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The Power of Credit Ratings

- A study of credit rating changes' effects on essential firm aspects

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ABSTRACT

Title	The Power of Credit Ratings - A study of credit rating changes' effects on essential firm aspects
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Keywords	Credit ratings, capital structure, financial ratios, valuation, performance
Purpose	The aim of this study is to empirically examine how a change in credit rating affects three specific firm aspects: capital structure, valuation and performance. We want to extend the scope of previous research by examining whether US firms change their capital structure after a change in its Broad rating. We will also investigate whether a change in firms' long-term ratings has an effect on firm valuation and performance.
Methodology	The methodology used in this study is of a deductive, quantitative nature. We will investigate the relationship between credit ratings and changes in financial ratios using multiple linear regression models.
Theoretical perspectives	The theoretical framework of this study is based on main theories on capital structure and other firm aspects, as well as previous research on credit ratings and their impact on financial ratios.
Empirical Foundation	This study's empirical investigations are based on historical data from Standard & Poor's long-term issuer rating and firms' financial information on a sample of 77 firms. The data collected covers a five-year period from 2009-2013, which amounts to a total of 385 firm-years.
Conclusions	The findings of this study support the hypothesis that credit rating changes affect firms' capital structure decisions. Further, the results indicate that credit rating changes do not have a statistically significant impact on valuation and performance. These findings are evident for large cap firms on the US market and might be explained by the characteristics of our data sample. According to this study, the trade-off theory outweighs the CR-CS and TTCR hypotheses.

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LIST OF ABBREVIATIONS

BLUE	Best Linear Unbiased Estimators
CLRM	Classical Linear Regression Model
CR-CS	Credit Rating- Capital Structure hypothesis
MM	Modigliani-Miller theorem
OLS	Ordinary Least Squares
S&P	Standard and Poor's
TTCR	Trade-Off Theory Credit Rating hypothesis

1. INTRODUCTION

The introductory chapter introduces the background to the topic of our study. We will present a problem discussion that leads to a formulation of research questions, followed by the study's aim and objectives. The chapter concludes with a description of the target group to which this essay is addressed and ends with a disposition.

1.1 Background to the study

Partnoy (1999) quotes a famous interview with Thomas Friedman who emphasizes the importance of credit rating agencies. He compares the power they possess with the power of The United States as a superpower. This accentuates the critical role that credit ratings have played in the progress of the development of financial markets (Partnoy, 1999).

"…The United States can destroy you by dropping bombs, and Moody's can destroy you by downgrading your bonds. And believe me, it's not clear sometimes who's more powerful." –Thomas Friedman, 1996

(Partnoy, 1999:620)

Credit ratings measure the debtor's ability and likelihood to pay back debt as well as the firm's risk of default (Partnoy, 1999; Ogden et al, 2003). The history of credit rating agencies dates back to 1909 when John Moody was first to publish credit ratings of a range of firms. In 1916 Poor's Publishing followed with their credit ratings and a couple of years later came Standard Statistics and Fitch, publishing their first ratings in 1922 and 1924, respectively. With a slightly different arrangement, Moody's, Standard and Poor's and Fitch are still the greatest credit rating agencies in the market today (White, 2007). Standard and Poor's is the leading agency and rates government and corporate debt to a value of $2 trillion (Partnoy, 1999).

The rating agencies add market value and help reduce information asymmetry by using public as well as confidential and firm specific information in their rating processes (Partnoy, 1999; Grunert et al, 2005). Firms are ranked according to their relative creditworthiness and ability to pay back debt, which in turn motivates the pricing of different kinds of debt such as corporate bonds.

Credit rating agencies are dependent on their trustworthiness and therefore need to exercise caution in their rating processes. The agencies must be careful with giving firms excessive high grades to avoid a weakened reputation and a risk of losing future errands

(Partnoy, 1999). When Enron and Worldcom faced difficulties in the beginning of the 21st century, neither Standard & Poor nor Moody's chose to downgrade the firms until the stocks crashed. This became a well-known event in the market and endangered the rating agencies' credibility (Güttler et al, 2007; White, 2007). To address the credibility issues, objectivity and independence are essential guiding principles that credit rating agencies should build their operations on.

Until 1970 credit rating agencies were hired by investors to assess firms' financial strength and be given credit ratings. However, this has changed and today the respective firm hires and pays the agencies to rate their company (Partnoy, 1999). This can be seen as a major reform in the industry that may have entailed consequences for the agencies' independency. Due to this, the legislation has changed over time, sought to improve the business of credit ratings (Partnoy, 1999; White, 2007). According to Partnoy (1999), the fact that firms today pay the costs associated with credit ratings could be one of the reasons for the great expansion in the industry. However, the risk of potential conflicts of interest has increased. An agency might be tempted to rate a firm with a higher grade in exchange for a larger compensation (White, 2007). This would in turn have a negative impact on the industry since investors would not be able to rely on the ratings. During the last 15 years, national regulatory categories and legislations, such as the Sarbanes-Oxley Act from 2002, have been implemented in order to control the agencies and ensure fair credit ratings (White, 2007).

One of the most essential financial decisions firms undertake is determining their capital structure. Moreover, it includes deciding how much long-term debt and equity capital to issue (Ogden et al., 2003). Credit ratings are the second highest concern when CFOs determine their firm's capital structure, according to a study conducted by Graham and Harvey in 2001. As much as 57.1% of the CFOs questioned found credit ratings to be essential when issuing debt (Graham and Harvey, 2001). Other important features of a firm are valuation and performance, however these are not as easy for management to influence as capital structure decisions. Credit ratings can also affect these aspects of the firm by strengthening future outlook.

Credit rating agencies, and ratings overall, play an important role in todays business environment and financial markets. With a history that stretches over a century, they have become a utility not only for stakeholders such as investors and lenders, but also for firms themselves in their capital structure decisions. Previous research conducted in the field has revealed a significant relationship between credit ratings and various financial ratios. Distinguished relationships can also be drawn to well-known financial theories such as the Modigliani and Miller theorem of capital structure, in addition to the trade-off and pecking order theories. Although these theories explain some of the reasons for capital structure decisions, they do not consider all relevant factors that affect capital structure. Thus, implying that the field is not yet fully investigated (Kronwald, 2009).

1.2 Problem statement

Previous studies have confirmed credit ratings' impact on firms' capital structure decisions. An empirical research conducted by Ogden et al (2003) examined how changes in credit ratings in the late 1990s lead to changes in three certain financial variables; sales growth, debt ratio and market equity value. The results revealed that firms that had undergone a rating upgrade experienced increased sales growth and market equity value, but a decrease in debt ratio. Firms that had been downgraded experienced the reverse; decreased sales growth, a fall in market equity value but an increase in debt ratio (Ogden et al, 2003). Ogden et al (2003) further developed this study, concluding that eight specific financial ratios were affected by changes in credit ratings.

In another study, Kisgen (2006) found that capital structure decisions are directly affected by credit ratings. The focus of this study was how companies close to an upgrade or downgrade changed their issuance of debt and equity. In contrast, Ogden et al's (2003) study examined the results after a rating change. The results in Kisgen's study showed that firms close to an upgrade or downgrade are reluctant to take on additional debt. These firms issued approximately 1% less net debt relative to net equity. Michelsen and Klein did a similar, refined study in 2011 with an international perspective in the period of 1990 to 2008. This confirmed Kisgen's previous study but showed an even more distinct decrease in the firms net debt issuance by 1.8%. Kisgen (2009) extended his research on credit ratings by examining capital structure decisions after a Broad rating change[1]. He found that downgraded firms issue less debt relative to equity, while an upgrade led to more debt issuance. These findings were more significant for lower rated firms, therefore it is of interest to examine whether the opposite relationship exists with large and higher rated firms.

By combining the findings from Ogden et al and Kisgen, we would like to determine if a change in a firm's credit rating affects its capital structure, as well as the effect on financial ratios. In contrast to Kisgen (2006), but similar to Kisgen (2009), we want to examine how capital structure decisions are affected after an actual change has occurred. Since credit ratings also affect other aspects of the firm, it is interesting to examine the effect ratings have on other features like valuation and performance. While Ogden et al (2003) studied how credit rating changes affected sales growth, debt ratio and market equity value, we are interested in looking at the effect changes in credit ratings have on net debt issuance, market-to-book and return on assets. These ratios relate to capital structure,

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[1] A rating change from one category to another

valuation and performance, respectively. The ratios Ogden et al (2003) used also reflect these three aspects, but while management can control the debt ratio, it is more difficult for a firm to control sales growth and market equity value. Our ratios on the other hand, are more controllable than Ogden et al's (2003). A firm can regulate their net debt issuance, and it has more power over its market-to-book and return on assets compared to its market equity value and sales growth. Since a company has more control over all the ratios we have chosen, they are easier to compare to each other. To the extent of our knowledge, this will be the first paper to examine how firms that have experienced a change in their Broad rating also exhibit a change in capital structure, valuation and performance.

1.3 Research Question

In order to determine if a change in credit rating leads to a change in a firm's financial ratios, the following research questions have been formulated:

1. *Do firms change their capital structure by issuing more debt in relation to equity after a Broad rating change?*

2. *Does a Broad rating change affect other firm aspects like valuation and profitability?*

1.4 Aim and objectives

The aim of our study is to extend the scope of previous research by examining whether US firms experience a change in firm aspects after a change in its Broad rating. This study will emphasize on the effect credit ratings have on firms' capital structure, but we will also investigate the effect on companies' valuation and performance.

Our study is based on previous research from primarily three articles: Kisgen (2006; 2009) as well as Ogden et al (2003). Kisgen (2006) introduces the CR-CS hypothesis, which states that the impact of credit rating modifications directly affect capital structure decision making, and that companies near a change in rating issue less net debt than companies not close to the same change. In 2009 Kisgen extended his research by examining actual changes in credit ratings. Ogden et al (2003) did another type of research, testing which financial ratios that are most affected by credit ratings. Since these studies already have been conducted, we want to focus our study on how firms' capital structure, valuation and performance are affected after an actual change in Broad rating.

1.5 Scope and limitations

The purpose of this study is to examine how a change in credit rating affects three specific financial ratios. The ratios we will test are (1) net debt issuance, (2) market-to-book ratio and (3) return on assets. These ratios reflect a firm's capital structure, valuation and performance, respectively. The sample used in our study is based on US firms from the S&P 500 list, with ratings from the time period 2009-2013. We will examine the previously mentioned relationship between present and historical elements of 77 US firms, equivalent to 385 firm-years (see *Appendix* I). All of the companies presented in our sample are part of S&P 500 and rated during the entire time period of our study. The credit ratings data used is Standard & Poor's long-term domestic issuer rating, which according to Kisgen (2006) represents the corporate credit rating. The study will address a time period of five years after the previous financial crisis, a period that to our knowledge has not yet been researched. In chapter 3 the selection procedures and criteria will be discussed in more detail.

1.6 Target group

This study is aimed mainly to researchers and students who are interested in finance, and in the relationship between credit ratings and their effect on capital structure, valuation and performance in particular. Furthermore our study can be of interest for firms with an existing credit rating, as they can use this information to examine how their credit rating is connected to their financial ratios.

1.7 Disposition

Theory	This chapter seeks to outline existing and relevant theories for the field of our study. We present S&P’s evaluation process as well as the MM theorem of capital structure, an important basis for the trade-off theory as well as the pecking order theory. We will also present previous research and their findings in order to find possible drawbacks to our research questions.
Methodology	In this chapter we will describe our approach and choice of methodology used in this study. Furthermore, we will explain the sample method and the variables applied in the study.
Results	In the following chapter we will present the results from our regressions. Further, the hypotheses tests and the model of fit will be examined.
Analysis	In this chapter we will analyze the results based on the theoretical framework presented earlier in our study. Our aim is to first analyze the effects of credit rating on capital structure decisions, followed be its effect on other important firm aspects. Finally, we will outline relevant limitations that might have affected our results.
Conclusion	The final chapter will present the conclusions of our study, in addition to suggestions for further research within the field.

2. THEORIES & PREVIOUS RESEARCH

This chapter seeks to outline existing and relevant theories for the field of our study. We present S&P's evaluation process as well as the MM theorem of capital structure, an important basis for the trade-off theory and the pecking order theory. We will also present previous research and their findings in order to find possible drawbacks to our research questions.

2.1 S&P's Evaluation Process

One of the most fundamental criteria for the existence of credit rating companies is their credibility to outside investors. To achieve trust in the market, rating agencies need to fulfill the criteria of reputational capital[2] (Partnoy, 1999):

1. The rating companies must have reputational capital at stake when certifying the issuing corporation.
2. The loss of reputational capital must exceed the gain possible from false certification.
3. The ratings services must be costly, and this cost must be related to the asymmetric information associated with the issuing firm.

(Partnoy, 1999:628)

The last financial crisis revealed that rating agencies had much to improve to restore confidence in their ratings. Standard and Poor's has taken several initiatives to better its transparency and quality in its grade-setting processes (S&P, 2009). The company has a long experience in the field, but to maintain its strong position S&P must preserve its trustworthiness in the market (Partnoy, 1999; S&P, 2008). To provide a greater transparency S&P has, for example, published "what-if" analyses examining factors that might cause a change in ratings and changes made to rating criteria. Standard and Poor's believes that actions, like publishing the "what-if" analysis as well as other significant information, will help the market to better understand the ratings, and act on them if they agree with the given information (S&P, 2009).

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[2] A reserve of good will, on which other parties rely in transacting with that individual. Reputational Capital leads parties to include trust as a factor in their decision-making; trust enables parties to reduce the costs of reaching agreement." (Partnoy, 1999, p. 628)

Standard & Poor's corporate credit rating is their forward-looking opinion on the issuer's fundamental creditworthiness (S&P, 2009). An important note is that a corporate rating is not a reflection of priority or preference among the evaluated obligations, but foremost an opinion on the financial condition (S&P, 2008). The rating reflects the issuer's capacity and disposition to assemble its financial obligations on time. Hence, the primary factor when rating issuers and obligations is the likelihood of default. The credit rating also reflects the issuer's payment priority, recovery and credit stability (S&P, 2009).

The investment grades that S&P assigns are categorized into two groups, investment grade and speculative grade. The highest rating that can be attained is the AAA rating, a grade that is given solely to a few companies in an exceptionally strong financial state, with a solid capacity to meet obligations on time. This rating is regarded an investment grade, along with ratings AA, A and BBB (Ogden et al., 2003). The investment group reflects issuers and obligations that have at least an adequate capacity to meet their commitments. The lowest rating given is a D, which is given when a company is in default. Along with ratings BB, B, CCC, CC and C, the D rating is considered a speculative grade (S&P, 2014). An overview can be found in table 1. The issuers with speculative grades face ongoing uncertainties, which can lead to an insufficient capacity to meet their financial obligations. Standard & Poor's also assigns modifiers to the ratings to indicate whether the issuer is strong or weak within the appointed grade. The modifiers are given by the signs (+) or (-). The rating NR (Not Rated) characterizes that S&P's does not rate the specific issuer or that the issuer cannot be rated due to inadequate information (Ogden et al., 2003).

