The influence of possible credit score upgrades and downgrades on companies' capital structure.

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ABSTRACT

The present Dissertation purpose is to understand if and how managers alter their firm's capital structure when facing possible upgrades or downgrades of credit ratings through a sample of 10339 observations in the 2001-2021 time-spam. The possible changes in credit rating are observed through two different dummy variables. The first one -CRpom- includes companies with a plus or a minus in their credit rating and thus regrouping firms near notch rating changes. The second one -CRhorl- takes the value of one for companies in the higher and lower third of each rating based on a score calculated through an equation that tries to mimic credit rating agencies' scores criteria.

The results show that managers do adapt capital structure but only for changes in credit ratings and interestingly in opposite ways. Companies near upgrades tend to use less debt while the ones near a downgrade seem to have a decrease in debt.

The same questions are asked for a second sample where debt is broken down into seven categories. Bond levels are significantly impacted by upgrades and downgrades. More precisely, companies in either situation see bond levels diminish. This also highlights the importance of studying debt as a complex and heterogeneous source of financing.

The results are robust for investment and non-investment grade companies as well as across credit ratings and time.

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RESUMO

O objetivo da presente Dissertação é entender se e como os gestores alteram a estrutura de capital das empresas diante possíveis upgrades ou downgrades de ratings de crédito, utilizando uma amostra de 10339 observações no período de 2001-2021. As possíveis mudanças nos ratings são medidas utilizando duas variáveis. A primeira variável -CRpom- inclui empresas com mais ou menos na sua notação de crédito e, portanto, agrega empresas perto de mudanças de rating. A segunda -CRhorl- assume o valor de um para empresas no tercil superior e inferior de cada rating, tendo por base uma pontuação calculada através de uma equação que tenta replicar os critérios de classificação das agências de notação de crédito.

Os resultados mostram que os gestores adaptam a estrutura de capital, mas apenas para mudanças nas notações de crédito e, curiosamente, de maneiras opostas. As empresas perto de upgrades tendem a usar menos dívida, enquanto as próximas de um downgrade parecem diminuir a dívida.

As mesmas perguntas são feitas para uma segunda amostra em que a dívida é dividida em sete categorias. A dívida titulada é significativamente afetada por upgrades e downgrades. Mais precisamente, as empresas em ambas as situações vêm o nível de títulos diminuir. Este resultado também destaca a importância de estudar a dívida como uma fonte complexa e heterogénea de financiamento.

Os resultados são robustos para empresas acima e abaixo de investment grade, bem como para diferentes ratings e períodos.

Título: A influência de possíveis *upgrades* e *downgrades* de *rating* de crédito na estrutura de capital das empresas.
Autor: Alexia Ubiali
Palavras-chave: *ratings* de crédito, estrutura de capital, dívida, decisões de gestão.

Table of Contents

Tables index

Abbreviation index

CD = current debt
CR = credit rating
HorL = high or low
LTD = long term debt
ND = net difference
POM = plus or minus
NetDiss = net debt issuance
MorE = mortgage or equipment
ConvD = convertible debt
CRA = credit rating agencies
S&P = standard and poor

I. Introduction

Today's economy is far from the perfect market depicted by Modigliani and Miller. Frictions are multiple and difficult to understand. One of the frictions is the problem of asymmetric information and it leads to a complex lender-borrower relationship. To mitigate this problem, external rating agencies appeared in 1841. Credit rating agencies gather extensive and private information about companies to give a "trustworthy" judgement about companies' financial health. This valuation is provided in the form of a rating- Each of the three major players (Moody, S&P and Fitch) has slightly different grading scales. These scores not only have an informative role for investors, but are also linked to specific regulations that give companies benefits, such as access to a broader range of financial instruments or, on the other hand, higher costs of financing, thus being relevant for managerial decisions. Indeed, in their 2001 paper, Graham and Harvey demonstrated that more than 55% of managers consider credit ratings when determining the appropriate capital structure for their companies. This begs the question of how managers adapt their debt level to the change in credit ratings.

Previous research on the subject is quite restricted, especially compared to other factors that can or do influence managers' capital structure decisions. Additionally, one of the first papers focusing on the relationship between credit ratings and capital structure is quite recent considering that it was published by Kisgen in 2006 whereas scores were first introduced in 1841. In this paper, the author proves that companies tend to decrease debt by almost one percent when facing possible changes in ratings. He concludes that managers are interested enough in the benefits and costs of credit ratings to adapt their company´s capital structure.

