

Master Thesis Finance

Credit rating changes and the effect on market leverage

How credit rating changes around the Financial Crisis affect US market leverage



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Abstract

This study investigates the effect of credit rating changes on market leverage, by comparing a pre-crisis (2004-2007) and crisis (2008-2011) sample, to study the effect of this economic crisis. The dataset encompasses all firms having a Standard & Poor's credit rating. The sample consists of 518 downgrades and 679 upgrades. The results show that in the year following a downgrade, in crisis period, downgraded firms significantly reduce market leverage by 3.84% compared to other firms. In the year following an upgrade firms increase their leverage by 2.55% in the pre-crisis sample, and 2.21% in the crisis sample. These results indicate that rating changes significantly influence capital structure behavior, in the pre-crisis and crisis sample.

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Section 1 Introduction

Since the introduction of ratings by John Moody in 1909, corporate managements have been concerned about their credit ratings. Almost all companies with public debt have a credit rating, and so do many private firms (Kisgen, 2007). Most US firms' credit worthiness is evaluated by the three major credit rating agencies (CRAs): Standard & Poor's, Moody's and Fitch, which assign a rating based on their perception of the firm's credit quality. The presence of these agencies suggests that they provide important information to investors, borrowers and creditors (Sufi, 2009). Credit ratings matter to managers and shareholders as it can increase the firm's ability to access the capital market, and it lowers disclosure requirements and capital reserve requirements for investors.

The importance of credit ratings has increased significantly as financial markets have grown massively, became more complex and interrelated. Therefore, a more transparent and objective risk-measure became more valuable. As the market for credit ratings increased, the importance of CRAs' opinions have grown considerably (Gonzalez et al., 2004). The importance of credit ratings has increased significantly as it affects firms' access to and cost of capital, the structure of financial transactions, and the ability for financial investors to make particular investments. Firms, investors, banks, regulators and several more financial parties rely on credit ratings. The CRAs were originally set in place to provide independent ratings about default likelihoods, to limit the duplication effort of financial markets and provide rapid dissemination of important information about companies (Becker & Milbourn, 2011). By providing important pieces of information, which cannot be obtained by the investors, CRAs reduce the information asymmetry between borrowers and lenders. However, as this market grew rapidly, it seemed more complicated to provide the market with accurate ratings as the structure of the industry seems unusual. The industry is dominated by only three CRAs and the issuer-pays-model is the most common used. This created huge conflicts of interest. CRAs have also been criticized of being slow in updating their ratings (Altman & Rijken, 2004; Fons, Cantor, & Mahoney, 2002). When the financial crisis took its course after the sub-prime mortgage bubble burst in 2007, CRAs were accused of assigning too favorable ratings. By disseminating inaccurate ratings (on especially CDOs¹) and reacting slow to information, they took a large role in the sub-prime mortgage market to grow excessively. Once defaults started to hit the market, a lot of value was lost. If the ratings would have been more conservative, the crisis might have been avoided (Strier, 2008).

As the importance of credit ratings becomes clear and how their role affected the 2007-2008s crisis, this thesis tries to provide more insight in how rating changes influenced managers in making capital structure decisions. Some firms take actions to explicitly target a particular rating, while other firms commit to a certain threshold, for example 'investment grade'. To achieve or maintain certain ratings, managers make capital structure decisions by issuing debt or equity, or by selling of assets or cutting down dividends (Kisgen, 2007). Anecdotal evidence is provided by a survey of Graham and Harvey (2001) who show that credit ratings are the second highest concern for CFOs when determining their capital structure. Furthermore, they notice that credit ratings are more important to managers than many factors suggested by traditional capital structure theories (as opposed to tax advantage of interest

¹ Collateralized debt obligation.

deductibility). Generally, managers describe their capital structure policy as getting a target credit rating by making a variety of investment, financing and hedging choices (Hovakimian, Kayhan, & Titman, 2009). However, there are also firms that abandoned their rating targets, with the aim of increasing shareholder value².

In the two most prominent theories about the optimal capital structures, the trade-off and pecking-order theory, credit ratings are not explicitly taken into account. In the trade-off theory, managers maximize value by trading of the costs of bankruptcy and the benefits of debt. Theory has shown that firms tend to move back to an optimal leverage level (Fama & French, 2002). Managers' concerns for credit ratings are due to the discrete costs (benefits) associated with different rating levels. Kisgen (2006) argues that if the rating-dependent costs or benefits are important enough, managers will balance that costs or benefits against the traditional trade-off theory. This may result in managers that make capital structure decisions that move away from the traditional trade-off theory. For the pecking-order theory, where firms generally prefer to use internal funds first, then debt and only issue equity as a matter of last resort, the benefits of a higher rating might make managers issue equity if it outweighs the discrete costs associated with a rating change. Kisgen (2006) shows that before a possible rating change (up- or downgrade), managers issue 1% less net debt rather than equity in comparison with firms not near a rating change. These results persist within previous empirical tests of the pecking-order and trade-off theory. Kisgen (2009) complements his former research by investigating if firms target specific ratings. If firms do target ratings, they will decrease leverage after being downgraded, to retain their rating. His results show that firms reduce leverage by 1.5-2.0% after being downgraded, but respond little to upgrades (as an upgrade is beneficial to the firm). This suggests that firms target minimum rating levels. Because managers care about maintaining a particular rating, rating changes can be seen as endogenous choices.

While Kisgen (2006, 2009) provides evidence about these effects, this thesis extends this research and tries to add insights to the existing literature in a sense that it incorporates the effects of a macroeconomic crisis in capital structure decisions. It tries to determine if these implications also hold during the crisis that started in 2008. I thereby choose the 2007-2008s crisis for two reasons. First, the empirical literature is not yet overloaded with research about the direct effect of credit rating changes on capital structure decisions (to my knowledge, Kisgen is the first to test this direct relationship), which leaves more to contribute to the literature. Second, the consequences of the 2007-2008 crisis are still prevalent in the current state of the economy, so this will add an extra dimension to my study on the effect of rating changes on capital structure decisions.

To examine the effect rating changes have on leverage before and during the 2007-2008s crisis, four hypotheses are constructed. The first two hypotheses examine leverage behavior after downgrades and upgrades before the crisis. The third compares two subsamples pre-crisis (2004-2007) and crisis (2008-2011) to identify if the crisis has an effect on leverage changes after downgrades and upgrades. The fourth hypothesis examines the effects on investment and speculative rating levels in the pre-crisis and

² To give a point of reference: in 1980 there were 32 non-financial AAA rated firms, which dropped to only 7 in 2005.

crisis period. To provide evidence on the constructed hypotheses, the same model is used as Kisgen (2009) and Flannery and Rangan (2006). This thesis focusses on the US and Standard & Poor's ratings, as ratings data are only available for this market and rating agency.

The results indicate that firms are more likely to reduce leverage after being downgraded in the pre-crisis period, as the coefficient is negative, but insignificant. Comparing the pre-crisis with the crisis period, it is shown that during the crisis period, firms significantly decrease their leverage with 3.84% after being downgraded. Looking at upgraded firms, they significantly increase their leverage with 2.55% and 2.21% during pre-crisis and crisis period. For the test at individual rating levels, the results are only significant in the pre-crisis period.

The remainder of this thesis is organized as follows. Section 2 reviews the rating industry. Section 3 provides an overview of the current state of the literature. Section 4 discusses the constructed hypotheses. In section 5 the data, methodology and descriptive statistics are discussed. Section 6 explains the empirical results. Section 7 concludes and is supplemented with limitations and further research.

Section 2 Review rating industry

The last decades, financial markets have grown massively, became more complex and interrelated. This resulted in less transparent markets and therefore the need for some kind of objective risk-measure became stronger. The role of rating agencies comes in to place here. Investors, regulators, banks, bondholders, large pension funds trustees and other financial institutions are using rating-based criteria to constrain financial behavior. Therefore, the opinions of CRAs have grown considerably the last years (Gonzalez et al., 2004). This is also due to the fact that most debt securities that are issued in the US are rated by at least one rating agency (Covitz & Harrison, 2003). CRAs are designated with the task of providing risk-measures and creditworthiness of countries, companies and financial products.

After the financial meltdown, which started with the sub-prime mortgage crisis in 2007 and the collapse of major financial institutions in the preceding years, CRAs were accused of assigning too favorable ratings. By disseminating inaccurate ratings, on especially CDOs, and reacting slow to new information, they took a large role in the sub-prime mortgage market to grow excessively (Benmelech & Dlugosz, 2010). Once these lenders started to default on their loans, these CDOs lost a lot of their value. If the CDOs were rated relatively speculative, the market probably would not have grown that massively and the financial crisis might have been avoided (Strier, 2008). To better understand the CRAs and the market they operate in, this section will provide information about the role CRAs play and the rating industry.

2.1 The role of rating agencies

The primary task of CRAs is to assign credit ratings for issuers and investors of different types of debt obligations. They rate the creditworthiness of countries, companies and financial products. They base their ratings on company's financial statements, management quality, franchise value and its competitive position in the industry, using private and public information and taking a range of macroeconomic and credit conditions in consideration (Gonzalez et al., 2004).

Essentially, CRAs provide two services. First, they provide independent ratings by offering information services about default likelihoods and recovery rates of widely available securities, limiting the duplication effort of financial markets and provide rapid dissemination of important information about companies³. CRAs provide uninformed investors to quickly assess the broad risk properties of companies, countries and securities (Becker & Milbourn, 2011). By providing important pieces of information, which cannot be obtained by the investors, they reduce the information asymmetry between borrowers and lenders. Also liquid markets are promoted and they increase the pool of potential borrowers. Second, monitoring services are provided, whereby issuers are influenced to take actions to avoid downgrades via 'watch'-programs (De Haan & Amttenbrink, 2011). For companies having a rating involves certain benefits. For instance, it gives the firm the ability to access commercial paper and it gives access to

³ In this thesis, ratings are assumed to be independent. However, this is doubted by numerous researchers (Becker & Milbourn, 2011; Benmelech & Dlugosz, 2010).

investors that were otherwise restricted investing in corporate bonds. It also lowers disclosure requirements and capital reserve requirements for investors.

