segments follow almost same identical levels. We also see that the utilization rate of southeast Asia rigs had a faster recovery in rate level than harsh, but in general they follow each other.



(Figure 9: ihsmarkit.com)

Figure 9 shows that a newbuild harsh Jack-up rigs cost about two times as a moderate drilling rig, and that the more water depth on the Jack-up you want, the more it cost. However, the increase in cost based on water depth level is not very high because when you reach a certain water depth you move from using a Jack-up unit to a semi-sub unit.

Fig. 2: Newbuild cost model A output containing water depth and water depth squared terms



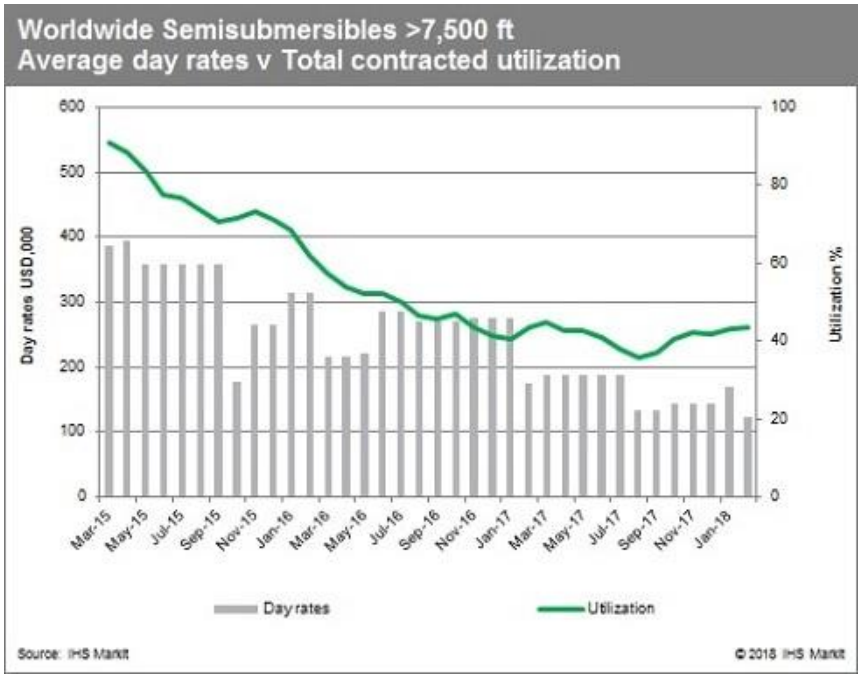
(Figure 10: ihsmarkit.com)

As we can see, Jack-up rigs are the smallest, cheapest and most easy rigs to transport around. Therefore, there are also those rigs there are the most common in the market. In 2017 there were 204 Jack-up in use worldwide while only 88 semi sub and 45 drill ships (Shinn, D. C. 2017). Jack-up is also the rig type that has the highest utilization rate which tells us that when markets are tight or improving, Jack-up rigs are the preferable choice. And that is because the lesser the water depth is, the cheaper for the oil companies to build the infrastructure as well when starting production.

2.4.2 Semi-Submersible.

When drilling offshore in water depths greater than 520 metres the use of Semi-Submersible units becomes preferable. Semi-submersible or semi-subs are a floating unit who uses chain and ankers to attach to the seabed because the use of fixed structures like Jack-up rigs are less practical. To be able to stay stable, a semi-sub rig use ballasted, watertight pontoons which are located below the surface and thereby avoid interaction with waves. The operating deck

are located high above the surface, connected to the pontoons with structural columns providing good stability. Form figure 4 we can see that the cost of building a semi sub rig is a little more than twice the cost of Jack-up rigs, dependent on which specs required. From figure 11 we understand that the rates for semi-sub rigs are higher than Jack-up rigs, which makes much sense because they are more expensive to build which increases the level of break even. Due to the fact that they are more expensive to use and built for deeper water depths, the oil and gas companies often hire these types of rigs when the market have improved for a while and Jack-up rigs are more difficult to attain. This is not only because of the higher cost of hiring the rig compared to Jack-up, but also because of the cost for increased difficulty of placing production infrastructure in deep water. Again, the profitability of the project decides which are related to the oil and gas prices. This is issues we have discussed earlier and here it shows it mechanisms and impact on the semi-sub market as an example



(Figure 11: ihsmarkit.com)

2.4.3 Drillships

The last segment in the offshore drilling industry is what we call drill ships. Drillship is a merchant vessel which are designed to be used for offshore drilling, mainly in deep-water and ultra-deep-water to explore for oil and gas. Because of the ability of drilling in such water depths, drill ships need to be well equipped, often with the latest and most advanced dynamic positioning systems. Drill ships are the only unit which can go below 10 000 ft of water depths and the most expensive drill ships cost more than 1,15 billion dollars (Figure 4).

They are the clearly most expensive drilling units in the market, and therefore also they are the fewest in use. Drill ships are used in markets when the oil price is high, and it is profitable to start ultra-Deepwater projects. As we can see in figure 10, the day rates for the use of drill ships are very comparable to semi-subs rates. The reason is that several semi-subs can drill up to 10 000 feet's and due to lower construction cost can be preferable, and it can be argued that it acts like a reference point for drill sips.

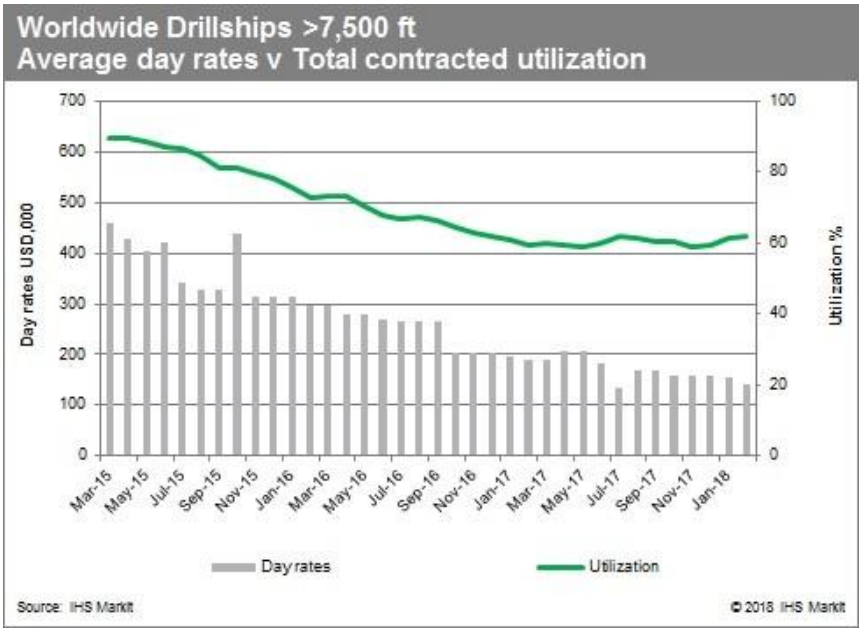


Figure 12: ihsmarkit.com

To conclude the segment consisting of Jack-up rigs are maybe the most influential of the three main segments in the drilling industry. Jack-up rigs are the rig type with highest number of units in the industry, by far. There are almost twice as many Jack-up rigs in the market than drill ships and semi-submersible combined (Shinn, D. C. 2017). Jack-up rigs are the first to experience increase in activity level when the oil companies begin to increase their

exploration activities because they are the cheapest units around and most accessible. This factor is important to think about when we now discussing sources of financing and the capital structure in the industry.

3.0 Theory of Capital Structure

There has been a lot of research in capital structure over the past 50 years. Ever since the M&M Theorem was presented in 1958, the theory of capital structure has been heavily debated and developed. In this section I will present the most relevant theories for my master thesis. Also, heavily criticised for its relevance in the real world, the M&M Theorem is included as it provides important background and is the foundation that the capital theory is built upon. Today, however, the Trade-Off theory (1973), The Pecking order theory (1984) and the market timing theory (2002) are the most relevant theories used in practice.

3.1 Modigliani-Miller

The most traditional view on capital structure today is the theory presented by Franco Modigliani and Merton Miller in 1958 (Modigliani, Miller, 1958). They state that if we remove taxes, bankruptcy costs, agency costs and asymmetric information, the structure of financing in a company will not affect the value of the firm. The theorem consists of two propositions.

Without taxes

Proposition 1: $V_U = V_L$,

Equation 1, Modigliani Miller (1958)

V_u: Unleveraged,
V_L: Leveraged.

Proposition 2: $rE_L = rE_U + \frac{D}{E}(rE_U - rD)$

Equation 2, Modigliani, Miller (1958)

rE_L: Return on Equity leveraged,

rE_U: Return on Equity unleveraged,

D: Debt,

E: Equity,

rD: Return on Debt

However, when tested in the real world, the theorem was proven it did not apply under several circumstances, including bankruptcy cost, agency costs, taxes to name some.

Therefore, Modigliani and Miller made a correction in 1963 where they included taxes in their model. The result of the new research resulted in a restate of their propositions.

With taxes

Proposition 1: $V_L = V_u + T_CD$,

Equation 3, Modigliani, Miller (1963)

V_L: Value of leveraged firm,

V_U: Value of unleveraged firm,

T_CD: Tax rate times Debt.

Proposition 2: WACC = $r_E(\frac{E}{V}) + r_D(\frac{D}{V})(1\text{-}Tc)$

Equation 4, Modigliani, Miller (1963)

WACC=Weighted Average Capital Cost

r_E: Return on equity

E: Equity

V: Total Value

r_D: Return on debt

D: Debt

Tc: Tax rate

When considering that debt is cheaper than equity, we see the following:

$\lim_{WACC \to 0} Fv \uparrow$, FV= Firm Value

The model assumes that there does not exist any transition cost, corporations and individuals can borrow at the same rate and that companies only pay taxes after interests.

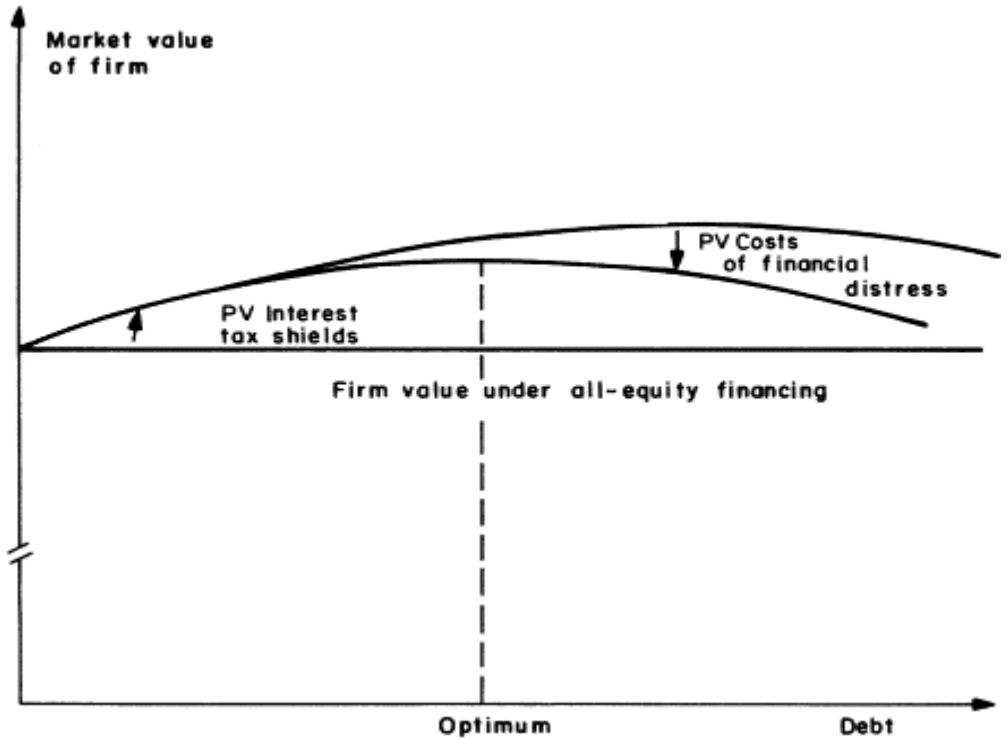
However, the new model did not include bankruptcy cost, asymmetric information, and agency cost. Today, Subsequent studies have shown us that the M&M theorem remains a very

unrealistic approach in its original form. Therefore, we have seen two new models been derived from the MM Theorem, the Trade Off theory and The Pecking Order Theory.

