The effect of credit ratings on firm's leverage in the aftermath of 2008

(Evidence from the U.S Market)

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Choosing to pursue a master degree and specializing in Finance was a hard choice to make during my last years of undergraduate studies. A choice that I can proudly say I did not regret today. During these two years, CLSBE has opened the gates for me to new horizons and provided me with the tools and knowledge to grow. The faculty installed in me discipline and a strong work ethic. The toughness of the program pushed us to work hard and persevere eventhrough the difficult days. At the end of this experience, I could only say Thank you.

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Abstract

The objective of this dissertation is to study leverage decisions of firms and the explanation of their behavior before and after a credit rating change. I analyze the effect of ratings prior and post upgrade and downgrade on different sub-samples and assess the strength of the relation existing between credit ratings along with certain ratings positions on the leverage levels of firms in the US. The results of the fixed-effects model show that firms that are on the verge of a credit rating upgrade or downgrade tend to decrease their leverage. This behavior changes for downgraded firms, 1-year post downgrade, as I notice a strong statistical tendency for firms to increase their leverage. I notice also a robust statistical significance for this relationship for a sub-sample constituted of speculative firms.

O objetivo desta dissertação é estudar as decisões de alavancagem das empresas e a explicação do seu comportamento antes e depois de uma mudança de rating de crédito. Eu analiso o efeito dos ratings antes e depois do upgrade e downgrade em diferentes sub-amostras e avalio a força da relação existente entre os ratings de crédito e certas notações de ratings nos níveis de alavancagem das empresas nos Estados Unidos. Os resultados do modelo de efeitos fixos mostram que as empresas que estão à beira de um *upgrade* ou *downgrade* do rating de crédito tendem a diminuir sua alavancagem. Este comportamento muda para empresas alvo de *downgrade*, 1 ano após o evento, dado que observo uma forte tendência estatística para as empresas aumentarem sua alavancagem. Existe também evidência de uma robusta significância estatística para esta relação para uma sub-amostra constituída por firmas de notação especulativa.

JEL Classification: G32

Keywords: Leverage, Credit Rating, Downgrade, upgrade.

1-INTRODUCTION:

In the last few decades, a close attention started to be attributed to credit rating agencies and their effects on market participants. With more and more presence in the economy, credit ratings and their relation drew the attention of the public. Being, initially, just a grade attributed to enterprises in order to assess the quality of their financial decisions and the strength of their financial position, credit ratings grew out to be more important in our modern economies. Their ability to exhibit firms public and non-public information into a grade that summarizes the riskiness of an investment opportunity made their effect on firms financing decisions non negligible. Kisgen (2006) was among the first to bring a formal empirical study about the effect of ratings on firm's capital structure decision. The author, using several models on different samples, bring the hypotheses that a relation exists between Credit ratings and managerial decisions. In the following years, similar studies appeared tackling the same topic. This was also influenced by the subprime mortgage crisis, which drew attention to credit rating agencies and prompted numerous criticisms.

Graham, Leary and Roberts (2014) find that changes in firm characteristics, as well as changes in the relationships between these characteristics and Leverage decisions, are insufficient to explain much of the shift in financial policies. The authors find that the capital structure decision is influenced by institutional settings and macroeconomic uncertainty. Additionally, the paper shows that when the economy is in a slump, Investment prospects are scarce. The latter lowers the need for external cash, which lowers enterprises' Leverage ratios. Duff and Einig (2009) show that credit ratings tend to be quite relevant to many financial market observers. High ratings are expected to reduce financing expenses, whereas low ratings are thought to increase funding costs. Credit rating agencies have access to a variety of data, including business plans for organizations, capital expenditures, and future dividend policies that are not revealed to investors, among other things.

Market participants heavily relied on the ratings that credit rating agencies assigned to financial instruments, particularly mortgage-backed securities, prior to the financial crisis of 2007–2008 to determine the creditworthiness of alternative investment options. That is, until the Financial Crisis Inquiry Commission declared in its Financial Crisis Inquiry Report (FCIR) that "this crisis could not have happened without the rating agencies.". Related to this issue, Duff and Einig (2009) discuss the reliability of credit ratings. The authors consider how frequently CRAs' independence is called into question. They draw attention to the inherent conflict of interest that is also visible in the rating industry's business model, in which the CRA is payed from the party it rates. This creates an inherent conflict of interest, which is also visible in the related financial gatekeeping profession of auditing.

Looked upon with a dim view as already mentioned above, credit rating agencies have been heavily criticized in the last decade. Myers and Majluf (1984), on the other hand, defend their existence by stating that financial intermediaries such as banks, rating agencies and financial advisory services exist under the guise of partially eliminating the adverse effects of information asymmetries. Companies have strong motive in addressing a high importance to credit ratings. The latter can be explained by the fact that an investment grade firm would find itself more at ease at contracting debt at a lower cost or also contracting equity than a speculative one. When the 2008 crisis hit many expected a wave of deleveraging to happen. McKinsey Global Institute (2018) state the opposite by showing that global debt kept increasing after the recession. Since the end of 2007, the total global debt of governments, non-financial corporations, and households has increased by $72 trillion. Beneath this headline figure are important differences in borrowers and the source and type of debt outstanding. Governments in advanced economies have borrowed heavily, as have non-financial corporations around the world. In a post crisis turbulent environment, numerous were the assumptions made around the evolution of debt but also the real impact of credit ratings on firms.

This dissertation investigates the impact of credit ratings downgrades and upgrades on firms in the US. I conduct different regression models to assess the existence or not of a significant relation. Since there is still uncertainty around this topic, this dissertation will contribute to the existing work by giving argument, for or against, this hypothesis. I use all tradable U.S firms for the period ranging between 2009 and 2015 using yearly data. Bancel and Mittoo (2004) during a survey of managers of firms find that financial flexibility and credit ratings are considered the most crucial aspect when defining firm's debt policies.

This dissertation will study the effect of rating changes by analysing changes on the Leverage levels of firms. The data will be cleaned thoroughly by setting a number of constraint described later on in the methodology. I use a similar approach than the one used in Kisgen (2006) in order to target by which group this causality between ratings and debt level is explained better. I check for differences between investment grade groups (with S&P long term issuer credit rating higher or equal to BBB-) and speculative grade groups (with S&P long term issuer credit rating higher or equal to BBB-). I find that firms denoted with a plus or minus sign tend to lower their leverage. I also find strong significance for firms to increase their leverage 1-year post downgrade across different study sample. The spread of the change in the credit rating also shows a strong significance for downgrades in comparison to upgrades. Firms seem to be more preoccupied and react more in the event of losing a grade in comparison to the event of an upgrade.

2-Literature:

Numerous scholars have attributed a close attention to credit ratings and capital structure during the previous decades. Encouraged by the occurrence of several crises that have impacted heavily businesses, studies emerged around this topic to try to comprehend the existence or not of a relation between Rating changes and capital structure of firms. The flow of debt and equity is a major standpoint which generally determines the strength of a company's position. Graham

and Harvey (2001) support this claim. The study examines 396 chief financial officers in regards to the cost of capital, the budget for capital, and the structure of capital. The authors demonstrate that executives rely heavily on informal, everyday rules when it comes to capital structure. The most significant factors in influencing debt policy are financial flexibility and a high credit rating. The effect of credit ratings on Fortune 500 companies is also significant.

Kisgen (2006) is considered as one of the first empirical studies conducted around CR-CS (Credit Rating and Capital structure model state that firms with minus or plus rating will issue less debt relative to equity than firms that are in the middle). The paper demonstrates the importance of credit ratings in capital structure decisions. It investigates whether firms approaching a rating change issue less net debt relative to net equity in the following period than other firms. The author's research show that concerns about the benefits of upgrading and the costs of downgrading have a direct impact on managers' capital structure decisions. Firms that are on the verge of a credit rating upgrade or oppositely downgrade, issue about 1% less debt relative to net equity than firms with a stable credit rating.