Rating agencies' goal is to provide ratings that display the likelihood of timely and complete payment of debt securities within pre-specified classes. Rating agencies generally use letter scales⁴. Appendix 1 shows the rating classes of the three biggest CRAs; Standard & Poor's, Moody's and Fitch. Their focus is on relative risk of debt securities and not on absolute default probability. Besides that, they focus on long-term developments and do not respond to short-term market fluctuations (Dittrich, 2007). CRAs use information about future intentions and want to provide reliable ratings that do not change every time good or bad news enters the market (Standard & Poor's refer to this as 'prudent rating migration policy'⁵). Altman and Rijken (2004) also provide evidence that CRAs focus on the long term.

The presence of these agencies suggests that they provide important information to investors, borrowers and creditors (Sufi, 2009). Apparently, CRAs create value by reducing information costs in the marketplace. According to Gonzalez et al. (2004), CRAs have on the one hand, the ability to provide information economies of scale, and on the other hand they contribute to solving the principal-agent problem. Issuers of ratings have found it efficient to use ratings as an indicator for initiating and monitoring their transactions. This contributed to the access of borrowers to debt markets, because the investor's pool became broader and adverse selection problems resulting from information asymmetry problems reduced. Ratings also affect the market in solving the principal-agent problem by offering the principal a simple and verifiable rule with low transaction costs⁶, to be able to monitor and constrain the actions of the agent. This rating gives the principal the opportunity to give an incentive for agents to perform well, there it is hard to observe or control their actions.

2.2 Rating industry

As made clear above, the importance of a reliable rating industry seems clear. However, providing the market with accurate ratings seems to be more complicated by the unusual structure of the industry. First, the industry is dominated by only three major players. Their market share is around 95%⁷. Second, CRAs are being paid by the firms that they rate. An obvious conflict of interest arises in their business model here. This unusual structure accompanies conflicts of interest and a phenomenon called rating shopping, which will be discussed in the next sections.

⁴ Standard & Poor's and Fitch use AAA, AA, A, and BBB for investment grade categories, and BB, B, CCC, CC, C, and D for speculative grade rankings. They often add pluses and minuses to modify the rating within a class. Moody's uses Aaa, Aa, A, Baa for investment grade and Ba, B, Caa, Ca, and C for speculative grade. Moody's adds numerical adjustments 1-3, where 1 is in the higher end of the class and 3 in the lower end.

⁵ Standard & Poor's Corporate Ratings Criteria (2006) manual states: "There is no point in assigning high ratings to a company enjoying peak prosperity if that performance level is expected to be only temporary. Similarly, there is no need to lower ratings to reflect poor performance as long as one can reliably anticipate that better times are just around the corner (page 34)".

⁶ Ratings rely heavily on rules and regulations. This allows a principal to use a rating as a simple and verifiable rule with low transaction costs.

⁷ Obtained from SEC Annual Report on Nationally Recognized Statistical Rating Organizations, March 2012.

2.2.1 Conflicts of interest and reputation

During the first half of the twentieth century, ratings were purchased by the investors; they were subscription-based. In the 1970's, CRAs moved to an issuer-based compensation model, where the agencies are being paid by the issuers to publish a rating. Nowadays, this is the most dominant model used in the industry (De Haan & Amtenbrink, 2011)⁸. The issuer-based model creates conflicts of interest because CRAs face a financial incentive to meet the preferences of the issuers so they can build a good relationship with the issuer. However, this goal conflicts with their intention to provide independent and objective credit-risk analysis. Agencies also have an incentive to build and preserve their reputation for being independent and objective, because investors use their ratings and they need accurate ones. Therefore, there is a trade-off for agencies to please individual paying issuers and the need to maintain objective and accurate (Becker & Milbourn, 2011).

According to Hunt (2009), a lot of scholars and the agencies themselves generally believe that the function of CRAs is to issue high-quality ratings, and that the value of a rating agencies business derives from the reputation they build in the market⁹. This reputation can be seen as an asset that produces returns, therefore the term reputational capital. Loss (or fear of loss) of this reputation will (or can) provide agencies with the right incentives. For this reason, the agencies themselves argue that conflicts of interests are not a problem, because they have far more to lose by a decrease in reputation for objectivity than they gain from a single client. However, this argument has less force for structured-finance products, where the market is dominated by only a few agencies that arrange issues (Hunt, 2009). Also Covitz and Harrison (2003) provide evidence that CRAs are not importantly influenced by conflicts of interest, but they are primarily motivated by reputation-related incentives. Hunt (2009) takes it even a step further by stating that policymakers already tried to address problems with ratings by increasing competition, promoting transparency, reducing conflicts of interest and reducing the rating-dependent regulation. These methods fit in the dominant academic theory of 'reputational capital' model, which states that under the right circumstances, a well-functioning reputation mechanism will prevent CRAs from giving low-quality ratings. These solutions to the problems with the industry are designed to make the reputation mechanism work well. However, Hunt (2009) states that the efforts are fundamentally incomplete, because even a well-functioning reputation mechanism will not generate optimum rating quality on new products. He based this idea on the fact that after a new product is introduced, agencies do not have any reputation for high quality on this product and they have nothing to lose on reputation. Even if low-quality for a specific product is harming the agencies reputation on other products, the CRAs will still be encouraged to issue low-quality ratings if the new product is large enough in volume. Mathis, McAndrews, and Rochet (2009) and Bolton, Freixas, and Shapiro (2009) also provide evidence that rating standards will decline when the volume of issuance and revenues are high enough relative to the costs of errors that affects the reputation.

Hunt (2009) and many other researchers believe there are several aspects of the rating market that cause it to perform less well than it could. These consist of conflicts of interest, lack of competition,

⁸ See also: Partnoy (2006), Strier (2008), who also conclude that CRAs have an obvious conflict of interest.

⁹ See also: Schwarcz (2002) and Dittrich (2007).

rating-dependent regulation and absence of transparency. These problems, separately or in combination causes the reputation mechanism to work poorly.

2.2.2 Rating shopping

Another problem that occurred in the rating industry is a phenomenon called ‘rating shopping’, where issuers shop around the CRAs for the highest rating. Fama and French (2002) define rating shopping as: “Rating shopping occurs when an issuer chooses the rating agency that will assign the highest rating or that has the most lax criteria for achieving a desired rating. Rating shopping rarely involves corporate, sovereign and municipal bonds. However, it is common for securitization issues.” They also state that rating shopping has a strong effect when an agency has more lenient standards than its competitor. This might have inflated ratings of structured finance products (Benmelech & Dlugosz, 2010). Rating shopping has been largely appointed as one of the explanations of the poor performance of structured finance products, but there is little empirical evidence that evaluates the effect of rating shopping on quality and performance. Several models are developed where CRAs trade-off the value of inflating its issuers rating against an expected reputation cost (Bolton et al., 2009). Benmelech and Dlugosz (2010) provide suggestive evidence that tranches that were rated by a single agency are more likely to be downgraded, which is consistent with the theory that issuers are shopping for the highest available rating. They also show that tranches that were rated by only one agency (S&P in particular), are more likely to be downgraded and suffer more from these downgrades.

2.3 Conclusions

As can be made clear, the role that CRAs play in the financial market has grown massively the last decade and their presence is significant in the financial marketplace. CRAs are assigned to assess the creditworthiness of countries, companies and financial products. They provide independent ratings and thereby limiting the duplication effort and decreasing the information asymmetry. The rating industry seems rather unusual and incorporates several problems. It has only three big players, there are conflicts of interest and rating shopping played an important role in the industry. For these reasons, CRAs have been criticized a lot.

Section 3 Literature Review

This section will discuss the evidence presented in earlier studies on credit ratings and capital structure. The first paragraph will discuss the importance of credit ratings, the second will discuss traditional capital structure theories. The third paragraph goes in to determinants of leverage, the fourth will discuss credit rating targets and capital structures, the fifth paragraph goes into credit ratings during crisis and the last section provides evidence on leverage during the crisis.

3.1 Importance of credit ratings

Credit ratings are an important consideration in managers' capital structure decisions. According to Hovakimian et al. (2009), a firm's credit rating gives valuable information about its capital structure. A firm's debt ratio, the maturity and priority of its debt and the volatility of cash flows is incorporated. Also, the maturity and seniority structure of its debt and the amount that is on- versus off-balance sheet are included. A survey of Graham and Harvey (2001) suggests that managers care for a particular rating. They provide anecdotal evidence that credit ratings are the second highest concern (after financial flexibility) for CFOs when determining their capital structure. Generally, managers describe their capital structure policy as getting a target credit rating by making a variety of investment, financing and hedging choices (Hovakimian et al., 2009). However, there are reasons to believe that credit ratings may not be an accurate measure of a firm's financial condition. CRAs have been criticized of being slow in updating their ratings (Altman & Rijken, 2004; Fons et al., 2002). Nevertheless, CRAs use information about managements' future intentions and they include hard as well as soft information. So, in some way ratings can be stale, but in other ways ratings can be forward looking in comparison with financial ratios that measure a firm's current leverage. Kisgen (2006) argues that managers' concern for credit ratings is due to the discrete cost (benefits) of a particular rating. The significance of credit ratings for capital structure has three reasons: regulations on bond investments, information content of ratings and costs directly imposed on the firm. They are outlined below.