3.2 The Trade Off Theory

The fact that the M&M theorem don't take into consideration the aspect of bankruptcy costs, agency costs has led to a lot of challenges against the theory. As a result, the theory has been further developed. In example, Frank & Goyal (2008) highlight the fact that without including offsetting of debt, the optimal capital structure gives us the incentive of 100 % of debt financing, as shown in lim function in the Equation 4.

To deal with this issue, the trade-off theory took a rise to the surface. The trade-off theory introduced by Litzenberg & Kraus 1973 states that the capital structure is a trade-off between a company's cost and benefits of taking on debt. The theory builds on the findings presented by M&M in 1958 and 1963. The essence of the theory is that when a company aim to maximize its value, the company will take on debt until the point where the marginal benefits of debt equals the marginal cost of debt.



(Figure 13. Shayn-Sunder & Myers, P. 220 Journal of financial economics (1999))

The figure shows that a change in the capital structure benefits the shareholder if the value of the firm increases. A company with debt receives tax reductions and therefore pay less tax than all equity firms.

This theory has later been divided into two different directions, The Static Trade-Off Theory, and the Dynamic Trade of theory. The Static theory emphasize a situation where the trade-off has a time period of only one period. In this period, the maximization of the firm value is reached by substituting equity for debt and vice versa until that point is reached (Myers, 1984). According to Brealey and Myers (2003) the trade-off is between the possible tax shields and the costs that financial distress brings along. Companies with a high degree of tangible assets and taxable income to shield would have a higher target ratio than companies with a higher degree of intangible assets, greater risk and less taxable income, which rely more on equity. According to Brealey and Myers (2003) the value of a firm can be calculated as follows:

$$V = D + E = VF + PVt - PVb$$

Equation 5: Brealey & Myers (2003)

VF: Value all equity firm

PVt: Present value of tax deductions for interest rates (tax shields)

PVb: Present value of future cost due to risk with a higher degree of leverage (Financial distress) or bankruptcy cost.

However, for this approach to work there must be a modification of the tax structure if it shall fit the model properly (Bradley, Jarrel and Kim, 1984). Further it fails to deal properly with adjustment costs as well as cost of financial distress (Myers, 1984).

Where the static trade-off theory is followed if a company determines its leverage by a single period trade-off between tax benefits and the deadweight costs of bankruptcy, the dynamic trade off theory discuss the situation where a firm shall decide to retain earnings or pay dividends in this period or the next period (Frank & Goyal, 2007). The dynamic theory brings adjustment costs and the role of expectation into the model and tax rates and the alternative return on equity for investors are factors that the decision of pay dividends this period or next depend upon (Frank & Goyal, 2007).

3.3 The Pecking Order Theory

As a result of the shortcomings of the trade of theory, The Pecking order theory was presented by Myers in 1984. Akerlofs (1970) "Market for Lemons" laid down the foundations were the Pecking Order theory arise from. The theory deals with the situation that managers and executives possess more information about the company's state of art and future than outside investors. There is a fair assumption to be made that executives because of this have more information on supply and demand and risks connected to the company and thereby creates a situation of asymmetric information when looking for funding (Myers, 1984).

When a company looks for funding operations or investments the following general sources of funding is available: Retained earnings, debt and equity. According to Myers, *"firm is said to follow a pecking order if it prefers internal to external financing and debt to equity if it issues securities" (Myers, 1984, pp. 576).* This put equity in a way both at the top and at the bottom. Where the Trade-Off theory follows and aims for an optimal debt-Equity ratio which is given, the pecking order looks at sources of funding by level of risk with the safest being chosen first. This means that the firm first will choose equity in form of retained earnings to fund operations and investments. The next source in line will be straight debt, followed by convertible bonds and then finally new equity.

As managers possess the asymmetric information discussed above, this would lead to incentives for managers to issue new equity when the firm is overvalued and debt when the firm is undervalued, given the asymmetric model (Myers & Majluf, 1984). However, investors can only estimate the external value, and as a result the value of the equity issued will decrease. This phenomenon is illustrated in a good manner by Akerlofs (1970) "The market for lemons". He explains that when a used car dealer has sold some bad cars, the market knows this and thereby drive out the good ones. As investor learns the same information as managers, the value will increase or decrease depending on the information.

Where the trade-off theory states a positive relationship between profitability and debt ratio, the pecking order theory states that more profitable firms use less debt (Brendea, 2011). The pecking order implies a more dynamic approach allowing there to exist a optimal capital structure, while the trade-off is more static, even though there has been introduced a more dynamic version of the trade-off theory.

3.4 Market timing theory

The market timing theory was first presented by Baker and Wurgler (2002). The theory states that managers can identify certain periods were the issue of new equity is the preferable choice of funding due to high valuation of the company's stock. Therefore, managers will issue equity only when capital market conditions are favourable to the firm (Frank & Goyal, 2009). Instead of an optimizing of a dynamic strategy the managers take advantage of favourable markets. Managers will time the equity market by issuing new equity when the market value is higher. As a result, the cost of equity for the firm would be lower and managers would increase the value of the firm at the cost of new shareholders and for the benefit for current shareholders (Brendea, 2011).

The theory moves away from the understanding of a target capital ratio because managers in bad conditions will delay issuance of new equity and may issue more than needed in good conditions in order to meet future requirements. Issue of new capital therefore often happens after a period of increase in the stock price of the company (Frank & Goyal, 2009).

Low leveraged firms are firms that in good market conditions choose to issue new equity, while high leveraged firms have issued new equity during bad marked conditions, thus giving long-lasting effects on capital structure of a firm (Baker & Wurgler, 2002). Frank & Goyal (2004) questioned the theory. However, empirical studies by among others, Huang & Ritter 2005), Alti (2006) and Hovakimian (2006) gave the existence of the market timing theory significant support and established the theory in the modern capital structure literature (Brendea, 2011).

3.5Maximizing value

The most widely recognized and accepted objective for a company is to maximize the value of the company, or in other words, maximizing shareholder wealth. One of my lecturers at MGIMO with over 10 years in BP, Mr. Mikhailov, Stanislav, always stressed the issue that if a project did not add value to the firm, it was not worth doing. However, in recent years the stakeholder theory has come and taking ground in business and finance theory. HBS Professor Micahel C. Jensen states that many managers are caught in a dilemma between the desire to maximize the value of the company and to take into account the interests of all stakeholders in a firm (stakeholder theory). As Mr. Mikhailov also says, adding value does not mean that the

project necessarily has to provide positive cash flow as long it adds value to the firm. One example might be to install CO2 cleaning technology on drilling rigs. The cash flow might go down, but the perception of being environmental to the market might add value to the stock.

Drilling rigs are a part of big scale global industry as Oil and Gas, and environmental issues are addressed all the time over the business. A fleet of old and less efficient drilling rigs are maybe not a good investment opportunity as new and more efficient drilling rigs. When managers lay down strategic plans and plan for the future, taking this into account is very important, also in the matter when choosing sources of funding

4.0Sources of Financing

Shipping is regarded as a very capital-intensive business, where newbuild prices for the largest oil tankers can reach 150 million dollars, give it or take. Now we know that newbuild prices for drilling rigs varies from approximately 200 million for Jack-up and up to approximately 1200 million for a drillship. Securing financial structures in this industry plays a major role as it is an asset-based industry. It differs from other asset-based industries because a rig owner can choose the jurisdiction of the drilling rig. Therefore, we see a lot of drilling companies registered in for example Bermuda. The drilling rig business is a specialist business with international mobility (Stopford, 2009)

In this industry, banks are not that focused on booms, but more interested in recessions. Bankers are only interested in getting repaid their loans with their interest, which means that bankers are concerned whenever debt exceeds the value of the firm. On the opposite side, investors are looking at the investment's potential, knowing that high profitability often comes with greater risk (Stopford, 2009) As an example, it can be compared with lenders selling a call option and shareholders buying a call option.

Since banks are losing money when the debt of a firm is greater than the firm's value, the payoff for the banks is comparable to selling a call option. Therefore, lenders care more about recessions because recessions can lead to losses. However, a lender won't be taking advantages of a boom because they only get paid interest.

For the shareholders the opposite is happening. Like buying a call option, the shareholders will earn pay off when the value of the company exceeds the value of the debt. Those two phenomena are worth thinking about when connecting them to financial theories.

There are several ways to finance drilling rigs and drilling companies. There are three main sources of funding.

4.1 Internal Equity

First, we have Equity. Equity are funds that a company or a private person holds. Start-up companies often secures initial funding from heritage, investments or loans from family and friends. Existing companies on the other hand have already established cash flows which are providing the company with equity to invest in other projects. However, we see often that the equity hold by the company isn't enough and they have to look for additional capital from the outside.

4.2 Debt

When not having enough private funds, going to a bank and negotiate for a loan is a very common practice. For funding in the maritime sector, bank loans are the most important source for funding (Stopford, 2009). By doing so the company will take on an additional cost which is called interest. This capital cost can be very expensive for a company, dependent on factors like liquidity, market conditions, world economy etc. There are many types of loans, but we can divide them into short term and long-term loans. Since banks demand access to financial information for lending money, this is probably the most secure source of funding. Drilling rigs are long terms assets which makes them collateral for the banks. Because of the significant amount of capital required to invest in drilling industry, banks often form syndicates of several banks in order to diversify their exposure to one borrower. When a company experience financial difficulties and the different participants in the syndicate have different experiences with maritime industries, the syndicate get a problem. A bank without the knowledge and experience of the cycles will not act in the same way as the more experienced ones. As result, companies often prefer banks who offer joint financing rather than diversified syndicates.

4.3 Bonds

Another type of loan which has become very popular is to issue a bond. Bonds are interest-bearing securities with more than one-year maturity. In the maritime industry, most bonds are issued with a five-year maturity (Liang, Liu, Lin and Yeh, 2006) Bond is a choice of funding when a company wants to borrow money from the open public on a long-term basis. The choice of issuing a bond is often the result when the company's internal capital sources do not cover the bank's capital requirement. A bond work in the way that one buys a bond from the company. Then the company (the bond issuer) will pay an interest rate, called the coupon rate during the time of the bond. The cash flow from a bond will be stable, meaning the coupon rate is fixed. This means that the value of a bond will increase or decrease when there are changes in interest on the marketplace. (Ross, Westerfield, 2007)

4.4 External Equity

In the end we have the option of going to equity markets to search for funding. Capital raise in this regard are being done by making an IPO (Initial Public Offering) or an emission. An IPO is the first time a company are listed to a stock exchange and being open for trade to the public. Emission are existing listed companies who are issuing new blocks of shares to the open market. This option is often the less preferred choice of funding because owners then must give up some of their share of the company. If an owner has 100%, then do an IPO of 40% of the shares, then the owner has 60 % left which off course in turn resulting the owner decreasing its influence over the company.

Capital structure as we understand is a key factor. The level of debt ratio shows us the willingness for companies to take on debt. Below are one table showing the debt/equity ratio of some drilling companies in the end of year 2017.