Kisgen (2009) finds that firms decrease their leverage after a credit rating downgrade. When compared to other firms, downgraded firms issue approximately 1.5 to 2.0% less net debt relative to net equity as a percentage of assets 1-year post downgrade. The author finds that while upgraded firms are more likely to issue debt, investment grade firms are less likely to issue debt than other upgraded firms. Firms that have been upgraded are also more likely to issue equity and less likely to reduce equity. Furthermore, in agreement with previous downgrade scenarios, the paper shows that firms that have been downgraded consistently reduce Leverage more than firms that have not had their ratings changed. After adjusting for changes in Leverage and other firm characteristics, downgraded firms engage in capital structure behaviour to try to restore their prior rating. Tang (2006) discovers that companies

that are upgraded have better access to the credit market since their borrowing rates are lower and they issue more debt than companies that are downgraded.

Bancel and Mittoo (2004) see little evidence that other factors (such as agency costs, signalling, asset substitution, free cash flow, and product market concerns) affect capital structure choice. They also allege that managers make funding decisions based on various informal criteria such as: Credit rating and EPS dilution. All elements of capital structure decisions are consistent with the authors' conclusions. Both European and American groups regard earnings per share dilution as the most important aspect of their equity policies, while ranking financial flexibility and credit quality as the most important aspects of their debt policies. Additionally, in an analysis of executive responses, the paper showed that financial flexibility was the most important factor with an average rank of 3.39, followed by creditworthiness with an average rank of 2.78. In addition, globally active companies have a very different perspective than their competitors on several fronts. For example, companies that have issued foreign debt or equity in the research sample of the paper pay more attention to credit ratings.

Servaes and Tufano (2006) draw some interesting results from a survey conducted during mid-2005. 334 companies globally participated with responses distributed widely by geography and by industry. The survey reveal that except for Eastern Europe, the Middle East, and Africa, credit rating ranks first or second in every region in terms of importance when determining the level of debt. The paper also shows that in a sample of 159 companies, credit rating is among the only 3 factors: target debt level, credit rating and financial covenant, that scored 60% or above as the most important factor in firm’s decision to not use more debt.

Michelsen and Klein (2011) examine the role of external credit ratings in capital structure-related decisions in a sample of international firms. By considering firm-specific factors and rationale for financial distress, the authors identify economically significant credit

issues in managers' capital structure decisions in a large sample of S&P-rated firms in Europe, the Middle East, and Africa (EMEA) as well as in the United States. Companies whose issuer credit ratings have been upgraded or downgraded have 1.8 percent less net debt and net equity (as a percentage of total assets) issued in the next fiscal year. The negative rating outlook corresponds to a more conservative leverage policy (-2.1%).

Samaniego-Medina (2019) investigate the impact of these indicators on the rate of Leverage adjustment for listed European companies between 2004 and 2014. The paper shows that Companies that are near a credit rating downgrade increased their Leverage ratio much more slowly than companies that are near a credit rating upgrade or not near a credit rating change. The minus sign resulted in a reduction in the Leverage ratio for companies with credit ratings equal to or lower than BBB on average.

Wojewodzki, et al. (2017) investigate the role of issuer credit ratings in explaining corporate Leverage and the rate at which firms adjust toward their optimal level of Leverage using an international dataset of 19 countries and with different financial orientation. The authors find that credit ratings have a negative impact on capital structure, which is more pronounced in countries with more market-based financial systems, as measured by the financial architecture variable. The negative relationship between credit ratings and Leverage ratios can be explained by the material costs and benefits of credit ratings for firms (especially the highest ratings) as well as asymmetric information. Companies with a better credit rating may be less hesitant to use debt financing and have easier access to equity financing than those with a poor credit rating. As a result, they issue more equity and less debt, resulting in a lower Leverage ratio. The survey also reveals that in countries with a more market-oriented financial system, firms with lower credit ratings adjust significantly faster (both economically and statistically) toward their target debt level than firms with higher credit ratings. This evidence

backs up our hypothesis that credit ratings are more important for firms in economies with a more market-based financial architecture.

Faulkender et al (2012) discover that financial constraints influence how quickly firms adjust toward target Leverage ratios. Firms that pay dividends or have a credit rating adjust significantly faster than constrained firms when under levered, and relatively slower when over levered.

D'amato (2020) examines how the recent 2008 global financial crisis affects capital structure decisions of SMEs and their drivers. The credit supply shock had a negative impact on Italian SME debt. Compared with pre-crisis, Italian SMEs significantly reduced their Leverage, especially their short-term credit exposure, during and after the crisis. He finds that the credit conditions of the short-term debt channel are more volatile than the long-term debt channel. His findings suggest that riskier, more valuable companies reduced their debt more during the crisis than before.

Hovakimian et al. (2009) investigated the existence and impact of target credit rating levels on capital structure. The initial cross-sectional regressions in the paper provide mixed support for the hypothesis that firms that benefit the most from higher ratings make choices that lead to higher ratings. The authors find that firms that have higher market to book ratios and higher selling expenses possess higher ratings. These firms are likely to benefit the most from higher ratings because they have a greater need for access to financial markets and because they are more likely to have customers and other stakeholders who are concerned about the firm's long-term viability. However, contrary to what one might expect from a trade-off theory, there is no evidence that firms with the lowest bankruptcy costs have the lowest credit ratings. Larger firms and those with more tangible assets than their industry peers tend to have higher ratings, in general.

Kemper and Rao (2013) make an analysis for the entire sample of firms placed on the S&P Watch list with negative implications. They find that more debt relative to equity is issued in the quarter following the listing. In the case of a potential rating upgrade, they observe firms reducing debt financing as a way to confirm and ensure that the rating agency will follow through on a rating upgrade. In addition to the overall sample results, the authors test the sensitivity of the results to firms that are near a loss of their investment grade rating. Although there is anticipation that firms on the verge of losing their investment grade status will respond more aggressively to a ratings threat, the evidence does not suggest that marginal financing patterns vary by this attribute. Overall, the authors conclude that credit ratings, as a determinant of capital structure policy, are most likely a second order factor rather than a primary determinant.

3-Data and methodology:

3.1-Data:

I extract all the database of listed companies on WRDS finance, Compustat capital IQ for the period between January 1, 2009, to December 31, 2015. I choose to work on US companies excluding Canadian ones. An explanation to the latter choices is coming from the fact that the US is a leading economy. I extract all companies along with their standard industry classification code (Sic code: "This item contains the code that identifies the line of business best representative of the company as a whole."). I eliminate from my sample financial institutions by filtering out the companies with sic codes between 6011-6099. I use the Standard & Poor's Long-Term Domestic Issuer Credit Rating which is considered as among the most prominent rating agencies. I also opt for the S&P credit rating agency thanks to the availability of the data on the WRDS finance platform. According to Standard and Poor's (2001), this metric represents the firm's corporate credit rating and represents the "current opinion on an issuer's

overall capacity to pay its financial obligations.". I extract the required variables to run the empirical study. The two data sets, one containing the company's variables and another containing the respective company's S&P long term credit rating are merged. In the next step, I thoroughly clean the data: first, companies with no available ratings in the study window are eliminated; second, companies that are not active during the whole study window are removed. Firm-years that have missing data in frequently required fields are removed. After finishing with the process of filtering the data and due to a high number of missing values the data is reduced from 47,671 to 4025 firm-years observations between 2009 and 2015. I am left with a final sample constituted of a balanced set of 4025 firm-years panel data. Before applying any statistical analysis on the data, I winsorise the sample at the top and bottom tails at 1% level (tukey (1962)) to reduce the influence of outliers.