3.1.1 Regulations on bond investments

Financial institutions' investments in bonds are regulated. These regulations are directly tied to credit ratings. According to Cantor and Packer (1995) virtually all financial regulators rely on ratings, including the public authorities that oversee banks, insurance companies, securities firms, mutual funds and many more. An example of these regulations is that banks are restricted from owning speculative grade bonds (Partnoy, 1999). Due to these regulations, the costs for investors to invest in a particular class of bond are affected. Also, restricting a bond will increase its demand yield. Although a firm may have the same probability of default, it may be required to pay a higher interest rate because of its rating. Regulations may also affect the liquidity for bonds by rating. Firms might face higher interest rates in less liquid markets because of the credit rating. Therefore, they can have incentives to avoid these rating levels. Thereby, at some rating levels (e.g. speculative grade), in bad economic times it might be difficult for firms to raise capital, so firms with that rating incur additional costs, affecting capital structure choices (Kisgen, 2006).

3.1.2 Information content of ratings

As discussed in the previous section, credit ratings provide information on firms that are not observable to investors. CRAs are specialized in information gathering and evaluation processes and might provide more reliable measures of creditworthiness (Kisgen, 2006). De Haan and Amtenbrink (2011) argue that CRAs decrease agency problems and provide rapid dissemination of valuable information. Because ratings contain this kind of information, they signal overall firm quality and they will be pooled with other firms in the same category with similar creditworthiness. Thus, when a firm is rated for example a particular good BB-, it will be in the same pool with a firm that is a bad BB-, because they have the same credit spreads. However, firms near a downgrade (the bad BB-) now have an incentive to maintain the higher rating; otherwise they will be pooled into a lower rating class. This also is also valid for potential upgrades. These potential rating changes should be significant for capital structure decisions (Kisgen, 2006).

3.1.3 Direct costs to the firm

Different rating levels impose direct costs to the firm, because it affects operations of the firm, its access to financial markets and disclosure requirements for bonds and bond covenants. Rating changes can incur costs by, for instance, being charged with higher interest rates. Ratings can affect operations in a way that a firm enters in a long-term supply contract which may require a specific rating. It also affects the access to the commercial paper market. According to Hahn (1993), money market funds, which consist of a significant portion of the commercial paper market, invest almost solely in A1-rated papers¹⁰. Having a lower rating could decrease a firm's access to financial markets.

3.2 Capital structure theory

Modigliani and Miller (1958) demonstrated their capital structure irrelevance theorem. Much research has been done afterwards towards capital structure and capital structure theory. The two most prominent academic theories about optimal capital structure are the trade-off theory and the pecking-order theory.¹¹ They are explained below together with their implication towards credit ratings.

3.2.1 Trade-off theory

The trade-off theory is initially developed by Kraus and Litzenberger (1973) and is a direct result of Modigliani and Miller's irrelevance theory. Fama and French (2002) describe the trade-off theory of capital structure simply by stating that if a firm is maximizing its value, it will meet a trade-off between benefits of debt and the costs of bankruptcy in order to determine an optimal level of leverage. These

¹⁰ Standard & Poor's state there is a strong link between a firm's long-term and its commercial paper rating. Generally, firms with an A+ or A rating receive an A1 commercial paper rating (Standard & Poor's, 2008).

¹¹ Market timing theory is also considered as an important theory (developed by Baker and Wurgler (2002)). It states that managers are indifferent about debt and equity financing and the choice is determined by which market offers the most favorable conditions at the moment the firms needs to raise money. The debt and equity choice of a firm can therefore be seen as an accumulation of historical market timing decisions. There are several papers that find a market-timing trend (Baker & Wurgler, 2002; Welch, 2004), but other papers states that its effect fades away over longer time periods ((Hovakimian, 2006; Leary & Roberts, 2005)). Therefore, this theory is not discussed in this thesis.

benefits are typically the tax-deductibility of interest payments (compared to stock dividends, which are not deductible) and the disciplinary effect debt has on managers to pay out free cash flow (compared to use it on empire building). The costs of debt are indicated as the present value of direct and indirect costs of bankruptcy (Kisgen, 2007). Further, Fama and French (2002) state that a firm will tend to move back to its optimal leverage level¹². Having a particular credit rating is associated with discrete costs or benefits to the firm. Kisgen (2006) argues that if the rating-dependent costs or benefits are important enough, managers will balance that costs or benefits against the traditional trade-off theory. This may result in managers that make capital structure decisions that move away from the traditional trade-off theory, especially when firms are close to getting a downgrade from investment- to speculative grade.

Kisgen's research also shows that higher credit ratings provide benefits to the firm. He does this by looking at both the upper and lower range of ratings boundaries. He shows that firms at the upper and lower boundaries reduce their leverage more than the ones at the middle categories (i.e. between BBB+, BBB and BBB-). He provides evidence that managers indeed reduce leverage more at the upper (to achieve better ratings) and the lower (to prevent downgrade) boundaries. Managers issue approximately 1.0% less net debt rather than net equity annually, in comparison to firms not near a rating change. These results show that credit ratings directly affect capital structure decisions by managers, and it is consistent with the view that managers are concerned with rating-triggered costs (Kisgen, 2006).

3.2.2 Pecking-order theory

The pecking-order theory was originally initiated by Donaldson (1961) and further developed by Myers (1984) and Myers and Majluf (1984). The theory states that firms generally prefer to use internal funds first, then debt and only issue equity as a matter of last resort. They do not prefer equity because of asymmetric information costs and higher information costs (Frank & Goyal, 2003). The pecking order predicts that if a firm has short-term variations in earnings and investment, it will have a strong short-term response of leverage. Hovakimian, Opler, and Titman (2001) provide evidence that the pecking-order affects a firm's capital structure in the short run, but in the long run, firms move towards a capital structure that is consistent with trade-off models. Because credit ratings are an important consideration in capital structure decisions, it implies that a change in leverage induces costs for the firm due to a credit rating change. This theory together with the trade-off theory implies that a firm will face a trade-off between the costs of issuing equity and the costs associated with a potential rating change (Kisgen, 2006). This might in some cases make managers move away from the pecking-order theory and might make managers issue equity if it outweighs the discrete costs associated with a rating change. This applies especially for firms near an upgrade that want to achieve a better rating.

3.2.3 Which is right?

As described, a lot of different theories tried to explain capital structure decisions. They became more advanced over time and tried to tackle the capital structure puzzle from different angles. Unfortunately, these theories often point into conflicting directions and there is still no unambiguous answer to the

¹² Also Leary and Roberts (2005) provide evidence that firm actively rebalance their leverage to stay within an optimal range.

question who is right. In short, the pecking-order suggests that managers observe no great leverage effect on firm value, so they will not make an effort to reverse the changes in leverage. In contrast, the trade-off does argue that market imperfections create a link between leverage and firm value, so managers will try to reverse leverage changes. For mature, larger firms the pecking-order seems to fit the best because they have better access to the external debt markets. For younger and smaller growth firms, the trade-off theory seems to be a more suitable theory, because they have less financial stability and are less able to access the debt market. However, as indicated above, firms still are concerned with rating-triggered costs that might make managers move away from the optimal leverage level that both theories propose.

3.3 Determinants of leverage and target capital structures

3.3.1 Determinants of leverage

A lot of new studies introduced a completely different way in explaining capital structure decisions, because the traditional capital structure theories have conflicting characters. These studies do not look for an all-explaining theory, but they try to relate leverage to several firm-specific factors, the 'determinants of leverage'. The most commonly accepted and important determinants are: firm size, growth opportunities, tangibility, profitability and initial leverage (as proposed in studies of (Fama & French, 2002; Frank & Goyal, 2003; Lemmon, Roberts, & Zender, 2008; Rajan & Zingales, 1995; Titman & Wessels, 1988).

The trade-off and pecking-order can empirically and intuitively explain firm size. The trade-off states that firm size is negatively related to the risk of bankruptcy. Larger firms are more stable and relatively take on more leverage (Rajan & Zingales, 1995). From the pecking-order theory's point of view, larger firms have less asymmetric information problems, which may lead to lower costs of debt, so firms tend to have more leverage. Both trade-off and pecking-order predict a positive relationship between size and leverage. Profitability should have a positive relation to leverage, according to the Cash Flow Theory (Jensen, 1986), because debt limits a firm's free cash flows and therefore restrain managers to invest in negative NPV projects. However, the pecking-order states that firms prefer internal financing first, so they will rely less on debt and thus will be less levered (Rajan & Zingales, 1995; Titman & Wessels, 1988).

Asset tangibility is a measure of how much collateral is available. From the trade-off theory view, collateral reduces agency problems concerning the debt holders (if debt can be collateralized, the borrower is restricted to use funds for a specified project, if debt cannot be collateralized, then creditors may want more favorable terms, which in turn may lead to use equity instead of debt). From the pecking-order view it reduces information asymmetry problems (if firms have fewer tangible assets, firms will issue equity to better control if managers divert wealth away from shareholders, and so if assets are tangible, debt can increase) (Rajan & Zingales, 1995; Titman & Wessels, 1988).

The literature does not give a clear answer towards the relationship between growth opportunities and leverage. A positive relation is presumed from the pecking-order's view. Growth opportunities have more potential to take on debt, so future investment are more likely to be financed with debt.

Empirically, however, there seems to be an opposite relation in Myers (1977) Agency Theory. This negative relation is caused because highly levered firms might have to refuse positive NPV projects to prevent themselves of being in distress. Growth firms will therefore focus more on equity than on debt to sustain financial flexibility for future investments (Rajan & Zingales, 1995; Titman & Wessels, 1988).

