NTNU – Trondheim
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Dynamics of Debt Structure and Credit Ratings

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Oppgavetekst/Problembeskrivelse Purpose: Assess the relationship between debt structure decisions and credit ratings in order to improve our understanding of what considerations determine the capital structure of firms. Main content: 1. Review and discussion of theoretical and empirical literature examining debt structure, including literature focusing on credit rating and heterogeneous debt considerations. 2. Formulation of testable hypothesis, discussion of data, and analysis of data with the intention of gaining new insight regarding the relationship between credit rating and heterogeneous debt structure. 3. Overall assessment of the implications of the empirical study.	
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Dynamics of Debt Structure and Credit Ratings

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May 26, 2013

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Preface

This master thesis concludes our Master of Science degree with specialization in Investment, Finance, and Financial Management at the Department of Industrial Economics and Technology Management at the Norwegian University of Science and Technology (NTNU).

The motivation for writing this master thesis was the authors' personal and academical interest in corporate debt structure and its relation to capital structure. Recent financial turbulence as well as the growing development of world bond markets has focused our attention especially at the importance of credit ratings. Our objective is to shed light on the importance of understanding debt heterogeneity and its effects of credit ratings with a different point of view than prevailing academic literature. Working with this master thesis has been instructive and an exciting learning experience where we have gained new insights into various topics of financial literature. We look forward to the development of this unexplored area within capital structure.

The text has been typeset in LaTeX, with illustrations prepared in Microsoft Excel. Simple data analyses are done in Excel, while the main regression analyses have been prepared in R, a statistical software program. The data is primarily obtained from the FactSet database.

We would like to thank our supervisor, Associate Professor Einar Belsom at the Department of Industrial Economics and Technology Management for constructive feedback and committed guidance. We would also like to express thanks to all other parties contributing to this thesis.

Trondheim, May 26, 2013

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Abstract

Using a comprehensive dataset comprising 1 863 unique U.S. firms as well as 100 unique Norwegian companies in the period 2006 - 2011, we examine the dynamics between corporate debt structure and credit ratings. We address especially three concerns related to credit ratings and their effects on debt structure decisions: We first identify the effects of bond market participation, measured by having a credit rating, before we emphasize the effects of being near a change in credit rating. Last, we address how credit ratings affect corporate debt maturity structure. These considerations form the foundation for understanding what drives corporate capital structure.

Our main findings indicate that rated firms are to a greater extent characterized by debt heterogeneity relative to unrated firms. The difference become more apparent as credit ratings exacerbates. We find evidence that firms adjust leverage ratios in concern of a rating change with the boundary between investment grade and non-investment grade as most important. Finally, we observe an inverse u-shaped relationship between credit ratings and public debt issues, with BBB rated firms having the longest maturities.

The two markets are compared in order to capture possible similarities in debt structure behavior. We find that U.S. and Norwegian companies behave similar in terms of the priority structure of bank and bond debt. Furthermore, we identify credit ratings as highly prominent for management of firms' debt structure and find that regulation effects and enhanced incentives to monitor are mainly the reasons why debt structure decisions vary between investment grade and speculative graded firms.

Sammendrag

Ved å bruke et omfattende datasett bestående av 1 863 unike amerikanske firmaer og 100 unike norske bedrifter i perioden 2006 - 2011 undersøker vi dynamikken mellom firmaers gjeldsstruktur og kredittvurdering. Vi ser spesielt på tre områder av kreditvurderingens innvirkning på gjeldsstruktur: tilgang til det offentlige gjeldsmarkedet, målt ved å ha en kredittvurdering, og dens effekt på gjeldsstruktur beslutninger. Hvordan effekten av å være nær en endring i kredittvurdering påvirker gjeldsstruktur, og til slutt hvordan kredittvurderinger påvirker forfallstrukturen til firmaers gjeldsposisjoner. Disse betraktningene danner et fundament for forståelse av hva som driver firmaers kapitalstruktur.

De viktigste resultatene våre viser at kredittvurderte selskaper er i større grad preget av gjeldsheterogenitet sammenlignet med selskaper som ikke har en kredittvurdering. Denne forskjellen blir mer tydelig ettersom kreditvurderingen forverres. Vi finner bevis for at bedrifter justerer gjeldsandelene sine når de er nær en endring i kredittvurdering, der skillet mellom investerings grad og spekulativ grad er av høyest betydning. Til slutt observerer vi en invers u-formet sammenheng mellom kredittvurdering og offentlige gjeldsutstedelser, hvor BBB firmaer har de lengste løpetidene.

En sammenligning av det amerikanske og norske gjeldsmarkedet er undersøkt for å fange opp eventuelle likheter i beslutningstaking angående gjeldsstruktur. Vi finner at begge markedene deler en lik oppfatning og adferd om prioritetsstrukturen for bank- og obligasjonsgjeld. Videre identifiserer vi kredittvurdering som svært fremtredende for styringen av firmaers gjeldsstruktur og finner ut at reguleringseffekter og økte insentiver for overvåking er hovedsakelig årsakene hvorfor gjeldsstrukturen varierer mellom investerings- og spekulativ graderte firmaer.

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1 Introduction

Recent turmoil in financial markets causing waves of bankruptcies has highlighted the need for careful credit risk assessment. Credit ratings have emerged as an important instrument assessing credit risk and is in fact seen by CFOs as the second most important factor influencing companies' total amount of debt (Graham and Harvey, 2001). Debt is however a highly complex quantity comprising several instruments. Not only is the total amount of debt important, but the composition is an even more fundamental factor influencing companies' credit risk, therefore there exist complex dynamics between credit ratings and a firm's debt structure. There are several considerations that are likely to influence a firm's debt structure. For example, financial intermediaries impose tougher lending conditions than the public debt market, the cost of issuing debt publicly varies according to a firm's risk factors, investors respond to regulatory requirements on their investment decisions, and finally typical firm characteristics, such as profitability and reputation in the market are also likely to be affecting factors. These considerations have led the focus of capital structure more and more over to the management of corporate debt structure.

Debt structure is one of the main financial areas corporations need to be aware of in order to improve performance and create firm value. Its complexity has however prevented most previous literature in examining debt as a heterogeneous quantity. By treating debt as a homogeneous financial commitment, analysis is simplified, but important aspects of the various forms of debt are lost. For real world firms debt structure is determined by different characteristics and regulations affecting financial decision making. Thus it is essential for our understanding of capital structure decisions to understand debt heterogeneity as an aspect of capital structure.

Our main objective is to assess the relationship between debt structure and credit ratings in order to improve the understanding of what considerations determine capital structure of firms. By discussing relevant debt structure decisions and features of credit ratings we establish three different considerations examining various aspects of the relationship. We consider the effect of having access to public bond markets, being close to a rating change, and finally how credit ratings affect corporate debt maturity structure. There are intuitively different incentives and trade-offs regarding the various considerations. For example, bond market participation is associated with faster and easier access to capital financing, however many lower rated companies find bank debt more attractive as higher credit risk is associated with tougher lending conditions in the public market. Moreover, we compare U.S. and Norwegian companies and identify similarities and inequalities of how credit ratings influence their debt structure behavior. The empirical analysis is constructed using different panel data regression models.

We break the traditional pattern in literature discussing capital structure by introducing the effects of debt heterogeneity. The area that we investigate is to our knowledge a limited research field both empirically and theoretically. The results presented in this study implicate that debt structure and credit ratings are highly

related and should be thoroughly considered by corporate managers facing capital structure decisions. Motivated by Rauh and Sufi (2010) and Colla et al. (2009, 2012), our study expand this fairly unexplored research area and contributes new attractive knowledge to the field of capital structure. In this study, we first identify the effects of being rated and find that companies become less debt specialized, while simultaneously increasing leverage. Secondly, we find that being near a credit rating change is of high concern for companies, hence adjustments of leverage are identified. Lastly, we consider the effects credit ratings have on corporate debt maturity structure and find that they affect firms' debt structure decisions mainly due to regulatory differences. By comparing U.S. and Norwegian debt structure behavior we find that firms think somewhat strategically equal, although special firm characteristics have opposite effect on debt structure decisions for the two countries.

Capital structure literature is mainly focused around U.S. companies. Our paper is the first that investigates the current objective in the Norwegian market. No other study has examined the combination of credit ratings and debt structure for Norwegian companies to such an extent as we do. The elaboration of Norwegian debt structure and the effects of credit ratings are discussed in chapter 9. Our study is closely related to Rauh and Sufi (2010) who examines types, sources, and priorities of debt on U.S. firms during the period 1996 - 2006, and Colla et al. (2012) who investigates debt specialization across credit ratings during the period 2002 - 2009, also on U.S. firms. Their work presents a number of important findings, however there are still many unanswered questions concerning debt structure: Do credit ratings affect a company's debt maturity structure? Do non-U.S. rated firms borrow simultaneously from a variety of sources such as U.S. companies tend to do? What are the main relationships between firms' debt structure and their credit ratings? To answer these questions we use the most updated dataset within the fixed-income market and conduct our analyses for the period 2006 - 2011. The last aspect that distinguishes our study from previous studies are our thoughts and discussions on the relationship between corporate debt maturity structure and credit ratings. As far as we know there are no other scholars who have investigated this relation under a debt heterogeneity perspective.

The remaining part of the thesis proceeds as follows. It begins with introducing capital structure theories and important determinants. Secondly, we provide a presentation of U.S. and Norwegian debt trends before we go deeper into the effects of debt heterogeneity. Third, we discuss the effects of credit ratings and introduce testable hypotheses. Forth, we present our dataset, methodology, and the choice of estimation model. Fifth, we present and discuss the results up against the hypotheses before we finally end this thesis with a conclusion and directions for further work.

2 Capital Structure

In its most basic form, capital structure refers to the behavioral strategy corporations implement in order to create value maximization by choosing a combination of equity, debt, and other hybrid securities. In reality, capital structure is a highly complex area, but also a very important aspect of firms' governance as it is vital for firms' performance in the market. The complexity becomes even stronger knowing that corporations rely on different kinds of debt securities in order to finance its assets. A number of theories and predictions have emerged in response to the many unanswered questions related to capital structure. We will in this chapter outline the most common capital structure theories as well as draw upon findings from previous literature. Furthermore, we choose to define capital structure as a concern of corporate debt structure and will therefore shed light on important explanatory variables that affect firms' debt structure decisions.

2.1 Capital structure theories

In 1958 Modigliani and Miller argued that in a perfect capital market the firm's capital structure does not affect its market value. The effects they found to be influential for firm value are however relevant in the real world as markets are exposed to imperfections. Many scholars have investigated these imperfections and identified different conditions affecting corporate capital structure. These imperfections relate to corporate taxes (Modigliani and Miller, 1963), bankruptcy costs (Titman, 1984), asymmetric information (Myers, 1984), and agency costs (Jensen and Meckling, 1976) and (Myers, 1977). According to the latter factors, several predictions and theories emerged, with the Trade-off Theory, the Pecking Order Theory, and the Market Timing Theory as the ones explaining modern capital structure.

There are two perspectives that explain the trade-off theory, respectively the "tax-bankruptcy" view and the "agency" view. According to the "tax-bankruptcy" view firms should choose their capital structures such that it balances the tax-shield benefits of debt (corporate tax savings) with the direct and indirect costs of bankruptcy. Several studies are broadly consistent on this view[1]. For example, larger firms tend to be more tangible and would therefore face lower probability of bankruptcy. Thus they should have a higher optimal debt ratio. According to the "agency" perspective debt disciplines managers while simultaneously mitigating agency problems of free cash flow because debt must be repaid to avoid bankruptcy. In response to the latter perspective Stulz (1990) shows that debt mitigates shareholder-manager conflicts but exacerbates shareholder-debtholder conflicts.

In contrast to the trade-off theory, the pecking order theory is not a theory concerning the optimal leverage ratio, but it proposes a prioritized order of funding. The theory considers asymmetric information as the major driver for how a firm raises

[1]See for example, Rajan and Zingales (1995), Fama and French (2002) and splendid reviews by Harris and Raviv (1991) and Frank and Goyal (2009).

capital. Since information asymmetries are only relevant for external financing, a firm will always prefer internal financing, which explain why established and profitable firms tend to have low ratios of leverage. Furthermore, firms will issue debt before convertible debt and equity as it otherwise would be a strong signal to the market that the equity is overpriced and would be a cheap financial resource for the firm (Myers, 1984).

The market timing theory has gained popularity in recent years (Graham and Harvey, (2001) and Baker and Wurgler, (2002)). The basic idea is that firms will choose the source of financing that at the time of issuing is the cheapest or most favorable. The theory states further that firms may defer issuances if markets are unfavorable or in contrast if the markets are prosperous, firms may raise capital even if the firm currently has no needs. Moreover, the theory gives no optimal capital structure, it only explains the capital structure as an outcome of optimal financial decisions over time (Baker and Wurgler, 2002).

2.2 Explanatory variables of capital structure

Within the capital structure literature there is a large number of studies that investigate firm characteristics and their impact on capital structure decisions. These firm characteristics reflect, among others, a company's performance, its profile, the industry it operates in, and the scale of the company. Due to the number of different capital structure theories, many of these characteristics contradict each other. However, comprehensive studies have found significant results that such characteristics are important in understanding a firm's capital structure decisions. One of the most comprehensive academic studies incorporating the spacious range of factors from the literature were conducted by Frank and Goyal (2009). They investigate an extensive amount of factors and find specifically six of them being statistically significant, i.e. profitability, tangibility, size, market-to-book ratio (growth opportunities), industry median leverage, and expected inflation are all extensively influencing the capital structure choice of companies.

Several other studies[2] are in line with the results of Frank and Goyal (2009). According to Harris and Raviv (1991, p. 334), the available studies "generally agree that leverage increases with fixed assets, non-debt tax shields, growth opportunities, and firm size, and decreases with volatility, advertising expenditures, R&D expenditures, profitability, and uniqueness of the product." The majority of the literature compares these factors with leverage as a single quantity. In contrast, there are very few studies that have investigated the current research question with debt being heterogeneously distributed. Rauh and Sufi (2010) and Colla et al. (2009) regress firm characteristics against debt types and find, among many observations, that for example convertible debt is negatively correlated with profitability, whereas bank debt is positively correlated with profitability, both being statistically significant.

[2]For example, see studies by Bradley et al. (1984), Titman and Wessels (1988), and Graham and Leary (2011).

The last two studies are found to be most relevant for our research as they both investigate the U.S. debt market. However, as we also do a smaller investigation of the Norwegian debt market a paper by Mjøs (2007) has come to our attention as a good proxy for firm characteristics in the Norwegian market. Furthermore, as these papers coincides with our sample, we regard their conclusions as indicative. We end this section by briefly discussing a selection of firm characteristics, which later will be analyzed in this paper.

Profitability

Profitable firms have the ability to fully utilize the interest tax shields as their expected financial distress costs are low. The "tax-bankruptcy" perspective, thus predict that profitable firms use more debt. Furthermore, Jensen (1986) argue from an "agency costs" perspective that higher debt ratios is consistent with the free cash flow problem profitable firms may have, thus the discipline provided by debt to avoid negative NPV projects is more valuable for these kinds of firms. However, the pecking order theory points out that firms prefer internal funding before external funding, which implies that profitable firms with extensive free cash flow will become less levered over time. The negative correlation between profitability and leverage are supported by most scholars in previous empirical literature[3].

Size

Larger and more diversified firms face less business risk and will consequently have less volatile cash flow. A stable cash flow will reduce default probability; hence such firms prefer to maximize the benefit of tax shields. Mature firms have during their lifetime built valuable reputation in debt markets. Hence, firms with good reputation exhibit less information asymmetry, which results in lower agency costs. The trade-off theory thus predicts that large and mature firms should have relatively higher leverage ratios. The pecking order theory usually implicates an inverse relation between firm size and leverage. Large and mature firms have had the opportunity to retain earnings, and will therefore use them as the first source of capital when financing new investments. However, the common perception among scholars is that firm size is positively correlated with leverage[4].

Tangibility

Tangible assets are best known as property, plant, and equipment and are easier for outside investors to value than intangibles, thus confirming less information asymmetry (Frank and Goyal, 2009). Higher levels of tangible assets lower the possibility of distress costs as well as agency costs, and therefore according to the trade-off theory predict a positive relation between tangibility and leverage indicated by higher leverage ratios. According to the pecking order theory if adverse selection costs is about assets in place, tangibility increases adverse selection and results in higher debt. (Frank and Goyal, 2009). Rauh and Sufi (2010) find that tangible firms are more likely to issue bond debt rather than bank debt.

[3]See e.g. Kayhan and Titman (2007) and Harris and Raviv (1991).
[4]See e.g. Frank and Goyal (2009) and Titman and Wessels (1988).

Growth opportunities

The most common and reliable proxy for growth opportunities is the market-to-book ratio (Adam and Goyal, 2008). A firm's growth and investment opportunities are difficult to measure for people outside the company. Growth is associated with increasing financial distress costs, reducing free cash flow, and exacerbates debt-related agency costs. Hence, the trade-off theory argues that growth reduces leverage. This coincides with the results of Colla et al. (2009). This empirical proof disagrees with the pecking order theory, which states that higher growth will increase leverage over time due to up-front investment costs associated with growth projects. Rauh and Sufi (2010) find growth to be significant negatively correlated with leverage with borrowers holding significant amounts of bank and bond debt.

Industry Leverage

It is well known that different industries exhibit significant variation in leverage ratios. Lemmon et al. (2008) presents formal tests that confirm this variation in leverage across industries. There are several possible meanings to follow an industry leverage level. One interpretation could be that managers follow the proxy of an industry median leverage as a benchmark when considering the firm's own debt structure. In addition, firms in the same industry are likely to be affected by common forces in their financing decisions. These forces can among others reflect nature of competition, product market interactions, industry heterogeneity in the types of assets, business risk, technology, or regulation (Frank and Goyal, 2009). The trade-off theory predicts that firms with higher industry median leverage should have more debt, while under the pecking order perspective, the industry should only matter to the extent that it serves as a proxy for the firm's financing deficit (Frank and Goyal, 2009).

3 Comparison between U.S. and Norwegian Debt Markets

There are many differences between the U.S. and the Norwegian debt market. Perhaps the most obvious distinction between the two markets is the relative size of the markets. The U.S. corporate debt market is one of the worlds most complexed capital markets, with maybe the highest trading volume of numerous debt instruments. In contrast, the Norwegian debt market is much smaller and consist hence of less advanced but more typical debt instruments. We do a comparative study between the two markets to understand similarities and differences between U.S. and Norwegian corporations' choice of debt structure decisions. The comparison will be highlighted in chapter 9. For now we briefly discuss recent trends in both markets and describe structural differences.

3.1 Trends

In order to understand the impact that corporate debt issuances have on firms' capital structure, it is necessary to assess what trends have occurred in the recent decade. From figure 1 we see that total U.S. corporate debt increased continuously up until the financial crisis. In this year capital markets were hit by a severe skepticism which consequently affected future corporate debt levels. In the years following the financial crisis U.S. debt levels have not experienced the same increase as it obtained earlier. Arguments targeting the past years stable debt levels confirms that U.S. corporations are still skeptic towards capital markets and are thus behaving carefully with their investment decisions. Even though firms can achieve growth at fixed leverage levels we believe that corporate leaders are affected with their debt structure decisions when unforeseeable events occur.

Compared with the Norwegian market, the U.S. market is extremely large. However, the Norwegian debt market has experienced a similar trend in corporate debt issuances the last decade. In contrast to the U.S. economy, the Norwegian economy suffered a minor downturn around 2003. The downturn was mostly due to a combination of high interest rates (a tight monetary policy to fight inflation), with a very strong Norwegian krone as a result, thus leading to weak export prospects and a fall in oil investments (Krogh, 2010). In the preceding years of the financial crisis, Norwegian capital markets experienced a steep increase in both equity and debt markets. Corporations were issuing equity and debt related securities more than ever before, but in 2008, the increase naturally stopped as the world economy were thrown into the financial crisis. As Norwegian banks had relatively small exposure to sub-prime mortgages in the U.S., no domestic banks got into any grave problems. In the years following the crisis, Norwegian capital markets have been relatively stable, however as of 2012, Norwegian corporations tend to issue more debt-related securities relative to equity issuances compared to previous years. It is likely that Norwegian corporations again see benefits of issuing more debt as their pessimism

towards the financial markets seems to diminish.