USD 1000

Table 4-1 Debt/Equity ratio of 31.12.2017

Company	Equity	Debt	Debt/equity ratio
Seadrill	6959	11023	1,58
Oddfjell	767	1372	1,79
Fred Olsen	593	1048	1,77
Transoccean	12711	9641	0,76
Ensco	8730	5897	0,68
Diamond	3774	2476	0,66
Noble	5951	4844	0,81
Ocean Rig	2203	649	0,29
Awilco	231	100	0,43
Pacific	2152	3044	1,41

As we can see from this table, the drilling companies listed on Oslo Stock Exchange (Seadrill, Odfjell and Fred. Olsen) have significant higher debt/equity ratio than the companies listed outside Norway. This is an interesting observation as it seems like investors who invest on OSE have more appetite for risk than investors associated with other stock exchanges.

5.0 Methodology

The main goal of this thesis is to explore and identify factors which impacts how offshore drilling companies are financed. By using a set of collected data from the companies and the market, the capital structure of the offshore drilling companies can be illustrated trough a model which shows what leverage the companies take upon them self. In other words, the goal is to look at some factors with may explain the level of risk taken by the offshore drilling industries. The data collected for this purpose are extracted from quarterly reports from company web pages, Federal Reserve and US Energy Information Administration.

5.1 Research design

A research design describe how we are to proceed with everything related to how we conduct a scientific research. The question of which data are to be collected, how the data are to be collected and how the data are to be analysed are examples of what the choice of research design are telling us. The research design should be adapted to the purpose of which the research lies upon. The question of whether the research require in depth qualitative interviews or does require historical known data, or maybe both are sorted out in the design. For this thesis, the research design chosen to act upon follow a descriptive approach. The main goal of this thesis is to at some extent, describe the phenomenon called capital structure in the offshore drilling industry. To illustrate this phenomenon, existing theories are being applied in order to determine whether we can explain causality of the phenomenon by the chosen input factors. The method of testing a theory or several theories by utilize data, formulate a hypothesis, test the hypothesis and then accept/reject are generally called a deductive approach (Easterby-Smith, Thorpe, Jackson, 2012).

The methods applied in this thesis are mainly inspired by other similar papers. Therefore, this paper has not a purpose of challenging and create new methods for research but rather deploy and explain a phenomenon in an industry based on methods used to analyse similar questions in other industries. When reading research papers on similar topics, a clear pattern of preferred attacking angle on capital structure derives. A quantitative approach to investigating capital structure is the most widely used method, and thus also applied in this thesis. Using a quantitative approach to explore this phenomenon gives the opportunity to tell more about the "population" and therefore brings the ability to generalize.

5.2 Model

5.3 Ordinary Least Square

For the purpose of this study, the most suitable option when choosing a model is to use a multiple regression model. This model is a god vehicle to explain one dependent variable by a set or several independent variables. The advantages that comes from a multiple regression model compared to a regression with one explanatory variable is that the model are able to explain the variances of the predicted values to a much greater extent because we throw more independent variables into the model. Equation 6 presents the multiple regression formula in

general where β_0 represent the constant value, $\beta_1 \ldots\ldots \beta_n$ represent the isolated coefficients for the relating independent variable and ε the margin of error.

(6) $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_{ni} + \varepsilon$

Some conditions have to be in place for an ordinary OLS model to be valid. These are the condition of linearity, normality, multicollinearity, autocorrelation and homoscedasticity.

When utilizing the ordinary least square model, or a regression model in general sort of speak, it is important to be aware of the bias called possible omitted variable. In order for this to be taking place, two conditions must be fulfilled: The first one is the possibility that the omitted variable correlate with the regressor. The second one is that the omitted variable is part of determine independent variable. However, the error term will in fact capture the effect of the omitted variable, and therefore actually increase the explanatory power of the model by including more omitted variables.

5.4 Least Square Dummy Variable Model

Stock & Watson (2012) makes a strong argument that fixed effect model are a more suitable and a strong and powerful tool to analyse panel data. When all the data occurs for the same time period and entity, we say the data is balanced. If the dataset is missing data points it is declared unbalanced. By introducing the Least Square Dummy Variable Model it allows us to adjust the model for unobserved variables across entities. Companies can have different cultures, different relationship with banks, different relationships with investors and markets and so on and forth making it har to analyse the data based on all as an equal and homogenous population. By introducing the dummy variables for each entity, we deal with this challenge.

(8) $y = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_n x_{ni} + \alpha i + \varepsilon_i$

Where α is the intercepts of the entities.

5.5 Dependent Variable

As we understand, the focus of this study is to do a research about capital structure in the offshore drilling industry. Therefore, there is very important that dependent variable to be chosen are able to describe this phenomenon. When similar research papers are being analysed, the most preferred choice of dependent variable is the level of debt used in a

company. However, there are different ways to measure the level of debt and what is included in the "debt part" of the equation. In this thesis the interesting thing to look at is the total amount of debt compared to the level of equity. This gives the following equation for the dependent variable debt/equity ratio (leverage).

$$Leverage = \frac{Total\ Debt}{Total\ Equity}$$

As the formula clearly states, all debt is taken into account when calculating the degree of leverage the company have by debt. Some may argue that short term debt, or current liabilities, are a part of day to day operations and thus should be excluded and long-term debt is more on a strategically level and influence the capital structure in a greater way. However, all debt with bearing interest rates will influence the decision for sources of capital and therefore are included in this thesis.

Another aspect of this equation which have been widely discussed in academic literature is the use of market leverage vs book leverage. From one point of view, several researches tend to lean on market value when financial decisions are to be made. Book debt is backward logging and not forward looking, as the market tend to be (Barclay et al, 2006) and when analysing the capital structures of companies, the market value is the preferred choice of action (Frank & Goyal, 2009).

Meanwhile the book value, according to several scholars, represent the correct measurement. The base of the assets should be the underlying factor which capital structure is supported and decided upon, not potential growth (Myers, 1984). Further, Frank and Goyal (2009) report that managers often find the market too volatile when exploring measurement functions and therefore find it more appropriate to use book value as the base when making decisions on funding. As we have discussed already, the offshore drilling is a highly volatile industry and extremely capital intensive. Therefore, it can be argued that if managers where to making financing decision based on market value, these would have a huge impact of alterations. One more reason in favour of book value is that market value is very difficult to reliably quantify.

When taking these arguments into consideration, knowing that the offshore drilling industry is a part of a giant industry called the oil and gas industry which are heavily influenced by the oil price. The oil prices are very volatile and therefore, the model used in this research will use book value as base for the calculations of debt/equity ratio.

5.6 Independent variables

Underneath the prediction of the chosen independent variables influence on debt/equity ratio for this model are summarized in a table. Further we discuss tirst the variable of company specific first, then more macroeconomic and market deciding factors are discussed.

Table 5-1: Theoretical perspective - Prediction

Variable	Trade-Off Theory	Pecking Order Theory	Market Timing Theory
Operating Margin	+/-	-	
Tangibility	+	+/-	
Size	+	-	
Oil Price	-	-	+
10 year FED Interest rate	-	-	-

The purpose of this table is to summarize and display what impact the different theories are expected to have on debt/equity ratio based on the chosen independent variables.

Some of the variables are chosen on the background of former studies (Frank & Goyal, 2009) and some are chosen because of the logical relation between market dynamics and company behaviour. It is to some extent some difficulties to compare studies with others because researchers tend to define their variables differently, even the ones wo intend to measure the same content. Different context and different models etc are factors that imply this mismatch to occur.

5.7 Firm specific variables

Profitability

The Pecking Order Theory states that the preferred choice of funding for companies with high profitability is their own internal funds. High profitability will generate high cash flow and turnover thus leading companies to not have the need and therefore don't require high amount of debt to fund their operations. On the contrary, the trade-off theory tells us that high profitability companies can handle more debt and therefore take on more debt in order to maintain managerial discipline (Jensen & Meckling, 1976). However, Frank & Goyal (2009) argues that according to the trade-off theory may lead firms to actually decrease their amount of debt because leverage actually can be related negatively to profits because of different market frictions and volatility. Anyway, the theory which have the most empirical backing is the pecking order theory. In that regard, the debt/equity ratio is expected to be negatively correlated to profitability.

There are several ways to calculate profitability for a firm. A common method is to divide the company's Earnings before interest, taxes, amortization and depreciation (EBITDA) with total capital in the company. However, in this model all the company are operating in the same industry, thus giving us an incentive to include amortization and depreciation to make the numbers more comparable over the industry since all the players in this market have a large amount of assets.

$$Operating\ Margin = \frac{Earinings\ before\ interest\ and\ taxes\ (EBIT)}{Total\ Liabillities+Equity}$$

Tangibility

One aspect that the Trade-Off Theory implies is the relationship between assets and debt. Companies with higher amount of tangible assets have lower bankruptcy cost. Therefore, it is arguable that the more tangible assets a company possess, the more debt the company have resulting in a higher leverage ratio. From the Pecking Order Theory point of view, Frank & Goyal (2009) argues that there exists some level of ambiguity when assets are being connected to the adverse selection cost. This argument further underlying the fact that debt /equity ratio should increase if tangible assets increases. The result of this reasoning gives the expected relationship that debt/equity leverage and tangibility correlates positively.

$$Tangibility = \frac{Net\ Property,Plant\ \&\ Equipment\ (PP\&E)}{Total\ Book\ Value\ of\ Assets}$$

Size

When it comes to capital structure theory, several academics argues that the size of a company influence the decisions of funding. Larger firm are often considered to be more transparent than smaller firms. Because of this, Frank & Goyal (2009) argue that larger firms will have higher level of debt/equity ratio due to less asymmetric information. Bankers and investor in other words will have more information about large companies than small companies, in turn making it more comfortable to grant loans and invest capital. A result is that agency costs for larger firms therefore should be lower due to their recognition in the market. This implies a positive correlation between size and debt/equity ratio according to the trade-off theory. On the contrary, the theory presented in the pecking order theory implies that larger companies will in turn generate higher margins which in turn will prompt companies to choose inhouse funding resulting in a negative correlation effect between size and debt/equity ratio.

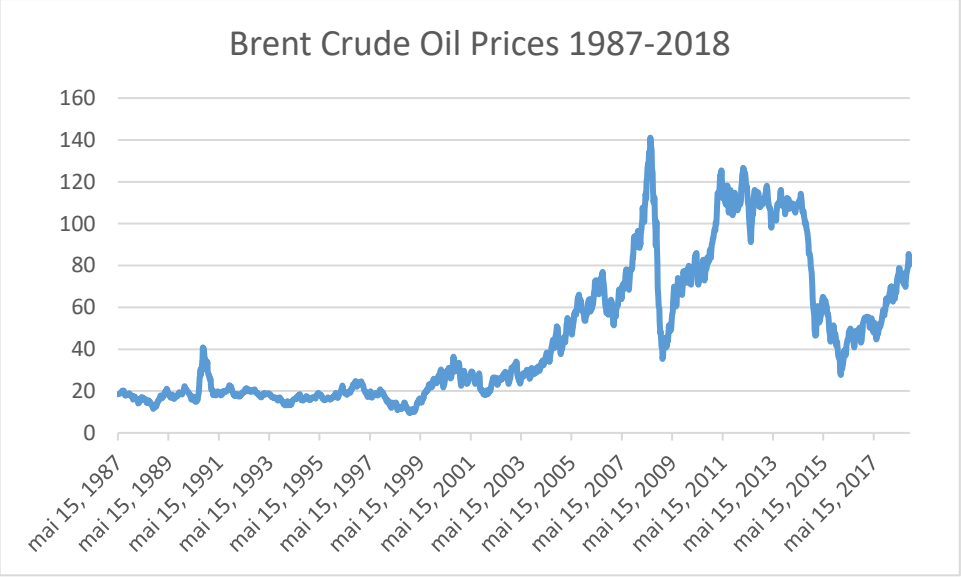
There are several ways to measure a company's size. Some common variables used are in example total revenues of the company or the total numbers of employees in the firm. However, the most common variable to distinguish size is to measure it by total book value of assets. Because we want to increase the conditions for linearity, the natural logarithm to the total asset values have been deployed, because otherwise those numbers will be extremely high compared to the other variables.