Table 1: *Credit ratings definitions*

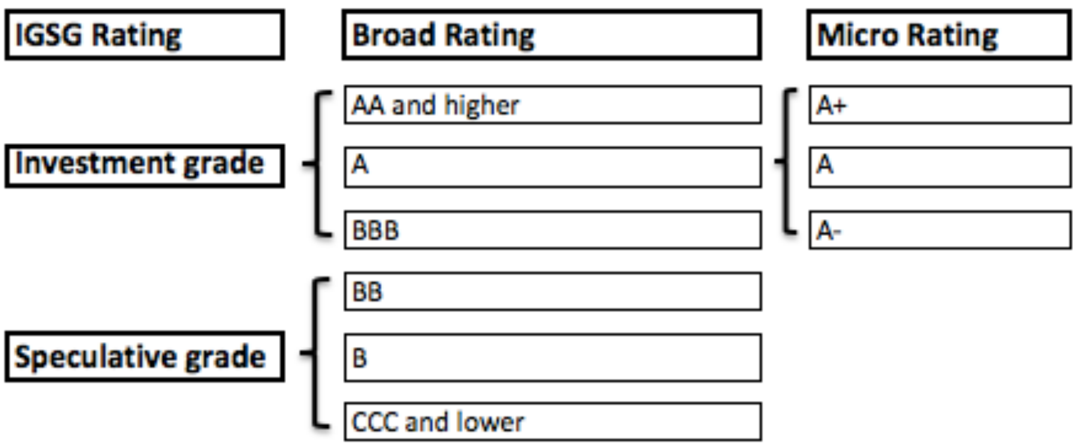
	S&P credit ratings definitions	
	Credit rating	**Capacity to meet financial commitments**
Investment grade	AAA	Extremely strong
	AA	Very strong
	A	Strong
	BBB	Adequate
	BBB-	Considered lowest investment grade rating
Speculative grade	BB+	Considered highest speculative grade rating
	BB	Vulnerable
	B	More vulnerable
	CCC/C	Extremely vulnerable
	D	In default

Note: Ratings from AA to CCC may be modified by the addition of a plus (+) or minus (-) sign to show relative standing within the major rating categories. BB+/BBB- is only presented to determine the division between investment and speculative grade.

Source: Standard & Poor's, 2014

According to Kisgen (2006) there are three different ways to measure credit ratings (see figure 1 below). In addition to investment grade and speculative grade rating, Kisgen (2006) also divides ratings into Broad ratings and Micro ratings. While Micro rating is the plus, middle or minus within a certain rating, Broad rating classifies the ratings as the general letter, e.g. B, BB, or A. This study will focus on changes in Broad ratings.

Figure 1: *Three types of rating changes*



2.2 Main theories

2.2.1 Capital structure

Modigliani and Miller's (1958) propositions on capital structure was one of the first theories explaining a firm's capital structure choice, and the MM theorem[3] still infiltrates almost all aspects of financial economics today. In their seminal work from 1958, Modigliani and Miller proved that in theory neither capital structure nor dividend policy affect a firm's value. They argue that the right action is to try to maximize the value of the company, and that a certain capital structure or dividend policy is irrelevant for the shareholders. Further they conclude that, under certain restrictive assumptions, a firm's value should be independent of its capital structure. In 1963, however, the realization of

[3] Modigliani & Miller's main assumptions are:

- Financial markets are perfect and without friction
- There are no taxes
- Firms can only issue two types of securities; equity and risk-free debt
- There are no default risks
- There are no transaction costs
- Both firms and investors have the same information
- The firm management acts exclusively on the behalf of stockholders

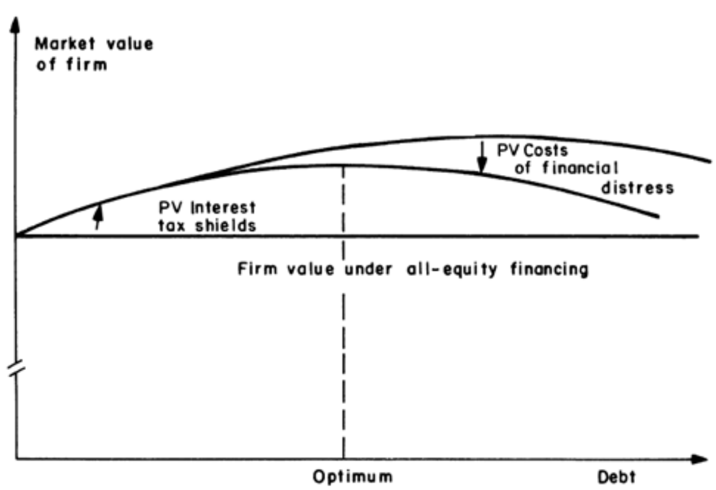
tax advantages of debt financing led Modigliani and Miller to conclude that the capital structure is relevant to the total value of the firm.

As Kraus and Litzenberger (1973) points out, the Modigliani and Miller thesis does not hold in practice as the market has imperfections. In order to get to a theoretical framework that better reflects the real-world market situation, these assumptions needed to be re-worked. As a consequence, two main theories explaining how firms determine their capital structure have emerged, namely the trade-off theory (Myers, 1984) and the pecking order theory (Myers and Majluf, 1984).

2.2.2 Trade-off theory

Myers (1984) introduced the trade-off theory as one of two ways of thinking about capital structure. The trade-off theory of capital structure explains how corporations usually are financed partially with debt and partially with equity. In the trade-off model the value of a company is maximized through the balance between costs and benefits associated with debt and equity financing. In order to attain an optimal capital structure that maximizes their total market value, a firm has to pursue debt levels that balance the value of interest tax shields to the various costs of bankruptcy or financial distress. Figure 2 illustrates how the trade-off theory of capital structure works and how a firm seeks to achieve an optimal balance between debt and equity.

***Figure 2**: The trade-off theory of capital structure*



Source: Myers, 1984, p. 577

The benefits of leverage include tax advantages and the reduction of free cash flow problems. The costs associated with debt involves cost of financial distress or bankruptcy and agency costs, in addition to the actual cost of holding debt because of interest payments (Fama and French, 2002).

2.2.3 Pecking order theory

The pecking order theory was developed by Myers and Majluf (1984), and seeks to explain a firm's priorities of financing. The theory takes a different approach on capital structure decisions by including the assumptions of asymmetrical information as an aggravating factor. As a consequence of this asymmetrical information, companies follow a certain pecking order when determining their capital structure (Myers and Majluf, 1984). The basis of the pecking order theory is that firms prefer internal funds rather than external funds, and debt before equity, as this is the most expensive way of financing. According to Kronwald (2009) managers have an incentive to issue equity when the firm is overvalued, and investors will take this into account when investing. As a result, the cost of equity increases and debt becomes a more preferable option.

2.3 Previous research

2.3.1 The Significance of Credit Ratings on Financial Ratios

Several previous studies examine the subject of how credit ratings and different financial measurements are incorporated with each other. A relationship between capital structure, financial ratios and credit ratings was determined as early as in the 1960's when Horrigan (1966) published a study regarding the relationship between credit ratings and financial ratios.

Horrigan (1966) used a sample of US firms that all had bonds rated by S&P during the significant period he tested. The dependent variable in the study was credit ratings, based on a previous study by Hickman in 1958. Hickman had found credit ratings to be good estimators on default risk. Horrigan found the dependent variable, the credit rating, challenging since it is based on different factors, which include raters' own opinions. Horrigan used total assets and other key ratios as independent variables. Horrigan believed that the largest interest in long-term credit administration was the issuers' capacity to repay its long-term debt. The hypotheses in the study generally implied that high ratings were given to:

"...large firms whose long-term solvency ratios are high, whose profit-margin and return-on-investment ratios are higher than the industry average, and whose capital-turnover ratios are close to the industry average"

(Horrigan, 1966: 52)

The test results proved that there were simple correlations between the independent variable and the ratings. This proved financial ratios to be useful when determining corporate ratings (Horrigan, 1966). West (1970) criticized Horrigan for not basing his hypotheses on theoretical studies or at least explanations to why he developed the hypotheses in such manner. He also believed Horrigan's study to rely too heavily on one year's financial data in ratio form to predict ratings. Therefore Fisher (1959) had a better study since he linked risk premiums to default risks, and thereby to marketability. West found Fisher's model more empirically based and thoroughly rationalized. Fisher's model was based on more historical numbers and not on a certain year's ratios. One year's financial data cannot either predict variability in a firm's income. Therefore historical numbers give a better understanding of the default risk. Despite this, Horrigan's model had an advantage in the easiness of calculating the ratios, and West concluded that Horrigan's model was slightly better based on the easiness of calculation (West, 1970).

More recently, an empirical research was conducted by Ogden et al (2003), which investigated the determinants of S&P's ratings during a period between 1996 and 1999. Specifically the study consisted of five empirical analyses, each with slightly different objectives. The first investigated whether certain financial characteristics can be recognized given a firm's level of rating. To further extend this analysis, Ogden et al (2003) examined to what extent rating variation can be explained by financial variables. The understanding was deepened through testing the ratings' stability over time, which drew attention to historical changes in Broad rating. The results indicated that, during the time period tested, ratings changed relatively frequent and only about one third had maintained the same rating throughout the whole period. Of the firms that had undergone a change, a slightly higher proportion had been downgraded compared to the proportion that had been upgraded.

The next step in Ogden et al's (2003) analysis was to look more closely into the firms that had undergone an actual change in their rating during the period, and examine whether these firms had also experienced any essential changes in their financial structure. Three certain financial variables were analyzed: sales growth, debt ratio and market equity value. For each number of changes a firm had undergone, an average for the measurements was calculated. The study revealed that there was in fact a significant relationship between credit ratings and financial ratios. Firms that had experienced upgrades generally also experienced higher sales growth and increased market equity value, as well as a reduction of their debt ratio. For a downgrade the reverse relation occurred, i.e. increased debt ratios, and fall in sales growth and market equity values. The last analysis that was conducted examined the effects macroeconomic factors have on bond rating in general. This analysis investigated the years 1985-1999. Average changes in rating were compared to GDP growth, which revealed a significant increase in ratings during the recession of 1990-1991, followed by a decrease in ratings when the economy recovered.

2.3.2 The Significance of Credit Ratings on Capital Structure

Kisgen (2006) examined the influence of credit ratings on a firm's capital structure decisions, although his focus was slightly different than ours. Kisgen focused on firms that were near a change in rating, and he argued that there are discrete costs (benefits) associated with different credit rating levels. Kisgen (2006) proposed the Credit Rating–Capital Structure hypothesis (CR-CS), which states that credit ratings are important in capital structure decisions. The hypothesis also states that firms will undertake less debt if close to a change in rating. Therefore, the CR-CS hypothesis argues that firms near a change in rating are more likely to undertake debt-reducing activities compared to firms that are not close to a change in credit rating. As previously mentioned, Kisgen (2006) discovered that firms near a rating change issue 1% less debt to equity.

Kisgen (2006) proposed several motives behind the discrete costs and benefits, as well as the evidence that credit ratings affect a firm's capital structure decision. These arguments also support his CR-CS hypothesis:

1. *Regulations on Investments*

   Numerous regulations on financial corporations are, according to Kisgen, directly tied to credit ratings. Cantor and Packer (1994) suggest that credit rating agencies extend financial regulators in overseeing the financial and capital markets. Banks, mutual funds, insurance companies, private pensions and security firms have increased their reliance on credit ratings since the ratings reflect the financial health of the specific firm. For example, many pension funds are not allowed to invest in speculative grade bonds (Partnoy, 1999).

2. *Information Complexity of Ratings*

   Credit rating agencies receive information on a firm's quality and financial health that other public stakeholders may not have. For instance, credit rating agencies may also be specialized in gathering and evaluating information. Therefore they have an advantage in being more reliable in examining a firm's credit rating. In other words, the ratings are based on both public and private information.

3. *Costs Directly Imposed on the Firm*

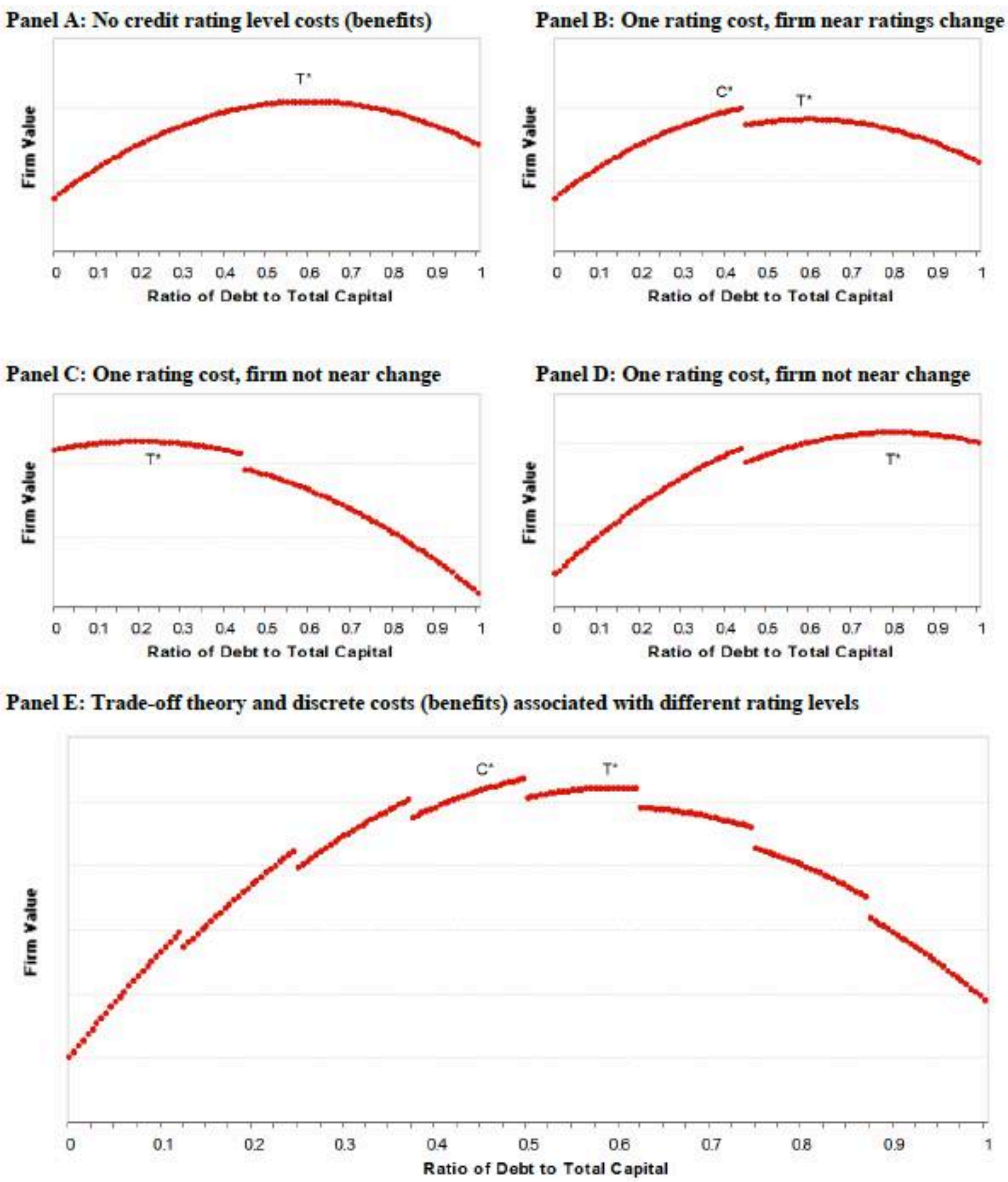
   There are direct costs associated with different rating levels. Firm operations are affected by its credit rating such as access to other financial instruments i.e. commercial papers and bond covenants. These might contain rating triggers, which can cause a forced repurchase or changes in coupon rates (Kisgen, 2006).