How initial leverage is related to capital structure decisions is being studied by Lemmon et al. (2008). They show that leverage is persistent over long horizons, meaning that high levered firms stay highly levered over long periods. A firm's long-term target leverage ratio looks very similar to its original leverage ratio. They find a strong positive relation between initial leverage and future leverage.

3.3.2 Targeting capital structure

Besides the pecking-order and trade-off theory, a lot of research has been done towards target capital structure theory. In agency-theoretical models, several researchers (Hart & Moore, 1995; Jensen & Meckling, 1976; Stulz, 1990) show that target leverage minimizes the agency costs of debt that are associated with problems like underinvestment (Myers, 1977) and asset substitution (Jensen & Meckling, 1976). Ross (1977) creates a signaling model where target leverage is determined by trading-off the benefits of higher market value and the costs of credibly signaling to the market that the value is high (as he implies that "the value of firms will rise with leverage, since increasing leverage increases the market's perception of value"). Existing evidence on target leverage is mixed. Research on the determinants of corporate debt ratios ((Hovakimian et al., 2001; Rajan & Zingales, 1995; Titman & Wessels, 1988) mainly support the idea that firms aim to maintain target capital structures. Observed leverage ratios seem to relate to firm characteristics as size, tangibility, profitability and growth opportunities which are consistent with the trade-off theory. Hovakimian et al. (2001) provides evidence that the deviation from the target leverage ratio is an important determinant of capital structure. They argue that firms may change over time and therefore their target ratios also, as the firm's profitability and stock price changes.

Flannery and Rangan (2006) argue that the speed with which firms reverse deviations from their target debt ratio depends on the costs of adjusting their leverage. On the one hand, when adjustment costs are zero, the trade-off theory would predict that firms should never deviate from their optimal leverage. On the other hand, when adjustment costs were infinite there would be no movements towards a target. Flannery and Rangan (2006) provide evidence that firms do target a long run capital structure, and that firms converge towards that long-run target with more than 30% per year. They argue that this is three times faster than existing theory predicts which implies that targeting capitals structure is an important effect on a firm's capital structure.

3.4 Credit rating targets

As Graham and Harvey (2001) show, managers' second highest concern are credit ratings when making capital structure choices. Also Hovakimian et al. (2009) and Kisgen (2009) show that managers make financing choices to achieve a particular rating, which they indicate as the Target Ratings Hypothesis. Hovakimian et al. (2009) uses a model were they run credit rating regressions on the same way as

traditional debt ratio regressions do¹³. The advantage of this model is that credit ratings aggregate the different aspects of capital structure, such as the maturity and seniority of debt. Therefore, credit ratings might provide a better overall measure of financial leverage. Their results show mixed support for the hypothesis that firms that benefit the most from higher ratings, do make financing decision that lead to higher ratings (especially growth firms, because they need high ratings to provide them with access to financial markets). In their second part they check what kind of financing decisions managers make. Consistent with the Target Ratings Hypothesis, firms that are below their target decrease their leverage and firms that are above their target increase their leverage. As Kisgen (2006) shows, managers reduce leverage to achieve upgrades or prevent downgrades and shows that credit ratings are a considerable implication for capital structure decisions. Kisgen (2009) complements his research about credit ratings and capital structure by looking if managers target specific ratings. If managers want to achieve better ratings, they will not only change capital structure to avoid downgrades, but they will also reduce leverage after being downgraded, to again regain their desired rating. He finds that firms lower leverage after downgrades, but responding little to upgrades. Firms that have been downgraded issue approximately 1.5% - 2.0% less net debt as a percentage of assets relative to equity compared to other firms. These findings even hold within a framework of targeting leverage behavior. Reverse causality is therefore less likely, as Kisgen provides evidence in both his studies that firms target minimum credit ratings. They reduce leverage before getting a downgrade (or upgrade), but they also reduce leverage after being downgraded (his result show no significant change after upgrade). They make these particular capital structures choices, because they are concerned with the benefits of higher ratings after considering target leverage behavior. This effect is larger for firms that are downgraded to speculative grade. They are twice as likely to reduce debt as other firms. These results show that managers might move away from the trade-off and pecking-order theory.

3.5 Credit ratings during crisis

3.5.1 Asymmetric information framework

As explained in section 2, CRAs use fixed, documented and standard rating procedures, but they also take managers future intentions (soft information) into account when assigning ratings. However, CRAs emphasize that a rating is after all still their subjective opinion and because of that, it is not verifiable by court. Therefore, the quality of CRAs assessments depends entirely on the CRAs incentives to build and maintain a good reputation. Under certain assumptions, this leads to creditable information transmission¹⁴. Of course, the rapid growth of CRAs' reputation the last decades implies that reputational interest can provide adequate incentives generating high quality information (Kuhner, 2001). However, in the presence of systemic risk, there might be incentives to not communicate observed information adequately. Systemic risk is the threat that a certain shock hits the market and will trigger a series of following losses. The shock might be a major change in expectations in response to a

¹³ In these debt ratio regressions firm size, asset tangibility, market-to-book, R&D expenses, selling expenses, profitability and operating risk are considered as important determinants of target debt ratios predicted by the trade-off theory. These determinants are also used in Titman and Wessels (1988) and Rajan and Zingales (1995).

¹⁴ See for evidence that reputational interests under assumptions will lead to credible information transmission: Hax (1998).

dramatic event, i.e. the breakdown of large financial intuitions or the bursting of a bubble. The emergence and growth of a systemic crisis are explained by a number of theories. An important one underlines asymmetric information. In a normal state of the economy, debtors have incentives to signal good credit quality. Based on this information, creditors can distinguish between different levels of credit quality. However, there is informational asymmetry between borrowers and lenders; borrowers have more information about the investment projects they want to take on (adverse selection) (Mishkin, 1991).

During a shock event, it appears that the signaling mechanisms do not work properly. Supporters of the asymmetric information theory explain this by the fact that financial information gathering comes with the free rider problem. However, CRAs were set in place to overcome such free riders problems. Their ultimate responsibility is to release early warnings and signals so that investors can make rational exit decisions. So after a shock event, because of growing informational asymmetries that consider the creditworthiness of companies and institutions, there might be withdrawal of funds by investors, because of a negative perception of their credit quality. So, dramatic losses can be directly caused by investors withdrawing their funds, because they suspect the positions of their debtors is worsened.

Kuhner (2001) creates a signaling game-model where he tries to answer the question if CRAs might have incentives to misinterpreted their clients' credit quality during an ongoing systemic crisis. In this model there are two important assumptions during a crisis: (1) Investors are not able to distinguish fundamentally healthy debtors from fundamentally unhealthy ones (CRAs are assigned with this task). (2) Investors tend to cumulatively withdraw their funds. The game focusses on the creditor's financial pay-offs and the agency's reputational pay-offs. He contributes with his model to the understanding of the self-fulfilling prophecies (where CRAs realize they made a mistake by assigning a particular rating when a shock hits the market). In his game, Kuhner shows that there are no separating equilibriums where CRAs report observed credit quality truthfully and investors withdraw their funds based on that report. Basically, there is no causality relating the agency's announcement to the creditor's withdrawal decision, when the above assumptions are taken into account. Only when they are relaxed, there is some transmission of decision-useful information.

3.5.2 Procyclicality of ratings

As referred in section 2, CRAs have been criticized a lot for adjusting their ratings to slow. In their defense; they address this issue by explaining it by the rating through-the-cycle methodology that they use¹⁵. CRAs tend to measure default risk over long investment horizons (Altman & Rijken, 2004; Dittrich, 2007). Whereas, Kuhner (2001) shows that there is no causality between the agencies announcement and the withdrawal of investors' funds during a shock event (so investors do not take their announcements into account), Altman and Rijken (2004) show in their model that rating agencies place less weight on short term indicators of credit quality, so they focus on the long term. Bangia, Diebold, Kronimus, Schagen, and Schuermann (2002) show that the procyclicality of credit quality changes is empirically significant, because the losses are much higher in a contraction (bust) vs. expansion (boom)

¹⁵ Also called: 'prudent rating migration policy'.

state of the economy. Nickell, Perraudin, and Varotto (2000) study the probability of a rating change in bonds during a given timeframe, conditioning on the state of the business cycle and provide evidence that transition matrices tend to have more downgrades during recession and upgrades during booms. The problem with these last two studies is that they do not condition for true underlying default risk that might, in part, be procyclical. So these studies do provide evidence that ratings move procyclically, but not that these ratings are assigned procyclically. Several other studies have tried to explain credit rating changes over time with other predictors. Altman and Kao (1992) show that rating changes tend to contain serial correlation. This means that a downgrade is more likely to be followed by another downgrade instead of an upgrade. An attempt to explain this comes from the observation that CRAs seem to try avoiding rating reversals, because it can harm their reputation (Löffler, 2005). Ferri, Liu, and Stiglitz (1999) provide evidence that CRAs worsened the East Asian crisis. By having failed to predict the emergence of the crisis, they became excessively conservative. They downgraded East Asian countries more than the economic fundamentals of these countries would justify. These downgrades increased the cost of borrowing excessively and caused the supply of credit to be cut off. As described in section 2, CRAs rely on their reputational capital, and when their reputational capital fluctuates procyclically, they may have incentives to set ratings procyclically. So, when the East Asian crisis unfolded, their reputational capital suffered, and made them rate more conservative to rebuild their reputational capital. This argument also works the other way around. In expansionary period, their reputational capital is likely to be high, so they do not need to worry about rebuilding it, so they can indulge in less strict ratings assignments.