Size = ln (Total Book Value of Assets)

5.8 Macroeconomic variables

Crude Oil Price

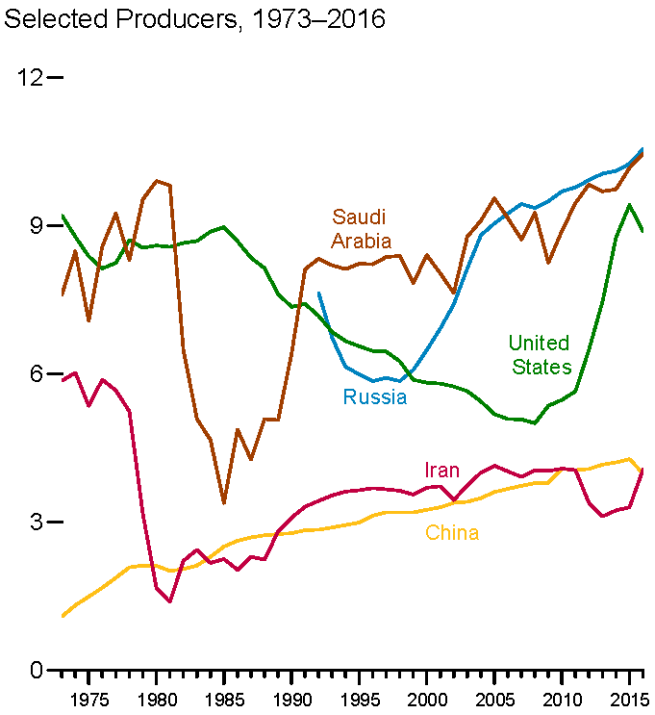
It is obvious that when analysing the debt/equity ratio for offshore drilling companies, the prices for crude oil has to be an input factor in the model. As discussed earlier in this thesis, the demand for offshore rigs follows an equation where oil prices are a dominant part. Further, the demand for crude oil are setting the tone for how much and how intensive the investments from the oil and gas companies for new production. The prices for Crude Oil are in other words a must be. Since this thesis look at the drilling business in the offshore segment, the WTI Crude Oil are not being taken into consideration. The Oil price used in this thesis is weekly Brent Crude. Oil prices are extremely volatile and the big shifts in the price levels dominates the outcome for the industry.



(Figure 14, Made by author based on numbers from EIA)

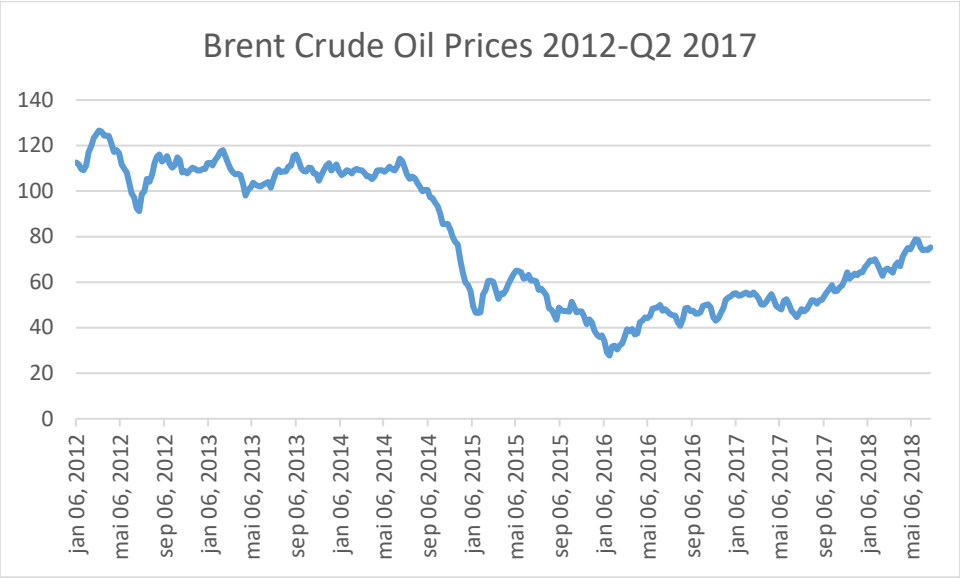
Figure 14 describes how much the oil prices can fluctuate over time. Oil prices on the y-axis and time is the x-axis. Since the oil and gas industry are of the significant size it is, and so important on a geopolitical level, there are a lot of factors that influences the prices. Organisation of Petroleum Exporting Countries (OPEC) have historically had huge influence on the price level, and in example its main protagonist Saudi Arabia have operated as a swing producer several time over the decades (Figure 15) in order to dictate prices to keep balance

in the market. In figure 15 we see oil production of million barrels pr. Day on the y-axis and time on the x-axis.



(Figure 15, EIA, May 2017)

However, lately we have seen that Saudi Arabia not unconditionally keeps the oil prices high. The significant dip in oil prices shown in figure 14 from year 2014 is due to Saudi Arabia's intention to fight with the US Shale Oil industry. The Development of the Shale Oil and Gas industry in the United States revolutionized the oil market. Knowing that the industry needed high oil prices to survive, Saudi Arabia did not cut their production in order to balance the market but to keep their market share and force Shale producers out of the market. By doing so, it left Venezuela out hang and dry, possibly. Offshore exploration and production are off course also influenced by this game played by the big nations. Increased onshore production means decreased offshore production in the big picture as it is much cheaper. However, now the breakeven levels of shale production are still relatively high but are decreasing every year. And when we know that Saudi Arabia intends to make Saudi Aramco ready for an Initial Public Offering (IPO) it will also be in their interest to have stable and relatively high oil prices to maximize the value of the company. All this are factors worth mentioning and difficult to foreseen for managers making financial decisions in an industry which require so much amount of capital as the offshore drilling industry and to see the correlation effect will be highly interesting to see and discuss.



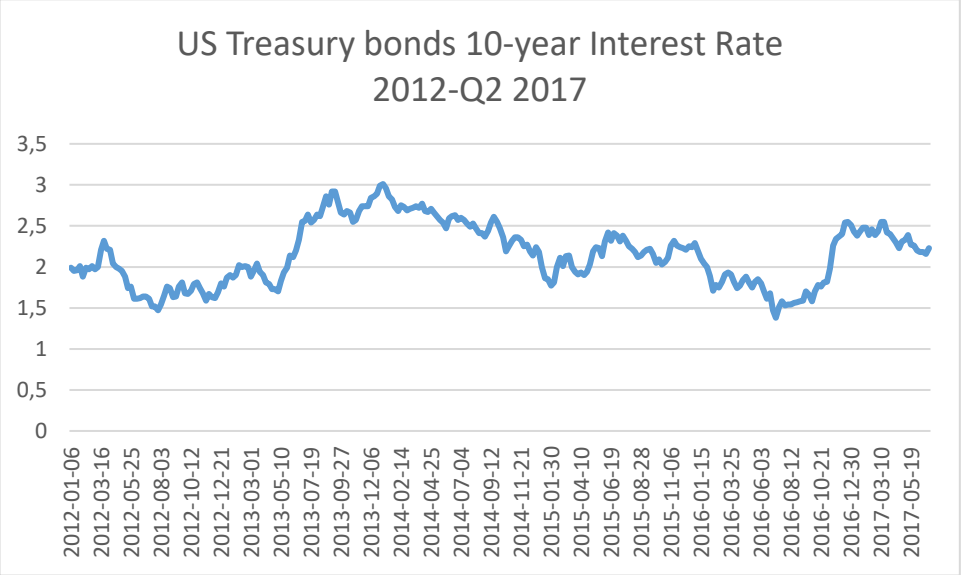
(Figure 16, Made by author based on numbers from EIA)

The period of oil prices used in this paper are shown in figure 16 where the y-axis consists of oil price level and the x-axis describe the time. The reason of the extraction of a certain period is that it matches the time period of which company data from most players in the industry are available. If we use the oil price as a cycle indicator, we see that we capture the plateau, collapse, through and possible recovery of the last cycle in that time frame.

The industry is very similar with shipping, and when you enter a peak or see one coming on the horizon, everyone wants to be on board. The banks start to lend out more money and the rig owners take greater risk because of the increase in asset value. That last factor is not shown in the books but are a market behaviour we must take into consideration. However, from the capital structure point of view, the trade-off states that higher profitability gives incentive for lower debt level thus supporting a pro-cyclical behaviour (Frank & Goyal, 2009). The Pecking Order Theory favours internal funding compared to outside funding. When putting it up against the market timing theory especially, the taking advantage of a peak behaviour kicks in thus supporting the counter-cyclical behaviour argument of Halling, Yu & Zechner (2015). From the theories we expect a negative correlation in relation to the Trade-Off Theory and the Pecking Order Theory and a positive correlation to the Market Timing Theory.

Interest rates

For companies who are issuing different type of debt, interest rates are crucial. High interest rate will result in more expensive loans for companies. Therefore, the preferred course of action when interest rates increases the companies want to use equity. Preferable own equity, but of outside capital is required, companies should then theoretically issue new equity. Because of this dynamic, the interest rate is included in the research to see to what extent the debt/equity ratio correlates with interest rate.



(Figure 17, Made by author based on numbers from Federal Reserve)
**Interest rate Y-axis, Time x-axis.*

The same logic applies for interest rate as for the oil prices when it comes to the time period used in this research. Because of the limitations from the companies in the industry, the interest rate used in this research is for the period 2012-end of Q2 2017. The interest rate chosen to be included in this research is the 10-year interest rate for US Treasury bonds.

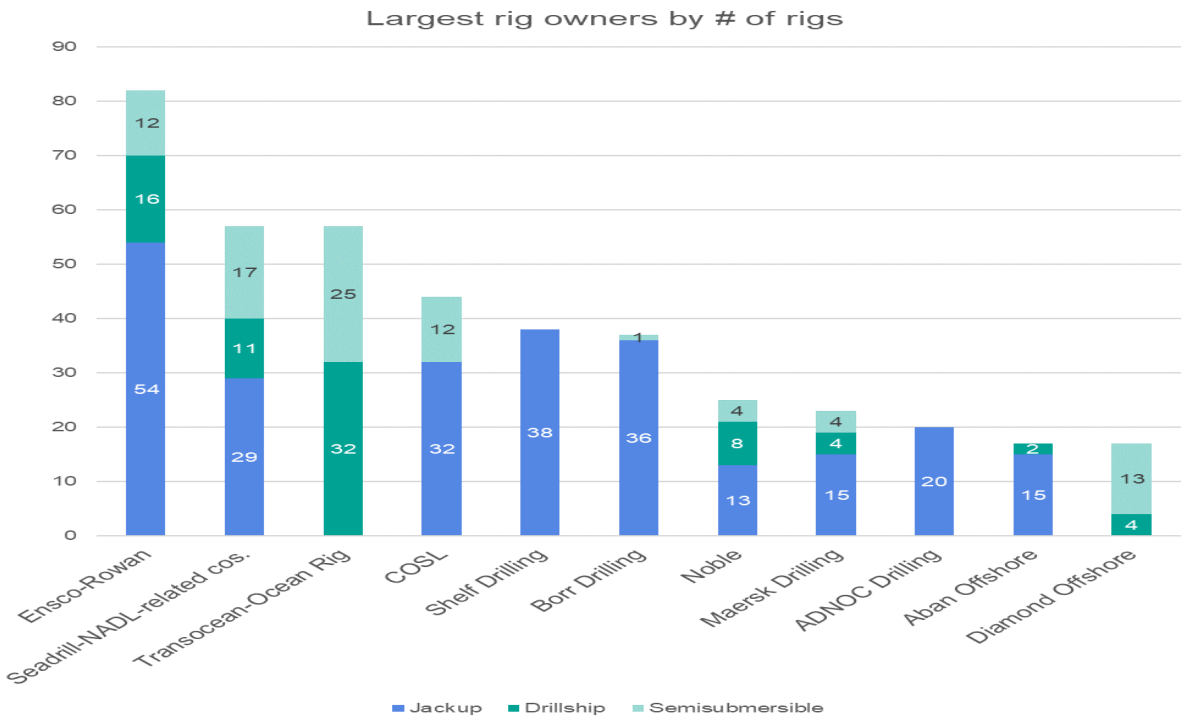
From capital theory perspective and cost of debt it is presumable to anticipate a pattern that says that the higher the interest rate, the costlier the debt are and therefore the lower the debt/equity ratio are. Therefore, the expectation of a negatively correlation with all the capital theories are presumable.

