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"Which factors are reliably and important for prediciting leverage?"

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Abstract

This thesis examines various determinants that affect capital structure in the Norwegian market from 1994-2019. Our study presents some important theoretical framework and previous empirical evidence in order to highlight the justification of capital structure but did not successfully explain all aspects of capital structure. By applying econometric methods for our data analysis, we were able to construct multiple regression models regressed on several leverage measures which later was used to answer our hypothesis.

Our first model used BIC - selection criterion to choose our core factors, which later was used for core model (5). We found evidence for significant determinants for the nature of assets, growth, industry leverage and risk. Therefore rejected the null hypothesis that there is no correlation between the determinants and leverage. When considering model (6), we examine if the determinants still will be significant when grouping the firms in different industries. This section serves as our contribution to existing literature of capital structure in the Norwegian market. Our result is mostly consistent with trade-off theory when relating literature to our implications and predicts many of the same relations we were studying. In general terms, we can conclude that none of the theories could fully explain our results, like many earlier studies. This study gave us factors that were reliable important for leverage.

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CHAPTER ONE

INTRODUCTION

1.1 Research question

How firms finance themselves and if there is an optimal way to do so are questions that have been asked by economics for centuries. Large numbers of theories and studies have been developed to explain these questions. The importance of capital structure is acknowledged worldwide, but none of the existent capital structure models can explain all the empirical findings. Almost all models have some empirical support, but also contradict each other. Frank and Goyal (2009) indicated that with a large amount of evidence, it is quite easy to find empirical support for one's benefit. This raised several concerns because literature did not have a solid empirical basis to analyse the strengths and weaknesses of the theories. This led Frank and Goyal to write an article titled "*Which Capital Structure Decisions: Which Factors Are Reliably Important?".* In this article, factors that are reliably important for predicting leverage in the United States were examined.

Our study addressed the capital structure practices of Norwegian firms. In order to establish this, unique factors that have significant importance in the relationship with the firm's capital structure were inspected and examined. With this, some of the central theories of capital structure were examined in a bid to explain the findings. These theories are often used as a basis in capital structure research, and are highly recognized by many economists. The formulated problem to be addressed is: "*Which factors are reliably important for predicting leverage?"*

1.2 Aim and Objectives of the Study

The aim of the study is to find firms' specific determinants of the capital structure of Norwegian firms. Firms' specific characteristics were analysed as well as the level of individuals' contribution for capital structures. Four different leverage measures were formulated in accordance with Frank and Goyal (2009), taking into account book and market measurement with main focus on total debt and the market value of assets (TDM). Furthermore, the

determinants of capital structure were examined and addressed to ascertain if pecking order theory and trade off theory can explain differences in capital structure for listed firms in Norwegian.

1.4 Organization of the Study

The study is organized and divided into five chapters, chapter one deals introductory aspect of the study, it provided an explanatory note on the objectives of the study, statement of the problem as well as the organization of the study.In chapter two, the theoretical frameworks and fundamentals for the study were introduced, the chapter further provided information on the determinants of capital structure and the study hypothesis. Chapter three is the methodology, where the economic method was presented and which was used for the analysis. In chapter four, analysis, result and discussion were presented using descriptive statistics and a correlation table made from the sample. Then regression was performed using pooled OLS regression, Lastly, chapter five provides information on the summary of findings, conclusion, limitations of our study, areas for future research among others.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

This section establishes the theoretical framework for the study and briefly highlights some models about determination of capital structure. The chapter introduces capital structure in perfect markets in relation to Miller and Modigliani's theory of capital structure irrelevance. Moreover, tradeoff- theory, pecking order theory and market-time theory will be used as the main guide cord to discuss the statistical findings.

We begin with a brief explanation about capital structure and the irrelevance theory of miller and Modigliani, before we introduce the main theories which are tradeoff theory and pecking order theory. All of the reviewed theories are included in our empirical findings and discussion in the coming chapters.

2.2 Capital Structure

2.2.1 Capital Structure in Perfect Markets

Several theories have attempted to explain the determinant factors that persuade firms' financing preferences. One of the biggest concerns faced today is the fact that there does not exist a theory capable of explaining every important future fact of capital structure or capital decisions, despite broad contributions from leading economic researchers. One of the first main contributors was Miller and Modigliani.

The Modigliani-Miller (MM) Theorem was published in 1958 and 1963. The theory dealt with the irrelevance of capital structure and payout policies. The article published in 1958 expressed that a firm's value is unaffected by changes in capital structure as long as there is a perfect capital market. The present value of future earnings determines the market value. This theory is called the MM1. There are a few assumptions behind perfect capital market and these are:

(1) Investors and firms can trade the same set of securities at competitive market prices equal to the present value of their future cash flows. (2) Investors and firms can also lend and borrow at the same interest rate. (3) There are no taxes, transaction costs, or issuance costs associated with security trading. (4) A firm's financing decisions do not change the cash flow generated by its investment, nor do they reveal new information.

MM1 states that the firm value of a unlevered firm is the same as the firm value of a levered firm. In other words, the way a cake is carved does not change its size. MM1 has an assumption that there is a perfect capital market, but restraints can only hold only in a hypothetical world. Sources like taxes, transaction costs, asymmetric information, agency problems and bankruptcy problems make these assumptions fairly unlikely. A second article by MM explains the second proposition (MM2). MM2 involves how leverage affects expected returns. MM1 is important because it helps to understand that optimal capital structure is based on market imperfections. MM2 involves how leverage affects expected returns. The required returns on equity were obtained using the weighted average cost of capital (WACC). Higher expected return on equity can be obtained by moderating the debt to equity ratio. This can only happen if the rate of returns on assets is larger than the rate of returns on the firm's debt. WACC on the other hand is not affected by changes in leverage. It must be noted that at one point the debt lenders will demand higher returns on their debt due to increased risk. An increase in the rate of returns on the firm's debt will decrease or slow the increases on the return on equity. The tradeoff theory comes into play here.

2.2.2 Capital Structure in Imperfect Markets

In reality there is nothing like perfect markets. Researchers have developed theories that can explain capital structure in imperfect markets by considering numerous market imperfections. Three basic and essential theories for capital structure are the trade-off theory, pecking order theory and market timing theory. Modigliani and Miller (1963) introduced the effect of taxes into the original model. This led to the advent of the trade-off capital structure theory, where the tax-related advantages of debt such as interest tax-shield were offset by the agency costs arising between shareholders and creditors. Another theory based on asymmetric information between ‘outside’ investors and ‘inside’ managers is the Pecking order theory (Myers, 1984;

Myers and Majluf, 1984). The idea behind market timing theory is that firms monitor the market to decide leverage. The financing option that is most valued in the market will be chosen.

2.2.3. Tradeoff Theory

The tradeoff theory explains the way firms finance themselves. It deals with how debt and equity financing is determined based on balancing the good and cost from debt. The financiers of the firm are interested in the profit that can be distributed to them. Free cash flow often represents that. Taxes lowers the free cash flow and thereby the value of equity and the firm. There is a need to deduct earnings before tax and interests are deducted where required. For the unlevered firm, the present value of free cash flow will be the firm's value as well. Debt on the other hand will change the cash flow. When a firm takes up debt, the debt lender requires an interest payment which is most times a certain percentage of the debt. Interest payment is important because they lower the tax base, this is because interest payments are tax deductible. When the tax base gets lower, investors get a larger profit. This is positive because profit can then be distributed to shareholders. Since debt changes the cash flows, the value of the firm also changes. The firm value now is the value of a unlevered firm plus the present value of the tax saving, minus the financial distress cost. If the present value of tax saving is higher than the financial distress cost, leverage has created value through a tax shield on interest payment.

With regards to financing and debt, it seems like debt financing is always positive. This is not the case and debt financing also has limits and costs. First and foremost, no company will gain from tax benefits if the interest payment is higher than earnings before interest and tax, this will cause a negative profit. In some cases, firms use the negative profit to get a refund from taxes they have paid earlier or they use it to pay less tax in the future. But in general and in the long run, the interest payment should not exceed earnings before interest and tax. Secondly, when taking on more debt, the interest payment will increase and higher interest payment will at one point make the risk of default increase. This is a concern because this increases the risk of losing the tax benefits. For example, if the debt lenders notice that risk of default increases, they may therefore demand a premium for that. This will again affect cash flow and the firm's

value. In addition to this, there are a lot of other tax credits and deductions that reduce the benefits of tax shields. One example is financial distress/bankruptcy.

2.2.3.1 Financial Distress/Bankruptcy

Financial distress occurs when a firm has debt and finds it difficult to meet its debt obligations. If a firm does not pay the required interest payment or violates the contract between the firm and debt holders, it can have a negative impact on the firm. The debt holders can overtake the firm's assets through bankruptcy. This is something that firms have to take into consideration when taking debt. In a perfect capital market, financial distress is not a disadvantage of debt. As with MM1 and a perfect capital market, the value of the firms does not depend on the capital structure. The value of the firms does not change because the ownership of financial distress goes from equity holders to debt holders. It can be indicated that a perfect capital market exists and in reality, financial distress and bankruptcy is a complicated process.

Financial distress will actually reduce the value of the assets the firm's investors receive in a non perfect capital market. This is due to direct costs from financial distress such as consulting, legal and accounting expenses. This is often 3-4% of the pre-bankruptcy market value of assets. Indirect cost of financial distress will also affect the firm. Examples of indirect cost are loss of customers, loss of suppliers, loss of employees and cost to credit etc. This loss is often between 10 to 20% of the firm’s value, but varies across different industries. The costs are significant and someone has to pay for them. In an investment situation, equity holders will only lose their investment and therefore do not care about the bankruptcy cost. In a possible failed investment, the debt holders will have to pay for the cost. Debt holders know this and therefore will adjust their approach to debt. The present value of the bankruptcy cost will be less. There are three factors that determine the present value of distress cost, these include:

1. The probability of financial distress: This increases with the amount of a firm's liabilities and the volatility of the firm's cash flows and asset values.
2. The magnitude of the cost after a firm is in distress: Financial distress will vary across industries, for some industries, financial distress will be less than others because they have a lot of tangible assets that can be liquidated.

