Norges Handelshøyskole
BERGEN, SPRING 2011

# Capital Structure in Capital Intensive Industries

## - An Empirical Study of Determinants of Capital Structure with Emphasis on the Offshore Industry

**Bjørn G. Oftedal and Jostein Sørhus**

**Supervisor: Tommy Stamland**

**Independent work within the Master of Economics and Business Administration**

**Major: Financial Economics**

NORGES HANDELSHØYSKOLE

## Executive Summary

This thesis analyses which factors that may explain the capital structure, it focuses on the offshore industry and compares it to a reference sample consisting of 11 722 companies.

Initially, this thesis discusses different known theories covering perfect and imperfect capital markets and it is a focus on the offshore industry with its different characteristics.

The dependent variable representing capital structure is defined as debt ratio. The independent variables are the degree of asset tangibility, dividend ratio, effective tax, profitability, size, the degree of capital intensity, growth opportunities, risk, utilization of tax havens, common law legal system versus civil law legal system, French-, and Scandinavian civil law legal systems versus German civil law legal system.

The traditional regression and the fixed effects regression find that all the independent variables have a significant effect on capital structure in the reference sample. Further, we find that the offshore sample differs from the reference sample when it comes to the variables representing the degree of asset tangibility, growth opportunities, and profitability due to the indication of a stronger relationship in the offshore sample.

The most interesting finding is the variable representing the degree of asset tangibility. The results indicate that this variable may be the driver of debt levels.

# Preface

This thesis has without doubt been the most challenging and engaging part of our Masters degree, but it has also been the most interesting. The fact that we have had to use knowledge that we have acquired in several of the courses that we have taken at NHH has been exciting, and we learned a lot along the way.

We both find capital structure and the possibility to specialize in the offshore industry interesting, and this is something we will find useful in the future.

We have worked with this thesis from different continents and it has at times been challenging, especially regarding the time difference. At the same time it has been a new experience that we have learned a great deal from.

We would like to thank our supervisor Tommy Stamland for quick responses, constructive feedback, and useful input. The opportunity to make use of his knowledge of the subject has been helpful to us.

Bergen, June 2011

_____ _____

Bjørn G. Oftedal Jostein Sørhus

# Table of Contents

**List of tables:**



**List of figures:**



**List of appendices:**

# 1.0 Introduction

We will in the next sections explain our reasoning concerning the choice of topic, introduce our problem statement, and explain what kind of study this is. To increase the understanding of our reasoning later in this thesis, we will also define the offshore industry. Lastly, we will introduce the scope and limitations of this thesis and explain our reasoning for this.

## 1.1 Motivation for the selection of topic

After five years of studies in economics and business administration it will be concluded with a master's thesis. The large variety of different topics one might choose will be narrowed down by the areas of interest. It is natural that some topics are more interesting than others and we have both the greatest interest within the field of finance.

When deciding on the topic we focused on areas that interested us and at the same time could provide us with useful experience that we could gain from as professionals on a later point in time. When discussing potential topics within finance the choice of financing and capital structure resurfaced over and over again. The topic is essential for any finance department and it creates the foundation for the operational activities.

Further, the discussion turned to whether we wanted to analyze capital structure on a general basis or find a specific industry we wanted to analyze. The importance of the offshore industry for the Norwegian economy and our interest in the industry resulted in the decision to analyze this industry.

We have not found any previous studies that address the capital structure in the offshore industry in particular, and we found it interesting to see if there were any special factors that influenced the choice of capital structure in this industry. Also, industry specific characteristics contributed to pique our interest. The fact that the industry is regarded as cyclical, and that investment in this industry is so large that it is characterized as capital intensive led to our hypothesis, namely that this industry differs from the rest when it comes to premises, and that this also would lead to differences in terms of capital structure. In that regard, we wondered how this would influence the capital structure and which factors that stood out as different.

## 1.2 Definition of the offshore industry

It would be proper to start out by clarifying what we mean by the offshore industry. Our motivation for choosing the industry we wanted to analyze was that it was capital intensive, took place at sea, and in addition not operating directly in oil production. With that in mind we narrowed the industry down to shipping-, drilling-, seismic, supply-, and oil field service companies. The problem of using SIC-code (Standard Industry Classification code) is that many of the companies are not found under a particular SIC-code but are rather spread across many different SIC-codes based more specifically on what they are doing. Therefore, there will be many different companies located under several different SIC-codes in our selection of companies, but the main criteria for being included is that they are operating in a capital intensive industry and that they do so at sea, in addition to not being an oil production company. This will be important for the reader to have in mind when evaluating our assumptions, the analysis, and the results.

## 1.3 Problems to be addressed

We will, in this thesis, focus on the capital structure in the offshore industry. In order to do this we will look at what factors are involved in determining capital structure in the offshore industry. Furthermore we will look at the offshore industry in relation to a reference sample consisting of most industries.

**The problems to be addressed are:**

***What are the determinants of capital structure? Are there any differences between the offshore companies and companies in general when it comes to factors that affect the capital structure?***

**Supplementary problems to be addressed:**

***Have the credit crisis of 2008/2009 affected the capital structure? Are there differences in how the two samples have been affected in terms of capital structure?***

***Are there any differences between high levered companies and low levered companies in characteristics that influence capital structure?***

## 1.4 Scope and limitations

It is appropriate to present some limitations and refinements regarding this thesis. Firstly, the overall focus in this thesis is to answer the problem statement mentioned above, and in order to do that we have focused on the renowned capital structure theories and their relations to the results we present based on our data analysis. We will present many different empirical studies and their findings, but it is not a critique or review of their methods. Rather, it is included to increase the overall understanding of the subject.

Secondly, the term capital structure refers to the mixture of debt and equity in firms. Although a great deal of empirical studies has analyzed the composition and design of the different types of debt and equity, this will not be taken into consideration in this thesis.

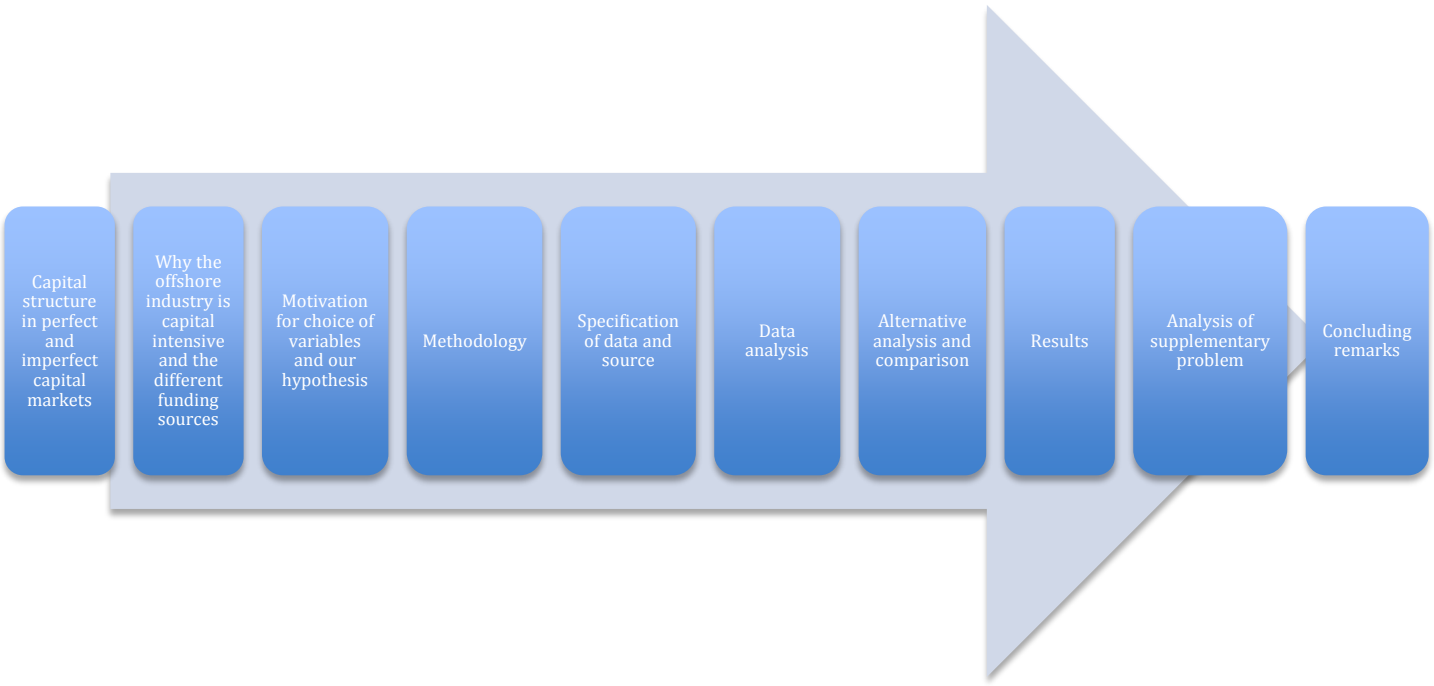
Lastly, the theories included in this thesis have been chosen on the basis of what we regard as the most relevant for capital structure. These theories are selected on the basis of what known researchers have based their work on, and which ones that have proved to be the ones that have been most recognized as explanatory of capital structure

This is not an attempt to degrade those theories that are not included but due to time limitations we had to focus on the theories we regarded as most relevant for this thesis.

## 1.5 Outline

The overall structure of this thesis is illustrated in the forthcoming figure:

**Figure 1: Outline of this thesis**




We start this thesis by presenting and discussing different theories regarding capital structure, and then we explain why the offshore industry is capital intensive as well as the different funding sources that are often used in this industry.

The next section presents our motivation for the selected variables and earlier empirical findings based on these variables. Then we give a brief overview of the methodology utilized in this thesis, and explain the regression model and the assumptions it is based on. Further, we clarify how we selected the data and why the source we used was appropriate.

The next chapter gives an incremental elaboration of the OLS regression as well as an alternative method. The results from the main analysis will then be presented and it will be followed by a supplementary analysis to give us a further understanding of the capital structure. The conclusion, criticism of the thesis, and suggestions to future research is the last chapter.

# 2.0 Capital structure in perfect capital markets

## 2.1 Miller and Modigliani

Miller & Modigliani (1958) introduced, in 1958, a theory stating that, under certain assumptions, capital structure is irrelevant for the value of the firm. Their article was controversial, but based on their belief in these self-proclaimed assumptions, the theory is intuitive because of the *law of conservation of value*. Brealey, Myers, & Allen (2008, p. 476) state that "the value of an asset is preserved regardless of the nature of the claims against it".

### 2.1.1 The assumptions of Miller and Modigliani

Their theory is based on a set of assumptions and the main assumption is that the capital markets are perfect. When it comes to lending and borrowing the conditions are equal for all of the participants. Furthermore, the participants are acting rationally (Miller & Modigliani, 1958).

Some other assumptions (Miller & Modigliani, 1958):

- No transaction costs occur for financial transactions.
- There is no information asymmetry, which means that everyone has the same information, and therefore the expectations regarding risk and return are the same.
- There are no agency costs which mean there are no incentive conflicts between the owners, creditors and the management.
- Neutral taxes. This means the design of the tax system is made so that it does not affect investors' assessment of the company's capital structure.

These assumptions neutralize all the pros and cons of holding debt. Neutral taxes means there are no advantages of holding extra debt. The management is already maximizing firm value and therefore the disciplining effect is excessive. Bankruptcy costs are non-existent (no transactions costs). Creditors are perfectly protected against transfer of funds and there is no lost flexibility because the firm may lend or get equity in the market free of transaction costs.

### 2.1.2 Miller and Modigliani's irrelevance theorem

*"The market value of a company is independent of its capital structure".* (Miller & Modigliani, 1958)

Their first theorem examines the firm's cash flow and states that a firm can not change the total value of its securities just by splitting its cash flows into different streams. The value of a firm is determined by the value of the real assets and the cash flow it generates, not by the securities it issues to finance its real assets. Therefore, the capital structure is irrelevant as long as the firm's investment decisions are taken as given (Brealey, Myers, & Allen, 2008, p. 472). However, if this assumption does not hold, there will exist arbitrage opportunities[1]. Investors will invest in the undervalued company's shares and sell shares in the overvalued company. This will continue until the two companies are equally valued again. This implies that if you add the net present value of the cash flows to the creditors and the owners respectively, they are equal to the net present value of those cash flows separately. This is the principle of value additivity (Brealey, Myers, & Allen, 2008). The value of the firm is therefore not affected by the financing of the real assets but the cash flow the real assets generate, assuming the conditions Miller and Modigliani based their arguments on.

Miller & Modigliani (1958) also state that the investors can change their leverage if they are not satisfied with the level of debt the company has. With their assumptions in mind the investors may borrow or lend to the same terms as the company and the taxes are neutral. They can therefore lend money to buy shares and change their risk-reward ratio by increasing their leverage to a level they are satisfied with. They may also, if they are unsatisfied with the dividend, sell some of their shares they hold in the company and vice versa.

To exemplify this we can take a look at two identical companies, the only difference is the financing. Company A is all equity financed and have a cash flow of X. Company B is financed with 50 % debt (their interest payment is *r*) and 50 % equity, and have an equally large cash flow as A = X = Y. If you buy 1 % of company A you are entitled to receive 1 % of the cash flow X. If you buy 1 % of company B (1 % of the debt and 1% of the equity = (0.01 x 0.5E) + (0.01 x 0.5D) = 1 % of the whole company) you are entitled to receive 1 % of the cash flow Y

[1] Arbitrage: An opportunity to a guaranteed positive return, with no net investment (Lazear & Gibbs, 2007).

after subtracting the interest payment *rD*: 0.01(Y – *r*D), but it also entitles you to receive 1 % of the interest payment the company pays: (0.01 x *rD*). This implies that your net profit from your investment in company B equals 1 % of the cash flow Y: 0.01(Y - rD) + 0.01(rD) and this is the same as you receive from the investment in company A. The law of one price[2] implies that the two companies must be equally valued and therefore the financing is irrelevant assuming the conditions Miller and Modigliani based their theory on (Brealey, Myers, & Allen, 2008, p. 475).

It is a natural mistake to assume that the unrealistic assumptions made by Miller and Modigliani invalidate their theory, but capital structure may be irrelevant even though the debt is risky. A company that borrows money does not guarantee to repay its debt. They will only repay their debt in full if its assets are worth more than the debt obligation. In other words the shareholders in the company have limited liability. There are, according to Brealey, Myers, & Allen (2008, p. 476), many individuals that would be interested in borrowing with limited liability, and they might be interested in paying a premium if there is insufficient supply of levered shares to cover their needs. But in reality there is enough supply of common stocks levered, and therefore it is unlikely that they would pay a premium for specific shares.

### 2.1.3 Miller and Modigliani's second theorem

*"The expected return of the company's equity increases proportionately by increased leverage"* (Miller & Modigliani, 1963)

This theorem states that the expected rate of return on the common stock of a levered firm increases in proportion to the debt-equity ratio (D/E) expressed in markets value. The increase depends on the difference between the expected return on a portfolio of all the firm's securities and the expected return on debt. Their first theorem states that financial leverage has no effect on shareholder's wealth but their second theorem states that investors can expect their rate of return on their shares to increase as debt-equity ratio increases. This may be illustrated through the Weighted Average Cost of Capital (WACC).

[2] Two assets generating the same cash flow must be of equal value (Brealey, Myers, & Allen, 2008)

The WACC is the weighted average required return from equity and debt, expressed as:

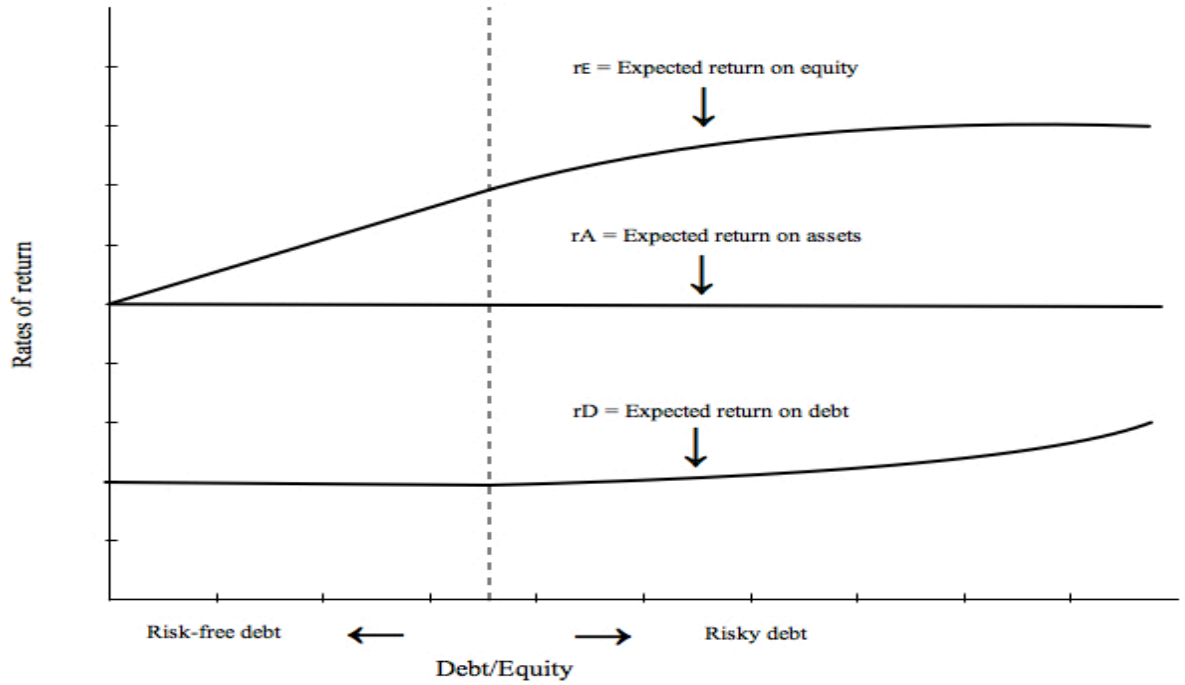
$$r_A = \frac{E}{V} \times r_E + \frac{D}{V} \times r_D$$

Where:

$r_A$ = expected return on assets, $r_E$ = expected return on equity, E = equity, D = debt, V = Value of firm (debt + equity), $r_D$ = expected return on debt

If the debt-equity ratio is increased, the weight on debt is increased, and even though the return on debt is substantial lower (due to lower risk) than the return on equity, the WACC will not be changed because of the increased risk for the equity holders (probability of bankruptcy). And so, the required return for the equity will increase, but this will perfectly offset the changes made by changed weights (Brealey, Myers, & Allen, 2008, p. 482).

**Figure 2: Overview of the WACC's composition**




## 2.1.4 Miller and Modigliani, and corporate taxes

Many criticized Miller and Modigliani's theorems, stating that the assumptions they was based on was unrealistic (Ghosn, 2008). M&M realized that the model lacked an important

issue, namely the corporate tax. They published a new article in 1963 concluding that leverage will increase a company's value, seeing as interest is tax-deductible, while the dividend income from owning shares is not deductable (Miller & Modigliani, 1963). This implies that the difference between a levered and an unlevered company is the tax shield:

$V_L = V_U + T_D$.

### 2.1.5 Criticism of Miller and Modigliani's research

When Miller and Modigliani's theory was introduced in 1958 it was controversial, but since then been widespread as a theory of interest. Much of the critique concerned the second theorem and the debate over corporate taxes. Gordon (1989) stated in his article that "… the models MM employed are at best inadequate and in crucial instances are incorrect as instruments for testing their theorems". He claimed that the estimates of the cost of capital would only be correct when their hypothesis about dividends and debt were accurate (Sarma & Rao, 1969). Graham (2000) argued that M&M overestimated the debt tax shield after he had conducted his study where he had measuerd the tax benefits from debt financing. Forsberg (2010) conducted an analysis to test both the tax- and the no-tax equation and he concluded that none of them were accurate predictors of firm value.

But the main criticism of the theory is concerning the underlying assumptions and that these assumptions do not reflect the real world. In real life there are transaction costs, the taxes are not neutral, there are agency costs, there are information asymmetry, and everyone can not lend and borrow at the same terms. This makes it interesting to take a look at imperfect markets and what kind of theories that are evolving there.

## 3.0 Capital structure in imperfect capital markets

As explained earlier in this thesis, the Miller and Modigliani articles were controversial but have since become widespread. Researchers have yet to provide adequate explanations of capital structure based only on perfect markets as this is not the case in real life markets. The next section of this thesis will examine the theory of capital structure in an imperfect market.

## 3.1 Asymmetric information

In many instances there are tendencies to assume no asymmetric information[3] which implies that there are no insiders with more information than the rest. This is clearly a simplification of what we can observe in the real world. It is obvious that managers and other insiders know more about the condition of the firm and its prospects for the future than most people. Brealey, Myers, & Allen (2008) points out that this can be proved by observing stock price changes caused by announcements by managers when they for example announce an increase in the regular dividend. This information transfers from the management to the investors, causing the stock price to rise which can only happen if the managers know more in the first place (Brealey, Myers, & Allen, 2008).

### 3.1.1 Moral hazard

Moral hazard[4] is phenomenon that may arise in situations where asymmetric information is present. Moral hazard occurs when a party insulated from risk may behave differently than he would if he were fully exposed to the risk (Lazear & Gibbs, 2007). "Moral hazard arises because an individual or institution does not bear the full consequences of their actions, and therefore has a tendency to act less carefully than it otherwise would, leaving another party to bear some responsibility for the consequences of those actions" (Lazear & Gibbs, 2007).

A classic example is when a company is close to default and is facing an investment opportunity that has a negative net present value, but the upside is so great that it will save the company from defaulting. This project will with a high probability decrease the value of the company, and the risk of the project is almost entirely on the hands of the creditors. This because the company is about to default anyway and the owners of the company have the right to leave the "sinking ship" due to their limited responsibility. This problem is to some extent resolved by covenants the creditors include in the deal.

[3] Asymmetric information: Situations where one part is better informed than the other part. In economic theory: a bias in the information allocation (Lazear & Gibbs, 2007)
[4] Moral hazard: Occur in states where the principal cannot perfectly observe what the agent does (Lazear & Gibbs, 2007)

#### *3.1.1.1 Moral hazard in the offshore business*

This phenomenon may be found in the offshore industry. Companies may choose to operate in fixed contract markets, in the spot market or in a mix of these. A levered company that is close to defaulting and normally operates in the fixed contract market may want to switch to operating in the spot market to get a higher expected return, but the risk is naturally increased as well and might lead to bankruptcy. The loss is mostly on the hands of the creditors due to the limited liability of the equity holders and is not in the best interest of the creditors.

### 3.1.2 Adverse selection

Adverse selection is a possible consequence of asymmetric information. It can be divided in to two categories. The first one is adverse selection of goods or services. The renowned article "The Market for Lemons" (Akerlof, 1970) provides a good explanation of the problem. In his article, Akerlof explains the problem of adverse selection and uses the used-car market as an example. The owner of the car knows the standard of the car but the buyer does not. The problem is that there are both good and bad cars sold in the market but the buyers have no way of differentiating the good from the bad, and this lowers the prices. This creates a situation where the owners of the good cars suffer a loss, making them unwilling to sell their cars in this market and the market will only contain cars with a lower standard after some time. His conclusion is that this makes the bad drive out the good and is referred to as the "Lemons Problem" (Akerlof, 1970).

The second example of adverse selection relates to customers. This is when a provider of goods or services is "forced" to provide all its customers with equal terms because he is unable to differentiate them due to lack of information. The information asymmetry between the buyers and sellers make the "bad" customers more likely to be selected (Lazear & Gibbs, 2007). This is to some extent the case in the insurance business.