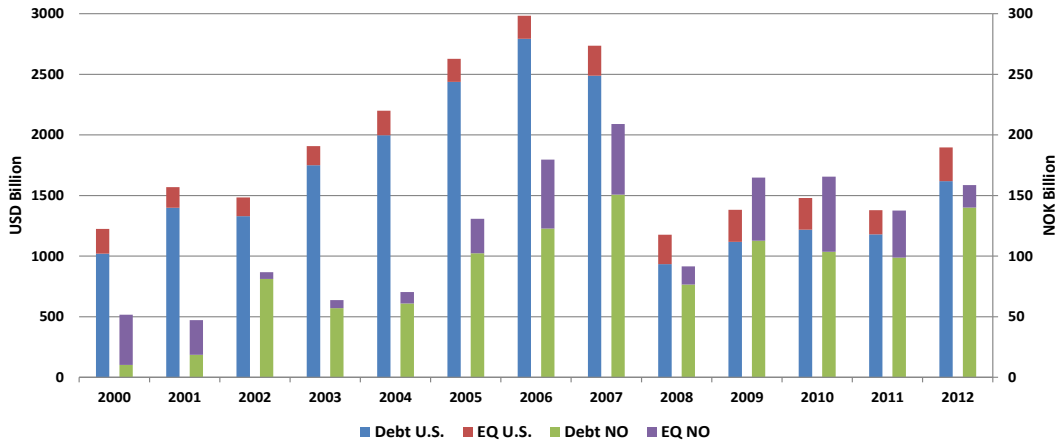

Figure 1: U.S. and Norwegian public debt and equity issues
Source: U.S. data: Securities Industry and Financial Markets Association (SIFMA, 2013), Norwegian data: Stamdata (STAMDATA, 2013) and Oslo Børs (Oslo Børs, 2013)

3.2 Structural differences

Figure 2 presents the development of the U.S. and Norwegian corporate bond market for the past decade. The graph illustrates the use of public debt in both markets and to what extent firms issue investment grade or high yield debt. According to figure 2 the U.S. and Norwegian public debt market are different in several ways. Not surprisingly is the size of total debt issues higher for the U.S. sample. There is however a more interesting structural difference between the two markets. U.S. firms issue more debt classified as investment grade relative to high yield debt. In contrast, Norwegian firms issue more high yield debt relative to debt classified as investment grade. Apparently the trend has been stable since the year of 2005 until today except for the years of the financial turmoil, hence Norwegian firms show a greater appetite for riskier debt issuances. We choose to believe that the composition of bond issuances reflects investors hunger for higher yield spreads, as the Norwegian debt market is commonly assumed to be one of the least risky markets to invest in.

In the years prior to the financial turmoil both markets experienced an increase in public debt issuances. Similar as the U.S. corporate bond market, the Norwegian corporate bond market peaked in 2007. The financial crisis created a strong pessimism towards capital markets, which corresponded to a significant decrease in Norwegian public debt issuances that year. In the years following the crisis the Norwegian public debt market has experienced a sort of u-shaped debt issuance development, while the U.S. public debt market have increased year after year. Hence, it might seem that Norwegian firms are a bit more pessimistic to the overall financial market, however they are closing in on the levels prior to the crisis and becoming more equal the U.S. public debt market.

In 2012 the U.S. corporate bond market experienced a historical peak for issuers and investors, especially those in the speculative-grade segment. Reasons such as the "financial turmoil in Europe, slowing economic growth in developing markets, and all-time low U.S. Treasury rates prompted investors to move more and more into U.S. corporate bond debt. The increased demand for corporate bond debt created some of the most favorable lending conditions for corporate borrowers since the financial crisis in 2008" (S&P, 2013).

These features are important to have in mind when we now go on discussing heterogeneous debt considerations.

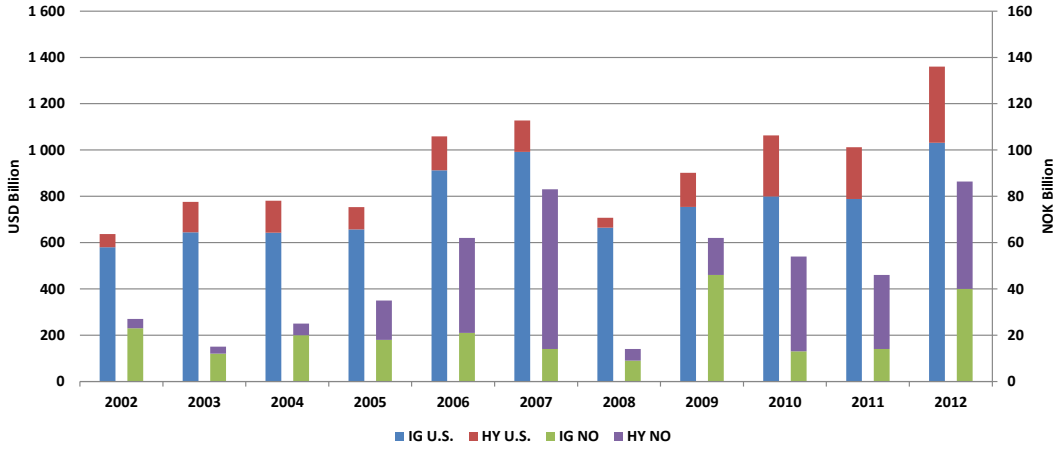

Figure 2: U.S. and Norwegian corporate bond market
Source: U.S. data: Securities Industry and Financial Markets Association (SIFMA, 2013), Norwegian data: SEB (SEB, 2013)

4 Heterogeneous Debt Considerations

The majority of recent capital structure literature has chosen to treat debt as a homogeneous variable. By analyzing debt as a net magnitude, the debt-equity ratio is the most fundamental consideration in the determination of capital structure decisions. However, this consideration is not intuitively correct for capital structure research because in fact companies operate with different kinds of debt securities that have different regulations and characteristics that affect a firm's capital decisions. In this section, we will describe the importance of considering debt as a heterogeneous variable. In addition, we assess meanings and conclusions of some scholars who have focused their work on heterogeneous debt structure in order to broaden our understanding of the heterogeneous field.

4.1 Assessment of the heterogeneous debt view

Assessing debt from a heterogeneous angle clarifies a number of important aspects and dimensions that are not obvious with a homogeneous approach. First of all there exist great many different debt securities that can be issued both in the private and public market, ranging from traditional types of debt such as term loans and bond debt, to more advanced structured securities such as CDOs and other synthetic financial instruments. In this paper we will focus on the traditional debt securities as these are most common among companies. Debt contracts differ on a number of dimensions, such as maturity, seniority, covenants, and different types of embedded options such as convertible features and call options. Even when institutions, regulations, taxations and market conditions remain relatively constant, these features vary both across different firms' debt issues and over time within the same firm's issues (Julio et al., 2007). Taking these factors into account we are able to generate a better understanding of what considerations are important for firms' capital structure decisions.

Companies that borrow mostly from banks face higher regulations on their debt instruments, than companies issuing in the public market. Butler and Berlin (2001) talk about two effects that are put in place when companies lend from private institutions, respectively the monitoring effect and the confidentiality effect. First, banks can through restrictive covenants control and reduce a firm's aggressiveness in the capital markets. Secondly, private debt reduces the amount of public information about a firm that becomes available to its competitors. In contrast, companies who issue debt in the public market face less restrictions, however their private information now become publicly available.

In the heterogeneous debt assessment there are especially three areas worth mentioning. The maturity structure plays an interesting role in manager's choice of security. Practitioners commonly argue that firms should match maturities of the security it issues with the investment it finances[5]. Diamond (1991) argue from a

[5]For a deeper investigation please refer to text by Myers (1977), Barclay and Smith (1995),

liquidity risk perspective that short term issuers are more likely to be larger, have stronger growth opportunities, hold more cash, and have a lower fixed asset ratio than otherwise similar issuers of long term debt.

The second aspect is whether a firm should issue secured or unsecured debt securities. Bank debt and bond debt can both be secured or unsecured. What distinguish them is that secured debt is backed by collateral against a firm's assets; hence it is a less risky investment than unsecured debt. One common finding in the literature is that highly levered firms tend to issue more secured debt than unsecured debt (Julio et al., 2007) and (Rauh and Sufi, 2010).

Finally the last, but maybe the most interesting aspect that we mention are connected to the convertibility and exchangeability of certain debt securities. The distinctive features of convertible debt is first its structure that gives either the issuer or the bondholder the option to exchange the debt for another security, and secondly its somewhat equity-like feature. Particularly in situations in which asymmetric information is likely to be severe, these types of securities are preferable for financing projects with embedded real options (Stein, 1992). Furthermore, Stein (1992) states that firms with high costs of financial distress but strong investment opportunities need to raise external financing and choose to do so through convertibles to avoid the lemons problem in equity issuance. Corresponding to the latter arguments, Mayers (1998) claims that in situations in which a substantial fraction of a firm's investment is in the form of future investment options, convertibility can lead to more efficient investments.

4.2 Debt structure decisions

Corporations face many complex choices when making financing decisions. To finance investment projects managers need to choose between retained earnings, equity or one of many possible types of debt. In a study conducted by Bolton and Scharfstein (1996) based on data spanning a 31 year time frame, they observe that 85% of total U.S. external financing was raised through debt offerings, compared to only 7% through equity offerings. In light of their research, the choice between alternative types of debt financing are likely to be equally or even more important than the choice between equity and debt when understanding how companies finance their investments.

One of the major choices managers need to make is whether the company should issue private or public debt[6]. In relation to the market perspective, there are different demand- and supply-side factors that contribute to firms' debt structure decisions. The demand-side factors typically involve costs directly and indirectly associated with a debt issue, whereas the supply-side factor is basically corresponding to a

Stohs and Mauer (1996) and Guedes and Opler (1996).

[6]We characterize private debt as bank debt(term loans + revolving credit) and private placements, and public debt as debt traded on the public market(bonds, convertible debt, commercial paper, capital leases).

firm's possibility of engagement in different markets. Motivated by Rauh and Sufi (2010), we will later in this paper focus on firms that act in the public market, characterized by having a credit rating. But first we briefly discuss the factors that affect managers' debt structure decisions.

4.2.1 Demand factors

Information asymmetry affect how firms finance their investments. The choice of lender is highly impacted by the information gap between capital markets. Firms with high levels of information asymmetry may find it difficult to convey trustworthy information in the public market because it might affect the competitive advantage of the business. Such companies will therefore prefer bank financing before public financing. This coincides with the study by Welch (1997) who argue that private debt is a safer instrument than public debt because private lenders are better informed through monitoring and screening. The monitoring service that banks impose on firms is beneficial for all of the firm's investors because of the potential to spot problems faster than other capital market participants. The latter argument implies that bank debt may be particularly useful for firms with high information asymmetry and lower credit ratings, and especially for firms with good prospects. In contrast, higher quality firms exhibit less information asymmetry and are therefore more likely to borrow publicly because the benefits of bank financing are smaller (Denis and Mihov, 2003).

Liquidation and renegotiation is the second concern managers need to be aware of. The costs associated with bankruptcy and eventually liquidation can be potentially harmful for the firm. It is more costly to renegotiate existing debt claims with several bondholders instead of one financial institution, thus we expect that lower quality borrowers employ bank debt. Another striking problem that might occur when renegotiating with public bondholders is the "holdout problem". Some individual bond holders might want to waive their contracts and hold out even though it might be of the best interest for the bondholders to renegotiate as a group. Chemmanur and Fulghieri (1994) derive predictions about the sources of borrowing as a function of the borrower's prior probability of default and the lender's ability to make an efficient liquidation decision, and suggest that banks and other private lenders have higher flexibility of renegotiation than publicly lenders due to existing regulatory settings.

The underinvestment problem addresses managers' decisions to not undertake valuable projects if the benefits of the new investment are likely to accrue to debt holders. Myers (1977) suggests that maintaining an intimate and flexible relationship with the lender can mitigate the underinvestment problem. It is more likely to sustain such a relationship with one financial institution rather than many public debt holders. Thus firms facing higher growth opportunities will prefer bank debt rather than public debt.

4.2.2 Supply factors

Companies that have obtained a credit rating have direct access to the public debt market. Such companies have larger leeway in terms of their financing decisions than unrated firms who basically can borrow from banks and other private institutions. This flexibility is of great importance for many firms in order to maximize firm value and minimize cost of capital. Faulkender and Petersen (2006) argue that restricted access to debt markets, all else equal, leads to less debt issued because financing takes place through equity markets. This is further discussed by Colla et al. (2012) who concludes that debt specialization is more common among firms without constrained access to public debt markets. Access to the public debt market entails that it is also great differences across the debt structure of high- and low-credit quality firms. The results by Rauh and Sufi (2010) coincide well with the predictions of Diamond (1991), Chemmanur and Fulghieri (1994), and Bolton and Freixas (2000) that high credit quality firms rely more on public financing, while lower quality firms prefer bank debt.

4.3 The empirical modeling of debt structure

As far as we know, there are only two scholars who have investigated corporate debt structure with focus on individual debt securities, i.e. Rauh and Sufi (2010) and (Colla et al., 2009, 2012). Among all the research that we reference, these two are likely the ones that bears most resemblance with our study. Many other studies investigate capital structure by introducing a fixed debt amount, usually total debt or long term debt. However, those studies lack the important findings of debt heterogeneity and are thus not able to explain special characteristics of firms' debt structure, which are prominent for firms' capital structure decisions.

5 Credit Ratings and its Impact on Debt Structure

This chapter introduces credit ratings as an important influencing factor for debt structure decisions. As pointed out in a survey by Graham and Harvey (2001), 57,1% of the asked CFOs saw credit ratings as the second most important debt factor concerning their future capital structure decisions. Motivated by this survey, we explore the area of credit ratings and its impact on firms' debt structure. Since the first public bond rating was published in 1909, the U.S. Credit Rating industry has grown to become world leading. Although there appear to be roughly 150 local and international credit rating agencies worldwide (BCBS (2000); Langhor and Langhor (2008, p. 384)), Moody's, Standard & Poor's and Fitch are clearly the dominant entities. Further in this paper we will refer to credit ratings issued by Standard & Poor's. We start this chapter by looking at the corroborative characteristics of credit ratings and why they are essential for firms' debt policy. Next, we draw upon findings and conclusion in previous literature.

5.1 The assessment of credit risk

Credit ratings plays a useful role in enabling corporations to raise money in capital markets. By issuing bonds and notes in the public market, corporations can borrow money directly from investors. The assessment of credit/default risk involves analyzing both business risk and financial risk of a corporation, as well as the industry and competitive position the firm has in the market. Based on an overall assessment, debt issues are then given a credit rating, which indicate the agencies' opinion about the firm's creditworthiness. Standard & Poor's sequence their credit ratings by 21 notches, ranging from AAA to D, with AAA being the highest rating indicated by an extremely strong capacity to meet financial commitments, whereas letter D default on financial commitments. The ratings are modified by adding a plus (+) or minus (-) sign in order to show relative standing within the major rating categories. The credit rating distribution is presented in table 1.

In 1951, the National Association of Insurance Commissionaires (NAIC) established a system of internal quality categories in which the top-quality (low-quality) classification corresponded to ratings of BBB and above (BB and below), effectively establishing uniformity in the definition of "investment grade" ("speculative grade/non-investment grade/ high yield") across banks and insurance regulators (Cantor and Packer, 1994). These definitions are still highly prevalent in the markets. Issues rated as investment grade are associated with good prospects and less risk of default, whereas high yield issues are associated with greater default risk. Since many financial intermediaries face regulatory requirements on their investments, the distinction between investment grade and non-investment grade are of concern for many individual issuers because the two levels classify the issue as either a good investment or a risky investment.

Table 1: Credit rating scale (Standard & Poor's)

	S&P	**Capacity to meet financial commitments**	**Creditworthiness (Description of credit risk)**
Investment Grade	AAA	Extremely strong	Extremely strong capacity to meet financial commitments. Highest rating
	AA	Very strong	Very strong capacity to meet financial commitments
	A	Strong	Strong capacity to meet financial commitments, but somewhat susceptible to adverse economic conditions and changes in circumstances
	BBB	Adequate	Adequate capacity to meet financial commitments, but more subject to adverse economic conditions
	BBB-	Moderate	Considered lowest investment grade by market participants
Speculative Grade	BB+	Substantial	Considered highest speculative grade by market participants
	BB	Less vulnerable in near-term to adverse business, financial and economic conditions	Less vulnerable in the near-term but faces major ongoing uncertainties to adverse business, financial and economic conditions
	B	More vulnerable to adverse business, financial and economic conditions	More vulnerable to adverse business, financial and economic conditions but currently has the capacity to meet financial commitments
	CCC	Currently vulnerable	Currently vulnerable and dependent on favorable businesses, financial and economic conditions to meet financial commitments
	CC	Currently highly vulnerable	Currently highly vulnerable
	C	Bankruptcy petition has been filed	A bankruptcy petition has been filed or similar action taken, but payments of financial commitments are continued
	D	Payments default	Payments default on financial commitments

5.2 Characteristics of credit ratings

When a company is in the possession of a credit rating it needs to be aware of specific features. By having a credit rating investors will impose certain characteristics on the firm. The next three paragraphs discusses some of the features related to possessing a credit rating.

5.2.1 Regulations

Many institutional investors face limitations on their investment decisions, due to regulations on their capital requirements. The Securities and Exchange Commission (SEC) certifies certain rating agencies as qualified for implementation of various kinds of regulations. These agencies are better known as "Nationally Recognized Statistical Ratings Organizations" (NRSRO). The designation of NRSRO is seen as very important by numerous institutions and regulatory bodies as they rely on ratings provided by such agencies for their investment decisions. Thus, there exist a causal relationship between credit ratings and regulations. Credit ratings influence investors' choice of holding certain types of bonds. For example, an investment grade bond mutual fund is only allowed to invest 5% of their assets in junk bonds but must sell any security if it falls below a B rating (Kisgen and Strahan, 2010). Firms can achieve benefits such as less disclosure requirements, access to regulated investors as well as access to markets by acquiring a rating from a NRSRO agency. Since the origination of the NRSRO's, SEC has adopted numerous investment rules and regulations in order to try to reduce firms' default risk.[7]. Furthermore, in December 2010, the Basel Committee on Banking Supervision (BCBS) as well as the G-20 leaders agreed to the new regulatory standards on bank capital adequacy and liquidity. Thus, the "Basel III" accord works as a limiting factor for financial intuitions' holdings in risky investments.

5.2.2 Information content of ratings

Credit ratings may provide information beyond other publicly available information on firms' credit quality. Moody's and S&P follow a similar pattern in respect to rating corporate issuances. All corporate bonds registered by the Securities and Exchange Commission (SEC) are rated whether or not requested by the issuer (White, 2001). When a company request a rating the assessment is based on publicly available information as well as private information disclosed by the management, hence the company gets an opportunity to provide sensitive information to investors. Actors in the market have various meanings whether or not the rating agencies provide any extra information to the bond markets. Although many empirical papers find significant results that credit ratings correlate well with average default rates, these

[7]In 1993, the Basel Committee on Bank Supervision proposed in its market risk guidelines that internationally active commercial banks dealing in securities should hold extra capital against their non-investment grade bond inventories (Kisgen and Strahan, 2010).

results are no indicator of new and useful information provided by rating agencies. However, recent literature finds that rating changes do provide significant new information to the financial markets[8]. Furthermore, the new information that a bond rating change brings to the financial markets may also be about the change in the bond's regulatory status rather than any new information about the likelihood of default.

5.2.3 Measuring risk and its corresponding costs

Credit ratings are meant to capture and categorize credit risk. Bonds and other debt securities are in addition subject to liquidity risk and interest rate risk. Huang and Huang (2003) states that credit risk is the risk factor corresponding to the largest part of the risk premium. Together, these risk factors underpin the yield associated with each debt security. The borrowing cost associated with debt issuances are hence strongly affected by the riskiness of debt contracts. However, credit risk become more important for firms as you move down the credit rating scale. That is, junk bonds accounts for a much larger fraction of the observed corporate-treasury yield spreads (Huang and Huang, 2003). An investor investing in a speculative graded debt security would require a higher yield to maturity because of the higher risk of default. As credit ratings measure a firm's default risk by adding a single letter, the assessment done by the rating agencies also provides yield spreads for different rating levels. Hence ratings may possibly affect a firms debt cost of capital.

5.3 Credit ratings in the Norwegian market

The Norwegian credit market was until 1980 strictly regulated by the government. During the following decade the government liberalized the credit market, making it more internationalized through deregulation, technological advancements, and increased international trade. The liberalization of the credit market resulted in additional market players, higher liquidity in the market, and increased market capitalization. Despite its development, the Norwegian credit market is still small and less complexed than the U.S. credit market. This is apparent as the Norwegian debt market is characterized by high transparency and simpler debt instruments.

Credit ratings in the Norwegian market is less widespread as the market is influenced by higher transparency. While all publicly traded U.S. firms are credit assessed by typical NRSRO agencies such as Moody's and Standard & Poor's, only a handful of Norwegian companies experience the same credit assessment. These firms are typically the largest and most recognized firms trading on Oslo Stock Exchange. For the rest of the publicly traded firms in Norway, brokerages produce so-called shadow ratings without charging the issuer for it. Ratings are assessed using only publicly available information, however they follow the same criteria and rating scale as official ratings. Hence, these ratings are assessed by the same standards and can

[8]Please refer to the text by Jewell and Livingston (1999).

consequently be used to compare the individual risk level of Norwegian companies. Although shadow ratings don't fulfill the NRSRO rating based regulations, they are specially customized for the Norwegian bond market and their regulations. The Norwegian Registry of Securities has thus ascertained that two shadow ratings are equivalent to one official credit rating.