3.2-Variables:

In the making of the model, the main analysis is a similar remake of Kisgen (2006). I use a different time window to see, the existence or not, of a change in the behaviour of companies after the 2008 economic crisis. the well-known collapse of Lehman Brothers, the fourth-largest American investment bank was an eye-opener regarding financing decisions in the aftermath of the crisis. While a big wave of deleveraging was expected, the exact same opposite was seen. According to S&P Global Ratings, the combined global debt of governments, non-financial corporations, and households has increased by 50% over a 10-year period (S&P global).

To run the regression analysis, numerous variables are used as described here below:

Leverage: Book Value of Debt / (Book value of Debt + shareholder's Equity)

CRPlus: Is a dummy variable that takes the value of 1 for firms that have a plus sign in their S&P supplier long term credit rating at the beginning of time t and equal to 0, otherwise

CRMinus : Is a dummy variable that takes the value of 1 for firms that have a minus sign in their S&P supplier long term credit rating at the beginning of time t and equal to 0, otherwise

CRPOM = CRPlus + CRMinus : Is a dummy variable that takes the value of 1 for firms that have a plus or minus sign in their S&P supplier long term credit rating at the beginning of time t and equal to 0 otherwise.

$Downgrade\ i\ t-1$: is a dummy variable that takes the value of one if a firm was downgraded in the last period and 0 otherwise.

$Upgrade\ i\ t-1$: is a dummy variable that takes the value of one if a firm was downgraded in the last period and 0 otherwise.

NumberofNotches: Is the absolute value of the numerical difference between the credit rating from one period to another.

Notches upgrade: Is the numerical difference between the credit rating from one period to another when a firm is upgraded

Notches Downgrade: Is the numerical difference between the credit rating from one period to another when the firm is downgraded

$K\ i\ t-1$: is a Set of control variables used in the regression model that include Size, EBITDA to Sales, Debt to EBITDA, Cash to Assets and Tangibility.

With:

Size: the natural logarithm of Total Assets.

EBITDAtoSales: Earnings before interest, taxes, depreciation and amortization over Total Sales.

DebttoEBITDA: Total Debt over Earnings before interest, taxes, depreciation and amortization.

CashtoAssets: Cash to Total assets.

Tangibility: Fixed Assets over Total assets.

For the empirical test, and to run the regressions, I use a set of 13 variables. I use one dependent variable: Leverage characterized as Book value of debt over Book value of debt plus shareholder's equity. I use five control variables: Size characterized as the natural logarithm of total assets, EBITDAtoSales characterized as earnings before interest and tax, depreciation and amortization over total sales, CashtoAssets characterized as cash over total assets and Tangibility characterized as total fixed assets to total assets. Furthermore, I use 5 dummy variables: CRPOM characterized as Credit rating plus or minus and takes the value 1 if the credit rating has a plus or minus sign and 0 otherwise. CRPlus characterized as credit rating plus and takes the value one if the credit rating has a plus sign and 0 otherwise. CRMinus characterized as credit rating minus and takes the value of 1 if the credit rating has a minus sign and 0 otherwise. Downgrade that takes the value of 1 if the firm has been downgraded in the previous year and 0 otherwise. Upgrade that takes the value of 1 if the firm have been upgraded in the previous year. Numberofnotches is characterized as the absolute value of the numerical difference between credit ratings from one period to another. The last two variables represent the number of notches split into number of notches upgrade or downgrade.

I run two sets of regression models on the study variable Leverage. I use the first sets of regression to assess the behavior of firms when they are on the verge of being downgraded or upgrade. When firms are on the verge of being downgraded or upgraded, they tend to undertake financial decisions in order to maintain their current credit rating or guarantee their rating upgrade. Then I perform a second set of regressions to study the behaviour of firms 1 year after being downgraded or upgraded. I also implement Numberofnotches as an absolute value of the difference between credit ratings from one period to another. The latter is done to picture, regardless whether a firm was upgraded or downgraded, if the spread in the downgrade/upgrade present a robust statistical evidence on debt levels.

I use the first regression equation on Leverage as follow:

$$Leverage_{i,t} = \alpha + \beta_1 \text{CRPOM}_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

$$Leverage_{i,t} = \alpha + \beta_1 \text{CRPlus}_{i,t-1} + \beta_2 \text{CRMinus}_{i,t-1} + \beta_3 K_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

$$\text{Leverage}_{i,t} = \alpha + \beta_1 \text{CRPOM}_{i,t-1} + \beta_2 K_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

Then I perform another set of 3 regression equations on Leverage to assess the behavior of firms 1-year post downgrade or upgrade. The regression equations performed are as follow:

$$\text{Leverage}_{i,t} = \alpha + \beta_1 K_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

$$\text{Leverage}_{i,t} = \alpha + \beta_1 Downgrade_{i,t-1} + \beta_2 Upgrade_{i,t-1} + \beta_3 K_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

$$\text{Leverage}_{i,t} = \alpha + \beta_1 Number\_Notches_{i,t-1} + \beta_2 K_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

Since their existence, Credit ratings' purpose was to portray a good analysis of a company financial standing and viability. With the economy becoming more and more developed and with a great increase of investing trends, Credit ratings and Credit ratings agencies became the center of attention when it comes to analysing any investment opportunity for a publicly traded firm. A credit rating agency's independent review of the debt issuer's prospects, including all public and non-public information sources, improves stakeholders' perceptions of the organization's ability to service the debt. A solicited rating enables the CRA to incorporate a variety of soft qualitative information into their assessment that is not available in publicly available financial reporting data (Butler and Rodgers, 2003). Table 1 display the numerical representation of the S&P supplier long term credit rating. Each rating grade is attributed an individual rating code that will be used for the variable numberofnotches to assess if the Size of the spread has an effect on Leverage.

Table 1: Credit rating scales

The individual rating code is implemented in order to investigate the difference between the credit ratings between two periods for the variables numberofnotches. The credit ratings in the study sample, from AAA to SD, are assigned credit codes. An individual rating code going from 1 to 22 is assigned to each rating category with 1 corresponding to the highest credit rating assigned by the standard and Poor's (AAA) and 22 to the lowest credit rating (SD).

	AAA	AA+	AA	AA-	A+	A	A-	BBB+
Individual Rating Code	1	2	3	4	5	6	7	8
	BBB	BBB-	BB+	BB	BB-	B+	B	B-
Individual Rating Code	9	10	11	12	13	14	15	16
	CCC+	CCC	CCC-	CC	D	SD		
Individual Rating Code	17	18	19	20	21	22		

The summary statistics in Table 2 best portrays the reasoning tackled previously. The statistics for the variable Leverage by credit rating shows that, for credit ratings among the A grade (rated A- and higher), the Mean Leverage ranges between 8,87% and 19.13%, excluding AA+ firms. As we move to lower ratings, we notice a transition to a higher Leverage scale. For ratings going from BBB+ to B+, the mean Leverage goes from 22.24% to 46,40%. For the lowest credit ratings, ranging from B to D, the mean Leverage value ranges from 51,49% to 65,69%. Overall, we can observe a negative relation between rating groups and Leverage. The increase in this difference as we move across lower and lower ratings is high. Standard deviation for all the categories combined ranges between 4,02% and 25,66%.

Figure 1 depicts the percentage of debt and equity distributions for each credit rating. It is possible to see that companies with high credit ratings have less debt and more equity than companies with low credit ratings. This may be explained by the fact that low rated firms must issue debt in order to raise more capital to invest in new projects that cannot be funded solely

through equity, as portrayed in the graph in Figure-1, whereas firms with ratings higher than B+ have a higher proportion of equity than debt.

Table 2: Descriptive statistics: Firm-Years, Leverage and Investment Ratio

Summary statistic table of Means, standard deviations, 25th percentiles, Medians and 75th percentiles of Leverage by credit rating within the sample, as well as the number of firm-years (out of a total sample of 4,025 firm-years) that started with the indicated rating. The sample consists of Compustat firms from 2009 to 2015. Firms with missing values for commonly used variables in the paper's empirical tests were removed (these include credit ratings, total assets, debt, and equity). Leverage is calculated by dividing total debt over total debt plus total equity.