2.4 Credit Ratings in the Context of Existing Capital Structure Theories

2.4.1 CR-CS and the Trade-off theory

Kisgen (2006) argued that the CR-CS hypothesis complements the traditional theories of capital structure by explaining differences in leverage from the debt level suggested by the trade-off and pecking order theories. CR-CS states that different credit rating levels are associated with discrete costs (benefits) to the firm. In some cases, the costs related to a rating change may result in a capital structure behavior that differs from what the traditional trade-off theory implies. In contrast to the trade-off theory, CR-CS argues that firms regardless of their credit rating will issue less debt when they are close to a change in credit rating. In other cases, the trade-off theory factors may offset the credit rating concerns, depending on how near the firm is to a credit rating change. Kisgen's arguments are further illustrated in figure 3 A-E.

Figure 3*: *Firm value with trade-off and credit rating effects



Source: Kisgen, 2006, p. 1042

Figure 3 shows the firm value as a function of leverage, and illustrates the balance of costs suggested by the trade-off theory and CR-CS hypothesis. Figure 3A illustrates the situation when a firm does not experience any discrete costs related to their credit rating. T* signifies the optimal capital structure according to the trade-off theory. This is the point where the overall firm value is maximized in the case of no discrete costs (benefits) associated with credit rating changes.

Figures B-E illustrates different situations where discrete costs (benefits) of credit rating changes exist. Panel 3B shows the situation where a firm experiences that the CR-CS factors offset the trade-off theory. In situations where a firm is close to a potential rating change, they will maximize the overall value by issuing less debt relative to equity than the trade-off theory implies, in order to either prevent a downgrade or to obtain an upgrade. T* indicates the optimal leverage level according to trade-off theory factors, while C* shows the new optimum level where the firm value is maximized by including the effect of discrete costs (benefits).

In panels C and D the trade-off theory outweigh the CR-CS hypothesis. The discrete costs will not be considered significant in managers' capital structure decisions if T* relates to a credit rating where the risk of potential downgrade (C) or upgrade (D) is low. Hence, the cost of moving too far from the optimal debt level (T*) by issuing less debt in order to obtain an upgrade will offset the cost of a lower rating. Finally, figure 3E illustrates the discontinuous relationship between firm value and leverage caused by discrete costs for several credit rating levels. In this figure, T* shows the optimal leverage based merely on trade-off theory factors, while C* indicates the optimal level including the effect of credit ratings.

2.4.2 CR-CS and the Pecking order theory

According to the pecking order theory, firms will choose to finance projects with debt rather than equity. This reasoning is based on information asymmetry costs that make equity more costly than debt (Myers, 1984). A company will first prefer to use internal funds when financing investments, then issue debt and as a last resort it will issue equity. Debt increases if the investment costs exceed internal funds, but decreases if the investment costs are less than the available internal funds. Hence, short-term variations in earnings and investments have an effect on short-term leverage. CR-CS argues that because of a credit rating change, a discrete cost (benefit) will be sustained based on a change in the level of leverage. If pecking order and CR-CS costs for some level of leverage are substantial, the cost of issuing equity and the cost of a change in rating will balance each other out. Therefore, in contrast to the pecking order theory, some firms near an upgrade will issue more equity to attain a higher rating. Meanwhile, firms near a possible downgrade may want to issue less debt to avoid the costs associated with a downgrade (Kisgen, 2006).

2.4.3 Further research

Michelsen & Klein (2011) conducted a similar research based on Kisgen's study from 2006. They wanted to refine Kisgen's research and provide a more specific test on the relationship between credit ratings and capital structure. Michelsen & Klein (2011) complemented Kisgen's work by adding S&P's rating outlook as a further representation of a change in rating. By testing companies rated by S&P in the period of 1990-2008, they found that firms with a negative outlook on their issuer rating issue 1.8% less debt than equity in the succeeding year compared to steady firms. A firm's credit rating outlook is affected by their performance and confidence in their future growth. Therefore, performance is a firm aspect that is relevant to examine when studying credit rating changes.

Kemper and Rao (2013) criticize Kisgen's study from 2006. First, they argue that there are other factors that affect credit ratings besides leverage, and mention performance and quality of assets as examples. Therefore companies may use other instruments than leverage to try to affect their credit ratings, like operating cost changes and asset reconstructions. Their findings also give little support to the CR-CS method and conclude that it may only apply to firms with a risk of receiving a speculative grade. Hence, Kisgen's original results seem to be determined by the subsample of firms with very low ratings. The findings of Kemper and Rao (2013) show that firms close to a downgrade issue 0.3% less debt to equity. However, they discuss that firms' financing behavior, when close to a downgrade, can be explained by lack of access to the debt market rather than a deliberate strategic move to strengthen its position and thereby keep a rating. Further, companies near a rating upgrade do not show any changed debt issuing patterns. This result differs from Kisgen's findings.

Kisgen (2009) investigated how changes in credit ratings affect a firm's subsequent capital structure decisions. Kisgen (2009) found that firms whose credit rating gets downgraded subsequently reduce their leverage, while firms that are upgraded subsequently increase their leverage. He further conducted tests to identify the effects of credit ratings, including changes in a firm's leverage, performance and bankruptcy as additional explanatory variables for capital structure behavior. His tests proved that the effect of a downgrade is larger at downgrades to a speculative grade rating, and that rating upgrades do not affect subsequent capital structure activity. Furthermore, he found that downgraded firms issue 1.5%-2.0% less debt to equity in the following year. Kisgen (2009) further introduced the TTCR theory, which is how the trade-off theory and credit rating effects together imply that firms will balance the trade-off benefits of high leverage against the benefits of lower leverage and the discrete credit rating benefits of lower leverage. Although his study is very similar to our focus, we do not put emphasis on his method.

2.5 Credit Ratings in the Context of The Efficient Market Hypothesis

The theory of efficient markets was introduced by Eugene Fama in 1970, and has played a significant role in the area of financial economics. According to Fama (1970) the market's primary role is to allocate the ownership of the economy's share capital, where the prices provide perfect signals for allocation of resources. The prices on an efficient market should at all times fully reflect all available information. This means that, according to Fama (1970), as soon as new information is available the market will react and the stock prices will automatically stabilize at a new equilibrium. A credit rating change would definitely be assumed as new information on the market, which is why it is interesting to examine how this affects the market's valuation of a firm after a rating change.

3. METHODOLOGY

In this chapter we will describe our approach and choice of methodology used in this study. Furthermore, we will explain the sample method and the variables applied in the study.

3.1 Methodological approach

The methodological approach of our study is based on previous research and existing theories, which is why we will take on a deductive approach (Jacobsen, 2002). As our objective is to analyze quantitative data and identify causal relations between credit ratings and capital structure as well as valuation and performance, our study adopts a quantitative approach. A quantitative method is appropriate in research based on measurements of a large sample with the intention of testing a hypothesis (Lundahl & Skärvad, 1999). The aim of this study is to examine hypotheses to determine the effect on capital structure and also apply his method on valuation and performance, based on a sample of data from 77 firms, which is why a quantitative approach is suitable.

Some criticism has been directed against research based on a deductive approach. Jacobsen's (2002) opinion is that the approach as such may be limiting and contains an imminent risk of neglecting important information and data. There is a possibility that our sample is too small or includes too few variables, which might limit our results. To avoid the problem, we have conducted a thorough review of previous research and work closely related to existing theories. We have also used reliable sources to support our study.

3.2 Reliability and validity

3.2.1 Reliability

Reliability is of high importance in all scientific studies and replicability is a concept that is often related to reliability. This implies that the results or findings from an investigation should, provided high reliability, be exactly the same if the study was carried out again (Bryman & Bell, 2007). Reliability is also about making sure that the results are not being influenced by errors in the sample such as irregular data, outliers and temporary or random differences (Lundahl & Skärvad, 1999; Bryman & Bell, 2007).

To increase the reliability in our investigation we have been careful in the choice of which sources to use in the data collection. We have used trustworthy and, in the context of corporate finance, recognized sources such as S&P Capital IQ and Thomson Reuters Eikon to gather our information. Both databases are used regularly by academic researchers as well as by professional practitioners in the field. Using these databases was considered necessary to access the information required for this study. The financial data that is gathered from Capital IQ and Eikon is derived from financial information from the individual firms. This means the data is reliable and has been reviewed and approved by auditors. As a consequence we believe there is a high reliability in the data collected.

We are well aware that even these sources contain a risk of having errors in the data, which is why the reliability of this research has been strengthened in several ways. First we chose a time period of five years (2009-2013) in order to extend the scope of data and minimize the irregularity of information available. Finally, our sample of firms included in the study is shown as a compilation in *Appendix 1* in order to increase the ability of replication.

3.2.2 Validity

In addition to high reliability, a high level of validity is of great importance when doing research. Bryman & Bell (2007) argue that the validity of a research might be of even greater importance than the reliability. Validity can be described as the extent to which the method applied in the study measures what it is supposed to measure (Bryman & Bell, 2007). Furthermore, validity can be defined as the absence of systematic errors in the measurements (Lundahl & Skärvad, 1999). Lundahl & Skärvad (1999) distinguishes between two different types of validity: internal and external validity. Internal validity exists when there is a causal relationship between the variables being measured. This means that the proposed independent variable is the variable causing the changes in the dependent variable (Bryman & Bell, 2007). The financial ratios we are using are well developed and thereby supports that our research has a high internal validity. External validity, on the other hand, concerns the results and whether they can be generalized beyond the particular context being researched (Bryman & Bell, 2007). We developed thorough sample criteria in order to present a true and meaningful depiction of the S&P 500 list. The S&P 500 list consists only of large cap firms, which can be a disadvantage when examining credit ratings since most of these firms have a high credit rating. Although we believe our sample represents the US market well, we recognize the difficulties in generalizing results.

3.3 Sample and sampling method

As basis for our sample we used all companies listed on S&P 500. The S&P 500 list consists of 500 large cap firms that are all traded on US stock markets. The years of 2009-2013 were chosen as the time period of our study since we wanted an up to date analysis that had not yet been researched. The elimination process of companies contained criteria listed in figure 4.

Figure 4: *Sampling procedure*

First step	Second step	Third step	Fourth step	Fifth step	Sixth step
Selected all firms present on S&P 500 rated in the period of 2009-2013 → 500 firms	Excluded financial corporations, a total of 87 companies excluded → 414 firms	Excluded firms not relevant because of a takeover, merger or delisting, a total of 31 companies excluded → 383 firms	Excluded firms not rated during all the years of our analysis, a total of 76 companies excluded → 307 firms	Excluded firms with headquarters outside the US, a total of 5 companies → 302 firms	Excluded firms that did not undergo a Broad rating change between 2009-2013, a total of 225 companies → 77 firms

First, we selected all current as well as historical S&P 500 corporations in the period of 2009-2013. A period of five years gives us enough basis to draw safe conclusions and limit the effect of the financial crisis, as this could give misleading results. If we had chosen a longer period, we would risk losing a large number of observations in our sample since the companies need to be rated during the whole time period. Second, we excluded all financial corporations on the S&P 500 list from our sample. We eliminated all financial corporations because their capital structure usually differs substantially from other sectors in our sample. This could have led to misleading results in our regressions. Companies that had been acquired, merged or delisted during the period of our analysis were also excluded from our sample, since including them could have given a double listing of firms. After, we eliminated all firms that had not been rated throughout the entire time period of our study (2009-2013), based on the information accessible from Thomson Reuters Eikon. This was done since we wanted to include all years in our analysis. Later we excluded companies exchanged on US stock markets, but with headquarters in a foreign country. Our aim is to study US firms, which makes our sample more homogeneous since these companies follow the same federal regulations. Finally, we eliminated all firms that did not experience a change in their Broad rating during the years we have examined. This resulted in a final sample of 77 US firms.

3.3.1 Descriptive statistics of final sample

All the companies in our final sample are presented in *Appendix 1*. Table 2 below illustrates the distribution of the sample firms' credit ratings in the period 2009-2013. The majority of the firms, 291 firm-years (76%), are categorized by an investment grade rating, and none of the firms in our sample have a lower credit rating than B- (with one exception in 2009). This is probably due to the fact that all the firms are large corporations from the S&P 500 list, which mostly includes stable, profitable companies. An interesting observation is that the firms' credit ratings have a tendency to move closer towards the middle of the credit rating scale during the five-year period, indicating that the firms' credit ratings become more alike.

Table 2: *Firms' rating changes*

Firm's Credit Ratings						
Credit Rating	Year					Firm years
	2009	2010	2011	2012	2013	
AAA	0	0	0	0	0	0
AA+	0	0	0	0	0	0
AA	1	1	1	1	0	4
AA-	5	5	4	2	2	18
A+	3	2	2	4	5	16
A	9	8	5	3	2	27
A-	9	9	15	19	23	75
BBB+	15	16	16	18	12	77
BBB	9	10	6	4	9	38
BBB-	5	2	5	9	15	36
BB+	10	12	14	11	3	50
BB	3	4	4	4	4	19
BB-	4	3	2	1	1	11
B+	2	2	3	1	1	9
B	1	2	0	0	0	3
B-	0	1	0	0	0	1
C/CCC	1	0	0	0	0	1
Firm years	77	77	77	77	77	385

In table 3 below, the sample firms are divided into each sector according to S&P 500's industry classification. The most represented sector is Consumer Discretionary, with 27% share of the sample, followed by Information Technology with 17% share. Although firms in the Utilities and Energy sectors have a slightly different capital structure than the rest of the firms in our sample, we include these sectors, as the hypotheses tests will still be strong (Kisgen, 2009; Michelsen & Klein, 2011). Hence, in order not to further restrict the size of our sample, we include these in our regressions.

Table 3: *Industry classification of all firms in the sample*

Sector Classification	Nr. of Firms	Share of Sample
Consumer Discretionary	21	27%
Consumer Staples	6	8%
Energy	4	5%
Health Care	10	13%
Industrials	10	13%
Information Technology	13	17%
Materials	4	5%
Telecommunications	2	3%
Utilities	7	9%
Total	77	100%

3.4 Definitions of variables

This section seeks to define the variables that are used in the regressions of this study. The variables presented below commonly recur and will therefore be explained first. The values we have used are based on book values, since these are the values S&P uses in the rating processes (2008). Book values also more directly reflect managerial decisions (Kisgen, 2006). The financial information is collected from S&P Capital IQ.