3. The appropriate discount rate for the distress cost: A cost beta which is an opposite sign of the firm's beta indicating that the higher the risk that firm has, the lower the cost beta.

2.2.3.2 Is Trade-off Theory able to explain Capital Structure?

The historical data does not provide a significant agreement in favour of the trade-off theory. Debt financing is used to reduce tax payment, at least according to trade-off theory, but tax rates and debt ratios that have been observed do not correspond (Frank and Goyal, 2008). Also, consistent empirical findings of inverse relation between debt and profitability contradict the trade-off theory. Profitable firms should not have conservative debt ratios, but there are still substantially many profitable firms with excellent credit ratings that have low debt ratios (Myers, 1977; 2001). Another researcher found that approximately 50% of taxpaying firms in his sample could utilize the interest tax shield more efficiently by doubling the interest payment (Graham, 2000).

Prior to these findings, Graham found results that were consistent with the trade-off theory. His results showed that changes in long term debt were positively related to a firm's marginal tax rate (Graham, 1996). Myers (2001) argued that large firms may favour debt financing due to the low cost of adjusting their capital structure and multiple financing alternatives. The trade-off theory argues that profitable firms should use debt to finance themselves due to interest tax shields and MacKie-Mason (1990) result supported this. Taxpaying firms favor debt over equity as a financing tool.

2.2.4 The Pecking Order Theory

Pecking order is one of the most persuasive theories to explain corporate leverage. Initially, perfect capital markets as proposed by MM, was reinforced in a different matter by Myers and Majluf (1984), who found that management prefers to utilize internal funds that are generated in opposition to external debt financing, and eventually equity as a final rescue. The optimal financing source is based on information asymmetry and adverse selection. In a case of information asymmetry, a firm's manager has more information than the investor. Adverse

selection is at its minimum when internal funds are preferred first. The second choice is debt due to low cost of adverse selection and low information asymmetry. Equity is the last alternative because of its high cost and information asymmetry (Myers, 1984). Harris and Raviv (1991) argued that capital structure options are a tool to be used to remove any inefficiency that is caused by asymmetric information. Since debt decisions give signal to the outsiders on how operational drift is going and solidity. This can be managed by presenting a low risk averse attitude towards debt. Myers (1984) discovered that changes in capital structures convey signals to the company's investors.

If equity is preferred over debt when both are available, it will portray a picture of pessimistic managers and that the firm value is overpriced. Therefore, equity is only a choice when there is no other financing source available, in other word, the firm has no retained earnings, high debt and additional debt will be more costly than issuing equity. In contrast to trade-off theory, the pecking order theory does not try to aim at optimal debt ratio. According to the pecking order theory, capital structure is determined by their obligations and minimizing adverse selection and information asymmetry. Firms prefer debt rather than equity financing when an external financing approach is necessary due to cost related to information. Equity is barely issued under the assumption that debts are more hybrid securities, since they are fixed and less affected by asymmetric information. The key to moderating these effects relied on accumulation of dividends and change in working capital. Changes in external financing due to deficits should therefore be related to changes in internal measures such as net cash flow.

2.2.4.1 Is Pecking Order theory able to explain Capital Structure?

There are multiple studies that acknowledge pecking order theory and find support for it. Myers and Majluf (1984) found that as long as the firm's manager feels they have better information than others, they prefer other financing sources than equity. Myers (1984) also discovered that lower debt was associated with high growth firms with high profitability. Frydenberg (2004) study of Norwegian manufacturing firms had strong support for pecking order theory as well. Even though Shyam-Sunder and Myers (1999) sample was small, the results were consistent with the pecking order theory.

Frank and Goyal (2003) on the other hand found results that contradicted Myers (1984) and Shyam-Sunder and Myers (1999). Frank and Goyal (2003) study had the same context as Shyam-Sunder and Myers (1999), but with a much larger sample. Despite a broad framework that can be seen as a part of a larger picture to determine a firm's capital structure, the pecking order theory still does not count for all determinants (Frank & Goyal, 2008). Research on pecking order theory has not been adequate to show the connotation of determining firms' capital structure. Fama and French (2002) demonstrated that pecking order and tradeoff theory had certain features that determine capital structure, where certain appearances were better described by pecking order theory.

2.2.4 Market Timing Theory

A slightly different approach that challenges both pecking order- and tradeoff theory is market timing theory. The idea of the theory is that the market is one of the determinants when choosing the leverage ratio. Relevant studies such as Baker and Wurgler (2002) have attempted to reflect why equity financing was increasingly high in hot periods, as well as debt to explain long term leverage. Their research suggested that equity issuers on average can time the market with a component of cost of equity. Managers examine equity and debt while financing a project and choose the most appropriate option at the time. Managers are also said to avoid external financing if one of the two sources of funding is unfavorable.

2.3 Empirical studies on determinants of capital structure

Similar leverage factors are valued differently by researchers in various studies, thus, there is no consensus regarding determinants of capital structure. Although some determinants like firm size, tangibility, growth, and profitability seems to have some consistency. The results of international research as well as research focused on Norwegian firms will be presented below for almost each determinant.

2.3.1 Firm Size

Firm size has been considered as a natural diversification mechanism of earnings, and should reduce the probability of default (Titman & Wessel, 1988). Large firms should therefore have a higher leverage ratio than a small firm. The tradeoff theory predicts a positive relationship between leverage and size. The pecking order theory on the other hand predicts a negative relationship between leverage and size. The reason behind this is that large firms are more well known than small firms because they were established much earlier and also had the time to retain earnings. In addition, large firms have less of a problem with information asymmetry than small firms, thus making equity more favorable.

Frank and Goyal (2009) conducted a study on capital structure for American public firms in the time period 1950 to 2003. They wanted to examine which factors were reliably important. Their results showed that firm size was positively correlated with leverage when total debt over market value of assets (TDM) was used as leverage measure. Alternatively, large firms had higher leverage ratios. Psillaki and Daskalakis (2009) study on capital structure determinants also showed a positive relationship between firm size and leverage. Even though there has been used different measurements for leverage and firm size, similar results have been found by Rajan and Zingales (1995), Frydenberg(2004), Gaud, Hoesli, and Bender (2005), Antoniou et al (2008), Mjøs (2007) and Fan et al (2012). Rajan and Zingales (1995) found a negative relationship between firm size and leverage in Germany, but this was not caused by asymmetric information according to them. The previous empirical research is in accordance with tradeoff theory.

2.3.2 Profitability

Profitability is a measurement of efficiency and is measured as operating income before depreciation to asset. Profit is a positive sign in the debt market and makes it easier for profitable firms to use debt as a finance source. The trade-off theory forecasts a positive relation between profitability and debt. Intuitively, high profitability increases the amount of funds available for managers to invest in new potential unprofitable investments. Pecking order theory implies a negative correlation between profitability and leverage. Since the most

affordable way of raising capital is by using retained cash, high profitability increases financing cash and reduces the need of issuing debt (Myers, 1984). Over time, the use of internal funds will make the firm less levered. For less profitable firms, there is the other way around. The lack of internal funds will lead to more lending and thus, higher leverage.

Profitable firms with low debt ratios are easily explained by the pecking order theory, but not the trade-off theory. Results from empirical studies show that there are substantially many profitable firms that have low debt ratios (Fama & French, 2002; Frank & Goyal, 2009). According to the trade-off theory, this should not be the case, managers should exploit the tax advantages and increase debt ratio. Frydenbergs (2004) results also showed a negative relationship between leverage and profitability for Norwegian manufacturing firms.

2.3.3 Growth

An increase in financial distress can be caused by growth. Therefore, the tradeoff theory predicts that growth will reduce the leverage. Pecking order on the other hand predicts that growth causes the leverage ratio to increase. Thus a positive relationship. The most used proxy for growth is market-to-book ratio (Frank & Goyal, 2009). The percentage change in total assets (log of assets) and capital expenditure are also used to measure growth. These measurements should be positively correlated to leverage, at least according to the pecking order theory.

Expected future growth is considered to be negatively related to leverage according to the theories. Titman and Wessels (1988) as well as Rajan and Zingales (1995) found that there is an opposite relation between growth firms and leverage, where high growth firms tend to use less leverage. Similar results were found by Gaud et al. (2005) and Antoniou et al (2008). Myers (2001) results showed that the leverage ratio for growth firms was low or negative. Frydenberg (2004) presented results where growth was determinant for capital structure.

2.3.4 Nature of assets

Tangible assets are determinants for capital structure and are measured by tangibility, RND and SGA. (see chapter definition of variables for more details). The most secure assets that creditors can accept as security for the issued debt can be seen as tangible assets. Debtors can easily liquidate the tangible assets in the case of a bankruptcy or an unexpected event. Tangible assets serve as collateral for the firm's debtor and this security reduces the distress cost and asymmetric information. Intangible assets on the other hand, for instance renomme or good reputation are more difficult to liquidate due to asymmetric information and not having a revision standard like tangible assets.

A positive relationship between tangible assets and leverage is predicted by tradeoff theory. Firms with a high ratio of tangible assets to total assets should finance themself with more debt due to the low cost of debt. The pecking order theory predicts a negative relationship between tangibility and leverage. The reduction in asymmetric information by tangible assets makes equity financing less costly and therefore more attractive (Harris and Raviv, 1991). As a result, firms with high tangibility should have less leverage ratios. However, adverse selection is increased by tangibility, which leads to higher debt. Firms that spend a lot on selling, general and administrative- and research and development expenses tend to have more intangible assets and thus lower leverage ratio (Frank & Goyal, 2009, s. 9).