Cantor and Mann (2003) demonstrate that ratings have been remarkably stable over past credit cycles. Amato and Furfine (2004) evaluate if ratings are excessively procyclical in their assignment of ratings. They use a ratings determination model that takes factors of business and financial risk and macroeconomic conditions into account. The US economy is being tested if it is an important determinant of firm's credit ratings, after properly accounting for firm-specific factors. They conclude that ratings generally do not display excess sensitivity to the business cycle. Their results are robust to three different measures of the state of the cycle. An additional result that is obtained regards the trend behavior over time. Blume, Lim, and MacKinlay (1998) argue that ratings have, on average, become worse through time, but Amato and Furfine (2004) provide evidence that BLM findings disappear when taking systematic changes in measures of risk into account.

3.6 Leverage during crisis

3.6.1 Procyclicality of leverage

The amount of credit and how it varies over the business cycle is an interesting topic, especially in the wake of the financial crisis. At least some cyclical variation in total lending should be expected, even in a frictionless world. There are more NPV-projects to be financed in a strong economy than in a weak. Therefore, the expectation is that total credit will increase during a boom and decline during a bust (Adrian & Shin, 2013). Financial crises have happened multiple times in macroeconomic history. Often, excess credit is being appointed as a cause, and the warnings signs of increased leverage that led to the crisis of 2008 were for most part ignored.

Alan Greenspan (2002) said: “moderate leverage undoubtedly boosts the capital stock and the level of output ... the greater the degree of leverage in any economy, the greater its vulnerability to unexpected shortfalls in demand and mistakes.” The concerns about the increasing level of corporate debt are not new. It has been long recognized that the financial conditions of the private sector have a powerful effect on the macro economy.

The structural theory of corporate debt describes the link between increased leverage with higher corporate risk and thus higher costs of financing (Merton, 1974). Because of higher funding costs, investments are reduced, which lowers future cash flows and output. This may slow down the economy. A lot of studies have shown that leverage, among other balance sheets indicators has a huge effect on spending, inventories and employment. Furthermore, financial accelerator theory (Bernanke & Gertler, 1990) suggest that high corporate leverage can make busts more severe by amplifying initial adverse shocks¹⁶. Finally, because of high debt payments, the economy may face slow recovery because it creates liquidity problems, combined with weak profits, decreasing productive investments, push up default rates and erodes production capacity (Ivaschenko, 2003).

As many research shows¹⁷, financial factors play an important role in the modern business cycle. The vulnerability of economic shocks is increased when leverage is increased. With more debt outstanding, a procyclical behavior of prices can lead to bigger debt-deflation pressures. Increasing leverage can also lead to distinct confidence shocks and expectation fluctuations. Jordà, Schularick, and Taylor (2011) provide evidence that credit plays an important role in creating the business cycle, especially the intensity and the likelihood of financial crisis. When countries experience large credit booms in the run-up of a crisis, they recover slower than countries that had smaller credit booms. Braun and Larrain (2005) show that industries are hit harder during crisis when they are more dependent on external finance.

Financial data show that higher leverage means higher corporate risk. Therefore, these firms pay a higher premium in the market. According to Ivaschenko (2003), during the mid-1990s, there was an increase in leverage, rising corporate defaults and declining recovery rates. He shows that leverage tends to be higher during crisis. As becomes clear, the business cycle has an effect on the increase on leverage during booms, which increases the vulnerability of the cycle, which increase the probability of economic shocks.

According to the structural theory of corporate debt, the costs of external financing are not very sensitive to an increase in leverage as long as the value of corporate assets exceeds a default barrier. These assets depend on conditions of the balance sheet, market structure and macroeconomic variables. An increase in leverage may not raise the probability of a firm going bankrupt, if it can be offset by growth expectations, better monetary policy and improved debt contract terms. This suggests that the vulnerability of the corporate sector to economic shocks, and therefore the probability of a recession, does not depend solely on leverage but should be related to a combination of variables. He shows that macroeconomic conditions (equity volatility, and the structure of financial contracts, in addition to

¹⁶ The financial accelerator (FA) theory works mainly through the value of collateral: the rise in asset prices makes it easier for firms to get loans, and a decline in prices makes it more difficult.

¹⁷ See: Adrian and Shin (2013); Bhattacharya, Goodhart, Tsomocos, and Vardoulakis (2011).

financial conditions), determine the health of the corporate sector, and the economy as a whole. As the study of Ivaschenko (2003) implies, the corporate leverage loses its forecasting of predicting the probability of US recessions.

3.6.2 Corporate's reaction of leverage

Since the Great Depression, the global crisis of 2007-2008 (that started in the financial sector and later turned into a global recession) had a large decline of output, employment and trade. A lesson learned from previous crises is that banks' and firms' financing conditions are key mechanisms to turn a crisis into recession. During a crisis, with declining collateral values, lead to higher cost of external financing which forces banks and firms to lower their leverage and output. Kim (1999) provides a model of firms in East Asia, where he shows that highly levered firms can magnify the impact of a liquidity shock on the real economy. To avoid bankruptcy they sell their capital at a discount and reduce investment, thereby reducing output and prices. The procyclicality of leverage might therefore be an important amplification instrument in spreading financial shocks to the real economy (Kalemli-Ozcan, Sorensen, & Yesiltas, 2012). According to Kalemli-Ozcan et al. (2012), the value of equity as a percentage of assets will increase as asset prices increase. Keeping the rest equal, this rise of assets will decrease leverage. In a downturn, however, asset prices fall and leverage ratio increases. This procyclicality amplifies the business cycle, which could lead to systemic crisis. This might especially be the case when asset prices do not properly reflect fundamental values (bubbles). It is often argued that the lending boom of the early 2000s (that fueled the run-up to the sub-prime mortgage crisis), was the cause that banks and firms increased their leverage substantially. The crisis was born when the boom turned into a bust.

Section 4 Hypotheses

The previous chapter reviewed literature on credit rating changes and leverage. This chapter will discuss and create hypotheses to check statements in that review.

As indicated in the literature, business cycles are influenced by the amount of leverage, and might increase the probability of economic crises. The vulnerability of economic shocks is increased when leverage is increased. This thesis tries to add another dimension to the literature by looking at the evidence that is given on credit rating changes and leverage changes, but also relating it to the 2007-2008s crisis and test if the given implications also hold for this period of economic downturn.

4.1 Hypothesis 1: Leverage behavior after downgrade before crisis

As explained in the literature review, a lot of research has been done towards capital structure theory and its determinants. Research shows that managers care about maintaining better ratings, because it affects their capital structure decisions. This implies that a complete model of capital structure must include credit ratings. Kisgen (2009) provides evidence that managers target credit ratings in making capital structure decisions, by reducing leverage after being downgraded, but responding little to upgrades (as upgrades are beneficial). However, Hovakimian et al. (2009) provide evidence that when observed ratings are above their target (by getting an upgrade), firms make security and repurchase decisions that increase leverage to return to their optimal rating. To check whether firms do react to downgrades the following hypothesis is formulated:

1. *Firms reduce leverage after being downgraded before the financial crisis*

4.2 Hypothesis 2: Leverage behavior after upgrade before crisis

As argued above, firms respond little to upgrades, but they do tend to get back to their target ratings even if this means that firms increase leverage after being upgraded. Therefore, to check whether firms respond to upgrades, the following hypothesis is formulated:

2. *Firms increase leverage after being upgraded before the financial crisis*

4.3 Hypothesis 3: Leverage behavior during crisis

CRA's were widely accused of assigning too favorable ratings to a variety of financial products and therefore played an important role in the recent global financial crisis. Because of their bad performances, it might be that issuers and investors that rely on ratings have less confidence in CRA's. In the literature it is not really clear whether CRA's act procyclically or that they rate through-the-cycle. Amato and Furfine (2004) show that CRA's do rate through-the-cycle. However, Altman and Kao (1992) show that rating changes tend to contain serial correlation and downgrades are more likely to be followed by another downgrade instead of an upgrade. Also Ferri et al. (1999) show that CRA's might

have incentives to assign their ratings procyclically. The evidence that (Kisgen, 2009) provides¹⁸ (a downgrade results in leverage reducing activity, an upgrade does not really respond to it), forms the basis for my hypothesis to check the effect the financial crisis has on this relationship. For this reason, the following hypothesis is formulated:

3. The financial crisis has an effect on leverage reduction (increase) after downgrade (upgrade)

This thesis will try to determine if the financial crisis has an effect on leverage after a downgrade or upgrade. This will be done by comparing two subsamples, one pre-crisis period (2004-2007) and one crisis period (2008-2011). One can imagine that firms reduce leverage during a crisis as an effect of financial distress factors. To control for this financial distress, the effect on firm size will be mainly looked at. Firm size is a proxy for the likelihood of bankruptcy, stability of cash flows and the degree of diversification, so it can be seen as a risk factor. In times of crisis, these factors might be more important because crisis is mainly characterized by decreasing trust, less stable cash flows and uncertainty. Since larger firms have lower probabilities of distress, firm size is an explicit measure of financial distress (Kisgen, 2006). In these regressions there will also be controlled for other determinants of target leverage, because they all might have an impact on leverage.

4.4 Hypothesis 4: Investment- and speculative grade

As Kisgen (2009) shows, firms downgraded to speculative grade are twice as likely to reduce debt as other firms. If firms do target rating levels, firms will put a greater effort in trying to get back to their targets than 'normal' downgraded firms. These effects might be stronger at the speculative grade rating level as regulations restrict particular financial investors to invest in this rating class and it increases capital charges for other investors. So if rating targets matter, the effect should be more significant at this barrier. To check whether this feature holds within the financial crisis the following hypothesis is formulated:

4. Firms being downgraded to speculative grade reduce leverage more during the financial crisis than firms being downgraded to speculative grade before the financial crisis

This hypothesis will look at four different rating levels, which are the two latest investment grade levels (BBB and BBB-) and the two first speculative grade levels (BB+ and BB). These are chosen to check whether there are stronger leverage effects around the investment- and speculative grade barrier.