The Norwegian sample thus consists of both official ratings as well as shadow ratings. We further use these ratings interchangeably to identify credit rating considerations in relation with Norwegian corporate debt structure.

5.4 Previous empirical findings

The majority of empirical literature stem from studies in the U.S. market, where credit ratings play an important role in the determination of capital structure decisions. Graham and Harvey (2001) find that credit ratings are the second most important debt factor for a firm, beating traditional factors suggested by traditional capital structure theory, such as tax advantage of interest deductibility. Thus, it may seem as an indication that firms are more concerned about distress costs and the risk of bankruptcy.

Although most prior literature[9] describes the relationship between credit ratings and firms' level of leverage, recent literature focus more on linkages between a firms rating level and its respective debt structure. As discussed in chapter 4, treating debt as a heterogeneous entity is important trying to understand what considerations determine a firm's capital structure decisions. Rauh and Sufi's (2010) empirical study examines debt structure across the credit rating distribution. Their study provides new insights by recognizing that firms simultaneously use different types, sources, and priorities of debt. They find that speculative graded firms have substantially larger amounts of debt compared to investment graded firms, as well as it differs by a multi-tiered debt structure often comprised by both secured and subordinated debt issues. These results underpin the research done by Colla et al. (2009). However, Colla et al. (2009) perform their analysis on both rated and unrated firms. They find that firms having access to the public debt market, by having a credit rating, use multiple types of debt in their debt structure. Hence, firms that are unrated rely much more on bank debt.

One important issue regarding capital structure decisions is when a firm experiences a change in its credit rating. In case of a rating change there are many implications to a firm's debt structure. Treating debt as a net magnitude, Kisgen (2006) find that firms close to a change in rating issue approximately 1 % less net debt relative to net equity than firms not near a rating change. Moreover, the effects are stronger for certain levels of rating, i.e. especially the boundary between investment grade and speculative grade ratings. Furthermore, Kisgen (2009) investigates whether managers target credit ratings in making capital structure decisions. He finds that

[9]See e.g. Faulkender and Petersen (2006), Kisgen (2006), and Mittoo and Zhang (2010) for a deeper analysis.

changes in credit rating affect firms' subsequent decisions regarding capital structure, by showing that downgraded firms issue approximately 1.5 % - 2 % less net debt relative to equity. Rauh and Sufi (2010) implements a similar analysis, though with a heterogeneous debt perspective and with a data sample consisting only of firms that are downgraded from investment grade to speculative grade, commonly known as "fallen angels". Their main results reveal that firms within two years after a downgrade tend to decrease unsecured debt, simultaneously showing an increase in secured and subordinated debt.

5.5 Testable hypotheses of credit rating considerations

We examine three perspectives on the relationship between credit ratings and a firm's debt structure. In addition, we investigate the same hypotheses on both the U.S market and the Norwegian market. These hypotheses are chosen in order to improve our understanding of what considerations determine the capital structure of firms. Although the Norwegian sample is much smaller than the U.S. sample, we expect to see similar trends.

The first hypothesis corresponds to companies that have access to the public debt market qualified by having a credit rating. We expect that rated firms spread their priority among multiple types of debt securities compared to unrated firms. Moreover, we think that once a firm has access to the public debt market, they will prefer bond debt relative to any other debt type. Furthermore, in relation with prior literature, we believe that the distinction among debt securities will be more significant across the credit rating distribution, meaning that lower credit rating leads to lower debt specialization. We denote this hypothesis as having a credit rating.

H_{HACR}: *Companies that have a credit rating, measured by its presence in the public debt market, spreads their priority among multiple types of debt securities to a higher degree than unrated firms. This dispersion is assumed to be more pronounced for non-investment graded firms.*

The second hypothesis investigates how a firm responds to being near a change in credit rating in terms of a change in its debt structure. We choose to look at this problem in two perspectives, i.e. a change from a broad rating category, and during a time period before and after a rating change. First we test the effect of a rating change from one broad rating category to another including both upgrades and downgrades. Secondly, we test how companies react on their debt structure in times advancing the rating change, as well as in retrospect of the rating change. The second perspective involves an analysis of "fallen angels", which is academically known as companies that have been downgraded from investment grade to non-investment grade. According to previous literature, we expect that companies, especially at the lower part of the credit rating distribution experience more severe adjustments to their debt structure. We denote this hypothesis as being near a rating change.

H_{NARC}: *Companies that are near a change in rating level will adjust their debt ratios towards lower levels and will prioritize adjustment of their debt securities differently relative to firms not being near a credit rating change. The adjustment is greater for lower quality firms and is assumed to be more pronounced for downgraded firms, especially "fallen angels".*

Finally, the last hypothesis that is investigated contributes to the field of credit ratings and debt maturity. This relation is a small, and to our understanding, not a highly researched field within the capital structure theory. In resemblance with Gopalan et al. (2013) we test the effect different maturities have on a company's debt structure. Meaning we test for three different maturities, i.e. less than 5 years, 5-15 years, and above 15 years. Furthermore, we investigate whether the maturity of different public debt instruments vary with credit ratings. We expect that especially debentures, which is the security that mostly resembles a normal bond, will have shorter maturities for lower rated firms as these firms typically have more bank debt than bond debt. We believe that companies belonging in the center of the rating scale will have longest average maturity as higher quality firms possess more equity and short term debt, while lower quality firms face heavy restrictions from financial intermediaries. We denote this hypothesis as debt maturity structure.

H_{DMS}: *Companies that issue public debt will have different maturity structure on their debt issues dependent on which credit rating they possess. Companies belonging to the center of the rating scale are expected to have the longest average maturity, and companies are assumed to have a more concentrated maturity structure as credit ratings exacerbates.*

6 Data

Our dataset consist of non-financial companies listed on major U.S. benchmarks and Oslo Stock Exchange in the period 2006 - 2011. The data is obtained from several sources. All financial company data, credit ratings, and fixed income data are collected from FactSet, an international provider of financial information and analytic software for investment professionals. FactSet obtains data from third party vendors, such as Reuters and Standard & Poor's, and is recognized for being accurate by leading investment banks. Most of the Norwegian credit ratings are obtained from well-known Norwegian brokerages[10].

This chapter provides insight of the construction of the different samples. Moreover, we clarify the different debt types used in our study, before we end the chapter with a section presenting descriptive statistics for each sample.

The sample corresponding to the "DMS"-hypothesis will easily be described in chapter 9.3.

6.1 Sample construction

U.S. reference sample

The U.S. reference sample consists of non-financial firms traded on the AMEX, Dow Jones, and NASDAQ indices during the analyzed period[11]. Originally the sample population consisted of 2 947 unique firms, with a total of 17 607 firm year observations. To obtain a desired dataset we apply the following restrictions. We first remove observations with missing or zero long term debt (removing 8 167 firm year observations). Furthermore, we remove observations that have missing values on the independent variables, i.e. firm characteristics (removing 709 firm year observations). Lastly we remove all observations where the difference between the sum of all debt types and long term debt exceeds 10 % (removing 154 firm year observations). We end up with the U.S. reference sample consisting of 1 863 unique firms and 8 577 firm year observations.

U.S. rated sample

From the U.S. reference sample, Standard & Poor's provide credit ratings on 885 unique firms. The U.S. rated sample hence consists of 4 199 firm year observations, which account for approximately 49 % of the total U.S. sample.

[10]Credit ratings (shadow ratings) are provided by Carnegie, SEB Merchant Banking, Nordea Markets, and DNB Markets.

[11]FactSet reports fixed income data back to 2006.

Norwegian reference sample

The Norwegian reference sample consists of all non-financial firms traded on the Oslo Stock Exchange All Share Index (OSEAX) during the analyzed period[12]. Originally the sample population consisted of 156 unique firms, with a total of 781 firm year observations. Similar to the U.S. reference sample we make the same restrictions, counting for missing or zero values of long term debt (removing 371 firm year observations), missing firm characteristics data (removing 13 observations), and finally difference between sum of debt components and long term debt exceeding 10 % (removing 17 firm year observations). The Norwegian reference sample hence consists of 100 unique firms and 381 firm year observations.

Norwegian rated sample

For the Norwegian reference sample, Standard & Poor's only provide official credit ratings on seven firms, thus the collection from various investment banks has been vital to secure a satisfying subsample. The Norwegian rated sample hence consists of 28 unique firms and 114 firm year observations, which accounts for approximately 30 % of the Norwegian reference sample.

6.2 Individual debt types

Using the individual debt types reported in FactSet we separate out the most common debt types utilized by U.S. firms and use them further in our panel data regressions. These debt types are recognized as primary to firms' debt policy and will hence be of great importance for firms' debt structure decisions. We have chosen to focus on the following debt types.

Revolving Credit - (RC) is a debt type belonging to the more broad comprehension of what we call bank debt. It is defined as lines of credit for which a customer can use when needed. Require paying a commitment fee.

Term loans - (TL) is equivalent to a regular bank loan, hence involve a specified repayment schedule and a floating interest rate.

Commercial Paper - (CP) is a short-term debt instrument issued by companies. The instrument is not backed by any form of collateral; hence making it only valuable for high quality firms, as the firm otherwise would have offered substantial discounts for the debt issue. It is a cost-effective instrument as it matures usually within 270 days and does not need to be reported to the Securities and Exchange Commission.

Private Placements - (PP) are associated with the sale of securities to a small and selected number of investors as a way of raising capital. These investors are typically large banks, pension funds, and insurance companies. Private placements is the opposite of a public debt issue, hence they are not traded on the open market. As

[12]FactSet began providing fixed income data on Norwegian companies in 2007.

commercial paper, private placements do not require registration to the Securities and Exchange Commission.

Capital Leases - (CL) is associated with a purchased asset for accounting purposes.

Bonds and Notes - (BN) consists of all publicly traded bonds and notes except convertible bonds. These are loan agreements for which an investor loans money to an entity, usually a corporation, for borrowing purposes for a specified time period. Bonds and notes are interest bearing debt securities for which a fixed interest rate is applied to the contract. The difference between bonds and notes is the maturity structure, where bonds are the security with the longer maturity.

Convertible debt - (CONV) consists of all convertible bonds issued by companies in the sample. Convertible debt is commonly known as a debt security that can be converted into a predetermined amount of a company's equity at specified times during its life.

Beside of each individual debt security, we also test for the priority structure of bank and bond debt. We therefore test whether secured and unsecured bank/bond debt affect corporate debt structure decisions. The difference between the priority structure is mainly that the secured issues are backed by a kind of collateral in terms of default, whereas unsecured issues are not backed by any collateral and hence ranks lower than secured debt.

6.3 Descriptive statistics

Key statistics describing the dataset are presented in table 2, 3, and 4, and in figure 3 and 4 in this section.

Table 2 presents mean values of different debt types for both the reference samples and rated samples. As credit rating agencies use book values it is reason to believe that the use of book values are more appropriate than market values when analyzing regressions involving credit ratings (Kisgen, 2006). Hence, all our analyzed results involve book values.

According to table 2 there is a clear variation in firms' use of different debt instruments with the majority of firms holding bonds and term loans. For example, only 3 % of U.S. rated firms have commercial paper in their debt structure. The presented results also indicate that the reference samples have more bank debt and less bond debt compared to the rated samples, indicating that rated firms use more public debt. Moreover, rated firms have on average higher levels of long term debt than the reference samples.

Table 2: Overview of debt types

	U.S. All		**U.S. Rated**		**NO. All**		**NO. Rated**	
	Mean	% of Firms	Mean	% of Firms	Mean	% of Firms	Mean	% of Firms
LTD	0.251	100 %	0.308	100 %	0.345	100 %	0.372	100 %
RC	0.169	38 %	0.071	34 %	0.135	28 %	0.115	30 %
TL	0.305	69 %	0.180	73 %	0.520	83 %	0.463	90 %
CP	0.002	2 %	0.005	3 %	NA	0 %	NA	0 %
PP	0.058	11 %	0.016	6 %	0.001	1 %	0.005	4 %
BN	0.365	52 %	0.649	86 %	0.261	52 %	0.366	86 %
CONV	0.100	18 %	0.068	21 %	0.021	11 %	0.023	15 %
CL	0.053	42 %	0.023	45 %	0.066	44 %	0.039	44 %
Sec. Bank	0.259	41 %	0.157	36 %	0.214	34 %	0.156	27 %
Unsec. Bank	0.165	27 %	0.063	25 %	0.091	19 %	0.091	25 %
Sec. Bonds	0.056	11 %	0.100	19 %	0.049	8 %	0.007	3 %
Unsec. Bonds	0.228	33 %	0.439	63 %	0.203	46 %	0.011	85 %
N		8 577		4 199		381		114

"% of Firms" describes the percentage of total number of firms that have the respective instrument in their debt structure.

Explanatory variables

In accordance with Colla et al. (2009) and Frank and Goyal (2009) we use the same definitions of proxies[13] in our use of firm characteristics. We winsorize all the continuous variables at the 1^{st} and 99^{th} percentiles to eliminate the negative effect of outliers. Table 3 presents mean and median values of the respective variables. The rated samples consist of firms that on average are larger, more tangible, more profitable, and tend to follow an industry median long term debt level relative to unrated firms. This holds for both the U.S. and Norwegian market. Unrated U.S. firms tend to be on average more growth oriented relative to rated firms. This trends is opposite for Norwegian firms.

[13]See Appendix D for further details around definitions and proxies for the explanatory variables.

Table 3: Overview of firm characteristics

	U.S. All		**U.S. Rated**		**NO. All**		**NO. Rated**	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Size	6.514	6.994	8.186	8.270	8.770	8.664	9.957	9.709
Tangibility	0.275	0.187	0.334	0.259	0.425	0.359	0.498	0.542
Growth	1.334	0.995	1.174	0.993	0.914	0.826	0.983	0.890
Profitability	0.079	0.110	0.146	0.125	0.082	0.079	0.109	0.097
Industry	0.217	0.227	0.238	0.232	0.348	0.332	0.361	0.399
LTD								
N	8 577	8 577	4 199	4 199	381	381	114	114

Industry distribution

The difference in firm characteristics might be explained by both samples' industry distribution. We classify all firms according to the SIC-distribution[14]. According to figure 3, the industry distribution is fairly equal comparing the U.S. reference sample and the U.S. rated sample, with the majority of firms representing the manufacturing industry. This indicates no industrial difference between these two samples. The Norwegian samples are though less diversified and more focused around some specific industries. For example, the transportation sector consist only of shipping firms, which are closely related to the oil industry, while in the mining industry 80 % of the firms are oil and gas related services. Adding these two industries together, the Norwegian Stock Exchange consist of approximately 59 % companies in or closely related to the oil and gas industry. It is likely that the results from the Norwegian regression will be affected by the poor diversification on the Norwegian market.

Credit rating distributions

Credit rating distributions for the U.S. and Norwegian market is presented in figure 4. According to Holba (2006), a market place for Norwegian high yield bonds has emerged over the recent years, which is illustrated by the majority of Norwegian credit ratings belonging in the lower part of figure 4. Both the U.S. and the Norwegian rated sample have a credit rating distribution with two local maximums, both close to the edge between investment and non-investment grade, and one local minimum closer to the same boundary. The observed distribution indicates that there may be a trade-off between the cost of issuing high yield debt and high credit ratings. Furthermore, it seems like firms try to avoid if possible being very close to the boundary as it causes extra stress-related costs. Holba (2006) finds in her study that banks and other financial institutions are primarily the issuers in the Norwegian bond market. As we have excluded all financial firms, the Norwegian

[14]The Standard Industrial Classification (SIC) is a system classifying industries into a four digit code.

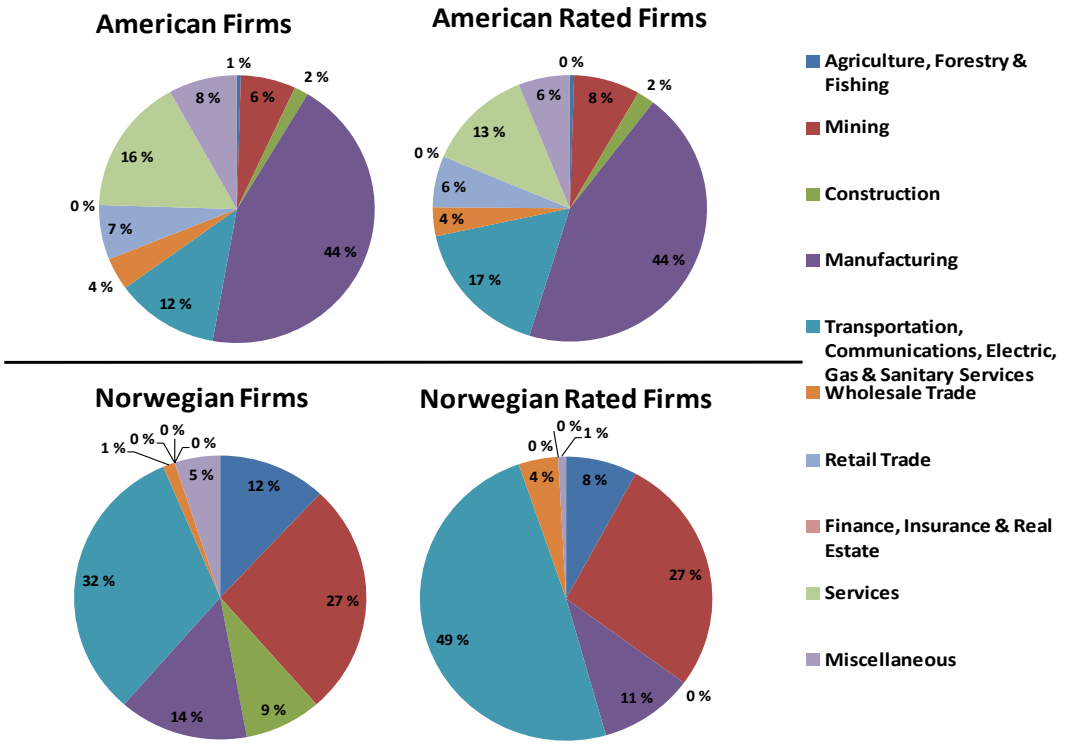

Figure 3: Distributions of industries for both markets

rated sample may be subject to skewness in terms of what financing source is most favorable, bank or public debt.

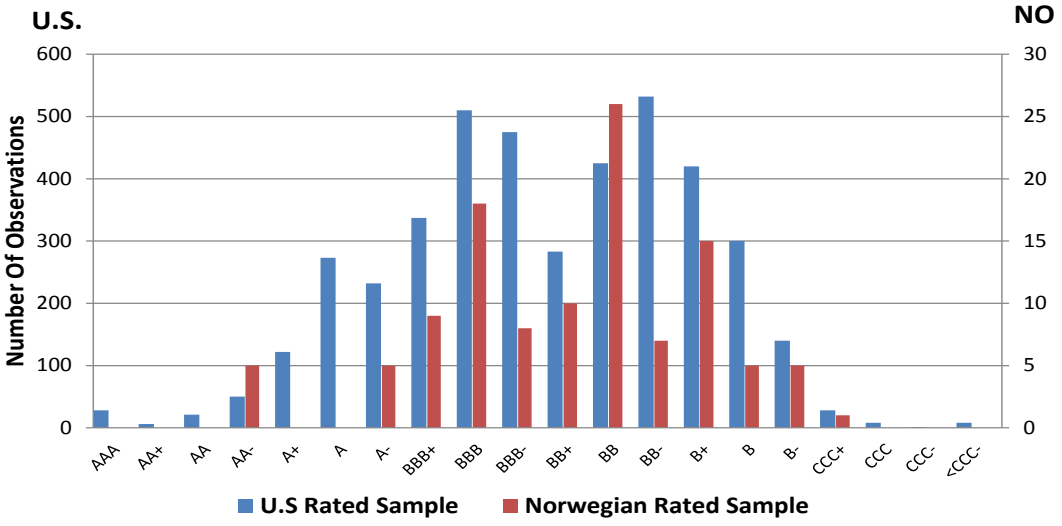

Figure 4: Credit rating distribution of both rated samples

Debt specialization

To confirm our beliefs that capital structure decisions are based on corporate debt being heterogeneous we test for debt specialization for both the U.S. and Norwegian rated samples.