Myers (2001) found that intangible assets are associated with low debt and that tangible assets are positively correlated with leverage. Gaud et al. (2005) presented results where tangibility and leverage had a positive relationship. The same results were found by Fan et al (2012), Frank and Goyal (2009), Antoniou et al (2008) and Mjøs (2007). These results are in line with the tradeoff theory. Contradicting results were found by Psillaki and Daskalakis (2009). They demonstrated that tangibility had a negative relation with leverage everywhere in the world except for Portugal. Booth (2001) also found a negative relation between tangibility and leverage. These findings are in line with the pecking order theory.

2.3.5 Risk

Risk is associated with the firm's earning volatility. High uncertainty of cash flows lead to higher financial distress costs which lead to firms being less tempted to finance by debt. The reason behind this is that high uncertainty of cash flows makes debt related tax savings less predictable. Stakeholders willingness to invest is also determined by risk. The tradeoff theory therefore predicts a negative relationship between risk and leverage. The higher risk, the lower leverage ratio. Some firms are more affected by adverse selection, and the pecking order theory therefore predicts that riskiers firms would have higher debt ratios. In addition, firms may have to take upon debt to meet their obligations due to high volatility in cash flows. The cash flow could be lower than expected for some time periods.

Psillaki and Daskalakis (2009) discovered a negative correlation between leverage and risk, just like the tradeoff theory predicted. Firms with high risk should have lower leverage ratios (Frydenberg, 2004). Frank and Goyal (2009) found six core factors that affected leverage the most. Risk was not one of them, but they found that risk affected leverage slightly and that this was a positive effect.

2.3.6 Industry

Industry is presumed to have an impact on the choice of capital structure. Leverage ratios differ significantly between industries (Lemmon, Roberts, and Zender, 2008). This has a number of explanations, whereas one possible explanation is that firm managers use the median industry leverage as a benchmark to decide their own leverage ratio. Results supporting this explanation have been found by Hovakimian et al. (2001). Another explanation is that firms in different industries often face different challenges. Two industry variables will be used to test for industry conditions. First variable is already mentioned above and is industry median leverage. The tradeoff theory predicts that the higher this variable is, the more debt a firm will have. The second variable is industry median growth and the higher this variable is, the lower should the debt be. Pecking order suggests that industry is just an indirect link as it is only a benchmark for financing deficit.

Frank and Goyal (2009) discovered a positive correlation between industry leverage and firm leverage. Myers (2001) pointed out that some industries rely more on high debt ratios than others. Frydenberg 2004) presented industry as one of the determinants of capital structure for norwegian firms.

2.3.7 Tax

Debt financing clearly offers advantage in the form of tax deductible interest payments, given that there is a corporate tax system (Mayers & Majluf, 1963). The increase of income for shareholders, due to the interest tax shield, is a positive effect by choosing debt over equity. Therefore, the tradeoff theory predicts that firms will issue more debt when the tax rate increases to efficiently benefit from higher interest tax shields. Deprecation, investment tax credits etc. can be categorized as non debt tax, and is an alternative for the interest tax shield of debt financing (DeAngelo and Masulis 1980). This is because deprecation can be used to reduce taxes, seeing that they can be deducted from the income before taxes. The trade-off theory suggests that debt financing is negatively correlated with non debt tax.

Mayers and Majluf (1984) found results that complied with the trade-off theory, revealing that firms would finance themselves with debt due to interest tax shield. Fan et al. (2012) results demonstrated that firms use more debt in countries where the tax gains are greater. Mayer (1990, cited in Rajan & Zingales, 1995) on the other hand did not find a result that has the same conclusion. The study indicated that taxes do not have any explanatory power. Other researchers like Graham (2000) found that firms do not utilize the tax benefits. Results from DeAngelo and Masulis (1980) indicated that firms who had large non-debt tax shields also had small debt ratios. Another researcher that found a negative relationship between non-debt tax and debt financing is Frydenberg (2004). Results from empirical studies are in line with the tradeoff theory.

2.4 Hypothesis development

The theories and empirical studies presented in this chapter are the foundation of our hypothesis. In this chapter we introduce each determinant with a short description of the foundation of the hypothesis developments.

Firm size

Large companies have a better reputation and are more diversified than smaller firms. Consequently, the chance for bankruptcy is relatively smaller as mentioned (Titman and Wessels, 1988). Larger firms will also be more secure of mispricing due to asymmetric information and larger firms can evoke their fundraising even more and grow further. We expect a positive relation between leverage and size.

H_o: There is no correlation between leverage and firm size

H_1: There is a correlation between leverage and firm size

Profitability

In section 2.3.2 we found that there is a negative relationship between profitability and debt financing (Titman and Wessels 1988; Rajan and Zingals, 1995; Fama and French 2002; Hovakimian et al 2004), Therefore we expect that profitability will have a negative impact on leverage.

H_0: There is no correlation between leverage and profitability.

H_1: There is a correlation between leverage and profitability.

Growth

Previous empirical research has found a negative relationship between leverage and growth (Frank & Goyal, 2009). This is consistent with tradeoff theory which predicts a similar relationship. As a result we also expect a negative relation between leverage and growth.

H_0: There is no correlation between leverage and growth.

H_1: There is a correlation between leverage and growth.

Nature of assets

According to recent findings for both norwegian and foreign firms by Frydenberg (2004), Frank and Goyal (2009), Rajan and Zingales (1995) that discovered a positive relation between the two variables, we expect to find similar results. Firm that spends much on SGA is expected to have more intangible assets and therefore lower leverage ratio (Frank & Goyal, 2009).

H_0: There is no correlation between leverage and the nature of assets.

H_1: There is a correlation between leverage and the nature of assets.

Risk

Studies by Psillaki and Daskalakis (2009) and Frank and Goyal (2009) found a negative relationship between leverage and risk. The tradeoff theory also predicts a negative relationship between leverage as risk. Therefore we expect to find results that are similar to previous findings.

H_0: There is no correlation between leverage and risk.

H_1: There is a correlation between leverage and risk.

Industry

As discussed in the section 2.3.6 Goyal found a significant variation across leverage when controlling for industry conditions. The same did Frydenberg (2004). Therefore, we control for firm leverage heterogeneity by including industry leverage as one of firm leverage predictors.

H_0: There is no correlation between firm leverage and industry median leverage.

H_1: There is a correlation between firm leverage and industry median leverage.

Tax

According to the tradeoff theory there should exist a positive relationship between leverage and tax shield. Results in accordance with the tradeoff theory have been found by Mayers and Majluf (1984). We expect similar results.

H_0: There is no correlation between leverage and interest tax shield.

H_1: There is a correlation between leverage and interest tax shield.

DeAngelo and Masulis (1980) showed that debt financing is negatively correlated with non-debt tax. The same outcome is predicted by the tradeoff theory. We therefore expect a negative correlation between leverage and non-debt tax.

H_0: There is no correlation between leverage and non-debt tax.

H_1: There is a correlation between leverage and non-debt tax.

CHAPTER THREE

METHODOLOGY AND DATA

3.1 Introduction

The collected data creates the foundation of this study and therefore, this section provides information on how data was collected and the justification for the treatment of the data. This section also provides information on how the data was analyzed.

3.2 Data Collection and Time Horizon

In order to test the hypotheses stated in the study, there is a need to decide on time and the period for the study. Leverage test was carried out for the recent time in order to observe recent trends in capital structure for Norwegian firms. Maybe more important, the study included as many observations and many fitted firms as possible for the research to be reliable. Based on that, the study employed the use of a sample period of 25 years, from 1994 to 2019. Furthermore, the study employed the use of research capital structure in relevant areas, which is why the population of the study consists of companies that operate in Norway. The study population consisted of 243 firms. The input data for this study were extracted from the Thomson Reuters Eikon's database. Eikon consists of comprehensive information that covers necessary components needed to carry out the analysis.

3.3 Types of Data

The data consist of daily, monthly and yearly observations which later were converted to annual statistics. Since the financial and Dot com- Crisis took place in the period of time the research was conducted, some anomalies may be included. This is moderated using a dummy variable in one of the later regression analyses. There should not be any survival bias since no restriction was imposed that systematically excluded some firms.

Financial firms (Banks and insurance) are not included due to regulatory requirements and their structural characteristics that make them naturally different from companies included (IT,

Technology, etc). The study ended up using 243 firms and a dataset containing 3044 observations.

3.4 Regression Analysis

In order to test the hypothesis, it was considered appropriate to make use of multiple regression analysis which enhances the discovery of factors that are significant in the determination of a firm's leverage ratio and prediction of values of samples. The regression models can be described as:

$$Y_t = \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_{tk} + \mu_t$$

The above equation consists of a dependent variable Y, independent variables X and the error term (μ). The error term is the residual variable that represents variation in the dependent variable which is not explained by the regressors (beta coefficients) on the regression model. "T" represents the number of observations and "k" is the number of regression variables included in the model. Ambition of the multiple regression model is to "capture" the relationship between regressors and the dependent variable. The coefficients should explain a relative change in dependent variable for one-unit change in independent variable. This excludes B0, which is the intercept that expresses the mean value when all X variables are equal to zero.

3.5 Panel data

The regression in this study requires data combination from both time series and cross-sectional data. With the inclusion of different firms in the dataset for a fixed period of time, it is comprehensive to use panel data. In other words, panel data contains data for a multiple time period and for multiple units (firms in our case). However, panel data can be unbalanced, in that regard, there was no full information for all the firms in all the periods of time selected for the study, and therefore some of the firms were observed more than others. For instance, a firm

can be included in the entire time frame of 20 years while a different firm can only occur in the dataset for 5 years. There are therefore cases of unbalanced cases like this.