The results regarding the hypotheses will be discussed in section 6. The next section will discuss the data and methodology used to check the above mentioned hypotheses.

¹⁸ Kisgen (2006, 2009) shows in both studies that credit ratings are an material consideration in managers' capital structure behavior due to discrete benefits associated with higher rating levels.

Section 5 Data and Methodology

In order to be able to test the hypotheses presented in the previous section, a dataset is constructed. Paragraph 5.1 explains the data gathering and construction of the dataset. Paragraph 5.2 will explain the methodology used to test the hypotheses.

5.1 Dataset construction

The sample used in this study is constructed from all firms with a credit rating in the Compustat North America database. Ratings data are only available for the US market. All firms with a public debt rating account for approximately 78% of all outstanding debt, so this can be seen as a significant part of firms that are active in capital markets (Faulkender & Petersen, 2006). The credit rating used is Standard & Poor's Long-Term Domestic Issuer Credit Rating, which is the firm's corporate credit rating. The sample period is divided into two subsamples: a pre-crisis period from 2004-2007 and a crisis period from 2008-2011. To define what the dividing line between pre-crisis and crisis period is, the definition of National Bureau of Economic Research (NBER) is used¹⁹. The Business Cycle Dating Committee observed the end of a peak (start of a trough) in December 2007 and therefore the start of the crisis is defined at January 2008. By creating two subsamples, the effect the crisis has on the leverage decisions after up- and downgrades will be determined. Also a comparison can be made between a 'normal' period and a crisis period, where there is more uncertainty in cash flows, higher volatility and decreasing trust. Down- and upgrades are measured by a change in S&P rating scales showed in Appendix 1.

In this study only downgrades and upgrades of one notch are considered to really determine the direct effect of a rating change on leverage changes. A rating change is considered when there is a difference in rating at the beginning and the end of the year. Compustat contains monthly data on ratings, which are set on each last day of the month. A yearly rating change is therefore the difference in rating at December 31 of the year previous to the rating change and the year that the rating change had occurred²⁰. The accounting data used to create the necessary variables (also from Compustat) are yearly, so to better match rating changes with the accounting data, this option is chosen out of practical purposes. Only firms that have a credit rating for at least two years and firms that have at least two years of consecutive data are incorporated in the sample. Firm years with missing data that are needed to perform the regressions are excluded from the sample. Financial companies and utilities are also excluded (SIC codes 4000-4999 and 6000-6999), as the same model is used as Flannery and Rangan (2006) & Kisgen (2009). They exclude these industries because their capital structure decisions may reflect special factors. This leaves the dataset with 5,721 firm years. Table 1 shows the sample descriptive statistics for upgraded and downgraded firms and the sample distributions.

¹⁹ The NBER is seen as the authority to define crises and recessions in the US. Obtained from: <http://www.nber.org/cycles.html>

²⁰ For example: a rating change in 2007 is considered to be the difference between the rating on December 31 2006 and December 31 2007.

Table 1

Sample descriptive statistics			
Table shows number of downgrades and upgrades of all non-financial and non-utility (sic codes 4000-4999 and 6000-6999 are excluded) firms that have an credit rating in Compustat in the period 2004-2011. Number of downgrades and upgrades in the pre-crisis period (2004-2007) and crisis period (2008-2011) are shown.			
Sample	Pre-crisis	Crisis	Total
Downgrades	243	275	518
Upgrades	299	380	679
Total	542	655	
N	2,694	3,027	

The table shows the number of downgrades, the number of upgrades and the number of firm years in both sample periods. Both sample-periods have comparable characteristics. They have comparable number of observations and are relatively equally weighted. The percentage of downgrades to firm years in the pre-crisis and crisis are both 9%. The percentage of upgrades in the pre-crisis is 11% and 12.5% in the crisis period. One can observe that the absolute number of downgrades and upgrades increases during the crisis.

Table 2

Downgrades at specific rating levels		
Table shows number of downgrades of all non-financial and non-utility (sic codes 4000-4999 and 6000-6999 are excluded) firms at specific rating levels. Number of downgrades in the pre-crisis period (2004-2007) and crisis period (2008-2011) at the rating levels BBB, BBB-, BB+ and BB are shown.		
Panel A: Investment grade		
	Pre-crisis	Crisis
BBB	20	24
BBB-	40	31
Panel B: Speculative grade		
BB+	31	16
BB	21	14

Table 2 shows the descriptive statistics of downgraded firms at four individual rating levels. These levels are BBB and BBB-, which are investment grade levels and BB+ and BB which are speculative grade. As indicated, the leverage effects at investment- to speculative grade might be stronger. Therefore, these four individual rating levels are chosen.

5.2 Methodology

Following Kisgen (2009), leverage is being measured by the market-debt ratio including variables that are considered to be determinants of target leverage (profitability, Market-to-Book, size, and fixed

assets)²¹. They use the same model as Flannery and Rangan (2006), where they argue that a firm's target market debt ratio (MDR) can be determined as a linear combination of various capital structure factors:

$$(1) \quad MDR_{i,t+1} - MDR_{i,t} = \beta X_{i,t} + \varepsilon_{i,t}$$

The variable X includes measures of profitability (measured by EBIT), Market-to-Book ratio (proxy for growth opportunities), size (log of total assets) and fixed assets (proxy for tangibility). The variables used are considered proxies for target leverage. These variables are chosen as they appear regularly in the literature (Fama & French, 2002; Hovakimian et al., 2001; Rajan & Zingales, 1995).

When looking at the direct effect of down- and upgrades, equation (1) can be modified by adding rating changes to the regression-equation:

$$(2) \quad MDR_{i,t+1} - MDR_{i,t} = \beta_1 MDR_{i,t-1} + \beta_2 X_{i,t} + \beta_3 Downgrade + \beta_4 Upgrade + \varepsilon_{i,t}$$

MDR is defined as short term + long term debt divided by total debt plus the market value of equity. Market value of equity is calculated by the stock price multiplied by the number of shares. A leverage change is being measured by the difference in MDR between t (the year of the rating change) and $t+1$ (the year following the rating change). The lagged version of the dependent variable (MDR_{t-1}) is added as an explanatory variable. In tests of Flannery and Rangan (2006) the specification of excluding the lagged version of MDR implies that the observed capital structure is always at its target. However, when adding the lagged version of MDR they observe extremely high significant results, indicating that it is an important explanatory variable. They further denote that adding the lagged version of MDR creates a bias in the estimates. By using the lagged value of book leverage and the lagged variables in X , this issue is resolved. The same approach is used in this research. *Downgrade* and *Upgrade* are dummy variables equal to 1 if the firm was downgraded or upgraded the previous year. The variables included in X are added as controls for target leverage, as they may also proxy for the deviation from the target. Their implications with respect to leverage and how they are calculated are explained below.

- EBIT: defined as earnings before interest and taxes divided by total assets. EBIT is considered to be a proxy for profitability. A firm with higher earnings could prefer to use low or high leverage. Low leverage might be used as higher retained earnings reduce leverage. High leverage might reflect the firm's ability to meet their debt obligations. The expectation about the coefficients sign is therefore not clear.
- Market-to-Book: defined as book liabilities (long plus short debt) plus the market value of equity divided by the book value of total assets. MTB is considered a proxy for growth opportunities. The literature does not give a clear answer about which relation is expected. A higher MTB is seen as potentially high growth opportunities, so firms tend to keep leverage low, to protect these opportunities, so in this sense a negative relation is expected. From the pecking-order theory however, a positive relation is expected, because high growth opportunities have the potential to take on more debt.

²¹ Market leverage is chosen as Flannery and Rangan (2006) refer to the fact that finance theory often tends to tone down the importance of book ratios.

- Log of Assets: defined as the natural log of total assets. Log of assets is considered a measure of firm size. Larger firms tend to operate with more leverage, because of the lower probability of default and more certainty of cash flows. Firm size is also considered a measure for financial distress (Kisgen, 2006). From both the pecking-order and trade-off a positive coefficient is expected.
- Fixed Assets: fixed assets as a proportion of total assets is defined as property, plant and equipment divided by total assets. Fixed assets are considered to be a proxy for tangibility. The more tangible assets, the higher the debt capacity, so firms with more fixed assets have more collateral. Therefore, a positive coefficient is expected.

The above specified regression-equation is used to test the capital structure decisions following credit rating changes, given positive adjustment costs²². As described in section 3, Kisgen (2006) argues that credit ratings are an important consideration in managers' capital structure decisions. He also argues that if the rating-dependent costs or benefits are important enough, managers will balance that costs or benefits against the trade-off theory. The same holds for the pecking-order theory, where managers balance the costs of issuing equity against the benefits of a higher rating. These costs or benefits might make managers move away from their theoretical optimal capital structure. Given this evidence that credit ratings are an important consideration, there are some implications for leverage behavior to be expected: i) firms that are downgraded will be more likely to reduce leverage compared to non-downgraded firms; ii) upgraded firms are not likely to significantly affect capital structure decisions, because an upgrade is beneficial to the firm and it will not try to reverse it. These implications will be tested by hypothesis 1 and 2, using regression equation (2).

While Kisgen (2006, 2009) provides evidence about these implications, this thesis tries to determine if these implications also hold during the crisis that started in 2007-2008. To test the effect the financial crisis has on the implications, regression equation (2) is used for both sample-periods (hypothesis 3). Additionally, to quantify if the means of the subsamples significantly differ from each other a two-group mean-comparison t-test is performed.