- TA_{it} *= the book value of total assets for firm i at time t*
- D_{it} *= book long-term debt and book short-term debt for firm i at time t*
- ΔD_{it} *= long-term debt issuance minus long-term debt reduction for firm i, corrected for changes in current debt in period t to t+1.*
- E_{it} *= book value of total equity for firm i at year t*
- ΔE_{it} *= changes in firm i's total equity during t to t+1, i.e. sale of common and/or preferred stock minus purchases of common and/or preferred stock for the same period*
- $EBITDA_{it}$ *= Firm i's Earnings Before Interest, Taxes, Depreciation and Amortization for year t*
- MtB_{it} *= market-to-book value for firm i at time t*
- ROA_{it} *= return on asset for firm i at time t*

3.4.1 Dependent variables

Three separate regressions with different dependent variables will be conducted.

(1) *NetDIss*

As a measure of the firm's capital structure decisions given its level of credit rating, we used a variable defined as the amount of net debt and net equity acquired throughout the year, divided by the firm's total assets at the beginning of the year.

$$NetDIss_{it} = \frac{(\Delta\, D_{it} - \Delta\, E_{it})}{TA_{it}}$$

More specifically, net debt issuance is identified through measuring the yearly change in the firm's total debt. Similarly, the change in total equity is calculated through measuring the total change in equity throughout the period, including aspects of minority interests for the firms where this is applicable. The dependent variable therefore shows the firm's directly subsequent capital structure behavior after the measured credit rating situation. This means that we have managed to measure the managers' direct activities linked to capital structure decisions, similar to the measurements in the studies of Kisgen (2006; 2009). Further, it is also in line with the CR-CS and TTCR hypotheses, which predicts the capital structure decisions based on the previous credit rating.

Some potential consequences regarding the dependent variable, which might complicate the tests, should be proposed (Kisgen, 2006). First, capital structure decisions might be influenced by the fact that debt and equity issuance are associated with transaction costs. Second, the capital structure decision process has a time lag, meaning there might be a difference in time between making the decision and the execution of it. Third, credit ratings might change any time of the year, not only in the end. In this case, the credit rating from the beginning of the year may be inaccurate.

(2) △*MtB*

In the next regression we want to measure if a rating change might affect an aspect of the firm that can be more difficult for managers to influence. In this case we wanted to see how a change in Broad rating affects the market value of a firm. The market-to-book ratio has a direct connection to the valuation of the firm and its share price, and it is therefore suitable to examine the relationship between the market-to-book ratio and credit rating changes. As dependent variable we used a measure of the change in the market-to-book ratio (△*MtB*) during the subsequent period after measured credit rating situation.

$$\Delta\, MtB_{it} = \frac{(MtB_{it} - MtB_{it-1})}{MtB_{it-1}}$$

The Market-to-Book ratio relates the market value of a firm to its book value (Ogden et al, 2003). When the market value is high, relative to the book value, the market believes in the future of the company. This should be coherent with a higher credit rating. The dependent variable more specifically measures the relative increase or decrease in the ratio during the period after the firm's given credit rating situation.

(3) $\triangle ROA$

In our last regression we aim to investigate if there is a significant relationship between a Broad rating change and the firm's performance. As a measure of this we used the return on asset ratio and calculated the change ($\triangle ROA$) during the subsequent time period after the measured credit rating situation.

$$\triangle ROA_{it} = \frac{(ROA_{it} - ROA_{it-1})}{ROA_{it-1}}$$

Return on assets indicates how profitable the firm is in relation to its assets and is further a good indicator of how efficient management is at using the firm's assets to generate earnings (Ogden et al., 2003).

The consequences proposed regarding the dependent variable measuring the firm's capital structure decisions might also affect and complicate the latter regressions. Regarding the change in the firm's market value, the time lag might be smaller following a rating change. The market reacts on new information, i.e. a firm's new rating, which will be reflected in the share price. In situations where the rating changes during the year, the previous rating will be inaccurate. For the performance of a firm, measured through changes in $\triangle ROA$, there might also be a time lag. A rating change in the middle of the year implies the same as for the ones previously discussed. Finally, transaction costs might also have an impact on the firm's performance in real life.

3.4.2 Descriptive variables

The descriptive variables help explain the behavior of the dependent variable. In economic research the dependent variable is most commonly explained by several independent variables. This explains the relevance of the multiple regressions, taking into account the influence of more than one factor (Gujarati & Porter, 2010). However, even if we use a multiple regression it is not possible to measure all possible factors that in reality affect the dependent variable and the regression still explains a simplified situation.

Our aim is to test whether a change in credit rating affects the capital structure and other aspects such as the firm value and overall performance. The credit rating is not the only variable that describes the behavior of these figures and it is therefore necessary to use a multiple linear regression and add more explanatory variables. The descriptive variables in our study are a set of dummy variables as well as a set of control variables. These will be presented below.

3.4.2.1 Dummy variables

A dummy variable is used when the data does not fit in ratio or interval measurements. The dummy has a value of either 0 or 1, depending on whether a trait is present or nonexistent (Weiers, 2011). Our analysis includes three dummy variables, which indicate if a credit rating has changed or not during the immediately preceding period. The first, CR_{change}, indicates a change of any type. CR_{up}, on the other hand, shows whether a company has experienced an upgrade. Finally, CR_{down} indicates if the companies have faced downgrades. All three dummies take on the value 0 for the years where no rating change has been conducted, while 1 is given if there has been an upgrade or downgrade, respectively. The change can be either a Broad rating change from speculative grade to investment grade or the reverse, as well as Broad rating changes within the speculative and investment grade areas. As mentioned earlier, however, only firms that undergo a Broad rating change during the time period are included in our sample. Recall, that we use S&P's long-term domestic issuer credit rating as base for this study and the dummy variables describe the credit rating level for each firm in the beginning of each period. The dependent variable represents the following 12-month period in order for it to be possible to measure effects.

3.4.2.2 Control Variables

As mentioned above, the dependent variable is in reality not only affected by the independent variables identified in this study. Therefore, a number of control variables will be included. Kisgen (2006) as well as Michelsen and Klein (2011) used control variables measuring firm size, firm profitability and book leverage. These are firm-specific factors that help to identify the effect of credit rating changes on capital structure decisions, firm value and performance, respectively. Using the same control variables that have been used in previous research in our regressions will give us the possibility to compare our results to them.

(1) *SIZE*:

Several studies have shown that firm size is an important factor to a firm's credit rating (Horrigan, 1966; Ogden et al, 2003). A large company indicates a strong market position as well as economies of scale and the risk of default decreases (Ogden et al., 2003). This means, that larger firms are less likely to default and therefore it is natural for us to include size as a control variable in our regressions. To measure *SIZE*, we have used total assets and logarithmized the values in order to make them look normally distributed. Otherwise they would not be comparable to the other variables (Brooks, 2008; Gujarati & Porter, 2010). Because of the reduced risk of default, we expect the coefficient of *SIZE* to be positive in *NetDIss* regressions. Hence, larger firms, with lower probability of distress, issue more debt in relation to equity (Kisgen, 2006). In the other regressions, $\triangle MtB$ and $\triangle ROA$, we find it likely that the coefficient will be positive as well, because of the previously mentioned advantages firm size emphasizes; economies of scale and the strong market positions (Ogden et al, 2003).

$$SIZE_{it-1} = ln(TA_{it-1})$$

(2) *PROF*:

The profitability of a firm is measured as the earnings before interest, taxes and depreciation/amortization (EBITDA) and put in relation to the firm's total assets. The value of this measure depends to a large extent on firm characteristics. Firms in our sample are from the S&P 500 list, meaning they are considered big, profitable and relatively stable. However, there might be significant differences between distinctive markets as well as in between different industries. With Kisgen's (2006) work in mind, we expect a positive coefficient for *PROF* for the *NetDIss* regressions. He suggests more profitable firms to be more hesitant to raise equity. Since we, similar to Kisgen (2006), also have US firms in our sample, it is likely that *PROF* will show the same behavior. Regarding our other regressions, we expect *PROF* to show a positive relationship with changes in $\triangle MtB$ and $\triangle ROA$. This is because an increase in profitability works as positive information, which in turn leads to a positive reaction in the market (Fama, 1970). We are well aware that $\triangle ROA$ and *PROF* might measure similar aspects, however the relation between the two variables will be tested in a correlation matrix to determine if *PROF* can be used as control variable on $\triangle ROA$.

$$PROF_{it-1} = \frac{EBITDA_{it-1}}{TA_{it-1}}$$

(2) *BL*:

Book Leverage is measured as total debt over total assets and describes the leverage situation in firms at the time for the measured credit rating. We expect the coefficients for *NetDIss* to be negative for *BL* because firms that already have high debt levels tend to issue less net debt in relation to net equity (Kisgen, 2006). Since *BL* and *NetDIss* might measure similar aspects, we will test the correlation between the two variables in a correlation matrix. Further, we expect *BL* to have positive coefficients in $\triangle MtB$ and $\triangle ROA$ since a higher book leverage brings advantages such as lower cost of capital and tax shields, which increases both market value and return on assets (Ogden et al., 2003).

$$BL_{it-1} = \frac{D_{it-1}}{TA_{it-1}}$$

3.5 Econometric techniques

To empirically examine the hypotheses in our study, several multiple regressions will be conducted. A multiple regression analysis is an examination of the relationship between the dependent variable and a set of two or more independent or explanatory variables. The regression estimates a linear relationship, including an error term (ε_{it}), allowing for the fact that the relationship is inaccurate (Weiers, 2011). The multiple linear regression model we use will be as follows:

$$Y_{it} = \alpha + \beta_1 X_{1it} + \ldots + \beta_n X_{nit} + \varepsilon_{it}$$

Where:

Y_{it} is the dependent variable

α is the intercept

β_n is the coefficient

X_{nit} are the independent variables

ε_{it} is the error term

The model presented above is a general model explaining the features of a regression of a pooled sample. In pooled data, the elements are of both time-series and cross-sectional data (Gujarati & Porter, 2010). The data included in our sample is of both time-series and cross-sectional character (Brooks, 2008), where the time-series data refers to the time perspective of our study, a five-year sample period. The cross-sectional data refers to the width of the data (Gujarati & Porter, 2010), here the 77 firms included in our sample. Hence, we will use pooled data by combining the time-series and cross-sectional data dimensions in our regressions. In our model, *i* specifies the particular observation, while *t* indicates the period (year). A special type of pooled data, panel data, is where the same cross-sectional unit, here a firm, is surveyed over time (Gujarati & Porter, 2010). The pooled data regressions used in our study will be estimated with panel analysis, in order to avoid some disadvantages related to pooled data.

The panel data is based on the whole sample period of five years, and the analysis combines time-series and cross-sectional observations. This provides results regressed on between 382 and 385 observations, which is a result of missing values.

3.5.1 OLS Method

The Ordinary Least Squares (OLS) method is used to estimate the regression models and examine the linear relationship between the dependent and the independent variables. The OLS method is the most commonly used method in econometrics (Ramanathan, 2002; Verbeek, 2004). In order for the OLS regression to have minimum variance in the linear estimators, the regression must fulfill a few assumptions. By fulfilling these assumptions, the OLS estimators are Best Linear Unbiased Estimators (BLUE) (Brooks, 2008). The regressions can be considered reliable only if these assumptions are met. The OLS (CLRM) assumptions are further explained below.

The econometrics software program EViews 7 has been used for all regression analyses in this study.

3.5.1.1 CLRM assumptions

In order to prove that the OLS estimators fulfill their desirable properties (BLUE) and that the hypotheses tests concerning the coefficient estimates are validly conducted, the assumptions of the Classical Linear Regression Model (CLRM) need to be fulfilled (Brooks, 2008). The five CLRM assumptions, according to Brooks (2008), are as follows:

(1) The average value of the errors is zero. This means that if a constant term is included in the regression, this assumption will never be violated. If a regression does not include an intercept, and the average value of the errors is not zero, various unwanted consequences can occur (Brooks, 2008). We have included a constant term in all of our regressions and thereby the assumption is fulfilled.

$$\varepsilon(u_t) = 0$$

(2) The assumption of homoscedasticity argues that the variance of the errors is constant. If the errors do not have a constant variance, they are assumed to be heteroscedastic. Further, if the errors are heteroscedastic the variance of the error is the same regardless of the independent variables' value (Brooks, 2008). There are several ways to test for homoscedasticity, which is further explained later in the chapter.

$$Var(u_t) = \sigma^2 < \infty$$

(3) The covariance between the error terms is zero over time or cross-sectionally. That is, it is assumed that the errors are uncorrelated with each other. If they had not been correlated with one another, the errors would be said to be autocorrelated (Brooks, 2008). It is therefore required to do a test of this assumption. To test this we have used the Durbin-Watson test, which is described in section 3.5.3.

$$Cov(u_i, u_j) = 0 \; for \; i \neq j$$

(4) The x_t are non-stochastic. This means that, provided that the regressors are not correlated with the error term, the OLS estimator is consistent and unbiased in the presence of stochastic regressors. If one or more of the explanatory variables are simultaneously correlated with the error term, the OLS estimator will not be consistent. If X_2 and X_3 are nonstochastic, this assumption is automatically fulfilled. Since $E(u_t)=0$, the expression will be zero and the estimator is therefore unbiased (Brooks, 2008).

$$Cov(u_i, x_t) = 0$$

(5) The disturbances are normally distributed. The normality assumption;

$$u_t \approx N(0, \sigma^2)$$

is required in order to conduct single or combined hypothesis tests about the model parameters (Brooks, 2008).

We have included another assumption that Gujarati & Porter (2010) mention as an equally important OLS assumption, multicollinearity. This occurs when two or more of the independent variables are highly correlated with each other. Multicollinearity may cause a problem because it can present abnormal results when testing how well the independent variables describe the dependent variable (Brooks, 2008). The problem appears when the independent variables do not describe enough of the dependent variable (Weiers, 2001).

3.5.1.2 Tests to support the CLRM assumptions

To examine whether our regressions are reliable, it is essential to perform tests to control that they fulfill the requirements. The different tests and results are presented below, and further examined in chapter 4. The test results are shown in *Appendix 2*.

Heteroscedasticity

A problem that can arise in multiple linear regression is heteroscedasticity. This implies that the assumption that the random term should have a constant variable is not fulfilled (Brooks, 2008). In other words, a test of heteroscedasticity shows how well a regression model can predict whether a dependent variable is consistent across all values of the dependent variable. If a high level of heteroscedasticity exists, the OLS-estimation will not show the lowest variance and thereby better estimations will exist (Brooks 2008).