In accordance with Colla et al. (2012) we use the commonly accepted measure for market concentration, namely the normalized Herfindahl-Hirschman Index (HHI). In relation with our study, this index measure firms' concentration of debt specialization, i.e. to what degree firms use more than one debt component[15]. The normalized HHI-measure is calculated by the following equation and the results in relation with credit ratings are presented in table 4.

$$HHI = \frac{H - 1/N}{1 - 1/N} \quad \text{where} \quad H = \sum \left(\frac{DebtType_i}{LTD} \right)^2 \tag{1}$$

Table 4: Mean values of debt specialization across credit ratings

	A	**>A**	**BBB**	**B**	**BB**	**CCC**	**<CCC**	**Unrated**	**Rated**
HHI U.S.	0.803	0.764	0.741	0.642	0.623	0.584	0.483	0.785	0.694
HHI NO	0.448	0.507	0.552	0.623	0.615	0.245	N/A	0.753	0.582

The table presents mean values for the HHI results. Dashed lines represents means that are not significantly different from each other on a 5% significance level.

The results indicate that both U.S. and Norwegian firms are characterized by a heterogeneous debt structure. Furthermore debt specialization become weaker as credit ratings exacerbates and rated firms are financed by more debt types relative to unrated firms. However, as the results indicate we can't distinctively distinguish between some rating categories. For example, U.S. companies having B, BB, and CCC ratings have different HHI values, though on a 5 % significance level we can't say that these mean values are different. This is also true for the Norwegian sample, but here it accounts for the whole rating specter. That means we can't claim on a 5 % significance level that Norwegian rated companies have different debt specialization, independent of which credit rating they possess. We can however claim that there exist a distinct difference between rated and unrated firms. Both the U.S. and Norwegian samples indicate that being rated leads to lower debt specialization relative to being unrated. This is a consequence of easier access to public debt markets.

Appendix A.1 and A.2 contains more results on debt specialization.

[15]The HHI-measure presents a value between 0 and 1. A value of 1 means that a firm specialize particularly in one debt type, whereas a value of 0 indicate a complete diversified use of all debt types in the respective universe.

7 Methodology

This chapter provides an overview of the generalized empirical model that is analyzed to describe firms' debt structure decisions and defines proxies for the explanatory variables. A theoretical discussion of estimation methods and how to choose the most appropriate method that are most relevant for the regression analyses will also be presented.

7.1 General model

Firms' choice of debt structure is still a fairly unexplored research area. We believe that these choices are made up by variables such as typical firm characteristics. Hence, the independent variables of our regressions are the explanatory variables presented in chapter 2.2. As we measure debt structure and not a single debt level, we operate with several dependent variables. We divide the dependent variables as static proxies and adjustable proxies. In total we use the reported debt types presented in section 6.2 as well as the level of long term debt. The same dependent variables are modified for adjustments and form the basis of the general model:

$$Debtstructure = f(Size, Tangibility, Growth, Profitability, IndustryLeverage) \tag{2}$$

The static level of leverage within each debt type is defines as LTD (Debttype) over total assets (LTD). To measure the adjustment of firms' position within each debt type we use the change in leverage positions from one year to the next as proxies.

In accordance with prior empirical literature we define our independent variables from scholars interested in both homogeneous ((Kisgen, 2006) and (Frank and Goyal, 2009)), and heterogeneous (Rauh and Sufi (2010) and Colla et al. (2012)) debt structure. The natural logarithm of total assets has been a natural measure of company size by many scholars. A logarithmic transformation of size will mainly affect small companies if size effects are present (Titman and Wessels, 1988). The proxy of tangibility is measured by a company's property, plant, and equipment over total assets as this proxy is frequently used in the literature. Growth has a complex proxy and is measured by the market value of equity plus total debt plus preferred stock liquidating value minus deferred taxes and investment tax credit over total assets. Profitability is measured as EBITDA over total assets and gives an indication of how companies use their assets to generate earnings. The last explanatory variable is industry median leverage and is measured by estimating median LTD (Debttype) each year for all firms within a sector corresponding to the classified SIC codes. This proxy indicates to what degree companies follow the median LTD (Debttype) trend in their own industry. The general model can be rewritten as:

$$LTD_{it}/DebtType_{it} = \alpha_i + \beta_1 Size_{it} + \beta_2 Tangibility_{it} + \beta_3 Growth_{it} + \beta_4 Profitability_{it} + \beta_5 IndustryLeverage_{it} + u_{it} \quad (3)$$

For the purpose of each hypothesis, the general model will be modified by adding one or more dummy variables. The modified models are presented in chapter 9. A summary of different proxies and dummy variables are presented in table 22 in appendix D.

7.2 Estimation methods

In similarity with recent studies[16], dependencies will be modeled using linear panel regression models. Linear panel regression models differs with ordinary linear regression models as they include a time dimension by pooling the data by time. The linear panel regression literature favors basically two common models, i.e. the fixed effects model and the random effects model (Baltagi, 2008, pp. 14-21). The two models differ in their way of estimating individual heterogeneity.

The fixed effects model

The fixed effects model[17] takes into account the existence of unobserved debt heterogeneity and decomposes the model error into two parts. First, a fixed individual effect term, μ_i, that is time-invariant and describes an individual condition such as management skills, company culture or other undetected factors that correlate with the dependent variable. Second, an error term that is assumed to be independent and identically distributed (IID) that captures the remaining disturbance, better known as white noise, ν_{it}. The following equation show the simple fixed effects model regression and its assumptions are summarized in table 5.

$$Y_{it} = \alpha_i + \beta_{it} + u_{it} \quad (4)$$
$$\text{where } u_{it} = \mu_i + \nu_{it}$$

Literature presents two estimators of capturing the fixed effects; the mean transformed data approach, *within estimator*, and the least squares dummy estimator (LSDV). The two estimators differ mainly in how they estimate the α_i term without violating the assumptions. The mean transformed data approach is calculated by equation 5[18]. Since α_i is independent this term will be zero, and hence equation 4 can be estimated by the pooled ordinary least squares method.

[16] See, e.g. Colla et al. (2012) and Rauh and Sufi (2010).

[17] For a complete derivation of the fixed effects model, see Baltagi (2008, p. 14).

[18] All variables are calculated as the difference from time averages. $\ddot{y}_{it} = y_{it} - \overline{y}_{it}$; $\ddot{x}_{it} = x_{it} - \overline{x}_{it}$; $\ddot{u}_{it} = u_{it} - \overline{u}_{it}$.

$$\ddot{y}_{it} = \beta_1 \ddot{x}_{it} + \ddot{u}_{it} \tag{5}$$

The LSDV estimator introduces a dummy variable representing the α_i for each individual. This estimator requires many degrees of freedom in its calculations. Based on the size of our dataset, the LSDV estimator has a major downside, thus the mean transformation data approach is used when applying the fixed effects model.

The random effects model

The random effects model[19] assumes the individual model error as a random individual disturbance effect that enters the regressions randomly every year for each company. Thus, this model assumes that u_i is IID distributed and independent of the explanatory variables. Equation 6 show the regression equation of the random effects model and its assumptions are summarized in table 5.

$$Y_{it} = \alpha_i + \beta x_{it} + u_{it} \tag{6}$$

There are two different estimators for the random effects model, the OLS-estimator and the generalized least squares (GLS) estimator. The GLS-estimator is the most efficient when there are presence of heteroscedasticity and autocorrelation in the model errors. Moreover, Baltagi (2008) argue that the GLS-estimator is the preferred estimator for models with many degrees of freedom. Due to our large number of observations, we thus apply the GLS-estimator further in this study.

Table 5: Model assumptions

Model		Notation	Implications
FE.1	RE.1		There exist a linear relationship between the dependent variable and the independent variables
FE.2		$\nu_{it} \sim IID(0,\sigma^2)$	ν_{it} is independent and identically distributed $(0,\sigma^2)$
	RE.2	$u_{it} \sim IID(0,\sigma^2)$	u_{it} is independent and identically distributed $(0,\sigma^2)$
FE.3		$\nu_{it} \sim N(0,\sigma^2)$	The error term is normally distributed
	RE.3	$u_{it} \sim N(0,\sigma^2)$	The error term is normally distributed.
FE.4	RE.4	$Q_{xx} = E(x_{it}x_{it}^{'})$	Is a positive-definite matrix indicating no perfect multicollinearity
FE.5		$E(\nu_{it}\|x_{it}) = 0$	The expected value of the idiosyncratic error is strictly uncorrelated with the explanatory variables
	RE.5	$E(u_{it}\|x_{it}) = 0$	The expected value of the idiosyncratic error is strictly uncorrelated with the explanatory variables

FE corresponds to the fixed effects assumptions, while RE corresponds to the random effects assumptions.

[19] For a complete derivation of the random effects model, see Baltagi (2008, p. 17).

7.3 Selecting estimation model

To select the estimation model that best fits the dataset, properties of the data will be explored. First, we test for different statistical features such as linearity, heteroscedasticity, normality, autocorrelation, and multicollinearity. These underlying assumptions are important to be aware of as they may impact the data that are used in the analyses. Next, the data are tested for panel data effects. If panel data effects exist, either the fixed effects model or the random effects model will be preferred. It is the assumption regarding the correlation between the individual error term and the explanatory variables that is of concern when choosing the right model. The random effects model forces this correlation to zero, allowing no correlation, while the fixed effects model does the contrary. The Hausman test will be performed to determine the use of either the fixed effects model or random effects model.

8 Evaluation of Estimation Models

This chapter discusses whether the various assumptions displayed in table 5 in chapter 7.2 are satisfied or not, and the consequences it has for the right choice of appropriate model. The statistical software, R, has been used in the following empirical analyses and the data exploration of this study. The following evaluation tests[20] have been conducted on the U.S. rated sample.

8.1 Functional form

The main assumption and underlying idea of any linear regression is that there exist a linear relationship between the dependent and independent variables. Both estimation models assume this feature, i.e. FE.1 and RE.1 in table 5. However, in empirical research perfect linearity rarely occurs. Relationships between dependent and independent variables are illustrated in figure 5 with the linear OLS regression line marked in red. As the observations in the two first scatter plots are somewhat more concentrated around the regression line, it seems to exist a weak linear relationship between long term debt, and size, and tangibility. Although the existence of linearity is poorly identified, there is nothing that suggests a different functional form. As linear dependencies are assumed by many other studies[21] this assumption will also be considered valid for our study as it is the slope of dependency that is of most interest.

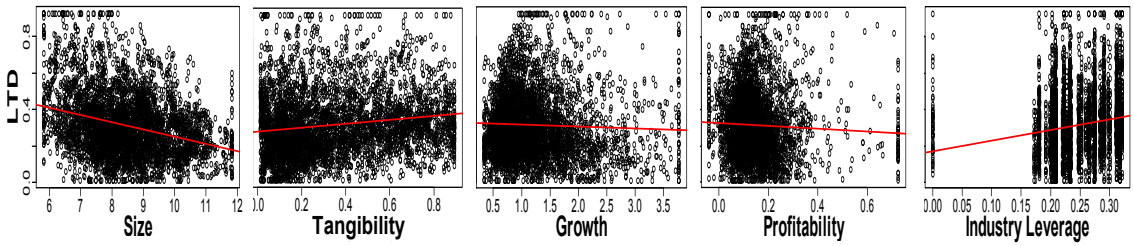

Figure 5: Variable relationships for the general model

An additional assumption for both models is that error terms are independent and identically distributed (IID) with finite variance and zero mean. This underpins also the calculations of F-statistics and other various significance tests as these tests require the residuals to be normally distributed with zero mean. Next, we test the assumption of heteroscedasticity and normality of distributed residuals.

[20] See appendix E for evaluation tests on the U.S. reference sample as well as the Norwegian reference and rated sample.

[21] Among other Kisgen (2006), Colla et al. (2009), and Rauh and Sufi (2010).

8.2 Heteroscedasticity

Heteroscedasticity is tested for using the Breusch-Pagan test, see appendix E, where the results obviously indicates that there exist heteroscedasticity in both estimation models. If the residuals are heteroscedastic the estimators will still be unbiased and robust, but the calculation of standard errors will no longer be correct as the calculations assume finite variance (Baltagi, 2008). While performing panel data analysis the general method of moments (GMM) estimator can be used to deal with heteroscedasticity. This estimator is normally robust to violations of heteroscedasticity and normality.

8.3 Normality

Testing for normality we check whether the residuals are normally distributed by plotting them in a normal quantile-quantile plot. As figure 6 illustrates, the residuals show some departure from normality outside the 95% quantile. The results may therefore possibly be biased because calculations affect the standard error. Cameron and Trivedi (2005, p. 79) argue that the normality assumption is unneeded dealing with micro econometric panel regressions[22] as the regression method is asymptotic. Since the calculations of the hypotheses tests are based on normality assumptions, i.e. FE.3 and RE.3 in table 5, and the q-q plots indicates that 95% of the observations lies within the scope of normality, we thus assume that this assumption hold. This approve a consistent use of the applied F-statistics and the reliability of the estimations.

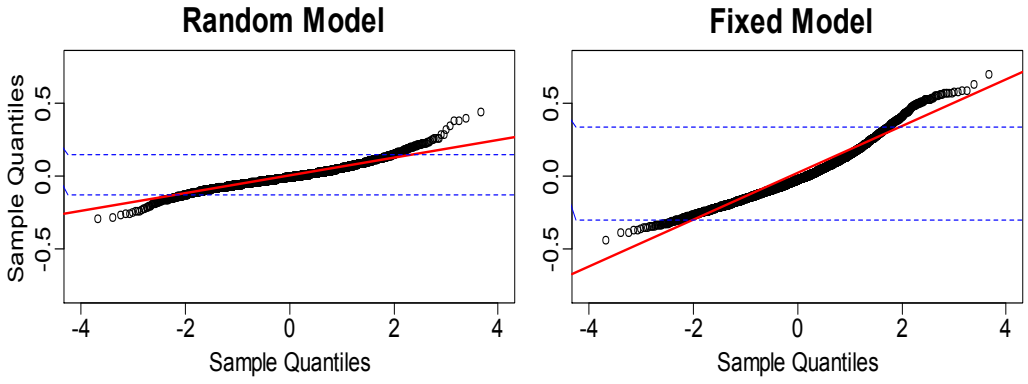

Figure 6: Normal quantile-quantile plots of the residuals
Red line presents the normal quantile line and the blue dashed lines represents the 2.5 % quantile and the 97.5 % quantile

[22]Micro economical panel data denotes panel data with few years and a large number of observations (T≪N).

8.4 Autocorrelation

Figuring out if the assumptions regarding correlation in the error terms hold, i.e. assumptions FE.4 and RE.4 in table 5, we test for autocorrelation in the residuals. We do not however, test for cross-sectional dependence as this is usually not a problem in micro econometric panel data (Baltagi, 2008).

Autocorrelation in linear panel data leads to less efficient results and biases the standard error (Drukker, 2003). Drukker suggests using the Wooldrige test when testing for autocorrelation effects, due to its few assumptions and robust answers. The results from the Wooldrige test is presented in table 24 in appendix E and describes no indication of autocorrelation in the fixed effects model, however autocorrelation is observed for the random effects model. Autocorrelation can weaken the reliability of the model because it may lead to wrong inferences about the relationship between the dependent variable and the explanatory variables.

8.5 Multicollinearity

Brooks (2008, p. 171) distinguishes between perfect and near multicollinearity. There are to our knowledge few formal tests or procedures that detects near multicollinearity in panel data. Medvedev (2006, p. 24) suggests one logical approach to verify whether two variables have a linear relationship or not. By regressing one variable against another using panel regression, while simultaneously checking for significant coefficient values and R^2 values, it is possible to detect collinearity between two variables. Medvedev (2006) further argues that variables with low R^2 values will not affect the regression as these variables have low explanatory power of the movement in other variables.

Table 6: Correlation matrix for the independent variables

	Coefficient [R^2]			
	Size	Tangibility	Growth	Profitability
Tangibility	0,010 [0,003]			
Growth	-0,009 [0,000]	-0.413*** [0,026]		
Profitability	0.022*** [0,049]	-0.004 [0,000]	0.070*** [0,208]	
Industry Leverage	0,002 [0,000]	0.145*** [0,091]	-0.044*** [0,054]	-0.098*** [0,006]

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. R^2 values are given in brackets. The panel regressions are performed using the fixed effects model.

Perfect multicollinearity means that two independent variables are perfectly correlated. According to table 6 none of the relationships have an R^2 value equal to one, hence there are no perfect multicollinearity in the data. Furthermore, the relationship between growth and profitability is the only observed observation with an adjusted R^2 value exceeding 0.15, which is assumed as a high value (Medvedev, 2006). As the other relationships are uncorrelated and their collinearity effect is irrelevant, the results between growth and profitability may present biased results.

Perfect or near multicollinearity in the dataset makes the regressions inconsistent. With two or more highly correlated independent variables, a small change in the dataset can result in big and unpredictable responses in the estimated coefficient values.

8.6 Choice of estimation model

The dataset was first tested for panel effects using the Breusch-Pagan Lagrange multiplier, which clearly indicated that there exist panel effects in the dataset, see table 27 in appendix E. This confirms that the study should be modeled either by the fixed effects model or the random effects model. To find the preferred model the underlying assumptions is taken into consideration and the Hausman[23] test is performed for verification.

It is assumed proper to model the dependent and independent variables by a linear relationship. By modeling this relationship both the fixed effects model and the random effects model experienced nearly normally distributed residuals, however heteroscedasticity were present in both models. Autocorrelation was however only present in the random effects model. Based on the assumptions and the results from the Hausman test, the fixed effects model is the preferred model and will therefore be used further to analyze the hypotheses.

Adjusting for the heteroscedastistic residuals that are present in the preferred model, the sandwich estimator has been applied to achieve proper residuals and a robust covariance matrix of the independent variables.

[23]The Hausman test is performed both on the reference samples as well as the regression models before making a decision which model fit our dataset best. See appendix E for test scores on other regression models.

9 Analysis

This chapter presents the results from the three various hypotheses stated in chapter 5.5. We test the reliability of the hypotheses by implementing different modifications to the discussed general models in chapter 7.1. The aim of this chapter is to evaluate the relationship between corporate debt structure and credit ratings in order to increase the perception of capital structure decisions. We end the two first hypotheses sections by comparing the U.S. sample against the Norwegian sample in order to capture similarities and inequalities between the two debt markets. Results for the Norwegian sample are found in Appendix A and B.

9.1 The impact of having a credit rating

In this analysis we investigate two aspects of having a credit rating. First, the impact level bond market participation has on firms' debt structure decisions, and secondly how corporate debt structure varies across the credit rating distribution. This test will be referred to as the "HACR" test.

Participation in the bond market is measured as having a credit rating. To capture this effect we use a dummy variable equal to one if the firm is rated and zero otherwise for the reference sample. In accordance with Rauh and Sufi (2010) we regress both long term debt and the reported debt types individually to verify the effects of treating debt as a heterogeneous variable. We also test for firms' priority structure by regressing both secured/unsecured bank and bond debt.

The variation in corporate debt composition across the credit rating distribution is measured by constructing a model consisting of six dummy variables corresponding consequently to rating levels between AAA/AA and <CCC. Similar as the previous model we regress against both long term debt and the reported debt types and also test for firms' priority structure. We regress thus the following two models:

$$\begin{aligned} LTD_{it}/DebtType_{it} =& \alpha_i + \beta_1 Size_{it} + \beta_2 Tangibility_{it} + \beta_3 Growth_{it} + \beta_4 Profitability_{it} \\ &+ \beta_5 IndustryLeverage_{it} + \beta_6 Rated_{it} + u_{it} \end{aligned} \tag{7}$$

$$LTD_{it}/DebtType_{it} = \alpha_i + \beta_1 A_{it} + \beta_2 BBB_{it} + \beta_3 BB_{it} + \beta_4 B_{it} + \beta_5 CCC_{it} + \beta_6 < CCC_{it} + u_{it} \tag{8}$$

The results are tabulated and discussed in chapter 9.1.1. We also introduce insights on the relationships between firm characteristics and debt structure. These results are discussed in 9.1.2.

9.1.1 Credit ratings and debt composition

Results reported in table 7 identify the rating dummy variable to be positive and significant for the level of long term debt. After controlling for other determinants of leverage we find that firms who have access to bond markets have 12.6 % higher level of long term debt than firms who not have a credit rating. This result corresponds to the findings of Mittoo and Zhang (2010). Even more interesting are the results of the reported debt types. We find significant results indicating that rated firms give revolving credit and term loans, i.e. bank debt, less priority compared to the higher prioritized bonds and notes. For example, rated firms have issued relatively 39.3 % more bonds and notes than unrated firms.