#### *3.1.2.1 Adverse selection in the offshore business*

The Lemons Problem may be applied to the offshore industry. When companies want to issue equity, only the management knows the true value of their future prospects, the only knowledge the investors hold is that the companies' value is in the interval of 0 - 1 000. The

investors will only be willing to pay the average price of 500 and that implies that the companies with a future prospect higher than 500 will lose money and they will not go through with the issue. This process will continue until only the less prosperous companies are left because they will be content with anything above 0 and the bad will therefore drive out the good.

### 3.1.3 Principal-agent theory

The theory concerning this problem is based on the fact that owners (principal) hire professional managers (agent) even though they are concerned that they do not have the same incentives as themselves; that is maximizing the value of the company. If their objectives differ, agency costs occur and it may be divided into two main parts; when the owners spend money to monitor the management or when managers do not attempt to maximize firm value (Brealey, Myers, & Allen, 2008, p. 8).

Jensen & Meckling (1976) found that a lot of the problem occurs when the management holds less than 100 % of the residual claim. Consequently, they do not capture the entire gain from their profit enhancement activities, but they do bear the entire cost of these activities in form of effort and reputation. For example, managers can invest less effort in managing firm resources and may be able to transfer firm resources to their own, personal benefit in form of perquisites. Kochhar (1996) argues that managers have incentives to practice strategies that lessen their employment risk (Amihud & Lev, 1981), or increase firm size such that it will lead to greater compensation (Baker, Jensen, & Murphy, 1988). This may lead to non-profitable investments (Kochhar, 1996).

Some companies are in the situation where they have large cash flows and few profitable investments. This large free cash flow[5] may lead the managers to invest sub optimally and start building “private empires” with the shareholders money and is not in the best interests of the owners. This does not maximize the firm value. Jensen (1986) pointed out that debt financing may discipline the managers because the interest payments reduce the free cash flow. Grossman & Hart (1982) pointed out that if bankruptcy is costly for the managers due to lost benefits of personal control and/or their reputation is damaged, this may lead the

[5] Free cash flow: The amount of cash a company can pay out to investors after paying for all investments necessary for growth (Brealey, Myers, & Allen, 2008)

managers to work harder, consume fewer perquisites and make better investment decisions as well as reducing the probability of bankruptcy. Kochhar (1996) supports this statement by saying that the threat of losing decision control or possibly their employment prevents managers from undertaking wasteful actions, instead they aim to utilize assets effectively, increasing the company's value.

#### *3.1.3.1 Principal-agent problems in the offshore industry*

There are obviously potential principal-agent problems in this industry. For example Seadrill obtain a high debt ratio (Seadrill Ltd, 2011). This indicates potential conflicts between what the creditors and the owners incentives are. The creditors want the company to operate with a risk that matches the interest they receive on the debt and that the company does not increase this risk after they have lent them the money. The owners of the company are interested in receiving a higher return and may want to enter other markets or investments to achieve this and that means exposing the company of a higher risk. This is not in the creditors' best interest because the increased business risk will increase the bankruptcy risk as well. The creditors will try to monitor what the owners are doing. They also have the opportunity to include covenants that prevent the owners from doing what they want. These costs are known as agency costs.

### 3.1.4 The market timing-theory

This theory builds on the idea that companies will get the type of financing that is favorable for the company when the need of capital arises (Baker & Wurgler, 2002). This implies that companies will issue new equity when the management's opinion is that the stock is overvalued and they will issue debt when the stock is undervalued. Consequently, Brealey, Myers, & Allen (2008, p. 521) claims that companies tend to issue equity in bull[6] markets and debt in bear[7] markets. This may lead to the conclusion that companies do not chose between debt and equity, but focuses on what is most favorable for them in the situation they are in.

This theory is tested and Baker & Wurgler (2002) based their article on market-to-book ratios to figure out if that influenced the capital structure. They found that there were a

[6] The term bull market refers to a market with rising prices (Investopedia)
[7] The term bear market refers to a market with falling prices (Investopedia)

relationship between fluctuations in market values and capital structure. They further believe this is the cumulative outcome of past attempts to time the equity market (Baker & Wurgler, 2002).

Graham & Harvey (2001) found that two-thirds of CFOs agree that they considered the over- or undervaluation of the company's stocks as an important variable when considering their funding options (Baker & Wurgler, 2002).

#### *3.1.4.1 The market timing-theory in the offshore industry*

The variation in demand for the services of offshore companies will vary over time and this may affect their ability to get external funding. This will affect the value of the companies and therefore the funding options that are most attractive. The offshore industry, as defined by us (shipping, drilling, seismic etc.) operates in different markets when it comes to the length of the contracts. Those that operate in longer term contracts have the possibilities to time the market, because the downturn does not hit them as hard as the economy as a whole and the possibilities to contract new assets in a cyclical downturn is favorable. But for example shipping, which is a quite large contributor in our offshore sample, has sub segments that are driven by short term contracts that fluctuate quite rapidly, as for example the bulk-segment (Qfinance, 2010). In those cases, the connection between the demand for goods in the world and the rates they receive are perceived to be strong (Qfinance, 2010). This implies that this segment of the offshore industry may have a hard time timing the market because when the investment opportunities are good they will be forced to borrow the money because an equity issuance is to expensive (too much of the company must be sold to finance the asset).

## 3.2 The Signalling Effects – A precursor to the pecking order-theory

This theory is based on the asymmetric information problem. It is plausible that managers obtain more information about the company than outside investors do. Ross (1977) developed a signalling model of capital structure based on the asymmetric information problem. His theories derived from the problem of information asymmetries between well-informed insiders and the less informed outside investors. He found that if the company issued bonds in the capital market it was perceived as a positive signal that the stock was

undervalued, and that they would like to share this potential upside only with existing shareholders. On the other hand, issuing new equity was perceived as if the company had poor future prospects and that they wanted to pass this burden on to other shareholders, and the assumption in the market were that the company was overvalued.

However, this may not be the best reflection of the behaviour in markets today. The theory claims that younger firms with good future prospects should issue debt instead of equity due to the fact that they are relatively undervalued and therefore avoid selling the stocks cheaply, but this is not the case in practice. In reality, it is the mature firms with steady cash flows that prefer large portions of debt (Ghosn, 2008). One potential explanation may be that younger firms want to protect their positive future prospects by not having to much financial risk (Ghosn, 2008).

## 3.3 Pecking order-theory

This leads up to the pecking order-theory introduced by Myers (1984). It is based on the problem of asymmetric information and is a ranking of the various alternatives based on asymmetric information. Asymmetric information affects the choice between internal and external financing and between new issues of debt and equity securities (Brealey, Myers, & Allen, 2008, p. 517). Myers (1984) points out that capital structure will be driven by firms' desire to finance new investments first internally, then with debt, and finally with external equity only as a last resort. This is because investors often interpret an equity issue as if the managers imply the stock is overvalued and therefore well suited to sell stocks as a way to get the financing and the investors will act accordingly. There are exceptions to this. If the management wants to engage in a project that is perceived by the investors to be a good project, this effect may be reduced.

If the managers issue debt the investors interpret this as if the managers thinks that the stock is undervalued and therefore not suitable to sell, and that the investment prospects are good and they do not want to "share" this opportunity at a discount. This may lead to underinvestment because the company may choose not to invest if the only alternative is to issue new equity. Internal funding prevents this from happening because it is not mispriced and that is why companies prefer internal funds above the other alternatives (Myers &

Majluf, 1984). Also, the financial slack[8] is of great value because a company can act quickly if they are liquid and they avoid a lengthy debt or equity issuance.

This theory is not meant as an explanation or to find the optimal capital structure, but to rank the alternatives. Myers & Majluf (1984) found support for their theory by investigating non-financial companies from 1973-1982. They found that internal funds represented 62 % of the investments and that debt covered the vast majority of the rest. Ghosn (2008) claims that the only companies that will borrow to invest are the less profitable companies, because they have less retained earnings to invest with. Profitable companies will only borrow if the investment exceeds the internal cash flow and this argument supports the pecking order theory (Ghosn, 2008).

Brennan & Kraus (1987), Noe (1988), and Constantinides & Grundy (1989) criticize the findings of Myers & Majluf (1984). They claim that firms do not necessarily have a preference for issuing straight debt over equity and that the underinvestment problem can be resolved through the richer set of financing options (Harris & Raviv, 1991).

### 3.3.1 Pecking-order theory in the offshore industry

The beta list developed by New York University - Leonard N. Stern School of Business (2011) indicates that what we have defined as the offshore industry (shipping, drilling, oil field service etc.) is more cyclical than the market as a whole. Most of the companies in our offshore sample would be included in Stern's "maritime industry" or "oil field service industry". They have betas of 1.37 and 1.45 respectively (New York University - Leonard N. Stern School of Business, 2011), meaning the variation in return in these industries are larger than in the market as a whole. This is especially true if they expose themselves to the short term contracts which are the most volatile market. Drilling companies may also face differences within the rates they receive. The difference depends on which segment they are supplying. The shallow water segment with need of Jack-ups is a more mature segment with more rigs and it is relatively small oil companies that demand their services. The deeper the water is the more stable and higher the day rates (Seadrill Ltd, 2011). The main driver of the demand for rigs is the oil and gas prices. The higher the oil price is the higher the exploration

[8] Financial slack: The sum of cash, marketable securities, and readily saleable real assets (Brealey, Myers, & Allen, 2008)

and production (E & P) budget for the oil companies are. Rates for the shipping industry also vary a lot for the different types of ships and what they may carry. This is also driven by the demand for the various products in the world.

The retained earnings will naturally vary a lot in absolute terms and may also be negative. The capital intensity in this industry may lead to insufficient retained earnings and therefore a higher debt ratio because they borrow to invest. The mismatch between income and expenditures may also be a reason for higher debt. The assets are mostly rigs or ships and if the yards charge them ongoing payment throughout the project that means that the company buying the asset has a large outflow of cash long before they can make any money on it. If their retained earnings are insufficient they might choose to borrow the amount needed to invest.

Seadrill is an example of a company that deviates from the pecking-order-theory. They have an aggressive growth-strategy and use acquisitions and new-build programs to achieve this. They are known for paying out large dividends and therefore have less retained earnings. Seadrill announces in their financial report that their strategy is to finance their aggressive growth with debt (Seadrill Ltd, 2011). According to the Pecking order theory they should have used their retained earnings to finance this.

## 3.4 Explanation of variables included in the Trade-off-theory

It might be appropriate to explain bankruptcy costs and debt tax subsidies in order to better understand the trade-off-theory.

### 3.4.1 Bankruptcy costs

These are costs that come to play in the event of bankruptcy. Myers (1984) points out that costs of financial distress include the legal and administrative costs of bankruptcy, as well as the subtler agency costs, moral hazard, monitoring and contracting costs which can erode firm value even if formal default is avoided. Weiss (1990) indicates that some of the direct costs associated with bankruptcy are legal costs and fire sales. The legal costs is not the most severe, but the fire sales may be large, especially if the assets are specialized and/or non-tangible (Weiss, 1990). Some of the indirect costs prior to default are, as Andrade & Kaplan

(1998) found in their study, costs associated with protection of stakeholder interests, underinvestment and risk shifting. Key personnel may also quit, customers may disappear and/or require price cuts, and suppliers increase prices or require guarantees (Andrade & Kaplan, 1998).

Bankruptcy happens when the company is unable to service its debt. What happens next is either default or restructuring in cooperation with the creditors and shareholders.

### 3.4.2 Tax

Corporate tax is paid on the basis of the taxable profit the company has achieved. This is the difference between taxable income and deductible expenses. In most countries interest payments are deductable, and therefore the debt makes a difference when it comes to financing decisions. The level of corporate taxes throughout the world differs from country to country[9] but it will only make a difference if the personal taxes on capital gain and/or the ability to deduct interest payments are different. If not there would be a situation like the one described in the Miller & Modigliani section.

#### *3.4.2.1 Tax in the offshore industry*

Our offshore industry consists of shipping-, drilling-, seismic-, and supply companies, and these industries are affected by different tax schemes. Shipping-, seismic-, and supply companies are mainly affected by the same tax laws. These tax schemes try to reduce the number of ship owners that move their fleet to a tax haven to reduce their taxes. The government offers something similar, and the ship owners are therefore excused from the regular corporate tax, instead they are paying taxes depending on their net tonnage. This is collected even though the company produces a negative profit. The level of the effective Norwegian shipping tax is estimated to be 0.6 % of the operating profit in the industry in 2006. This is approximately the same as Great Britain, Denmark, and The Netherlands (Schjelderup, et al., 2006, p. 91).

"The Norwegian shipping tax regime includes transportation of personnel or supplies by ship and operation of tugs, supply vessels or other support vessels for use in the petroleum

[9] Appendix 1 provides an overview of the different corporate taxes in OECD countries.

business. Examples of support vessels are anchor handling vessels, standby vessels, diving vessels, seismic vessels and fire ships. Some of these vessels are also included in other European shipping tax regimes." (Schjelderup, et al., 2006, p. 55)

The offshore industry is an international industry with tough competition regardless of where the companies are based. Tax is a cost that the companies have to consider carefully. If some companies do not minimize the tax bill and others do, they may lose competitiveness relative to the companies that do minimize it, and it will make them unable to compete efficiently in the long run. The existence of tax havens and low-tax countries have made it possible to effectively cut the tax bill completely, and in combination with the fact that the shipping industry is very mobile it makes it easier for them to do so. These are the underlying facts that relatively high-tax countries have faced when they have made tax regimes with low taxes for this industry. This imply that many of the companies in this industry is either paying taxes based on the mentioned shipping tax regime or is registered in tax havens and there should be reasons to believe that they have one less variable to evaluate when they decide their capital structure.

The drilling industry is not included in the shipping tax regime. They are taxed after conventional corporate tax regimes. They are taxed by the countries they operate in and the tax rate may vary a lot but it is significantly higher than the rates the shipping companies pay. A used practice within this industry is to locate the headquarters in a tax haven or low-tax country to reduce the total tax bill. Seadrill and Transocean are two examples of this practice. Seadrill is located in Bermuda which is a tax haven, and Transocean is located in Switzerland which is a low tax country. This reduces their total income tax bill and they only pay taxes to the countries they operate their rigs in based on operating income minus tax-deductable costs. Seadrill's effective tax rate in 2009 was 8.2 % and this may imply that their deliberate choice of being located in Bermuda has considerably lowered their taxes. However, the fact that they hold a large portion of debt may contribute to the low effective tax. The corporate tax they pay on their drilling activities ranges from 16 % to 35 % and they can not offset a loss in one jurisdiction with a gain in another jurisdiction (Seadrill Ltd, 2011). This means the effective tax in this business "will differ significantly from period to period depending on the level of activity in and mix of each of the tax jurisdictions in which our operations are conducted" (Seadrill Ltd, 2011).

Not all of the companies in our data pay taxes based on the shipping tax regimes because they are not justified based on their operations, but it is reasonable to assume that the vast majority pay significantly lower taxes than the companies in our reference sample, which is mainly paying taxes based on conventional corporate taxes. This may be because of their mobility and they can therefore easier relocate to a tax haven or low tax country.

### 3.4.3 Debt tax subsidies

Miller and Modigliani's first theorem is based on neutral taxes. That assumption is not consistent with the real world. A company's debt tax subsidies occur because their interest payment is deductable before they pay their taxes. In other words their taxable income is reduced by the interest payment and that implies that the more debt they have, the higher the interest payment is, and the more they are allowed to deduct. This implies that debt is favored over equity since the debt reduces tax expenses and creates value for the company whereas dividends and share buybacks are not tax deductable.

The effect of tax on company value may be viewed as follows (Koller, Goedhart, & Wessels, 2005):

*Value of a levered company = Enterprise value as if the company was all-equity financed + Present value of tax shields*

*Where:*

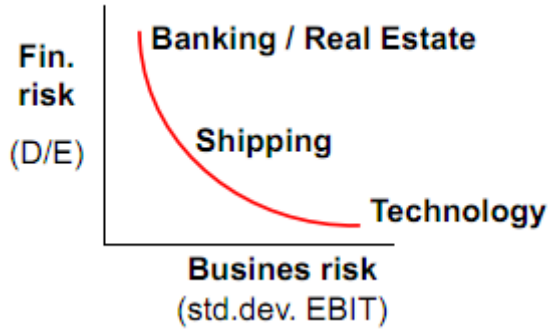
*The tax shield is defined as interest payment x corporate tax.*

Miller and Modigliani (1963) introduced corporate tax in their second theorem and they found that the maximum benefit of debt may be debt x corporate taxes, but when personal taxes where introduced in the model it became more complicated. The maximum benefit of debt depends on the personal taxes, and it is especially the difference in taxation on debt income and equity income that causes the value of the tax shield to vary (Miller & Modigliani, 1963).

## 3.5 The trade-off theory

The trade-off-theory is based on the assumption that a company will adapt to the capital structure that maximizes the value of the firm. This is represented by the pros and cons of debt, and the equilibrium is where the marginal benefit of debt is equal to the marginal cost of debt. The benefit of debt is the tax shield it creates and the reduction of free cash flow problems. The cost of debt is the bankruptcy costs and the probability of bankruptcy due to the added financial risk in addition to the agency costs. The figure below is an illustration of typical industries that have various levels of business risk and financial risk.

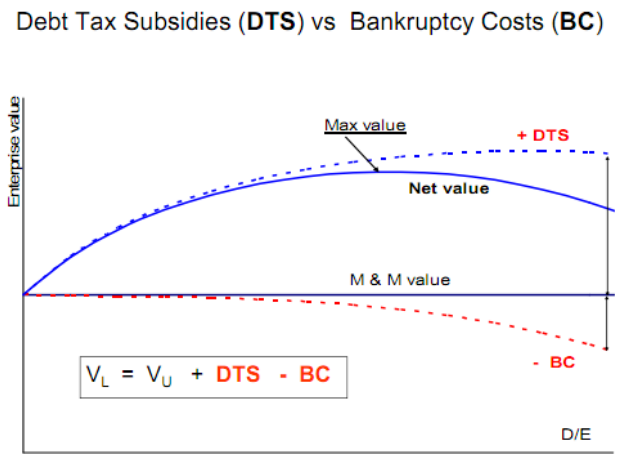
**Figure 3: Examples of companies with their related risk composition**




(Johnsen, 2009)

Both the debt tax subsidies and the bankruptcy costs will increase if the debt is increased. These will meet in equilibrium at some point and that is where the theoretical optimal capital structure is, and that is what this theory is all about; the trade-off between increased tax shield and increased bankruptcy costs. The question is really how much bankruptcy costs a company would prefer for their debt tax subsidies. This trade off is illustrated in the figure below:

**Figure 4: Overview of debt tax subsidies versus bankruptcy costs**




(Johnsen, 2009)

Mathematically it can be shown as (Koller, Goedhart, & Wessels, 2005):

*Value of a levered company = Enterprise value as if the company was all-equity financed + Present value of tax shields – Present value of bankruptcy costs*

If a company has a high level of business risk and therefore have an unstable cash flow they should borrow less than a company with a high and stable cash flow. This is especially true for companies with high growth and investment potential. The idea is that companies with substantial growth and investment opportunities have the most to lose when overhanging debt prevents new capital from being raised or leads to an inefficient bankruptcy negotiation during which some investment opportunities are forever lost (Baker & Wurgler, 2002). This is because this extra financial risk increases the probability of financial distress. Companies with high and stable cash flows can expose themselves of more financial risk through debt because their business risk is low. This makes them more able to exploit the debt tax subsidies and therefore increase debt to the level where marginal benefit of debt is equal to the marginal cost of debt.

It costs money to adjust capital structure and it will therefore be costly to have the optimal capital structure at any time. Myers (1984) pointed out in his article, "Capital Structure Puzzle", that if there were no adjustment costs, every company would adjust to the optimal capital structure at any time no matter how far they were from the optimum. But there are adjustment costs such as fees to the underwriters when you issue new equity and costs of

establishing new loans. This makes capital structures lagged and the optimal capital structure will be reached over time (Myers, 1984).

### 3.5.1 Trade-off-theory in the offshore industry

Debt tax subsidies are the benefit of debt and some of the companies in this industry (especially shipping companies) have favorable tax schemes. The offshore industry in general is highly globalized and many of the companies are located in various tax havens around the world, and according to the trade-off theory, they have no incentives to hold debt and should be all equity financed. It will only increase their overall risk by taking on additional financial risk so they should, according to the trade-off-theory, have small or no portions of debt.

The business risk in this industry may be perceived as high, especially if the companies focus mainly on the spot market. That may imply that the optimal debt ratio should be low because additional financial risk would lead to marginal costs of debt exceeding the marginal benefits of debt. But a lot of companies in this industry, as for example Seadrill, hold large portions of debt. So there must be something else that makes the owners choose to have substantial portions of debt.

## 3.6 Dividend policy

There is a close connection between dividend and corporate capital structure. Dividend is a way for the company to return cash to its shareholders and may be divided into two parts; dividend payments and repurchases of stocks. The first is a regular out flow of cash and is often set as a percentage of last year's earnings. This percentage is declared by the company and is therefore a known variable. Deviations from this percentage may affect the stock price due to the signaling effects of cuts in dividend. Dividend payments may also come as an extraordinary dividend.

The second option is an offer from the company to buy back shares at a premium, and those who want to accept the offer receive cash. The company then deletes these shares and the effect is a relative increase in debt compared to equity (Brealey, Myers, & Allen, 2008).

The payout policy is of great importance for a company's capital structure (Brealey, Myers, & Allen, 2008). The amount of retained earnings will naturally be lower if they decide to pay out a higher percentage of the earnings over time and this affects the capital structure because they have to facilitate other sources of funding than retained earnings to meet investment opportunities. This is also true if they repurchase shares because they will have an out flow of cash to the owners and therefore reduce their equity compared to the debt (Brealey, Myers, & Allen, 2008).

Dividends may be used as a way for the owners to resolve the free cash flow problem. By paying out large dividends they reduce the cash held by the company and this will mitigate the managerial agency costs such as over- or under investments. This will work in a similar way as debt because they will both represent an out flow of cash and therefore reduce the free cash flow. Shleifer & Vishny (1997) and La Porta, Lopez-de-Silanes, Shleifer, & Vishny (2000) claims this will not only resolve some of the free cash flow problem but they will also have their debt capacity intact and that may be useful in times with investment distortions. Companies with high dividend payments will also have reputations for high dividends and that may make it more plausible to get a price closer to intrinsic value when they decide to issue equity (DeAngelo & DeAngelo, 2006).

The research of Agrawal & Jayaraman (1994) found, based on a smaple of all-equity financed companies, that firms that were all-equity financed had a significantly higher payout ratio compared to the levered companies. Allen & Michaely (2003) suggest that companies with high fixed financial payments do not want to pay high levels of dividend as well.

### 3.6.1 Dividend policy in the offshore industry

Seadrill and Frontline are examples of companies in this industry that pay generous dividends to their shareholders. Seadrill recently announced that six of their deepwater rigs operating in the North Sea should be separated out of Seadrill and it would be formed a new company called North Atlantic Drilling Ltd (NADL). NADL is controlled by Seadrill and John Fredriksen (known for paying high dividends in his companies) announced that this new company had a goal of minimum 7 % dividend yearly (Dagens Næringsliv, 2011). The equity issue was for 2.4 billion NOK and was more than 20 times oversubscribed completing the issue one day prior to the deadline (Dagens Næringsliv, 2011). The same happened when

Fredriksen's oil service company Seawell issued equity. Aker Drilling also issued equity and tried to get 3.6 billion. They used two weeks and had to lower the price to get the financing needed (Dagens Næringsliv, 2011) and they are not know for paying generous dividends as Fredriksen's companies are. This may indicate that the investors are more interested in investing in companies with high dividends and may support the evidence of DeAngelo & DeAngelo's (2006) theory that companies with high dividends easier get a price closer to the intrinsic value when they issue equity. However, this is a complex subject and it is difficult to know for sure if it is the dividend that gives this effect or whether there are other underlying causes, but this may be an indication that dividend has an impact on capital structure.