6.0 Data

The data has been gathered from various sources. Company reports are used to gather company data. Oil prices are extracted from EIA and US Treasury rates from Federal Reserve Bank.

6.1 Data Sampling Process

The sample of companies in this survey consist of 8 (11) companies of the offshore drilling industry who combined generates a total of 525 quarterly observations used in this paper. Eight companies do not sound very representative for a multi-billion-dollar industry. However, as already discussed, the Offshore Drilling Rig business have huge capital requirements which make it a risky business to enter. Therefore, the industry consists of very few, but large players. Figure 16 shows the largest Offshore drilling companies in the world as of October 2018.



(Figure 18: Bassoe Offshore, Oct 08. 2018).

Further there are some companies who operate drilling rigs onshore as well as offshore. The purpose of this paper is to do a research about the offshore drilling industry, thus leaving out

drilling companies who operates onshore. Therefore, the companies included in this study are chosen by the following two criteria's: (1) The companies are public listed companies and, (2) The main purpose of business operations are in the offshore drilling market.
Because of this, China Oilfield Services (COSL) who are owned by the China National Offshore Oil Corporation (CNOOC) and Abu Dhabi National Oil Company (ADNOC) are not included as they are state owned and not publicly listed. Aban Offshore are also left out due to their heavily involvement in wind energy as well as not being listed early enough to make the cut because of difficulties of determine which assets on their balance sheet is drilling rigs and what is wind power plants. Shelf Drilling and Borr drilling are companies who were listed on the Oslo Stock Exchange in 2018 and 2017 respectively making them way too young for this research. That leaves us with the following companies displayed in table 6-1.

Table 6-1. Variables and total observations.

Company	Nr of Variables	Listed on OSE	Total observations
Seadrill	3	Yes	63
Odjell Driling	3	Yes	63
Fred. Olsen Energy	3	Yes	63
Transoccean	3	No	63
Ensco	3	No	63
Diamond	3	No	63
Awilco	3	Yes	63
Pacific	3	No	63
Noble	1	No	21
Totalt	3		525

The table displays how many variables (debt/equity ratio, Tangibility and Operating Margin) are conducted from each company, if the company are listed on the Oslo Stock Exchange (OSE) and how many quarterly observations in total which are extracted from each company.
Source: Company reports, quarterly and annual.

Finally, one more criterion was laid down in order to be included in this paper which is that there could not be any non-missing data for total book assets. Because of this criteria, Ocean rig, Rowan Companies and Noble Corp. did not make the final cut.

The observations are extracted in a time period ranging from Q1 2012 until Q2 2017 are included. Financial statements are extracted from the companies itself through quarterly and annual reports published reports on the respectively company's website. All the numbers are converted into million dollars

For the macroeconomic factors who are included in the research it is important that they are provide from a source which are both reliable and provides up to date data. Therefore, the Brent Crude Oil prices are being extracted from the US Energy Information Administration where oil prices able for direct downloading range from 1987 and up to date. The interest rate used is the US Treasury bonds 10-year interest rate extracted from the Federal Reserve Bank. Oil prices are in the currency of US dollar and the same counts for rig rates. Therefore, the US FRB interest rates are the most sufficient rate to use in this research.

6.2 Representativeness of Data Sample

As mentioned above, the research consists of only 8 companies. This represent the major issue that can be questioned about this study. There is no doubt that I acknowledge that because of this issue, the findings conducted through this research can be influenced. The existence of this drawback is because of the requirement that companies included in the paper are public listed and have been so since 2012, excluding large players as COSL in the process.

However, the biggest players are included and when we look at the total amount of units these companies possess, we are still on a significant share of total tonnage in the industry. The companies Seadrill, Transocean and Ensco are the three biggest players in the industry, an industry who are in a consolidation process. Ensco acquired Atwood, leaving Atwood in a condition to not be able to take part in this industry as an own entity. Ensco have also during the fall of 2018 announced they will acquire (or Merge) with Rowan Companies while Transocean are acquiring Ocean Rig. This means that the most powerful and largest companies in the industry are included in the survey. Additionally, the companies included in the research represent a total of 40 % share of the total amount of Offshore Drilling Rigs in the industry. Last, but least. The company listed on the Oslo Stock Exchange are 50% of the companies included in the research. Out of this, only one is registered in Norway, being Fred. Olsen Energy. Seadrill and Odfjell are Bermuda registered companies while Awilco is registered in England & Wales. This knowledge, along with the findings that companies listed

on OSE are generally more leveraged tells us that there might be something attractive with the OSE.

However, the final sample of companies in the industry are being believed to give a representative illustration of the industry but, the reader, with these addressed issues in mind should include them in their thoughts while reading the results.

6.3 Descriptive Statistics

The purpose of this section is to present an overview of the data collected to be used in this research. This section will also include some comments about some of the data because certain values and observations must be emphasized in a greater detail. Table 6-2 show us the total number of observations, minimum and maximum value, median, average and standard deviation, for each of the variables the model is decided to rely upon.

Table 6-2. Total no. of companies included in this research.

Variable	min.	max.	std.	Med.	Average	Observations
debt/equity	0,44	2,58	0,45	1,09	1,14	176
Tangibility	0,50	0,91	0,09	0,75	0,75	176
Operating m	-3,05	0,87	0,55	0,27	0,16	176
oil price	27,76	126,62	30,47	91,23	80,18	287
Size	303	35312	10395,20	5813,5	10916,19	176
interest rate	1,38	3,01	0,38	2,18	2,15	287

As we can read from this table there are a significant difference between the bottom and top level of debt/equity ratio. As the median and average indicates the firm in general tends to rely more on debt than on equity. The standard deviation also indicates some degree of a great spread in this level. Tangibility however is much more balanced. Even though the minimum value of 0,50 is a very low level in this type of industry, the standard deviation, median and average values support the claim that it is a more balanced level. Operating margin are in general also to some extent very balanced and steady above zero. Off course, the decrease in oil prices from the autumn of 2014 in turn brought some poor quarters for the firms. However, the extreme numbers as -3,05 thus indicating an operating margin of -305 % is due to loss on assets which are either sold, scrapped or loss on impairment. This happened on 8 occasions from the total number of 176 observations and all from q4 of 2014 and onwards. This is also an observation who support the evidence of a collapse in the cycle for the offshore drilling industry. The different levels in oil prices with variations from approximately 28 to 127

dollars pr. barrel show that the dataset last for a period long enough to include both peak/plateau, collapse and through period of the market. The interest rate of 10 years US Treasury bonds are more balanced compared to oil prices but have in fact some variations, though.

What does this numbers tell us actually? Apart from possibly serve as a benchmark for the industry and show some relationship with risk and adjustments to market conditions, the picture will contain more useless information if we compare the findings up against something to make an illustration more readable for the reader. Now, one way is to compare this industry numbers with for example the debt/equity ratio of for example the Oslo Stock Exchange to receive a comparison in general, or we can use Oil Companies or Shipping companies to compare leverage with more similar industries. When remembering the end of chapter 4, one interesting observation came to mind. As we can extract in table 4-1, it appears that companies listed on Oslo Stock Exchange have a higher degree of leverage than those who are not. And this is an interesting observation that is worth to take a deeper look into. Therefore, the companies are divided into two slots: (1) Companies who are listed on the Oslo Stock Exchange (Table 6-3) and (2) companies who are not listed on the Oslo Stock Exchange (Table 6-4). The outcome by separating the companies into those groups is rather interesting. You may notice that the variable oil price and interest rate are not included in the two tables. The reason is because those are macroeconomic variable who are insignificant to the fact which exchange the companies have chosen to be listed upon, resulting the two tables contain firm specific variables only.

Table 6-3. Companies in this research who are listed on Oslo Stock Exchange.

Variable	Min	Max	Std	Med.	Average	Observations
Dept/Equity	0,44	2,58	0,473148686	1,35	1,39	88
Tangibility	0,50	0,86	0,085311544	0,72	0,72	88
Operating Margin	-1,96	0,87	0,461729085	0,28	0,24	88
Size	303	27491	9387,005634	2707,5	7233,06818	88

Table 6-4. Companies in this research who are not listed on Oslo Stock Exchange.

Variable	Min	Max	Std.	Med.	Average	Observations
Debt/Equity	0,51	1,36	0,246037513	0,84	0,88	88
Tangibility	0,58	0,91	0,085710886	0,79	0,78	88
Operating Margin	-3,05	0,46	0,611567593	0,26	0,08	88
Size	3510	35312	10089,78226	10996,5	14599,3182	88

As we see from the two tables, there are some important aspects to derive from them. First of all, there is a significant difference in the debt/equity ratios between companies listed on Oslo Stock Exchange (OSE) compared to those companies who are not. Companies listed on the OSE varies from 0.44 to2,58 while companies which are not listed have values varying from 0.51 to 1.36. The minimum levels are not that different, but the maximum levels are. We also see that the standard deviation levels provide evidence for a much greater spread on OSE when it comes to leverage. For the tangibility variable, the outcomes from the tables are rather similar. There is a higher level of tangible assets on the books in companies not listed on OSE. However, while the difference is present it is not very significant. When it comes to operating margin, the spread is actually higher outside OSE than on OSE. A part of the reason for this can be related to the fact that there are some extreme data observations due to loss on sold assets or loss on impairments. As we see from the Size variable which are measured by total book value of assets, we see that the companies not listed on OSE are on average approximately twice as big as its competitors on OSE. The fact that Awilco Drilling with its peak of 507 million dollars in book value of assets in Q3 2014 is a much smaller company than the other companies included in the survey. However, the average of not OSE compared to the Average of all the companies are higher than the difference between average size of OSE companies and the total average, thus indicating a lower impact from Awilco Drilling. Transocean are the largest company in the research with a peak of 35 312 million in book value of assets and Seadrill the second largest with 27 491 million in book value of assets. Anyway, Ensco, Diamond and Pacific are all on several occasions during the time period 2012-2017 Q2 at least twice as big as Odfjell Drilling and Fred. Olsen energy. The companies with missing observations to be included in the final research like Ocean Rig and Noble lies between Ensco and Diamond Offshore, giving further evidence and would likely increase the difference in Size between OSE listed companies and not OSE listed companies.

As we discussed the subject of cycles in chapter 2.2, it could be interesting to explore how the table would look like if we do a cross section of the observations gathered based on two different and opposite phases of the cycle. More specifically the plateau and through phase. From figure 14, it can be argued that the oil price of the year 2013 indicates a plateau phase in the market with prices steady above 100 dollars pr. Barrel, thus making the oil & gas companies willing to invest heavily in exploration and production. From the same figure we get the sense that the year 2016 indicates a through phase, or at least the beginning of the through phase. Table 6-5 represent the year 2016 including observations from each of every

quarter, and table 6-6 the same for 2013.