Panel data's advantage is that it can handle and use the information in the dataset better than time series and cross section methods. When studying changes, panel data is an excellent option and there are three different models of panel data that can be used. There is pooled OLS model, fixed effects model and random effects model. For panel data, the error term is very important. Assumptions about the error term determinants include the type of model to be used. As Frank and Goyal (2009) did, our study will also focus on a pooled ordinary least square (OLS) model. Frank and Goyal (2009) excluded the firm's fixed effects because their study did not aim to look at the dynamics. The fixed effects interpretation is also not appropriate for this present research.

3.5.1 Pooled OLS

In a pooled OLS model, there is no separation between time series and cross-sectional data as random and fixed effects models do. A random effects model considers differences across entities while fixed effects models consider changes within entities. Pooled OLS is the basic model of panel data. The coefficients are found where the sum of squares residuals is the smallest. OLS assumes that there is a linear in parameters, random sampling, no multicollinearity, zero conditional mean, homoscedasticity and no autocorrelation. When all of these assumptions stand, correct estimates that are linear and unbiased will be gotten.

When there is no time specific or cross-sectional effects, a pooled OLS model will be sufficient and results in consistent estimates. It can be described as:

$$Y_{it} = \beta_0 + \beta X_{it} + \varepsilon_{it}$$

In the above equation, Yit is the dependent variable. i stands for the cross-sectional dimension while t is for the time series dimensions. B0 is the intercept that expresses the

mean value when all X variables are equal to zero. B is the vector of independent coefficients. X is the vector of the independent variables. The last part of the equation is the error term where cross-sectional and time effects are zero.

3.6 Outliers

Outliers are often referred to as data observations that deviate to a special degree from other values included in the dataset. Considering OLS to be sensitive to such observations and extreme values for estimates of regressions, the study decided to cut this observation to obtain reliable results. A passive way to encounter outliers should be aimed as they may cause increased error variance and low explanatory power of estimates. With some extreme cases of observation, it was considered appropriate to winsorize the data, which is the process where the tails of the normal distribution are replaced to the last extreme observations that have not been removed. Firstly, the outliers were detected by drawing histogram plots and specifying commands for different variables to define the extremeness of the case. Cook's distance and residual analysis was also performed, by measuring the relative change in coefficient when observations were dropped. All values higher than 10 were problematic. 2.5% of both tails for all selected variables were winsorized in order to keep consistency in treatment and not modify data in a manipulated way.

3.7 Definition of variables

In this section we explain the variables that are going to be included in our analysis. We will review the dependent variable as well as the determinants. We mainly use four leverage measures, but the most critical and focused measure is TDM.

3.7.1 Dependent Variables

$$TDM = \frac{Total\ debt}{Market\ value\ of\ assets}$$

$$TDA = \frac{Total\ debt}{Book\ value\ of\ assets}$$

$$LDM = \frac{Long\ term\ debt}{Market\ value\ of\ assets}$$

$$LDA = \frac{Long\ term\ debt}{Book\ value\ of\ assets}$$

3.7.2 Determinants

Firm size

Log of Assets (LogAssets): The variable log of assets was generated in two steps. The first step was to deflate the book value of assets to year 2012 by using the GDP deflator. Second step was to take the natural logarithm of the deflated data

Mature firms (Mature): Mature is a dummy variable that takes a value of one if the firm has been listed in the dataset for more than 5 years.

Profitability

$$Profit = \frac{operating\ income\ before\ depreciation}{Book\ value\ of\ assets}$$

Growth

$$MKTBK = \frac{Market\ value\ of\ assets}{Book\ value\ of\ assets}$$

$$Capex = \frac{Capital\ expenditure}{Book\ value\ of\ assets}$$

Change in log assets (ChgAsset): The change in log of the book value of assets.

Industry

Median industry leverage (IndustLev): Median to TDM. Industry leverage is a variable constructed out of median to total debt over market value of assets by industry sector variable. The disadvantage of this variable relies on the industry level. Categorization of firms by CID-codes could not be done or division of firms as broad as US-firms, since Norwegian firms in particular are not categorized in the same manner. However, they were divided into industries. The contribution of this variable is to indicate whether industry effects are important, or minor compared with other studies that managed to divide firms in groups with more similarities.

Median industry growth (IndustGr): The median of change in the log of assets. This is measured as the median log of assets by using the industry and year variable.

Nature of assets

$$Tang = \frac{Net\ property, plant\ and\ equipment}{Book\ value\ of\ assets}$$

$$RnD = \frac{Research\ and\ development\ expenses}{revenu}$$

$$SGA = \frac{Selling, general\ and\ administrative\ expense}{revenu}$$

Taxes

The tax system in Norway is considerably different from USA firms and the database Eikon did not provide any good steadfast tax rates or tax- payments. The proxy used in this study is based on the average tax rate for firms in Norway (SSB). The disadvantage is that we do not regress specific tax payments for each firm and the relevance of the tax rate is solely based on if the firm was in a tax position and paid taxes. Booth et al (2001) argues that it is difficult to define a good measure or a proxy for the tax variable for each individual firm. Since each firm can be in a tax position and either obtain zero or a positive margin for taxes. Therefore we use a proxy that should serve as an average tax rate and still reinforce other variables' explanatory power. Tax is therefore the income tax rate for Norwegian firms.

$$Depr = \frac{Depreciation\ expense}{Book\ value\ of\ assets}$$

Risk

Variation in a company's current profitability is referred to as risk. Current profitability is measured by calculating the returns from stock prices and then finding the standard deviation for the returns.

3.8 Data descriptive

Table 1 highlights important descriptive statistics for our analysis. The summary statistics provides information about means, percentiles and standard deviations which is used to mark differences in tendencies and spread. For many of the variables, the mean is higher than the median which indicates high cross-sectional differences. The table illustrates a positive skewness to the right for many of the variables since the mean is higher than the median.

Table 1: Summary statistics

Table 1 highlights important descriptive statistics for our analysis. The summary statistics provides information about means, percentiles and standard deviations which is used to mark differences in tendencies and spread. For many of the variables, the mean is higher than the median which indicates high cross-sectional differences. The table illustrates a positive skewness to the right for many of the variables since the mean is higher than the median.

	N	Mean	Std. Dev.	p10	Median	p90
TDM	2083	0.38	0.34	0.00	0.30	0.89
TDA	2496	0.48	0.23	0.14	0.50	0.75
LDM	2495	0.18	0.22	0.00	0.09	0.54
LDA	2502	0.21	0.21	0.00	0.16	0.53
Profit	2502	-0.07	0.25	-0.36	0.00	0.11
log Asset	2502	20.49	2.16	17.71	20.55	23.43
Mature	3047	0.64	0.48	0.00	1.00	1.00
MKTBK	2496	3.55	6.74	0.55	1.32	6.93
ChgAsset	2263	0.10	0.37	-0.26	0.05	0.51
Capex	2502	0.02	0.05	0.00	0.00	0.08
IndustLev	2872	0.37	0.18	0.17	0.34	0.59
IndusGr	2857	0.09	0.16	-0.05	0.05	0.25
Tang	2502	0.32	0.30	0.00	0.20	0.80
RnD	2395	0.00	0.00	0.00	0.00	0.00
SGA	2395	0.70	1.49	0.04	0.25	1.12
Tax rate	3047	0.26	0.02	0.22	0.28	0.28
Depr	2502	0.03	0.03	0.00	0.03	0.07
Risk	2534	0.17	0.41	0.05	0.11	0.27

TDM

TDM has a mean of 0.38 and a standard deviation of 0.34. This indicates how much debt a firm has in relation to its assets' market value. The higher this ratio is, the higher the leverage will be. The mean of 0.38 indicates that a firm has an average debt of 38% in regards to the firm's market value of assets.

Market to book value (MKTBK)

This ratio compares a firm's market value to book value. Assuming that the market value is much higher than the book value, the firm is considered overvalued. A mean of 3.55 indicates that the stock price is expensive and overvalued. The observed standard deviation (6.47) for this variable is higher in comparison with the rest of the included variables. Based on our data exploration, we haven't discovered any special reasons why MKTBK is relatively higher than that reported by Frank and Goyal (2009). For instance, we explored how this ratio changes over time and we observed that its values are consistently high throughout the time period covered by our study. This suggests that the difference in MKTBK levels between our study and that of Frank and Goyal (2009) is a difference that is likely to be related to different markets used by the two studies.

Profit

The mean for profit is -0.07 and low compared to the ones found by Frank and Goyal (2009) which found a mean of 0.02. In our untabulated results we calculated annual averages of this variable which discovered that while profitability of Norwegian firms was positive between 1994 and 2000, it started declining in the years starting from 2001 onwards. Additionally, profitability of Norwegian firms was very low in the last three years covered by this study (2017-2019) with profitability levels being around -0.10, on average.

Log of Assets

The mean of the natural logarithm of total assets is 20.47 (NOK723 Million) and has a standard deviation of 2.27. The 10th percentile of the natural logarithm of total assets equals 17.71 (an equivalent of NOK49 Million) while the 90th percentile equals 23.43 (an equivalent of NOK15 Billion). This variable was used as a proxy for firm size.

Mature

An average of 0.64 of this variable indicates that 64% of the sample corresponds to mature firms. The remaining 36% correspond to firms who have been listed on Thomson Reuters Eikon for less than five years.

Capex

A mean of 0.02 indicates that the firms in our sample did not have high capital expenditures over the sample period covered by this study. Since CAPEX is an indicator for firm growth, this suggests that Norwegian firms haven't experienced large growth rates over the studied period.

Industry Leverage

The measure has a mean of 37% and displays 50th and 90th percentile of 34% and 61%, respectively. Relatively high standard deviation indicates high differences in terms of debt within industries in the local market.