# 4.0 Why offshore industry is capital intensive, and their different funding sources

The investments needed to be able to operate in this industry make this industry capital intensive. This is based on the asset prices and the vast amount of capital that is required to invest (Dagens Næringsliv, 2011), (Dagens Næringsliv, 2010), (Stopford, 2009, p. 269). One of the reasons it is cyclical is that there are significant gains in an upturn in the business and some operators in this industry are speculative. Asset play[10] may be a contributor to this. Any assets value is equal to its discounted future cash flow (Koller, Goedhart, & Wessels, 2005). That implies that the value of the assets in this industry will vary a lot depending on where they are in the cycle and the rates the owner may receive at that time. Asset play is most prevalent in good times when the rates increases. This will, over time, lead to overcapacity in the industry and the rates drops, much like what happens in commodity markets. The oil price is also an important value driver for the drilling and oil service companies because the higher the oil price is the more difficult projects the oil companies can take on, and that increases the demand for the companies in the industry we are analyzing.

The lenders on the other hand, are more concerned about the risk the borrower has undertaken and the probability of default. They have no upside, but a significant downside risk especially considering the sums involved in these transactions.

[10] Asset play is when an asset is bought or sold with a speculative motive as market conditions are changing.

The offshore industry is extremely capital intensive. For example an Ultra Deepwater rig (UDW) cost as much as USD 600 million (Dagens Næringsliv, 2011) and the price of a jack-up rig is about USD 180 million (Dagens Næringsliv, 2010). Ships for transporting liquefied natural gas (LNG) costs about USD 225 million and tankers costs as much as USD 150 million (Stopford, 2009, p. 269). With investments as large as this for a single asset makes it interesting to take a look at how they are financed because of their impact on the balance sheet.

The strategy is different amongst companies but there are few companies with enough cash to buy these assets with retained earnings. Huge swings in earnings over time make it less likely that a company can retain enough money to make investments of this size and that would be a rarity rather than the standard. One possibility is to issue equity to finance the investment and that is used by for example Nordic American Tanker Ltd. (NAT). They have a very small portion of debt and their reason for that is that they expose their fleet to the spot market due to the higher average rates but it also increases their business risk and therefore has to have lower financial risk (Nordic American Tanker Shipping Ltd., 2011). When they have an investment opportunity they usually issue equity in the market.

There are a huge number of different types of debt facilities that may be used. Banks have over time gained experience from this industry and how it works, and they have become an important source of capital. There are often tight connections between the bank and the company because of the immense need of capital to invest and the banks have the opportunity to tailor the loans to satisfy the company's needs. They also have the ability to cooperate with different banks to spread the risk by diversifying themselves. A different form of debt that is not necessarily offered from banks is bonds. That is a large loan that investors may buy small portions of and the risk is therefore spread amongst many creditors. Other forms of debt may be credit from the yards that are building the asset or subordinated debt such as mezzanine loans that have a higher interest rate because it is subordinated (junior) to senior debt. Seadrill is an example of a company that uses a lot of debt when they finance their investments (Seadrill Ltd, 2011). They are known for paying high dividends and therefore use a lot of the earnings on dividend instead of retaining it and use it to finance investments.

There are many different ways of financing an investment but it has become more and more common to mix debt and equity to do it and the reason for that may be that the creditors require that the company also take some of the downside risk. This also reduces the possibility of moral hazard.

## 5.0 Choice of variables

As seen in the theory chapter there are many different theoretical angles explaining which factors influence the capital structure in corporations around the world. To finance the operational activity the companies have to obtain capital from different sources and the main separation is between debt and equity. There are however many different forms of debt, and companies can issue multiple forms of these securities in an attempt to maximize the value of their firm. Why there exist differences in capital structure is hard to explain. For some companies it might be a defined strategy they maintain and for others it may be due to coincidences that occurred. The reality is that the differences in capital structure are present and that they are between countries, industries, companies etc. By studying these differences we will increase our understanding of the complexity of the problem and gain a greater understanding of why the differences exist. It will also be interesting to learn if our findings will be in line with renowned theories and recent research.

Following, we will describe our motivation behind our decision to focus on the offshore industry. We will further define the variables we have chosen to focus on based on well-known theories attempting to explain which factors influence the corporate capital structure. We will also include empirical findings from renowned researchers within the field.

## 5.1 Why we focus on the capital structure in the offshore industry

The reason why we focus on the capital intensive offshore industry is multiple. The maritime industry has historically been, and still is of great importance for the Norwegian economy. The maritime industry in Norway has always been a dominant player in the maritime sector worldwide. For example the Norwegian merchant fleet has kept its place as the third largest merchant fleet with 6 % of the world fleet in the 1880's (only USA and UK was larger) to 10 %

in 2000 (Birkeland & Eide, 2000). And for example Seadrill is ranked as the 2nd largest offshore driller based on enterprise value[11], and they have the 2nd largest ultra-deep water fleet (waters deeper than 7000 feet (Nergaard, 2005)) The Norwegian offshore industry is regarded as one of the most versatile in Europe and their ability to exploit new niches, such as Atlantic Drilling's deep water and harsh environment rigs, is seen as an important property (Dagens Næringsliv, 2011). We regard it as very useful to gain knowledge of this industry on a higher level because of its importance in the Norwegian economy. In addition, the industry has some specific characteristics such as special tax schemes or possibly a more frequent use of tax havens, capital intensity, cyclic tendencies, and the assumption that the companies in the industry hold a lot of tangible assets make this industry interesting. These are factors that may influence the capital structure and it will be interesting to see if that may be the case.

## 5.2 The motivation for choice of variables

**Dependent variable:**

**Debt ratio (DebtRatio)**

Our debt ratio variable is defined as long-term debt divided by the sum of long-term debt and market capitalization[12]. The long term debt consists of bank loans, debentures and convertibles, lease liabilities, and other long term interest bearing debt. The reason for excluding short-term debt and non-interest bearing debt is that those measures includes factors that are non-financial and arises from the operation of the firm, and they carry little financial risk. We also want to look at the capital structure in terms of what is used to finance the firm and the types of short term debt mentioned above either is non-interest bearing debt or they arises from the operation of the firm.

The impact of short term debt on the capital structure is also tested in our sample and on average for the offshore sample the debt ratio increases with 1.8 % when short term debt is included which implies that the offshore industry uses short term debt only to a small

[11] Enterprise Value is defined as market capitalization + debt + minority interests + preferred shares – total cash and cash equivalents. This is regarded as the theoretical takeover price (Investopedia)

[12] Market capitalization equals shares outstanding times the current share price and is a proxy of the size of the company.

degree. We want to see if there are any differences in the capital structure when it comes to financing of the firm and since the short term debt is of little importance for the offshore industry it is not included.

The use of market capitalization makes this ratio a quasi-market ratio. The reasons for using market capitalization instead of book values of equity are multiple. Under normal conditions a company's equity are valued higher by the market than the balance sheet due to the fact that the market value reflects the future instead of the past. Therefore the use of market capitalization instead of book value of equity better reflects the "real" debt ratio. If we had used the book value of equity we may have, on average, overvalued the debt ratio because book value of equity on average is lower than the market value, as mentioned above.

Our data consists of companies from many different countries in the world and the accounting standards are different from country to country and the use of market capitalization may reduce the potential bias this may have led to due to the fact that it is not affected by any accounting standards.

Rajan and Zingales (1995) discuss in their paper, many different measures of leverage and they point out that every measure have their pros and cons. We have in this thesis focused on the capital that finance the firm and the "real" ratio of debt, as discussed above, and have therefore based our choice of debt ratio on those factors.

The construction of this variable:

$$Debt\ ratio = \frac{long\ term\ debt_t}{(long\ term\ debt_t + market\ capitalisation_t)}$$

**<u>Independent variables:</u>**

*<u>Firm specific variables:</u>*

**Degree of asset tangibility (AssetTang)**

This variable is defined as fixed assets over total assets and is a measure of the degree of asset tangibility in the company. This is in line with the research of Rajan & Zingales (1995), Titman & Wessels (1988), and Frank & Goyal (2003). Intangible assets are assets that can not

be seen, touched or physically measured. These properties make it harder to convert them into cash. Tangible assets on the other hand are typically property, plant and equipments (PPE) and can more easily be converted into cash.

The importance of intangible assets is not diminished by the fact that it is not physically seen or that it can not be easily converted into cash. Trademarks, copyrights, patents, and corporate "know-how" are examples of intangible assets, and Nike or IKEA are examples of companies that have achieved long term success and it may partly be because of those assets.

The construction of this variable:

$$Degree\ of\ asset\ tangibility = \frac{fixed\ assets_t}{total\ assets_t}$$

The rationale behind this variable is based on the trade-off theory. Companies with a high degree of tangible assets have more collateral for the banks to claim in the case of financial distress than companies with a lower degree of tangible assets. This may be an important factor for the creditors to evaluate before lending the capital. This is because, in the case of bankruptcy, the tangible assets are more liquid than intangible assets (Myers, 1984).

According to Jensen & Meckling (1976) and Rajan & Zingales' (1995) discussion of agency theory, tangible assets will reduce the agency problem related with debt and they suggest that there is a positive relationship between the degree of tangible assets and debt ratio in the company. However, the volatility in companies with a high degree of specialized intangible assets are harder to observe than the volatility in companies with tangible assets with active second hand markets and Myers (1984) suggests that because of this there is a positive relationship between specialized intangible assets and debt ratio (Myers, 1984). The degree of tangible assets may therefore influence the debt ratio in both directions but the most prominent argument is the role tangible assets play as collateral when companies borrow money.

Empirical findings regarding this variable:

Rajan & Zingales (1995) expected a positive relationship between the degree of asset tangibility and leverage. This is based on the fact that tangible assets can be used as collateral when borrowing money and therefore reduce the agency problem because both parts has values at stake. Their findings was also in line with their expectations. Daskalakis & Psillaki's (2008) findings were opposite and they found a negative relationship between asset tangibility and leverage. They explain this by pointing out that companies with a high degree of asset tangibility already have found a stable source of return which provides them more internally generated funds and discourage them from turning to external financing (Daskalakis & Psillaki, 2008).

We believe that the relationship will be positive for both samples, but stronger for the offshore sample due to the capital intensity in the offshore industry and the collateral the assets represent.

**Dividend ratio (DivRatio)**

This variable is defined as the payout ratio and is calculated as dividend divided by net income and it tells us how much of the net income the company pay out to its investors. This ratio may be affected by the fact that some companies in the time period has had negative net income and this will lead to a negative dividend ratio. Also the companies that has had net income close to zero will be affected because their dividend ratio will be abnormally high if they pay regular dividends or close to regular dividends to not be victim of the signaling effect. In these cases this variable is not constructed optimally. However, these cases represent approximately 4 % of the observations (2052 observations out of 47 416 in total) in the raw data and we have therefore decided to keep the construction of the variable as it is.

The construction of this variable:

$$Dividend\ ratio = \frac{dividend_t}{net\ income_t}$$

Dividend is interpreted as a strong signal to the market concerning the company's financial condition. A company that is paying out dividend sends a positive signal to investors that the company expects good future earnings in addition to the fact that the company is able to finance its future investments with existing capital, or that they have possibilities to get the necessary financing if needed. It may also give signals to the market that this is a company they would like to invest in because of the dividend yield. This may make the process of issuing equity easier and DeAngelo & DeAngleo (2006) claims that this may give them a price closer to the intrinsic value (DeAngelo & DeAngelo, 2006). However, some research have been done on the subject and Allen & Michaely (2003) suggest that companies that are eager to pay out dividend to its investors may indicate that the company have run out of profitable ideas for the future.

Companies that has insufficient funds to pay their regular dividends may want to finance their dividend with debt in order to avoid the signaling effects of cuts in dividends. However, profitable companies that are able to borrow at a lower interest rate than expected return may also want to finance dividends with debt. One possible rationale behind why they would want to use debt to finance dividend is that the debt financing is cheaper than using the retained earnings, and the debt would further work as a discipline mechanism on the management. This requires that they have investment opportunities to invest in. If the alternative is to preserve the funds as cash on the balance sheet, this may not be an optimal decision.

Empirical findings regarding this variable:

Mjøs (2007) finds a significantly negative relationship between dividend and leverage. Mjøs (2007) further points out that the companies adapt their dividend strategy to the tax regime and that a change in the tax regime will influence the companies dividend. We will conduct an analysis of international companies and it will be very challenging to analyze the effects of changing tax regimes around the world which is therefore not performed in this thesis.

Frydenberg (2004) used a dividend variable constructed as dividend divided by total assets and found in his studies of Norwegian manufacturing companies mixed results depending on

the statistical method he used. The fixed-effects method[13] found a positive relationship between short term debt and dividend and a negative relationship between long-term debt and dividend. He explains the positive relationship between short term debt and dividend with Norwegian accounting standards, where dividends promised to shareholders amount to short term debt at the end of the year (Frydenberg, 2004). His OLS[14] regression found a significant negative relationship between dividend and all debt ratios. Frydenberg (2004) interpret this as if the companies that pay dividend to its shareholder is not in need of debt financing to the same extent. A positive relationship would imply that the companies obtain debt to finance the dividend. The decision to obtain debt to finance dividend may be based on the signalling effects of dividend or as a control mechanism on the management to prevent overinvesting (Kochhar, 1996).

Frank & Goyal (2003) point out in their article that dividends are part of the financing deficit in the same way capital expenditures are, and that it is expected that a dividend-paying company will use more debt, hence a positive relation between the two. Their results are otherwise and they find that a dividend-paying company has less debt than a non-dividend-paying company (Frank & Goyal, 2003).

Based on previous empirical findings we believe that this relationship will be negative for the reference sample, but the fact that this industry is capital intensive and the predictions of the pecking order theory, we believe the relationship for the offshore industry will be negative, but stronger than for the reference sample. The reason is that the industry is more capital intensive than the average industry and that implies that if they pay out capital they otherwise could have retained, the probability that they will have to borrow to invest is greater.

**Effective tax (efftax)**

This variable is defined as income taxes divided by pre-tax income and is measuring the effective tax rate. This variable may have the same problem as the dividend variable, namely

[13] Fixed effects regression is a statistical method that control for omitted variables that varies between companies but is constant over time. The method uses the change in the variables over time to estimate the effects of the independent variables on the dependent variable (Wooldridge, 2009)

[14] OLS (Ordinary Least Square) is a statistical method that estimates the unknown parameters in a linear regression model. The OLS estimates is found by minimizing the sum of the squared error terms (Wooldridge, 2009)

that companies with small but positive pretax income, and companies with negative pretax income will have abnormal estimates of their effective tax. This may dilute the value of this variable and in these cases the variable is not constructed optimally. However, these cases represent approximately 6 % of the total observations (2878 observations out of 47 417 observations in total). We have therefore decided to include the variable as mentioned above, income taxes divided by pretax income, but have to have the problem in mind when interpreting the results.

The construction of this variable:

$$Effective\ tax = \frac{income\ taxes_t}{pretax\ income_t}$$

The effective tax rate is the burden ratio at which a business is taxed and it is hardly ever the same as the official tax rate due to the deductions of interest payment. The rationale behind this variable is based on the trade-off theory and is set to discover the tax incentives associated with debt. DeAngelo & Masulis (1980) argue that non-debt related tax shield is positively correlated with a company's leverage. This non-debt related tax shield arises from depreciations of PPE and they suggest that a company with a large portion of fixed assets have an incentive to obtain more debt. Furthermore this will enable them to borrow cheaper because of the assets they can use as collateral when borrowing (DeAngelo & Masulis, 1980).

Empirical findings regarding this variable:

Fan, Titman, & Twite's (2010) found in their research that when tax gain from leverage is positive, companies tend to tilt their capital structure towards debt. However, their tax effect is not as strong and persuaisive as other influences on capital structure.

We claim, as mentioned in the chapter regarding tax, that this industry has a significantly lesser tax burden than the reference sample. This will, according to the trade-off theory imply that this industry should have less debt because of it, all else equal. Based on this we believe that the offshore industry will have a weaker positive link between tax and leverage than the reference sample.

**Profitability (ebitta)**

The variable for profitability is defined as EBIT divided by total assets, and it measures the return their assets have given them. This construction is in line with the study of Daskalakis & Psillaki (2008). The reason for using total assets as the denominator is to try to capture the capital intensity in this industry.

The construction of this variable, based on the credit crisis in 2008/2009 and the short time period we analyze, may give the small companies in the sample abnormal values for this variable. The reason is that a large negative EBIT compared to total assets, which for small companies is not that large, will give abnormal values for this variable. This may dilute the value of the variable. However, the total number of observations with this problem represents approximately 7 % of the total sample. We have therefore decided to include the variable as it is, but have to be careful when interpreting the results.

The construction of this variable:

$$Profitability = \frac{EBIT_t}{Total\ assets_t}$$

The pecking-order theory predicts that companies first want to use retained earnings before turning to external sources of capital. This to say it is a strong link between profitability and capital structure, at least over time because profitability obviously influences the cash flow directly. The trade-off theory is also tightly linked to this variable. It states that it is a trade-off between bankruptcy costs and the debt tax shield and in order to gain from the debt tax shield the company must have had a positive return (Myers, 1984). Profitable companies also have less probability for bankruptcy because they earn cash to service their debt.

Jensen (1986) claims that profitable companies should obtain higher debt ratios to increase the firm value because it would reduce the free cash flow problem and prevent managers from overinvesting.

Empirical findings regarding this variable:

Rajan & Zingales (1995) found in their studies a negative relationship between profitability and leverage which was of statistical significance when thay had defined their variable as EBITDA divided by total assets, and this deviates a bit from our variable. Daskalakis & Psillaki (2008) constructed their profitability variable as EBIT divided by total assets and found an inverse relationship between leverage and profitability. The same was the result of the reasearch of Gaud, Jani, Hoesli, & Bender (2005). These findings supports the pecking order theory of Myers & Majluf (1984) where they suggested that companies preferred internal funding over external funding.

Based on this we expect a negative relationship between profitability and leverage for both the offshore sample and the reference sample. Furthermore, some of the sub-industries in our offshore industry is, in good times, highly profitable. This makes them able to retain capital in good times and preserve them until they need to invest. However, the capital intensity in this industry is massive and the investments are therefore large and an increase in profitability may not reduce the need for external capital to the same extent as in the reference sample but the effects are hard to estimate and they may be offsetting. Therefore we have no indication if it will be weaker or not.

**Firm size (TotAssets)**

This variable is defined as the natural logarithm of total assets. This construction is also in line with the study of Mjøs (2007). We want to test if it is a difference in capital structure in the offshore industry compared to other industries. Some of our motivation for choosing the offshore industry is, as mentioned earlier, that it is capital intensive. It is therefore more natural to look at the natural logarithm of total assets than other proxies for size such as revenue. The reason we use the natural logarithm[15] of total assets is that our dataset consists of companies of various sizes, and this will reduce the magnitudes of the differences between large and small companies.

The construction of this variable:

[15] Transforming variables to the natural logarithm is a well-known method in order to reduce the magnitudes of the residuals. (Gujarati & Porter, 2009)

$$Size = \ln(total\ assets_t)$$

One rationale explanation for using this variable is that larger companies have better access to external capital and the trade-off theory predicts that the leverage will increase with increased size due to reduced risk and information asymmetry (Mjøs, 2007). Reasons for this may be that they are listed and their stock is liquid. It may also be because they have more assets they can use as collateral when borrowing and therefore receive better conditions. This is also in line with the research of Titman & Wessels (1988). Furthermore, large companies are diversified to a higher degree than small companies and therefore their risk is lower due to reduced bankruptcy risk. Smaller companies may also be subject to a higher degree of asymmetric information which affects their stakeholders negatively.

Empirical findings regarding this variable:

Rajan & Zingales (1995) found in their analysis of international data that there were a positive relationship between the size of the company and the capital structure which means that an increase in size also increases the debt. Wald (1999) found in his studies that the firm size show different effects in different countries. Daskalakis & Psillaki (2008) as well as Gaud, Jani, Hoesli, & Bender (2005) found a positive relationship between leverage and firm size in their research.

We will, in line with these findings, expect that there is a positive relationship between firm size and capital structure. We also believe there is a stronger link between the two in the offshore industry than in companies in general. The reason for this is that the underlying risk in this industry arguably is greater than in industries in general. A larger company has the opportunity to diversify itself more by involving itself in other regions or other markets that will reduce the overall risk. Such activity will reduce the probability of default and therefore the bankruptcy costs. However, this effect will be present in most industries but we believe the relationship will be stronger in the offshore industry.

**Degree of capital intensity (AssetsPrEmp)**

This variable is defined as the natural logarithm of total assets divided by the natural logarithm of number of employees, and is a proxy for the capital intensity.

$$Degree\ of\ capital\ intensity = \frac{\ln(total\ assets_t)}{\ln(number\ of\ employees_t)}$$

We have not found any earlier research that has used this variable but it is an intuitive variable. It is fair to assume that a capital intensive industry will have a higher ratio compared to an industry that is less capital intensive. The reason we want to include this variable is to see if the degree of capital intensity will affect the leverage. Our assumption is that a company in a capital intensive industry will, over time, not have enough retained earnings to finance their investments and that it will have a greater need for external capital because of it, and the pecking-order theory then predicts that debt is used. Therefore we assume that there is a positive relation between capital intensity and leverage and that it is stronger for the offshore industry than the reference sample.

**Growth opportunities (markettobook)**

The variable used in this thesis as a proxy of future growth opportunities is the market-to-book ratio. The market value of a company's equity is the market capitalization, and this is divided by the book value of assets calculated as total assets minus total liabilities and is in the balance sheet referred to as stockholder equity. The book value of assets represents the shareholders ownership of assets. This is a good measure in capital intensive industries because their tangible assets are the main driver of value in the company. This is also in line with the studies of Rajan & Zingales (1995) and Myers (1977).

The construction of this variable:

$$Growth\ opportunities = \frac{market\ capitalization_t}{book\ value\ of\ assets_t}$$

Assuming efficient markets, the market-to-book ratio above one would imply that they have good future prospects and the investors expect the company to grow and do better in the future, assuming all other factors are unchanged. A ratio of less than one implies that the market regards their assets as overvalued and/or the company's assets earn a very low return.

Myers (1977) argues that companies with good future prospects should not obtain to much debt in order to be able to finance the growth opportunities in the future. This underinvestment hypothesis claims that companies with good future prospects that hold a lot of debt may have to reject profitable investmenst because they can not obtain any more debt and this will inhibit their growth.

Myers (1984) argues that a company with high market-to-book ratios indicate that the company is overvalued if it suddenly is in financial distress (buble), but the signalling effects of growth opportunities would be positive and may help them issue equity or debt.

Empirical findings regarding this variable:

Myers (1977) claimed in his studies that companies with high leverage is more likely to pass up profitable investment opportunities and that companies expecting high future growth should use more equity to decrease the probability of default and therefore defend their good future prospects from financial distress. Rajan & Zingales (1995) point this out in their research and they found a negative relationship between growth opportunities and leverage. They explain the relationship with market timing theory, namely that companies will try to issue equity when the share price is perceived to be high (Rajan & Zingales, 1995).