	AAA	AA+	AA	AA-	A+	A	A-
Number of Firm-Quarters	26	13	37	64	131	274	242
Leverage							
Mean	8,87%	35,69%	13,77%	12,17%	14,98%	19,13%	18,81%
Std Dev	0,00%	25,66%	4,02%	4,84%	10,33%	12,73%	11,74%
25 Percentile	8,87%	8,87%	10,24%	8,87%	8,87%	9,64%	9,89%
Median	8,87%	39,55%	13,38%	9,97%	10,40%	15,00%	15,07%
75 Percentile	8,87%	62,37%	16,81%	14,05%	15,80%	21,49%	24,29%
	BBB+	BBB	BBB-	BB+	BB	BB-	B+
Number of Firm-Quarters	384	537	470	323	375	368	291
Leverage							
Mean	22,24%	23,70%	26,54%	28,16%	33,14%	39,74%	46,40%
Std Dev	11,48%	12,78%	13,29%	12,89%	14,93%	15,75%	15,06%
25 Percentile	14,20%	14,42%	16,74%	18,44%	22,70%	28,31%	35,34%
Median	20,32%	20,41%	24,85%	26,88%	30,87%	38,56%	45,91%
75 Percentile	27,02%	30,32%	33,61%	36,01%	42,63%	52,69%	60,90%
	B	B-	CCC+	CCC	CC	SD	D
Number of Firm-Quarters	221	112	43	11	4	4	7
Leverage							
Mean	51,49%	58,23%	59,78%	62,53%	65,69%	65,69%	57,57%
Std Dev	15,03%	11,89%	9,99%	7,34%	0,00%	0,00%	19,88%
25 Percentile	38,86%	52,51%	55,12%	63,93%	65,69%	65,69%	65,69%
Median	56,62%	65,69%	65,69%	65,69%	65,69%	65,69%	65,69%
75 Percentile	65,69%	65,69%	65,69%	65,69%	65,69%	65,69%	65,69%

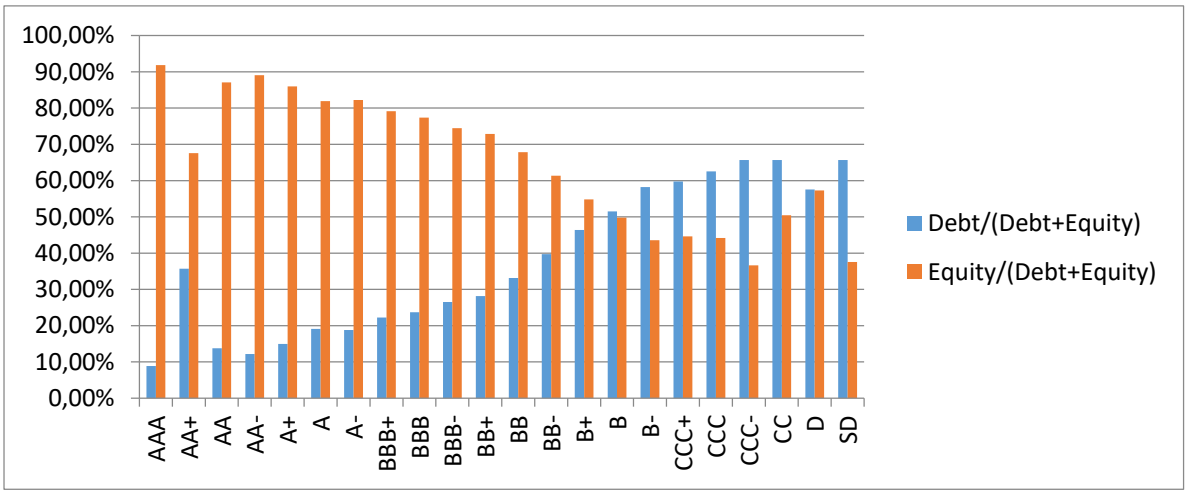
Table 3: Summary Statistics: Study and Control variables

The table displays Means, 25th percentiles, Medians, 75th percentiles, Min and Max of the study variables Leverage characterized as Debt over Debt plus equity. Control variables are Size characterized as the natural logarithm of total assets, EBITDAtoSales Characterized as Earnings before interest and tax depreciation and amortization to total sales, DebttoEBITDA characterized as total debt over earnings before interest and tax depreciation and amortization, CashtoAssets characterized as Cash and marketable securities over total assets and Tangibility Characterized as Total fixed assets over total assets. The sample consist of 4025 Firm-years observations.

Stats	Leverage	Size	EBITDAtoSales	DebttoEBITDA	CashtoAssets	Tangibility
N	4024	4025	4024	3904	4025	4025
Mean	0,307	8,843	0,179	2,526	0,072	0,295
P25	0,155	7,866	0,095	1,189	0,021	0,134
P50	0,265	8,763	0,156	2,079	0,059	0,296
P75	0,422	9,794	0,25	3,563	0,112	0,457
Min	0,088	7,213	0,041	0,626	0,006	0
Max	0,656	10,665	0,377	5,759	0,177	0,585

Figure 1: Capital Structure distribution by Credit Rating Categories

The figure shows the average values of Debt/(Debt+Equity) and Equity/(Debt+Equity) for each credit rating for all firms within the study sample from 2009 to 2015. X-axis represents the ratings attributed by the standards and Poor's. Y-axis represents the percentages of the two ratios used: Debt/(Debt+Equity) and Equity/(Debt+Equity)



4-Empirical Results:

To analyse the effect of ratings on firms within the sample, I go throughout two phases. I run a first set of regression to analyse, first, the global effect of credit ratings on firms when they are on the verge of being downgraded or upgraded. With each ranking positions possessing

discrete costs or benefits, firms tend to behave differently based on the opportunity cost of each change. This behaviour is performed to maintain a certain credit position or guarantee an increase in their credit rating. Kisgen (2006) argues that managers are concerned about credit ratings because of the discrete costs (benefits) associated with various rating levels. Credit rating levels influence whether or not specific investor groups, such as banks or pension funds, are permitted to invest in a firm's bonds, as well as whether or not investor groups, such as insurance companies or brokers-dealers, are subject to specific capital requirements when investing in a firm's bonds. In this dissertation, I test changes in leverage pre-downgrade or pre-upgrade by running regressions on firms denominated with a plus or minus sign. Table 4 represents a POM-test on Leverage for the whole sample while fixing for firm specific factors. The first regression is estimated on the dummy variable CRPOM without controls. CRPOM is highly significant at 0.1% level with a negative coefficient of -5.63%. The second regression including the 5 controls, shows that CRPOM is still highly significant at 0.1% level. All control variables are highly significant at 0.1% level except for DebttoEBITDA. The controls are negatively related to Leverage except for the variable CashtoAssets. The last regression equation includes both dummy variables CRPlus and CRMinus. Both variables are highly significant at 0.1% level. In addition, in concordance with previous theories, CRPlus and CRMinus display a negative relation with Leverage. For the study sample, when firms are on the verge of being upgraded or downgraded, Leverage decreases respectively by 3.09 and 3.49 percentage points. All control variables are significant except for DebttoEBITDA. Size, DebttoEBITDA, EBITDAtoSales and Tangibility are negatively related to Leverage whereas CashtoAssets present a positive relation to Leverage. I run a second set of regressions for the same sample, this time accounting for both firm and year specific factors. The first regression without control is highly significant. When introducing the controls in the second regression, there CRPOM coefficient decreases slightly but is still highly significant at 0.1% level. The

third regression with dummies CRPlus and CRMinus present negative coefficients with respectively 1% and 0.1% significance. Both coefficients are negative meaning that for the whole sample when firms are denoted with a plus or a minus sign, Leverage decreases. All control variables, for columns 5 and 6, are significant at 0.1% level except for *CashtoAssets* and *DebttoEBITDA*.