Table 6-5 Cross section table for the year 2016

Variables	min	Max	Std	Med	Average	Observations
Debt/equity	0,599	2,248	0,47566177	1,164	1,129	32
Tangibility	0,582	0,908	0,083278	0,803	0,781	32
OM	-1,612	0,642	0,4162879	0,215	0,154	32
Size	5,894	10,199	1,34314632	8,730	8,578	32
Oil Price	36,750	54,960	6,64421553	48,145	47,000	32
Interest Rate	1,490	2,450	0,37752163	1,715	1,843	32

Table 6-6. Cross section table for the year 2013

Variables	min	Max	Std	Med	Average	Observations
Debt/equity	0,519	2,247	0,48827176	1,048	1,081	32
Tangibility	0,639	0,901	0,07076452	0,721	0,727	32
OM	0,135	0,677	0,14541793	0,309	0,346	32
Size	5,838	10,394	1,39931832	8,891	8,692	32
Oil Price	102,490	109,950	2,86271132	107,850	107,188	32
Interest Rate	1,870	3,040	0,40626346	2,525	2,514	32

Surprisingly, as some may very well would state, the debt/equity values actual do not differ that much from a good year like 2013 from a bad year like 2016. The variables leverage, tangibility and size are very much the same in both years with a slightly overweight to higher levels in 2013 compared to 2016. Off course, the oil price has significant difference those two years compared, but that was the purpose. The interesting variable here is the operating margin. The companies included in the research made an average Operating Margin of 34,6 % in 2013, making all the companies rather cash machines in this market. In the year of 2016 the average Operating Margin have decreased to more than half the level of 2013. When compared to the table illustrating all the observations, we see that the operating margin of 2016 actually are very close to the total average, while 2013 lies quiet ahead of the total average.

6.4 Credibility of the study

When conducting any form for research, it is important to address the quality of the data gathered and used to make and complete the research. This is important because the research

can be conducted correctly. However, if the process of gathering data or the data itself are of weaker quality, then the research will suffer in shape of credibility. This issue is important to address whether it is qualitative, quantitative or a combination of the two, depending on the research design, in order to secure a satisfying supply of data to the research. Therefore, in order to make a statement about the quality of the research, reliability and validity are two aspects that must be given attention.

6.4.1 Reliability

The degree of reliability is believed to be high if the object measured will provide similar results under consistent conditions. (Easterby-Smith, Thorpe, Jackson, 2012). In other words, the results produced in this research are reproducible and consistent if the research would be conducted in a similar way by a group of different testers.

The data used in this research are extracted from various reliable sources. The company data are gathered from quarterly reports from the companies itself, which are being made under regulation and requirements from the Stock Exchange where the companies are listed. However, the actual data used in this research have been taken out manually from the company report by the researcher. The data have experienced checks to make sure the correct data have been gathered. However, free of human failure can never be guaranteed and therefore company reports may contain some incorrect data as well as the excel spreadsheets made by the researcher.

Interest rates are downloaded from the US Federal Reserve Bank, which represent a strong and reliable source for this data. The same accounts for Brent Crude Oil prices as those are downloaded from the U.S. Energy Information Administration. The same rule apply here, human failure can never be guaranteed for completely, but these sources are believed to be solid.

All the data sampled to conduct this research are put in order in Excel spreadsheets. The spreadsheets are presented in figures and tables and are also to be found in the appendices. The data which is included in the regression analysis are presented in its own spreadsheet called regression input.

In order to increase the reliability of the outcome of the research, the Ordinary Least Square model have been expanded to a so called Least Square Dummy Variable Model. Because

different entities (companies) have different cultures and different ways of doing business, his modification includes that aspect arguably make the results more reliable.

6.4.2 Validity

Validity is a measure which is used to ensure that the results from any research provide accurate reflections of reality (Easterby-Smith, Thorpe, Jackson, 2012). There are two forms of validity: internal and external.

Internal validity relates to systematic factors of bias. In a regression, this relates to the fact that there is a possibility that the variables are dependent on the same underlying variables for example. The variables used in this research are heavily based on earlier research on capital structure form different industries. Variables in similar research also varies from research to research. The variables which finally got chosen for the purpose of this survey are variables that normally are included in similar studies, variables which make logic sense and the variables are easy to access, related to practical and available reasons.

One way to measure goodness of fit for a model is given by R^2. R^2 stands for the explanatory power of the chosen model and is given in a range from 0 to 1 where 0 indicates no fit at all while 1 indicates a perfect fit. Later in the research, the R^2 values of the regression models will be highlighted and discussed.

External validity is related with how far the conclusion can be generalized across other types of settings, times, populations or universe.

Some threats to external validity are the likes of sources of bias, setting and history.
Bias are addressed above while setting can for example relate to different geographical aspects. While the result as whole from this research may can be generalized, the companies listed on Oslo Stock Exchange and those who are not actually operates in different settings. Therefore, results found from the one group may not apply for the other group and vice versa. This will be addressed later in the research. The same applies for history. The outcome of this survey may be working for this era, but not applied into different eras. Is it fair to say that behaviour in capital structure in the offshore rig business in the 1960's applies to day? This highlight the importance of knowing the limitations that history brings onboard. In example, economic booms and recessions will trig different behaviour.

Finally, to make the research as much valid as possible, the researcher is sad for the fact that the industry consists of very few players and are even more sad for the fact that some of the players don't have enough sufficient data published. By including more players in the industry to the survey, the researcher would increase the share of the industry players included in the research, which in turn would have made the survey more solid.

Due to the lack of great population, the researcher has chosen not to do a winsorizing or trimming of the dataset. These are two methods which are used to deal with extreme observations in the dataset in order to make the regression more correct. Because of the lack of a huge population and because of the fact that Seadrill filing for chapter 11 was the motivation to do this research, the extreme observations are included untouched in order to explore if big losses had an impact on the company's capital structure. The researcher are well aware that this creates a question where the answer might be that the results of the regression done loose some validity because of this extreme observations.

6.4.3 Regression conditions

For an OLS model to be valid it requires four assumptions to be met. This will be discussed in the following section and some tests for some of the models will be discussed as an illustration.

Linearity

The first assumption to be met is the one who deals with linearity. The dependent variable Y is required to be a linear function based on the independent variables selected for the model. For the regression to be valid, this accounts for each of the independent variables. However, the model will, at least try to, estimate a linear relationship between the variables even though the linearity criteria are not existent. As a result, the model may not be valid. One way to deal with this challenge is to transform variables into for example logarithm numbers (Keller, 2008). In this research, the variable of size has been transformed into logarithm numbers because of the huge difference in values in order to try to fulfil the assumption of linearity.

Normality

Normality is determined by the distribution of residuals. For the assumption of normality to be valid, the distribution of residuals must be normally distributed. A residual is the distance one observation lies from the mean and a good model should have equally probability for over estimating values as underestimating values (Midtbø, 2012). The smaller the dataset is, the higher the risk for the model not to fulfil the normality assumption. Two important aspects are related to this topic. First, the level of skewness which measures to what extent the distribution is symmetric or not related to the average. Second, the kurtosis which measures the thickness. Normality are tested by using three different mathematical tests. Beneath, three tests are run on three different stages of the model. Table 6-4 are the model 2 in a whole, while table 6-5 and 6-6 are tests done for Tangibility and Operating Margin respectively.

As we can see, to a significant level of 5 % the model is not fulfilling the assumption of normality. However, tangibility fulfil normality in all tests, but operating margin among others does not. Interest rates for example fulfil normality for Jarque-Berra tests while fail the two others. As a result, we can declare that the model used in this research are not the best suited model for the task as it does not fulfil all the assumptions for OLS, shown by not being able to reject the zero hypothesis and thereby failing the normality assumption.

Table 6-7: Normality tests, total dataset model 1

Normality Test	Score	C.V.	P-Value	Pass?	5,0%
Jarque-Bera	858,68	5,99	0,0%	USANN	
Shapiro-Wilk	0,58	#I/T	0,0%	USANN	
Doornik Chi-Square	2687,78	5,99	0,0%	USANN	

Table 6-8: Normality tests Tangibility

Tangibility	Normality Test	Score	C.V.	P-Value	Pass?	5,0%
	Jarque-Bera	3,20	5,99	20,2%	SANN	
	Shapiro-Wilk	0,99	#I/T	6,2%	SANN	
	Doornik Chi-Square	3,77	5,99	15,2%	SANN	

Table 6-9: Normality tests Operating Margin

Operating	Normality Test	Score	C.V.	P-Value	Pass?	5,0%
	Jarque-Bera	1473,21	5,99	0,0%	USANN	
	Shapiro-Wilk	0,64	#I/T	0,0%	USANN	
	Doornik Chi-Square	541,14	5,99	0,0%	USANN	

Homoscedasticity

The third criteria for making sure a regression model is valid is due to the fact whether residuals experience constant variance (var (E|X)=σ^2) thus implying they should be independent of the value of x. If the residuals show sign of heteroscedasticity, for example varying variances, the OLS will not be a sufficient estimator and therefore inferences that the model is based upon will be invalid. By calculating Eicker-Huber-White standard errors this challenge can be overcome (Stock & Watson, 2012). However, the excel version with the additional NumXL in which the researcher have conducted the models does not have the possibility to calculate Eicker-Huber-White standard errors. The fact that the study does not calculate the Eicker-Huber-White Standard Errors is considered a weakness.

Multicollinearity

Multicollinearity occurs when two or more independent variables corelates and thus reduced the robustness of the model. The causality relationship will be more difficult to determine if presumably independent variables are to correlate. By checking the correlation between the variables, we are able to test if there are any concerns related to multicollinearity

Table 6-10: Correlation matrix model 1 and 2

	Debt/Equity	*Tangibility*	*Operating M*	*Size*	*Oil Price*	*Interest Rate*
Debt/equity	1					
Tangibility	0,1313992	1				
Operating M	-0,05817322	-0,18293409	1			
Size	-0,04521779	0,13527676	-0,02677256	1		
Oil Price	-0,08236801	-0,28323478	0,29411853	0,0201295	1	
Interest Rate	-0,02251011	-0,07896854	-0,01980035	0,0230459	0,2642718	1

In general, none of the results can provide any concern of the performance of the model chosen for this research. However, some observations may to some extent correlate. For example, we see that oil price have a correlation of 0,28 with tangibility and 0,29 with operating margin. However, the correlations are not no substantial enough to bring any concerns for the model. The same accounts for interest rate who correlates 0,26 with oil price.

In the end, the researcher does not observe any concerns or problems related to multicollinearity for model 1 and 2.

However, when looking at model 4, there is some observations that may rise some concerns.

Table 6-11: Correlation matrix model 4

Not OSE	*Debt/Equity*	*Tangibility*	*Operating M*	*Size*	*Oil Price*	*Interest rates*
Debt/Equity	1					
Tangibility	0,26292348	1				
Operating M	-0,08965766	-0,14292334	1			
Size	0,20362074	0,61019268	-0,02820623	1		
Oil Price	-0,12433294	-0,64656835	0,30193612	0,07111512	1	
Interest Rates	-0,05709687	-0,04866823	-0,01843973	-0,03773585	0,26427184	1

Here we clearly see that size (0,6) and Oil Price (0,64) have a very high correlation with tangibility. Here we experience observations above the critical point of 0,4 and we have to take that into consideration when reading the result.

Alternative Regression

There are arguments that short term debt is a result of the day-to day operations and thereby not relevant for strategical decisions when deciding upon capital structure. Therefore, to check the robustness of the model, an alternative regression should be made based on long term debt only as the input factor in the debt/equity ratio as the dependent variable.

Table 6-12: Alternative regression, long-term debt as dependent variable.

	Total Debt	Long-term debt
	Regression statistics	
R multiple	0,85289208	0,80563542
R Square	0,72742489	0,64904843
Adjusted R Square	0,70122304	0,61707654
Standard deviation	0,24605263	0,21057848

	Observations	176	176		
Total Debt	Variable	*Coefficient*	*Std deviation*	*t-Stat*	*P-value*
	Tangibility	1,369	0,293	4,678	0,000
	Operating Margin	-0,114	0,039	-2,934	0,004
	Size	0,556	0,156	3,568	0,000
	Oil Price	0,000	0,001	0,292	0,771
	Interest Rate	-0,051	0,049	-1,036	0,302
Long-term debt					
	Tangibility	0,754	0,260	2,904	0,004
	Operating M	-0,066	0,032	-2,074	0,040
	Size	0,037	0,134	0,276	0,783
	Oil Price	0,087	0,251	0,348	0,728
	Interest rate	-0,023	0,040	-0,579	0,563

When comparing the alternative model with the model chosen for this study, the results are quite clear in favour of total debt as the debt factor in the debt/equity equation. The adjusted R square are significant higher for the total debt model (0,70) which means the chosen model chosen upon have a significant higher explanatory power compared to the long-term debt (0,61) model. Further support of total debt as the most robust choice are found in the values for the independent variables. In example, for the long-term debt model, the zero hypothesis for size cannot be rejected with P-value 0,783 and t-Stat 0,276. This numbers contrast with the total debt model, 0,0005 and 3,568 respectively, giving support for a reliable relation between size and debt/equity.