Based on this we expect that the relationship between growth and leverage is negative but that the relationship in the offshore industry is weaker than for the reference sample. This is based on the fact that the offshore industry is cyclical and that a change in the market-to-book ratio does not necessarily come from a change in market shares based on investments but rather come from fluctuations in the rates the companies may charge. In other industries a change in the market-to-book ratio most likely comes from changes in their market share.

**Risk (Risk)**

This variable is defined as the standard deviation of operating revenue in the four year period divided by average operating revenue in the same period. The standard deviation of operating revenue is based on the four years of data we have available and is used as a proxy of the riskiness of the company for the time period we analyze. The reason for using operating revenue is that it is the top line in the income statement and large deviations in

the operating revenue from year to year indicate high operational risk. Income items further down in the income statement may be influenced by actions the company may have been forced to take as a reaction to the decrease in the operating revenue and is consequently not a suitable proxy for the operational risk of the firm. Other proxies such as variance in stock return may also be influenced by noise in the market and this may have overstated the risk in the time period we analyze due to the massive fear that hit the markets in 2008. Further, this is not the best proxy for operational risk because stock prices focus on future earnings and expectations, and may not be the best proxy for the short term volatility in earnings. Also, even though we have included market data we had not access to stock returns or other market based proxies for risk.

The biggest problem with our risk variable is the short time period. The short time period may not adequately reflect the true risk and this is something we have to have in mind when interpreting the results.

The construction of this variable:

$$Risk = \frac{standard\ deviation\ of\ operating\ income_{t \to t_4}}{average\ operating\ revenue_{t \to t_4}}$$

The link between risk and capital structure is quite strong and the renowned theories on capital structure has risk as an important factor. The company's ability to service its debt will be affected if earnings are highly volatile. According to the trade-off theory risk affects the magnitude of the bankruptcy costs because it affects both the probability of bankruptcy and the costs if bankruptcy occurs. A higher bankruptcy cost will affect the optimal debt level in a negative way and lead to lower debt levels.

More volatile earnings will affect the amount of capital the company may retain. With the pecking order theory in mind this will over time limit the company's opportunities to obtain the required capital through retained earnings and force the company to turn to external sources of capital, and according to the theory debt is the next preferable option. However, one might debate, on a general basis, that risk will influence the ability to get external funding negatively, for example through loan conditions, terms for equity issues (harder to "sell" and more due diligence to do for the underwriter) etc.

Empirical findings regarding this variable:

Mjøs (2007) defines his risk variable as the standard deviation of ROAA[16] for the years preceding the observation. He finds a positive relationship between risk and leverage. This may sound contradictory but he interprets it as if earlier volatility has reduced the equity and that the companies therefore are in need of new capital. He further suggests that it may be because shareholders would like to push more of the risk on to the creditors (Mjøs, 2007).

Gaud, Jani, Hoesli, & Bender (2005) performed regressions on both book values and market values of leverage and found opposing results. The regression where they used book values of leverage did not find any significant relations but the regression where they used market values did find a significant positive relationship between risk and leverage. This may be explained by the construction of the variable. They constructed it as volatility in ROAA each year and found the squared difference between the company and the average of all of the companies that specific year. Observations under the average was given a negative sign and the companies above the average was given a positive sign (Gaud, Jani, Hoesli, & Bender, 2005). The interpretation of their results in light of their construction of the variable suggests that the companies below the average has less debt than the ones above it. This means the companies with higher operational risk try to control their overall risk by reducing their financial risk.

We believe that this industry is riskier than the average industry and that the negative relation between risk and leverage is stronger in this industry than in the reference sample. This is based on the fact that the industry is cyclical. In addition, their assets are mainly tangible and fluctuations in earnings are easily observable in the value of the assets and will have a significant impact on the value of the firm.

[16] ROAA = Return On Average Assets and is calculated as:
$return\ on\ average\ assets\ (ROAA) = \frac{EBIT_t + total\ interest\ and\ related\ income_t}{\left(\frac{total\ assets_{t-1} + total\ assets_t}{2}\right)}$

*Country specific variables:*

**Tax haven (taxhaven)**

This variable is constructed as an indicator variable to recognize if a country is regarded as a tax haven or not. If it is regarded as a tax haven it will take the value of one and if it is not regarded as a tax haven it will take the value of zero.

We have not seen this variable used in any other research but it will, based on our problem statement, be interesting to see if it influences the choice of capital structure, or whether it is a significant difference between offshore industry and our reference sample.

Intuitively, the fact that tax havens are utilized amongst the companies in our data it should affect the capital structure based on the trade-off theory. We believe the relationship will be negative, namely if a company is located in a tax haven it will have less debt than companies that are not located in a tax haven. Our assumption is that the mobility and the high degree of globalization in the offshore industry will make this relationship stronger in this industry because we believe it is more frequently used.

**Common / civil legal system (law_common)**

This variable is an indicator variable and it will take the value of one if the legal system in the country is based on common law and the value of zero if it is based on civil law and this construction is in line with the method used by Fan, Titman, & Twite (2010).

La Porta, Lopez-de-Silanes, Shleifer, & Vishny (1998) found a significant variation in the extent of legal protection of external investors across both developed and developing countries, and claim that legal systems based on common law offer investors (both equity and debt) better protection than those based on civil law, resulting in higher security values (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 2002). The choice of financing sources may be influenced by the pecking order theory because the financing option next in line after retained earnings is debt. This may imply that companies in countries with common law legal systems use more external financing than companies in countries with a civil law legal system, and with a better protection for investors (equity) it may imply that equity is more used than the pecking order theory predicts. Legal systems therefore may influence the

choice of capital structure. It further implies that companies in countries with a civil law legal system mainly focus on retained earnings and then debt, as the pecking order theory predicts, and this may reduce their growth.

To further distinguish between the companies located in countries with civil law legal system we have constructed two more indicator variables based on the Scandinavian civil law legal system (law_sc) and legal systems based on the French civil legal system (law_fr). This implies that if a country takes the value of zero for all of these variables it means their legal system is based on German civil law. This implies that the coefficients of the indicator variables law_sc, and law_fr will be compared to the effect of being based in a country with a legal system based on German civil law. The reason to do this is to see if there is a difference between the different civil law legal systems in addition to the distinction between common and civil law legal system.

*Overview over countries and their legal system:*

Scandinavian civil law legal system:

Denmark, Finland, Norway, and Sweden

German civil law legal system:

Germany, Austria, and Switzerland

French civil law legal system:

France, Belgium, Greece, Italy, Portugal, Spain, Netherlands, and Luxembourg

Common law legal system:

United Kingdom, United States of America, Ireland, Canada, Australia, and Caribbean Islands.

Empirical findings regarding this variable:

Fan, Titman, & Twite (2010) found in their article based on international data that the legal environment had an important influence on capital structure choices. Their results further

indicates that companies in countries with a legal system based on common law has lower leverage.

Our assumption is that companies based in countries with common law legal systems will have lower leverage than companies based in countries with a civil law legal system (negative relationship). We are uncertain of the impact the different civil legal systems have on leverage and are therefore unable to make a prediction. The vast majority (86 %) of the companies in the offshore sample is either located in countries with common law legal system or in countries with Scandinavian civil law legal system but we are not certain of the impact this will have on the selection.

**Table 1: Hypotheses regarding the variables**

| Variables | Offshore sample | Reference sample | Based on: |
|---|---|---|---|
| **Degree of asset tangibility** | Stronger positive link | Positive | Trade-off theory (collateral in case of financial distress), Agency Theory |
| **Dividend ratio** | Stronger negative link | Negative | Pecking order theory, Agency theory |
| **Effective tax** | Weaker positive link | Positive | Trade-off Theory |
| **Profitability** | Negative | Negative | Pecking order theory, Trade-off theory |
| **Size** | Stronger positive link | Positive | Trade-off theory |
| **Capital intensity** | Stronger positive link | Positive | Pecking order theory |
| **Growth opportunities** | Weaker negative | Negative | The underinvestment hypothesis |
| **Risk** | Stronger negative link | Negative | Trade-off theory, Pecking order theory |
| **Tax haven** | Stronger negative link | Negative | Trade-off theory |
| **Common law** | Negative | Negative | Better legal protection for external investors (debt and equity) |
| **French civil law** | Uncertain | | - |
| **Scandinavian civil law** | | | - |

# 6.0 Methodology

The purpose of this chapter is to give a brief introduction to how our analysis is methodological designed.

## 6.1 Choice of method

We are going to use a quantitative research method in this thesis. Our intention is to discover explanations based on a large number of data. This will also lead to increased understanding of the challenges regarding the capital structure.

The design chosen in this thesis is based on the fact that there are a lot of theories out there that we can use as base to test our hypotheses. That implies that a deductive design can be used. If there had been no theories on the subject we would have to have an inductive design. Further, we will try to describe relationships between variables and the design will therefore also be somewhat descriptive.

## 6.2 Regression

Ordinary Least Square (OLS) regression is a well-known and widely used analysis. It is a basic econometric tool used to identify empirical correlation between variables (Biørn, 2009, p. 11). The goal of the method is to explain the observed dependent variable (Y) by analyzing the independent variable(s) (X). If there is only one independent variable the regression is simple, otherwise it is called a multiple regression. The simple regression analyzes the effect a change in the independent variable has on the dependent variable (Y). It may also be used to make predictions for a new observation for a known x-value (Wenstøp, 2006, pp. 315-318). We will use a multiple regression because we have many explanatory variables.

In order to distinguish between multiple samples in the regression we have to use indicator variables, also known as dummy variables. Dummy variables are used instead of qualitative variables because qualitative variables can not be ranged and are therefore useless as variables in the regression without decoding them. A dummy variable gets the value 1 if it is true and 0 if it is not true. The dummy variable enables that $\alpha$ can vary between the samples and you can see the result of both samples in the same regression model.

### 6.2.1 Assumptions

A regression is based on a set of assumptions. The assumptions in mind are linearity, homoskedasticity, normality, multicollinearity and autocorrelation. For a more detailed description see appendix 2.

## 7.0 Specification of data and source

In this thesis, we have used the Bureau van Dijk (BvD) database and this is a database that is constructed in such a way that it is appropriate to use for our purposes. The database consists of information of approximately 65 000 listed companies worldwide and it provides information of both accounting- and market data. The fact that it includes only listed companies may lead to a biased selection, but we wanted to use market data in our analysis and it is therefore appropriate to use it. The analysis of capital structure choices is more meaningful when we include the companies with the greatest opportunities to raise new capital and listed companies fit that description best. It would also be hard to obtain the needed information if we would have included private companies.

The time period chosen stretches from 2006-2009. We wanted to include market information as far as it was possible because it possibly could diminish the effect of differences in accounting standards and the database only consisted of market information from 2006-2010. When we started to work on this thesis the 2010-information was not ready for most companies and was therefore discarded. The purpose of this analysis is not to look at changes in capital structure over time, rather to see if there are differences in the two samples in terms of capital structure. However, this does not justify the problem of having a short time period and we will have to be careful when concluding because of it.

The database consists of company information from many different countries and problems with different accounting standards are taken care of by normalizing the data in order to ensure comparability across borders and this is done by BvD. One problem that may still affect the data is that the accounting standards are constantly changing and this could possibly interfere with the results. To correct for each change would be very time consuming and is therefore not done, but we have, in order to ensure the comparability, focused on

European, North-American and large Asian countries in addition to tax havens such as many Caribbean Islands.

Our dataset is a combination of time series- and cross-sectional data. Time series data have multiple subsequent observations of the same variable over time. Cross-sectional data have observations of multiple variables for a given time. Examples are the different variables such as dividend ratio, effective tax, profitability etc. that we have for all the companies for all the years. In other words, we have data on $n$ cases, over $t$ time periods, for a total of $n \times t$ observations (The Trustees of Princeton University, 2007). This combination is defined as panel data and it gives us the opportunity to better understand how the evolvement in the data has been in the chosen time period (Wooldridge, 2009, pp. 10-12).

Our data is, after elimination of extreme observations and other inappropriate data, classified as an unbalanced panel data because there are different numbers of observations for each variable from year to year (Greene, 2008, p. 184).

*Potential problems with the data:*

Selection bias will occur to some extent in the dataset and is typical in connection with selection of the population and the time interval. By including all the companies with the same Standard Industrial Classification-code (SIC) this problem might be reduced because all companies, new as old, are included for the current year. The time interval might also, as mentioned, lead to this problem because you might have a time interval that do not have both up-turns and down-turns in the economy, and this might influence the results and make you unable to generalize the results. We have selected a time interval of 4 years and this period has only one economical up turn and down turn[17] and this forces us to be cautious when trying to generalize.

There will also be survivorship bias in the dataset because all the companies in the database are the companies that actually survived from the beginning until the end of the time interval. This implies that companies that have gone bankrupt, been involved in mergers or acquisitions or been delisted from the stock exchange are not included in the dataset. In

[17] The boom prior to 2008, and the credit crisis in 2008/2009.

other words, when a company falls under the factors above, only the data up until the event (for instance bankruptcy, involvement in mergers or acquisitions etc.), are included.

The problem is that these companies might differ in characteristics from the companies that are still included in the database. The companies that have gone bankrupt are especially interesting. It is a fair assumption, with the fact that they have gone bankrupt in mind, that these companies have had a higher debt ratio than the rest and this might lead to an underestimation of the debt ratio of the dataset for the selected time period. This problem is not easy to solve. We could include all the companies that have been delisted, but the bankrupt companies are no longer present and therefore impossible to include in the dataset. The delisted companies will also be difficult to include because of the lack of information about their balance sheet seeing as they are private and we would therefore have to reconstruct the data from old financial statements. This would raise the possibility of diminishing the reliability of the research, due to possible faults in the data, it would be very time consuming, and they are therefore not included.

The conclusion is that there will be some problems with the dataset that we are unable to handle and we will therefore have this in mind when we are in the process of concluding.

## 7.1 The offshore sample

The problem with this industry is that it has no specific SIC-code, as mentioned earlier. We have therefore searched in BvD using the SIC-codes for shipping (SIC 4400: Water Transportation and SIC 4412: Deep Sea Foreign Transportation of Freight) and manually located other listed companies that fit with our definition and included them in the offshore sample. The total number of observations is 528. This means that the offshore sample consists of 132 companies, with four observations each (i.e. observations for each company for the years 2006 through 2009).

## 7.2 The reference sample

The reference sample is a selection of listed companies from around the world. The total number of observations is 46 888 and will cover the vast majority of the value creation in the

world. This implies that we have included 11 722 companies that have four observations each (i.e. observations for each company for the years 2006 through 2009).

Naturally, financial companies are not included due to their special capital structure. Inclusion of these companies would distort the results a great deal and is therefore excluded.

## 8.0 Data analysis

We will start this analysis with the presentation of how we handled the extreme observations and then present the descriptive analysis. Further, we will present the regression analysis. The program we have used to analyze the data is STATA.

## 8.1 Handling of the extreme observations

Research methodology suggests that we need to manage extreme values in the dataset in a structured manner. Extreme values can be caused by errors in the data material or as the outcome of miss-specified formulas. It can also be caused by extreme events that are not representative of the sample as a whole. Further, extreme observations may represent special circumstances that should not influence the results as much as they would do if they were included. These values may not be representative for the variable it is associated with, and including extreme values in the dataset may potentially lead to less reliable results. The effects of extreme values are changed standard deviations, which in turn reduces the significance of the specified model.

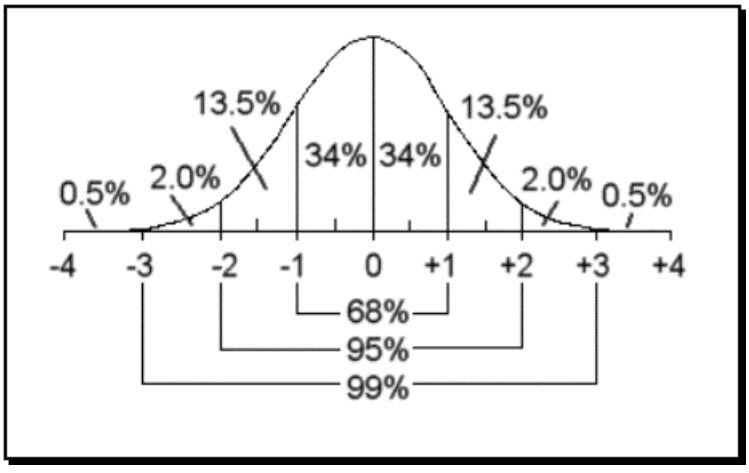
The table below shows descriptive statistics for select variables before handling of extreme observations. We observe that the variables dividend ratio, effective tax rate and market-to-book ratio all have extreme values max and min values compared to the values at the upper and lower $99^{th}$ and $95^{th}$ percentile respectively. This methodology takes into account the distribution of values for each variable. The process involves calculating the upper and lower threshold value such that 99 % of the observations are included for each variable, and the top and bottom 0.5 percent are excluded.

Table 2: Descriptive statistics before elimination of extreme observations

| BEFORE ELIMINATING EXTREME OBSERVATIONS: | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Debt Ratio | DivRatio | efftax | ebitta | TotAssets | Assets PrEmp | Market ToBook |
| COUNT | 43874 | 46226 | 46254 | 46065 | 46065 | 33525 | 38308 |
| AVERAGE | 0.2 | 0.2 | 0.2 | -3.0 | 5.1 | 5.8 | 1.9 |
| MEDIAN | 0.1 | 0.0 | 0.2 | 0.0 | 5.0 | 5.7 | 1.2 |
| STDEV | 0.3 | 7.3 | 6.9 | 721.8 | 2.4 | 1.3 | 6.7 |
| MAX | 1.0 | 1105 | 579 | 63251 | 13.3 | 11.5 | 871.0 |
| 99 perc upper | 1.0 | 2.4 | 1.9 | 0.4 | 10.7 | 9.6 | 11.0 |
| 95 perc upper | 1.0 | 0.8 | 0.5 | 0.2 | 9.1 | 8.1 | 4.4 |
| 95 perc lower | 0.0 | 0.0 | -0.2 | -0.7 | 1.5 | 3.8 | 0.5 |
| 99 perc lower | 0.0 | -0.8 | -1.8 | -2.8 | -0.8 | 2.8 | 0.2 |
| MIN | 0.0 | -526 | -877 | -130077 | -10.1 | -1.6 | 0.0 |

Our approach to eradicating extreme values has been to restrict values in our analysis such that only observations that falls within the 99$^{th}$ percentile upper and lower band for each variable, which is close to three standard deviations, is included in the analysis. The illustration below shows the 99$^{th}$ and 95$^{th}$ percentile in relation to the mean of 0 and the standard deviation. By eliminating the top and bottom 0.5 percent we have excluded the outlier values in the tails of the distribution, i.e. the extreme values.

Figure 5: Normal distribution and related standard errors




The table below shows descriptive statistics for the variables after handling of extreme values. Note the changes in mean and standard deviation for the variables mentioned above. For the remaining variables the changes are less significant.

Table 3: Descriptive statistics after elimination of extreme observations

| AFTER ELIMINATING EXTREME OBSERVATIONS: | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Debt Ratio | DivRatio | efftax | ebitta | TotAssets | Assets PrEmp | Market ToBook |
| COUNT | 43874 | 45302 | 45329 | 45160 | 45150 | 32854 | 37540 |
| AVERAGE | 0.2 | 0.1 | 0.2 | 0.0 | 5.1 | 5.8 | 1.6 |
| MEDIAN | 0.1 | 0.0 | 0.2 | 0.0 | 5.0 | 5.7 | 1.2 |
| STDEV | 0.3 | 0.3 | 0.3 | 0.3 | 2.2 | 1.2 | 1.3 |
| MAX | 1.0 | 2.4 | 1.9 | 0.4 | 10.7 | 9.6 | 11.0 |
| 99 perc upper | 1.0 | 1.4 | 1.0 | 0.3 | 10.1 | 9.0 | 7.4 |
| 95 perc upper | 1.0 | 0.8 | 0.5 | 0.2 | 8.9 | 8.0 | 4.0 |
| 95 perc lower | 0.0 | 0.0 | -0.2 | -0.6 | 1.7 | 3.9 | 0.5 |
| 99 perc lower | 0.0 | -0.2 | -0.9 | -1.6 | 0.3 | 3.2 | 0.3 |
| MIN | 0.0 | -0.8 | -1.8 | -2.8 | -0.8 | 2.8 | 0.2 |

## 8.2 Descriptive statistics

Descriptive statistics provides valuable information about the spread the variables have especially concerning the differences between the data samples. In what follows, we will compare the variables of the reference sample against the variables of the offshore sample.

### 8.2.1 Comparing the descriptive statistics of the two samples

Table 4: Descriptive statistics for the reference sample

| Variables | Observations | Mean | Std.Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| DebtRatio | 37457 | 0.176 | 0.228 | 0 | 1 |
| AssetTang | 43319 | 0.513 | 0.26 | 0 | 1 |
| DivRatio | 42717 | 0.141 | 0.313 | -0.79 | 2.43 |
| Efftax | 42744 | 0.158 | 0.292 | -1.76 | 1.86 |
| Ebitta | 42638 | -0.01 | 0.204 | -0.99 | 0.43 |
| TotAssets | 42637 | 5.19 | 2.18 | 0 | 10.66 |
| AssetsPrEmp | 31079 | 5.78 | 1.179 | 2.8 | 9.6 |
| Markettobook | 36303 | 1.59 | 1.23 | 0.2 | 11 |
| Risk | 41850 | 0.336 | 0.343 | 0.02 | 1.84 |
| Tax haven | 45529 | 0.144 | 0.351 | 0 | 1 |
| Law_common | 45525 | 0.744 | 0.436 | 0 | 1 |
| Law_fr | 45529 | 0.13 | 0.338 | 0 | 1 |
| Law_sc | 45529 | 0.052 | 0.222 | 0 | 1 |

Table 5: Descriptive statistics for the offshore sample

| Variables | Observations | Mean | Std.Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| **DebtRatio** | 456 | 0.324 | 0.267 | 0 | 0.99 |
| **AssetTang** | 507 | 0.712 | 0.207 | 0 | 0.997 |
| **DivRatio** | 491 | 0.194 | 0.385 | -0.59 | 2.25 |
| **Efftax** | 497 | 0.119 | 0.342 | -1.68 | 1.81 |
| **Ebitta** | 506 | 0.064 | 0.116 | -0.62 | 0.39 |
| **TotAssets** | 505 | 6.85 | 1.743 | 0.62 | 10.66 |
| **AssetsPrEmp** | 382 | 6.90 | 1.416 | 2.9 | 12.49 |
| **Markettobook** | 445 | 1.80 | 1.601 | 0.4 | 10.6 |
| **Risk** | 522 | 0.342 | 0.314 | 0.03 | 1.71 |
| **Tax haven** | 526 | 0.333 | 0.472 | 0 | 1 |
| **Law_common** | 526 | 0.559 | 0.497 | 0 | 1 |
| **Law_fr** | 526 | 0.091 | 0.288 | 0 | 1 |
| **Law_sc** | 526 | 0.302 | 0.460 | 0 | 1 |

In this section we will shed light on the differences between the two samples, and possibly highlight specific differences in company characteristics.

*Debt ratio:*

The debt ratio ranges from zero to one and indicates that the companies included have logic values. If the max number had been larger or smaller than one it would have indicated errors in the data because of the construction of this variable.

The debt ratio in the offshore sample has a mean of 32 % and that is almost twice as high as the mean for the reference sample (17.6 %). This may indicate that the offshore sample is more leveraged than the companies in the reference sample.