As indicated, firms that are downgraded to speculative grade are twice as more likely to reduce debt than other firms. For testing this hypothesis (hypothesis 4), the dataset is reduced to four individual rating levels, where downgraded firms are compared to firms with the same rating levels that were not downgraded. As these firms have the same rating level, they should have similar financial distress concerns and costs of debt. For these tests at individual rating level, the same regression-equation (2) is used. This hypothesis tries to indicate if firms that were downgraded from investment grade to speculative grade reduce leverage more during the crisis than before. Also here, an additional two-group mean-comparison t-test is performed at the investment- and speculative grade level in both sample periods.

²² Adjustment cost can have a significant influence on capital structure decisions, which might in some cases make a firm move away from their optimal leverage (Flannery & Rangan, 2006; Kisgen, 2009).

Section 6 Empirical results

This section shows the empirical results of the constructed hypotheses discussed in section 4. The analysis is based on the data and the methodology discussed in section 5.

6.1 Leverage behavior after downgrades and upgrades in pre-crisis period

Hypothesis 1 is constructed to test whether firms reduce their leverage after being downgraded in the pre-crisis period. In this test, dummy variables were added for whether the firm's credit rating was downgraded or upgraded. The results presented in table 3 indicate that in the pre-crisis period (2004-2007) the coefficient on downgrade is negative, but insignificant. Although it is insignificant, the negative sign indicates that the coefficient does not tend to be positive, so it implies that firms reduce leverage after being downgraded. Similar results (however, these are significant) regarding downgrades are also found in Kisgen (2009).

Table 3

Leverage changes following credit rating changes							
Coefficients and test-statistics of changes in market leverage (MDR) on lagged levels of market leverage and various controls for determinants for target leverage. MDR is defined as short plus long term book value of debt divided by total debt plus the market value of equity. The dummy variables downgrade and upgrade are equal to 1 if the firm was downgraded or upgraded in the previous year. Firm fixed effects are added in the regression. The column t-value indicates the t-statistics where *, ** and *** represent the statistical significance at the 10%, 5% and 1%.							
Pre-crisis period							
Variable	Downgrade	Upgrade	MDR _{t-1}	EBIT _{t-1}	MTB _{t-1}	Log(Assets) _{t-1}	FixedAssets _{t-1}
Coefficient	-0.0176	0.0255	-2.51e-06	5.19e-06	0.0613	0.1610	0.0850
T-value	-1,44	2,95***	-4.06***	2,59***	2,12**	3.03***	2.07**
Firm Fixed Effects?	Yes						
N	2446						
R ²	0.3901						

The goal of hypothesis 2 is to test if firm increase their leverage after being upgraded. The coefficient on upgrades is positive and significant, which indicates that firms subsequently increase their leverage the year following the upgrade by 2.55% more than other firms during the pre-crisis period. These results regarding upgrades are different from the evidence Kisgen (2009) provides. As he finds that upgrades are not significant in any of his regressions, in this regression, upgrades are significant at the 1% level. The significance of the upgrade variable might be explained by an alternative model offered by Hovakimian et al. (2009) where they try to determine proxies for target credit ratings and target debt ratios. They find that firms that are below their target rating are more likely to decrease their leverage (which is consistent with Kisgen (2009)), however, firms that are above their target are more likely to increase their leverage (by repurchasing equity instead of retiring debt), to again regain their target rating.

Furthermore, the controls for determinants for target leverage (EBIT, MTB, Log(Assets) and FixedAssets) are all significant. As explained, the expectation about the coefficient on EBIT is not clear as profitable firms could prefer to use high or low leverage. The coefficient is positive, but very low, so not much is explained by EBIT. MTB is also positive, which might be plausible from the pecking-order theory. The coefficient on Log(Assets) is positive, which indicates that larger firms tend to increase their leverage, because they are less risky (Hovakimian et al., 2009). Also the coefficient on FixedAssets (tangibility) is positive, which implies that firms with more tangible assets have more collateral and thus might increase their leverage, which is consistent with Hovakimian et al. (2009).

6.2 Leverage changes during crisis

Hypothesis 3 is used to test whether the 2007-2008s crisis affected the relationship between leverage reduction (increase) after downgrades (upgrades). In his research Kisgen (2009) showed that downgrades subsequently reduce leverage and upgrades does not show any significant leverage effects. The same procedure is followed in this thesis, so in the regressions firm fixed effects and the lagged dependent variable (MDR_{t-1}) are excluded (column 2 and 3 in both samples). This is done to detect if there might be potentially remaining econometric issues that could significantly influence the rating effects. The results are presented in table 4. In panel A, for regression 1, the same results are shown as in table 3. After excluding fixed effects and lagged MDR, the coefficient on downgrades remains negative. During the crisis-period (2008-2011), the coefficients on downgrades are negative and statistically significant on the 1% level in all regressions. It shows that downgraded firms reduce their market leverage by 3.84% compared to all other firms in that period. These results on downgrades are in line with evidence provided in the theory. It seems that during the crisis-period, the magnitude of the effect of the downgrade increases, as the coefficient increases (so leverage is reduced more after a downgrade during crisis) and the coefficients become significant, even when firm fixed effects²³ and lagged leverage are excluded. The results regarding upgrades are again positive and significant in all regressions except one, where firm effects are excluded. The magnitude of upgrades does not change very much (except for regression 2 in the crisis sample, which decreases). In the pre-crisis period, upgraded firms increase their leverage by 2.55%, as indicated in table 3. In the crisis period firms increase their leverage by 2.21%. Again this is not consistent with findings of (Kisgen, 2009), but are consistent with (Hovakimian et al., 2009). Additionally a two-group mean-comparison t-test is conducted, to better identify if the two subsamples significantly differ from each other. This test does not necessarily posit any causal relationship, but it does indicate that the means of downgraded and upgraded firms in the pre-crisis and crisis period significantly differ from each other. The results for downgraded firms indicate that in the crisis period, the mean leverage change is significantly different from the pre-crisis period at the 1% level²⁴. The same holds for upgrades.

²³ The importance of firm fixed effects becomes clear as the model loses a lot of its explanatory power when firm fixed effects are excluded, since R^2 drops from 40.86% to 4.02%.

²⁴ In the crisis-period, the mean leverage is negative, and the pre-crisis is positive, which indicates that during crisis, leverage is reduced more.

Table 4

Leverage changes following credit rating changes						
Coefficients and test-statistics of changes in market leverage (MDR) on lagged levels of market leverage and various controls for determinants for target leverage. MDR is defined as short plus long term book value of debt divided by total debt plus the market value of equity. The dummy variables downgrade and upgrade are equal to 1 if the firm was downgraded or upgraded in the previous year. Panel A represents the pre-crisis period (2004-2007), where Panel B represents the crisis period (2008-2011). Firm fixed effects are added in the regression. The column t-value indicates the t-statistics where *, ** and *** represent the statistical significance at the 10%, 5% and 1%. Additionally, a compare means t-test is performed to test if the two subsample significantly differ from each other.						
All firms				All firms		
Panel A: Pre-crisis period				Panel B: Crisis period		
Variable	1	2	3	1	2	3
Downgrade _{t-1}	-0.0176 (-1.44)	-0.0019 (-0.27)	-0.0169 (-1.38)	-0.0384 (-3.41)***	-0.0389 (-6.60)***	-0.0380 (-3.44)***
Upgrade _{t-1}	0.0255 (2.95)***	0.0131 (2.02)**	0.0253 (2.99)***	0.0221 (3.78)***	0.0022 (0.44)	0.0219 (3.69)***
MDR _{t-1}	-2.51e-06 (-4.06)***	-1.12e-07 (-0.50)		-1.04e-06 (-1.42)	-2.23e-07 (-1.39)	
EBIT _{t-1}	5.19e-06 (2.59)***	5.07e-07 (0.63)	3.44e-06 (2.02)**	-8.08e-07 (-0.69)	-2.30e-07 (-0.46)	-8.63e-07 (-0.69)
MTB _{t-1}	0.0613 (2.12)**	0.0152 (5.49)***	0.0628 (2.15)**	-0.0486 (-1.57)	-0.0008 (-0.32)	-0.0483 (-1.54)
Log(Assets) _{t-1}	0.1610 (3.03)***	-0.0017 (-0.88)	0.1528 (2.91)***	0.0302 (1.66)*	0.0102 (6.00)***	0.0244 (1.63)
FixedAssets _{t-1}	0.0850 (2.07)**	-0.0041 (-0.70)	0.0854 (2.08)**	0.1137 (2.31)**	0.0031 (0.67)	0.1141 (2.32)**
Firm Fixed Effects?	Yes	No	Yes	Yes	No	Yes
N	2446	2446	2446	2171	2171	2171
R ²	0.3901	0.0171	0.3890	0.4086	0.0402	0.4079
T-test downgrades	6.55***					
T-test upgrades	7.23***					

A concern might be that firms reduce leverage following downgrades because of financial distress factors during the crisis period. To control for financial distress, the effect on firm size might play an important role. Firm size is a proxy for the likelihood of bankruptcy and stability of cash flows, so it can be seen as a risk factor. In times of crisis, these factors might be more important because a crisis is characterized by decreasing trust, less stable cash flows, higher volatility and more uncertainty. Since larger firms have lower probabilities of distress, firm size is a measure for financial distress (Kisgen, 2006). The positive coefficient in all regressions (except for regression 2 in pre-crisis period) on Log(Assets) indicates that firms with lower probability of distress issue more debt relative to equity (the difference between the change in MDR is positive, so firms increase their leverage). This implies that larger firms can increase debt and therefore are not concerned with financial distress factors. This indicates that it is more likely that these results are not affected by financial distress factors.