Autocorrelation

The consequences of ignoring autocorrelation when it is present are similar to those of ignoring heteroscedasticity. Therefore, in addition to the test of heteroscedasticity, a test of autocorrelation has been conducted. To test for this we have used the results from the Durbin-Watson test in the EViews regressions. The Durbin-Watson statistic can take on values between 0 and 4. If it assumes a value under 2, it has a negative autocorrelation, while over 2 indicates a positive autocorrelation. Thereby, you want to be as near 2 as possible, which indicates no autocorrelation (Gujarati & Porter, 2010).

Normality test

According to Körner et al (2000) and Weiers (2011), the residuals from the regression need to be normally distributed so that a confidence interval can be created. To test if our regressions hold, we will perform a Jarque-Bera normality test, which according to Brooks (2008) is one of the most commonly applied tests for normality. The Jarque-Bera test uses the property of a normally distributed random variable that the entire distribution is characterized by the mean and variance. Furthermore, the standardized moments of a distribution also include its skewness and kurtosis. Skewness measures the symmetric distribution around the mean, and the kurtosis measures how fat the tails of the distribution are. If the residuals are normally distributed, the histogram in the Jarque-Bera test should be bell-shaped and the Jarque-Bera statistic should not be significant (Brooks, 2008).

Multicollinearity

To control for multicollinearity between the independent variables we apply them to a correlation matrix, which is shown in *Appendix 2*. Here we will accept correlations of up to -0.5/0.5. Another way to check for multicollinearity is to examine the variance inflation factor (VIF) of the variables, however we find it excessive to conduct both in our study (Weiers, 2011).

3.6 Regressions and hypotheses

In section 3.4 we presented an overview and definitions over terms and variables that are used in this study's regressions. The regressions, in full, will also be presented in this section.

The following regressions will be tested:

$$NetDIss_{it} = c + \beta_1 CR_{change} + \phi K_{it} + \varepsilon_{it} \quad \text{(Model 3.1)}$$

$$NetDIss_{it} = c + \beta_2 CR_{up} + \beta_3 CR_{down} + \phi K_{it} + \varepsilon_{it} \quad \text{(Model 3.2)}$$

$$\triangle MtB_{it} = c + \delta_1 CR_{change} + \phi K_{it} + \varepsilon_{it} \quad \text{(Model 3.3)}$$

$$\triangle MtB_{it} = c + \delta_2 CR_{up} + \delta_3 CR_{down} + \phi K_{it} + \varepsilon_{it} \quad \text{(Model 3.4)}$$

$$\triangle ROA_{it} = c + \gamma_1 CR_{change} + \phi K_{it} + \varepsilon_{it} \quad \text{(Model 3.5)}$$

$$\triangle ROA_{it} = c + \gamma_2 CR_{up} + \gamma_3 CR_{down} + \phi K_{it} + \varepsilon_{it} \quad \text{(Model 3.6)}$$

Where:

- $NetDIss_{it}$ = net debt in relation to net equity raised by the firm, scaled to the firm's total assets
- $\triangle MtB_{it}$ = the period change in market-to-book ratio for firm i at time t, consisting of the market value calculated through the number of shares and the outstanding share price relative to book value
- $\triangle ROA_{it}$ = the period change in return on asset ratio for firm i at time t
- CR_{change} = dummy variable for firms that have undergone a Broad rating change; then CR_{change} = 1; otherwise 0
- CR_{up} = dummy variable for firms that have undergone a Broad rating upgrade in the beginning of the period tested; then CR_{up} = 1; otherwise 0
- CR_{down} = dummy variable for firms with a Broad rating downgrade in the beginning of the period; then CR_{down} = 1; otherwise 0
- K_{it} = a set of control variables, presented above, including $SIZE_{it-1}$, $PROF_{it-1}$ and BL_{it-1}

3.6.2 Specification of hypotheses

In the following study, we will test the existing relationship between credit ratings and important aspects for the firm such as managers' subsequent capital structure decisions, markets firm valuation and firms overall profitability. We will test the hypothesis at a 10% significance level.

The first hypothesis ($H_{NetDIss}$) affects firms' capital structure behavior relative the credit rating:

$H_{NetDIss}$: Firms that have undergone a Broad rating change issue more debt in relation to equity compared to firms that did not undergo a Broad rating change.

H_0: $\beta_i \leq 0$ *i = 1, 2, 3*

H_1: $\beta_i > 0$

The next hypothesis ($H_{\Delta MtB}$) concerns market valuation, and are stated:

$H_{\Delta MtB}$: Firms that have undergone a Broad rating change will also experience a change in market valuation.

H_0: $\delta_i = 0$ *i = 1, 2, 3*

H_1: $\delta_i \neq 0$

The last, ($H_{\Delta ROA}$) concerns firms' performance:

$H_{\Delta ROA}$: A Broad rating change will affect firms' performance.

H_0: $\gamma_i = 0$ *i = 1, 2, 3*

H_1: $\gamma_i \neq 0$

3.6.3 Interpretation of regression results

The multiple coefficient of determination (R^2) indicates the proportion of variation in the dependent variable that is described by the explanatory variables (Brooks, 2008). Since there are many elements that influence the choice of firms' capital structure, credit ratings cannot alone explain capital structure decisions. The same applies to the market-to-book ratio in relation to valuation as well as the return on assets ratio in relation to performance. Based on this fact, we expect a low R^2 our regressions. This is also consistent with previous studies on CR-CS (Kisgen, 2006; Michelsen & Klein 2011). Even though we believe that our regression will show a low R^2, previous studies on the CR-CS hypothesis emphasize results showing statistical and economical significance. We therefore believe this will be true for the other regressions as well. Furthermore the R^2 will reflect cross-sectional values of panel data. Thereby we will be able to compare the different companies based on all the respective years.

Regression coefficients explain the effect independent variables have on the dependent variable (Brooks, 2008). Our method is based on the CR-CS hypothesis that expects a negative coefficient for the dummy variables, signifying that the dummies will have a negative effect on the dependent variables. In other words, firms close to a credit change will issue less net debt. However, we want to test whether firms change their capital structure after a change in credit rating and therefore expect a positive coefficient for both our dummy variables in the *NetDIss* regressions.

The effective market hypothesis states that share prices always reflect all relevant information. Since credit ratings reflect firm information the rating will also have an effect on the market value. An increased rating indicates that the rating firm has confidence in the rated firm's future prospect. Hence, we presume that a positive coefficient for our dummies following an upgrade, while a downgrade will result in a negative coefficient in the $\triangle MtB$ regression. The same applies for the $\triangle ROA$ regression since enhanced market confidence in a company can lift future outlook.

The regressions will be tested on a 10% significance level, meaning that the null hypothesis can only be rejected if the p-value for the coefficients falls below 0.10. Each variable is studied, using the p-value, in terms of its statistical significance. The p-value indicates the least significance level that the null hypothesis can be rejected for each coefficient.

4. RESULTS

In the following chapter we will present the results from our regressions. Further, the hypotheses tests and the model of fit will be examined.

4.1 Descriptive results

A summary of the sample statistics is presented in table 4 below. Our final sample consists of 77 companies, which equals 385 firm-years. The table presents the relationship between the firms' credit ratings and debt levels. The means, medians and standard deviations of every Broad rating category are displayed below. If we compare firms with credit rating AA to firms with an A rating, we see that firms with the lower credit rating issue more debt. The same result is evident between firms with credit rating BB compared to B or lower. However, it is not possible to see this relationship throughout the whole sample.

Table 4**:** *Summary of the sample's rating level and firm leverage*

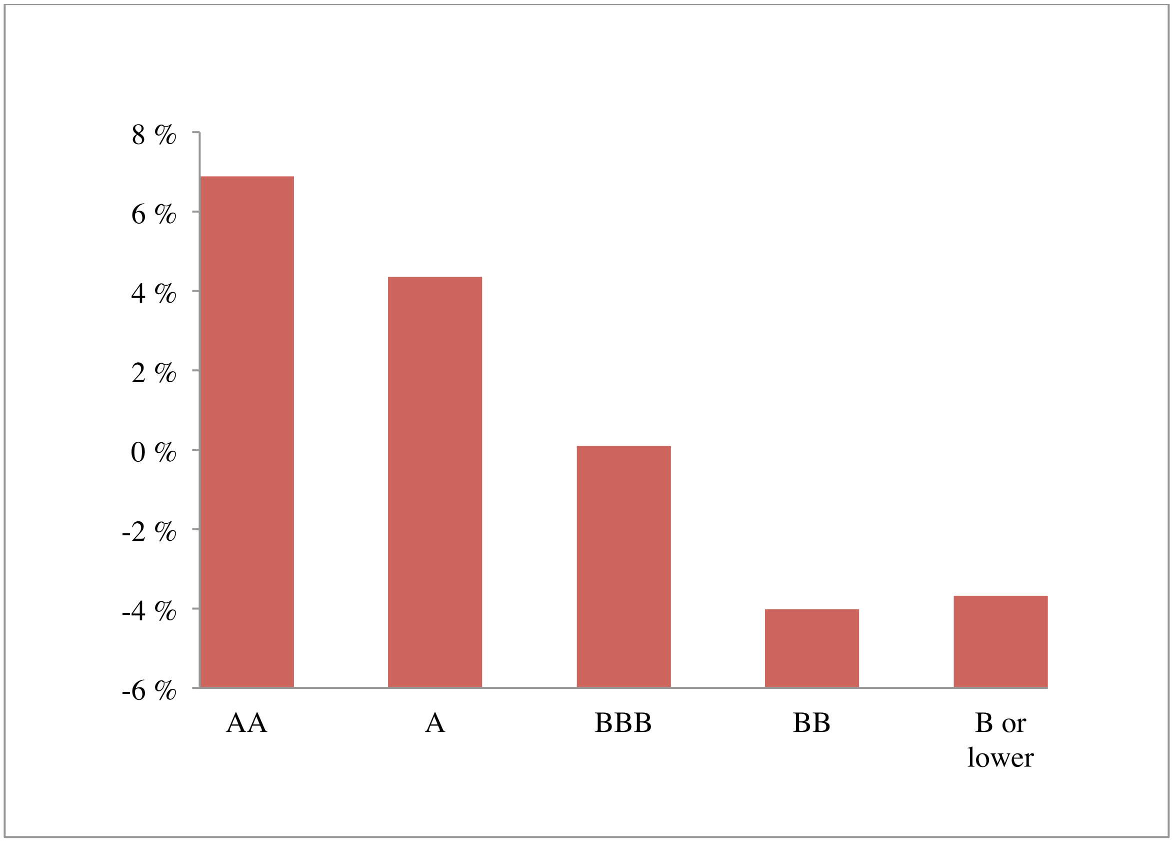
	AA	**A**	**BBB**	**BB**	**B or lower**
Numer of firm-years	22	118	151	80	14
Debt/(Debt+Equity)					
Mean	61,8%	65,5%	61,7%	51,6%	62,0%
Median	61,4%	64,7%	62,1%	53,7%	61,4%
Std. Dev.	12,5%	23,0%	15,8%	15,6%	23,3%

Note: firms with credit ratings followed by (+) or (–) are included in each one of the five Broad rating categories. For example, A+ and A– are both calculated for in category A.

4.1.2 *NetDiss*

Figure 5 shows the relationship between the credit rating and the dependent variable *NetDiss* expressed as mean value for each category. The figure shows an evident relationship: companies with lower creditworthiness, and therefore have a lower rating, issue less debt relative to equity than firms with higher credit ratings.

Figure 5**:** *Average net debt minus net equity per credit rating category for sample, 2009-2013*



Note: firms with credit ratings followed by (+) or (–) are included in each one of the five Broad rating categories. For example, A+ and A– are both calculated for in category A.

4.2 Regression results

4.2.1 Diagnostic testing of the CLRM assumptions

All six regressions are tested for the CLRM assumptions presented in 3.5.2. The first assumption, stating that the average value of the errors is zero, is fulfilled because a constant term is included in all regressions.

By using White standard errors and covariance for the panel data analysis, the heteroscedasticity problems were corrected. Thereby, the second assumption is fulfilled. The third assumption, concerning autocorrelation, was tested using Durbin-Watson. The results from this test showed statistics ranging between 1.22 and 1.95. This implies signs of slightly negative autocorrelation, however it is considered an acceptable level (Brooks, 2008). Assumption five, concerning normal distribution, was tested with Jarque-Bera tests. The results of the Jarque-Bera tests are provided in *Appendix 2* and show that our sample is normally distributed.

Finally, the correlation matrix presented in *Appendix 2* shows the correlations between two variables. The correlations between variables that will not be displayed in the same regressions are not outlined in the matrix. A few correlations slightly exceed our level of acceptance. However, since they lie close to -0.5/0.5 we find our level of multicollinearity acceptable.

4.2.2 Broad rating tests

Table 5 on the following page shows a compilation of the regression results. They are arranged and categorized after each respective regression. The first numbers presented are the variable coefficients, followed by White standard errors in parentheses. The level of significance is shown in bold and in parentheses below.

Table 5: *Regression results*

	NetDIss		*△MtB*		*△ROA*	
	Model 3.1	**Model 3.2**	**Model 3.3**	**Model 3.4**	**Model 3.4**	**Model 3.6**
***Intercept*:**	-0.6439	-0.6438	-1.2725	-1.2222	-0.1443	-0.1852
	(0.2125)	(0.2108)	(1.4492)	(1.4255)	(0.9754)	(0.9600)
	(0.0026)	**(0.0024)**	**(0.3805)**	**(0.3917)**	**(0.8825)**	**(0.8472)**
***CR_{change}*:**	0.0436	-	0.0603	-	-0.1117	-
	(0.0291)	-	(0.1652)	-	(0.1814)	-
	(0.1355)	-	**(0.7155)**	-	**(0.5385)**	-
***CR_{up}*:**	-	-0.0011	-	-0.1219	-	0.0735
	-	(0.0447)	-	(0.0746)	-	(0.1009)
	-	**(0.9806)**	-	**(0.0979)**	-	**(0.4672)**
***CR_{down}*:**	-	0.06773	-	-0.1099	-	0.0427
	-	(0.0405)	-	(0.1097)	-	(0.2347)
	-	**(0.0954)**	-	**(0.3171)**	-	**(0.8556)**
SIZE:	0.0550	0.05577	0.1613	0.1616	-0.0147	-0.0158
	(0.0189)	(0.0191)	(0.1329)	(0.1330)	(0.0762)	(0.0779)
	(0.0040)	**(0.0037)**	**(0.2257)**	**(0.2251)**	**(0.8475)**	**(0.8391)**
PROF:	2.4646	2.4626	-0.6097	-0.6476	0.6492	0.6865
	(0.7748)	(0.7710)	(0.5501)	(0.5427)	(0.7307)	(0.7266)
	(0.0016)	**(0.0015)**	**(0.2684)**	**(0.2335)**	**(0.3749)**	**(0.3454)**
***BL*:**	-0.3750	-0.3809	0.1374	0.1256	0.2167	0.2291
	(0.1403)	(0.1430)	(0.3816)	(0.3807)	(0.31105)	(0.3113)
	(0.0078)	**(0.0081)**	**(0.7190)**	**(0.7416)**	**(0.4865)**	**(0.4623)**
Adj R^2:	0.6148	0.6192	0.0234	0.0222	0.0067	0.0101
F-statistics:	153.8125	122.9305	3.2851	2.7310	0.3650	0.2371
Firm-years:	384	384	382	382	382	382

Note: The results showed in the table are for the pooled sample 2009-2013. The first presented numbers are the coefficients, while numbers in parentheses are the standard errors (corrected for heteroscedasticity using White diagonal standard errors). Numbers in bold and in parentheses shows the probability of significance. Last, the models adjusted R^2 and F-statistics are presented. Firm-years vary since those with missing values of any variable are excluded.