Industry Growth

The average is 0.09 across all firms and standard deviation is 16% which is a very high difference between firms. This indicates high potential for future growth for the firm's size variable controlled for industry. Frank and Goyal however found a mean of 0.02 which is similar to the findings of this study.

Tangibility

The average firm in the sample has a mean of 0.32, which suggests that fixed assets account for 32% of total assets and can be utilized as collateral. The mean is 2% lower compared to Frank and Goyal (2009) and the standard deviation is 5% higher. The sample of this study

deviates more from the mean of other samples in the study mentioned above as their findings indicate 34% mean and 25% standard deviation.

RnD

The average is 0%, thus, also making the standard deviation the same. For USA firms the mean was 14% and standard deviation was 95% (Frank & Goyal, 2009). A mean of 0 indicates that firms in the sample do not use much of the revenue on research and development.

SGA

This measures how much selling, general and administrative expenses have been used from every dollar a firm earns. Frank and Goyal (2009) presented a mean of 38% with a standard deviation of 110%. Findings from our analysis revealed a mean of 70% and with a standard deviation of 149%. These findings suggest that selling, general and administrative expenses are significantly higher than those observed by Frank and Goyal (2009).

Tax rate

Tax rate is the average income tax for companies. This is 26% and the standard deviation is 2% while the median is 28%. Compared to Frank and Goyal (2009), this is lower, but the tax rate is determined differently by countries with the United States tax rate having an average of 45% and a standard deviation of 7%.

Depreciation

Assets depreciate over time and become less valuable. This ratio shows the value lost on an asset. A mean of 3% indicates that the book value of assets decreases with 3% The firms in our sample have less depreciated assets compared to the firms in Frank and Goyal (2009) which reports a mean of 5%.

Risk

Our proxy of risk - measured as asset return variance - has an average of 17% and a relatively high standard deviation of 41%. These findings are somewhat different to what Frank and Goyal (2009) found, but this could be due to the fact that their factor is measured yearly. Risk measured was 27% in their study and the standard deviation was 40%.

CHAPTER FOUR

Results and Analyses

4.1 Introduction

This chapter consists of correlation analysis, regression models and the empirical results that are going to be used to answer our hypothesis. Lastly consider the findings and relate these to our hypothesis, reckoned theories and previous empirical research. Then we move on to our main models which are mainly based on regression analysis. We begin with the first regression model (3) which aims to choose the core factors - determinants of firm leverage. Then we introduce model (4) with constrained and not constrained firm characteristics. Model (5) is our main model where we test whether the factors are significant and reliable. Finally we present model (6) where we analyze the changes for determinants for different industries. This final model summarizes all our earlier regressions results, and provides the final answer to our hypothesis.

Figur 1:

This figure is made to give a overview for the steps we are going to perform during this study.

Models	Model number	Aim of model	Analysis	Regression and variables used

BIC –factor selection	(3)	Chose firm factors based on BIC-criteria.	Which factors should be included for the best fitted model?	All variables with a possible correlation with leverage from Frank and Goyal.
Do different factors matter for firms for different circumstances	(4)	Does firm characteristic affect the importance of factors defined in model (3).	Used for robustness check.	OLS- regression for the main factors obtained in model (3).
A core model of leverage	(5)	Core factors significant?	Is the core factors significant when regressed on leverage measures; TDM (panel A) and TDA (panel B)	OLS- regression for the main factors obtained in model (3).
Industry impact on leverage	(6)	Does the factors matters different in various industries?	Which core factors is more important for leverage in some industries?	Regress individual regression for each industry with the factors obtained in model (5).

4.2 Factor selection

4.2.1 Correlation table

In order to choose factors that have an effect on firm leverage, we take different steps based on different statistical tools. First of all, we want to see if there is correlation between the dependent variables and the factors. The correlation coefficient is a statistic with a value ranging from +1 to -1. A perfect positive correlation is shown by a correlation of +1, whereas a perfect negative correlation is shown by a correlation of -1. In the case of a correlation of 0 there is no linear relationship between the independent variables. A correlation higher than 0.7 is considered to be high.

Table 2: Correlation Table

This table displays the correlation coefficient between the dependent variables and leverage factors. The number under the correlation coefficient is the P-value.

Variables	TDM	TDA	LDM	LDA
Profit	0.053*	0.056*	0.162*	0.204*
	(0.022)	(0.005)	(0.000)	(0.000)
Ln(assets)	0.189*	0.197*	0.329*	0.342*
	(0.000)	(0.000)	(0.000)	(0.000)
Mature	0.050*	0.022	-0.111*	0.023
	(0.023)	(0.268)	(0.000)	(0.244
MKTBK	-0.295*	-0.122*	-0.285*	-0.111*
	(0.000)	(0.000)	(0.000)	(0.000)
ChgAsset	-0.222*	-0.129*	-0.016	0.003
	(0.000)	(0.000)	(0.441)	(0.888)
Capex	0.116*	0.046*	-0.026	0.167*
	(0.000)	(0.021)	(0.201)	(0.000)
IndustLev	0.212*	0.196*	0.269*	0.147*
	(0.000)	(0.000)	(0.000)	(0.000)
IndusGr	-0.085*	0.019	-0.031	0.013
	(0.000)	(0.336)	(0.119)	(0.509)
IndustLev	0.212*	0.196*	0.269*	0.147*
	(0.000)	(0.000)	(0.000)	(0.000)
RnD	-0.116*	-0.178*	-0.151*	-0.165*
	(0.000)	(0.000)	(0.000)	(0.000)
SGA	-0.185*	-0.256*	-0.136*	-0.214*
	(0.000)	(0.000)	(0.000)	(0.000)
Tax_rate	0.012	0.056*	0.049*	0.057*
	(0.587)	(0.005)	(0.015)	(0.005)
Depr	0.264*	0.241*	0.126*	0.193*
	(0.000)	(0.000)	(0.000)	(0.000)
Risk	0.084*	-0.026	-0.049*	-0.051*
	(0.000)	(0.235)	(0.026)	(0.020)

* shows significance at the .05 level

The correlation between TDM, TDA LDM and LDA is moderate, but this is expected because of them being proxies constructed by very similar components. The main goal of this study is to observe how different variables are correlated to leverage. The correlation matrix has therefore been adjusted for that purpose, following the approach of Frank and Goyal (2009). The coefficients for Profit, Log_Asset,, IndustLev, Tang and depr are positive and statistically significant for each leverage measure at 5 % level. The coefficients for MKTBK, RnD and SGA are negative and statistically significant for each leverage measure. The factor Tang has the highest correlation of all the factors regardless of the leverage measure.

For TDM all the factors coefficient, without coefficient for Tax, were statistically significant. The coefficient for Profit, log_asset, mature, Capex, IndusLev, Tang, depr and risk was positive while the coeffisent for MKTBK, ChgAsset, IndustGr, RnD and SGA were negative. Our result is similar to Frank and Goyal's (2009) paper. Their sample period was much larger than our and they therefore split their sample period in six different periods. They found significant and positive correlations with TDM for at least one period for the factors profit, log of assets, mature, IndusLev, Tang and depr. They also found significant and negative correlation for profit, MKTBK, ChgAsset, Capex, IndustGr, RnD, SGA and risk. The difference in results is that Capex and risk is positive in our result, while it is negative in Frank and Goyal's paper.

4.2.2 Selection based on BIC

In order to determine which factors that affect leverage the most we apply BIC criterion as the selection method for important factors. We start with a multiple regression model that includes all the factors in this study. We then proceed by removing one factor at the time by choosing the factor with the lowest absolute t-stat in order to get a set of most important determinants of leverage. Table 3 reports the coefficients and t-statistics for the factor with the lowest t-statistic in columns one and two. Columns four and five report the adjusted R2 and BIC from the multiple regression model. After identifying the variable with the lowest absolute t-statistic we estimate a single regression mode which only includes the factor with the lowest t-statistic. The r squared from this model is reported in column three. Next, a new multiple regression model is estimated while excluding the factor identified in the previous step. BIC of this regression is

presented so that it can be compared to the multiple regression model from the previous step. This procedure is repeated until only one factor remains in the regression model. Then we identify the smallest BIC value which tells us the list of factors that have the best explanatory power over firm leverage. These factors are defined as core factors.

Table 3: Core Factor Selection Using Market Leverage as the Dependent Variable

Table 3 provides information about variation in leverage that are accounted for by the various factors. The variables were lagged one year, and the leverage measure is TDM. Standard errors were corrected for clustering at firm level. First three columns report the number of observations, coefficients, and T-stat from the univariate analysis. R-squared from the univariate analysis is reported in column 4. Cumulative R-squared reports the relevant R^2 for the multiple regression model. The Bayesian information criterion (BIC) is included in the last column of the table.

Factors	N	Coefficient	T-stat	Own R^2	Cumulative R^2	BIC
Tangibility	2,058	0.61	13.59	0.31	0.31	583.77
MKTBK	2,054	-0.01	-7.06	0.06	0.35	459.15
ChgAsset	1,981	-0.09	-4.11	0.01	0.37	390.50
IndustLev	2,068	0.29	3.27	0.02	0.38	359.90
Risk	1,939	0.05	1.92	0.00	0.39	349.76
SGA	1,975	-0.02	-9.69	0.04	0.40	320.91
Profit	2,058	0.13	2.46	0.01	0.40	325.59
Depreciation	2,058	2.33	4.27	0.04	0.40	325.97
Mature	2,071	0.02	0.87	0.00	0.40	329.89
Tax rate	2,071	0.00	0.00	0.00	0.40	335.51
R&D	1,975	-12.06	-4.90	0.02	0.40	342.25
Industry Growth	2,071	-0.18	-2.95	0.00	0.40	349.76
Capex	2,058	0.98	3.97	0.02	0.40	357.26
Ln (Assets)	2,058	0.04	3.90	0.06	0.40	364.61

Based on the BIC- criterion the model with the last included variable should be “SGA”. This is where the BIC has the smallest value (321.70). The best and most accurate model should therefore include the variables: *Tang, MKTBK, ChgAssets, IndusLev, Risk* and *SGA.* Adding more variables will increase the cumulative R2, but these are minor increases. The increase in

the cumulative R2 by adding profit to the table is 0.00071359. This will also increase the BIC value up to 326.04.