Table 7: The effect of being rated

Equation (7)	*Dependent variable:*					
	LTD	**RC**	**TL**	**CP**	**PP**	**BN**
Rated	0.126***	-0.156***	0.000	-0.040*	-0.111***	0.393***
	[0.000]	*[0.000]*	*[0.287]*	*[0.043]*	*[0.000]*	*[0.000]*
N	8 577	3 236	143	5 949	904	4 463
R^2	12.00	12.10	2.18	13.50	5.33	50.00
	CONV	**CL**	**Secured Bank**	**Unsecured Bank**	**Secured Bonds**	**Unsecured Bonds**
Rated	-0.050***	-0.042***	*-0.057***	-0.195***	0.065***	0.287***
	[0.000]	*[0.000]*	*[0.001]*	*[0.000]*	*[0.000]*	*[0.000]*
N	1 564	3 591	3 506	2 279	919	2 851
R^2	4.28	4.11	11.80	7.68	5.11	41.40

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. P-values are given in brackets. The dependent variables are divided on LTD (LTD is divided on total assets), while the omitted independent continuous variables are divided on total assets. The omitted variables are proxies of size, tangebility, growth, profitability and industry median leverage.

Furthermore, the rating dummy indicates that rated firms have significantly less secured and unsecured bank debt and more secured and unsecured bonds compared to unrated firms. The differences are most striking for unsecured bonds and unsecured bank debt with relatively 28.7% more unsecured bonds and 19.5% less unsecured bank debt. These results reveal that participation in the bond market is important for how firms organize and decide upon their debt structure. Being present in the public market is thus vital and must be seen as an important consideration that affects the capital structure of firms.

Why is it that companies choose to be issuers of public debt? The answer is related and supported by the trade-off theory. The costs related to financial intermediaries are higher than the benefits of tax reductions. However, by interpreting firms' choice of financing in light of financial intermediary costs and the firm's risk structure, an

introduction of regulation directives such as the Basel II and Basel III may involve consequences for the bond market. The result of a more risk sensitive capital requirement structure imposed on financial intermediaries can lead high rated companies towards bank financing as they receive favorable covenants (Holba, 2006).

Table 8: Debt structure for individual credit ratings

Equation (8)	*Dependent variable:*							
	LTD	**RC**	**TL**	**CP**	**PP**	**BN**	**CONV**	**CL**
AAA/AA	- - - - - - - - - - - - - - - - - - - Omitted baseline -							
A	0.096***	0.022***	-0.120"	0.011***	0.015*	0.088	0.028*	-0.008
	[0.000]	*[0.000]*	*[0.078]*	*[0.000]*	*[0.022]*	*[0.202]*	*[0.044]*	*[0.430]*
BBB	0.145***	0.072***	-0.105	0.005***	0.028***	0.007	0.025*	-0.003
	[0.000]	*[0.000]*	*[0.124]*	*[0.000]*	*[0.000]*	*[0.921]*	*[0.015]*	*[0.750]*
BB	0.208***	0.111***	0.103	0.000	0.003	-0.269***	0.084***	-0.003
	[0.000]	*[0.000]*	*[0.141]*	*[0.213]*	*[0.195]*	*[0.000]*	*[0.000]*	*[0.760]*
B	0.337***	0.061***	0.130"	0.001*	-0.001	-0.237***	0.090***	-0.008
	[0.000]	*[0.000]*	*[0.068]*	*[0.022]*	*[0.750]*	*[0.000]*	*[0.000]*	*[0.450]*
CCC	0.435***	0.038**	0.090	0.001*	0.010	-0.224*	0.120*	-0.002
	[0.000]	*[0.002]*	*[0.313]*	*[0.012]*	*[0.381]*	*[0.021]*	*[0.014]*	*[0.920]*
<CCC	0.476***	0.128"	0.163	0.001	-0.002	-0.394**	0.113*	0.026
	[0.000]	*[0.067]*	*[0.248]*	*[0.100]*	*[0.373]*	*[0.003]*	*[0.033]*	*[0.430]*
N	4 199	1 431	3 052	130	242	3 614	864	1 890
R^2	24.70	3.82	15.40	3.22	2.72	17.10	2.85	0.21
Adj. R^2	24.60	3.81	15.40	3.21	2.71	17.00	2.84	0.21
p-value^A	<2e-16	<2e-16	<2e-16	<2e-16	<2e-16	<2e-16	<2e-16	0.177

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. P-values are given in brackets. The dependent variables are divided on LTD (LTD is divided on total assets), while the independent variables are dummy variables.
^{A} Indicates the F-statistics p-value of the regression model.

According to table 8, debt structure differ significantly between investment grade companies and non-investment grade companies. By holding ratings larger than A+ constant, there is a positive and significant monotonic trend in the amount of long term debt along the rating scale. For example, the lowest graded companies have 47.6% higher long term debt ratio than top rated companies. In contrast, higher quality firms issue significantly more commercial paper and private placements, which is intuitive as these securities are only valuable for high rated companies or issued to a few selected investors.

Furthermore, we find that lower rated companies tend to rely more on bank debt and convertibles than any of the other debt types. Use of convertibles corresponds to the findings of Brennan and Schwartz (1988) who argued that the relative sensitivity of convertibles to the issuers' riskiness enables risky companies to raise capital at the same terms as less risky companies. As a confirmation to the latter argument Getz

Table 9: Priority structure for individual credit ratings

Equation (8)	*Dependent variable:*			
	Secured Bank	**Unsecured Bank**	**Secured Bonds**	**Unsecured Bonds**
AAA/AA	- Omitted baseline - - - - - - - - - - - - - - - - - -
A	0.016***	-0.012	0.006	0.150
	[0.000]	*[0.840]*	*[0.827]*	*[0.141]*
BBB	0.035***	0.054	-0.001	0.057
	[0.000]	*[0.370]*	*[0.971]*	*[0.570]*
BB	0.272***	-0.012	-0.045*	-0.210*
	[0.000]	*[0.840]*	*[0.033]*	*[0.037]*
B	0.281***	-0.049	0.028	-0.250*
	[0.000]	*[0.410]*	*[0.232]*	*[0.014]*
CCC	0.232*	-0.044	0.217**	-0.389***
	[0.000]	*[0.460]*	*[0.007]*	*[0.000]*
<CCC	0.351**	-0.002	0.172	-0.436***
	[0.003]	*[0.980]*	*[0.172]*	*[0.000]*
N	1 496	1 062	777	2 631
R^2	19.20	4.93	3.08	20.20
Adj. R^2	19.20	4.95	3.07	20.20
p-value^A	<2.2e-16	<2.2e-16	<2.2e-16	<2.2e-16

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. P-values are given in brackets. The dependent variables are divided on LTD, while the independent variables are dummy variables.
^{A} Indicates the F-statistics p-value of the regression model.

(2011, p. 11) states the following; "bondholders only get downside protection from companies with steady cash flow and recovery values if default, characteristics not suitable for risky companies. Therefore risky companies cannot afford high-yield debt, and have to issue convertibles." In addition, convertibles are driven by liquid secondary markets, enabling investors to enter or exit positions quickly if required.

Common for lower rated bond issuers are their higher probability of default, leading to more expensive interest terms on debt issues. This provides an incentive to be financed by banks. The result is in line with the idea that banks require higher monitoring and investigation of firms that are closer to default. Moreover, this statement is in accordance with the results in table 9. Non-investment grade companies tend to prioritize secured bank debt while simultaneously issue very low amounts of unsecured bonds relative to investment grade companies. The results confirm the HHI-analysis, which indicated that firms tend to spread more of their debt issues on multiple types of debt as credit ratings exacerbates. When it comes to unsecured bank debt, however, there are no significant results. Even though there are some significant results describing secured bonds, there is also no specific trend captured from this regression.

9.1.2 Firm characteristics and debt composition

Firms who are engaged in the public debt market have distinctive features. By exploring only the rated sample we are able to capture possible relationships between firm characteristics and debt structure of firms participating in the bond market. We discuss the results of each characteristic below, while the results are presented in table 10.

Size

According to table 10 we find a negative relationship between size and long term debt. Even though the coefficient is quite small it is statistically significant. The result contradict the trade-off theory as the theory ascertain that larger firms should be more levered, due to lower debt related agency costs, lower bankruptcy risk, and higher reputation in capital markets. One possible explanation can be that larger firms benefit from their reputation in the market and hence achieve cheaper short term financing rather than long term financing. Furthermore, presence in the public market has apparently great influence on large firms' debt structure. We find a positive and significant correlation between size and bonds and notes, but also a negative and significant relationship between size and bank debt (revolving credit + term loans). One interpretation could be that larger firms simply prefer the easiest and less expensive debt issue, as these firms normally does not experience heavy regulations from banks.

Tangibility

Tangibility is found to have a positive and significant correlation with long term debt. This is empirically in line with most scholars' opinions (Frank and Goyal (2009) and Titman and Wessels (1988)). In tabulated results presented in Appendix A.4 we find that U.S. firms issue positive amounts of secured bond debt. This confirms the importance tangible assets have as collateral against defaulting payments and further supply of long term debt.

Growth

The results between growth and debt structure are found to be statistically very weak. Presence in the public market does not affect growth opportunities. One possible explanation could be that growing firms usually issue debt to finance R&D investments. Hence, they prefer short term bank debt instead of long term debt.

Profitability

For firms engaged in the bond market the proxy of profitability is found to be significant and negatively correlated with long term debt. Profitable firms use their extra profits to pay off their existing claims. This is in line with the pecking order theory that ascertains that companies use internal financing before external financing in their capital decisions. We only find insignificant results comparing the reported debt types except from convertible debt. This security is found to be negatively correlated. One possible reason is that profitable rated firms are usually the highest quality firms with the best ratings who possess larger amounts of equity relative to

debt. Thus, they do not need to issue lots of convertible debt as this type of debt eventually will be converted into equity-like securities.

Industry median leverage

Industry median leverage is found to be highly significant and positively correlated with long term debt. This is also valid for the reported debt types. This coincides with the findings of Hovakimian et al. (2001), and confirm that firms actively adjust their debt ratios towards industry leverages. Furthermore, since credit assessments involves comparisons of markets and the industry the firm operates in, it was expected that the industry median leverage for long term debt would be significant as it would be a target for comparison.

Table 10: Firm characteristics and debt structure for U.S. rated sample

Equation (7)	*Dependent variable:*							
	LTD	**RC**	**TL**	**CP**	**PP**	**BN**	**CONV**	**CL**
Size	-0.042*** *[0.000]*	-0.023*** *[0.000]*	-0.051*** *[0.000]*	0.002*** *[0.000]*	-0.005*** *[0.000]*	0.092*** *[0.000]*	-0.012** *[0.002]*	0.000* *[0.013]*
Tangibility	0.094*** *[0.000]*	0.046** *[0.009]*	-0.140*** *[0.000]*	0.001 *[0.672]*	0.011* *[0.202]*	0.156*** *[0.000]*	-0.092*** *[0.000]*	-0.001 *[0.782]*
Growth	0.012 *[0.190]*	0.004" *[0.492]*	-0.0105 *[0.430]*	0.003" *[0.057]*	0.001 *[0.187]*	-0.014 *[0.391]*	0.005 *[0.606]*	0.001 *[0.567]*
Profitability	-0.121** *[0.006]*	0.0142 *[0.640]*	-0.082 *[0.170]*	0.000 *[0.961]*	0.025 *[0.246]*	0.112 *[0.150]*	-0.093* *[0.042]*	-0.016 *[0.297]*
Industry Leverage	0.496*** *[0.000]*	0.556*** *[0.000]*	0.367*** *[0.000]*	N/A	N/A	0.050" *[0.055]*	N/A	0.660 *[0.255]*
N	4 199	1 431	3 052	130	242	3 614	864	1 890
R^2	13.80	6.06	8.93	2.09	1.45	13.60	2.59	0.44
Adj. R^2	13.80	6.05	8.91	2.08	1.44	13.50	2.59	0.44
p-value^A	<2e-16	<2e-16	<2e-16	<2e-16	1.79e-12	<2e-16	<2e-16	<2e-16

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. P-values are given in brackets. The dependent variables are divided on LTD (LTD is divided on total assets), while the independent continuous variables are divided on total assets. Cells marked by N/A are due to low number of observations.
^{A} Indicates the F-statistics p-value of the regression model.

9.1.3 Norwegian debt structure and bond market participation

In terms of having a credit rating the Norwegian sample indicates similar trends as the U.S. sample.[24] Although not all of the results are statistically significant they do show nearly identical negative or positive signs as the the results from the U.S.

[24]Readers are advise to see table 17 in Appendix A.3 for the results of the "HACR" test for the Norwegian sample.

regressions. Norwegian rated firms tend to have higher amounts of long term debt compared to unrated firms. They also tend to have lower amounts of revolving credit and term loans, but higher amounts of bonds and notes. Focusing on the priority structure of bank and bond debt we find evidence that rated firms have 11.2 % less secured bank debt and 19.4 % higher level of unsecured bond debt relative to unrated firms. The results confirm that credit rating considerations are vital and important for Norwegian companies dealing with debt structure decisions. These decisions are consequently affecting the capital structure of Norwegian firms.

With a baseline corresponding to firms rated better than A+, Norwegian firms classified as non-investment grade tend to strategically allocate their debt equally as U.S. firms. The similarities are though not that convincing for investment grade firms. For example, A and BBB rated firms have significantly less long term debt than better rated firms. What we experienced with the U.S. sample was a monotonic increasing trend in long term debt as the credit quality exacerbated. For the Norwegian sample, we tend to get a breakpoint at the boundary between investment and non-investment grade. This breakpoint is mainly due to the use of revolving credit. As credit rating exacerbates Norwegian companies decrease their proportion of revolving credit whereas U.S. companies increase their proportion. It is hard to see any specific trends across the rating distribution for the Norwegian sample, however the results[25] are more consistent with the U.S. sample for low rated firms.

The analysis of firm characteristics on the Norwegian rated sample confirms the same trend for long term debt as U.S. firms. Size and profitability have a negative effect on long term debt, whereas tangibility, growth, and industry median leverage all are positively correlated with long term debt. Although the results of long term debt are in line with the U.S. sample and other empirical research (Frank and Goyal, 2009), there is a vast difference in which debt instruments are favorable by Norwegian rated companies. We find a reverse relationship between bank debt and firm characteristics and bond debt and firm characteristics compared to the U.S. sample. For example, with a 0.1% statistical significance level, highly tangible Norwegian firms use more term loans and issue less bond debt relative to untangible firms. As 49% of the Norwegian rated sample consist of firms belonging to the transportation sector, i.e. shipping, we believe that the results are subject to skewness. Tangibility is usually considered as a good proxy to identify firm risk, however this is not applicable for the shipping industry. The shipping industry is known as a highly tangible sector but also characterized by high-risk due to great fluctuations on vessels' leasing rates. As a consequence of the high-risk, these firms may receive special bank conditions and therefore chooses to borrow from banks and other financial institutions as private investors tend to prioritize less risky investments. Again the results are subject to a small number of observations and will hence be subject to possible errors. Fully tabulated results are presented in table 18 in appendix A.3.

[25]Due to a low number of observations in both ends of the rating scale the results are subject to possible errors.

9.2 The impact of being near a change in credit rating

The following analysis investigates if companies being near a change in credit rating actively adjust their long term debt ratio and to what extent they adjust their ratios within the reported debt types. This test will be referred to as the "NARC" test.

The analysis covers two aspects. First, we test how being near a change in credit rating affect a company's debt structure decisions. In line with the approach of Kisgen (2006) we denote companies being near a change designated by having either a plus rating or a minus rating. To investigate this feature we use a dummy variable equal to one if the company either has a plus or a minus attached to its credit rating or zero otherwise. In addition we measure the individual effects of being near an upgrade or a downgrade. The first measure gives the "dummy" variable a value equal to one if the firm has a plus rating, while the second "dummy" variable equals one if the firm has a minus attached to its credit rating, zero otherwise.

For the second aspect, in accordance with Rauh and Sufi (2010), we use a subsample consisting of rated firms that have been downgraded from investment grade to non-investment grade[26] to elucidate the effect of actually being downgraded after a company has been near a change for a period of time. We investigate the change over a five year time horizon spanning two years before the downgrade until two years after the downgrade. We modify the general model in chapter 7.1 by adding credit rating dummy variables. Regressions on the following two models have been performed:

$\Delta LTD_{it}/\Delta DebtType_{it}=$

$$\alpha_i+\beta_1\Delta SIZE_{it}+\beta_2\Delta TANG_{it}+\beta_3\Delta GROWTH_{it}+\beta_4\Delta PROF_{it}$$

$$+\beta_5\Delta IND.LEV_{it}+\begin{cases}+\beta_6 PAM_{i(t-1)}+u_{it} & (9a)\\ +\beta_6 Plus_{i(t-1)}+\beta_7 Minus_{i(t-1)}+u_{it} & (9b)\end{cases}$$

$$LTD_{it}/DebtType_{it}=\alpha_i+\beta_1 2YB_{it}+\beta_2 Fallen_{it}+\beta_3 1YA_{it}+\beta_4 2YA_{it}+u_{it} \quad (10)$$

The results are presented in table 11 and table 12 and are discussed in chapter 9.2.1 and 9.2.2.

9.2.1 The adjustment effect of possible rating changes

Being near a change in rating level is for many companies either a milestone or a failure depending on which way the rating will change. However, increasing credit rating is normally a goal for CFO's as the parameter acts as a quality control for

[26]This boundary is by scholars known to be the downgrade level that concerns companies most due to increased regulatory consequences.

outside investors. According to table 11 we find significant negative results for the adjustment of firms' long term debt ratio. In particular, firms are found to reduce their long term debt ratio by approximately 3.4% when being concerned of a possible rating change. An interpretation of the individual results reveal the same tendency that being close to an upgrade or near a downgrade will result in firms decreasing their long term debt ratio. This signal in general that credit rating considerations are of importance for firms' long term debt adjustments.

A quick glance at the reported debt types and the priority structure of bank and bond debt indicates that the negative adjustment of long term debt is mainly caused by a reduction in unsecured bond debt. More interesting is it that firms being near a downgrade reduce their proportion of unsecured bonds by 19.8 %, while firms being near an upgrade tend to decrease their proportion of secured bank debt by 7.1 %. One possible explanation to the reduction of unsecured bond debt could be that as firms' rating worsens heavier debt restrictions are imposed and thus investors become more speculative to their investment decisions. The relative reduction of secured bank debt is primarily caused by a 7.7 % decline in term loans. This reduction is in accordance with the findings of Colla et al. (2009), and confirm that bank debt is seen as less attractive as credit ratings improve. In general, by reducing debt holdings firms are able to eliminate some of the overall risk imposed on their assets, hence providing incentive to reduce long term debt.

In a deeper analysis[27] we investigate the effect of being near a change for different rating categories and find that lower rated firms more actively adjusts their debt ratios than higher rated firms. We find for example no evidence that AAA and AA rated firms adjust their long term debt ratio in response to an upgrade or downgrade. "A" rated firms close to a downgrade do however reduce their proportion of secured bonds, hence confirming that lower rated firms tend to use more bank debt. Firms belonging on the edge of investment grade, i.e. BBB-, reduces relatively bonds and notes and long term debt by respectively 19.4 % and 5.5 %. Firms classified as non-investment grade that are near an upgrade tend to increase their proportion of secured bank debt in concern of a rating change. In contrast, firms classified as investment grade tend to increase their proportion of unsecured bank debt and decrease their proportion of secured bonds in concern of a downgrade. These results confirm the findings of Kisgen (2006) who claims that firms are more concerned about the rating level between investment grade and non-investment grade because at this level bond liquidity issues are most severe and access to the commercial paper market is affected.

Motivating by the interesting boundary between investment grade and non-investment grade leads us over to the second aspect that the "NARC" test investigates, namely "fallen angels".

[27] Readers are referred to Appendix B.2 if interested in tabulated results.

Table 11: Near a change in rating for U.S. rated firms

Equation (9)	*Dependent variable:*					
	ΔLTD	**ΔRC**	**ΔTL**	**ΔCP**	**ΔPP**	**ΔBN**
Plus$_{t-1}$	-0.035*	0.017	-0.077"	-0.001	0.018**	-0.043
	[0.036]	*[0.268]*	*[0.056]*	*[0.515]*	*[0.002]*	*[0.705]*
Minus$_{t-1}$	-0.033*	-0.011	-0.016	0.002"	0.017**	-0.165
	[0.044]	*[0.454]*	*[0.654]*	*[0.089]*	*[0.005]*	*[0.141]*
Adj. R^2	7.14	7.17	2.88	2.26	2.58	3.49
PAM$_{t-1}$	-0.034*	0.002	-0.043	0.000	0.017**	-0.110
	[0.018]	*[0.894]*	*[0.192]*	*[0.602]*	*[0.002]*	*[0.256]*
Adj. R^2	7.15	3.83	2.76	1.96	2.59	3.42
	ΔCONV	**ΔCL**	**ΔSecured Bank**	**ΔUnsecured Bank**	**ΔSecured Bonds**	**ΔUnsecured Bonds**
Plus$_{t-1}$	-0.013	-0.000	-0.071"	0.028"	0.013	-0.094
	[0.403]	*[0.965]*	*[0.083]*	*[0.057]*	*[0.447]*	*[0.231]*
Minus$_{t-1}$	-0.015	-0.002	-0.011	0.011	0.025	-0.198**
	[0.367]	*[0.569]*	*[0.777]*	*[0.451]*	*[0.150]*	*[0.005]*
Adj. R^2	1.98	0.4	3.37	1.33	1.06	1.84
PAM$_{t-1}$	-0.014	-0.001	-0.038	0.018	0.020	-0.152*
	[0.297]	*[0.684]*	*[0.265]*	*[0.153]*	*[0.178]*	*[0.020]*
Adj. R^2	1.98	0.39	3.24	1.25	1.04	1.71

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. P-values are given in brackets. The dependent variables are divided on LTD (ΔLTD is divided on total assets) while the omitted independent continuous variables are divided on total assets. The omitted variables are proxies of size, tangebility, growth, profitability and industry median leverage.