Colla, Ippolito and Li (2019) expended research on the subject with quite contradicting results. In their paper, the companies that are near an upgrade and the ones near downgrades have opposite capital structure adjustments to changes. Indeed, they find that companies near upgrades manage to lower the leverage ratio, which is a very good sign of financial health, while companies near a downgrade seem to already suffer from a deterioration in credit quality and experience a significant decrease in leverage.

Kemper and Rao also published a paper in 2013 that contradicts Kisgen's findings. Their general conclusion is that credit ratings are not a "first-order concern in capital decisions". But even more interestingly, one of the ways they used to arrive at this conclusion is by revisiting Kisgen findings. They found that a subsample of B rated firms could have biased the results.

The purpose of the present Dissertation is hence to extend the limited existing literature about credit ratings' impact on capital structure. More precisely it will test if Kisgen's findings can

also be robust to another time spam. The goal is to confirm or give a deeper insight into the affirmation that "credit ratings are significant for capital structure decisions, given discrete costs (benefits) of different credit rating levels". Additionally, the Dissertation will investigate if the results can be applied to a subsample of debt, For this purpose, debt will be divided into seven categories: bank debt, bonds, notes and commercial papers, debentures, convertible debt, mortgage and equipment debt, and other debt. The reasoning behind this new initiative is due to Rauh and Sufi (2010) findings that capital variation is often underestimated or misunderstood when looking at debt as a homogenous entity rather than at its complex composition.

Overall, the results show that managers act upon credit rating changes, more precisely they decrease debt leverage when close to an upgrade and companies' debt level increases when close to a downgrade, as if the consequence of such are already impacting the company. When looking at detailed debt, the usage of bonds significantly decreases for companies both near upgrades and downgrades.

The Dissertation is organized as follows. Section 2 presents the existing literature on the subject. In Section 3, an overview of the sample and the methodology is given. Section 4 is composed of the empirical test results and their interpretation and Section 5 provides a critical analysis of the results through robustness tests. Lastly, an overview of the paper's limitations and a concluding statement can respectively be found in sections 6 and 7.

II. Literature review

Literature on capital structure is broad and a consistent domain of focus of managers and investors. By definition, capital structure relates to how firms decide to finance their operations, especially the level of debt versus equity used. Modigliani and Miller (1958) were some of the first to talk about the subject, stating that capital structure is irrelevant to firms' value and that the sole focus shall be on the net present value projects, assuming a frictionless market.

In today's market, frictions are very much present in five main forms: transaction costs, taxes and regulations, asset indivisibility, nontraded assets, and agency and information problems.

Additionally, as highlighted by Graham (2022) several factors drive debt decisions other than optimal monetary gains. Moreover, the importance of these factors seems to depend not only on the business cycle but also on the size of the company making the choice. Researchers hence had to reevaluate capital structure decisions. Two main theories are still often referred to: the Static Trade-off Theory and the Pecking Order Theory. Both focus on the tradeoff between debt and equity financing. The first one focuses on the advantage of tax benefits coming from debt against the possible costs of it cares to achieve the optimum level of debt.

On the other hand, in the Pecking Order theory, advanced by Myers and Majluf (1984), there is not any optimal level of debt. Here firm characteristics are more important. Additionally, this theory implies that firms prefer internal financing above all and if not possible, debt over equity due to the problem of asymmetric information.
Debates are still ongoing on which theory better fits reality, but the evidence is quite contradictory. Additionally, when trying to understand a firm leverage choice it is important to look not only at the determinants or the preferred leverage but also at that specific firm's constraints. Indeed, as mentioned by Colla and Ippolito (2019) and Faulkender and Peterson (2005) for example, some firms are limited in terms of financing sources. This is often the case for small companies.

The research on capital structure is very thorough on this subject. All the following articles focus on a different way to arrive at the same conclusion: more profitable firms tend, on average, to have lower leverage ratios.

Interestingly, Titman and Wessels (1988) find, additionally to the fact that profitable firms tend to have less debt compared to equity in their balance sheets, that "firms with unique or specialized products have relatively low debt ratios". This proves that many other factors such as firm characteristics can influence debt levels.