4.3 Do different factors matter for firms in different circumstances?

One firm characteristic that has gained some attention in regards to capital structure focuses on constrained and not constrained firms (Lemmon & Zender, 2010). With this in mind, Frank and Goyal (2009) tested if factors worked better than others in different conditions. This current study will do the same, by analyzing constrained and not constrained firms. Status on dividend paying, firm size and market to book ratio will be used to determine if firms are financially constrained and not financially constrained. Non- financial constrained firms are recognized as large firms, with low growth and who pay dividends.

Table 4: Do different factors matter for firms in different circumstances?

In this table the results of robustness tests for different types of firms are summarized. Table 4 displays results of subsamples based on the three conditions: dividend, size and growth. Firm size is divided into large or small firms. Large firms have assets larger than 67th percentile while small firms have assets less than the 33rd percentile. High growth firms are classified by having a larger MKTBK ratio than the 67th percentile while low growth firms have MKTBK ratio less than 33th percentile. The results are presented in the columns labeled "+%" and "-%". These were generated by independently running the data for 10 periods, where each period consists of two years. The columns indicate if the coefficient is positive or negative and show the cumulative significance in percentage for all periods. The estimated regressions are based on a time frame from 1998-2019, because of the low number of observations between 1994-1998. All factors are lagged by one year and clustered for firm level.

	Dividend paying firms		Non dividend paying firms		Large firms		Small firms		Low growth		High growth	
	+%	-%	+%	-%	+%	-%	+%	-%	+%	-%	+%	-%
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Tangibility	100 %	0 %	65 %	0 %	75 %	0 %	40 %	0 %	55 %	0 %	95 %	0 %
MKTBK	0 %	70 %	15 %	25 %	5 %	25 %	0 %	25 %	15 %	5 %	10 %	50 %
ChgAsset	0 %	5 %	15 %	10 %	0 %	0 %	5 %	5 %	5 %	5 %	5 %	0 %
IndustLev	35 %	0 %	15 %	15 %	30 %	0 %	15 %	0 %	20 %	0 %	20 %	0 %
Risk	15 %	0 %	20 %	5 %	5 %	10 %	15 %	5 %	5 %	0 %	0 %	0 %
SGA	5 %	10 %	10 %	25 %	10 %	10 %	0 %	5 %	5 %	15 %	0 %	10 %
Profit	0 %	10 %	10 %	15 %	0 %	45 %	0 %	0 %	0 %	5 %	5 %	0 %
Depr	0 %	5 %	5 %	5 %	0 %	5 %	0 %	0 %	0 %	0 %	5 %	5 %
Mature	0 %	10 %	10 %	25 %	0 %	20 %	5 %	5 %	0 %	30 %	5 %	0 %
RnD	5 %	20 %	0 %	0 %	20 %	10 %	10 %	0 %	15 %	0 %	5 %	0 %
IndusGr	20 %	10 %	20 %	10 %	20 %	0 %	10 %	0 %	5 %	5 %	20 %	5 %
Capex	5 %	0 %	0 %	10 %	0 %	10 %	5 %	0 %	5 %	0 %	5 %	0 %
Ln(Asset)	0 %	10 %	20 %	10 %	0 %	15 %	0 %	0 %	5 %	15 %	0 %	15 %

Under the column “dividend paying firms”, the factor tangibility has 100% under the positive columns. This indicates that for dividend paying firms, tangibility was a positive and significant factor for leverage for all the 10 periods tested. Tangibility expresses a large importance for dividend paying firms for all 10 periods with 100% cumulative significance. (as illustrated in the first column and first row). The equal intuition goes for “non - dividend paying firms”.

Table three enhances the discovery of the best model factors that affect leverage. The model has core factors that affect leverage. The results from table four indicate that none of the excluded variables should be introduced into the core factors. As a matter of fact, table four shows that there is a need to exclude some of the core factors as well, according to the cutoff rule for inclusion by Frank and Goyal (2009). They had a 50% cut of the rule for inclusion. One explanation for the reason some of the core factors from table three are not significant could be due to the reduced number of observations included in the very small time period intervals. The key point of the table was to examine the common and important variables for different categories of firms. The factor tangibility for example is positive and significant for both dividends and not dividend paying firms. It is also the same if the firm has a low or high growth. For most of the factors, there were similarities across different types of firms. There are some differences, but the overall result shows that financing constraints, according to the measurement, do not significantly affect the importance core factors have on leverage.

4.4 Core leverage model

Table 3 provided the factors that had a significant impact on leverage. These factors were further used in table five. Table three mainly examined firm level and factors that determine firm’s leverage. Crisis dummies were not included in table three, because they were not exogenous shocks to the market and they are not considered as firm level and macro factors. Table five consists of parameter estimates, t-statistic, number of observations and r square.

With the operation of the time span 1994-2019, this has been sectioned into two different periods based on the number of observations. Two dummies were created called “Dotcom” and “fin_crisis” which are equal to one if the included year is a crisis year. Dummy variables for the internet bubble and financial crises have been included to control the effect they caused on leverage during these periods.

To determine whether our hypothesis is accepted or rejected, we will primarily use TDM as leverage measure (panel A) and the first regression model which includes all factors, column (1). Some determinants have more than one possible proxy, the justification for rejection of hypothesis will rely on at least one of the proxies to be statistically significant. As mentioned in the previous section, table 3 was used as a selection criterion to determine which factors should be included in the core model. The excluded factors did only elevate the explanatory power slightly and were therefore not included. Thus, we automatically have to accept the null hypothesis for the factors that were not included in table 5. Hence, the null hypothesis for firm size, profitability and tax has to be accepted.

Table 5: Core leverage model

Table 5 provides results from leverage regressions on the core model. All factors are consistently lagged by one year and clustered on firm level. Leverage is presented as TDM in panel A and TDA in panel B. Column (1) is a regression model for all the years included in the sample from 1994 to 2019. In this column, financial crises have been taken into consideration. Columns (2) and (3) are two regression models which were run for two segregated time periods that were divided based on the number of observations, but also with the desire not to divide periods immediately before or after periods of crises. Possible changes with regards to the crisis will deductively be neutralized in the two periods. Column (4) represents a regression model for all years in the sample, but without taking financial crises dummies into consideration. Column (5) is a regression model for all the years except for financial crises years. The periods of 2002 to 2003 and 2008 to 2009 were therefore excluded from the regression model. Column (6) differs from column (1) since it takes into account if a firm pays dividends or not. The estimated coefficients from the OLS regressions were reported in the columns.

Panel A					
	(1)	(2)	(3)	(4)	(5)
	All Years	1994-2008	2009-2014	2015-2019	All Years
Tang	0.63***	0.54***	0.63***	0.67***	0.63***
	(14.81)	(8.61)	(10.68)	(13.13)	(13.75)
MKTBK	-0.01***	-0.00*	-0.01***	-0.01***	-0.01***
	(-6.24)	(-1.83)	(-5.35)	(-5.48)	(-5.97)
ChgAsset	-0.06***	0.05*	-0.08**	-0.11***	-0.04*
	(-3.76)	(1.80)	(-2.07)	(-3.70)	(-1.83)
IndustLev	0.26***	0.29***	0.36***	0.37***	0.26***
	(3.56)	(3.29)	(2.78)	(3.05)	(3.41)
Risk	0.05***	0.06	0.06***	0.01	0.10**
	(2.80)	(0.38)	(3.11)	(0.27)	(2.26)
SGA	-0.00	-0.01***	-0.00	-0.00	-0.01*
	(-1.60)	(-4.77)	(-0.59)	(-0.47)	(-1.88)
dotcom	0.14***	0.26***			0.14***
	(3.59)	(8.49)			(3.73)
fin_crises	0.18***	0.26***			0.18***
	(6.75)	(9.10)			(6.69)
payingdiv					-0.04
					(-1.22)
_cons	0.12***	0.00	0.10*	0.11**	0.13***
	(3.84)	(0.01)	(1.92)	(2.36)	(3.14)
N	1839	465	626	748	1474
R^2	0.415	0.446	0.424	0.464	0.421

t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Core leverage model (Continued)

Panel B					
	(1)	(2)	(3)	(4)	(5)
	All Years	1994-2008	2009-2014	2015-2019	All Years
Tang	0.25***	0.21***	0.24***	0.28***	0.21***
	(6.84)	(3.73)	(5.21)	(6.83)	(5.80)
MKTBK	-0.00*	-0.00	-0.00	-0.00**	-0.00**
	(-1.69)	(-1.00)	(-0.22)	(-2.48)	(-2.19)
ChgAsset	-0.01	0.00	-0.05	-0.01	0.00
	(-0.61)	(0.04)	(-1.51)	(-0.41)	(0.10)
IndustLev	0.18***	0.06	0.28***	0.31***	0.16***
	(3.34)	(0.89)	(3.19)	(3.56)	(2.89)
Risk	-0.00	0.07	-0.01	0.00	0.09***
	(-0.22)	(0.56)	(-0.97)	(0.12)	(2.65)
SGA	-0.01***	-0.01***	-0.01***	-0.01**	-0.01***
	(-4.99)	(-3.97)	(-4.46)	(-2.34)	(-5.38)
dotcom	0.04	0.03			0.03
	(1.38)	(1.58)			(1.24)
fin_crises	0.07***	0.05**			0.07***
	(4.07)	(2.08)			(3.77)
payingdiv					0.00
					(0.09)
_cons	0.36***	0.42***	0.31***	0.32***	0.37***
	(11.42)	(8.08)	(7.11)	(7.96)	(9.58)
N	1777	549	635	593	1513
R^2	0.214	0.159	0.256	0.252	0.201

t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

For panel A column (1), the variation explained in the model measured by R2 was 41.5%, while it was 21.4% for panel B column (1). Regression models for panel A carry a higher explanation power than panel B with regards to R square. The tables show that there are some overall differences in significance of the coefficients between panel A and B.