9.2.2 Fallen angels

After several conducted tests on the fallen angels sample we find that firms' debt ratios two years before being downgraded from investment grade to non-investment grade are not significantly different than firms that have not experienced the same downgrade. Hence, our fallen angels results applies to the period two years before until two years after the downgrade.

According to table 12 firms that have been declassified from investment grade to non-investment grade have significantly adjusted their long term debt ratio during the five year time horizon. These firms experience an increase in long term debt the year of downgrade until two years after. In addition, "fallen angels" tend to increase their proportion of unsecured bonds while simultaneously decreasing secured bonds from the year of downgrade until two years after. These results reveal that the

priority structure become of less importance in the time period after the downgrade as firms starts to issue non-collateral assets. The results do not indicate any clear pattern in regards of bank debt, however we find that two years after the downgrade these firms tend to again decrease their unsecured bank debt. The results indicate no clear pattern between the different debt types and fallen angels. Hence, we believe the priority structure to be of higher concern for companies being downgraded from investment grade to non-investment grade.

Table 12: Fallen angels and debt structure

Equation (10)	*Dependent variable:*				
	LTD	**Secured Bank**	**Unsecured Bank**	**Secured Bonds**	**Unsecured Bonds**
Two years before downgrade	-0.040**	0.021	-0.049	0.169*	-0.169*
	[0.006]	*[0.660]*	*[0.206]*	*[0.026]*	*[0.027]*
One year before downgrade	- - - - - - - - - - - - - -Omitted Baseline- - - - - - - - - - - - - -				
Year of downgrade	0.041***	0.022	0.028	-0.176**	0.171**
	[0.000]	*[0.550]*	*[0.471]*	*[0.001]*	*[0.002]*
One year after downgrade	0.050**	-0.017	0.039	-0.178**	0.182*
	[0.001]	*[0.650]*	*[0.390]*	*[0.004]*	*[0.010]*
Two years after downgrade	0.043**	-0.009	-0.056"	-0.174*	0.233**
	[0.011]	*[0.850]*	*[0.085]*	*[0.012]*	*[0.002]*
N	204	58	70	41	155
R^2	26.30	0.83	6.39	25.10	23.70
Adj. R^2	18.90	0.61	4.67	18.30	17.30
p-value^A	4.4e-09	0.869	0.042	9.2e-09	3.2e-08

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. P-values are given in brackets. The dependent variables are divided on LTD (LTD is divided on total assets), while the independent variables are dummy variables.
^{A} Indicates the F-statistics p-value of the regression model.

9.2.3 Norwegian companies and their concern for rating changes

In terms of being near a change in credit rating the Norwegian sample indicates no evidence of any prominent results for the different debt types. However, the analysis provides significant results for the adjustment of long term debt and the priority structure of bank and bond debt. Table 20 in appendix B.1 displays the results of the analysis. Norwegian firms close to a downgrade increase their long term debt ratio by approximately 3 % relative to stable firms and firms near an upgrade. This is opposite from how U.S. companies behave close to a rating downgrade. Firms near either an upgrade or a downgrade decrease their proportion of secured bank debt and unsecured bond debt by respectively 4.6 % and 8.4 % relative to stable firms. Focusing on the individual effects of being either upgraded or downgraded we find similarities with the U.S. sample. Norwegian firms that are near an upgrade

or downgrade tend to reduce their proportion of secured bank debt and unsecured bond debt, while simultaneously tend to increase unsecured bank debt. Hence, Norwegian companies adjust the priority structure of their debt components equally independent if they are close to an upgrade or downgrade. This result is interesting as it was expected that firms' behavior to adjust debt structure is more prominent when being close to a downgrade. Norwegian firms are quite stable when it comes to rating changes, thus we do not provide any results of changes within each rating category or for the fallen angels sample.

9.3 Corporate debt maturity structure and credit ratings

The following analysis investigates the relationship between debt maturity and credit ratings. We use another dataset than what we used for the first two hypotheses. The dataset consist now of the same U.S. firms, thus only with public U.S. debt issues, divided into four different types, i.e. Medium term notes, Eurobonds, Debentures, and Asset backed securities. These types are further summed into one measure that we display as "Total public debt issues" in order to capture the yearly issuing effect. This test will be referred to as the "DMS" test.

The analysis covers two aspects related to firms' debt maturity and their respective credit ratings. First, we implement regressions that capture the individual maturity effect of each public debt issue with respect to credit ratings. We use dummy variables equal to the respective rating levels as independent variables, whereas each debt issue corresponds to the dependent variable. By adding a baseline equal to firms rated AAA we se that the results fluctuate around this baseline.

Secondly, motivated by the maturity grouping displayed in figure 9 in appendix C, we identify three maturity levels designated as short maturity (0-5 years), medium maturity (5-15 years), and long maturity (>15 years). In order to capture the maturity structure from each rating level this test is based on the three maturity levels described and the results are given as a percentage of total debt issues issued within the different time frames. We hence make regressions on the following model:

$$Maturity_{DebtType,it} = \alpha_i + \beta_1 AA_{it} + \beta_2 A_{it} + \beta_3 BBB_{it} + \beta_4 BB_{it} + \beta_5 B_{it} + \beta_6 < B_{it} + u_{it} \tag{11}$$

The results are presented in table 13 and 14 and discussed below. As the required data were not available for the Norwegian sample the comparative study of this analysis has not been performed.

Discussion of results

This analysis focuses on corporate debt maturity structure in relation with credit ratings. Table 13 and figure 7 both display the same results, only in different formats. The results reveal that the mean maturity of total public debt issues

have an approximately inverse u-shaped form with BBB rated firms peaking at the longest maturities. We find evidence that BBB rated firms have 1.96 years longer average maturity on their public debt issues than AAA rated firms. AAA rated firms have in comparison an average maturity equal to 10.62 years on their total public debt issues. Furthermore, the boundary between investment grade and non-investment grade is again interesting as maturities decreases from the peak exactly at this boundary. For example, firms with lowest credit rating have on average 2.38 years lower maturity on their public debt issues compared to AAA rated firms. One possible reason explaining this development is that lower rated firms struggle more with debt renegotiation due to, among others, lower reputation than higher rated firms, and thus they settle on shorter maturity contracts. Hence, the results confirmed our expectation stated in section 5.5.

Table 13: Corporate debt maturity and credit ratings of new issues

Equation (11)	*Dependent variable:*				
	Total public debt issues	**MTN**	**Eurobond**	**Debenture**	**Asset backed securities**
Intercept	10.617***	10.815***	7.552***	16.240***	6.981
AAA	- - - - - - - - - - - - - - - - - Omitted Baseline - - - - - - - - - - - - - - - - -				
AA	0.424 *[0.493]*	-0.118 *[0.845]*	6.695* *[0.018]*	-4.700* *[0.032]*	7.847 *[0.743]*
A	0.417 *[0.362]*	-1.840*** *[0.000]*	2.462 *[0.227]*	-3.700* *[0.046]*	6.712*** *[0.000]*
BBB	1.961*** *[0.000]*	-3.374*** *[0.000]*	3.934 *[0.102]*	-3.250" *[0.077]*	5.609*** *[0.000]*
BB	-1.290** *[0.004]*	-5.754*** *[0.000]*	0.608 *[0.391]*	-6.960*** *[0.000]*	0.724 *[0.565]*
B	-2.352*** *[0.000]*	N/A	0.342 *[0.584]*	-8.410*** *[0.000]*	-0.781 *[0.203]*
<B	-2.381*** *[0.000]*	N/A	1.951** *[0.002]*	-9.040*** *[0.000]*	N/A
N	6743	1581	329	3933	41
R^2	3.15	4.21	4.28	6.87	34.4
Adj. R^2	3.06	3.97	2.78	6.73	25.00
p-value^A	<2.2e-16	6.3e-14	0.0278	<2.2e-16	0.009

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. P-values are given in brackets. The dependent variables are divided on LTD (LTD is divided on total assets), while the independent variables dummy variables. Cells marked as N/A corresponds to zero observations.

^{A} Indicates the F-statistics p-value of the regression model.

Focusing on the individual debt issues we find that debentures[28] is the security with overall longest maturity independent of rating level, but also the security that fluctuates most with rating level. AAA rated firms on average issue 16.24 years debentures, while in comparison the lowest quality firms issue on average only 7.2 years debentures. The relatively large distinction may possibly come from the fact that financial intermediaries and other investors impose requirements on firms classified as non-investment grade. In addition, these firms' reputation and creditworthiness are limited for investors, thus it is basically to expensive to issue longer maturity debentures. We observe an approximately monotonic decreasing trend in the use of debentures as credit ratings exacerbates.

Medium term notes are commonly known to mature within 5-10 years. This is also the fact for our sample even though the firms rated less than BB do not obtain MTNs in their debt structure. On average, we find evidence indicating that the maturity range for MTNs is between 10.82 years to 5.06 years along the rating scale. Furthermore, as credit ratings exacerbates, the maturity of MTNs decreases , hence they are positively correlated.

Some companies issue Eurobonds in order to hedge themselves from currency fluctuations. Furthermore this security is financially attractive as the issuer gets the opportunity to choose which country fits their debt issue best with respect to the country's regulatory constraints. We find however no clear trend in the use of Eurobonds.

Asset backed securities[29] is a very popular debt instrument and has become increasingly important to the U.S. debt market (Hu, 2011). Our results indicates no specific trend as most of these results are either insignificant or not applicable for certain credit ratings. We do however find statistically significant that A and BBB rated firms issue longer maturity asset backed securities relative to AAA rated firms.

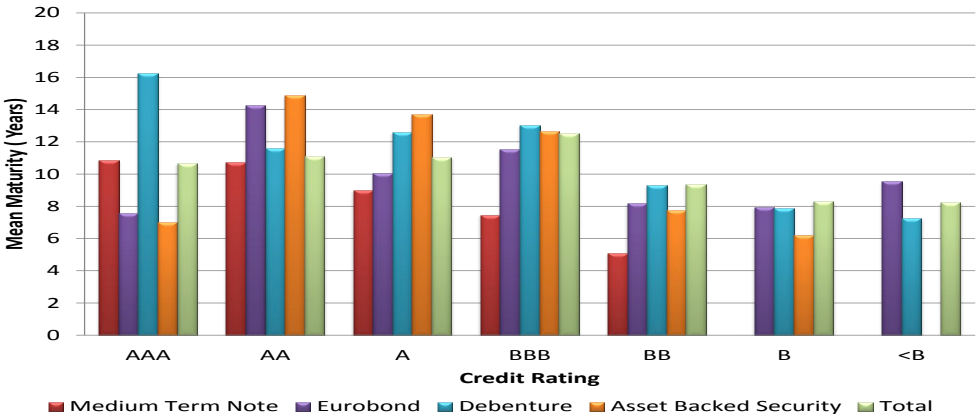

Figure 7: Mean maturity of new issues for individual credit ratings

[28] A debenture is an unsecured type of a bond instrument that is not backed by any form of collateral. General creditworthiness and reputation of the issuer is what favors this type of issue.

[29] Readers interested in the complexity of ABS securities are referred to read the book of Bhattacharya et al. (1996).

Table 14 displays the results from our own classification of debt maturity. For example, AAA rated firms issue on average 26.8 % of their total public debt with maturities less than five years. Furthermore, 50 % of their issuances have maturites between 5 and 15 years, while 23.2 % of the issues have maturities beyond 15 years. Independent of credit rating we observe that 5-15 years are the maturity level that relects most of firms' debt issues. The results verify an increasing trend in medium debt maturity as credit ratings exacerbates. Hence, lower quality firms issue on average more of their total public debt with medium maturities compared to high quality firms.

Of all public debt issues, firms classified as investment grade tend to spread their issuances with different kind of maturities, whereas non-investment graded firms issue relatively higher amounts of debt with medium maturity compared to short maturity and long maturity. One possible explanation why non-investment graded firms issue relatively low amounts of public debt with short and long maturity could be that investors impose requirements on lower quality firms. Companies issuing short term debt are known in the market as "good payers". Lower quality firms don't have this reputation and tend to avoid this maturity class. On the other side, long term debt requires continuous payments over a long period of time, hence profitable firms are typically issuing long term debt. Again lower quality firms do not usually possess the ability of being profitable year after year. Hence they do not issue great amounts of long term debt.

Table 14: Short, medium, and long maturity

	Yearly Interval:		
	0 - 5 years	**5 - 15 years**	**>15 years**
AAA	0.268	0.500	0.232
AA	0.190	0.629	0.181
A	0.301	0.464	0.235
BBB	0.136	0.663	0.201
BB	0.077	0.87	0.053
B	0.081	0.874	0.045
CCC	0.128	0.817	0.055

Results are interpreted as percentage means of total public debt issues maturing within one of the three time periods.

9.4 Summary and discussion

This section presents a summary of main findings from the three examined analyses. Some of the U.S. results are in accordance with the findings of previous scholars, i.e. among others Colla et al. (2012) and Rauh and Sufi (2010), while other findings have not yet been discussed in previous literature.

The "HACR" test stated that rated firms used multiple types of debt securities in their debt structure relative to unrated firms, and that debt specialization was assumed to decrease in line with credit ratings exacerbating. Rated companies participating in the U.S. public bond market are found to have 12.6% higher long term debt ratio than unrated firms. The identified leverage effect is found to be stronger for non-investment grade companies. In fact, we observe a monotonic increasing trend in long term debt as credit ratings exacerbates. The increase is mainly due to lower rated companies' financing policy where equity is a relatively small proportion of their total captial. Bank debt is more prioritized by low quality firms. Norwegian rated companies are found to have similar trend in the long term debt ratio as U.S. rated firms. The effect is found to be more equivalent to U.S. high yield companies.

The results presented in table 7, 8, 9, and table 17 in the appendix, as well as the HHI results, confirm the hypothesis that rated firms use multiple types of debt relative to unrated firms and that the dispersion of debt types become more apparent as credit ratings exacerbates. The use of several debt types come in light of easier access to markets, cheaper financing possibilities, and better conditions on debt contracts. These results are in line with the findings of Colla et al. (2012). Even though the significance of the Norwegian results are not as clear as the U.S. results, they are similar, hence we claim that U.S. and Norwegian companies behave somewhat equivalently in their debt structure decisions when they have access to public debt markets.

Examining rated firms and what explanatory factors determines capital structure decisions, we find that tangibility and industry median leverage both increase long term debt ratio while size and profitability reduce the same ratio. The same effects are pretty much found to be equal for the different debt types. These findings are in line with what is commonly accepted by scholars, (see e.g. Frank and Goyal (2009) and Harris and Raviv (1991)). The identified results of the Norwegian explanatory factors indicate a reverse relationship between bank and bond debt relative to the U.S. sample. For example highly tangible firms prioritize bank debt instead of bond debt. This reverse relationship was unexpected as firm characteristics are meant to classify firms into a specific group of firms independent on geographic location. We believe these results reflect more the Norwegian economic structure and its specific lending conditions, rather than features of firm characteristics.

The "NARC" test stated that companies near a change in credit rating will adjust their leverage ratios downwards relative to stable companies, and that leverage adjustments was assumed more vital for downgraded and lower rated firms. Concerns for credit rating changes are identified for leverage adjustments. Results presented

in table 11 and 12 confirm that U.S. rated companies near a change in rating are found to negatively adjust their long term debt ratio by 3.4 % relative to stable companies. This is in line with the findings of Kisgen (2006). We find some evidence of an adjustment on the individual reported debt types, but no specific trend is observed. However, we identify that the priority structure is of higher concern. Companies that are near a downgrade reduce their unsecured bonds ratio by 19.8 %, whereas companies near an upgrade reduce their proportion of secured bank debt by 7.1 %. The subsample of "fallen angels" confirm the results of the rated sample and identify that companies adjust their long term debt ratio and priority structure before and after a downgrade from investement grade to non-investment grade.

The results presented in table 20 in appendix B, reveal that Norwegian rated companies increase their long term debt ratio when being near a downgrade or in concern of a possible rating change. This result was unexpected and contradicts U.S. companies' behavior. We identify similarities in both markets priority structure of bank and bond debt, indicating that U.S. and Norwegian companies possess the same collateral aspect in concern of a possible rating change. Table 21 in appendix B.2 identifies that low quality U.S. companies tend to actively adjust their leverage ratios more than high quality U.S companies in concern of an upgrade or downgrade. Hence, confirming the hypothesis that lower rated firms adjust their debt structure more frequently.

Finally, the "DMS" test stated that companies with different credit ratings will have different maturity structure with ratings in the middle of the specter having longest maturities, and that the maturity structure is supposed to be more concentrated as credit ratings exacerbates. Corporate debt maturity structure and credit ratings are found to have an inverse u-shaped relationship. Firms with credit ratings in the middle of the specter are found to have on average longest maturities on their debt instruments. This result is in line with financial intermediaries setting closer restrictions on lower rated firms, while high rated firms enjoys the benefits of reputation and low risk. These findings are in accordance with Gopalan et al. (2013) however, their study only considers short and long term debt as two single quantities instead of using individual public debt instruments. We identify debentures as the instrument that is most regularly used by companies and that has the longest maturity. Our distribution of maturity structure identifies that high quality firms tend to spread their debt issues over several maturity levels. This effect is found to be more concentrated as credit ratings exacerbates. Lower quality firms issue most of their public debt with maturities between 5 and 15 years. These results confirm the hypothesis and provides important evidence to the theory of corporate debt maturity structure.

9.5 Assessing weaknesses of the analyses

Our study investigate dynamics between corporate debt structure and the role of credit ratings. The results have revealed interesting findings. However, there are weaknesses and limitations with the analysis that affect different aspects of the study.

Model limitations:

The implemented models in all three analyses either consist of explanatory variables and dummy variables or just dummy variables. A firm's capital structure is likely to be influenced by several explanatory variables. We chose to include only five variables as these are the most common ones explaining typical firm characteristics. In retrospect we see that the achieved values for adjusted R^2 fluctuates a lot between the models, some only explaining a few percent of the variation. Hence, it could be desirable using additional determinants to increase accuracy and reliability. Commonly, traditional leverage regressions using identified determinants of capital structure have adjusted R^2 values ranging from 18 % - 29 % (Lemmon et al., 2008). In addition, the dataset is subject to statistical limitations in which we had to make some assumptions regarding linearity, multicollinearity, and normality. These weaknesses are possibly affecting different aspects with the study.

Sample limitations:

The rated sample for both the U.S. market and the Norwegian market only accounts for respectively 49 % and 30 % of total firm year observations in both markets' reference samples. More specifically, the analysis of fallen angels consist of slightly less than 5 % of total firm year observations in the U.S. rated sample. The statistical variation increases with smaller sample sizes, thus affecting the reliability of the results. The Norwegian sample is affected by industry-wide effects with nearly 60 % of total firms belonging to either the oil and gas industry or closely related industries. It is likely that the Norwegian results are biased towards the characteristics of these industries. Credit ratings for the Norwegian corporate market is hard to evaluate as brokerages don't track historical ratings but only ratings reflecting individual bond issues. Controversial assumptions were used in constructing the Norwegian rated sample. We use shadow ratings from brokerages and historical ratings provided by FactSet interchangeably, which provide a skewness in the sample as these ratings are not issued under the same regulations. This is a limiting factor that might lead to inaccurate results, specifically in the "NARC" test where we look at changes in historical ratings.

Analyses limitations:

The comparative study is supposed to make a picture of similarities and inequalities of credit ratings and debt structure for both markets. As the U.S. sample are much more diversified it is hard to capture the effect of equally comparable firms. Norwegian companies are basically concentrated around two sectors, while the distribution of U.S. firms are much more widespread. It is likely that a comparison between equal industries will increase accuracy of the results, however, the down-

side is a smaller and limited sample. In the "DMS" test we have not included bank debt as this security class were not available in FactSet. This will likely affect the maturity structure of firms as many use large amounts of bank debt. Furthermore, we summed the various public debt issues into one common measure. It is likely that there are several public debt securities not reported in FactSet, which again will affect the true maturity structure of U.S. firms.