The result for the POM-test on the whole sample shows robust significance in favour of firms lowering their leverage when denoted with a plus or minus sign. I used firm and firm-year fixed effects to test the robustness of the relationship. All dummy variables showed high significance and displayed a negative relation with the variable Leverage. I therefore run the same regression models, but this time by truncating each time the sample into a sub-sample. I test this hypothesis on investment grade firms (firms with S&P long term credit rating equal or above BBB-) and speculative firms (firms with S&P long term credit rating equal or below BB+). Table 5 shows the results for both groups using firm fixed effects. Columns 1 and 2 show the same results for CRPOM. CRPOM loses significance when testing for the investment grade firms, with and without controls. Control variables in regression 2 are all significant at 5% level except for CashtoAssets. The third regression with both dummy variable CRPlus and CRMinus shows that we lose significance for CRMinus when testing for the investment grade firms. Overall we have no significance the 2 dummies CRPOM and CRPlus across the 3 first regressions, CRMinus is significant at 5%. Columns 4, 5 and 6 in Table 5 replicate the 3 first regressions, but this time for speculative firms.

We notice directly from regression 1 and 2 that CRPOM is negative and highly significant at 0.1% level. All controls are highly significant except for DebttoEBITDA. Column 6 also displays significance for *CRPlus* and *CRMinus* at 0.1% level. For speculative grades in the sample, when firms are denoted with a plus or minus sign, Leverage decreases respectively by 3.66 percentage points and 3.69 percentage points.

Table 4: Influence of credit rating On Leverage, Firm and Firm-Year fixed effects - POM Test: Whole sample

Coefficients and t-statistics from pooled time-series cross-section regressions of Leverage Characterized as Book Value of debt over book value of debt plus shareholder's equity on credit rating dummy variables and a set of Control Variables. CRPOM is a dummy variable that takes the value of 1 if a firm has a credit rating at the beginning of the year with a plus or minus sign and that takes 0 otherwise. CRPlus is a dummy variable that takes the value of 1 if a firm has a credit rating in the beginning of the year with a plus sign and that take 0 otherwise. CRMinus is a dummy variable that takes the value of 1 if a firm has a credit rating in the beginning of the year with a minus sign and that take 0 otherwise. Size, EBITDAtoSales, DebttoEBITDA, CashtoAssets and Tangibility are a set of control variables. The sample covers firm-years from 2009 to 2015. Financial institutions are excluded from the study sample, along with firm-years with missing data in regularly required fields. T-statistics in parentheses along with the asterisk are used to check the significance of the variables.

	Whole sample			*Whole sample*		
	1	2	3	4	5	6
CRPOM$_{i\ t\ -1}$	-0.0563***	-0.0329***		-0.0172***	-0.0173***	
	(-9.43)	(-6.35)		(-3.56)	(-3.69)	
CRPlus $_{i\ t\ -1}$			-0.0309***			-0.0157**
			(-5.06)			(-2.84)
CRMinus$_{i\ t\ -1}$			-0.0349***			-0.0189***
			(-5.75)			(-3.45)
Size $_{i\ t\ -1}$		-0.0419***	-0.0421***		0.0231*	0.0230*
		(-4.77)	(-4.79)		(2.54)	(2.53)
DebttoEBITDA $_{i\ t\ -1}$		-0.0000388	-0.0000393		-0.0000237	-0.0000241
		(-0.82)	(-0.83)		(-0.56)	(-0.57)
EBITDAtoSales $_{i\ t\ -1}$		-0.0928***	-0.0929***		-0.0861***	-0.0861***
		(-10.25)	(-10.25)		(-10.47)	(-10.48)
CashtoAssets $_{i\ t\ -1}$		0.463***	0.463***		0.0850	0.0848
		(8.62)	(8.62)		(1.68)	(1.67)
Tangibility $_{i\ t\ -1}$		-0.988***	-0.988***		-0.280***	-0.280***
		(-33.91)	(-33.91)		(-7.54)	(-7.54)
Intercept	0.355***	0.998***	1.000***	1.037***	0.810***	0.811***
	(84.53)	(12.60)	(12.61)	(63.33)	(10.19)	(10.20)
N	**4024**	**3902**	**3902**	**4024**	**3902**	**3902**
Firm Fixed Effect	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year Fixed Effect	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

In table 6, I run again the same sets of regression previously done but this time with fixing for firm and year fixed effects. Consistent with previous results for investment grade firms, I find no significance for both columns 1 and 2 for CRPOM.

Column 3 on the other hand show significance for the dummy variable CRPlus at 5% level. CRPlus is negative and have a coefficient of 1.34%. All control variables are significant at 5% level except for CashtoAssets.

Table 5: Influence of credit rating On Leverage, Firm fixed effects-POM Test: Investment and Speculative grades

Coefficients and t-statistics from pooled time-series cross-section regressions of Leverage Characterized as Book Value of debt over book value of debt plus shareholder's equity on credit rating dummy variables and a set of Control Variables. CRPOM is a dummy variable that takes the value of 1 if a firm has a credit rating at the beginning of the year with a plus or minus sign and that takes 0 otherwise. CRPlus is a dummy variable that takes the value of 1 if a firm has a credit rating in the beginning of the year with a plus sign and that take 0 otherwise. CRMinus is a dummy variable that takes the value of 1 if a firm has a credit rating in the beginning of the year with a minus sign and that take 0 otherwise. Size, EBITDAtoSales, DebttoEBITDA, CashtoAssets and Tangibility are a set of control variables. Investment grade firms are firms rated BBB- or higher by the S&P. Speculative grade firms are firms rated BB+ or lower by the S&P. The sample covers firm-years from 2009 to 2015. Financial institutions are excluded from the study sample, along with firm-years with missing data in regularly required fields. T-statistics in parentheses along with the asterisk are used to check the significance of the variables.

	Investment grade(pom)			*Speculative grade(pom)*		
	1	2	3	4	5	6
CRPOM$_{i\ t\ -1}$	-0.00599	-0.00452		-0.0517***	-0.0367***	
	(-1.12)	(-0.90)		(-5.61)	(-4.42)	
CRPlus $_{i\ t\ -1}$			-0.0123*			-0.0366***
			(-1.99)			(-3.79)
CRMinus$_{i\ t\ -1}$			0.00173			-0.0369***
			(0.30)			(-3.63)
Size $_{i\ t\ -1}$		0.0334***	0.0349***		-0.0549***	-0.0549***
		(3.68)	(3.85)		(-3.73)	(-3.72)
DebttoEBITDA $_{i\ t\ -1}$		0.00120*	0.00118*		-0.0000388	-0.0000388
		(2.31)	(2.27)		(-0.70)	(-0.70)
EBITDAtoSales $_{i\ t\ -1}$		-0.116***	-0.117***		-0.0841***	-0.0841***
		(-8.25)	(-8.34)		(-7.22)	(-7.22)
CashtoAssets $_{i\ t\ -1}$		0.0566	0.0601		0.456***	0.456***
		(1.11)	(1.18)		(5.01)	(5.01)
Tangibility $_{i\ t\ -1}$		-0.265***	-0.270***		-0.876***	-0.876***
		(-6.83)	(-6.94)		(-17.74)	(-17.72)
Intercept	0.219***	0.00133	-0.0124	0.477***	1.155***	1.156***
	(60.62)	(0.02)	(-0.14)	(71.48)	(9.34)	(9.30)
N	**2178**	**2178**	**2178**	**1846**	**1846**	**1846**
Firm Fixed Effect	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year Fixed Effect	**No**	**No**	**No**	**No**	**No**	**No**

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 6: Influence of credit rating On Leverage, Firm-Year fixed effects- POM Test: Investment and Speculative grades

Coefficients and t-statistics from pooled time-series cross-section regressions of Leverage Characterized as Book Value of debt over book value of debt plus shareholder's equity on credit rating dummy variables and a set of Control Variables. CRPOM is a dummy variable that takes the value of 1 if a firm has a credit rating at the beginning of the year with a plus or minus sign and that takes 0 otherwise. CRPlus is a dummy variable that takes the value of 1 if a firm has a credit rating in the beginning of the year with a plus sign and that take 0 otherwise. CRMinus is a dummy variable that takes the value of 1 if a firm has a credit rating in the beginning of the year with a minus sign and that take 0 otherwise. Size, EBITDAtoSales, DebttoEBITDA, CashtoAssets and Tangibility are a set of control variables. Investment grade firms are firms rated BBB- or higher by the S&P. Speculative grade firms are firms rated BB+ or lower by the S&P. The sample covers firm-years from 2009 to 2015. Financial institutions are excluded from the study sample, along with firm-years with missing data in regularly required fields. T-statistics in parentheses along with the asterisk are used to check the significance of the variables.