The results in table 5 above are used to test the three hypotheses. The first one, $H_{NetDIss}$, H_0: $\beta_i \leq 0$ and H_1: $\beta_i > 0$ for *i = 1, 2, 3,* is a one-sided hypothesis which can be tested with model 3.1 and 3.2. The null hypothesis (H_0) suggests that firms that have undergone a Broad rating change are indifferent or issue less debt in relation to equity. The credit rating dummy variables coefficients show positive signs for CR_{down} and CR_{change} as predicted, however for CR_{up} the coefficient is negative. Since the β_i for *i = 1, 3* show the predicted signs, we can reject H_0 as long as the one-sided p-values of the credit rating dummy variables are significant. This implies that they must be below the chosen 10 % significance level. Note however, that the p-values in bold and in parentheses above, are the p-values for a two-sided test and therefore not applicable for $H_{NetDIss}$, which is a one-sided hypothesis. The p-values applicable for all the hypotheses are shown in table 6.

H_0 is rejected at the 10% level for model 3.1, but for model 3.2 it cannot be rejected at the 10% level since CR_{up} shows insignificance with a one-sided p-value of 0.4903. However, CR_{down} shows a p-value of 0,0477, which means it is significant at a 5% level. $H_{NetDIss}$ cannot be rejected by model 3.2 since both CR_{up} and CR_{down} must show significance to reject H_0. Also, CR_{up} has a negative coefficient, which is not in line with $H_{NetDIss}$. However, if only CR_{down} is taken into account, H_0 can be rejected at a 5% significance level. This states that firms that have undergone a Broad rating downgrade issue more debt relative to equity.

The results from model 3.1, which are significant at the 10% level, suggest that firms that undergo any type of Broad rating change issue 4.36% more net debt relative net equity compared to firms that do not experience a Broad rating change. Further, the results from model 3.2 suggest that firms that undergo a Broad rating upgrade subsequently issue 0.11% less net debt in relation to net equity in the following financial year compared to firms that do not undergo a Broad rating upgrade. However, this is not significant and can therefore not be confirmed. A Broad rating downgrade instead implies that firms issue 6.77% more debt relative equity the subsequent year after the change, which is significant at the 5% level shown above. Still, H_0 cannot be rejected.

Table 6: *Results of hypotheses tests*

	NetDIss		***△MtB***		***△ROA***	
	Model 3.1	**Model 3.2**	**Model 3.3**	**Model 3.4**	**Model 3.5**	**Model 3.6**
H_0:	Rejected	(Not) Rejected	Not Rejected	Rejected	Not Rejected	Not Rejected
CR_{change}	0,0678	-	0,7155	-	0,5385	-
CR_{up}	-	0,4903	-	0,0979	-	0,4672
CR_{down}	-	0,0477	-	0,3171	-	0,8556

Note: The numbers in the table shows the p-values of the credit dummy variables. For NetDIss regressions (model 3.1 and 3.2) one-sided p-values are presented. For the rest, the table shows two-sided p-values. If respective values fall below the significance level of 10 %, each model's null hypothesis is rejected. For model 3.2 the hypothesis can be rejected according to CR_{down}, however not for CR_{up}.

The second hypothesis, $H_{\Delta MtB}$, H_0: $\delta_i = 0$ versus H_1: $\delta_i \neq 0$ for $i = 1, 2, 3$ is tested with model 3.3 and 3.4. Here, the null hypothesis (H_0) suggests that the market is indifferent with Broad rating changes in their firm valuation. The credit rating dummy variable coefficient shows negative signs for CR_{change}, presented in model 3.3 in table 5, which is in line with our predictions. Contradictory, model 3.4's CR_{up} and CR_{down} presented in the same table have negative coefficients, which was not expected. This means, δ_i for $i = 1$ does behave according to the expectations, but for δ_i $i = 2, 3$ does not. However, the hypothesis is double-sided which allows both positive and negative coefficients regardless of our expectations. The two-sided p-values for model 3.3 and 3.4 in table 6 need to be taken into account.

In model 3.3 CR_{change} has the predicted positive sign of the coefficient but is not significant with a p-value of 0.7155, meaning that H_0 cannot be rejected. On the other hand, in model 3.4 the credit dummy variable CR_{up} shows significance on the 10 % level with a two-sided p-value of 0.0979. The coefficient is negative, which implies that H_0 can be rejected. The model therefore suggests that firms that undergo a Broad rating upgrade will be devalued by the market with 12.19% in the subsequent financial year. CR_{down} on the other hand, also in model 3.4, does not show any significance with a p-value of 0.3171 and therefore does not support the rejection of H_0. Hence, H_0 for the hypothesis $H_{\Delta MtB}$ can be rejected by model 3.4 according to CR_{up}'s significance. In other words, model 3.4 suggests that firms do experience a valuation change (devaluation) when they achieve a higher Broad rating, but not when downgraded.

Since the p-value for CR_{down} is insignificant, the suggested results cannot be confirmed. Had it been significant, it would have implied that firms that were downgraded would be devalued with 10.99%. Model 3.3 suggests that firms that undergo a Broad rating change of any type will increase in market value with 6.0% the subsequent year. Recall, this result did not show any significance either.

The third hypothesis $H_{\Delta ROA}$, H_0: $\gamma_i = 0$ versus H_1: $\gamma_i \neq 0$ for $i = 1, 2, 3$ is tested with model 3.5 and 3.6. The null hypothesis suggests that firms' performance is not affected by a Broad rating change. The dummy variables' coefficients show negative signs for CR_{change}, which is not expected, but has as predicted positive signs for both CR_{up} and CR_{down} in model 3.6. Since this a double-sided hypothesis, we can reject H_0 based on only significance, and we therefore do not have to consider the direction of the coefficients. None of the credit rating dummy variables in the models show significant p-values at any acceptable levels (0.4672; 0.8556; 0.5385). Consequently, we cannot confirm that a Broad rating change affects firms' performance.

If the regressions had shown significance, model 3.5 would have implied that a change of any kind would lower the profitability with 11.17% over the subsequent 12-month period.

Model 3.6, however, implies the reverse relationship, suggesting that firms after a Broad rating upgrade would increase their profitability during the subsequent fiscal year with 7.34%. After a downgrade they would also increase their profitability, but with only 4.27%. This indicates that model 3.6 suggests any Broad rating change to increase firms' performance. Again, none of the models showed significance and therefore the indicated results cannot be confirmed.

4.2.3 Control Variables and Model-Fit

The *SIZE* variable takes on positive coefficients as predicted in both model 3.1 and 3.2 (*NetDIss* regressions). This is significant on the 1% level with p-values 0.0040 and 0.0037 respectively, which indicates that size has a strong positive effect on the net debt relative net equity issuance for firms. For model 3.3 and 3.4 (ΔMtB regressions) the variable shows positive coefficients as well, but for model 3.5 and 3.6 (ΔROA regressions) the signs are negative. However, *SIZE* shows statistical insignificance in the last four models. Further, *PROF* shows positive signs for *NetDIss* and ΔROA regressions, but not for the ΔMtB*'s.* Although, only model 3.1 and 3.2 shows significance with p-values 0.0016 and 0.0015, *PROF* is statistically insignificant in all other regressions. For the last control variable, *BL*, the coefficient is significant only for the *NetDIss* regressions with negative coefficients, but insignificant for the rest with positive coefficients.

Additionally, the model fit for the estimated regressions, which are measured by the adjusted R^2, are 0.6148 and 0.6192 for *NetDIss'* regressions. For the other four regressions the model fit ranges from 0.0101 to 0.0234. Further, the F-statistics show high significance in the *NetDIss* regressions (below the 0.1% level). For ΔMtB, the F-statistics are significant at the 5% level but for ΔROA they are not. Therefore, the F-statistics indicate that there is a strong relationship between the dependent variable and all or some of the explanatory variables for the *NetDIss* and ΔMtB regressions, but not for ΔROA.

5. ANALYSIS

In this chapter we will analyze the results based on the theoretical framework presented earlier in our study. Our aim is to first analyze the effects of credit ratings on capital structure decisions, followed by their effect on other important firm aspects. Finally, we will outline relevant limitations that might have affected our results.

5.1 Descriptive results

The results presented in table 4 show no major differences between companies' credit rating level and the level of debt they carry in their capital structure. One explanation could be that our statistical sample might be too small to show any differences in debt levels between the categories. The first category (AA) includes a total of 22 firm-years, which reflects the debt levels of only 7 companies, which could not be considered representable for the whole category. Another explanation of our result might be the fact that our study is based on large cap firms. These firms are well established and therefore able to take on more debt in either one of the credit rating categories.

Figure 5, on the other hand, suggests that firms with higher credit ratings issue more net debt relative to equity. The reason for this can be that firms with a high rating use their financial strength to issue more debt and thereby change their capital structure. These firms get better terms by issuing debt and therefore the cost will be lower than when raising equity. Firms with lower credit ratings may find equity issuance as the best alternative, though a lower rating will result in higher costs issuing debt and taking on debt might damage their creditworthiness even further. In addition these firms may not have access to debt markets based on their rating.

5.2 Capital Structure

Our first research question addresses whether a change in Broad rating affect a firm's capital structure decisions by issuing more debt. We found a significant relationship between credit ratings and managers' subsequent capital structure decisions. This result has also been confirmed in previous research (Ogden et al, 2003; Kisgen, 2006; Kisgen, 2009; Michelsen & Klein, 2011; Kemper & Rao, 2013). To be able to investigate this relationship, a null hypothesis for $H_{NetDIss}$ was formulated, stating that firms that have undergone a Broad rating change are indifferent or issue less debt in relation to equity. The null hypothesis could be rejected, which confirms that companies that undergo a

Broad rating change will alter their capital structure. More precisely, our results suggest that firms issue 4.36% more net debt relative net equity following a change. Even though not statistically significant, the results from our sample further suggest that an upgrade leads to less debt issuance. These results are consistent with Ogden et al's (2003) who found that downgrades result in an increase of debt issuance in relation to equity whilst upgrades result in decreased debt levels. The lack of significance in our CR_{up} results might depend on the characteristics of our sample.

Kisgen (2009) found that, based on the TTCR theory, firms issue 1.5%-2.0% less net debt when downgraded, which is the opposite of our results. However, Kisgen (2009) found that this was more significant for firms downgraded to a speculative grade, and more relevant for lower ratings. The contradictory results suggested in this study can therefore be explained by our sample consisting of mostly investment graded firms. Our sample firms might not be consistent with Kisgen's (2009) because they may act differently than lower rated firms. The CR-CS hypothesis (Kisgen, 2006) states that firms, regardless of their credit rating, issue less debt when they are close to a change in credit rating. Note that the CR-CS hypothesis is suggested to be true for firms close to being upgraded or downgraded, while our study focuses on actual Broad rating changes. This implies that there may consist discrepancies in our findings compared to Kisgen's (2006). Figure 3C and D shows how the trade-off theory outweighs CR-CS, which supports our results. Kemper and Rao (2013) found that the CR-CS method may only be relevant for examining speculatively rated firms and therefore support our results since our sample consists of mainly higher rated firms.

We could not verify that firms that have undergone a Broad rating change issue more debt in relation to equity for both upgrades and downgrades. However, our results suggest that firms issue as much as 6.77% more debt after a Broad rating downgrade. As mentioned, Kisgen (2009) found a more convincing relationship for downgrades, which implied that downgrades resulted in firms issuing less debt. This means that our result is not consistent with Kisgen's (2009). Again, this can be explained by our sample being too small and containing higher rated and stable firms. Another explanation for the different results might be that large cap firms can act different and issue more debt than the firms Kisgen researched. Note that the issuance of 6.77% more debt after a Broad rating change cannot be generalized and only applies to larger firms in the years that we have examined.

The main theories of capital structure, the trade-off and pecking order theory, can to some extent explain the issuance of debt for firms that have experienced a Broad rating change. The trade-off theory implies that firms increase their value by issuing more debt based on discrete benefits, which is consistent with our results for downgrade. According to the pecking order theory, firms want to issue debt rather than equity, because of the costs associated with raising equity. Our results for downgrade are consistent with this theory since downgraded firms issue more debt to equity. However, the trade-off and pecking order theories cannot explain capital structure decisions after Broad rating upgrades.

5.2.1 Model fit for *NetDIss*

NetDIss can be explained by 61% - 62% by the descriptive variables in the model. In other words, this means that a 61% - 62% of a firm's capital structure decisions can be explained by credit rating changes as well as the financial ratios used in the model. Though this might seem like a low fit, it is in line with previous research. Ogden et al's study (2003) showed a model fit of 67.5%, which is slightly higher than our result. Since there are more factors affecting capital structure decisions than credit ratings and our chosen control variables, our model of fit is realistic. Some of these other factors, like company traditions, industry characteristics and managements' preferences, are difficult or even impossible to measure. Since these and other factors are not taken into account, our model cannot fully explain capital structure decisions. Further, the F-statistics show high significance in the *NetDIss* regression, which shows a strong relationship between the net debt in relation to net equity and all or some of the explanatory variables.

5.3 Other firm aspects; Valuation and Profitability

Our second research question addresses whether a Broad rating change affects other firm aspects like valuation and profitability. Valuation was measured with market-to-book (ΔMtB), while profitability was measured with return on assets (ΔROA).

If the efficient market hypothesis holds, all relevant information is reflected in the market at all times (Fama, 1970). This should mean that a higher credit rating would lead to a higher ΔMtB value, as this provides a positive outlook. This applies to perfect markets, which is not fully applicable for a reality-based sample of firms. Our results for ΔMtB showed significance for a rating upgrade, though it suggested that the market-to-book ratio would decrease with 12.19%. This is not consistent with the efficient market hypothesis since a positive change (i.e. an upgrade) should be valued as positive information on the market and thereby increase the market value. Several different factors can explain our results. First, our sample period is directly following the previous financial crisis. The stock price, which our market value is based on, also reflects aspects that are not firm-specific, like psychological and macroeconomic factors. This supports that the financial crisis might have had an impact on our sample and therefore may have affected the results. Second, because our sample consists of large cap firms we may have developed results that are inconsistent with usual market behavior concerning all types of market capitalizations (i.e. small, mid and large cap firms). When firms reach a certain size, there is a risk that they can become inefficient, however still profitable, and a rating change will in this case not necessarily imply higher market valuation. Also, there are differences in

ΔMtB ratios between sectors (for sample sectors see table 3), which make it difficult to compare all the companies (Ogden et al., 2003).