*Degree of asset tangibility:*

The variable for degree of asset tangibility also ranges from zero to one and it indicates large differences amongst the different companies which is natural with respect to the different industries represented in the reference sample. The mean is 51 % for the reference sample which is considerably lower than the offshore sample (71 %). It indicates that our hypothesis, namely that the offshore sample would have a higher degree of tangible assets, are well-founded.

*Dividend ratio:*

The dividend ratio in the offshore sample has a mean of 19 % and is higher than the same measure for the reference sample (14 %). This may be explained by companies in the offshore industry being mature and they may not reinvest in the company due to lack of profitable investment opportunities, thus returning excess income to equity holders. Other viable explanations may be the signaling effects of cuts in dividends, or the profitability that the descriptive statistics shows has been greater in the offshore sample has led to higher dividends because these companies have been highly profitable in the time period we analyze and consequently capable of paying out more dividends. The credit crisis in 2008/2009 may have changed this significantly. However, the results may have been influenced by the high oil price (Tanderø, 2009) in the period and therefore the time period may be inadequate to measure this.

The minimum and maximum values are -25 % and 225 % respectively which tells us that the spread is narrower in the offshore sample than in the reference sample (-79 % and 243 %) but the standard deviation (38 % versus 31 % in the reference sample) indicates that the tails in the offshore sample are fatter than in the reference sample. The minimum and maximum values in both samples indicates that the problem mentioned under the motivation of variables, namely that companies with net income close to zero or negative net income will have abnormal, are present. As discussed they only represent a small fraction of the sample, but is something we will have to have in mind later in the interpretation of the results.

*Effective tax:*

The effective tax in the offshore industry has a lower mean than the reference sample, 11.9 % and 15 % respectively. Our assumption described in chapter 5.2 may therefore be valid, namely that the offshore companies have a lower effective tax than the reference sample due to special tax schemes or more frequent use of tax havens. Reasons for that may be the special tax scheme parts of the offshore industry are subject to, and the fact that tax havens are used more frequently. The high minimum and maximum values in both samples indicate that the small fraction of the sample that have negative results of close to zero results are still present even after the elimination of extreme observations and is something we have to have in mind when interpreting the results.

*Profitability:*

The profitability variable has a mean of 6 % compared to the reference sample's mean of negative 1 % and the standard deviation is lower as well (11 % versus 20 %). The credit crisis occurred in late 2008 and all markets fell significantly the following year and have influenced our data. The minimum value of -99 % emphasizes this. The relative high oil prices (Tanderø, 2009) throughout the period and the close link between the offshore industry and the oil industry may indicate that this is the reason for the difference between the samples, but the short time period makes it hard to conclude.

Another contributor to the negative mean in the reference sample may be that the data sample consists of large, medium, and small companies. Many of the small companies had a large negative EBIT compared to total assets in 2008 and 2009, and as mentioned earlier this may affect this variable and is something we have to have in mind when concluding. However, excluding them would have lead to a bias. We would no longer have a selection of data that consisted of large, medium and small companies, only large and medium.

Based on the fact that the time period we analyze is somewhat special (credit crisis in 2008) and to avoid a bias in our data we will still include the variable in the analysis.

*Size:*

The variable for size is constructed as the natural logarithm of total assets and the mean, minimum and maximum has little economic interpretation. The only thing the numbers tell us is that there is a relatively large spread which is natural based on the composition of our data. And the mean of the offshore sample is 6.8 versus 5.2 in the reference sample which may indicate that the average offshore company is larger than the average company in general. Also, the minimum value of zero for the reference sample could at first sight seem a bit startling but based on the construction of the variable it is not. All the numbers are listed in million and this specific company has total assets of one million in the raw data and when we apply the natural logarithm of one it equals zero.

*Degree of capital intensity:*

The variable representing capital intensity also contains a natural logarithm and the only numbers of interest are the mean that are 6.9 in the reference sample and 5.78 in the reference sample. This may indicate that the offshore industry is more capital intensive than the general sample, and is in line with our hypothesis.

*Growth opportunities:*

The variable representing growth opportunities indicates that the offshore industry has on average had a higher market-to-book ratio through the period, indicating that the industry may have been regarded as interesting by the market. The difference is marginal though (1.8 versus 1.6) and the standard deviation is higher for the offshore sample (1.6 versus 1.2), and this makes it hard to conclude.

*Risk:*

This variable has only marginally changed from the reference sample to the offshore sample (33 % versus 34 %) and indicates that the average offshore company is equally risky to the average company within the time period we looked at. The credit crisis in 2008/2009 may be the reason because, as mentioned earlier, virtually all industries went in to a recession and hence the difference in risk for our four year period was “diluted”. Also the short time period may be too short to adequately measure risk and is something to remember when interpreting the results.

*Tax haven:*

This variable’s mean changes from 14 % in the reference sample to 33 % in the offshore selection which may indicate that our assumption that tax havens are more frequently used in the offshore industry proves to be true.

*Legal system:*

The common law variable changes its mean from 74 % in the reference sample to 55 % in the offshore sample, indicating that on average less offshore companies are located in countries

with a common law legal system. The variable for companies located in countries with a legal system based on French civil law shows the same development and changes from 13 % to 9 %. The variable for companies located in countries with a legal system based on Scandinavian civil law increases significantly from 5 % to 30 % and may indicate the importance of the Norwegian offshore industry. Lastly, companies located in countries with a legal system based on German civil law decreases from 8 % to 6 % (100 % - 55 % - 9 % - 30 % = 6 %)

## 8.3 Regression analysis to address main problems

In the following chapter we will present the analysis of the data. The statistical method that is applied is OLS-regression and we will go through the analysis step by step and explain our findings and interpret these on the basis of economic comprehension.

We will start out by presenting the results of the regression concerning the entire sample and explain important features regarding regressions in general. Further, we will conduct separate regressions of the reference sample and the offshore sample, and then compare the results.

### 8.3.1 Regression 1: The entire sample

We have applied robust standard errors to try to avoid biased standard errors and t-statistics which may be the case with regular OLS standard errors. This is in line with the research of (Petersen, 2006). The observations for each company are clustered together and this approach is used in all the forthcoming regressions.

The results from this regression are presented in the table:

Table 6: Results from the regression of the entire sample

| Dependent variable: Debt ratio | Coefficient | Robust Std.Err. | t | P>\|t\| |
|---|---|---|---|---|
| **Degree of asset tangibility (AssetTang)** | +0.267 | 0.0085 | +31.6 | 0.000*** |
| **Dividend ratio (DivRatio)** | -0.0358 | 0.0047 | -7.68 | 0.000*** |
| **Effective tax (Efftax)** | -0.0081 | 0.0050 | -1.61 | **0.108** |
| **Profitability (Ebitta)** | -0.1095 | 0.0090 | -12.13 | 0.000*** |
| **Size (TotAssets)** | +0.0225 | 0.0011 | +20.47 | 0.000*** |
| **Degree of capital intensity (AssetsPrEmp)** | +0.0016 | 0.0018 | +0.88 | **0.377** |
| **Growth opportunities (markettobook)** | -0.0521 | 0.0015 | -34.30 | 0.000*** |
| **Risk (Risk)** | -0.0212 | 0.0081 | -2.62 | 0.009*** |
| **Tax haven indicator variable (taxhaven)** | -0.0498 | 0.0054 | -9.25 | 0.000*** |
| **Common law indicator variable (law_common)** | -0.0289 | 0.0064 | -4.54 | 0.000*** |
| **French civil law indicator variable (law_fr)** | +0.0286 | 0.0075 | +2.83 | 0.000*** |
| **Scandinavian civil law indicator variable (law_sc)** | -0.0238 | 0.0091 | -2.61 | 0.009*** |
| **Offshore** | +0.0727 | 0.0172 | +4.23 | 0.000*** |

*** = 1 % significance level, ** = 5 % significance level, * = 10 % significance level

The R-square is 28.52 % (see appendix 3 for raw table) which implies that the model explains 28.52 % of the total variation in our dependent variable; debt ratio. Given the complexity of the subject and the fact that there may be many different drivers of capital structure, this is a fairly good result.

As seen in the previous table the interesting variables are the variables representing effective tax (efftax) and capital intensity (AssetssPrEmp) because they are not statistically significant.

The fact that the effective tax variable is not statistically significant is at first sight surprising. It may in fact be true that there are no causal relationship between taxes and debt ratio and the coefficient is not significant because of it. However, based on the trade-off theory which implies that the companies should adjust their capital structure to where their bankruptcy costs equal their benefits of the tax shield, one might think that there would be a significant relationship here.

However, there may be several possible explanations to this phenomenon. One explanation might be that the companies have adjusted their debt ratio in such a manner that they all have about the same tax exposure, and we therefore find no significant relationship because the causal relationship between the two are so strong and important to the companies that they have taken this seriously in to consideration when deciding their capital structure.

Another possible explanation is the endogeneity-problem. This problem arises when the variables that are supposed to affect the outcome, depend on the outcome themselves. This implies that there are other variables that affect the dependent variable that is designated to our variable and we can therefore not be sure of the causal relationship. This might be the case with taxes because the effective taxes depend on the level of debt a company holds because the interest payments are deductable, hence the debt tax shield. On the other hand, as the trade-off theory assume, the debt levels in the company depend on the amount of taxes a company pay. In other words, they will tilt their capital structure so that they find equilibrium between the debt tax shield and the bankruptcy costs. This makes it hard to distinguish between the effect taxes have on capital structure and vice versa. This may not be the case only with this variable, but might be the case with several variables and is something that is hard to account for.

The next interesting finding is that the variable representing capital intensity is not significant. As described in the section of motivation for choice of variables we defined the variable assets per employees as the natural logarithm of assets divided by the natural logarithm of employees. A possible explanation is that we have a high correlation between several variables meaning that they are measuring much of the same effects. The most plausible explanation may be that the variable representing degree of asset tangibility is the best measure of the impact assets has on debt ratio. This is based on the large t-stat of 31.6 for the asset tangibility variable. In addition, total assets may also measure the effect assets have on the debt ratio, and this may imply that we have too many variables measuring the same.

Further, it may be worth noting that the variable representing the offshore sample (offshoredum) has a significant coefficient of 0.072 and may indicate that the classification “offshore” leads to an increase in the debt ratio. The descriptive statistics for the two

samples also implied the same, namely that the average debt ratio in the reference sample was considerably lower than in the offshore sample and it may therefore indicate that there is a difference in debt levels in the two samples.

Next, we will present a correlation matrix of the independent variables to see if there are any problems with high correlation amongst any of the variables.

**Table 7: Correlation matrix**

| Correlation Matrix | AssetTang | DivRatio | efftax | ebitta | TotAssets | AssetsPrEmp | markettobook | Risk | taxhaven | law_common | law_fr | law_sc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AssetTang | 1 | | | | | | | | | | | |
| DivRatio | 0.06 | 1 | | | | | | | | | | |
| efftax | 0.05 | 0.17 | 1 | | | | | | | | | |
| ebitta | 0.07 | 0.26 | 0.26 | 1 | | | | | | | | |
| TotAssets | 0.30 | 0.21 | 0.14 | 0.30 | 1 | | | | | | | |
| AssetsPrEmp | 0.22 | -0.01 | -0.02 | -0.10 | 0.16 | 1 | | | | | | |
| markettobook | -0.16 | 0.04 | 0.02 | 0.06 | -0.06 | 0.00 | 1 | | | | | |
| Risk | -0.03 | -0.20 | -0.15 | -0.35 | -0.24 | 0.26 | 0.08 | 1 | | | | |
| taxhaven | -0.02 | 0.05 | -0.09 | 0.04 | 0.19 | -0.09 | -0.03 | 0.07 | 1 | | | |
| law_common | 0.05 | -0.11 | -0.02 | -0.09 | 0.02 | -0.04 | 0.05 | 0.12 | -0.03 | 1 | | |
| law_fr | -0.03 | 0.07 | 0.04 | 0.07 | -0.06 | 0.05 | -0.07 | -0.11 | 0.02 | -0.62 | 1 | |
| law_sc | 0.00 | 0.07 | -0.02 | 0.01 | 0.11 | 0.00 | 0.05 | 0.01 | -0.12 | -0.39 | -0.12 | 1 |
| ρ>0.6 | | | | | | | | | | | | |
| 0.3<ρ<0.6 | | | | | | | | | | | | |
| ρ<0.3 | | | | | | | | | | | | |

The table shows the correlation between our independent variables. As we can see some of the variables are higher correlated relative to the rest of the variables. Overall the correlation among the independent variables is not that high, but the variables representing the different parts of the civil law legal system (law_fr and law_sc) is highly correlated to the common law legal system variable (law_common). The fact that they are correlated is not surprising due to the construction of the variables. The mentioned variables are all indicator variables and they will be negatively correlated because they are all based on the legal system but differentiate between differences in the legal system. The problem with high correlation among independent variables is that they will, to some extent, measure the same thing but this is not the case here because they are indicator variables measuring different things. The high correlation will therefore not be a problem with these variables.

However, the main problem here is probably the variables containing assets as a part of the variable. The variables in mind are asset tangibility, total assets, assets pr employee, and profitability (ebitta). The correlation is not as high as one might expect on basis of the previous regression but it may still be multicollinearity in the data. The not significant

coefficient of assets per employee may suggest that we have one variable too many that explains the impact assets have on capital structure.

Due to the relatively high correlation between assets pr employee, asset tangibility and total assets and the possibility that we have one too many variables explaining the same effect of assets on capital structure, we will omit the variable assets pr employee in the following analysis to see if this makes a difference.

Next, we will present the results from the regression of the different samples and compare them.

### 8.3.2 Separate regressions of the reference sample and the offshore sample

To better visualize the differences in the two samples we constructed a table where the results from both samples are presented.

Table 8: The different results of the OLS regression in the two samples

| Variables | Reference sample | | Offshore sample | |
|---|---|---|---|---|
| **Dependent variable: Debt ratio** | Coef. | P > \|t\| | Coef. | P > \|t\| |
| **Degree of asset tangibility (AssetTang)** | +0.2391 | 0.000*** | +0.5039 | 0.000*** |
| **Dividend ratio (DivRatio)** | -0.0336 | 0.000*** | -0.0063 | 0.818 |
| **Effective tax (Efftax)** | -0.0118 | 0.010*** | +0.0138 | 0.678 |
| **Profitability (ebitta)** | -0.1037 | 0.000*** | -0.2949 | 0.025** |
| **Size (TotAssets)** | +0.0244 | 0.000*** | +0.0167 | 0.040** |
| **Growth opportunities (markettobook)** | -0.0489 | 0.000*** | -0.0677 | 0.000*** |
| **Risk (Risk)** | -0.0428 | 0.000*** | -0.1294 | 0.033** |
| **Tax haven indicator variable (taxhaven)** | -0.0446 | 0.000*** | +0.0371 | 0.346 |
| **Common law indicator variable (law_common)** | -0.0299 | 0.000*** | +0.0267 | 0.805 |
| **French civil law indicator variable (law_fr)** | +0.0343 | 0.000*** | +0.0582 | 0.608 |
| **Scandinavian civil law indicator variable (law_sc)** | -0.0229 | 0.012** | +0.0810 | 0.477 |

*** = 1 % significance level, ** = 5 % significance level, * = 10 % significance level

The explained variation for the reference sample is 25.59 % (0.2559) and for the offshore sample it is 45.88 % (0.4588). The reason for the large difference may be the size of the samples and the fact that the offshore sample is a more homogenous sample (contains only one industry versus multiple industries in the reference sample). (See appendices 4 and 5 for the raw tables of the regressions of the offshore sample and the reference sample).

As previously discussed, one possible reason why the effective tax variable was not significant in the regression of the entire sample is that the causal relationship may be so strong that all the companies have adapted so that they all have about the same tax exposure. As we can see from the table above effective tax is, after removing the capital intensity variable, significant for the reference sample but not for the offshore sample. This may imply that the offshore industry, which is a more homogenous sample than the reference sample, has adjusted their capital structure so that they all have about the same tax exposure. The fact that many of these companies are subject to special tax schemes that gives them low effective taxes may also be an explanation for a homogenous tax exposure. Another explanation is the use of tax havens, but descriptive statistics told us that only 33 % of the offshore companies were located in a tax haven so a mix of the two are a more plausible explanation. However, the short time period and the relative small offshore sample make it hard to confirm the finding.

The reference sample's tax variable has a significant coefficient and may imply that the above mentioned phenomenon is not the case in this sample. However, the endogeneity problem make it hard to conclude in the reference sample as well.

The variable representing risk is marginally significant in the offshore sample, but it is significant at the 1 % level in the reference sample. This may confirm our concerns regarding this variable which we stated in the section of motivation for choice of the variable, namely that the period is too short to adequatly measure risk. One possible reason the reference sample's risk variable is statistically significant, and the offshore sample is only marginally significant, may be the size of the samples. The relatively small sample of offshore companies may not be adequate to find a statistical significant relationship. Another plausible reason may be that the sample is too homogenous, meaning that there may be a causal relationship between risk and debt ratio but the companies in the sample is exposed to the same degree of risk and has therefore adjusted their capital structure so that it is not possible to find a significant relationship.

The tax haven variable is significant in the reference sample, but it is not significant in the offshore sample. One reason may be that the causal relationship is so strong that all the companies in the offshore sample uses tax havens and therefore the statistical relationship

is not significant. The descriptive statistics tells us that 33 % (44 companies out of 132 companies in total in the sample) of the sample uses tax havens and this explanation seems to be not viable. Another explanation may be based on the taxes offshore companies pay if they are not located in a tax haven. If we compare the reference sample and the offshore sample, the gain of changing the location from a country that collects taxes to a tax haven may be less in saved taxes for the offshore companies than the reference sample, and therefore less important for them when it comes to capital structure. This is based on the special tax schemes some of these companies are subject to that may smooth the effect (see chapter 3.4.2.1 “Tax in the offshore industry” for a more thorough explanation of the special tax scheme). This may imply that the problem of endogeneity is also present in this variable because the tax haven variable may be closely linked to the effective tax variable and this may further imply that there are forces at work that we can not account for.

As the correlations matrix revealed in the regression of the entire sample, it may be some of the underlying assumptions behind OLS regression that is not met and it is plausible that this is the case in the separate regressions as well. Our panel data requires clustered standard errors, to be more confident that the t-statistics are reliable. The OLS standard errors may not correct for this and we will now introduce Newey-West standard errors. This does not change the coefficient (Coef.) or the explained variation (r-square), the only thing that changes are the standard errors (Std. Err.), the t-values (t) and the P>|t|. However, remember that we have omitted the variable representing capital intensity and that will lead to changes in the coefficients, and the explained variation as well. The purpose of the Newey-West standard errors is to take into account the auto correlation and heteroscedasticity that likely are present in the data.

### 8.3.3 Regression that takes into account autocorrelation and heteroscedasticity

Table 9: Newey-West regression of the entire sample

| Dependent variable: Debt ratio | Coefficient | Newey-West Std.Err. | t | P>\|t\| |
|---|---|---|---|---|
| Degree of asset tangibility (AssetTang) | +0.2419 | 0.0048 | +50.47 | 0.000*** |
| Dividend ratio (DivRatio) | -0.0327 | 0.0033 | -9.95 | 0.000*** |
| Effective tax (Efftax) | -0.0122 | 0.0042 | -2.90 | 0.004*** |
| Profitability (Ebitta) | -0.1055 | 0.0067 | -15.69 | 0.000*** |
| Size (TotAssets) | +0.0243 | 0.0006 | +39.07 | 0.000*** |
| Growth opportunities (markettobook) | -0.0494 | 0.0001 | -50.07 | 0.000*** |
| Risk (Risk) | -0.0440 | 0.0042 | -10.49 | 0.000*** |
| Tax haven indicator variable (taxhaven) | -0.0426 | 0.0032 | -13.45 | 0.000*** |
| Common law indicator variable (law_common) | -0.0292 | 0.0037 | -7.85 | 0.000*** |
| French civil law indicator variable (law_fr) | +0.0343 | 0.0044 | +7.76 | 0.000*** |
| Scandinavian civil law indicator variable (law_sc) | -0.0218 | 0.0056 | -3.90 | 0.000*** |
| Offshore | +0.0901 | 0.0105 | 8.60 | 0.000*** |

*** = 1 % significance level, ** = 5 % significance level, * = 10 % significance level

As we can see from the table the combination of omitting the capital intensity variable and the introduction of the Newey-West standard errors have made all the variables significant, but we still have to be concerned by the endogeneity problem. The coefficients and t-statistics did change, but that was because we omitted the variable measuring the capital intensity.

We have made a table to sum up the separate regressions of the reference sample and the offshore sample where we have applied Newey-West standard errors. In this table we have included a t-test statistics. The purpose of the test is to determine whether the coefficients estimated for the offshore sample is significantly different from the coefficient of the same variable for the reference sample, which again is relevant in drawing conclusions from the analysis.

Table 10: Results from the Newey-West regressions regarding the two samples

| Variables | Reference sample | | Offshore sample | | t-test |
|---|---|---|---|---|---|
| **Dependent variable: Debt ratio** | Coef. | P > \|t\| | Coef. | P > \|t\| | Difference |
| **Assets tangibility (AssetTang)** | +0.239 | 0.000*** | +0.504 | 0.000*** | -5.68*** |
| **Dividend ratio (DivRatio)** | -0.034 | 0.000*** | -0.006 | 0.806 | -1.05 |
| **Effective tax (Efftax)** | -0.012 | 0.005*** | +0.014 | 0.651 | -0.83 |
| **Profitability (ebitta)** | -0.104 | 0.000*** | -0.295 | 0.003*** | +1.93* |
| **Size (TotAssets)** | +0.024 | 0.000*** | +0.017 | 0.004*** | +1.32 |
| **Growth opportunities (markettobook)** | -0.049 | 0.000*** | -0.068 | 0.000*** | +2.67*** |
| **Risk (Risk)** | -0.043 | 0.000*** | -0.129 | 0.001*** | +2.13** |
| **Tax haven indicator variable (taxhaven)** | -0.045 | 0.000*** | +0.037 | 0.151 | -3.15*** |
| **Common law indicator variable (law_common)** | -0.030 | 0.000*** | +0.027 | 0.642 | -0.99 |
| **French civil law indicator variable (law_fr)** | +0.034 | 0.000*** | +0.058 | 0.351 | -0.38 |
| **Scandinavian civil law indicator variable (law_sc)** | -0.023 | 0.000*** | +0.081 | 0.190 | -1.68* |

*** = 1 % significance level, ** = 5 % significance level, * = 10 % significance level

(See appendices 6, 7, and 8 for the raw tables of the entire sample, the reference sample, and the offshore sample respectively)

All the variables now have a more significant coefficient and this may imply that we have had elements of autocorrelation and heteroskedasticity in the data that we have tried to correct for by using Newey-West standard errors. But as mentioned before, the problem of endogeneity is something that we have not corrected for and is something we have to take into consideration when interpreting the results.

As we can see from the previous table the variables representing dividend ratio, effective tax, tax haven, common law, French civil law, and Scandinavian civil law are all not significant in the offshore sample while they are significant in the reference sample. It may indicate that these are not important variables for offshore sample, but it may also indicate, as discussed previously that the causal relationship is so strong that the companies all have adapted to the same exposure for the variables. However, this is not the case with the variables measuring common law, French civil law, and Scandinavian civil law. If that were the case all the companies should have been located in the same type of legal system, but descriptive statistics told us that this is not the case. Another plausible explanation may be that the

sample is relatively small and the time period is short, and therefore the basis to determine significance is not present.