6.3 Leverage changes at specific rating levels

Hypothesis 4 is constructed to test rating changes at individual rating levels. Kisgen (2009) argues that some rating changes may be more significant than others, because of regulations that restricted financial companies to invest in certain rating categories. It might also be that firms with a lower rating might pay a higher interest rate or they might be more restricted to raise capital as of their lower rating. If firms do target rating levels, firms that were downgraded to speculative grade are expected to put a greater effort to get back to their targets. For this hypothesis, upgraded firms are excluded, because the effect of the downgrade to speculative in the pre-crisis period versus the crisis period is being tested.

Table 5 present the regression-results at four rating levels regarding downgraded firms compared to firms that already had that rating. As downgraded firms are matched with firms that already had this rating, they should have similar distress concerns. The table indicates that again; in all the regressions except BB in crisis period, downgraded firms tend to reduce their leverage more than firms that already had that rating. The coefficients on downgrades are all negative. This implies that firms are trying to get back to their previous rating. These results are significant at the BBB and BB+ level in the pre-crisis period and at the BBB level in the crisis period. In the other regressions the results are not significant, but as mentioned earlier, the results tend to be negative instead of positive. The most notable in these results is the sharp increase in significance-level of BBB- to BB+ (which is the barrier from investment- to speculative grade) during the pre-crisis period. The coefficient turns from not significant to highly significant and the magnitude of the downgrade coefficient increases from a 1.63% reduction to a 13.28% reduction. This indicates that firms at that level are strongly trying to decrease their leverage, to regain their previous rating. This phenomenon is not detected at the crisis-period and because the results are not significant in the crisis period, it is hard to determine if firms that are downgraded from investment to speculative grade reduce their leverage more during the crisis than before. The two-group mean-comparison t-test that is conducted at the BBB- and BB+ level (to determine if the means of leverage-change of the same rating-level in the different samples) does however indicate that for both levels during the crisis period the mean leverage change for downgraded firms is significantly different from the pre-crisis period at the 1% level. Also in these regressions, the coefficients for Log(Assets) are positive in all regressions, which indicates that these results are not likely to be affected by financial distress concerns.

Table 5

Leverage changes at specific ratings

Coefficients and test-statistics of changes in market leverage (MDR) on lagged levels of market leverage and various controls for determinants for target leverage. MDR is defined as short plus long term book value of debt divided by total debt plus the market value of equity. The table indicates the coefficients on four rating levels, where two are investmentgrade (BBB, BBB-) and two are speculativegrade (BB+, BB). The dummy variables downgrade and upgrade are equal to 1 if the firm was downgraded or upgraded in the previous year. Panel A represents the pre-crisis period (2004-2007) and Panel B represents the crisis period (2008-2011). Firm fixed effects are added in the regression. Upgraded firms are excluded from the sample. The column t-value indicates the t-statistics where *, ** and *** represent the statistical significance at the 10%, 5% and 1%. Additionally, a compare means t-test is performed to test if the two subsample significantly differ from each other.

Variable	All firms				All firms			
	Panel A: Pre-crisis period				Panel B: Crisis period			
	BBB	BBB-	BB+	BB	BBB	BBB-	BB+	BB
Downgrade _{t-1}	-0.0459 (-1.77)*	-0.0163 (-0.64)	-0.1328 (-18.62)***	-0.0260 (-0.50)	-0.0484 (-2.86)***	-0.0320 (-1.37)	-0.0479 (-1.20)	0.0043 (0.11)
MDR _{t-1}	-3.82e-06 (-0.69)	-0.0000 (-1.84)*	7.21e-06 (0.35)	3.47e-06 (0.15)	-6.36e-06 (-1.50)	-8.51e-08 (-0.02)	-6.44e-06 (-0.80)	-6.26e-06 (-0.28)
EBIT _{t-1}	0.0000 (1.68)*	0.0000 (2.15)**	8.11e-06 (0.16)	0.0000 (1.65)*	-6.24e-06 (-1.43)	5.45e-06 (1.19)	-0.0000 (-0.61)	-0.0000 (-1.31)
MTB _{t-1}	0.0461 (0.67)	0.0778 (3.20)***	0.0351 (0.52)	0.0898 (1.73)*	-0.0264 (-1.06)	-0.0408 (-1.74)*	-0.0156 (-1.16)	-0.0364 (-1.76)*
Log(Assets) _{t-1}	0.1195 (1.63)	0.2087 (3.08)***	0.1327 (1.68)*	0.1569 (2.85)***	0.0785 (1.22)	0.0375 (0.36)	0.0182 (0.31)	0.0333 (0.29)
FixedAssets _{t-1}	-0.0432 (-0.27)	0.1957 (2.22)**	-0.0190 (-0.54)	0.1984 (1.17)	0.0300 (0.49)	0.1047 (0.50)	0.3762 (2.05)**	0.0624 (0.66)
Firm Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	271	218	131	212	248	213	120	151
R ²	0.5506	0.7385	0.6430	0.5921	0.5785	0.4664	0.5426	0.6234
T-test BBB-	4.60***							
T-test BB+	2.67***							

Section 7 Conclusions

This thesis examines the effects of market leverage changes after rating changes by comparing two subsamples (pre-crisis and crisis period) in the period 2004-2011. A sample with all firms that have a credit rating made by Standard & Poor's in this time frame resulted in 1,197 unique up- and downgrades. A regression analysis is performed with dummy variables that are equal to 1 if the firm was downgraded or upgraded, a lagged version of the dependent variable MDR and controls for target leverage.

The results show that in the pre-crisis period, the coefficient on downgrades are negative but insignificant. As the coefficient is negative, it is more likely that firms reduce their leverage after being downgraded than that they increase their leverage. These results are similar to Kisgen (2009), although his results are significant. For upgrades the results are significant in the pre-crisis sample. Firms that were upgraded increase their leverage by 2.55% more than other firms during the pre-crisis period. These results are not in line as the theory predicts. Kisgen (2009) argues that upgrades should not significantly influence leverage behavior, as an upgrade is beneficial to the firm. This significance of the upgrade variable might be explained by an alternative model offered by Hovakimian et al. (2009) where they try to determine proxies for target credit ratings and target debt ratios. In line with Kisgen (2009) firms reduce leverage if they are below their target, but firms that are above their targets increase leverage, to regain their target ratings.

When comparing the results from the two sample periods, it is shown that the insignificant downgrades in the pre-crisis period become significant during crisis. Also, their magnitude increases. So, firms reduce their leverage with 3.84% compared to other firms and remain significant after excluding firm fixed effects and lagged MDR. This is consistent with the theory. The results regarding upgrades are again positive and significant in all regressions except one, where firm fixed effects are excluded. In the pre-crisis period, as is shown above, upgraded firms increase their leverage by 2.55% and by 2.21% in crisis period. Also in these regressions, the significance in upgrades might be explained by the model provided by (Hovakimian et al., 2009). Controlling by firm size for distress factors indicates that the results are not likely to be influenced by them, as firm size is positive in almost all regressions. These results are in line with theory (Kisgen, 2006).

The tests concerning the investment- and speculative grade show only in three out of eight regressions significant results, although in seven out of eight the downgrade is negative. These results are significant at the BBB and BB+ level in the pre-crisis period and at the BBB level in the crisis period. As downgraded to speculative grade firms are matched with firms that already had this rating, they should have similar distress concerns. However, the downgraded firms in pre-crisis period react strongly. At the investment grade-barrier, the coefficient turns from not significant to highly significant and the magnitude of the downgrade coefficient increases from a 1.63% reduction to a 13.28% reduction. As this phenomenon is not detected at the crisis-period and because the results are not significant in the crisis period, it is hard to determine if firms that are downgraded from investment to speculative grade reduce their leverage more during the crisis than before. These results are not in line with theory, as Kisgen (2006, 2009) shows that especially at speculative grade rating levels, firms would be more concerned about their

rating. This insignificance of the results might be caused by the limited number of downgrades and upgrades at the individual levels.

In conclusion this research provides evidence that credit rating changes result in significant negative coefficients during crisis for downgrades and significant positive coefficients for upgrades during the entire period. This implies that credit rating changes significantly influence capital structure behavior. This is consistent with previous research.

Limitations of the conducted research are the fact that R&D expenses are almost not available. As R&D expenses also proxies for growth opportunities, this could have been added as an additional control. As firms are not obligated to report R&D expenses, most firms lack to report these out of strategic purposes. In the total of 5,721 firm years, only 246 years (4.29%) of R&D expenses were reported, so I chose to do not take these into account. Furthermore, for US firms, only Standard & Poor's credit ratings were available. Adding rating changes of Moody's and Fitch could deepen the research by comparing the three CRAs and might detect differences amongst them. For further research it might be helpful to check whether the results within different CRAs would still be consistent.

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Appendix 1

Credit rating scales overview²⁵

	Interpretation	Standard & Poor's	Moody's	Fitch	
Investment grade	Highest quality	AAA	Aaa	AAA	
	High quality	AA+	Aa1	AA+	
		AA	Aa2	AA	
		AA-	Aa3	AA-	
	Strong payment capacity	A+	A1	A+	
		A	A2	A	
		A-	A3	A-	
	Adequate payment capacity	BBB+	Baa1	BBB+	
		BBB	Baa2	BBB	
		BBB-	Baa3	BBB-	
Speculative grade	Likely to fulfill obligations, ongoing uncertainty	BB+	Ba1	BB+	
		BB	Ba2	BB	
		BB-	Ba3	BB-	
	High-risk obligations	B+	B1	B+	
		B	B2	B	
		B-	B3	B	
	Vulnerable to default	CCC+	Caa1	CCC	
		CCC	Caa2		
		CCC-	Caa3		
	Near or in bankruptcy or default	CC	Ca		DDD
		C			
		D	C	DD	
			-	D	
			-	D	

²⁵ Obtained from: www.standardandpoors.com, www.moody's.com, www.fitchratings.com