In addition to valuation, we also considered performance to be affected by credit rating changes. Kemper and Rao (2013) mention that performance, along with other firm aspects, affects credit ratings. Therefore, we wanted to examine whether the reverse relationship also was evident. As presented in our results, we cannot prove a significant relationship between credit rating changes and a firm's performance. Similar to Ogden et al (2003) and Kisgen (2006; 2009), our sample includes firms from several different industries, which again might disturb the results. The profitability varies in different sectors, for example it can be considered to be high in the pharmaceutical sector compared to the consumer goods sector. This may imply that credit rating changes have a significant effect on the performance in some sectors but not in others. Also, in a sector with a very high profitability, the effect of a credit rating change will not have a large effect on their performance.

5.3.1 Model fit for ΔMtB and ΔROA

As expected, the model of fit is low and falls in a range from 1% - 2.5% for the valuation and performance models. We expected a low fit since there are many factors that explain these firm aspects, however we did expect that credit ratings would show significance in both models. The low fit may also be explained by the chosen control variables. They are too few in relation to all factors affecting performance and valuation, and it would be impossible to include all factors in the model. Also, credit ratings are to some extent based on confidential information, which is why it can be difficult to fully explain ratings in relation to valuation and performance. Another reason is that they are affected by firm specific factors and the raters' individual opinion (Horrigan, 1966). For ΔMtB the F-statistics shows significance, indicating a strong relationship between the dependent variable and all or some of the explanatory variables. However, significance could not be confirmed for ΔROA.

5.4 Comparison of firm aspects

Our results suggest that credit rating changes have a greater effect on some firm aspects than others. As expected, the capital structure is more affected than valuation and performance. This is because valuation and performance are affected by so many other factors than credit ratings, for example management preferences and macroeconomic factors. Since the market affects valuation and performance, firms have less control over these aspects than they have on capital structure.

5.5 Limitations

The fact that we have limited our sample to only containing companies listed on S&P 500 entails that the firms are large and most rather successful. Further, this means that the majority of the credit ratings are in the investment grade category, which is a recurring problem that also Ogden et al (2003) experienced. Since companies can decide whether they want to publish their ratings, it may not have helped to examine a larger population.

The sample data was collected from a 5-year period, from 2009 to 2013. Therefore our findings may include events specific for this period. Our sample contained more upgrades than downgrades. As discussed above, the recent financial crisis in 2007/2008 might have an impact on our findings. Firms that were downgraded during the financial crisis may have been upgraded the following years when the economy was stabilized, which in turn might have affected our results.

There might exist some limitations regarding the dependent variables. First, capital structure decisions might be influenced by the fact that debt and equity issuance are associated with transaction costs. Second, affecting all the dependent variables, there may be a time lag between the credit rating change and the effect it has on the financial ratios. Last, credit ratings do not only change in the end of the year, but also during. This means that there is a risk that some of the credit ratings used in the model are inaccurate (Kisgen, 2006).

As previously mentioned, our sample includes several industries. Some financial ratios used in this study are sector-specific, which may have caused noise in our findings. Consequently, the model fit (R^2) might be lower than in research that only examines one sector. Furthermore, differences between industries may cause misleading results, for example the utilities sector has a different capital structure than other sectors. This can result in unwanted insignificance since the sample data is drawn in different directions. However, this is not a study examining specific sectors.

6. CONCLUSION

The final chapter will present the conclusions of our study, in addition to suggestions for further research within the field.

6.1 Concluding remarks

This study examined whether a change in Broad rating has an impact on capital structure decisions, valuation and firm performance of US firms. We conducted a study that extended the scope of previous research, with background from mainly Ogden et al (2003) and Kisgen (2006; 2009), in addition to main theories and other relevant literature within the field. Our expectations were that credit rating changes had an effect on firms' capital structure decisions, and to some extent an impact on valuation and firm performance.

We found that firms do change their capital structure by issuing more debt after a downgrade, however we could not confirm the same for upgrades. Our results indicate that credit rating changes do not have a large impact on valuation and performance. These results can be explained partly because our data sample includes firms from different industries. Had we chosen to analyze only one sector, the results would probably have shown a stronger relationship since yield levels are valued differently between industries, which in turn is reflected in stock prices and market response. However, the main reason is that many other factors affect valuation and performance that credit ratings alone cannot explain the behavior of these aspects.

We believe that the financial crisis can be another explanation for our results, since the market did not function properly. Thereby investors may have been prevented in following credit rating changes when investing due to economical barriers. Many firms were also downgraded during the financial crisis and later upgraded when the economy recovered. This can be an explanation to why our sample includes more upgrades than downgrades.

The CR-CS and TTCR hypotheses are not suitable for investment graded firms according to our results. Furthermore, our results indicate that the trade-off theory outweighs the CR-CS hypothesis.

6.2 Suggestions for further research

Several new research questions and potential approaches have come to our attention. Our suggestions for further research are as follows:

As previously mentioned in our analysis, the final sample of this study might be too small to show any significant results. Therefore, it would be interesting in further research to choose a larger sample (i.e. all firms rated by S&P) to see if it is possible to achieve more significant results. Then, it would also be possible to examine if firms react differently to Broad rating changes depending on whether they are investment or speculative graded firms.

A way to further examine the topic of credit ratings' effect on firms' capital structure decisions and other financial ratios would be to apply the same empirical framework on mid cap firms. Since these firms are smaller and according to our study have less debt in their capital structure, the results would probably be more significant compared to when just investigating large cap firms. By doing this it would also be possible to compare the findings to our study.

Another suggestion would be to apply the same empirical set-up but using a different credit rating agency (i.e. Moody's or Fitch) to investigate if there are any differences between the impacts of rating considerations between the agencies.

As an extension of this study, it would also be interesting to investigate large cap firms in other markets, such as the Asian, with the same empirical set-up to see if the results support our findings. This would make it possible to compare emerging markets with established markets.

7. REFERENCES

Published sources

Brooks, C, (2008). *Introductory Econometrics for Finance*, 2nd edition, Cambridge University Press

Bryman, A. & Bell, E. (2007). *Business research methods*. Oxford, Oxford University Press

Cantor, R. & Packer, F. (1994). *The credit rating industry.* Federal Reserve Bank of New York Quarterly Review, 19, pp. 1-26

Fama, E. F. (1970). *Efficient Capital Markets: A Review Of Theory And Empirical Work.* The Journal of Finance, vol. 25, pp. 383–417

Fama, E. & French, K. (2002). *Testing trade-off and pecking order predictions about dividends and debt*. The Review of Financial Studies, vol. 15, 1-33.

Fisher, L. (1959). *Determinants of Risk Premiums on Corporate Bonds*. Journal of Political Economy, vol. 67, nr. 3, pp. 217-237

Graham, J. R. & Harvey, C. R. (2001). *The theory and practice of corporate finance: evidence from the field*. Journal of Financial Economics, vol 60, pp. 187-243

Grunert, J., Norden, L. & Weber, M. (2005), *The role of non-financial factors in internal credit ratings*, Journal of Banking & Finance, Vol. 29, Nr. 2, s. 509-531.

Gujarati, D. N. & Porter, D. C. (2010). *Essentials of econometrics*, New York, McGraw-Hill

Güttler, A. & Wahrenburg, M. (2007). *The adjustment of credit ratings in advanced of defaults.* Journal of Banking & Finance, vol. 31, nr. 3, pp. 766

Horrigan, J. O. (1966). *The Determination of Long-Term Credit Standing with Financial Ratios.* Journal of Accounting Research, vol. 4, pp. 44-62

Jacobsen, D. I. (2002). *Vad, hur och varför? – Om metodval i företagsekonomi och andra samhällsvetenskapliga ämnen*. Studentlitteratur AB, Lund.

Kemper, K. & Rao, R. (2013). *Do Credit Ratings Really Affect Capital Structure*? The Financial Review, vol. 48, issue 4, pp. 573-595

Kisgen, D. J. (2006). *Credit Ratings and Capital Structure.* Journal of Finance, vol. 61, pp. 1035-1072

Kisgen D. J. (2009). *Do Firms Target Credit Ratings or Leverage Levels?.* Journal of Financial and Quantitative Analysis, 44, pp 1323-1344.

Kraus, A. & Litzenberger, R. H. (1973). *A state-preference model of optimal financial leverage*. Journal of Finance, vol. 28, pp. 911-922

Kronwald, C. (2009). *Credit rating and the impact on capital structure. Who knows what: Information on capital markets*. University of Hohenheim.

Körner, S. & Wahlgren, L. (2000), *Statistisk dataanalys.* Studentlitteratur AB, Lund.

Lundahl, U. & Skärvad, P. H. (1999). *Utredningsmetodik för samhällsvetare och ekonomer*. Studentlitteratur, Lund.

Michelsen, M. & Klein, C. (2011). *The relevance of external credit ratings in the capital structure decision-making process*, University of Hohenheim.

Modigliani, F. & Miller, M. H. (1958). *The cost of capital, corporation finance and the theory of investment.* The American Economic Review, vol. 48, pp. 261-297

Modigliani, F. & Miller, M. H. (1963). *Corporate income taxes and the cost of capital: A correction.* The American Economic Review, vol. 53, pp. 433-443

Myers, S. C. (1984). *The Capital Structure Puzzle.* Journal of Finance, vol. 39, pp. 575-592

Myers, S. C. & Majluf, N. S. (1984). *Corporate financing and investment decisions when firms have information that investors do not have*. Journal of Financial Economics, vol. 13, pp. 187-221

Ogden, J. P., Jen, F. C. & O'Connor, P. F. (2003). *Advanced Corporate Finance – Policies and Strategies*. Prentice Hall, New Jersey

Partnoy, F. (1999). *The Siskel and Ebert of Financial Markets?: Two thumbs down for the credit rating agencies*, Washington University Law Quarterly, vol. 77, nr 3, pp. 619-712

Ramanathan, R. (2002). *Introductory Econometrics with Applications.* 5th edition, South-Western

Verbeek, M. (2004). *A Guide to Modern Econometrics*. 2nd edition, John Wiley & Sons Ltd.

Weiers, R.M. (2011). *Introduction to Business Statistics.*7th edition, pp. 606-635

West, R. R. (1970). *An Alternative Approach to Predicting Corporate Bond Ratings.* Journal of Accounting Research, vol. 8, nr. 1, pp. 118-125

White, L. J. (2007). *A New Law for the Bond Rating Industry.* Regulation, vol.30, nr. 1, pp. 48-52

Websites and Databases

Standard & Poor's (2008). Corporate Criteria: Rating Each Issue.
Available online via:
http://www.standardandpoors.com/prot/ratings/articles/en/us/?articleType=HTML&assetID=1245363579119 [Accessed 23rd of April 2014]

Standard & Poor's (2009). Understanding Standard & Poor's Rating Definitions.
Available online via:
http://www.standardandpoors.com/spf/upload/Ratings_EMEA/GeneralCriteriaUnderstandingSandPsRatingDefinitionsJune32009.pdf [Accessed 25th of April 2014]

Standard & Poor's (2014). Standard & Poor's Ratings Definitions.
Available online via:
http://www.standardandpoors.com/ratings/articles/en/us/?articleType=HTML&assetID=1245365752249 [Accessed 23rd of April 2014]

S&P Capital IQ Database

Thomson Reuters Eikon Database

Appendix 1 – Table of sample firms

A
Abbot Laboratories
AGL Resources Inc.
Amazon.com Inc.
AmerisourceBergen Corp
Analog Devices Inc.
AutoNation Inc.
Avon Products

B
Becton Dickinson
Bemis Company
Best But Co. Inc.
BIOGEN IDEC Inc.

C
Campbell Soup
Cardinal Health Inc.
CenterPoint Energy
CenturyLink Inc.
CIGNA Corp.
Cintas Corporation
Comcast Corp.
Computer Sciences Corp.
Cummins Inc.

D
Dentsply International
Duke Energy
Dun & Bradstreet

E
Ecolab Inc.

F
Fidelity National Information Services
Flowserve Corporation
FMC Corporation
Ford Motor

G
Gap
Graham Holdings Company

H
Harley-Davidson
Harman Int'l Industries
Hewlett-Packard
Home Depot

I
Integrys Energy Group Inc.
International Bus. Machines
Interpublic Group

J
Jabil Circuit

L
Lam Research
Leggett & Platt
Lennar Corp.

M
Macy's Inc.
MasterCard Inc.
McKesson Corp.
Medtronic Inc.
Micron Technology
Mohawk Industries
Motorola Solutions Inc.

N
Newfield Exploration Co
Nordstrom
Northeast Utilities

O
Omnicom Group

P
PACCAR Inc.
Pioneer Natural Resources
Pitney-Bowes
Polo Ralph Lauren Corp.
Precision Castparts
Priceline.com Inc.

Q
QEP Resources

R
Red Hat Inc.
Ross Stores

S
SanDisk Corporation
Southwestern Energy
Starbucks Corp.
Starwood Hotels & Resorts
Sysco Corp.

T
Thermo Fisher Scientific
Tyson Foods

U
Union Pacific
United Parcel Service

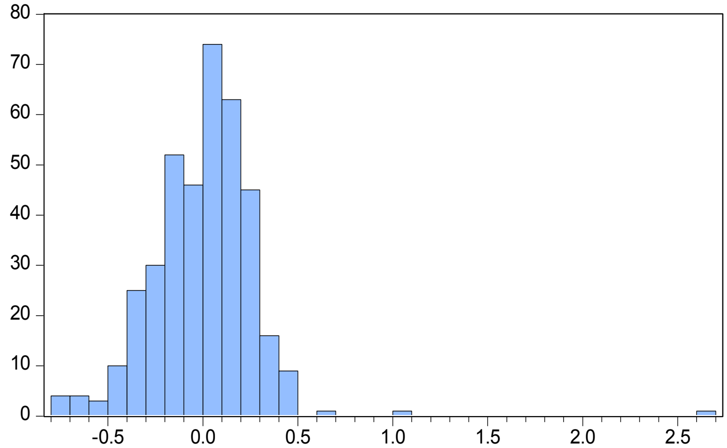
V
Verizon Communications
Vulcan Materials

W
Walgreen Co.
Western Union Co.
Whole Foods Market
Wisconsin Energy Corp.

X
Xcel Energy Inc.