Faulkender and Petersen (2005) explain in their paper that access to public debt highly influences a firm's capital structure. They consider that a firm has access to the public bond market if it has a debt rating and they find that on average these companies have 35% more debt. This suggests that the possible sources of capital are highly linked to "a firm ability to access debt markets." Additionally, they prove that firms that must go through financial intermediaries seem to have lower leverage. As hinted in the paper, this is highly related to the "costs of monitoring and imperfect financial contracting".

Hovakimian and al. (2004) innovatively study the effect of equity and debt dual issues. This shows the limitations of previous findings especially as they find that the "number of dual issues is fairly large and that the amount of capital raised tends to be very large".

As proven by the articles just presented, the literature on the capital structure trade-off between debt and equity is vast. But, as many articles limit their research on debt and equity as

homogenous entities, the understanding of the subject is limited. Rauh and Sufi (2010), who look at debt in a very detailed manner, mention in their paper that "traditional capital structure studies ignore debt heterogeneity and miss substantial capital structure variation". Indeed, debt shall be investigated more in detail as it can vary in many ways.

An example is Graham and Harvey (2016): they analyzed debt structure for American firms. In their paper, they mention debt variation in terms of financing choices (bank debt, bonds, government debt, loans and trade finance), sources (domestic and foreign) and maturities. For each category, the choice is motivated by different factors and firm characteristics, hence shedding a little on the complexity of debt and overall capital structure choices.

Another approach is the one of Colla, Ippolito and Li (2019), they decided to focus on the difference in debt structure between rated and unrated firms but also between firms with different credit ratings. This highlighted the problem of financing access; indeed, non-rated companies seem to rely only on capital leases and bank debt while rated companies have access to broader sources. Interestingly, the authors looked in this paper at the company's detailed debt structures and it seems that most firms prefer to concentrate their debt on a sole source of financing instead of using the whole array of resources they have at their disposal.

Another approach is presented by Bolton and Freixas (2000), who focus on the problem of asymmetric information. Their paper differentiates slightly from the previous literature as debt is now divided into 2 categories: bank debt and bonds. This article is the first that looks at debt heterogeneity. It proves the importance of dividing debt into several smaller categories as it impacts firms' capital structure choices. They highlight that bank debt is on one side more flexible but importantly on the other one more costly due to intermediaries' costs. But alternatives have downfalls too, indeed "bonds imply inefficient liquidation costs and equity informational dilutional cost". Due to this, banks seemed to be selected by riskier firms (as they require the flexibility the intermediary offers), while bonds are chosen by safe firms. The companies in between tend to mix equity and bonds.

Similarly, Crouzet works on a subdivision of debt by comparing debt (bank loans) and arm's length debt (bonds). These sources have two main differences: bank debt seems to be better in terms of financial distress as it can be renegotiated. This is highly related to previous articles, "the view that bank debt is more flexible market debt underlines much of the literature on debt

heterogeneity" and proven by factors such as the smaller liquidation premium of banks. The second difference is that market lenders benefit from a lower cost of debt issuance. Overall firms must weigh these two arguments against each other to decide their debt structure.

One very detailed paper on the subject is the one by Kale and Meneghetti (2011), who divide debt into two categories based on debt provenance: specifically, public debt (such as corporate bonds and commercial papers) and private debt (includes bank and all other forms of debt). The authors also highlighted the difference between bank debt and other private debt. Interestingly this article proves that banks tend to lend to low-risk borrowers, while other private institutions lend money to higher-risk borrowers. They even provide some insights into this conclusion: "regulation and capital requirements limit risk-taking abilities and banks develop a reputation for being reasonable with firms in financial distress and, thus, in order to protect their reputation and not force firms into liquidation very often, they only serve medium to low-risk firms". As can be noticed, this is quite conflicting with what Bolton and Freixas (2000) advanced in their paper.

Finally, on the subject of debt heterogeneity, Rauh and Sufi (2010) looked not only at seven different categories of debt but also considered the sources and priorities of the debt. From their sample, approximately 70% of the companies studied use at least 2 of the 7 debt types namely: bank debt, straight bond debt, convertible bond debt, program debt, mortgage debt and other debts. Surprisingly, this is contradictory to the findings of Colla, Ippolito and Li (2019). And very interestingly, they noticed that "25% of the observations in our sample experience no significant one year change in their total debt but significantly adjust the underlying composition of their debt". This has huge implications on the theories of capital structure and is due to the very different properties of each of the debt types.

The previously analyzed articles proved that there are many internal factors affecting firms' capital structure, and external factors can also affect it. The present Dissertation will study the possibility of credit rating changes effect on debt structure.