## 9.0 Alternative method to analyzing the data

When analyzing panel data the coefficients from a regular method, such as OLS regression, may be influenced due to the fact that some omitted variables affect the dependent variable and it is impossible to control. The problem is often referred to as the endogeneity problem, and this will make it hard to claim a causal relationship. There have been developed distinctive methods for analyzing panel data that control the effect possible omitted variables have on the dependent variable, without observing them directly. This may be done by observing the dependent variable over time. It is possible to control for effects that are constant over time but varies among cases, and the effects that vary over time but are constant among the cases (The Trustees of Princeton University, 2007).

The reason we want to conduct another test on the data is that the endogeneity problem may be severe and that does it harder to claim causal relationships. A test that takes this problem partially in to account is therefore appropriate because there are no present models that take the endogeneity problem 100 % into account, but to try to correct for it is appropriate to better be able to pin down the causal relationship.

## 9.1 Fixed effects regression

The fixed effects model is appropriate when considering omitted variables that varies between companies but are constant over time. The model reviews the changes in the independent variables over time, and estimates the effect on the dependent variable. Further, it removes these effects from the independent variables and the “true” effect of the independent variable is left (Wooldridge, 2009). We can not at any point claim that we have found the true causal relationship because there are no methods that take endogeneity 100 percent in to account.

The fixed effects method makes us able to rule out both the observed and unobserved time constant heterogeneity, and makes us more certain that the β in the regression is not affected of omitted variables that are constant over time, and is a method to address the

problem of endogeneity. However, it can not rule out unobserved time varying heterogeneity (University of Oregon, 2005).

## 9.2 Random effects regression

The random effects model is appropriate if you have reason to believe that some omitted variables may be constant over time but vary between companies, and others may be fixed between companies but vary over time, then you can include both types by using random effects (The Trustees of Princeton University, 2007).

This model assumes that the variations in the omitted variables among the companies are random and are uncorrelated with the independent variables (Torres-Reyna).

## 9.3 Choosing between fixed and random effects regression

The fixed effects model is always appropriate to use from a statistical viewpoint because it gives consistent results, but it is less effective than the random effects model. The random effects model gives better p-values because it is a more efficient model and should be applied if it is statistical justifiable to do so (The Trustees of Princeton University, 2007).

An appropriate test to find out which model to apply is the Hausman test. The test checks a more efficient model (random effects) against a less efficient but more consistent model (fixed effects) to see if the more efficient model also gives consistent results. The Hausman test tests the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator. If they are insignificant, namely a P-value given by Prob>chi2 larger than 0.05 then it is safe to use random effects. If you get a significant P-value you should use fixed effects (The Trustees of Princeton University, 2007).

The test suggests that the most appropriate model to use is the fixed effects-model (see appendix 9 for the raw table of the Hausman test). This is also the most used method to analyze panel data (The Trustees of Princeton University, 2007).

### 9.3.1 Analyzing the data with the fixed effects regression

The variables that we include in this model are slightly different than in the OLS regression. This is due to the properties of this method. The variables risk, tax haven, common law, French civil law and Scandinavian civil law are not included in this model because of the construction of these variables. They were omitted by STATA because they are all constant over time and are therefore not appropriate to include.

We still have to control for auto correlation and heteroskedasticity, and in order to do that we will have to include robust standard errors. The Newey West approach is not compatible with the fixed effects model, but Driscoll and Kraay have developed standard errors that takes autocorrelation and heteroskedasticity in to account (Torres-Reyna).

The table sum up the results from the fixed effects regression conducted separately on both samples.

Table 11: Fixed effects regression of the two samples with Driscoll-Kraay standard errors

| Variables | Reference sample | | Offshore sample | |
|---|---|---|---|---|
| | Coef. | P > \|t\| | Coef. | P > \|t\| |
| **Degree of assets tangibility (AssetTang)** | +0.122 | 0.000*** | +0.186 | 0.002*** |
| **Dividend ratio (DivRatio)** | -0.014 | 0.000*** | -0.036 | 0.099* |
| **Effective tax (Efftax)** | -0.014 | 0.000*** | +0.004 | 0.636 |
| **Profitability (ebitta)** | -0.160 | 0.000*** | -0.215 | 0.000*** |
| **Size (TotAssets)** | +0.072 | 0.000*** | +0.264 | 0.000*** |
| **Growth opportunities (markettobook)** | -0.021 | 0.000*** | -0.023 | 0.000*** |

*** = 1 % significance level, ** = 5 % significance level, * = 10 % significance level

(For the raw tables of the reference sample and the offshore sample, see appendices 10 and 11 respectively).

Firstly, it is important to notice that the interpretation of this model is slightly different than it is with a traditional OLS regression. In this model a negative coefficient, for example for the variable profitability (ebitta), indicates that if the company earns more money than its average in the period the variable will have a negative impact on the debt ratio. It differs from the OLS regression where the interpretation is if the company earns more the debt ratio will be reduced. The fact that the method compares the observations against their own

average may be something to be aware of because of the short time period. Abnormal values may influence the average too much and the results may be influenced.

Also, the explained variation is reduced from 25.59 % in the OLS regression to 11.99 % in the fixed effects regression. The same tendency is evident in the offshore sample as well but not to the same extent (from 45.88 % to 39.9 %) and may firstly indicate that the country level variables (tax haven, common law, French civil law, Scandinavian civil law, and the German civil law) are important explanatory variables of capital structure. Further, it may indicate that there have been effects from some unobserved variables that have been designated to the variables in the OLS model that are now removed.

# 10.0 Results from the main analysis

In what follows we will interpret the results from the separate regressions of the reference sample and the offshore sample with renowned theories, our hypothesis, and previous studies in mind. The comments in the following section will be based on the results from the analysis in sections 8.3.3 (table 10) and 9.3.1 (table 11)

To simplify we have made a table that sum up our hypothesis. The last column states if the results from the two samples are in line with our hypothesis.

Table 12: Our hypotheses and the results

| Variables | Reference sample | | Offshore sample | | Are our hypothesis correct? |
|---|---|---|---|---|---|
| | Hypothesis | Results | Hypothesis | Results | |
| **Degree of asset tangibility** | Positive | Positive | Stronger positive link | Stronger positive | **YES** |
| **Dividend ratio** | Negative | Negative | Stronger negative link | Weaker negative | **NO (offshore not significant)** |
| **Effective tax** | Positive | Negative | Weaker positive link | Positive | **NO (offshore not significant)** |
| **Profitability** | Negative | Negative | Negative | Negative | **YES** |
| **Size** | Positive | Positive | Stronger positive link | Weaker positive | **NO** |
| **Growth opportunities** | Negative | Negative | Weaker negative | Stronger negative | **NO** |
| **Risk** | Negative | Negative | Stronger negative link | Stronger Negative | **YES** |
| **Tax haven** | Negative | Negative | Stronger negative link | Positive | **NO (offshore not significant)** |
| **Common law** | Negative | Negative | Negative | Positive | **NO (offshore not significant)** |
| **French civil law** | Uncertain | Positive | Uncertain | Positive | **N/A (offshore not significant)** |
| **Scandinavian civil law** | | Negative | | Positive | **N/A (offshore not significant** |

We have also constructed a table that compares the Newey-West regression and the fixed effects regression.

Table 13: Comparison of the Newey-West regression versus the Fixed effects regression

| Variables | Results Newey-West regression | | Results Fixed effects regression | | Coefficient sign coincides |
|---|---|---|---|---|---|
| | Coefficient | Hypothesis | Coefficient | Hypothesis | |
| **Asset tangibility (offshore)** | +0.504*** | **Correct** | +0.186*** | **Correct** | **YES** |
| **Asset tangibility (reference)** | +0.239*** | | +0.122*** | | **YES** |
| **Dividend ratio (offshore)** | -0.006 | Not correct | -0.036* | Not correct | **YES** |
| **Dividend ratio (reference)** | -0.034*** | | -0.014*** | | **YES** |
| **Effective tax (offshore)** | +0.014 | Not correct | +0.004 | Not correct | **YES** |
| **Effective tax (reference)** | -0.012*** | | -0.014*** | | **YES** |
| **Profitability (offshore)** | -0.295*** | **Correct** | -0.215*** | **Correct** | **YES** |
| **Profitability (reference)** | -0.104*** | | -0.160*** | | **YES** |
| **Size (offshore)** | +0.017*** | Not correct | +0.264*** | Not correct | **YES** |
| **Size (reference)** | +0.024*** | | +0.072*** | | **YES** |
| **Growth opportunities (offshore)** | -0.068*** | Not correct | -0.023*** | Not correct | **YES** |
| **Growth opportunities (reference)** | -0.049*** | | -0.021*** | | **YES** |

*** = 1 % significance level, ** = 5 % significance level, * = 10 % significance level

**Our expectations prior to the analysis:**

We expected that the offshore industry had higher leverage than the companies in the reference sample and the reason being that the industry is highly capital intensive and because assets that offshore companies hold are tangible and fairly fungible which makes debt financing easier. On the other hand the tax incentive for obtaining debt is perceived to be lower. The result was in line with our expectations and the classification of an offshore company showed a positive coefficient of 9 % in table 9.

**Possible explanations of the variation in the debt ratio:**

*Degree of asset tangibility:*

The main explanation of the higher debt ratio in the offshore industry may be the degree of asset tangibility in combination with the capital intensity in the industry due to the perceived need for external capital. The offshore industry has a mean of 71 % versus the reference sample's 51 %, and the Newey-West regression indicates that this variable is the most important explanation of the variation in the debt ratio in this model. This finding supports both the asymmetric information theory and the trade-off theory, namely that the creditors would be cautious to lend the money if they do not have any collateral. The reason is that the collateral the assets represent makes it easier for the lenders to accept the loan. If the company gets in to financial troubles the lenders have something tangible that they can claim and it will reduce their loss, and the risk is therefore lower. The active second hand market for selling these assets will also make it easier for the lenders to get a better price, hence a lower loss.

Further, the fact that the vast majority of the assets are tangible (a mean of 71 % in the offshore sample) increases the possibility for the lenders to get their money back in the case of fire sale because they hold a claim of the total amount of capital they have lent and the other assets, even though they may not have financed them, may also be sold to cover the claim because in general debt is senior to equity. Our findings were that the offshore companies will with one percentage point's increase in tangible assets, increase their debt with 50 % versus the reference sample's 24 %. The difference between the two is statistically significant at the 1 % level.

However, the number seems to be high and may be influenced by endogeneity meaning that some unobserved variables have contributed to the number. The results from the fixed effects model support this assumption. In this model the results are drastically lower for both the samples (18.6 % for the offshore sample and 12.2 % for the reference sample) and may imply that there has been some time constant, unobservable variable that has contributed to the number. The significance level for the offshore sample is also reduced and may be explained by the sample size. However, it may indicate that the effects are not that prominent as the Newey-West regression indicates.

*Growth opportunities:*

The connection between growth opportunities and leverage is that companies with good future prospects should use retained earnings or external equity to finance investments in order to have their debt capacity intact to be able to seize future investment opportunities. This is also known as the underinvestement hypothesis that Myers introduced in 1977.

We expected that the relationship should be negative but weaker in the offshore sample compared to the reference sample. Our Newey-West analysis shows a significant ($p<0.01$) negative relationship in both samples but the link is stronger in the offshore sample (-6.8 % in the offshore sample and -4.9 % in the reference sample) and is not what we expected. The t-test results are also significant making us able to conclude that the coefficients are significantly different. The fixed effects results supports these findings but the coefficients are smaller (-2.3 % in the offshore sample and -2.1 % in the reference sample). This may imply that we have had some unobserved, time consistent variables that has affected the results for this variable.

We believed that the growth opportunities for the companies in the reference sample would on average be greater than in the offshore companies and we therefore believed that the link would be stronger in the reference sample. The neagtive link is in line with earlier studies.

Reasons why this is the case may be linked to the profitability in the two samples and the time period that we analyzed. The offshore industry has had, on average, a greater return than the companies in the reference sample and could be linked to the time period. This may imply that the years prior to the crisis were better in the offshore sample than the reference sample. The capital markets function is to ”reward” the winners and contributing capital to them. This would have contributed to a higher market-to-book, on average, and may have contributed to the results.

Another reason may be that the negative relationship between the market-to-book ratio and leverage is driven by the tendency for firms to issue equity when the price of their stocks is high relative to book value (as suggested by Rajan & Zingales (1995)). This builds on the

market timing theory and may imply that firms with high market-to-book value choose to issue new equity instead of obataining new debt when they are about to invest.

*Profitability:*

The profitability in the offshore sample was greater than in the reference sample which may be explained by the time period we analyzed, as mentioned earlier. Both the short length of the time period and the special incident in the time period (credit crisis) has possibly influenced our results and makes it hard to generalize the findings.

The Newey-West regression shows a significant ($p<0.01$) negative connection between profitability and leverage in both samples and that is what we expected. The results are for the reference sample -10.4 % and for the offshore sample -29.5 %. The fixed effects analysis shows a coefficient of -16 % for the reference sample and -21.5 % for the offshore sample. The large difference in the coefficients, especially in the offshore sample, may indicate that there have been some omitted endogenous variables that are time invariant that have affected the results. The sign of the coefficient is in line with the studies of Rajan & Zingales (1995), Gaud, Jani, Hoesli, & Bender (2005) and Mjøs (2007) in addition to the pecking order theory because increased profitability increases the opportunity to retain earnings.

The stronger negative connection in the offshore sample may indicate that the need for external capital (i.e. debt) is reduced more by profitability in the offshore sample than in the reference sample. The results from the t-test is only significant on the 10 % level and may indicate that the results should not be overemphasized. One explanation behind the stronger negative effect in the offshore sample may be that the time period has been more profitable for the offshore sample, giving them more capital to retain and therefore their need for debt has been reduced.

*Tax haven:*

The reason for including this variable was that we had not seen any other studies conducting a regression with this as an explanatory variable, and we believed that offshore companies utilized tax havens more frequently than other companies. Our hypothesis is based on the

trade-off theory and was therefore that the use of tax havens would reduce the tax incentives of debt and would therefore reduce the debt.

We find, as expected, that the use of tax havens have a negative impact on debt ratio in the reference sample but unexpectedly the coefficient in the offshore sample is positive. However, only the reference sample has a significant coefficient (the coefficient in the reference sample is -4.5 % and the coefficient in the offshore sample is 3.7 %). The fact that the coefficient is positive in the offshore sample may be due to the difference in sample size and that the offshore sample is not adequate to measure the effect of tax havens. We can therefore only conclude that the use of tax havens may have a significant negative effect on the debt ratio in the reference sample.

*Common law legal system:*

We had a hypothesis regarding this variable that the legal system would have an impact on the debt ratio and that legal systems based on common law would lead to lower debt ratio based on the arguments in chapter 5.2. The argument was that the better legal protection for external investors would lead to lower debt ratio. We had no indication if this relationship would be neither stronger nor weaker in the offshore industry.

We find that the link was negative and significant ($p<0.01$) in the reference sample and in line with the findings of Fan, Titman, & Twite (2010). The result for the offshore industry was marginally positive but not significant ($p>0.05$). One explanation may be that the sample size is inadequate to find a statistical significant relationship and/or the time period is too short.

Our results may indicate that the impact of being located in a common law legal system would lead to lower debt ratios than being located in a country with a civil law legal system. A possible explanation may be that the better protection of external investors reduces the risk of getting their shares expropriated or diluted without a compensation. Further, La Porta, Lopez-de-Silanes, Shleifer, & Vishny (2002) claims that the increased protection of external investors will increase the security values and based on our constrution of the dependent variable, where we have included the market capitalization in the denominator, this will lead to an increase in the denominator, hence the lower debt ratio.

However, we can not say anything about the offshore sample due to the insignificant coefficient, but the fact that this is a variable on country level leads to the assumption that the effect would be equal for the offshore sample because the law gives external investors better protection regardless of the industry they invest in. The t-test support this assumption because it is not significant which implies that we can not be certain that the coefficients are significantly different.

*Dividend ratio:*

We expected to find a negative link between dividend ratio and leverage, and that the link was stronger in the offshore sample. Both samples had negative coefficients in the Newey-West regression where the coefficient in the reference sample showed a value of -3.4 % ($p<0.01$) versus -0.6 % in the offshore sample, but the offshore sample's coefficient is not significant ($p>0.05$). The fixed effects analysis shows different results where the offshore sample's coefficient is -3.6 % and significant at the 10 % level. The estimated coefficient for the reference sample is -1.4 % and it is significant. This may indicate that endogeneity is a problem here because it is hard to pin down the causal relationship. In other words, it may be other important variables that are omitted from this model but has an important impact on the result.

As discussed earlier, dividends may be used as a discipline mechanism for the management in the same way that debt can be. This implies that a causal relationship is hard to establish because debt levels may be influenced by the dividends (amount of cash they retain), and dividends may be influenced by the debt levels (debt interest reduce the net income dividends are calculated from). The results of the fixed effects analysis may imply that the relationship is stronger in the offshore sample, and that is in line with our hypothesis and may indicate that the pecking order theory affect the offshore sample, namely that retained earnings are an important resource for the offshore sample. This is in line with the research of Frydenberg (2004) Mjøs (2007).

The conclusion is therefore that we can not say with certainty if there is a significant difference in the offshore sample versus the reference sample when it comes to dividend ratio and its impact on leverage. The insignificant result from the t-test further supports this.

*Effective tax:*

We expected that the effective tax in the offshore industry was significantly lower than the reference sample due to special tax schemes and the use of tax havens. This is also what we observe when looking at the descriptive statistics (11 % versus 15 %). Further, we expected that the effect of effective tax on leverage was positive for both samples but weaker positive for the offshore sample due to the special tax schemes and the use of tax havens. The trade-off theory also predicts that lower tax should lead to lower debt ratio.

The Newey-West regression shows a marginally negative (-1.2 %) effect in the reference sample but the effect in the offshore sample is not statistically significant, although the estimated coefficient is positive (1.4 %) as predicted. The fixed effects analysis shows the same results (a significant coefficient of -0.014 for the reference sample and an insignificant coefficient of +0.004 for the offshore sample), and based on this and the insignificant results from the t-test, we can not say with certainty if there is a significant difference in the offshore sample versus the reference sample when it comes to effective tax and its impact on leverage.

A viable explanation of the startling results for the reference sample may be that the fixed effects model is inadequate to measure the effect effective tax has on leverage because there are possibly some important, unobserved variable(s) that is time varying that has affected the outcome and the model may therefore be inappropriate to eliminate this effect, meaning there may still be problems with endogeneity. In other words there may be forces at work that we can not disentangle. Further, the relative small offshore sample compared to the reference sample may have influenced the results.

*Firm size:*

We argued in chapter 5.2 that the risk in this industry may be greater than in industries in general due to the cyclic tendencies and we therefore expected a stronger positive link between size and leverage in the offshore industry because of the greater benefit of diversification.

Our Newey-West analysis showed a significant ($p<0.01$) positive relationship between the two in both samples and a stronger link in the offshore industry, and it may indicate that our hypothesis is correct. This is in line with the findings in the studies of Rajan & Zingales (1995), Gaud, Jani, Hoesli, & Bender (2005), and Mjøs (2007). However, the t-test statistics is not significant so based on the Newey-West regression we can not say with certainty that there is a difference among the samples.

The fixed effects model coefficient is 7 % for the reference sample and 26 % for the reference sample, and they are both significant. This may be a confirmation of our hypothesis, and the results may indicate that if an offshore company is larger than its average in the period it will increase its debt ratio. The large difference in coefficients may indicate that this relationship is greater in the offshore sample than in the reference sample, and that is in line with our predictions.

A viable explanation may be that larger companies have better chance of getting favourable conditions in the capital markets when they want to obtain external capital, and according to the pecking order theory debt is favoured over external equity. Further, larger firms may have grown a lot recently and financed their growth with debt. Based on the time period and the years prior to our time period this may be the case. The economy boomed prior to the credit crisis and the lending activity was high. This may indicate that this was the case. But the short time period makes it hard to generalize the results.

*Risk:*

Our expectations regarding this variable were that the risk would have a negative impact on leverage and since the offshore industry is regarded by us as a riskier industry than the average industry the relationship should be stronger negative.

The Newey-West analysis reveals that our hypothesis may be correct, namely that the relationship in the offshore sample is stronger negative than in the reference sample and both the coefficients are statistical significant ($p<0.01$). It is worth noting that the link is markedly stronger in the offshore sample with a coefficient of -12.9 % versus -4.3 % in the reference sample. The t-test is also significant on the 1 % level, and that may imply that there is a stronger connection between risk and leverage in the offshore sample compared

to the reference sample. In other words, risk may affect capital structure more in the offshore companies than in other companies.

Our findings are also supported by the trade-off theory because it states that there is a trade-off between the tax shield and the bankruptcy costs which consist of probability of default and costs if it occurs. If the business risk is increased, the overall risk is obviously also increased, and in order to find equilibrium again the financial risk should be reduced equally to maintain the same risk level. A high debt level is an obvious contributor to high financial risk, and to reduce it one should reduce the debt level.

The risk variable is, as previously discussed, based on a short time period and the construction of the variable[18] may not adequately measure the true operational risk that is representative for the time period.

*French law legal system, Scandinavian law legal system, and German law legal system:*

The reason we wanted to include these variables was to see if there were any significant differences in capital structure between the different legal systems. Our findings indicate that the Scandinavian civil law legal system leads to a significant ($p<0.01$) lower debt ratio in the reference sample than the French and the German civil law legal systems, and that the French civil law legal system leads to significantly ($p<0.01$) higher debt ratio than the German and Scandinavian civil law legal system. The effect is expected to be the same for the offshore sample due to the fact that it is a variable on country level. None of the coefficients for the offshore sample are significant and the t-tests are also not significant which may support the assumption that the effect should be equal in the offshore sample. An explanation for the insignificance of the offshore sample's variables is that the sample size is far smaller than the reference sample.

[18] Our construction of the risk variable: $risk = \frac{standard\ deviation\ of\ operating\ income_{t \to t_4}}{average\ operating\ revenue_{t \to t_4}}$

# 11.0 Analysis to answer the supplementary problems

We will in this section conduct analysis that may give a better understanding of the capital structure and the surroundings that may affect it.

## 11.1 Analysis of the impact of credit crisis on the capital structure

To answer first of the supplementary problems we have introduced a new variable. As stated in the problem statement in chapter 1, we want to see if the credit crisis has had an impact on the capital structure, and if there are any differences between the samples. To be able to distinguish between pre-crisis- and the crisis-years, we have introduced an indicator variable. This variable will represent the years 2006, and 2007. This implies that we look at the capital structure in 2006 and 2007 compared to the capital structure in 2008 and 2009. The reason for looking at 2008 and 2009 combined is that the crisis hit in late 2008 and continued in to 2009.

*Our hypothesis for pre-crisis variable:*

Our hypothesis is that the debt ratios pre-crisis was higher relative to post-crisis. It is based on the assumption that the lending activity was higher pre-crisis and the possibilities to obtain debt were greater because of a perceived brighter future. In other words, the possibilities to refinance debt or borrow capital were greater pre-crisis than in the crisis.

Further, the long term debt is defined to be longer than one year and therefore there would not be any need for refinancing, at least not for companies that did not have debt that matured after the crisis. In other words, we believe that the coefficient representing the years 2006 and 2007 is positive meaning that the years 2006 and 2007 had a positive effect on the debt ratios. We further believe that the relationship is stronger for the offshore sample than the reference sample. This is based on the fact that the industry is more capital intense and therefore the need for capital combined with the willingness from banks and investors to lend money pre-crisis are factors that will make the relationship stronger.