4.4.1Nature of assets

Tangibility

The coefficient for tangibility is positive and statistically significant at 1 % level in both panel A and B. The variable demonstrates the highest explanatory power for leverage across all the different regression models. According to the findings of the study, one increase in tangibility is associated with an increase of leverage with 0.63.

SGA

In panel A, the coefficient for the variable SGA is zero and not statistically significant (column 1). However the variable turns out to be significant at 10% level with a reported coefficient of -0.01 when we include a dummy for dividend paying firms (column (6). In panel B, all the coefficients for SGA are -0.01 and statistically significant at 1% level. An increase in SGA ratio is related to a decrease of firm leverage. Firm that spends much on SGA is expected to have more intangible assets and therefore lower leverage ratio (Frank & Goyal, 2009).

Implications

Since this study focuses mainly on TDM as leverage measure, the coefficient from panel A will be discussed. The coefficient for SGA is not statistically significant, thus indicating that SGA does not affect leverage. SGA in contrast to tangibility was not defined as a core factor in Frank and goyal´s study. Since the SGA proxy for the nature of assets has contradicting signs when regressed on TDM and TDA and is not statistically significant for both measures, it makes it difficult to conclude whether this proxy is reliable to explain the nature of assets

measure. However, the coefficient for tangibility is statistically significant, therefore we accept the alternative hypothesis that there is a correlation between the nature of assets and leverage.

The positive and statistically significant coefficient for tangibility is in accordance with the tradeoff theory, which suggests a positive relationship between tangible assets and leverage. Firms that withhold a high ratio of tangible assets should finance themself with more debt. The positive relation between tangibility and debt indicates that debt increases when the share of fixed assets rises. Tangible assets represent the lender's available security and can be used as collateral while taking debt since collateral lowers the risk of default. In the event of a default, the lenders may be able to recover their loan by selling collateral. Due to the lower risk, the cost of financing with debt will also reduce and thus, make debt a more appealing option.

Findings from this study are consistent with earlier empirical studies. Frank and Goyal (2009) also discovered a positive relationship between tangibility and leverage. Similar results were found by Myers (2001), Gaud et al. (2005) and Antoniou et al (2008). Studies with Norwegian included firms such as Frydenberg (2004), Mjøs(2007) and Fan et al (2012) also found a positive relationship.

4.4.2 Growth

MKTBK

The coefficient for MKTBK is statistically significant for all levels and across all regression models in panel A, however only significant for 10% level in column (1) that includes all years. Consequently, growth is a central variable for determining capital structure in Norwegian market. An increase of 1% point in the MKTBTK ratio, will decrease debt to assets ratio by -0.001% point.

Change of Log Assets

Change of assets is a measurement for growth in this study and is negative across all the regression models in panel A. The only regression model that is not significant is the first time period column (2). When including a dummy variable for dividend paying firms, it can be seen that change of log assets is significant only at 10% level column (6), compared to significance at 1% when dummy for dividend paying firms is not included column (1). In panel B, the coefficient for change of log assets is not statistically significant at any point. The coefficient for change of log asset in panel A is -0.06 column (1) and is statistically significant at one percent level.

Implications

Growth is measured by MKTBK, ChgAsset and Capex. The last-mentioned variable was not included in the core factors and followingly not included in model 5. As highlighted in the previous subchapter, MKTBK and Change of assets were statistically significant and correlated to leverage. As a result, the null hypothesis is rejected, as there is evidence of correlation between leverage and growth.

Our findings are in accordance with the trade-off theory that states that a high level of debt increases financial distress, and therefore, firms with high growth will have less debt. Furthermore, in order to take full advantage of the tax benefit associated with high debt ratio, a firm should optimally have high earnings before taxes. Often, this is not the case for firms with high growth.

Findings from our study are in agreement with the indicated previous studies. Frank and Goyal (2009) discovered a negative relationship between growth and leverage. Similar results were found in studies by Rajan and Zingales (1995), Myers (2001), Gaud et al. (2005) and Antoniou et al (2008). However there are some contradicting results in these findings.

4.4.3 Industry

Industry is defined by using two proxies, industry leverage and industry growth. Table (3) excluded industry growth from the core factors. Accordingly we can say that industry growth does not serve enough explanatory power to explain the relation between industry growth and leverage. Industry leverage is the only robust measure to count for this relationship and will be discussed. The coefficient for industry leverage is equal to 0.26 in column (1) and statistically significant at 1% . In panel B the coefficient is equal to 0.18 and also statistically significant at 1% across all regression (1) to (6), with the exception of the period 1994-2011 where it was significant for 5% level. Industry leverage shows a high and positive relationship in panel A, and also a similar result for panel B when we compare the same constructed regression in column (1). The coefficient of 0.26 indicates that industry leverage is positively associated with debt. We therefore reject the null hypothesis of no correlation between industry leverage and firm leverage in favor of the alternative hypothesis of a statistically significant correlation between the two variables. Firms that are in industries where the median firm has high leverage often tends to have high leverage.

Our results are in line with the tradeoff theory that states that the higher industry leverage is, the more debt a firm will have. New investors may regard information about debt and market value of firms as potentials for growth. Capital intensive industries with investment opportunities will have more incentives to use debt than equity, also to avoid financial deficit problems. This may also be in line with tradeoff theory, that capital seeking firms and growth firms prefer debt financing instead of new equity offering to finance capital needs for investments. Furthermore, it is not unusual to use tangible assets as collateral, which also is an explanation for a high positive correlation. from the findings and the above discussion.

Relevant studies such as Lemmon et al. (2008) presented differences in debt ratios in different industries. Same result was found by Myers (2001). Our results support the empirical studies. A positive correlation between industry leverage and firm leverage was found by Frank and Goyal (2009). Industry is a determinant for capital structure (Frydenberg, 2004).

4.4.4 Risk

There is a positive relationship between risk and leverage in panel A. The coefficient is equal to 0.05 for this variable and is statistically significant at 1% level. An increase of risk is associated with an increase of leverage by 0.05. In panel B, column (1) the coefficient is not statistically significant for none of the significance levels. Since the coefficient for the variable is positive and statistically significant in panel A column (1), and we found supportive empirical evidence, we reject the null hypothesis and accept the alternative hypothesis of a correlation between risk and leverage.

Our results are in line with the pecking order theory. Firms are affected by adverse selection differently. Some firms have a higher proportion of adverse selection. The pecking order theory therefore assumes that riskier firms would have higher leverage. The increased risk will force a higher volatility for free cash flows and earnings generated before interest and taxes. Loans will be a safe tool to increase liquidity reserves in case of risk.

Our results contradict earlier empirical studies. Psillaki and Daskalakis (2009) found a negative correlation between leverage and risk. Frydenberg (2004) argued that firms with high risk should have lower leverage ratio. Risk was not one of the core factors found by Frank and Goyal (2009), but they found that the coefficients for risk were positive in their table 3. Our results are interesting, since we predicted a decrease in leverage for increased risk. However, it seems that the firms in our sample would like to transfer more risk to the debt lenders through increased leverage ratio.

4.4.5 ***Crises and Financial Constraint (dividend paying)***

The coefficient for dotcom dummy is positive and statistically significant in each regression in Panel A, but none of the coefficients were statistically significant in panel B although they were positive. Coefficient for the dummy fin_crises was positive and statistically significant at 1% for both leverage measures. Column one in panel A reveals that the financial crisis in 2008 made the leverage increase by 0.07. We can see that with the inclusion of the dummy variables,

the explanatory power is changed. The explanatory power is 41.5% for column (1) in panel A, whereas it decreased to 39.9% when they were included. The R2 for panel B was reduced from 21.4% in column one to 20.8% in column (4). A negative relation between risk and leverage was discovered earlier for panel B. However, financial crises are abnormal times, and this can lead to loss of income and higher operating cost. A study in Turkey showed that leverage level is different before, during and after a financial crisis (Jermias & Yigit, 2019).

Economic scholars have different opinions regarding the inclusion and exclusion of the factor. Frank and Goyal (2009) demonstrated that a dividend paying dummy is significant, their results showed that dividend paying firms had less leverage than non-dividend paying firms. Our result shows that this factor is not significant and we have therefore not focused much on it.

4.5 Does industry matters

The overall conclusion from table 4 was that financing constraints did not have a significant effect on the importance that factors have on leverage. Industries have different capital intensity levels and for some industries it is easier to handle a high debt level due to their nature. Financial structures are systematically different in various industries (Bowen, Daley & Huber, 1982). While "IndustLev" is the most important leverage determinant in the study of Frank and Goyal (2009), it does not have such great importance for determining leverage of firms in Norwegian market. One possible explanation is that industry definition in Norwegian market is less refined than industries applied in Frank and Goyal (2009). Also, a concern that Frank and Goyal (2009) had was whether the coefficient for the industry median leverage was biased due to few firms in some industries. The motivation behind this model is to investigate the importance of leverage by estimating the core leverage model separately for each of the 10 industries in our sample, in order to see how the leverage determinants change for industries. This way we can also see if our industry median leverage is biased.

Table 6: Does industry matter?