Market economic limitations:

The U.S. and Norwegian financial markets have experienced severe market fluctuations during the analyzed period. As well have bond markets world wide increased extensively during the last decade. It is therefore likely to believe that additional factors have influenced the observed debt structure decisions presented in this study, and moreover have affected the capital structure of U.S. and Norwegian firms.

10 Conclusions and Further Work

This last chapter concludes and provides thoughts about improvements of the work presented in this thesis as well as suggest directions for further work.

Using panel data regressions on an extensive dataset, we show that there exist unique dynamics between a firm's debt structure and its credit rating based on three analyzed considerations explaining main properties of this relationship. First, we confirm that rated firms who have access to public debt markets are to a greater extent characterized by debt heterogeneity relative to unrated firms. This is also valid for the Norwegian market. This distinctive difference is observed to become more apparent as credit ratings exacerbates, while firms' debt structure simultaneously shifts more and more from public debt towards bank debt. We argue that there is an inverse relationship between bank and bond debt for U.S. and Norwegian rated companies, and deduce this difference to be explained by the historical close relationship between Norwegian financial intermediaries and companies.

Secondly, we argue that firms' debt structure behavior is influenced by the concern of possible rating changes, with rating changes close to the boundary between investment grade and non-investment grade as the highest concern. We believe regulatory requirements and financial restrictions are main motives why corporate leaders make these adjustments to their debt structure. Furthermore, similar adjustment behavior in U.S. and Norwegian priority structure of bank and bond debt are identified. This causes reasons to believe that companies issue collateral debt to exploit market risk pricing and corporate characteristics.

Finally, the inverse u-shaped relationship observed for corporations' debt maturity structure stresses the importance of regulations and access to public debt markets for firms' lending conditions. We deduce that lower rated companies struggle to achieve long term financing, whereas higher rated companies harvest advantages of their credit ratings. For example, top rated companies on average issue nine years longer maturity debentures than the lowest rated firms.

By assessing new related aspects of debt structure, we have built on recent literature and developed it further. This thesis also forms the basis of empirical literature combining debt structure and credit ratings for the Norwegian market. Hence this thesis can be seen as a contribution to the knowledge of capital structure and debt structure. We conclude that U.S. and Norwegian companies think strategically equivalent in regards of their debt structure, and that credit ratings are highly important reflections of their decision making.

There are however different areas of improvement related to sample limitation and data realism. As mentioned in chapter 3, we do a comparative study to investigate differences between U.S. and Norwegian choice of debt structure under several conditions. By focusing on similar companies in specific industries the comparative results may have increased its explanatory power as the results would become more realistic and accurate.

Another enhancement that is of interest is the interchangeably use of credit ratings and shadow ratings. As these rating forms are provided by different institutions that assess ratings under unequal conditions, it is likely that the analyses are affected by these inaccuracies. It is also likely that NRSRO agencies will expand coverage of international firms in the future, providing numerous Norwegian companies with official credit ratings. In that case, credit rating analyses of Norwegian companies will be more reliable and internationally comparable.

Our findings suggest the following new directions to be highlighted in future research. First, it would be very interesting to see if the implemented effects of the Basel III accord affect companies' debt structure and their credit ratings. For example, the strengthened risk coverage of banks' capital framework might lead to tougher bank lending conditions, especially for lower rated companies. Second, an examination of the role of credit ratings in accordance with untraditional synthetic debt types would be valuable. As these debt types are known for high complexity, it would be interesting to see how credit ratings respond to their regulatory terms and conditions.

We started this thesis by introducing the important effect debt heterogeneity have on capital structure decisions. We would therefore like to end this thesis with one last direction for further work. Debt structure decisions are not limited to the different debt types presented in this study. A last possible avenue for future research that would be interesting is a thorough assessment of debt contracts in detail, including covenants, pricing, and other determinants as this joint determination can describe debt structure at an even higher level of detail.

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Appendices

A "HACR" test - Results, tables and figures

A.1 Relationship between HHI and credit ratings

$$HHI = \alpha_i + \beta_1 A_{it} + \beta_2 BBB_{it} + \beta_3 BB_{it} + \beta_4 B_{it} + \beta_5 CCC_{it} + \beta_6 CC_{it} + u_{it} \quad (12)$$

$$HHI = \alpha_i + \beta_1 Rated_{it} + \beta_2 Unrated_{it} + u_{it} \quad (13)$$

Table 15: Measures of debt specialization for individual credit ratings

Equations (12) and (13)	*Dependent variable:*			
	HHI (12)-U.S.	**HHI (12)-NO**	**HHI (13)-U.S.**	**HHI (13)-NO**
AAA/AA	- - - - -Omitted Baseline - - - - -			
A	0.035	-0.176**		
BBB	-0.029	-0.131"		
BB	-0.145*	-0.060		
B	-0.132*	0.022		
CCC	-0.194**	-0.363***		
<CCC	-0.291*	N/A		
Rated			-0.089***	-0.170***
N	4199	114	8577	381
R^2	7.48	6.75	2.91	8.47
Adj R^2	7.47	6.15	3.40	8.33
p-value^A	<2.2e-16	0.195	<2.2e-16	8.64e-09

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. The table presents the results of the fixed effects regression model. HHI is the normalized Herfindahl-Hirschman Index while the independent variables are dummy variables. HHI(12) corresponds to the rated sample, while HHI(13) corresponds to the reference sample. Cells marked as N/A are due to zero observations.

A.2 Credit ratings and debt structure for U.S. rated firms

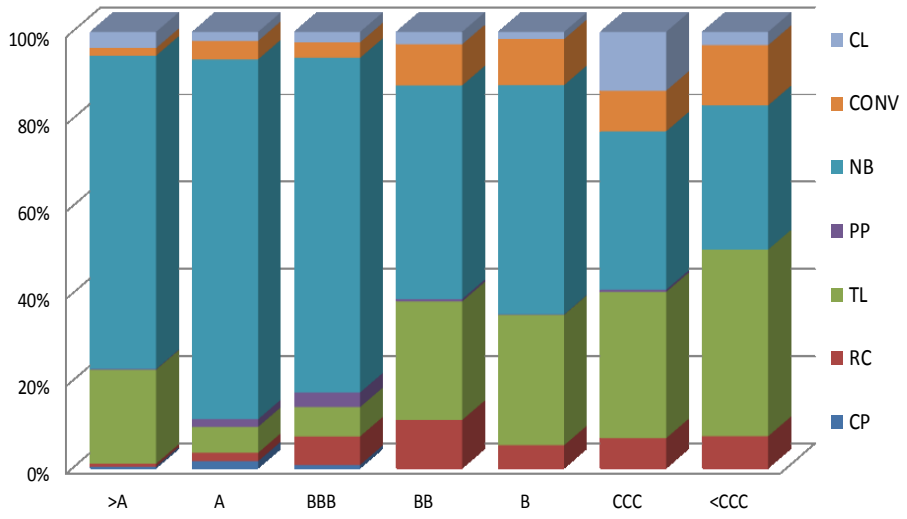

Figure 8: Debt composition for individual rating levels

Table 16: Credit ratings and debt structure

	RC	TL	CP	PP	BN	CONV	CP	N
>A	0.000	0.176	0.000	0.002	0.756	0.011	0.029	34
	[0.000]	*[0.024]*	*[0.000]*	*[0.000]*	*[0.875]*	*[0.000]*	*[0.000]*	
A	0.021	0.054	0.014	0.019	0.850	0.038	0.022	677
	[0.000]	*[0.008]*	*[0.000]*	*[0.000]*	*[0.956]*	*[0.000]*	*[0.000]*	
BBB	0.071	0.069	0.008	0.036	0.770	0.037	0.023	1322
	[0.000]	*[0.007]*	*[0.000]*	*[0.000]*	*[0.906]*	*[0.000]*	*[0.000]*	
BB	0.111	0.278	0.000	0.005	0.493	0.095	0.028	1240
	[0.000]	*[0.107]*	*[0.000]*	*[0.000]*	*[0.501]*	*[0.000]*	*[0.000]*	
B	0.057	0.303	0.000	0.001	0.528	0.101	0.017	860
	[0.000]	*[0.152]*	*[0.000]*	*[0.000]*	*[0.540]*	*[0.000]*	*[0.000]*	
CCC	0.032	0.262	0.000	0.012	0.547	0.129	0.022	37
	[0.000]	*[0.191]*	*[0.000]*	*[0.000]*	*[0.699]*	*[0.036]*	*[0.000]*	
CC	0.127	0.344	0.000	0.000	0.355	0.129	0.044	8
	[0.043]	*[0.246]*	*[0.000]*	*[0.000]*	*[0.281]*	*[0.010]*	*[0.000]*	

This table presents mean and [median] ratios of different debt types for individual credit ratings for the U.S. rated sample. N is noted as firm year observations.

A.3 The effects of being rated - Norwegian sample

Table 17: Debt structure and the effect of being rated - Norwegian sample

HACR NO	**LTD**	**RC**	**TL**	**PP**	**BN**	**CONV**	**CL**	**Sec. Bank**	**Unsec. Bank**	**Sec. Bonds**	**Unsec. Bonds**
Rated	0.024	-0.055	-0.930	0.002	0.108	0.004	-0.012	-0.112"	-0.050	0.036	0.194*
	[0.3779]	*[0.316]*	*[0.230]*	*[0.310]*	*[0.154]*	*[0.690]*	*[0.560]*	*[0.095]*	*[0.323]*	*[0.190]*	*[0.017]*
N	381	107	315	5	200	43	169	130	73	30	174
R^2	57.9	8.3	25.10	7.32	29.40	1.74	29.60	11.60	8.25	8.72	10.70
Adj.R^2	56.3	8.06	24.40	7.12	28.60	1.69	28.80	11.30	8.01	8.47	10.40
p-value^A	<2e-16	1.47e-05	<2e-16	3.18e-05	<2e-16	0.257	<2e-16	3.0e-08	1.61e-05	6.93e-06	1.63e-07
Credit Rating	**LTD**	**RC**	**TL**	**PP**	**BN**	**CONV**	**CL**	**Sec. Bank**	**Unsec. Bank**	**Sec. Bonds**	**Unsec. Bonds**
AA	- **-Omitted Baseline-** -										
A	-0.119"	-0.182*	-0.019	0.043	0.171	-0.002	-0.016	-0.164"	-0.002	-0.000	0.177
	[0.052]	[0.014]	*[0.878]*	*[0.240]*	*[0.252]*	*[0.490]*	*[0.350]*	*[0.068]*	*[0.490]*	*[0.920]*	*[0.251]*
BBB	-0.127*	*-0.073*	-0.082	0.017	0.157"	-0.004	-0.015	-0.169"	-0.004	0.001	0.161"
	[0.036]	[0.485]	*[0.878]*	*[0.280]*	*[0.888]*	*[0.260]*	*[0.390]*	*[0.056]*	*[0.260]*	*[0.650]*	*[0.075]*
BB	0.093	-0.138"	0.225*	0.000	-0.174*	0.065*	0.025	0.016	0.065*	-0.002	*-0.164**
	[0.149]	*[0.089]*	*[0.032]*	*[0.610]*	*[0.037]*	*[0.040]*	*[0.240]*	*[0.890]*	*[0.040]*	*[0.460]*	*[0.047]*
B	0.130"	-0.095	-0.014	-0.000	0.124	0.019	0.015	0.112	0.019	0.042	*0.048*
	[0.076]	*[0.255]*	*[0.905]*	*[0.650]*	*[0.301]*	*[0.260]*	*[0.490]*	*[0.320]*	*[0.260]*	*[0.290]*	*[0.694]*
CCC	0.515***	0.018	0.137	-0.001	-0.321***	-0.009	0.179***	0.556***	-0.008	-0.010	-0.306***
	[0.000]	*[0.817]*	*[0.132]*	*[0.470]*	*[0.000]*	*[0.300]*	*[0.000]*	*[0.000]*	*[0.300]*	*[0.300]*	*[0.000]*
N	114	34	103	5	98	17	50	31	28	3	97
R^2	23.30	7.29	10.40	23.50	14.90	19.70	8.92	12.10	5.42	7.60	12.60
Adj.R^2	21.20	6.65	9.50	21.40	13.60	18.00	8.13	11.00	4.95	6.93	11.50
p-value^A	3.76e-05	0.157	0.046	3.28e-05	0.004	0.000	0.079	0.018	0.318	0.139	0.0141

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. p-values are given in brackets. The dependent variables are divided on LTD (LTD is divided on total assets) while the independent continous variables are devided on total assets.

^{A} Indicates the F-statistics p-value of the regression model.

Table 18: Firm characteristics for Norwegian rated sample

Equation (7)	*Dependent variable:*						
	LTD	**RC**	**TL**	**PP**	**BN**	**CONV**	**CL**
Size	-0.005	-0.019	0.049	0.006	-0.071*	0.008	0.005
	[0.490]	*[0.370]*	*[0.197]*	*[0.240]*	*[0.021]*	*[0.197]*	*[0.349]*
Tangibility	0.293***	-0.009	0.586***	-0.012	*-0.555****	0.058"	0.110"
	[0.000]	*[0.940]*	*[0.001]*	*[0.270]*	*[0.000]*	*[0.093]*	*[0.063]*
Growth	0.155***	0.160	0.014	0.009	*-0.181"*	0.024	*-0.044"*
	[0.000]	*[0.270]*	*[0.938]*	*[0.320]*	*[0.094]*	*[0.371]*	*[0.075]*
Profitability	-0.846***	0.059	*-0.308*	-0.098	*0.696*	-0.121	-0.059
	[0.000]	*[0.840]*	*[0.725]*	*[0.220]*	*[0.343]*	*[0.304]*	*[0.697]*
Industry Leverage	0.744***	0.598"	*0.402**	N/A	0.749***	N/A	0.108"
	[0.000]	*[0.070]*	*[0.044]*		*[0.000]*		*[0.088]*
N	114	34	103	5	98	17	50
R^2	81.00	19.40	30.6	16.10	54.3	7.49	20.80
Adj. R^2	74.00	17.77	27.9	14.90	49.50	6.90	19.00
p-value^A	<2e-16	0.000	2.9e-07	0.001	2.6e-16	0.083	0.000

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. P-values are given in brackets. The dependent variables are divided on LTD (LTD is divided on total assets), while the independent continuous variables are divided on total assets. Cells marked by N/A are due to low number of observations.

^{A} Indicates the F-statistics p-value of the regression model.

A.4 Priority structure for U.S. rated firms

Table 19: Priority Structure for U.S. rated firms

Equation (8)	*Dependent variable:*			
	Secured Bank	**Unsecured Bank**	**Secured Bonds**	**Unsecured Bonds**
Size	-0.070***	-0.007**	0.004	0.102***
	[0.000]	*[0.008]*	*[0.316]*	*[0.000]*
Tangibility	-0.078**	0.023	0.026	0.046
	[0.009]	*[0.168]*	*[0.130]*	*[0.250]*
Growth	-0.019	0.030***	-0.004	0.022
	[0.105]	*[0.000]*	*[0.580]*	*[0.134]*
Profitability	0.020	-0.017	-0.128"	0.414***
	[0.732]	*[0.577]*	*[0.071]*	*[0.000]*
Industry Leverage	0.209"	-0.050	0.050	-0.288*
	[0.057]	*[0.403]*	*[0.429]*	*[0.036]*
N	1 496	1 062	777	2 631
R^2	11.00	1.45	0.77	14.70
Adj. R	11.00	1.44	0.76	14.70
p-value^A	<2.2e-16	7.40e-12	5.00e-06	<2.2e-16

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. P-values are given in brackets. The dependent variables are divided on LTD (LTD is divided on total assets) while the independent continuous variables are divided on total assets.
^{A} Indicates the F-statistics p-value of the regression model.

B "NARC" test - Results, tables and figures

B.1 Near a rating change for Norwegian rated firms

Table 20: Near a change for Norwegian rated firms

Equation (9)	*Dependent variable:*				
	ΔLTD	**ΔSecured Bank**	**ΔUnsecured Bank**	**ΔSecured bonds**	**ΔUnsecured bonds**
Plus$_{t-1}$	-0.003	*-0.041*	0.358	*0.000*	-0.074**
	[0.851]	[0.141]	*[0.140]*	*[0.930]*	*[0.001]*
Minus$_{t-1}$	0.030"	*-0.053"*	0.074	0.001	-0.095*
	[0.087]	*[0.069]*	*[0.120]*	*[0.290]*	*[0.018]*
N	85	24	26	2	75
R^2	19.2	13.0	7.39	9.50	11.3
Adj. R^2	16.7	11.4	6.43	8.27	9.86
p-value^A	0.023	0.153	0.555	0.366	0.239
PAM$_{t-1}$	0.012	-0.046*	0.053	0.000	-0.084**
	[0.378]	*[0.037]*	*[0.120]*	*[0.310]*	*[0.005]*
N	85	24	26	2	75
R^2	15.3	12.8	6.21	6.99	11.0
Adj. R^2	13.5	11.3	5.48	6.17	9.7
p-value^A	0.046	0.102	0.055	0.472	0.176

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10% and p-values are given in brackets. We have chosen not to display the explanatory variables in the table as these are not vital for the conclusion of this particular test. The omitted variables are proxies of size, tangibility, growth, profitability, and industry median leverage.

^{A} Indicates the F-statistics p-value of the regression model.

B.2 Adjustment of debt types for individual rating levels

Table 21: Adjustment of individual debt types

	>A	A	BBB	BB	B	<B
ΔLTD						
Plus	-0.780	-0.008	0.006	0.026	-0.028	0.035
	[0.555]	*[0.830]*	*[0.824]*	*[0.3851]*	*[0.320]*	*[0.701]*
Minus	0.045	-0.047	-0.055"	-0.044"	-0.061"	-0.068
	[0.596]	*[0.290]*	*[0.052]*	*[0.070]*	*[0.089]*	*[0.458]*
ΔRC						
Plus	0.027	-0.029	0.029	0.075"	-0.002	0.059"
	[0.835]	*[0.450]*	*[0.620]*	*[0.063]*	*[0.921]*	*[0.071]*
Minus	0.057	-0.010	-0.029	-0.002	-0.012	0.061*
	[0.593]	*[0.88]*	*[0.462]*	*[0.947]*	*[0.506]*	*[0.031]*
ΔTL						
Plus	-0.425	0.024	-0.057	0.074	-0.000	0.237***
	[0.440]	*[0.880]*	*[0.480]*	*[0.510]*	*[0.993]*	*[0.000]*
Minus	-0.055	0.094	-0.091	-0.079	0.060	-0.027
	[0.890]	*[0.440]*	*[0.190]*	*[0.341]*	*[0.363]*	*[0.778]*
ΔCP						
Plus	0.009*	-0.017	0.001	0.000	-0.001	
	[0.041]	*[0.190]*	*[0.863]*	*[1.000]*	*[0.453]*	N/A
Minus	-0.000	0.007	0.011*	0.000	0.000	
	[0.954]	*[0.270]*	*[0.013]*	*[0.990]*	*[0.955]*	
ΔPP						
Plus	0.049	0.008	0.035*	-0.003	0.009*	
	[0.120]	*[0.616]*	*[0.045]*	*[0.810]*	*[0.029]*	N/A
Minus	0.037	0.013	0.052**	-0.004	-0.000	
	[0.120]	*[0.392]*	*[0.007]*	*[0.700]*	*[0.943]*	
ΔBN						
Plus	-0.052	0.197	-0.033	0.135	-0.031	-0.035
	[0.043]	*[0.374]*	*[0.776]*	*[0.234]*	*[0.626]*	*[0.731]*
Minus	-0.043	-0.081	-0.194"	-0.126	-0.117"	0.051
	[0.313]	*[0.676]*	*[0.078]*	*[0.154]*	*[0.076]*	*[0.576]*
ΔCONV						
Plus	-0.034	-0.025	0.019	0.010	0.004	-0.026***
	[0.833]	*[0.570]*	*[0.681]*	*[0.740]*	*[0.878]*	*[0.000]*
Minus	0.038	-0.011	-0.015	-0.016	-0.020	-0.132*
	[0.809]	*[0.810]*	*[0.685]*	*[0.590]*	*[0.474]*	*[0.030]*
ΔCL						
Plus	-0.036	0.003	0.001	0.034	0.006	0.002
	[0.350]	*[0.730]*	*[0.870]*	*[0.340]*	*[0.215]*	[0.330]
Minus	0.000	0.001	-0.003	-0.028"	0.004	-0.002
	[0.990]	*[0.856]*	*[0.610]*	*[0.092]*	*[0.205]*	[0.360]
ΔSecure Bank						
Plus	-0.340	-0.131	-0.045	0.128"	-0.032	0.322***
	[0.465]	*[0.280]*	*[0.651]*	*[0.071]*	*[0.539]*	*[0.000]*
Minus	-0.145	-0.015	-0.086	0.049	0.039	0.050
	[0.707]	*[0.910]*	*[0.263]*	*[0.358]*	*[0.513]*	*[0.629]*
ΔUnsecured Bank						
Plus	0.265	0.040	0.052"	-0.010	0.002	0.044"
	[0.157]	*[0.310]*	*[0.069]*	*[0.753]*	*[0.869]*	*[0.094]*
Minus	0.231***	0.421	0.045	-0.044*	-0.010	0.046"
	[0.000]	*[0.450]*	*[0.133]*	*[0.046]*	*[0.574]*	*[0.069]*
ΔSecure Bonds						
Plus	-0.020	0.112	-0.032	0.050	-0.083	0.056
	[0.617]	*[0.542]*	*[0.730]*	*[0.578]*	*[0.115]*	*[0.508]*
Minus	-0.032	-0.241"	-0.089	-0.160*	-0.144*	0.049
	[0.128]	*[0.089]*	*[0.303]*	*[0.036]*	*[0.010]*	*[0.569]*
ΔUnsecured Bonds						
Plus	0.076	0.263	-0.027	0.016	0.060*	-0.135
	[0.644]	*[0.132]*	*[0.586]*	*[0.497]*	*[0.015]*	*[0.198]*
Minus	0.084	0.094	-0.064	0.044"	0.030	-0.100
	[0.544]	*[0.119]*	*[0.207]*	*[0.058]*	*[0.294]*	*[0.268]*

***, **, * and " denotes the significance levels at 0,1%, 1%, 5% and 10%. Cells marked by N/A are due to low number of observations.