	Investment grade(pom)			*Speculative grade(pom)*		
	1	2	3	4	5	6
CRPOM$_{i\ t\ -1}$	-0.00597	-0.00543		-0.0216**	-0.0228**	
	(-1.14)	(-1.10)		(-2.65)	(-2.87)	
CRPlus $_{i\ t\ -1}$			-0.0134*			-0.0230*
			(-2.23)			(-2.50)
CRMinus$_{i\ t\ -1}$			0.00102			-0.0226*
			(0.18)			(-2.33)
Size $_{i\ t\ -1}$		0.0530***	0.0542***		0.000524	0.000569
		(5.12)	(5.24)		(0.03)	(0.04)
DebttoEBITDA $_{i\ t\ -1}$		0.00124*	0.00122*		-0.0000256	-0.0000256
		(2.43)	(2.40)		(-0.49)	(-0.48)
EBITDAtoSales $_{i\ t\ -1}$		-0.112***	-0.113***		-0.0767***	-0.0767***
		(-8.08)	(-8.16)		(-6.89)	(-6.88)
CashtoAssets $_{i\ t\ -1}$		0.0494	0.0535		0.121	0.121
		(0.98)	(1.07)		(1.32)	(1.32)
Tangibility $_{i\ t\ -1}$		-0.223***	-0.228***		-0.360***	-0.360***
		(-5.74)	(-5.86)		(-5.43)	(-5.42)
Intercept	0.239***	-0.185	-0.195	1.031***	0.980***	0.979***
	(44.11)	(-1.83)	(-1.93)	(34.63)	(7.70)	(7.67)
N	**2178**	**2178**	**2178**	**1846**	**1846**	**1846**
Firm Fixed Effect	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year Fixed Effect	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Columns 4, 5 and 6 on speculative grades, again and consistent with previous results, show statistical significance for the 3 dummy variables. Column 5 shows that CRPOM is significant at 1% level with a negative coefficient of 2.28%. CRPlus and CRMinus in regression

6 are have a negative coefficient of, respectively, 2.30% and 2.26%. both dummy variables are significant at 5% level.

Table 7: Credit Rating Changes on Leverage, Firm and Firm-Year fixed effects: Whole Sample

Coefficient and t-statistics for fixed effect regression of Leverage Characterized as Book Value of debt over book value of debt plus shareholder's equity) on credit rating dummy variables and a set of control variables. Upgrade and Downgrade variables are dummies that take the value of 1 if the firm was, respectively, upgraded or downgraded in the previous period and that take 0 otherwise. The variable Numberofnotches is the absolute value of the difference between a credit rating of a given year and the year previous to that. Size, EBITDAtoSales, DebttoEBITDA, CashtoAssets and Tangibility are a set of control variables. T-statistics in parentheses along with the asterisk are used to check the significance of the variables.

	Whole sample			*Whole sample*		
	1	2	3	4	5	6
Size i t -1	-0.0448***	-0.0438***	-0.000541	0.0224*	0.0252**	0.0102
	(-5.07)	(-5.04)	(-0.06)	(2.46)	(2.84)	(1.02)
DebttoEBITDA i t -1	-0.0000304	-0.0000250	-0.0000442	-0.0000193	-0.0000128	-0.0000354
	(-0.64)	(-0.53)	(-1.09)	(-0.45)	(-0.31)	(-0.89)
EBITDAtoSales i t -1	-0.0942***	-0.0839***	-0.0910***	-0.0867***	-0.0740***	-0.0876***
	(-10.34)	(-9.26)	(-11.45)	(-10.53)	(-9.15)	(-11.17)
CashtoAssets i t -1	0.473***	0.459***	0.0760	0.0833	0.0450	0.0800
	(8.76)	(8.64)	(1.36)	(1.64)	(0.91)	(1.47)
Tangibility i t -1	-1.012***	-0.998***	-0.353***	-0.281***	-0.235***	-0.299***
	(-34.85)	(-34.83)	(-8.30)	(-7.54)	(-6.45)	(-7.16)
Upgrade i t -1		-0.0413***			-0.0296***	
		(-6.84)			(-5.41)	
Downgrade i t -1		0.0513***			0.0755***	
		(7.16)			(11.68)	
Number_Notches i t -1			0.00527***			0.00307**
			(5.44)			(2.60)
Intercept	1.010***	0.997***	0.430***	0.816***	0.810***	0.342***
	(12.69)	(12.72)	(4.91)	(10.26)	(10.44)	(3.66)
N	**3902**	**3902**	**3902**	**3902**	**3902**	**3902**
Firm Fixed Effect	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year Fixed Effect	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

To test the impact of a credit rating upgrade or downgrade on firm's Leverage and the significance of their spread, I use a second model with dummies: upgrade, downgrade and numberofnotches. Table 7 represents the results for the firm fixed effect regression around the study variable Leverage for the whole sample. The table depicts the leverage behaviour of firms 1-year post downgrade and upgrade. It also tests the significance of the change in the number

of grades in ratings described in the variable numberofnotches. The First regression with only controls shows that all the variables are highly significant at 0.1% level except for DebttoEBITDA. The variables Size, EBITDAtoSales, DebttoEBITDA and Tangibility have negative coefficients whereas CashtoAssets is positive. For column 2 the dummy variable downgrade shows, contrary to expectations, that when a firm is downgraded the reaction to a downgrade is followed by an increase in debt in the following period. The dummy variable downgrade is statistically significant at 0.1% level. On the other side, the dummy variable upgrade shows that when upgrade equals to 1, the Leverage decreases by 4.13 percentage points. The dummy variable upgrade is also highly significant at 0.1% level. All control variables are highly significant at 0.1% level except for DebttoEBITDA. Size, EBITDAtoSales, DebttoEBITDA and Tangibility all display a negative coefficient except for CashtoAssets. The 3rd regression tests for the significance of the variable Numberofnotches. Whether there is a significant relation for the spread of downgrades or upgrades depending on the number of notches. The results show that the variable numberofnotches is significant at 0.1% level with a value of 0.53%. Control variables similarly to previous regressions are all significant at 0.1% level except for Size, DebttoEBITDA and CashtoAssets. For all the regression the intercept is positive and highly significant at 0.1% Level. In the second part of table, I conduct a firm-year fixed effect on the whole sample. Two dummy variables upgrade and downgrade are still highly significant at 0.1% level with downgrade presenting a positive relationship with Leverage and upgrade presenting a negative relationship with Leverage. Column 6 shows also that the variable numberofnotches is still significant at 1% level. most controls in the second part of the table are significant at 1% level.

Table 8 uses the 3 regression equations employed previously but this time with testing for two sub-samples: Investment Grades and Speculative Grades.