Credit ratings have been used for a long time. They were first introduced in 1841 and kept on gaining importance. Indeed, as mentioned by Cantor and Packer (1995), due to the ever-growing complexity of financials all financial regulators increased their reliance on the opinions of the credit rating agencies. Investors can save a lot of time if relying on credit ratings and in

the past the agencies proved their reliability. Additionally, in a large survey, Graham and Harvey (2001) disclose that managers see credit ratings as one of the two most important factors, with financial flexibility, influencing debt policy.

Kisgen wrote two articles studying the influence of credit rating changes on capital structure decisions. The first one, published in 2006, is the pioneer on the subject. In this paper, the author argues that "managers' concern for credit ratings is due to the discrete costs associated with different rating levels". An example of these costs is that, in difficult economical periods, it can be complicated or more expensive for some firms with low credit ratings to raise debt. On the other hand, interest rates could be more advantageous for highly rated firms. Kisgen creates a hypothesis (CR-CS) that tests if managers are influenced by the benefits and costs of the different credit ratings. He first looks at broad credit rating because regulation is not different between notches. And then, focuses on all credit ratings based on a credit score he computes that allows him to understand in each rating which firms are losers to upgrades and downgrades. Overall, the paper concludes that capital structure is affected by credit ratings, specifically that firms endangered by a credit change, upgrade as well as a downgrade, tend to use on average 1% less debt in their capital structure compared to stable credit rating firms. Lastly, Kisgen states that "the effects of ratings on the capital structure can be viewed as complementary to existing capital structure"
This article will be the starting point of the present Dissertation.

The same author published a follow-up paper in 2009, in which he specifically researches if managers target credit ratings when making capital structure decisions. Here, results vary slightly compared to the previous article: first changes are now compared to post credit rating changes and it is shown that for downgrades debt level still tends to dimmish while upgrades do not seem to have a significant effect on capital structure. The takeaway from this research is that managers "undertake capital structure behavior to target minimum credit ratings over time." This links back to what some previous articles highlighted about access to debt sources. By keeping a "minimum" credit rating, firms are insured access to certain financing sources.

This proves the importance of studying the effect of credit ratings on capital structure. By looking closer, patterns that firms adopt before changes could be discovered hence allowing a better understanding of which financing sources are the most at risk or able to benefit when credit ratings change. Colla, Ippolito and Li (2019) started to wander on this path, exploring a

large dataset with detailed information on debt structure. By creating clusters based on the company's debt compositions, they conclude that the changes in capital structure are nonlinear. Results differ especially between the companies that are near an upgrade and the ones near downgrades, and also in between the seven clusters that might be linked to sizes as this analysis revealed that it seems to be similar for all firms of one sample.

This makes it legitimate to wonder if it is right to study all credit ratings together. Could Kisgen results be biased by his "general" sample? In his paper, he proves that his sample is somewhat balanced and that most of the credit ratings are significant when look at in detail. Nevertheless, Kemper and Rao in their 2013 paper find evidence that Kisgen's results might be led by a subsample of B- rated companies, the problem is made worst by the grade itself as it is not even an investment grade rate. They obtain these results as they run a very similar test, on a broader sample, in which they find the same overall results but then by doing deeper studies, especially by using subsamples, they conclude that this result does not hold for all access classes. They advanced this hypothesis even before any data usage, they argue that not all firms have the same incentive to achieve or maintain a certain rating, they give the example of firms issuing commercial papers and firms with several investment opportunities.
Additionally, Kemper and Rao (2013) also find opposite results to Kisgen (2006), as their results do not show that companies near the gasp of losing their investment grade are more propitious to adapt their capital structure to avoid such event, which is an implication of Kisgen CR-CS hypothesis. They mention that this might be due to the usage of the other multiple tools that are at managers' disposition (asset sales, layoffs…) hence proposing that credit rating is not the main focus of managers but not saying that they are not important.