7.0 Analysis and Results

This chapter will include results and discussions of the results related to the research design presented in chapter 4 and 5. The section will include comments about the result, the results compared to the expectations presented in table 5-1.

Furthermore, the following section of the researcher's findings will address the models overall explanatory power and coefficients of the independent variables. There have been run one Ordinary Least Square model and five Least Squares Dummy Variable Models.

First the OLS model was run of all included companies, with results presented in column one. Secondly, the model was run for all companies with least square dummy variable model which include fixed effects, presented in column 2. Third and fourth model are the companies included in this research divided into two groups: companies listed on Oslo Stock Exchange,

presented in column 3 and the companies listed outside Oslo Stock Exchange, which are presented in column 4. Column 5 and 6 represent two years of different market environments. 5 look at one year with high rates and good market conditions and represent a period of a Plateau (2013 while column 6 represents results of a year where the market conditions are in a through period (2016). 5 and 6 are included more as an illustration to give some additional aspects to the picture. The results are shown in table 7-1 showing the standard leverage regression models.

Table 7-1: Standard leverage regression

	all OLS	LSDV	OSE FE	non OSE FE	2013 FE	2016 FE
	1	2	3	4	5	6
Tangibility	0,6247	1,3694	2,3971	-0,3006	0,6692	-1,0163
	(0,4042)	(0,2927)	(0,4551)	(0,4045)	(1,2136)	(1,3034)
Operating Margin	-0,0217	-0,1141	-0,2391	-0,0603	-0,0071	-0,0639
	(0,0668)	(0,0389)	(0,0869)	(0,0280)	(0,0558)	(0,0600)
Size	-0,0209	0,5560	0,5560	0,4716	-0,5460	0,2179
	(0,0259)	(0,1558)	(0,2349)	(0,1625)	(0,5616)	(0,6031)
Oil Price	-0,0209	0,0002	0,0002	-0,0018	-0,0018	-0,0059
	(0,0013)	(0,0007)	(0,0012)	(0,0010)	(0,0038)	(0,0041)
Interest rate	-0,0006	-0,0505	-0,0505	-0,0329	0,0870	-0,0424
	(0,0881)	(0,0488)	(0,0853)	(0,04301)	(0,0574)	(0,0617)
Firm Fixed effects	No	Yes	yes	yes	yes	yes
Observations	176	176	88	88	32	32
Adjusted R Square	-0,004	0,701	0,590	0,609	0,903	0,894

As we can derive from the overview presented in the table, the explanatory power illustrated by the adjusted R^2 number shows us that the ordinary least square model is of little convenience. In other words, we can reject that the OLS model is fit to describe the relations between the dependent variables and the independent variables. This conclusion is strongly supported by the fact that the adjusted R^2 are of -0,004. When we look at the results given by introducing fixed firm effects the explanatory power increases as much as up to 0,701 for the

whole population, thus indicating the model is significantly more solid and better suited to the data gathered during this research. This support the established practice of favouring and using fixed effects when dealing with panel data. Therefore, when presenting and commenting the findings further on will mainly relate to model 2-4.

Tangibility

As shown in table 7-1, Tangibility have a huge impact on debt/equity leverage for the companies in the offshore drilling industry. As discussed earlier in the paper, this industry is a very asset driven and capital-intensive industry. Therefore, these results are of no surprise at all. As model 2 and 3 shows, the coefficients of 1,369 and 2,397 respectively are very strong indicators for the fact that tangibility is one of the main drivers for a company's capital structure. However, for the companies included in model 4 we get a coefficient of -0,301. This is a rather interesting observation. The results comprehend with the prediction for trade off theory when having a large amount of tangible assets, a huge amount of debt financing can be attractive. However, the findings give some edge of support for the pecking order theory which prefer internal funding to external funding. As predicted, this result shows backing for some degree of both theories applied when it comes to tangibility. However, the results from this research support the same findings as for example Frydenberg (2004) and Frank & Goyal (2009) that tangible asset are arguably the main variable for leverage and that it is very consistent regarding the trade-off theory and to some extent with the pecking order theory. This logic is further supported by the fact that the tangibility numbers from the two first models with fixed firm effects have the lowest P-value of all the independent variables as well as the highest T-values. This means we can reject the zero hypothesis and state that this relation is highly trustworthy.

Operating Margin

As mentioned in the discussion during independent variables, the argument is that operating margin are more consistent and influenced by the pecking order theory than the trade-off theory. Therefore, the expected outcome, or the hypothesis, is a negative coefficient between operating margin and debt/equity. As we can see from the table, this outcome occurs in every model. We can also see that there is a significant difference between companies listed on Oslo Stock Exchange compared to those who are not listed on Oslo Stock Exchange. This can be

interpreted in the way that companies listed on OSE tends to canalise their cash flow generated by higher operating margin into their businesses to a greater extent than companies who are not listed on OSE. In the end, however, these findings support the pecking order theory which states that firms are more likely to choose inhouse funding when being more profitable. By using a level of significance of 95 % all the three models which includes fixed firm effect have a very low P value and a T value stretching from 2,2 – 3,2 telling us that we can reject the zero hypothesis and trust the coefficients.

Size

As discussed in the independent variables part of the research, the expected outcome of the model is a positive coefficient of size related to debt/equity ratio if we follow the trade-off theory and a negative coefficient if the pecking order theory is the dominating factor. As the same results applies for tangibility and operating margin, size also have very solid P-values and T-values, implying reliable results where the zero hypothesis can be rejected. The results from the models imply that the trade-off theory is the dominating theory related to size with a positive correlation and reliable supported by the P- values and T values. However, one interesting observation is that for the model showing the year 2013 when the market experienced a period of a plateau, there is a negative coefficient which in turn supporting the Pecking order theory. This would support the theory that larger firms generate higher returns which in turn relate in more inhouse funding, illustrated by the results from a high market. However, all the other results support the theory that larger firms will have higher debt/equity ratios due to the firms larger bargaining power and asymmetric information (Frank & Goyal, 2009).

Oil Price

The hypothesis was that oil price will have a positive correlation to market timing theory and negative correlation to trade-off and pecking order theory because higher oil prices will generate more work for drilling rigs, thus increase rates and revenues for the offshore companies. Form the main fixed firm effects models, we only see a negative correlation in model 3. This coefficient is rather small and that is a very interesting observation. The researcher would expect the oil prices to have a much higher coefficient than the research results turns out to show us. With a T-value of 1,92 and P value of 0,05 the regression results

implies that the oil prices to some extent describes the influence on debt equity on some extent, but it is not satisfying values in the end. And when we look at the correlation and P- and T values for model 2 and 3, we see that they are not satisfying at all. This means we cannot reject the zero hypothesis and we must derive from this results that the oil prices may not influence the debt/equity ratio at all actually. This is very interesting observations and differ a lot from the researchers' expectations.

Interest rates

The hypothesis on interest rates influence regarding debt/equity leverage are expected to be negatively correlated to the simple fact that there are these expectations of higher rates results in more costly loans which in turn make companies to between either internal or external equity funding. From the model we can see that there is a negative correlation, thus supporting the expected outcome. However, the T values and P values are not satisfying enough, which means by using level of significance of 95 %, the zero hypothesis cannot be rejected. Even though the expectations of negative correlation occur, the influence and relation this variable have on debt/equity are not reliable and thus do not bring more solidity to the model. This is an interesting observation and should might have been anticipated to some extent by the researcher because small fluctuations in interest rate which over the period have been stable would not influence choices of funding in a significant degree. Maybe, if the interest rate hade varied from an example 1,5 % and up to 5-6 & we might would have received more reliable causality results, but this is on speculation from the authors thinking and reasoning.

7.1 Discussion of Results Related to Management and Strategy.

According to a paper from consultants from Deloitte (2017), a market downturn brings opportunities for merger and acquisitions (M&A) that create value and long-term growth possibilities. For companies who are in a strong position strategically and financially, a recession can present rare opportunities for them to improve their position by doing acquisitions or initiate partnerships (Harding, D. 2009). Stopford (2009) argues that when the industry experience a through phase, banks are more reliant to issue new loans and refinancing costs increases due to the banks approach to secure their investments to a greater

extent, as illustrated by the option examples during chapter 4.0. This phenomenon is something we have seen occur over the last year when reading about Seadrill and Fred. Olsen energy. Fred. Olsen where in so big troubles, and still are, that fund managers claimed they were the most preferable candidate for taking up short positions, betting their stock value would decrease because of large and complex debt and bond obligations and old drilling rigs without contracts (Strandli, 2017). Seadrill filed for chapter 11 bankruptcy in September 2017 because the company did not have the cash to repay bonds who were approaching date of maturity, thus leading to the bonds being converted to shares for the bond owners resulting in the current share owners being diluted (Skonnord & Smapath, 2017). As we understand, Seadrill and Fred. Olsen Energy have been dealing with restructuring of their financial obligations and been fighting to be able to survive over the past 2 years. The banks have been reluctant to refinance their loans, just as Stopford argued. Both are listed on Oslo Stock Exchange, an interesting observation.

Meanwhile, in the same period, Ensco and Transocean are taking advantage of the market being in a downturn and thus, acquire or merge with competitors. During the year of 2018, Transocean have acquired Songa Offshore and Ocean rig. However, the most interesting deal that have been done in the market is the merger between Ensco and Rowan, with Ensco being the overtaking part. After acquiring Atwood, Ensco went on to initiate the merger between Ensco and Rowan, which went on to be described by the analyst Shinn of Bassoe Offshore as the “the mother of all offshore drilling rig owners”. Not only does the company becomes the largest player in the industry. Ensco also get access to the new strategic partnership Rowan created with Saudi Aramco by creating a joint venture. The result of this is a drilling company with a huge geographical surface to operate and in the process getting and competitive advantage over its competitors. None of the companies are who are the dominant part of this deals are listed on the Oslo Stock Exchange. As we can see in table 7-1, companies not listed on Oslo Stock Exchange have much lesser coefficients in the relationship between tangibility and debt equity ratios. The non OSE model, model 4, shows a negative correlation, thus implying that the pecking order is applicable. Because of their size, they can take advantage of it and use inhouse funding to finance M&A operations in the industry, either by using cash (Transocean) or own stocks (Ensco). Furthermore, in the same table we also see the same counts for operating margin. Although the correlation is not negative for not OSE companies, the coefficients for OSE listed companies are significantly higher than not OSE listed companies. These findings may tell us that companies like Ensco and Transocean where and

are in a strong position strategically and finically despite the bad market conditions and therefore was able to make mergers and acquisitions in a recession, thus making foundations for long-term growth, as described by Harding, D (2009) and Deloitte (2017).

Most mergers and acquisitions who fails ore turns out to be successful are related to culture (Bradt, G, 2015). M&A tends to turn out to be too expensive and in turn making the overtaking company decrease in value. Actually, 83 % of mergers fails (Bradt, G, 2015). There are many reasons for that. Overpayment and integrations risk are two common reasons, but culture is the dominant factor. Therefore, the cultural match between two companies and potential for successful integrating are of absolute importance and truly essential to explore by executive management before a merger is initiated and completed. As Shinn (2018) explains, Ensco and Rowan will save 150 million dollars annual in costs due to synergies because of corporate and regional overlaps, supply chains etc. However, the most interesting aspect is that the companies claims to be built upon a common culture of safety and operational excellence, innovation etc. Time will show if they will succeed with the merger, but the reason why the companies was able to complete a deal in the first place are arguably because of the strong strategically and financial position.