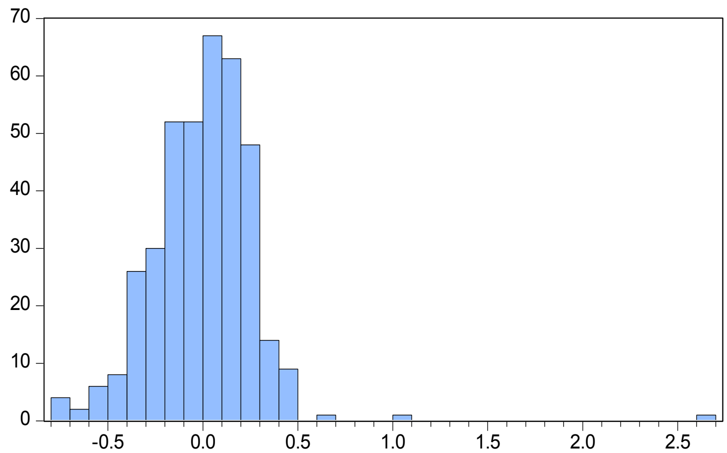
Appendix 2 – EViews outputs of CLRM assumptions

Model 3.1 Jarque-Bera test



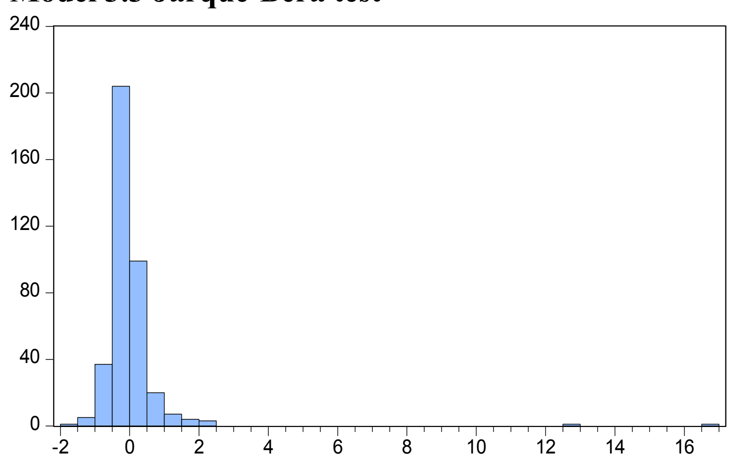
Series: Standardized Residuals	
Sample 2009 2013	
Observations 384	
Mean	2.65e-16
Median	0.022572
Maximum	2.625313
Minimum	-0.751679
Std. Dev.	0.275241
Skewness	2.027589
Kurtosis	23.97054
Jarque-Bera	7299.325
Probability	0.000000

Model 3.2 Jarque-Bera test



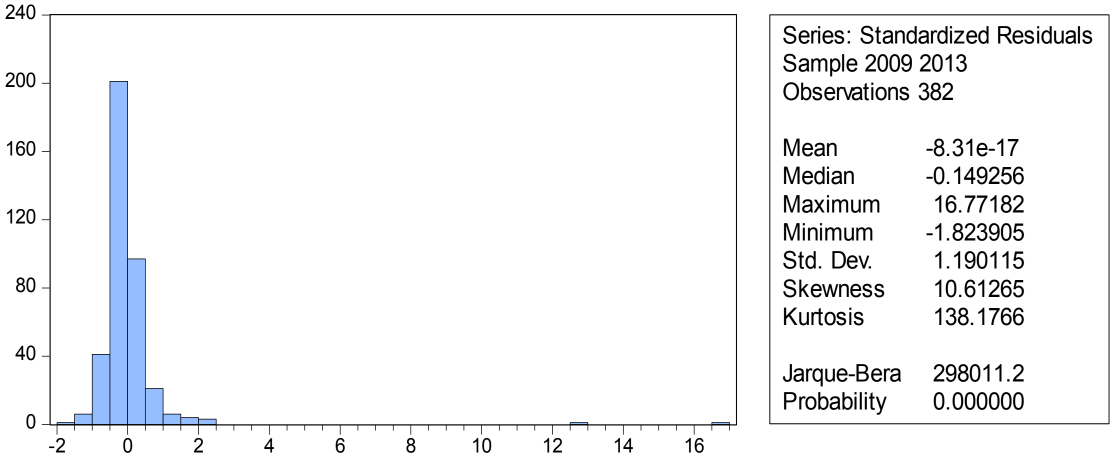
Series: Standardized Residuals	
Sample 2009 2013	
Observations 384	
Mean	3.77e-16
Median	0.015261
Maximum	2.611335
Minimum	-0.753891
Std. Dev.	0.275099
Skewness	2.006593
Kurtosis	23.54953
Jarque-Bera	7014.221
Probability	0.000000

Model 3.3 Jarque-Bera test

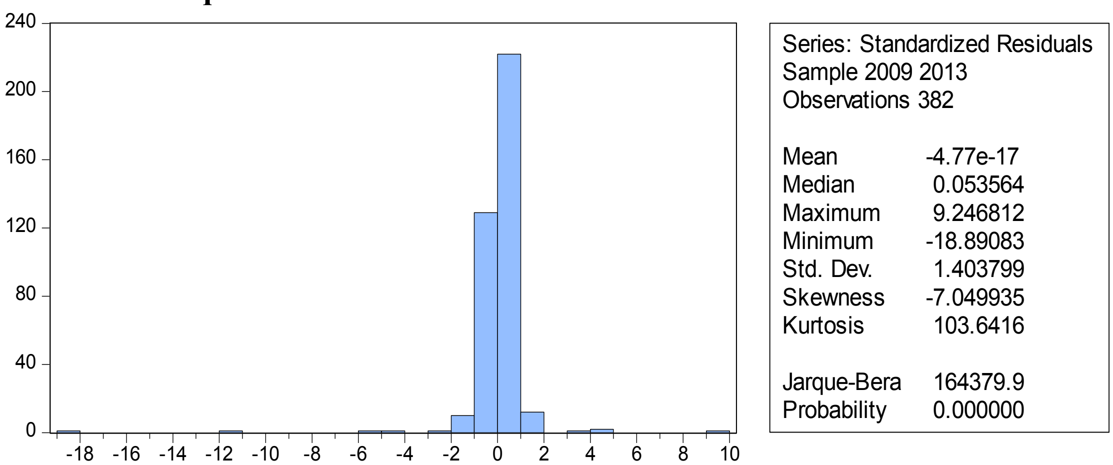


Series: Standardized Residuals	
Sample 2009 2013	
Observations 382	
Mean	-2.32e-16
Median	-0.165302
Maximum	16.81227
Minimum	-1.784786
Std. Dev.	1.190955
Skewness	10.63713
Kurtosis	138.5922
Jarque-Bera	299835.6
Probability	0.000000

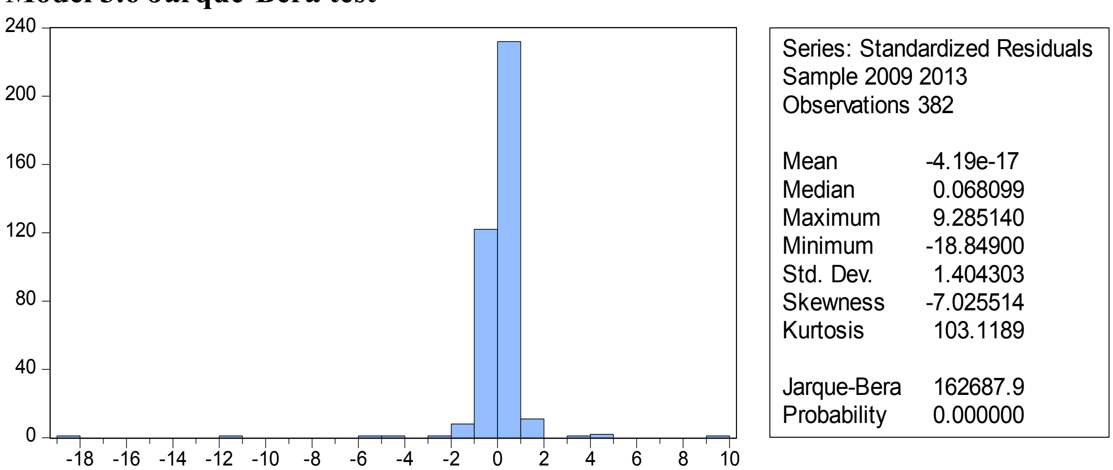
Model 3.4 Jarque-Bera test



Model 3.5 Jarque-Bera test



Model 3.6 Jarque-Bera test



Correlation Matrix

Correlation	*BL*	*C_MTB*	*C_ROA*	*CR_CHANGE*	*CR_DOWN*	*CR_UP*	*NETDISS*	*SIZE*	*PROF*
BL	1,000000								
C_MTB	0.097465	1,000000							
C_ROA	0.002198	-	1,000000						
CR_CHANGE	0.015636	0.030239	-0.036523	1,000000					
CR_DOWN	0.066064	-0.017728	0.006248	-	1,000000				
CR_UP	-0.070091	-0.036354	0.014618	-	-0.049065	1,000000			
NETDISS	-0.546843	-	-	0.004423	-0.013841	0.014300	1,000000		
SIZE	0.249803	0.164942	-0.018434	0.036754	0.007962	-0.009016	-0.098126	1,000000	
PROF	-0.550802	-0.115085	0.041855	-0.054701	-0.067994	0.006565	0.560355	-0.260563	1,000000

Appendix 3 – EViews outputs of regression results

Model 3.1 NetDIss Regression Change

Dependent Variable: NETDISS
Method: Panel Least Squares
Date: 05/23/14 Time: 13:39
Sample: 2009 2013
Periods included: 5
Cross-sections included: 77
Total panel (unbalanced) observations: 384
White heteroskedasticity-consistent standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.643977	0.212529	-3.030064	0.0026
CR_CHANGE	0.043609	0.029155	1.495777	0.1355
SIZE	0.055026	0.018978	2.899456	0.0040
PROF	2.464586	0.774790	3.180972	0.0016
BL	-0.375003	0.140302	-2.672829	0.0078

R-squared	0.618808	Mean dependent var	0.029375
Adjusted R-squared	0.614785	S.D. dependent var	0.445801
S.E. of regression	0.276690	Akaike info criterion	0.281095
Sum squared resid	29.01516	Schwarz criterion	0.332535
Log likelihood	-48.97016	Hannan-Quinn criter.	0.301498
F-statistic	153.8125	Durbin-Watson stat	1.228884
Prob(F-statistic)	0.000000		

Model 3.2 NetDIss Regression Up & Down

Dependent Variable: NETDISS
Method: Panel Least Squares
Date: 05/23/14 Time: 13:26
Sample: 2009 2013
Periods included: 5
Cross-sections included: 77
Total panel (unbalanced) observations: 384
White heteroskedasticity-consistent standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.643826	0.210793	-3.054300	0.0024
CR_UP	-0.001090	0.044689	-0.024387	0.9806
CR_DOWN	0.067726	0.040507	1.671975	0.0954
SIZE	0.055766	0.019080	2.922735	0.0037
PROF	2.462649	0.770982	3.194173	0.0015
BL	-0.380906	0.142981	-2.664036	0.0081

R-squared	0.619202	Mean dependent var	0.029375
Adjusted R-squared	0.614165	S.D. dependent var	0.445801
S.E. of regression	0.276912	Akaike info criterion	0.285269
Sum squared resid	28.98517	Schwarz criterion	0.346998
Log likelihood	-48.77159	Hannan-Quinn criter.	0.309753
F-statistic	122.9305	Durbin-Watson stat	1.223302
Prob(F-statistic)	0.000000		

Model 3.3 MtB Regression Change

Dependent Variable: C_MTB
Method: Panel Least Squares
Date: 05/23/14 Time: 13:47
Sample: 2009 2013
Periods included: 5
Cross-sections included: 77
Total panel (unbalanced) observations: 382
White heteroskedasticity-consistent standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.272473	1.449220	-0.878040	0.3805
CR_CHANGE	0.060265	0.165190	0.364820	0.7155
SIZE	0.161258	0.132885	1.213509	0.2257
PROF	-0.609684	0.550087	-1.108341	0.2684
BL	0.137392	0.381606	0.360036	0.7190

R-squared	0.033681	Mean dependent var	0.243142
Adjusted R-squared	0.023428	S.D. dependent var	1.211533
S.E. of regression	1.197257	Akaike info criterion	3.210945
Sum squared resid	540.4007	Schwarz criterion	3.262587
Log likelihood	-608.2906	Hannan-Quinn criter.	3.231433
F-statistic	3.285079	Durbin-Watson stat	1.213765
Prob(F-statistic)	0.011520		

Model 3.4 MtB Regression Up & Down

Dependent Variable: C_MTB
Method: Panel Least Squares
Date: 05/23/14 Time: 13:44
Sample: 2009 2013
Periods included: 5
Cross-sections included: 77
Total panel (unbalanced) observations: 382
White heteroskedasticity-consistent standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.222244	1.425461	-0.857438	0.3917
CR_UP	-0.121916	0.074575	-1.634805	0.0979
CR_DOWN	-0.109879	0.109693	-1.001698	0.3171
SIZE	0.161593	0.132986	1.215112	0.2251
PROF	-0.647623	0.542694	-1.193349	0.2335
BL	0.125614	0.380675	0.329978	0.7416

R-squared	0.035044	Mean dependent var	0.243142
Adjusted R-squared	0.022212	S.D. dependent var	1.211533
S.E. of regression	1.198002	Akaike info criterion	3.214770
Sum squared resid	539.6386	Schwarz criterion	3.276740
Log likelihood	-608.0210	Hannan-Quinn criter.	3.239355
F-statistic	2.730999	Durbin-Watson stat	1.207115
Prob(F-statistic)	0.019381		

Model 3.5 ROA Regression Change

Dependent Variable: C_ROA
Method: Panel Least Squares
Date: 05/23/14 Time: 13:51
Sample: 2009 2013
Periods included: 5
Cross-sections included: 77
Total panel (unbalanced) observations: 382
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.144324	0.975424	-0.147961	0.8825
CR_CHANGE	-0.111694	0.181409	-0.615705	0.5385
SIZE	-0.014657	0.076152	-0.192466	0.8475
PROF	0.649168	0.730728	0.888385	0.3749
BL	0.216686	0.311051	0.696627	0.4865

R-squared	0.003858	Mean dependent var	-0.076345
Adjusted R-squared	-0.006711	S.D. dependent var	1.406515
S.E. of regression	1.411227	Akaike info criterion	3.539799
Sum squared resid	750.8187	Schwarz criterion	3.591440
Log likelihood	-671.1015	Hannan-Quinn criter.	3.560286
F-statistic	0.365007	Durbin-Watson stat	1.954454
Prob(F-statistic)	0.833515		

Model 3.6 ROA Regression Up & Down

Dependent Variable: C_ROA
Method: Panel Least Squares
Date: 05/23/14 Time: 13:49
Sample: 2009 2013
Periods included: 5
Cross-sections included: 77
Total panel (unbalanced) observations: 382
White heteroskedasticity-consistent standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.185150	0.960016	-0.192861	0.8472
CR_UP	0.073450	0.100933	0.727712	0.4672
CR_DOWN	0.042731	0.234672	0.182088	0.8556
SIZE	-0.015829	0.077891	-0.203225	0.8391
PROF	0.686493	0.726648	0.944739	0.3454
BL	0.229103	0.311376	0.735776	0.4623

R-squared	0.003144	Mean dependent var	-0.076345
Adjusted R-squared	-0.010112	S.D. dependent var	1.406515
S.E. of regression	1.413609	Akaike info criterion	3.545751
Sum squared resid	751.3570	Schwarz criterion	3.607721
Log likelihood	-671.2384	Hannan-Quinn criter.	3.570336
F-statistic	0.237148	Durbin-Watson stat	1.960382
Prob(F-statistic)	0.945967		