Table 8: Credit Rating Changes on Leverage, Firm fixed effects: Investment and Speculative grades

Coefficient and t-statistics for fixed effect regression of Leverage Characterized as Book Value of debt over book value of debt plus shareholder's equity) on credit rating dummy variables and a set of control variables. Upgrade and Downgrade variables are dummies that take the value of 1 if the firm was, respectively, upgraded or downgraded in the previous period and that take 0 otherwise. The variable Numberofnotches is the absolute value of the difference between a credit rating of a given year and the year previous to that. Size, EBITDAtoSales, DebttoEBITDA, CashtoAssets and Tangibility are a set of control variables. Investment grade firms are firms rated BBB- or higher by the S&P. Speculative grade firms are firms rated BB+ or lower by the S&P. T-statistics in parentheses along with the asterisks are used to check the significance of the variables.

	Investment Grade			*Speculative Grade*		
	1	2	3	4	5	6
Size i t -1	0.0334***	0.0330***	0.0359**	-0.0588***	-0.0549***	-0.0281
	(3.68)	(3.70)	(3.23)	(-3.98)	(-3.83)	(-1.74)
DebttoEBITDA i t -1	0.00120*	0.00113*	0.000659	-0.0000295	-0.0000227	-0.0000428
	(2.31)	(2.21)	(1.19)	(-0.53)	(-0.42)	(-0.85)
EBITDAtoSales i t -1	-0.116***	-0.105***	-0.107***	-0.0852***	-0.0701***	-0.0806***
	(-8.27)	(-7.56)	(-7.56)	(-7.27)	(-6.10)	(-7.49)
CashtoAssets i t -1	0.0566	0.0230	0.0473	0.468***	0.462***	0.135
	(1.11)	(0.45)	(0.83)	(5.11)	(5.21)	(1.36)
Tangibility i t -1	-0.266***	-0.226***	-0.274***	-0.896***	-0.879***	-0.481***
	(-6.86)	(-5.84)	(-6.01)	(-18.12)	(-18.33)	(-6.45)
Upgrade i t -1		-0.0234***			-0.0537***	
		(-3.95)			(-5.89)	
Downgrade i t -1		0.0402***			0.0840***	
		(6.01)			(7.34)	
Number_Notches i t -1			0.00197			0.00559***
			(1.21)			(4.17)
Intercept	-0.00142	-0.0113	-0.0248	1.170***	1.131***	0.800***
	(-0.02)	(-0.13)	(-0.23)	(9.40)	(9.38)	(5.77)
N	**2084**	**2084**	**2084**	**1818**	**1818**	**1818**
Firm Fixed Effect	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year Fixed Effect	**No**	**No**	**No**	**No**	**No**	**No**

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

For the first column, we notice that compared to table-7 previously The Control variable CashtoAssets loses significance. All other variables are significant at 1% and 5% level. when implementing the regression dummies on investment grade group, the two dummy variables upgrade and downgrade remain highly significant at 0.1% level. All control variables are significant at 5% level except for CashtoAssets. The 3rd regression equation shows that the variable numberofnotches loses significance for the investment grade group. This could be

explained by the fact that there is no significant cost related to the Size of the spread within the range of investment Grades. All control variables are significant at 1% level except for the variables CashtoAssets and DebttoEBITDA.

Regressions performed on speculative grades show similar outcomes for the dummies upgrade and downgrade that remain significant at 0.1% level. We see therefore a stronger coefficient for the speculative grade group. For example, the variable downgrade show that firms issue slightly more debt for speculative grade compared to investment grade 1 year after a downgrade. The variable numberofnotches in column 6 on the other hand become highly significant at 0.1% level.

In Table 9, I replicate what has been done previously with implementing firm and year fixed effects. The first regression show that all controls are significant at 5% except for CashtoAssets. Column 2 for investment grade shows that upgrade and downgrade are significant at 1% level. The case is the same for column 5 on both dummy variables for the speculative group. Numberofnotches in the other hand, in both columns 3 and 6, loses significance when accounting for firm and year fixed effects.

I conduct another regression by splitting this time my sample into two different groups. A Prime grade group containing firms with credit ratings denoted “A” and an upper-average grade group containing firms with credit ratings denoted “B”. the results for the first regression equation in Table 10 show that the dummy variable upgrade loses significance. Downgrade on the other hand is still significant at 5% level. There is also no significance in column 2 for the variable NumberofNotches. For the second group, all 3 variables downgrade, upgrade and NumberofNotches become highly significant at 0.1% level.

Table 11 represent the results for the number of notches, split into upgrades and downgrades.

Table 9: Credit Rating Changes on Leverage, Firm-Year fixed effects: Investment and speculative grades

Coefficient and t-statistics for fixed effect regression of Leverage Characterized as Book Value of debt over book value of debt plus shareholder's equity) on credit rating dummy variables and a set of control variables. Upgrade and Downgrade variables are dummies that take the value of 1 if the firm was, respectively, upgraded or downgraded in the previous period and that take 0 otherwise. The variable Numberofnotches is the absolute value of the difference between a credit rating of a given year and the year previous to that. Size, EBITDAtoSales, DebttoEBITDA, CashtoAssets and Tangibility are a set of control variables. Investment grade firms are firms rated BBB- or higher by the S&P. Speculative grade firms are firms rated BB+ or lower by the S&P. T-statistics in parentheses along with the asterisks are used to check the significance of the variables.

	Investment Grade			*Speculative Grade*		
	1	2	3	4	5	6
Size i t -1	0.0529***	0.0513***	0.0478***	0.0000664	0.00676	-0.0149
	(5.11)	(5.01)	(3.94)	(0.00)	(0.45)	(-0.89)
DebttoEBITDA i t -1	0.00124*	0.00119*	0.000768	-0.0000197	-0.0000124	-0.0000308
	(2.43)	(2.35)	(1.43)	(-0.37)	(-0.24)	(-0.64)
EBITDAtoSales i t -1	-0.112***	-0.104***	-0.103***	-0.0773***	-0.0616***	-0.0785***
	(-8.09)	(-7.52)	(-7.32)	(-6.92)	(-5.66)	(-7.48)
CashtoAssets i t -1	0.0494	0.0216	0.0559	0.114	0.0826	0.131
	(0.98)	(0.43)	(1.00)	(1.24)	(0.93)	(1.36)
Tangibility i t -1	-0.225***	-0.197***	-0.241***	-0.352***	-0.296***	-0.414***
	(-5.77)	(-5.08)	(-5.36)	(-5.31)	(-4.60)	(-5.69)
Upgrade i t -1		-0.0182**			-0.0362***	
		(-3.08)			(-4.08)	
Downgrade i t -1		0.0362***			0.102***	
		(5.49)			(9.30)	
Number_Notches i t -1			0.000904			0.00124
			(0.34)			(0.78)
Intercept	-0.186	-0.184	-0.135	0.985***	0.952***	0.706***
	(-1.85)	(-1.84)	(-1.13)	(7.72)	(7.74)	(4.86)
N	**2084**	**2084**	**2084**	**1818**	**1818**	**1818**
Firm Fixed Effect	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year Fixed Effect	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

The results show a high significance at 0.1% for the variable Notches-downgrade when testing for the full sample.

Notches-downgrade remain significant when testing for investment and speculative grade with firm fixed effects (column 3 and 4). Notches-upgrade shows significance only when testing for investment grade firms while fixing for both firm fixed effect and firm-year fixed effect (column 3 and 5).

Table 10: Credit Rating Changes on Leverage, Firm fixed effects: Prime and upper-average grades

Coefficient and t-statistics for fixed effect regression of Leverage Characterized as Book Value of debt over book value of debt plus shareholder's equity) on credit rating dummy variables and a set of control variables. Upgrade and Downgrade variables are dummies that take the value of 1 if the firm was, respectively, upgraded or downgraded in the previous period and that take 0 otherwise. The variable Numberofnotches is the absolute value of the difference between a credit rating of a given year and the year previous to that. Prime Grades are firms with A-graded ratings attributed by the S&P. Upper average grade are firms with B-rated ratings attributed by the S&P. Size, EBITDAtoSales, DebttoEBITDA, CashtoAssets and Tangibility are a set of control variables. T-statistics in parentheses along with the asterisks are used to check the significance of the variables.