The aspects discussed above highlights the importance of always be asking the question: How does this course of action add value to the firm? As Mr. Mikhailov clearly stresses, adding value is the main important goal for any business decision, whether it be a merger, a split of the company or a spin-off of parts of the company, selling- or buying assets. Culture is a very difficult factor to measure and anticipate and are why executives are stressing the importance of matching cultures when considering merging or acquire a company, at least they should stress the issue.

8.0 Conclusion

This master thesis aims to provide insight and investigate what factors who influence capital structure in the offshore drilling industry. The dataset consists of 8 companies from the period 2012- Q2 2017. The dataset originates from annual reports collected from the company's websites and macro data are collected from US EIA and Federal Reserve Bank.

From the starting point of the dataset, four main regression models where made along with two more regression models for illustration purposes. By doing this, the researcher aimed to find answers to what variables influence the debt/equity ratios and if there are any significant differences between companies listed on Oslo Stock Exchange and companies not listed on Oslo Stock Exchange. To measure capital structure, the relation between dept and equity where chosen as the dependent variable. The independent variables included in research where chosen to be the following variables: Tangibility, Operating Margin, Size, Oil Price and 10-year Federal Reserve Interest Rates. The variables where chosen based on former studies implying those variables to influence the capital structure.

The research clearly concludes that a OLS in its pure form is not sufficient to describe the relationship and thus rejected. When adding firm fixed effects to the model, the regression become more reliable to describe the relations wanted to be explored. It turns out that Operating Margin significantly corelates negatively thus supporting the pecking order theory. Tangibility follows in general a more trade-off pattern, and the same accounts for size. Especially size as the correlation are positive significantly for all three fixed firm effects model for the entire period. Tangibility, however, interestingly are negative for companies not listed on OSE, thus implying support for the pecking order theory to some extent. In general, the model gives support for tangibility to be the most important variable of the variables examined in this research. Surprisingly oil prices and interest rates have very low correlation are also not significant implying not to be a sufficient variable to describe capital structure.

In general, the model indicate that the firm specific variables can describe decisions for capital structures, while the macro economic factors are to be rejected.

9.0 Limitations and Future Research

With a rather small population, only 8 companies included in the research, the results might be more influenced more by the big companies. Although, the companies included represent most of the assets in the industry. However, the total sample was limited because of lack of published company reports from several companies in the industry. There is no doubt that more companies would improve the reliability and validity of the research. In addition, the choice to only use public listed companies eliminated some industry players from taking part of the research.

Winsorizing could have been applied to improve the model because there are some spurious outliners in the dataset, especially in the observations of operating margins. Furthermore, an implementation of winsorizing may also could improve the model as spurious outliers may be a reason for normality not to be fulfilled as it is shown that normality for variables like operating margin where extreme observations occurs, are not present. The inclusion of only firmed fixed effects, and not time effects furthermore increase the potential of improvements to the model.

First, other variables to be examined is something a future research on capital structure in the offshore drilling industry should be considered. Either in addition to the selected variables in this research or alternate the variables completely are possible angles to attach the question of capital structure in the offshore drilling industry.

The most interesting to examine in a future research however is the fact that why are there so huge differences between companies listed on Oslo Stock Exchange and companies not listed on Oslo Stock Exchange. A deeper understanding of culture, management style, impact of stakeholders and regulations like tax structures and other governmental aspects can describe why the leverage differ between the two populations.

Speculation like asset plays and risk managing, and willingness are other factors that may influence the debt equity ratio which could be very interesting to examine.

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Attachments

Attachment 1: Normal OLS Regresion

Regresjonsstatistikk	
Multippel R	0,15421957
R-kvadrat	0,02378368
Justert R-kvadrat	-0,00492857
Standardfeil	0,45596058
Observasjoner	176

Variansanalyse

	fg	*SK*	*GK*	*F*	*Signifkans-F*
Regresjon	5	0,86106597	0,17221319	0,8283461	0,53113914
Residualer	170	35,3430083	0,20790005		
Totalt	175	36,2040742			

	Koeffisienter	*Standardfeil*	*t-Stat*	*P-verdi*	*Nederste 95%*
Skjæringspunkt	0,9035	0,4169	2,1672	0,0316	0,0805
Tangibility	0,6247	0,4042	1,5454	0,1241	-0,1732
Operating margin	-0,0217	0,0668	-0,3244	0,7460	-0,1536
Size	-0,0209	0,0259	-0,8076	0,4204	-0,0720
Oil Price	-0,0006	0,0013	-0,4446	0,6572	-0,0031
Interest rate	-0,0020	0,0881	-0,0227	0,9819	-0,1759

Attachment 2: All fixed effects regression

Regresjonsstatistikk	
Multippel R	0,85289208
R-kvadrat	0,72742489
Justert R-kvadrat	0,70122304
Standardfeil	0,24605263
Observasjoner	176

Variansanalyse

	fg	*SK*	*GK*	*F*	*Signifkans-F*
Regresjon	13	26,3357448	2,025826523	36,25002616	3,00895E-41
Residualer	163	9,86832943	0,060541898		
Totalt	176	36,2040742			

	Koeffisienter	*Standardfeil*	*t-Stat*	*P-verdi*	*Nederste 95%*
Skjæringspunkt	-5,672911	1,663325	-3,410586	0,000817	-8,957353
Tangibility	1,369369	0,292734	4,677861	0,000006	0,791329
Operating Margin	-0,114073	0,038879	-2,934056	0,003828	-0,190844
Size	0,555973	0,155817	3,568105	0,000472	0,248292
Oil Price	0,000209	0,000718	0,291519	0,771025	-0,001209
Interest Rate	-0,050508	0,048766	-1,035712	0,301870	-0,146803
Dummy Seadrill	0,822717	0,087431	9,409873	0,000000	0,650073
Dummy Odfjell	2,139067	0,381090	5,613028	0,000000	1,386558
Dummy fred olsen	1,702869	0,375140	4,539287	0,000011	0,962108
Dummy Transocean	0,000000	0,000000	65535,000000	#NUM!	0,000000
Dummy Ensco	0,054127	0,114065	0,474523	#NUM!	-0,171110
Dummy Diamond	0,453799	0,225360	2,013665	0,045690	0,008798
Dummy Awilco	2,478118	0,689194	3,595678	0,000428	1,117220
Dummy Pacific	1,009999	0,266128	3,795165	0,000208	0,484497

Attachment 3: OSE listed companies Regression

Regresjonsstatistikk	
Multippel R	0,81098981
R-kvadrat	0,65769988
Justert R-kvadrat	0,58959853
Standardfeil	0,29814680
Observasjoner	88

Variansanalyse

	fg	*SK*	*GK*	*F*	*Signifkans-F*
Regresjon	13	12,8097989	0,985369107	12,00883	1,731E-13
Residualer	75	6,66686371	0,088891516		
Totalt	88	19,4766621			

	Koeffisienter	*Standardfeil*	*t-Stat*	*P-verdi*	*Nederste 95%*
Skjæringspunkt	-5,931393	2,421290	-2,449683	0,016632	-10,754849
Tangibility	2,397123	0,455130	5,266894	0,000001	1,490457
Operating Margin	-0,239059	0,086949	-2,749414	0,007477	-0,412271
Size	0,593851	0,234869	2,528439	0,013560	0,125969
Oil Price	-0,000826	0,001186	-0,696183	0,488466	-0,003188
Interest Rate	0,000703	0,085271	0,008244	0,993444	-0,169165
Dummy Seadrill	0,000000	0,000000	65535,00000	#NUM!	0,000000
Dummy Odjell	1,317212	0,504400	2,611440	#NUM!	0,312394
Dummy Fred Olsen	0,834511	0,496060	1,682279	0,096674	-0,153691
Dummy Awilco	1,855161	0,969748	1,913035	0,059561	-0,076676

Attachment 4: Not OSE Listed regression

Regresjonsstatistikk	
Multippel R	0,82573053
R-kvadrat	0,68183091
Justert R-kvadrat	0,60946433
Standardfeil	0,1484852
Observasjoner	88

Variansanalyse

	fg	*SK*	*GK*	*F*	*Signifkans-F*
Regresjon	13	3,590861	0,27622007	14,8060632	1,0587E-15
Residualer	76	1,67563684	0,02204785		
Totalt	89	5,26649784			

	Koeffisienter	*Standardfeil*	*t-Stat*	*P-verdi*	*Nederste 95%*
Skjæringspunkt	-2,3996	1,5186	-1,5802	0,1182	-5,4241
Tangibility	-0,3006	0,4045	-0,7432	0,4596	-1,1063
OperatingMargin	-0,0603	0,0280	-2,1509	0,0347	-0,1160
Size	0,4716	0,1625	2,9017	0,0049	0,1479
Oil Price	-0,0018	0,0010	-1,9241	0,0581	-0,0037
Interest Rate	-0,0329	0,0430	-0,7655	0,4464	-0,1186
Dummy Seadrill	0,0000	0,0000	65535,0000	#NUM!	0,0000
Dummy Odfjell	0,0000	0,0000	65535,0000	#NUM!	0,0000
Dummy Fred olsen	0,0000	0,0000	65535,0000	#NUM!	0,0000
Dummy Awilco	0,0000	0,0000	65535,0000	#NUM!	0,0000
Dummy ensco	-1,0153	0,1815	-5,5941	#NUM!	-1,3768
Dummy diamond	-0,6296	0,0655	-9,6148	0,0000	-0,7600
Dummy Transocean	-1,0856	0,2699	-4,0229	0,0001	-1,6231
Dummy Pacific	0,0000	0,0000	65535,0000	#NUM!	0,0000

Attachment 5: Correlation matrix OSE Listed companies

OSE Lised	*Debt/equity*	*Tangibility*	*Operating M*	*Size*	*Oil Price*	*Interest Rate*
Debt/equity	1					
Tangibility	0,40811037	1				
Operating M	0,14900634	0,14946494	1			
Size	0,61940272	0,20406721	0,12805082	1		
Oil Price	0,08410471	0,13115878	-0,25361924	0,22729848	1	
Interest rate	-0,05118735	-0,1189472	-0,0225457	0,02489933	-0,05456195	1

Attachment 6: Normality tests OSE listed and not listed companies

OSE Listed

Normality Test	Score	C.V.	P-Value	Pass?	5,0%
Jarque-Bera	323,96	5,99	0,0%	USANN	
Shapiro-Wilk	0,70	#I/T	0,0%	USANN	
Doornik Chi-Square	1069,37	5,99	0,0%	USANN	

OSE not listed

Normality Test	Score	C.V.	P-Value	Pass?	5,0%
Jarque-Bera	3,75	5,99	15,4%	SANN	
Shapiro-Wilk	0,97	#I/T	4,1%	USANN	
Doornik Chi-Square	5,35	5,99	6,9%	SANN	

OSE Not listed Tangibility and Operating Margin

Normality Test	Score	C.V.	P-Value	Pass?
Jarque-Bera	3,75	5,99	15,4%	SANN
Shapiro-Wilk	0,97	#I/T	4,1%	USANN
Doornik Chi-Square	5,35	5,99	6,9%	SANN

Normality Test	Score	C.V.	P-Value	Pass?
Jarque-Bera	728,29	5,99	0,0%	USANN
Shapiro-Wilk	0,49	#I/T	0,0%	USANN
Doornik Chi-Square	464,92	5,99	0,0%	USANN

Tangibility reaches normality levels in every model. However, because of extreme levels in variables such as operating margin, normality is not reached in any of the models. Therefore, winzorizing have been evaluated and may should have been applied.

Attachment 7: List of companies included in the study

Seadrill Ltd.

Ofjell Drilling Ltd.

Fred. Olsen Energy ASA

Awilco Ltd.

Transocean Ltd.

Ensco plc.

Diamond Offshore Ltd.

Pacific Drilling S. A.