Table (6) provides results from leverage regressions on the core model separately for each industry. The estimated coefficients from the OLS regressions are reported in the columns, the core factors are lagged by one year and the standard errors were clustered on firm level. TDM and TDA are used as leverage measures respectively for Panel A and Panel B. Column (1) reports the estimated regression models from OLS regressions for all years and all industries included in the samples. This column coincides with column (1) in table 5 and acts as a reference point. Column (2) to (11) represents the performed regression for each of the 10 separate industries. "IndustLev" is excluded from these regressions because it is calculated by the median of industry leverage on industry level. Therefore, the variables do not have explanatory power over leverage when models are run for each industry separately. The estimated coefficients from the OLS regressions are reported in the columns, and the standard errors were clustered.

Panel A

	(1) Full Sample	(2) Communic. Services	(3) Consumer Disc.	(4) Consumer Staples	(5) Energy	(6) Health Care	(7) Industrials	(8) Information Technology	(9) Materials	(10) Real Estate	(11) Utilities
Tangibility	0.63***	0.23	0.83	0.41	0.62***	0.28	0.63***	0.65***	-0.38*	0.04	0.56
	(14.81)	(1.02)	(1.18)	(0.97)	(7.55)	(1.16)	(8.00)	(6.86)	(-2.10)	(0.60)	(2.31)
MKTBK	-0.01***	-0.01*	-0.01	-0.01	-0.01***	-0.02*	-0.02**	-0.00***	-0.05*	-0.16***	-0.01
	(-6.18)	(-1.99)	(-0.99)	(-1.80)	(-3.56)	(-2.01)	(-2.04)	(-3.46)	(-2.02)	(-7.41)	(-1.21)
ChgAsset	-0.05***	0.05	0.01	-0.04	-0.07***	0.04	-0.14***	-0.03	-0.13	-0.21***	0.16
	(-3.14)	(0.74)	(0.09)	(-0.56)	(-3.00)	(1.25)	(-3.78)	(-1.01)	(-0.61)	(-4.74)	(1.24)
IndustLev	0.23***										
	(3.23)										
Risk	0.05**	0.68	0.25	0.72**	0.06***	-0.16	-0.01	-0.13	0.76	0.08	-0.51**
	(2.53)	(0.74)	(0.32)	(2.26)	(3.10)	(-0.60)	(-0.61)	(-0.89)	(1.27)	(1.02)	(-3.57)
SGA	-0.00*	-0.01*	-0.03	-0.07	-0.00	0.00	-0.01**	0.00	-0.03***	0.01	0.45
	(-1.78)	(-2.12)	(-1.06)	(-1.42)	(-0.56)	(0.47)	(-2.58)	(0.30)	(-3.63)	(0.36)	(1.39)
_cons	0.14***	0.15**	0.27**	0.14**	0.27***	0.16	0.29***	0.13***	0.57**	0.72***	0.14
	(4.62)	(3.08)	(3.96)	(2.23)	(4.06)	(1.61)	(5.16)	(2.87)	(2.87)	(15.36)	(0.88)
N	1839	82	59	124	526	131	499	207	94	101	16
R^2	0.399	0.185	0.184	0.140	0.396	0.122	0.386	0.367	0.252	0.430	0.846

t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Does industry matter? (Continued)

Panel B

	(1) Full Sample	(2) Communic. Services	(3) Consumer Disc.	(4) Consumer Staples	(5) Energy	(6) Health Care	(7) Industrials	(8) Information Technology	(9) Materials	(10) Real Estate	(11) Utilities
Tangibility	0.25***	0.10	0.51	-0.01	0.44***	0.80***	0.08	-0.09	-0.06	0.17**	-0.26
	(6.82)	(0.26)	(0.75)	(-0.02)	(7.25)	(5.74)	(1.34)	(-0.62)	(-0.43)	(2.46)	(-1.59)
MKTBK	-0.00*	-0.02*	0.00	0.01***	0.00	-0.02*	-0.01	-0.01***	-0.02	-0.02	-0.01
	(-1.67)	(-2.24)	(1.08)	(3.60)	(0.15)	(-2.11)	(-0.68)	(-3.05)	(-1.26)	(-0.56)	(-1.95)
ChgAsset	-0.01	0.05	-0.08	-0.19	-0.03	0.02	0.00	-0.02	-0.09	0.06	0.16
	(-0.37)	(0.60)	(-1.54)	(-1.63)	(-1.21)	(0.33)	(0.08)	(-0.75)	(-0.55)	(1.39)	(2.40)
IndustLev	0.17***										
	(3.15)										
Risk	-0.00	-0.31	0.02	0.80***	0.01	0.01	-0.04**	-0.45**	0.25	-0.09	-0.44**
	(-0.34)	(-1.04)	(0.21)	(3.94)	(0.91)	(0.10)	(-2.12)	(-2.45)	(0.33)	(-0.95)	(-5.25)
SGA	-0.01***	0.00	0.01	-0.27*	-0.01	-0.00	-0.01***	-0.01	-0.01	-0.01**	-0.13
	(-5.12)	(0.06)	(0.23)	(-2.02)	(-1.45)	(-1.34)	(-4.06)	(-1.32)	(-1.46)	(-3.16)	(-1.55)
_cons	0.37***	0.54***	0.45***	0.38***	0.29***	0.27***	0.54***	0.57***	0.48***	0.52***	0.98***
	(11.98)	(3.82)	(6.22)	(6.81)	(6.52)	(5.68)	(14.05)	(10.34)	(3.83)	(12.97)	(12.32)
N	1777	81	54	120	512	121	496	192	93	95	13
R^2	0.208	0.267	0.103	0.337	0.344	0.350	0.105	0.299	0.071	0.146	0.813

t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The coefficient for tangibility is a positive and statistically significant in the overall model, however there is variation across the industries. For “communication services”, the coefficient is positive, but not statistically significant, while “energy” is positive and statistically significant at 1% level. The coefficient for MKTBK is negative and statistically significant at 1% for the information technology industry. For the industry energy this is not significant at all levels. Table 6 shows that the core factors have different importance depending on the industry, some factors are statistically significant in some industries while for others not.

The explanatory power for the full sample, column (1), is 39.9%. The industries energy and industrial have an explanatory power of respectively 39.6% and 38.6%. For the industry healthcare, the factors explain 12.2% of the variation in leverage. Utility reports an explanatory power of 84.6%, but this could be due to the low number of observations. There are some differences between panel A and B. Market to book ratio was negative and statistically significant for the industries energy and industrial in panel A, but are not statistically significant in panel B. Tangibility is also not statistically significant for industrial in panel B as the explanatory power was reduced for many of the factors. The “energy” industry had a slight decrease from 39.6% to 34.4%. This is remarkable when the overall model from panel A to B reduced from 39.9% to 20.8%. This indicates that for the industry energy, the importance of factors on leverage is just slightly affected by the differences in market and book values of assets.

Overall, the analysis in this section highlights the importance of factors among industries and how they differ. Our results revealed that Energy and industrials had the largest number of firm observations, and the majority of the factors coefficient were significant. Our results indicate that the industry median leverage may be biased due to a large variation in the number of firms per industry.

CHAPTER FIVE

SUMMARY OF FINDINGS AND CONCLUSION

5.1 Conclusion

This thesis studied the determinant factors that were reliably and important for capital structure for the past 25 year (1994-2019). We show that a collection of factors provides a solid description of the patterns in the data, based on a range of variables that have been used in earlier studies. These core factors that are statistically significant are tangibility, MKTBTK, ChgAsset, IndustLev and Risk.

- Firms with more tangible assets have higher leverage
- Firm with high growth tends to have lower leverage
- Firm that are in industries where the median industry leverage is high tends to have higher leverage
- Firm that have more risk will have higher leverage

For the leverage measure TDM all factors without SGA were statistically significant. For TDA as a leverage measure all factors without risk were statistically significant. This shows that SGA and Risk are not robust over market or book leverage. The explanatory power of the model with TDM a dependent variable is 41.5% while it is 21.4% for the model with TDA as dependent variable.

Further we analyzed if the core factors' importance varied across industries. There exist little empirical studies for the relation between leverage on industries in the Norwegian competitive market. This thesis contributes to this area by exploring how leverage factors are relatively important to various industries. Our results show the importance of factors and how they differ across different industries. These findings can be used for further research on the importance of factors and how they are in different industries.

5.2 Limitations of the Study

The financial data was gathered from Thomson Reuters Eikon, and this is a reliable database used all over the world. One of the limitations to this study is the fact that there were still some missing values, either because the firms did not report it or because Eikon did not have it included in their database. Another limitation is that some firms were observed more often than others. This is because there was not the same amount of information for all the firms. For some firm's data for five years were available, while for others there were 15. The data was highly unbalanced, and this can affect the estimates negatively.

Furthermore, there were only 243 firms and 3044 observations in this study. There should have been a lot more firms and thus, more observations. This could have improved the models as well as make the model more trustworthy. Due to the time period for our study, it was also difficult to include macro-economic factors in the models and therefore, we did not test for them. Endogeneity is also one big problem that we did not resolve. To do so we had to impose extra structure and then test for it. This is out of the scope of this thesis, but we hope that this can be done in the future.

5.3 Criticism of Data Sample

The study included 24 annual observations for regressions of variables. Therefore, there is no great confidence that these factors will achieve similar accountability for what was measured. The remaining factors such industry median leverage, tangibility and profits are robust across various alternative definitions of leverage. Statistically, in accordance with the findings in model 3, even some of the factors that could have been defined as core factors did not contribute to more than the estimated model. By excluding other factors such as interest rate, macro-economic growth, maturity or nature to mention a few, we did not include factors that could have been a part of our core factors.

There was difficulty in the division of the firms in a few categories (10 in the sample). The cross-sectional differences in terms of firm characteristic are to a minor degree counted for.

The result may have been more consistent if there was sectioning of firms into more industries with less firm characteristic differences. That would have made the result more trustworthy and provable. Since the sample was not large enough to apply this method, there is need to be careful about making unequivocal decisions about the effect of industries on leverage.

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