With the idea of extending Kisgen's study from his 2006 paper, the sample will contain two major crises: the global financial crisis and the covid-19 pandemic. Both strongly affected the economy. It is extremely important to investigate the effects of the global financial crisis as it is linked not only to changes in capital structure but also to credit ratings. Indeed, it is a popular belief that credit ratings are one of the causes of the crisis (Bahai, Serbs and Tamayo, 2014). Credit ratings based on mortgage securities and collateralized debt obligations failed to accurately predict default probabilities in 2007 (DeHaan, 2017). The origin of the problem is believed to be a conflict of interest between the rating companies and their "clients". CRAs (credit rating agencies) are suspected of relaxing standards hence leading to too "generous" predictions. Controversially, Bahai, Serbs and Tamayo (2014) argue that when looking into

corporate debt ratings they "find that rating agencies have become more conservative over time". They conclude that generally, firms have lower credit ratings today than in the past. Hence, it is difficult for firms to keep their rating from 10 years ago without improvement because of the tightened rating standards. This will need to be kept in my mind when comparing modern data to all older papers.

Additionally, firms' capital structures were highly influenced by the global financial crisis. Bank lending diminished consequently during that period, leaving most of the firms to deal with underinvestment. But all other financing sources were also affected, "In sum, the financial crisis made it much harder for firms to borrow and invest" (Balakrishnan, Watts and Zuo, 2016). This is again confirmed by Fosberg (2012), who proves that debt issuance diminished by 36% and equity issuance by 46.2% in that period.

During the pandemic, the effect on the capital structure was quite different: "firms increased their debt to take advantage of record low interest rates" (Altman, 2020). This led to a substantial growth in corporate debt and particularly a vast majority of this new debt is rated as BBB by credit rating agencies. (Altman, 2020). Importantly, this ratio marks the difference between speculative and investment grades of debt. It is believed that credit rating companies and the market conditions in that period allowed companies to have higher leverage ratios while keeping their investments grade.

In light of past research, the present paper aims to understand if managers take precautionary action on companies' capital structures when facing a possible change in credit rating. As a matter of fact, any upgrade or downgrade has advantages and disadvantages due to each rating specific regulations and reputation.

III. Data and methodology

a. Data

The main sample of this Dissertation is composed of 10339 observations. These are active American and Canadian publicly held firms available on the Compustat-Capital IQ north America fundamental annual database. From this platform, for each observation, eleven accounting variables such as assets, long-term debt and stockholders' equity are downloaded. All these variables are of high importance in the computation, hence all rows with missing

values are deleted. With this complete sample, the variables of interest are created, as described in Table 1.

Table 1: Variable description

Variable name	Acronym	Description
Equity	E	Value of Shareholder's Equity
Debt	D	Long Term Debt + Short Term Debt
Assets	A	Total Assets
Equity changes	ΔE	Sales of Common and Preferred Stocks – Purchases of Common and Preferred Stocks
Long Term Debt Changes	ΔLTD	Long Term Issuances-Long Term Reduction
Current Debt Change	ΔCD	Changes in Current Debt
Debt Changes	ΔD	ΔLTD + ΔCD
Net Debt Changes	NetDiss	(ΔD − ΔE)/A

$NetDiss_{it}$ is the dependent variable, it is the net debt raised for the year minus net equity raised for the year divided by beginning-of-year total assets (cf table 1). This reflects the firm changes in capital structure due to market transactions in a given year, indeed by excluding the changes in equity, that year earnings are not taken into account anymore. The coefficient of this variable will explain how debt levels adapt to changes in credit scores.

Three control variables are added to the model. Their purpose is to help in differentiating financial distress results from credit rating changes, which is important as in some cases the two can have the same empirical implication. But the focus of this paper is on credit rating, including the values at t-1 of size, leverage and profitability in the equations ensure that the results are the effects of credit rating changes only. These variables are also useful to mitigate the impact of firms' financial conditions on the results. The first one, leverage, is measured by the firm amount of debt divided by its liabilities. Leverage and financial distress are known to have a negative relationship. Size is also taken into consideration, through the natural logarithm of sales. This is a good measure of financial distress as larger firms tend to have lower probabilities of distress (Kisgen,2006). And, finally, profitability is measured by dividing the firm's Ebitda by its total assets. This depicts a good picture of a company ability to generate profits and overall performance. If this indicator increases, the probability of financial distress diminishes.

One of the most important variables of this paper is credit rating. The S&P Global Ratings Domestic Long-Term Issuer Credit Rating is used in the analyses. It is defined as "a current opinion of the creditworthiness of an obligor with respect to a specific financial obligation". It is available on Compustat but unfortunately only until 2017. All available scores are downloaded and merged into the Compustat data. After that, for all complete observations of 2018, 2019, 2020 and 2021, manual research is done on Refenitiv Eikon to add all available credit ratings. It is important to note that the credit ratings used for each year are the ones that companies had in January. They are split into seventeen categories going from AAA to CCC+ and below.