However, the crisis is perceived to impact the market capitalization negatively through reduced stock prices and we might have offsetting effects here (reduced denominator due

to reduced market capitalization leading to increased debt ratios after the impact of the crisis).

The table presents the separate regressions with the indicator dummy representing pre-crisis and hence we are comparing this to the crisis (2008 and 2009). We have used Newey West standard errors in these regressions as well to take autocorrelation and heteroskedasticity in to account.

**Table 14: The results of the regression with the pre-crisis indicator variable**

| Variables | Reference sample | | Offshore sample | | t-test |
|---|---|---|---|---|---|
| | Coef. | P > \|t\| | Coef. | P > \|t\| | Difference |
| **Degree of assets tangibility (AssetTang)** | +0.2382 | 0.000*** | +0.5025 | 0.000*** | -5.5*** |
| **Dividend ratio (DivRatio)** | -0.0334 | 0.000*** | +0.0043 | 0.864 | - |
| **Effective tax (Efftax)** | -0.0114 | 0.013** | +0.0120 | 0.690 | - |
| **Profitability (ebitta)** | -0.0967 | 0.000*** | -0.2289 | 0.024** | 1.31 |
| **Size (TotAssets)** | +0.0241 | 0.000*** | +0.0166 | 0.004*** | 1.31 |
| **Growth opportunities (markettobook)** | -0.0458 | 0.000*** | -0.0621 | 0.000*** | 2.41** |
| **Risk (Risk)** | -0.0439 | 0.000*** | -0.1292 | 0.001*** | 2.14** |
| **Tax haven indicator variable (taxhaven)** | -0.0448 | 0.000*** | +0.0335 | 0.189 | -3.05*** |
| **Common law indicator variable (law_common)** | -0.0298 | 0.000*** | +0.0220 | 0.701 | - |
| **French civil law indicator dummy (law_fr)** | +0.0344 | 0.000*** | +0.0539 | 0.380 | - |
| **Scandinavian civil law indicator dummy (law_sc)** | -0.0237 | 0.010*** | +0.0750 | 0.221 | - |
| **Pre-crisis** | **+0.0342** | **0.000*** ** | **+0.0721** | **0.000*** ** | **-1.95*** |

*** = 1 % significance level, ** = 5 % significance level, * = 10 % significance level

(For the raw tables of the reference sample and the offshore sample, see appendices 12 and 13 respectively).

The interpretation is based on the years 2008 and 2009 because that is the years that are omitted and is therefore the basis years. The interpretation will also focus on the pre-crisis variable due to the previous reflection of the other variables in chapter 10.0.

*Pre-crisis:*

As we can see from the regression of the reference sample, the years 2006 and 2007, are significantly different from 2008 and 2009 which is defined as the crisis years. In addition, the sign of the coefficient representing pre-crisis years are positive (3.4 %) which may indicate that the pre-crisis debt ratios were higher than in the crisis. Further, one possible explanation may be that the opportunities to borrow or refinance debt were greater in the reference sample pre-crisis because the credit markets was not in a credit crunch.

The offshore sample has a coefficient for the pre-crisis variable of 7.2 % and it is statistically significant. The t-test is significant at the 10 % level and indicates that the results should not be overemphasized. The offshore sample is greatly dependent on the oil industry because they are suppliers to the oil industry (drilling, seismic, and shipping) and when the oil price increases the growth opportunities also increases. The oil price was at all time high levels pre-crisis (Tanderø, 2009) and this may indicate that the industry had great growth opportunities and the lenders may have thought of this as a safe investment.

Hindsight tells us that the crisis impacted the market capitalization through a massive reduction in stock prices and further complicated borrowing of capital. Asset values fell due to lower operational activity and this may have made them less worth as collateral. The market was struck by the fear of counterpart risk, and no one knew who would be the next to default and would therefore not lend their capital to others.

Based on the trade-off theory this will imply that the lenders should be more restrictive to lend and that the companies that wanted to borrow money should be aware of the increased risk and should also be restrictive to borrow (they are insiders and have greater insight of their financial risk than the lenders, but the risk that some of their partners/suppliers/customers defaulted was probably beyond their knowledge).

Our hypothesis is in line with our findings. The signs of the coefficients for the pre-crisis variable are positive in both samples and the analysis show a stronger relationship in the offshore industry than in the reference sample. This may indicate that the pre-crisis debt ratios were higher than in the crisis, and that the effect in the offshore sample was greater. In other words, our results may indicate that there were a difference in capital structure pre-

crisis compared to in the crisis, and that the offshore sample had a greater effect of the pre-crisis years than the reference sample. However, the time period we have defined as "pre-crisis" consists of only two years and that may be too short to conclude and should therefore not be overemphasized.

### 11.2 Analysis of highly leveraged companies

To further increase our understanding regarding the capital structure in general we have conducted an analysis to see if there are any differences between the companies that already hold large portions of debt and compare them to companies that hold less debt.

The following section will compare results for two samples – a sample of approximately 5200 firm-year observations of where the debt ratio equal to or above 40%, and a sample of the remaining some 26 600 firm-year observations where the debt ratio is below 40%. Note that these samples do not take into consideration whether the firm-year observation is associated with an offshore company or not.

Table 15: Descriptive statistics for the low debt company sample

| Variables | Observations | Mean | Std.Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| **DebtRatio** | 31543 | 0.0913 | 0.1147 | 0 | 0.39 |
| **AssetTang** | 31491 | 0.49069 | 0.2509 | 0 | 1 |
| **DivRatio** | 30891 | 0.1572 | 0.3183 | -0.79 | 2.43 |
| **efftax** | 30870 | 0.1663 | 0.2873 | -1.76 | 1.86 |
| **ebitta** | 31042 | -0.0015 | 0.2030 | -0.99 | 0.43 |
| **TotAssets** | 31078 | 5.1997 | 2.1169 | 0.01 | 10.66 |
| **markettobook** | 30122 | 1.7125 | 1.2836 | 0.2 | 11 |
| **Risk** | 29544 | 0.31812 | 0.3247 | 0.02 | 1.83 |
| **taxhaven** | 31543 | 0.1473 | 0.3544 | 0 | 1 |
| **law_common** | 31539 | 0.7265 | 0.4457 | 0 | 1 |
| **law_fr** | 31543 | 0.1334 | 0.3401 | 0 | 1 |
| **law_sc** | 31543 | 0.0576 | 0.2329 | 0 | 1 |

Table 16: Descriptive statistics for the high debt company sample

| Variables | Observations | Mean | Std.Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| **DebtRatio** | 6368 | 0.6069567 | 0.1622887 | 0.4 | 1 |
| **AssetTang** | 6366 | 0.6580119 | 0.2231144 | 0 | 1 |
| **DivRatio** | 6114 | 0.1408472 | 0.3521487 | -0.77 | 2.43 |
| **efftax** | 6192 | 0.1570236 | 0.3440188 | -1.75 | 1.86 |
| **ebitta** | 6334 | -0.011811 | 0.1581301 | -0.99 | .43 |
| **TotAssets** | 6255 | 6.196387 | 2.079138 | 0.45 | 10.66 |
| **markettobook** | 5744 | 0.9418001 | 0.2400714 | 0.2 | 2.1 |
| **Risk** | 6249 | 0.2770299 | 0.2850228 | 0.02 | 1.82 |
| **taxhaven** | 6368 | 0.1173053 | 0.321809 | 0 | 1 |
| **law_common** | 6368 | 0.6818467 | 0.4657959 | 0 | 1 |
| **law_fr** | 6368 | 0.1809045 | 0.3849693 | 0 | 1 |
| **law_sc** | 6368 | 0.0607726 | 0.2389315 | 0 | 1 |

Table 17: Results of analysis - comparison of companies with high debt ratio vs low debt ratio

| Variables | Low Debt Firms | | Leveraged Firms | | t-test |
|---|---|---|---|---|---|
| **Dependent variable: Debt ratio** | Coef. | P > \|t\| | Coef. | P > \|t\| | Difference |
| **Assets tangibility (AssetTang)** | +0.116 | 0.000*** | +0.086 | 0.000*** | 2.87*** |
| **Dividend ratio (DivRatio)** | -0.002 | 0.318 | -0.047 | 0.000*** | - |
| **Effective tax (Efftax)** | +0.007 | 0.004*** | -0.014 | 0.020** | 3.22*** |
| **Profitability (ebitta)** | -0.034 | 0.000*** | -0.104 | 0.000*** | 4.08*** |
| **Size (TotAssets)** | +0.015 | 0.000*** | +0.004 | 0.000*** | 9.33*** |
| **Growth opportunities (markettobook)** | -0.019 | 0.000*** | -0.216 | 0.000*** | 24.56*** |
| **Risk (Risk)** | -0.036 | 0.000*** | +0.026 | 0.002*** | -6.96*** |
| **Tax haven indicator variable (taxhaven)** | -0.025 | 0.000*** | -0.014 | 0.022** | -1.68* |
| **Common law indicator variable (law_common)** | -0.024 | 0.000*** | +0.003 | 0.672 | - |
| **French civil law indicator variable (law_fr)** | +0.020 | 0.000*** | +0.005 | 0.538 | - |
| **Scandinavian civil law indicator variable (law_sc)** | -0.016 | 0.000*** | -0.006 | 0.586 | - |

*** = 1 % significance level, ** = 5 % significance level, * = 10 % significance level

**Reflections on some of the most interesting variables:**

*Asset Tangibility:*

Logically we would expect the highly leveraged companies to have a higher degree of asset tangibility, since we have already established it to be a key driver of leverage. It is necessary to have tangible asset for collateral in order to issue bonds or obtain bank debt. The results of the analysis show that for the leveraged companies there is a weaker link between asset tangibility and debt ratio than for the remaining companies. We believe this may be explained by the fact that to obtain the debt levels necessary to be in the high leveraged sample, companies have already used their most tangible and fungible assets as collateral. Thus, in cases which this is true, asset tangibility becomes a somewhat less important factor.

*Effective Tax:*

The average effective tax-rate of the high leverage sample is 15.7 % compared to 16.6 % for the main sample of companies. Notably, for the main sample an increase in the effective tax-rate leads to a slightly lower debt ratio – a result which is contradictory to the trade-off theory. We speculate that the reason behind this result is that for highly leveraged companies, increases in tax rates lowers debt capacity through decreased profitability and thus the companies ability to service debt obligations.

*Profitability:*

On average the highly leveraged companies are less profitable, as measured by EBIT over total assets, at negative three percent. Note that increases in profitability for this group brings with it lower leverage. This may be explained by the more profitable companies in this sample retaining funds to reinvest as opposed to taking on increased debt which perhaps is the only option for the less profitable companies.

*Market-to-book:*

The highly leveraged sample shows a significantly stronger negative link between leverage and market-to-book value. This may be explained by firm financing decisions – as the market value of its equity increases, it will likely issue equity over taking on more debt, whereas

increasing debt may be a signal of management perceiving the firm's stock to be undervalued. This result may also be influenced by firms in distress or in risk of bankruptcy. Such firms will typically lose market value, assuming the firm had been performing better in the past. As market value drop the debt to equity ratio increases while the market-to-book ratio decreases. This hypothesis is supported by the fact that the leveraged firm sample has a much lower average market-to-book ratio.

# 12.0 Concluding remarks

This thesis has examined capital structure and which factors that may affect this. Furthermore, we have focused on the offshore industry to see if there are any differences in the variables that influence the capital structure in this industry compared to a reference sample.

Main analysis:

The most interesting findings in this thesis:

- The variable representing degree of asset tangibility proved to be the most prominent explanatory variable and may be considered as the driver of debt levels. It had, as expected a positive effect on debt levels in both samples but the relationship was strongest in the offshore sample.
- The growth opportunities variable had a negative effect in both samples but it proved to be more important in the offshore sample than the reference sample
- The variable representing profitability had a negative effect in both samples but proved to be of greater importance for the offshore sample.
- The variable representing tax havens proved to have a negative effect on leverage.
- The variable representing common law proved to influence the debt ratio negatively.

The variable risk had a negative impact on debt ratio in both samples and the relation is strongest in the offshore sample. However, the short time period makes us unable to generalize.

The size variable proved to have a positive impact on debt ratio in both levels, but the t-test of significance in the difference of the coefficients was not significant.

The variables representing dividend ratio and effective tax had a negative impact on debt levels in the reference sample. The fixed effects model suggests that there is a negative relationship between dividend ratio and debt levels in the offshore sample but we can not claim that the two samples are different because the coefficients are not significant at a satisfactory confidence level.

The French civil law variable and the Scandinavian civil law variable showed opposite relation to the German civil law that is the basis. French civil law proved to yield a positive effect on debt ratio compared to the German civil law. Further, the Scandinavian civil law proved to have a negative impact on debt ratio compared to the German civil law.

Supplementary analysis:

We analyzed if the credit crisis has had a significant impact on debt ratios and if there was any differences among the samples. The credit crisis proved to have had a negative impact on debt ratios because the pre-crisis variable showed positive results, and the relationship proved to be strongest for the offshore sample.

Our investigation on differences in drivers of capital structure for highly leveraged companies yielded somewhat surprising results which suggest that the dynamics of these variables changes for companies with a debt ratio within the top quartile. Although not the main topic of our analysis, this is clearly a topic which warrants further investigation.

## 12.1 Criticism of this thesis

As mentioned, the industry we have defined as the offshore industry has no one specific SIC-code which made it harder to find and include companies in the offshore sample. The sample is small relative to the reference sample and has made it harder to detect statistically significant relationships. An increase in the sample could possibly improve this.

The time period we analyzed is short due to the lack of available years that contained market data. We considered the trade-off between a longer period and the ability to conduct the analysis with market data. Many of the analysis' we had seen was based on book values and we perceived market values to contain more information than book values and better reflect the true values. The fact that the time period is short is a handicap but we believe the inclusion of market data to some extent, can correct this because it gives the analysis a slightly different dimension than the other studies we have seen.

Econometric analyses can always be addressed and treated differently, and this is the case also in this thesis. The problem of endogeneity is challenging because it makes it hard to

detect the true causal relationship and could possibly lead to wrong conclusions. The reason is that the OLS regression may contribute the effect of an unobserved endogenous variable to a variable in the model and wrongfully strengthen the coefficient leading us to interpret the variable to be more important than it really is. We have tried to correct for this by conducting a fixed effects analysis, and that is known for removing some of the effects but one can never be sure that the problem of endogeneity is truly removed. However, one might argue that this problem is not sufficiently handled in this thesis in order to be able to claim causal relationships but identifying and adjusting for the endogeneity problem is not a straight forward task, and given the time constraint we have prioritized on a balance between quantitative and qualitative challenges.

The universe of statistical science gives a wide variety of possible solution to a problem so it should be emphasized that the assumptions made, and the analysis conducted, is at no means any absolute solutions.

## 12.2 Suggestions to further studies

Capital structure is a comprehensive theme and there might be several other interesting approaches that could increase the understanding of capital structure. One possibility is to have a more in depth approach on one or two variables perceived to be important explanatory variables for capital structure, and get a more thorough analysis of those.

Another possible approach may be to interview the CFO in a sample of companies in the offshore industry to see if they emphasize the same variables as the theory and research on the subject claim to be the most important. This would give valuable information from another angel and possibly give the research a new dimension because these are the people that handle issues regarding capital structure on a daily basis.

It would be interesting to include other capital intensive industries in an analysis that compared them to a reference sample, to see if the results across these capital intensive industries gave the same answer and therefore better be able to generalize.

Multi-national companies have the possibility to transfer debt to the subsidiaries in high tax countries to reduce their total tax exposure. It might therefore be interesting to base an

analysis on the trade-off theory and see if it is a good prediction of debt levels in the subsidiaries.

# Appendices

## Appendix 1: Overview of the corporate taxes in OECD countries

| Country | Central government corporate income tax rate | Adjusted central government corporate | Sub-central government corporate income tax rate | Combined corporate income | Targeted corporate tax rates |
|---|---|---|---|---|---|
| Australia | 30.0 | 30.0 | | 30.00 | Y |
| Austria | 25.0 | 25.0 | | 25.00 | N |
| Belgium | 33.99 (33.0) | 33.99 | | 33.99 | Y |
| Canada | 18.0 | 18.0 | 11.5 | 29.52 | Y |
| Chile | 17.0 | 17.0 | | 17.00 | Y |
| Czech Republic | 19.0 | 19.0 | | 19.00 | Y |
| Denmark | 25.0 | 25.0 | | 25.00 | N |
| Finland | 26.0 | 26.0 | | 26.00 | N |
| France | 34.43 | 34.43 | | 34.43 | Y |
| Germany | 15,825 (15,0) | 15,825 | 14.35 | 30.18 | N |
| Greece | 24.0 | 24.0 | | 24.00 | Y |
| Hungary | 19.0 | 19.0 | | 19.00 | Y |
| Iceland | 18.0 | 18.0 | | 18.00 | N |
| Ireland | 12.5 | 12.5 | | 12.50 | Y |
| Italy | 27.5 | 27.5 | | 27.50 | N |
| Japan | 30.0 | 27.99 | 11.55 | 39.54 | Y |
| Korea | 22.0 | 22.0 | 2.2 | 24.20 | Y |
| Luxembourg | 21.84 (21.0) | 21.84 | 6.75 | 28.59 | Y |
| Mexico | 30.0 | 30.0 | | 30.00 | Y |
| Netherlands | 25.5 | 25.5 | | 25.50 | Y |
| New Zealand | 30.0 | 30.0 | | 30.00 | N |
| Norway | 28.0 | 28.0 | | 28.00 | Y |
| Poland | 19.0 | 19.0 | | 19.00 | N |
| Portugal | 25.0 | 25.0 | 1.5 | 26.50 | Y |
| Slovak Republic | 19.0 | 19.0 | | 19.00 | N |
| Spain | 30.0 | 30.0 | | 30.00 | Y |
| Sweden | 26.3 | 26.3 | | 26.30 | N |
| Switzerland | 8.5 | 6.70 | 14.47 | 21.17 | N |
| Turkey | 20.0 | 20.0 | | 20.00 | N |
| United Kingdom | 28.0 | 28.0 | | 28.00 | Y |
| United States | 35.0 | 32.7 | 6.47 | 39.21 | Y |

(OECD, 2011)

## Appendix 2: Description of the underlying assumptions of the OLS regression

**Linearity:**

In order to use Ordinary Least Square regression (OLS) a linear model is essential. Therefore the independent variables and the dependent variable have to have a linear relationship (Mason & Lind, 1996, pp. 537-538).

**Homoscedasticity:**

This requirement indicates that the variation in the residuals is constant regardless of the size of the predicted values. In other words, the variation around the regression equation is the same for all the values of the independent variables (Lind, Marchal, & Wathen, 2008, pp. 532-533).

Violations of this condition indicates that the variance in the error terms distribution will change for every observation or series of observations.

**Normality:**

The difference between the actual Y and the estimated value $\hat{y}$ is called the residual. These residuals should follow a normal probability distribution and the mean of the residuals should be 0 (Lind, Marchal, & Wathen, 2008, p. 531).

**Multicollinearity:**

First it is important to mention that in practice it is nearly impossible to select variables that are completely unrelated but it is important to understand how this problem affects the regression and that a low correlation between them are preferable.

This phenomenon exists when independent variables are correlated and that makes it hard to evaluate the individual regression coefficients and their individual effects on the dependent variable. This problem does not affect the multiple regression equations ability to predict the dependent variable, but if we are interested in finding the individual relationship between each independent variable and the dependent variable, multicollinearity may show unexpected results (Lind, Marchal, & Wathen, 2008, p. 534).

There is no exact answer to what is too much correlation between two independent variables but literature on the subject suggests that the correlation between two independent variables should not exceed 0.6 to avoid the problem of multicollinearity. This might be a bit high, especially if there are multiple related variables, and is something we have to control for and be aware of.

**Autocorrelation:**

This assumption is that successive residuals should be independent. There should be no patterns; they should not be highly correlated and there are no long runs of positive or negative residuals (Lind, Marchal, & Wathen, 2008, pp. 535-536). In practice, this means the independent variables should be independent from each other (Kristianslund, 1996, p. 311).

This is often found in time series data and will lead to increased probability for error in the estimation of the true β because the auto correlated error term will make the dependent variable in the OLS regression to vary in a way that the OLS will assign to the independent variable.