	Prime grades		Upper-average grades	
	1	2	1	2
Size i t -1	0.0461***	0.0731***	0.0136	0.0205
	(3.35)	(4.13)	(1.57)	(1.94)
DebttoEBITDA i t -1	-0.000118	-0.000195	-0.0000530	-0.0000759
	(-0.33)	(-0.55)	(-1.27)	(-1.79)
EBITDAtoSales i t -1	-0.0863**	-0.0843**	-0.114***	-0.176***
	(-2.85)	(-2.68)	(-8.46)	(-11.53)
CashtoAssets i t -1	0.156**	0.165**	0.0614	0.0104
	(2.68)	(2.66)	(1.09)	(0.16)
Tangibility i t -1	-0.185***	-0.162***	-0.297***	-0.304***
	(-4.15)	(-3.53)	(-6.63)	(-5.75)
Upgrade i t -1	-0.00640		-0.0349***	
	(-0.92)		(-5.97)	
Downgrade i t -1	0.0181*		0.0814***	
	(2.30)		(11.22)	
Number_Notches i t -1		0.00270		0.00686***
		(1.12)		(6.09)
Intercept	-0.217	-0.496**	0.321***	0.277**
	(-1.58)	(-2.79)	(4.07)	(2.86)
N	**777**	**777**	**3080**	**3080**
Firm Fixed Effect	**Yes**	**Yes**	**Yes**	**Yes**
Year Fixed Effect	**No**	**No**	**No**	**No**

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

To sum up the empirical work, the regressions show that when firms are on the verge of being downgraded or upgraded, they tend to take decisions in order to lower their leverage ratio. The expected rating positions benefits or costs that those firms are respectively, likely to be upgraded to or downgraded to, seem to exceed the adjustment costs. This would imply the leverage reduction in order to gain a credit position or avoid a certain downgrade. Regression

results display a negative coefficient with the variable leverage all along the tests. This may be due to the fact that firms' give high importance to their ratings position for certain motives linked to the discrete benefits associated with that rating position (e.g. Investment opportunities). Servaes and Tufano (2006) in a survey study show that the two most important factors in determining the level of debt were: having a desired credit rating and the ability to continue making investments.

Table 11: Number of notches effects on Leverage- Firm and Firm-Year fixed effects: Whole sample, Investment and Speculative grade

Coefficient and t-statistics for fixed effect regression of Leverage Characterized as Book Value of debt over book value of debt plus shareholder's equity) on credit rating variables and a set of control variables. Notches-upgrade and Notches-Downgrade variables represent the value of the difference between a credit rating of a given year and the year previous to that, respectively for upgrades and downgrades. Size, EBITDAtoSales, DebttoEBITDA, CashtoAssets and Tangibility are a set of control variables. T-statistics in parentheses along with the asterisks are used to check the significance of the variables.

	Whole sample		Investment/Speculative		Investment/Speculative	
	1	2	3	4	5	6
Notches-upgrade	-0.00278	-0.00274	-0.0182***	-0.00186	-0.0140*	-0.00258
	(-1.47)	(-1.48)	(-3.31)	(-0.76)	(-2.57)	(-1.09)
Notches-downgrade	0.00756***	0.00633***	0.00349*	0.00812***	0.00530	0.00367
	(7.07)	(4.45)	(2.10)	(5.40)	(1.75)	(1.89)
Size i t -1	0.000623	0.0103	0.0337**	-0.0265	0.0460***	-0.0145
	(0.07)	(1.03)	(3.04)	(-1.65)	(3.80)	(-0.87)
DebttoEBITDA i t -1	-0.0000407	-0.0000330	0.000635	-0.0000396	0.000740	-0.0000294
	(-1.00)	(-0.84)	(1.16)	(-0.79)	(1.38)	(-0.61)
EBITDAtoSales i t -1	-0.0890***	-0.0848***	-0.106***	-0.0781***	-0.102***	-0.0759***
	(-11.23)	(-10.80)	(-7.50)	(-7.28)	(-7.27)	(-7.20)
CashtoAssets i t -1	0.0700	0.0771	0.0351	0.134	0.0461	0.130
	(1.26)	(1.42)	(0.62)	(1.35)	(0.83)	(1.34)
Tangibility	-0.332***	-0.285***	-0.253***	-0.457***	-0.230***	-0.396***
	(-7.82)	(-6.81)	(-5.54)	(-6.13)	(-5.12)	(-5.41)
Intercept	0.415***	0.338***	-0.00814	0.780***	-0.121	0.698***
	(4.74)	(3.62)	(-0.07)	(5.65)	(-1.02)	(4.81)
N	**3902**	**3902**	**3902**	**3902**	**3902**	**3902**
Firm Fixed Effect	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year Fixed Effect	**No**	**yes**	**No**	**no**	**Yes**	**Yes**

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

I also discover that within the study sample, firms that have speculative grade credit rating show the strongest relation to leverage. Speculative grade group, contrary to investment

grade group, remained significant while controlling for both year and firm fixed effects. In addition, I find that after being upgraded firms surprisingly lower their leverage and conversely after being downgraded firms increase their leverage. This can be explained by the fact that businesses use leverage to increase their buying power in the market. Companies use debt to fund their assets, instead of issuing stock to raise capital which become more complicated after a downgrade. Firms can therefore use debt to invest in operations to increase shareholder value. This case is significant for the whole sample but also for both investment and speculative groups. By truncating A-Rated firms and B-rated firms we notice that most of this relation is explained by firms that are in the middle of the S&P supplier long term credit rating table. The spread (Number of notches) for downgrades or upgrades in credit ratings is only significant for speculative firms but do not present any significance for investment grade firms.

Throughout the study, numerous regressions were performed with each time controlling for specific factors, temporal and firm specific, and by testing for number of sub-samples. The behaviour of firms was tested deeply during this study, and was able to provide insights for firm's leverage decisions both prior to any changes and post changes. I was able to gather robust statistical result during many stages of the empirical study that can allow the confirmation of the existence of a robust relation between rating changes and Leverage.

6-Conclusion

Credit ratings and their effect have been formally bought to discussion by Kisgen (2006), more than a decade ago. Today, and after several more research papers around this topic, the validity of credit ratings effect on capital structure is still an open question. Credit ratings are just a new element of a broader picture of internal and external factors such as financial crisis, managerial decisions, financial performance, and credit risk. Those elements also account, in many cases, to a high degree in affecting capital allocation of firms. Many

others claim that the effect of credit rating on capital structure is in fact really associated to discrete cost or benefits associated with losing or gaining a grade, therefore pointing out to other external factors. This dissertation examines the latter through assessing the significance of ratings denoted with a plus or minus signs. Result for the study sample concludes that firms denoted with a plus or minus sign decrease their leverage more than firms that do not expect any downgrade or upgrade soon. An analysis of different sub-samples shows that those concerns do not affect the top highest ratings but is conversely affecting mostly firms that situates in the middle of the S&P long term issuer credit rating table. Those firms as portrayed in the study previously, present close percentages of debt and equity finances. Therefore, those firms bear more costs/benefits from a rating change which would either allow or block their access to the numerous advantages of maintaining high credit ratings, such as increased commercial paper market entry, increased creditworthiness in the market, supplier loyalty, and so on. The relationship seems to hold in most of the paper. This hypothesis holds when considering neither cost nor benefit of each rating scales. Each benefit and cost within the rating scale should be assessed in the future to accurately measure the effect and the real incentives behind capital structure decisions in the event of a rating change.

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