C "DMS" test - Results, tables and figures

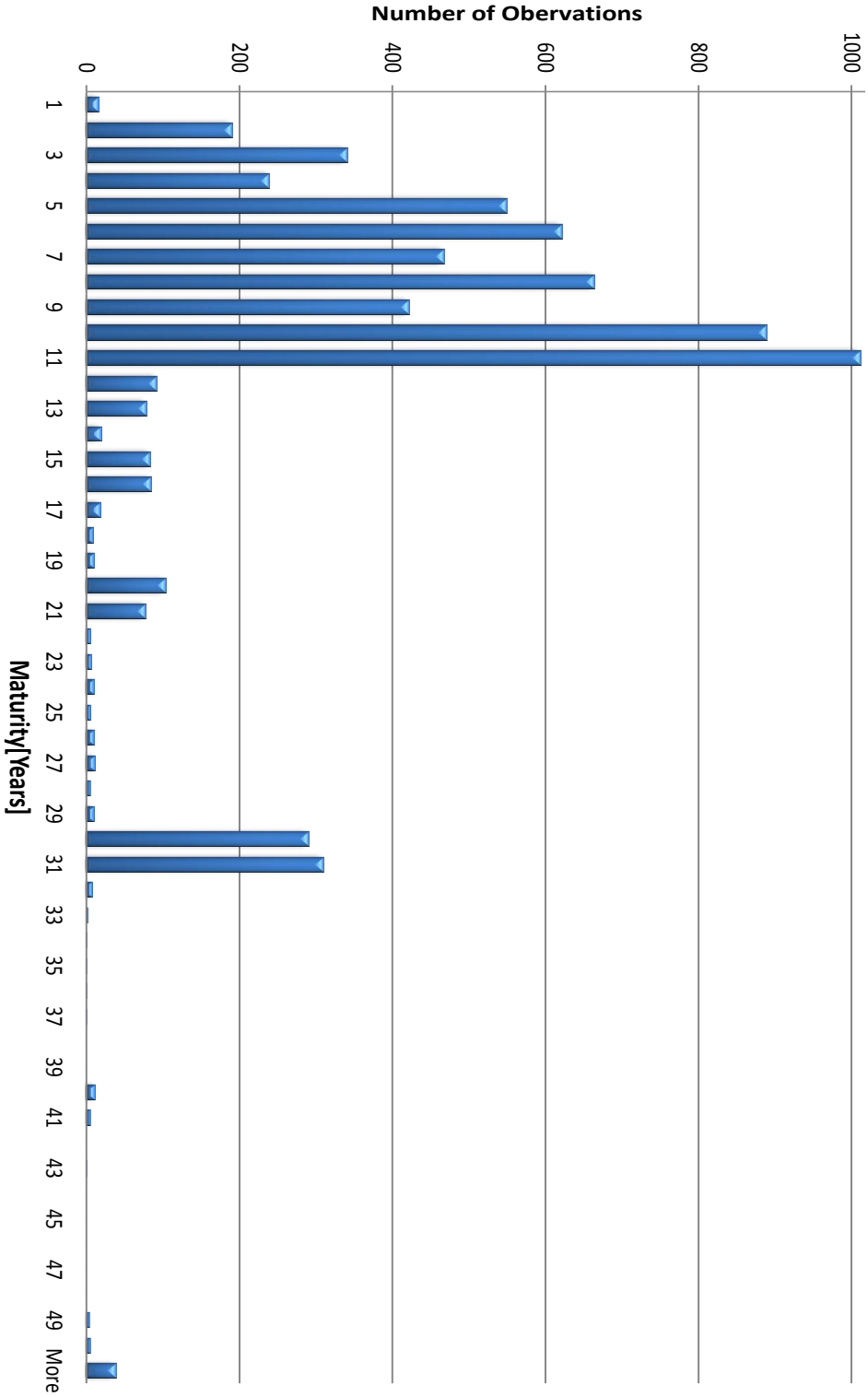

Figure 9: Debt maturity of new public issues

D Variables and proxies

Table 22: Description of regression variables

Explanatory variable	*Definitions:* **Proxy**
Size	Ln(Total Assets)
Tangibility	Net Property, Plant and Equipment (PPE) / Total Assets
Growth	Market to book ratio $\big[$(MV equity + Total debt + Preferred stock liquidating value − Deferred taxes and investment tax credit$\big]$ / (Total assets)
Profitability	EBITDA / Total Assets
Industry Leverage	Median leverage/debt Type by main SIC codes
Dummy Variable	
Rated	Equals 1 if the firm is rated
A, BBB, ...	Equals 1 if the firm has the respective rating
PAM_{t-1}	Equals 1 if the firm last year had a plus or a minus attached to its rating
$Plus_{t-1}(Minus_{t-1})$	Equals 1 if the firm last year had a plus (minus) attached to its rating
2YB	Equals 1 if the firm gets downgraded from investment grade to speculative grade in two years
Fallen	Equals 1 if the firm gets downgraded from investment grade to speculative grade this year
1YA(2YA)	Equals 1 if the firm was downgraded from investment grade to speculative grade one year ago (two years ago)
Debt Components	**Proxy**
LTD	Long Term debt/ Total assets
RC	Revolving credit/LTD
TL	Term Loans / LTD
CP	Commercial Paper / LTD
PP	Private Placements / LTD
BN	Bonds and Notes / LTD
CONV	Convertible debt / LTD
CL	Capital Leases / LTD
Sec.(Unsec.) Bank	Secured RC + Secured TL (Unsecured RC + Unsecured TL)
Sec.(Unsec. Bond	Secured BN + Secured BN (Unsecured BN + Unsecured BN)
ΔLTD(Debttype)	$LTD_{t-1}(Debttype_{t-1})$ - $LTD_t(Debttype_t)$
HHI	$\Big[[RC/LTD]^2+[TL/LTD]^2+[CP/LTD]^2+[PP/LTD]^2+[BN/LTD]^2+[CONV/LTD]^2+[CL/LTD]^2-\frac{1}{7}\Big]/(1-\frac{1}{7})$

All values are calculated as book values

E Test of model assumptions

Appendix E presents results of different tests done on the regression models to test for the assumptions in table 5. Due to the conclusions in chapter 8 and the results in table 28, the tests are performed using fixed effects panel regressions for both the U.S. sample and the Norwegian sample. The tests are performed using long term debt as dependent variable. Since the different debt types add up to long term debt they are assumed to follow the same assumptions as the long term debt model. Hence, the results from the models where the different debt types are dependent variables are therefore not displayed.

Linearity

The following figures illustrate relationships between the dependent and independent variables. Conducted tests indicate weak or no linear relationship between the various variables.

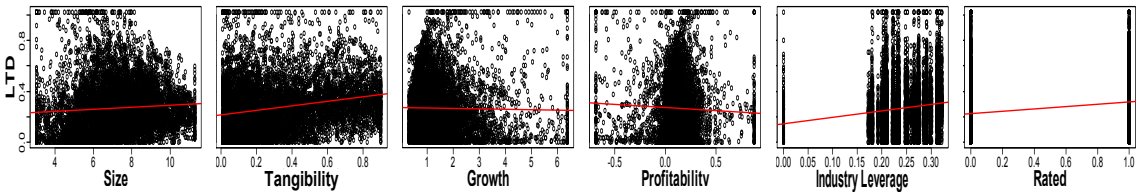

Figure 10: Variable relationship for the U.S. reference sample
(Equation 7)

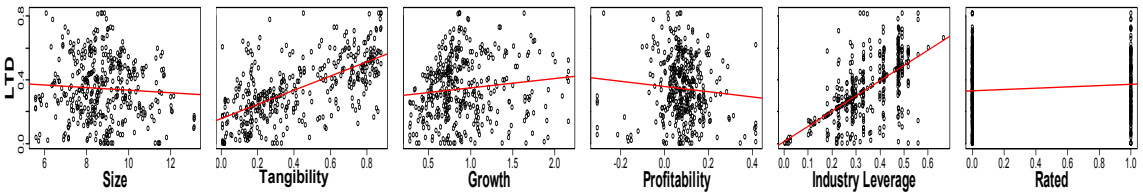

Figure 11: Variable relationship for the Norwegian reference sample
(Equation 7)

Equation 8 on rated sample.

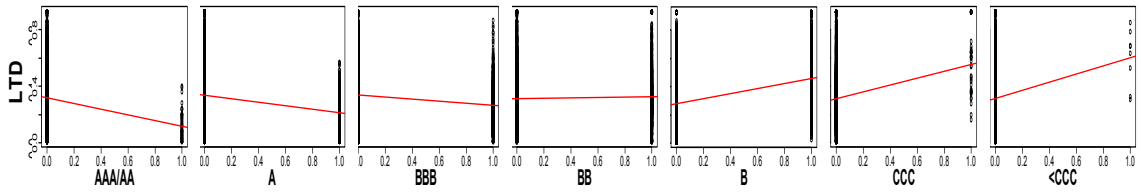

Figure 12: Variable relationship for the U.S. rated sample
(Equation 8)

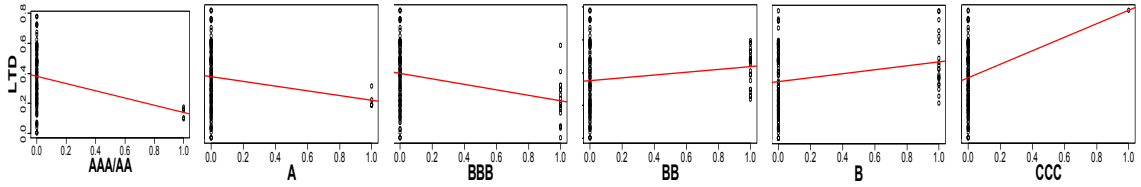

Figure 13: Variable relationship for the Norwegian rated sample
(Equation 8)

Heteroscedasticity

The Breusch-Pagan test is used to test for heteroscedasticity in the dataset, where the null hypothesis states that the error term is homoscedastic. The results in table 23 indicates at a 1% significant level that there exist heteroscedasticity in all U.S. models. For the Norwegian NARC test (PAM and Plus-Minus model) the Breusch-Pagan test is not able to detect heteroscedasticity.

Table 23: Breusch-Pagan test for heteroscedasticity

Model	**Equation**	**BP**	**DF**	**P-value**
General Model U.S. Rated Sample	3	336.20	5	<2.2e-16
HACR Model U.S. Reference Sample	7	1325.00	6	<2.2e-16
Rating Distribution Model U.S. Rated Sample	8	378.20	6	<2.2e-16
NARC - PAM Model U.S. Rated Sample	9a	61.19	6	2.972e-11
NARC - Plus-Minus Model U.S. Rated Sample	9b	61.29	7	8.321e-11
Fallen Angels Model U.S. Rated Sample	10	15.68	4	1.7e-03
DMS Model U.S Rated Sample	11	776.20	6	<2.2e-16
General Model Norwegian Rated Sample	3	19.29	5	1.69e-03
HACR Model Norwegian Reference Sample	7	48.76	6	8.33e-09
Rating Distribution Model Norwegian Rated Sample	8	19.49	5	1.56e-03
NARC - PAM model Norwegian Rated Sample	9a	6.74	6	0.3455
NARC - Plus-Minus Model Norwegian Rated Sample	9b	7.30	7	0.3982

Normality

To test for normality the residuals are plotted in a normal q-q plot. The blue dashed lines indicate the 2.5 % quantile and the 97.5 % quantile. The results indicate for all regressions a fairly good normality within these two quantiles, except for the firm characteristics model of the U.S. sample that clearly deviate from normality.

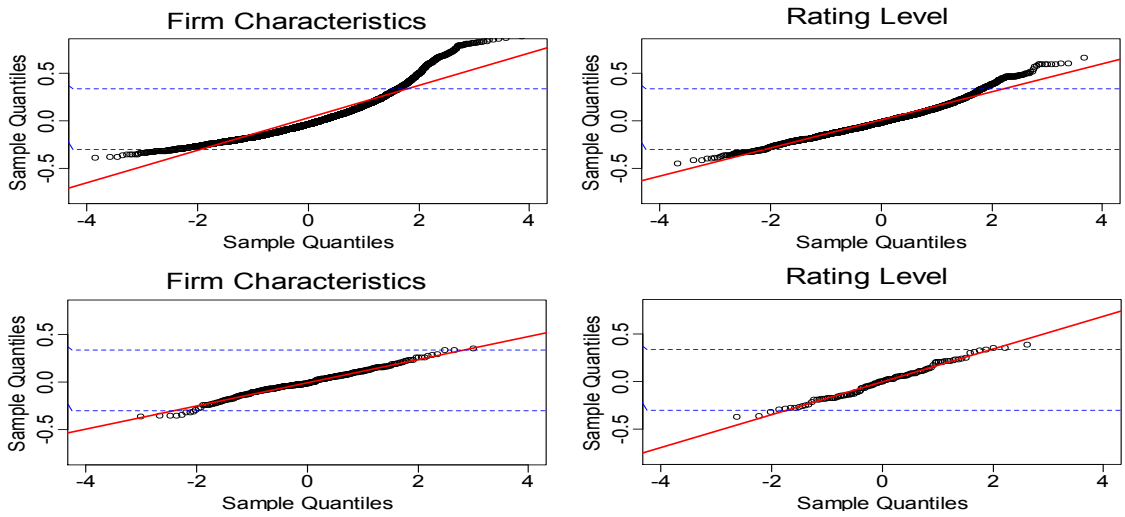

Figure 14: Normal quantile-quantile plot
Top: Normal q-q plot U.S. model, Lower: Normal q-q plot Norwegian model

Autocorrelation
The Wooldrige test tests for autocorrelation where the null hypothesis is no first-order autocorrelation. The results show no sign of autocorrelation in the U.S. models. For the Norwegian PAM and Plus-Minus tests the Wooldrige test is not able to disprove autocorrelation.

Table 24: Wooldrige test for autocorrelation

Model	**Equation**	χ_2	**DF**	**P-value**
General Model U.S. Rated Sample	3	2088.00	1	<2.2e-16
HACR Model U.S. Reference Sample	7	4016.00	1	<2.2e-16
Rating Distribution Model U.S. Rated Sample	8	2064.00	1	<2.2e-16
NARC - PAM model U.S. Rated Sample	9a	1774.00	1	<2.2e-16
NARC - Plus-Minus Model U.S. Rated Sample	9b	1773.00	1	<2.2e-16
Fallen Angels Model U.S. Rated Sample	10	13.72	1	1.69e-03
DMS Model U.S. Rated Sample	11	-9.56[A]	1	<0.01
General Model Norwegian Rated Sample	3	16.41	1	5.09e-05
HACR Model Norwegian Reference Sample	7	106.50	1	<2.2e-16
Rating Distribution Model Norwegian Rated Sample	8	55.00	1	1.2e-13
NARC - PAM model Norwegian Rated Sample	9a	1.30	1	0.2539
NARC - Plus-Minus Model Norwegian Rated Sample	9b	0.66	1	0.4174

[A] The DMS model is an ordinary linear regression model and therefore it is therefore the augmented Dickey-Fuller test has been used to detect autocorrelation.

Multicollinearity
By regressing one independent variable against another independent variable, the R^2 values will indicate how much of the variation in one variable is explained by another independent variable. A significant result and a R^2 value above 0.15 indicates collinearity in the data (Medvedev, 2006, p. 24).

Equation 8, 10, and 11 uses only dummy variables as independent variables and will therefore not experience any multicollinearity.

Table 25: Collinearity test of the U.S. reference sample

Variables	Coefficient *[R^2]*				
	Size	Tangibility	Growth	Profitability	Industry Leverage
Tangibility	0.023*** [*0.025*]				
Growth	-0.130*** [*0.049*]	-0.774*** [*0.037*]			
Profitability	0.022*** [*0.049*]	0.058*** [*0.007*]	-0.007*** [*0.002*]		
Industry Leverage	0.001** [*0.002*]	0.048*** [*0.061*]	-0.003*** [*0.005*]	-0.001 [*0.000*]	
Rated	0.188*** [*0.427*]	0.287*** [*0.021*]	-0.092*** [*0.034*]	0.466*** [*0.025*]	0.521** [*0.003*]

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. R^2 values are given in brackets. The regression is performed using the fixed effects model.

Table 26: Collinearity test of the Norwegian reference sample

Variables	Coefficient *[R^2]*				
	Size	Tangibility	Growth	Profitability	Industry Leverage
Tangibility	0.029* [*0.024*]				
Growth	-0.013 [*0.003*]	0.006 [*0.000*]			
Profitability	0.020** [*0.088*]	0.035 [*0.010*]	0.066* [*0.052*]		
Industry Leverage	-0.001 [*0.000*]	0.209*** [*0.225*]	-0.006 [*0.000*]	-0.038 [*0.001*]	
Rated	0.161*** [*0.266*]	0.285" [*0.029*]	0.128 [*0.009*]	0.812* [*0.030*]	0.255 [*0.005*]

***, **, *, " denotes the significance levels at respectively 0,1%, 1%, 5%, and 10%. R^2 values are given in brackets. The regression is performed using the fixed effects model.

Breusch-Pagan Lagrange Multiplier
The Breusch-Pagan Lagrange Multiplier test tests for panel effects in the data. The result from the table below indicates at a 1% level that all models contains panel effects.

Table 27: Breusch-Pagan Lagrange test

Model	**Equation**	χ_2	**DF**	**P-value**
General Model U.S. Rated Sample	3	18491.00	1	<2.2e-16
HACR Model U.S. Reference Sample	7	38711.00	1	<2.2E-16
Rating Distribution Model U.S. Rated Sample	8	18846.00	1	<2.2E-16
NARC - PAM model U.S. Rated Sample	9a	9360.00	1	<2.2e-16
NARC - Plus-Minus Model U.S. Rated Sample	9b	9361.00	1	<2.2e-16
General Model Norwegian Rated Sample	3	247.60	1	<2.2e-16
HACR Model Norwegian Reference Sample	7	917.40	1	<2.2e-16
Rating Distribution Model Norwegian Rated Sample	8	344.90	1	<2.2e-16
NARC - PAM model Norwegian Rated Sample	9a	40.85	1	1.647e-10
NARC - Plus-Minus Model Norwegian Rated Sample	9b	52.74	1	3.804e-13

Hausman test
The Hausman test estimates which estimation model is the preferred model, where the null hypothesis is that the random effects model is the preferred model. The Hausman test indicated that the fixed effects model was the appropriate model for the analyses.

Table 28: Hausman test

Model	**Equation**	χ_2	**DF**	**P-value**
General Model U.S. Rated Sample	3	259.90	5	<2.2e-16
HACR Model U.S. Reference Sample	7	156.60	6	<2.2e-16
Rating Distribution Model U.S. Rated Sample	8	33.74	6	7.656e-06
NARC - PAM model U.S. Rated Sample	9a	86.02	6	<2.2e-16
NARC - Plus-Minus Model U.S. Rated Sample	9b	86.03	7	<2.2e-16
General Model Norwegian Rated Sample	3	117.10	5	<2.2e-16
HACR Model Norwegian Reference Sample	7	19.90	6	0.0898
Rating Distribution Model Norwegian Rated Sample	8	40.45	6	1.212e-07
NARC - PAM model Norwegian Rated Sample	9a	38.04	6	1.105e-06
NARC - Plus-Minus Model Norwegian Rated Sample	9b	34.88	7	1.179e-05