## Appendix 3: OLS regression of the entire sample (offshore + reference)

Linear regression

| | |
|---|---|
| Number of obs | = 24937 |
| F( 13, 7807) | = 315.38 |
| Prob > F | = 0.0000 |
| R-squared | = 0.2852 |
| Root MSE | = .18384 |

(Std. Err. adjusted for 7808 clusters in conum)

| DebtRatio | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AssetTang | .2674404 | .0084641 | 31.60 | 0.000 | .2508486 | .2840323 |
| DivRatio | -.0357958 | .0046601 | -7.68 | 0.000 | -.0449309 | -.0266607 |
| efftax | -.0080885 | .0050372 | -1.61 | 0.108 | -.0179628 | .0017859 |
| ebitta | -.1094972 | .0090261 | -12.13 | 0.000 | -.1271908 | -.0918036 |
| TotAssets | .0225162 | .0010998 | 20.47 | 0.000 | .0203604 | .0246721 |
| AssetsPrEmp | .0016168 | .0018283 | 0.88 | 0.377 | -.0019671 | .0052007 |
| markettobook | -.0520955 | .0015189 | -34.30 | 0.000 | -.0550729 | -.049118 |
| Risk | -.0212485 | .0081089 | -2.62 | 0.009 | -.0371442 | -.0053529 |
| taxhaven | -.0497892 | .0053815 | -9.25 | 0.000 | -.0603384 | -.0392399 |
| law_common | -.0289938 | .0063902 | -4.54 | 0.000 | -.0415202 | -.0164674 |
| law_fr | .0286493 | .0075015 | 3.82 | 0.000 | .0139444 | .0433543 |
| law_sc | -.023811 | .0091296 | -2.61 | 0.009 | -.0417075 | -.0059144 |
| offshoredum | .0727716 | .0171921 | 4.23 | 0.000 | .0390704 | .1064728 |
| _cons | .0296916 | .0122737 | 2.42 | 0.016 | .0056318 | .0537515 |

## Appendix 4: OLS regression of the reference sample

Linear regression

| | |
|---|---|
| Number of obs | = 31433 |
| F( 11, 9450) | = 415.58 |
| Prob > F | = 0.0000 |
| R-squared | = 0.2559 |
| Root MSE | = .19029 |

(Std. Err. adjusted for 9451 clusters in conum)

| DebtRatio | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AssetTang | .2391264 | .0074552 | 32.08 | 0.000 | .2245127 | .2537401 |
| DivRatio | -.0336106 | .0043109 | -7.80 | 0.000 | -.0420609 | -.0251603 |
| efftax | -.0118236 | .0046022 | -2.57 | 0.010 | -.0208448 | -.0028024 |
| ebitta | -.1037454 | .0078731 | -13.18 | 0.000 | -.1191785 | -.0883124 |
| TotAssets | .0243797 | .001003 | 24.31 | 0.000 | .0224137 | .0263457 |
| markettobook | -.0489093 | .0013035 | -37.52 | 0.000 | -.0514643 | -.0463542 |
| Risk | -.0428458 | .0061264 | -6.99 | 0.000 | -.0548549 | -.0308368 |
| taxhaven | -.0446242 | .0050919 | -8.76 | 0.000 | -.0546053 | -.034643 |
| law_common | -.0299811 | .0062403 | -4.80 | 0.000 | -.0422135 | -.0177488 |
| law_fr | .0342727 | .0073504 | 4.66 | 0.000 | .0198644 | .048681 |
| law_sc | -.0229876 | .009123 | -2.52 | 0.012 | -.0408706 | -.0051045 |
| _cons | .0408073 | .0083175 | 4.91 | 0.000 | .0245031 | .0571114 |

## Appendix 5: OLS regression of the offshore sample

Linear regression

| | |
|---|---|
| Number of obs | = 417 |
| F( 11, 120) | = 19.74 |
| Prob > F | = 0.0000 |
| R-squared | = 0.4588 |
| Root MSE | = .19662 |

(Std. Err. adjusted for 121 clusters in conum)

| DebtRatio | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AssetTang | .5039636 | .0611349 | 8.24 | 0.000 | .3829207 | .6250064 |
| DivRatio | -.0063095 | .0272873 | -0.23 | 0.818 | -.0603365 | .0477175 |
| efftax | .013797 | .0331161 | 0.42 | 0.678 | -.0517705 | .0793645 |
| ebitta | -.2949885 | .1301537 | -2.27 | 0.025 | -.5526837 | -.0372933 |
| TotAssets | .0166653 | .0080107 | 2.08 | 0.040 | .0008048 | .0325259 |
| markettobook | -.067698 | .0086224 | -7.85 | 0.000 | -.0847698 | -.0506263 |
| Risk | -.1293647 | .0601212 | -2.15 | 0.033 | -.2484005 | -.0103288 |
| taxhaven | .0371009 | .0391933 | 0.95 | 0.346 | -.0404991 | .1147008 |
| law_common | .0267341 | .1081677 | 0.25 | 0.805 | -.1874304 | .2408987 |
| law_fr | .0582094 | .1132866 | 0.51 | 0.608 | -.1660903 | .2825091 |
| law_sc | .0810631 | .1136223 | 0.71 | 0.477 | -.1439011 | .3060272 |
| _cons | -.0299025 | .1325909 | -0.23 | 0.822 | -.2924233 | .2326184 |

## Appendix 6: Newey-West regression of the entire sample (offshore + reference)

Regression with Newey-West standard errors
maximum lag: 0

Number of obs = 31850
F( 12, 31837) = 850.84
Prob > F = 0.0000

| DebtRatio | Coef. | Newey-West Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AssetTang | .2418631 | .004792 | 50.47 | 0.000 | .2324707 | .2512555 |
| DivRatio | -.0327492 | .0032908 | -9.95 | 0.000 | -.0391992 | -.0262991 |
| efftax | -.0121556 | .004196 | -2.90 | 0.004 | -.02038 | -.0039312 |
| ebitta | -.1055215 | .0067245 | -15.69 | 0.000 | -.1187018 | -.0923412 |
| TotAssets | .0242794 | .0006214 | 39.07 | 0.000 | .0230613 | .0254974 |
| markettobook | -.0493532 | .0009856 | -50.07 | 0.000 | -.0512851 | -.0474213 |
| Risk | -.043973 | .0041915 | -10.49 | 0.000 | -.0521886 | -.0357575 |
| taxhaven | -.042632 | .0031701 | -13.45 | 0.000 | -.0488455 | -.0364184 |
| law_common | -.0292391 | .0037259 | -7.85 | 0.000 | -.036542 | -.0219361 |
| law_fr | .034336 | .0044231 | 7.76 | 0.000 | .0256665 | .0430055 |
| law_sc | -.0217979 | .0055911 | -3.90 | 0.000 | -.0327568 | -.010839 |
| offshoredum | .090063 | .0104733 | 8.60 | 0.000 | .0695349 | .1105911 |
| _cons | .0400435 | .0051166 | 7.83 | 0.000 | .0300148 | .0500723 |

## Appendix 7: Newey-West regression of the reference sample

Regression with Newey-West standard errors
maximum lag: 0

Number of obs = 31433
F( 11, 31421) = 888.99
Prob > F = 0.0000

| DebtRatio | Coef. | Newey-West Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AssetTang | .2391264 | .0048151 | 49.66 | 0.000 | .2296885 | .2485643 |
| DivRatio | -.0336106 | .0033 | -10.19 | 0.000 | -.0400788 | -.0271425 |
| efftax | -.0118236 | .0042344 | -2.79 | 0.005 | -.0201233 | -.0035239 |
| ebitta | -.1037454 | .0067338 | -15.41 | 0.000 | -.116944 | -.0905469 |
| TotAssets | .0243797 | .0006246 | 39.03 | 0.000 | .0231555 | .0256039 |
| markettobook | -.0489093 | .000996 | -49.10 | 0.000 | -.0508615 | -.046957 |
| Risk | -.0428458 | .0042016 | -10.20 | 0.000 | -.0510811 | -.0346106 |
| taxhaven | -.0446242 | .0031912 | -13.98 | 0.000 | -.050879 | -.0383694 |
| law_common | -.0299811 | .0037279 | -8.04 | 0.000 | -.0372879 | -.0226744 |
| law_fr | .0342727 | .0044312 | 7.73 | 0.000 | .0255874 | .0429579 |
| law_sc | -.0229876 | .0056446 | -4.07 | 0.000 | -.0340512 | -.011924 |
| _cons | .0408073 | .0051347 | 7.95 | 0.000 | .0307431 | .0508714 |

## Appendix 8: Newey-West regression of the offshore sample

Regression with Newey-West standard errors
maximum lag: 0

Number of obs = 417
F( 11, 405) = 31.90
Prob > F = 0.0000

| DebtRatio | Coef. | Newey-West Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AssetTang | .5039636 | .0464112 | 10.86 | 0.000 | .4127267 | .5952004 |
| DivRatio | -.0063095 | .0257164 | -0.25 | 0.806 | -.0568638 | .0442448 |
| efftax | .013797 | .030455 | 0.45 | 0.651 | -.0460726 | .0736665 |
| ebitta | -.2949885 | .0988524 | -2.98 | 0.003 | -.4893163 | -.1006607 |
| TotAssets | .0166653 | .0058145 | 2.87 | 0.004 | .0052351 | .0280956 |
| markettobook | -.067698 | .0069533 | -9.74 | 0.000 | -.081367 | -.054029 |
| Risk | -.1293647 | .0403608 | -3.21 | 0.001 | -.2087074 | -.0500219 |
| taxhaven | .0371009 | .0257628 | 1.44 | 0.151 | -.0135447 | .0877464 |
| law_common | .0267341 | .0574108 | 0.47 | 0.642 | -.0861262 | .1395945 |
| law_fr | .0582094 | .0623655 | 0.93 | 0.351 | -.0643912 | .1808099 |
| law_sc | .0810631 | .0617734 | 1.31 | 0.190 | -.0403734 | .2024996 |
| _cons | -.0299025 | .0781205 | -0.38 | 0.702 | -.1834748 | .1236699 |

## Appendix 9: Hausman test to test which model is most appropriate; Fixed- or Random effects

The "Prob>chi2" is equal to 0.0000 which indicates it is significant and we therefore have to discard the null-hypothesis that the two methods are consistent, and we therefore have to use the fixed effects model in order to get consistent results.

| | Coefficients (b) fixed | (B) random | (b-B) Difference | sqrt(diag(V_b-V_B)) S.E. |
|---|---|---|---|---|
| AssetTang | .1206184 | .1794232 | -.0588048 | .0058843 |
| DivRatio | -.015151 | -.0187971 | .003646 | .0013444 |
| efftax | -.0132907 | -.0113695 | -.0019212 | .0008071 |
| ebitta | -.1616418 | -.1130034 | -.0486384 | .0034945 |
| TotAssets | .0741937 | .0331541 | .0410396 | .0022592 |
| markettobook | -.0209431 | -.0313501 | .010407 | .0005377 |

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 613.28
Prob>chi2 = 0.0000

## Appendix 10: Fixed effects regression of the reference sample

Regression with Driscoll-Kraay standard errors — Number of obs = 33177
Method: Fixed-effects regression — Number of groups = 10168
Group variable (i): conum — F( 6, 10167) = 194.60
maximum lag: 0 — Prob > F = 0.0000
within R-squared = 0.1199

| DebtRatio | Coef. | Drisc/Kraay Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AssetTang | .1220162 | .0092744 | 13.16 | 0.000 | .1038365 | .1401959 |
| DivRatio | -.014164 | .002302 | -6.15 | 0.000 | -.0186762 | -.0096517 |
| efftax | -.0136027 | .0015352 | -8.86 | 0.000 | -.016612 | -.0105933 |
| ebitta | -.1596749 | .0183586 | -8.70 | 0.000 | -.1956613 | -.1236884 |
| TotAssets | .0723163 | .0100324 | 7.21 | 0.000 | .0526508 | .0919817 |
| markettobook | -.0206931 | .0025256 | -8.19 | 0.000 | -.0256437 | -.0157424 |
| _cons | -.2483863 | .0448609 | -5.54 | 0.000 | -.3363225 | -.1604502 |

## Appendix 11: Fixed effects regression of the offshore sample

Regression with Driscoll-Kraay standard errors — Number of obs = 417
Method: Fixed-effects regression — Number of groups = 121
Group variable (i): conum — F( 6, 120) = 29.87
maximum lag: 0 — Prob > F = 0.0000
within R-squared = 0.3919

| DebtRatio | Coef. | Drisc/Kraay Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AssetTang | .1858625 | .0600399 | 3.10 | 0.002 | .0669877 | .3047373 |
| DivRatio | -.0360385 | .0216817 | -1.66 | 0.099 | -.0789668 | .0068899 |
| efftax | .0042958 | .0090502 | 0.47 | 0.636 | -.0136229 | .0222145 |
| ebitta | -.2146561 | .0417025 | -5.15 | 0.000 | -.2972241 | -.132088 |
| TotAssets | .2641856 | .0471811 | 5.60 | 0.000 | .1707703 | .3576009 |
| markettobook | -.0232151 | .0018181 | -12.77 | 0.000 | -.0268148 | -.0196153 |
| _cons | -1.597553 | .311959 | -5.12 | 0.000 | -2.21521 | -.9798961 |

## Appendix 12: Newey-West regression of reference sample for the impact of the credit crisis

Regression with Newey-West standard errors
maximum lag: 0

Number of obs = 31433
F( 12, 31420) = 848.00
Prob > F = 0.0000

| DebtRatio | Coef. | Newey-West Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AssetTang | .2381839 | .0047955 | 49.67 | 0.000 | .2287845 | .2475833 |
| DivRatio | -.0333604 | .0032849 | -10.16 | 0.000 | -.0397989 | -.0269219 |
| efftax | -.0113772 | .00421 | -2.70 | 0.007 | -.019629 | -.0031255 |
| ebitta | -.0967011 | .0066926 | -14.45 | 0.000 | -.1098188 | -.0835834 |
| TotAssets | .0240835 | .0006213 | 38.77 | 0.000 | .0228658 | .0253012 |
| markettobook | -.0457539 | .0009777 | -46.80 | 0.000 | -.0476703 | -.0438376 |
| Risk | -.04387 | .0041913 | -10.47 | 0.000 | -.052085 | -.0356549 |
| taxhaven | -.0448105 | .00318 | -14.09 | 0.000 | -.0510435 | -.0385776 |
| law_common | -.0297504 | .0037193 | -8.00 | 0.000 | -.0370405 | -.0224604 |
| law_fr | .0343969 | .0044084 | 7.80 | 0.000 | .0257563 | .0430375 |
| law_sc | -.0236745 | .0056121 | -4.22 | 0.000 | -.0346743 | -.0126746 |
| precrisis | .0342354 | .0021411 | 15.99 | 0.000 | .0300387 | .0384321 |
| _cons | .0206449 | .0052498 | 3.93 | 0.000 | .010355 | .0309348 |

## Appendix 13: Newey-West regression of the offshore sample for the impact of the credit crisis

Regression with Newey-West standard errors
maximum lag: 0

Number of obs = 417
F( 12, 404) = 31.68
Prob > F = 0.0000

| DebtRatio | Coef. | Newey-West Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AssetTang | .5025168 | .0457105 | 10.99 | 0.000 | .4126566 | .592377 |
| DivRatio | .0042941 | .0250502 | 0.17 | 0.864 | -.0449509 | .0535391 |
| efftax | .0119829 | .030028 | 0.40 | 0.690 | -.0470478 | .0710135 |
| ebitta | -.2289311 | .1008504 | -2.27 | 0.024 | -.4271882 | -.0306741 |
| TotAssets | .0165532 | .0057529 | 2.88 | 0.004 | .0052438 | .0278626 |
| markettobook | -.0620813 | .0067431 | -9.21 | 0.000 | -.0753371 | -.0488254 |
| Risk | -.1292259 | .0396152 | -3.26 | 0.001 | -.2071036 | -.0513482 |
| taxhaven | .0335457 | .0254963 | 1.32 | 0.189 | -.0165763 | .0836677 |
| law_common | .0219695 | .0570879 | 0.38 | 0.701 | -.0902571 | .134196 |
| law_fr | .0539451 | .0614355 | 0.88 | 0.380 | -.066828 | .1747182 |
| law_sc | .0750016 | .0611523 | 1.23 | 0.221 | -.0452148 | .195218 |
| precrisis | .0720976 | .019266 | 3.74 | 0.000 | .0342235 | .1099716 |
| _cons | -.076153 | .0784653 | -0.97 | 0.332 | -.2304043 | .0780982 |

# List of References

Agrawal, A., & Jayaraman, N. (1994). The dividend policies of all-equity firms: A direct test of the free cash flow theory. *Managerial and Decision Economics* , 139−148.

Akerlof, G. (1970). The Market of "Lemons": Quality, Uncertainty and the Market Mechanism. *The Quarterly Journal of Economics* , 488-500.

Allen, F., & Michaely, R. (2003). Payout policy. In G. Constantinides, H. Milton, & R. Stulz, *Handbook of the Economics of Finance* (pp. 337-429). New York: North Holland.

Amihud, Y., & Lev, B. (1981). Risk reduction as a managerial motive for conglomerate mergers. *Bell Journal of Economics* , 605-616.

Andrade, G., & Kaplan, S. N. (1998). How Costly is Financial (Not Economic) Distress? Evidence from Highly Leveraged Transactions that Became Distressed. *Journal of Financial Economics* .

Baker, G., Jensen, M., & Murphy, K. (1988). Compensation and incentives: Practice vs theory. *Journal of Finance* , 593-615.

Baker, M., & Wurgler, J. (2002). Market Timing and Capital Structure. *Journal of Finance* , 25-26.

Biørn, E. (2009). *Økonometriske emner.* Oslo: Unipub.

Birkeland, S., & Eide, T. (2000). Lønnsomheten i norsk skipsfart. *Arbeidsnotat nr 63/00 for Norges Rederiforbund* .

Brealey, R. A., Myers, S. C., & Allen, F. (2008). *Principles of Corporate Finance.* International: McGraw-Hill/Irwin.

Brennan, M., & Kraus, A. (1987). Efficient financing underasymmetric information. *Journal of Finance*

Constantinides, G. M., & Grundy, B. D. (1989). Optimal investment with stock repurchase and financing as signals. *The Review of Financial Studies* .

Dagens Næringsliv. (2010, November 20). *Dagens Næringsliv*. Retrieved from www.dn.no: http://www.dn.no/energi/article2032258.ece

Dagens Næringsliv. (2011, January 3). *Dagens Næringsliv*. Retrieved from www.dn.no: http://www.dn.no/energi/article2052665.ece

Dagens Næringsliv. (2011, February 21). *Dagens Næringsliv*. Retrieved from www.dn.no: http://www.dn.no/forsiden/borsMarked/article2087514.ece

Dagens Næringsliv. (2011, February 2). *Dagens Næringsliv*. Retrieved from www.dn.no: http://www.dn.no/energi/article2090024.ece

Daskalakis, N., & Psillaki, M. (2008). Do country of firm factors explain capital structure? Evidence from SMEs in France and Greece. *Applied Financial Economics* , 87-97.

DeAngelo, H., & DeAngelo, L. (2006). Capital Structure, Payout Policy, and Financial Flexibility. *Marshall School of Business, Working Paper* .

DeAngelo, H., & Masulis, R. w. (1980). Leverage and dividend irrelevance under personal taxation. *Journal of Finance* , 452-464.

Fan, J. P., Titman, S., & Twite, G. (2010). An International Comparison of Capital Structure and Debt Maturity Choices. *American Finance Association 2005 Philadelphia meetings* .

Forsberg, R. H. (2010). A test of the M&M capital structure theories. *Journal of Business and Economic Research* .

Frank, M. Z., & Goyal, V. K. (2003). Capital Structure Decisions. *The American Finance Association 2004 San Diego Meetings* .

Frydenberg, S. (2004). *Determinants of Corporate Capital Structure of Norwegian Manufacturing Firms.* Trondheim: Trondheim Business School Working Paper No. 1999:6.

Gaud, P., Jani, E., Hoesli, M., & Bender, A. (2005). The Capital Structure of Swiss Companies: An Empirical Analysis Using Dynamic Panel Data. *European Financial Management* , 51-69.

Ghosn, A. (2008). *Capital Structure and firm performance.* New Jersey: Transaction Publishers.

Gordon, M. J. (1989). Corporate Finance Under the MM Theorems. *The Journal of the Financial Management Association* , 19-28.

Graham, J. R. (2000). How big are the tax benefits of debt? *The Journal of Finance* .

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics* .

Greene, W. H. (2008). *Econometric Analysis.* New Jersey: Pearson Prentice Hall.

Grossman, S. J., & Hart, O. (1982). Corporate Financila Structure and Managerial Incentives. *The Economics of Information and Uncertainty* .

Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics.* New York: McGraw-Hill Education.

Harris, M., & Raviv, A. (1991). The Theory of Capital Structure. *The Journal of Finance* .

Investopedia. (n.d.). Retrieved from www.investopedia.com: http://www.investopedia.com/terms/e/enterprisevalue.asp

Investopedia. (n.d.). Retrieved from www.investopedia.com: http://www.investopedia.com/terms/b/bullmarket.asp

Investopedia. (n.d.) Retrieved from www.investopedia.com: http:// www.investopedia.com/terms/b/bearmarket.asp

Jensen, M. (1986). Agency Cost of Free Cash Flow, Corporate Finance, and Takeovers. *The American Economic Review* .

Jensen, M. C., & Meckling, W. H. (1976). A Theory of the Firm: Managerial Behavior, Agency Costs an Ownership Structure. *Journal of Financial Economics* .

Johnsen, T. (2009). Corporate Finance. *Capital Structure* . Bergen, Hordaland, Norway: NHH.

Kochhar, R. (1996). Explaining firm capital structure: The role of agency theory VS. Transaction costs economics. *Strategic Management Journal* , 713-728.

Koller, T., Goedhart, M., & Wessels, D. (2005). Valuation: Measuring and Managing the Value of Companies. New Jersey: John Wiley & Sons.

Kristianslund, I. (1996). *Innføring i Statistikk.* Oslo: Cappelen Akdemisk Forlag.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (2000). Agency problems and dividend policies around the world. *Journal of Finance* .

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (2002). Investor Protection and Corporate Valuation. *Journal of Finance* , 1147-1170.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1998). Law and Finance. *Journal of Political Economy* , 1113-1155.

Lazear, E. P., & Gibbs, M. (2007). *Personnel Economics in Practice.* John Wiley & Sons.

Lind, D. A., Marchal, W. G., & Wathen, S. A. (2008). *Statistical Techniques in Business and Economics with Global Data Sets.* McGraw-Hill.

Mason, R. D., & Lind, D. A. (1996). *Statistical Techniques in Business & Economics.* Chicago: Times Mirror Higher Education Group.

Miller, M., & Modigliani, F. (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *American Economic Review* .

Miller, M., & Modigliani, F. (1958). The cost of capital, corporate finance and the theory of investment. *American Economic Review* .

Mjøs, A. (2007). *Corporate Finance: Capital Structure and Hybrid Capital.* Bergen: Department of Finance and Management Accounting at the Norwegian School of Economics and Business Administration.

Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics* , 147-175.

Myers, S. C. (1984). The Capital Structure Puzzle. *Journal of Finance* , 575-592.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* .

Nergaard, A. (2005). Retrieved from www.ccop.or.th: http://www.ccop.or.th/ppm/document/INEXV2/INEXV2DOC01_nergaard.pdf

New York University - Leonard N. Stern School of Business. (2011, January). Retrieved from NYU Stern: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html

Noe, T. (1988). Capital structure and signaling game equilibria. *Review of Financial Studies* .

Nordic American Tanker Shipping Ltd. (2011). *Financila report*. Retrieved 6 10, 2011, from www.nat.bm: http://www.nat.bm/reports/201/R/1508677/443459.pdf

OECD. (2011). *Home: Tax Policy Analysis > OECD Tax Database.* Retrieved from www.oecd.org: http://www.oecd.org/document/60/0,2340,en_2649_34533_1942460_1_1_1_1,00.html

Petersen, M. A. (2006). Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *Kellogg Finance Dept. Workin Paper No. 329; AFA 2006 Boston Meetings Paper* .

Qfinance. (2010). Retrieved 6 8, 2011, from www.qfinance.com: http://www.qfinance.com/sector-profiles/shipping

Rajan, R. G., & Zingales, L. (1995). What Do We Know about Capital Structure? Some Evidence from International Data. *Journal of Finance* , 1421-1460.

Ross, S. A. (1977). The Determination of Financial Structure: The Incentive Signalling Approach. *The Bell Journal of Economics* .

Sarma, L., & Rao, H. (1969). Leverage and the value of the firm. *Journal of Finance* , 673-677.

Schjelderup, G., Andvord, G. B., Holmøy, E., Håkonsen, L., Semmingsen, L., Skard, I., et al. (2006). Retrieved from NOU 2006: 4 - Rederiskatteutvalget: Forslag til endringer i beskatning av norsk utenriks sjøfart: http://www.regjeringen.no/Rpub/NOU/20062006/004/PDFS/NOU200620060004000DDDPDFS.pdf

Seadrill Ltd. (2011). *Financial report Seadrill Ltd.* Retrieved from Seadrill Ltd: http://www.seadrill.com/stream_file.asp?iEntityId=1252

Shleifer, A., & Vishny, R. W. (1997). A survey of corporate governance. *Journal of Finance* .

Stopford, M. (2009). *Maritime Economics.* London: Routledge.

Tanderø, N. P. (2009, 5 14). Retrieved 6 10, 2011, from www.nordensnyheter.no: http://www.nordensnyheter.no/default.aspx?Id=1986

The Trustees of Princeton University. (2007). *Data and Statistical Services*. Retrieved June 7, 2011, from http://dss.princeton.edu/online_help/stats_packages/stata/panel.htm

Titman, S., & Wessels, R. (1988). The Determinants of Capital Structure Choice. *Journal of Finance* , 1-19.

Torres-Reyna, O. (n.d.). *Panel Data Analysis Fixed & Random Effects.* Retrieved 6 7, 2011, from dss.Princeton.edu: http://dss.princeton.edu/training/Panel101.pdf

University of Oregon. (2005, 12 21). Retrieved 6 6, 2011, from www.uoregon.edu: http://pages.uoregon.edu/aarong/teaching/G4075_Outline/node9.html

Wald, J. K. (1999). How firm characteristics affect capital structure: An international comparison. *The Journal of Financial Research* , 161-187.

Weiss, L. A. (1990). Bankruptcy resolution: Direct costs and violation of priority of claims. *Journal of Financial Economics* .

Wenstøp, F. (2006). *Statistikk og Dataanalyse.* Universitetsforlaget.

Wooldridge, J. M. (2009). *Introductory Econometrics: a modern approach.* Ohio: South-Western Cengage Learning.