As the focus of this Dissertation resides in the impact of credit score changes on capital structure, scores given by S&P are looked at in two different ways.

The first view is broader and referred to as the Plus or Minus test (POM). Here credit ratings are separated into three categories solely based on the sign of the rating. This allows us to see if managers modify their firm capital structure to benefit from regulation changes as they are generally made for a notch of rating rather than each score (Kisgen, 2006).

CRplus allows us to see all firms that are near an upgrade, more precisely, close to a complete change in "broad rating". CRminus has similar information but for companies near a downgrade. And the dummy CRpom regroups all firms near a consequent change in credit rating, that is, for this test, all observations whose credit rating contains a plus or a minus (cf table 2). No differentiation is made regarding the score notch as the hypothesis tested states that the effect of credit rating affects companies at all credit rating levels.

Table 2: Plus or minus test dummies

CRplus	CRminus
AA+	AA-
A+	A-
BBB+	BBB-
BB+	BB-
B+	B-
Crpom	

Table 2 represents the repartition of ratings in the POM dummies, credit ratings are equal to 1 in the category they are in, in the above chart, and 0 otherwise. For example, BBB+ dummies will be equal to 1 in CRplus and CRpom and 0 in CRminus. Credit ratings not represented here such as AA has all its dummies equal to 0.

The second way of looking at credit ratings is more precise and focuses on smaller and "easier" changes. It allows us to see if managers are equally, more or less interested in a change in rating than within a Broad Rating. To do so, Kisgen's (2006) High or Low method is implemented. The author creates a formula, using similar data to credit rating agencies, that allows to rank firms by credit score.

$$\text{Eq(7)} = Credit\ Score = 1.4501Log(Assets) + \frac{11.6702EBITDA}{ASSETS} - \frac{6.0462Debt}{TotalCapitalization}$$

The purpose of the formula is to understand, in each credit score rating, which firms are closer to a change. With this ranking, three dummy variables are created: CRhigh regroups firms from the higher third of all 17 credit ratings and CRlow the lower third. Finally, CRhorl regroups firms from those two dummies too, once again, have a view of all firms near a credit rating[1]. Table 3 presents a more visual explanation of how the dummies are created.

Table 3: Dummies descriptions

Dummy name	Acronym	Description
Positive POM test	CRplus	=1 for firms with a plus in their credit rating
Negative POM test	CRminus	=1 for firms with a minus in their credit rating
Complete POM test	CRpom	=1 for CRplus and CRminus
Positive HorL test	CRhigh	=1 for firms in the higher third of their credit rating
Negative HorL test	CRlow	=1 for firms in the lower third of their credit rating
Complete HorL test	CRhorl	=1 for CRhigh and CRlow

Two additional dummies are created to look at the magnitude of the debt and equity issuance in a specific year. The dummies take a value of 1 if the issuance is bigger than 10% of the company's assets. This will be later used in the regressions as big issuances could interfere with the results. Indeed, if the issuance is too big it might result in a downgrade regardless of that company credit rating. Additionally, important issuance is often related to a consequent change in companies' structure or management, hence making the observations irrelevant to this Dissertation whose goal is to see if managers change their firm debt usage to obtain an upgrade or avoid a downgrade in credit rating Then, cases of large equity issuance are also excluded thanks to the high equity issuance dummy. Even if rarer, partially due to high transaction costs,

[1] In his paper, Kisgen mentioned that this measure, even if more detailed, is also less reliable due to the way the credit score is computed, hence the results should be looked at carefully. Additionally, this variable can not completely be used to answer the hypothesis as the author formulates that regulation should not vary within a given notch.

these issuances must be excluded as they could influence results. Nevertheless, it is interesting to compare results with only debt issuance excluded because there is the risk of excluding only smaller companies when limiting equity offering hence possibly creating bias in the sample.

In the sample, observations range from 2001 to 2021. In this period the economy went through many cycles and faced two major financial events that affected credit rating and capital structure: the financial crisis and the Covid-19 pandemic. To make sure that these extraordinary periods did not affect results, two dummies are introduced. FC is the Financial Crisis Dummy, based on the information of the US National bureau of economics[2] it takes a value of 1 in 2008 and 2009. Covid is the dummy that takes a value of 1 in the pandemic period that, according to Bloom, Fletcher and Yeh, (2021) impacts the market since the first quarter of 2020.

To bring this analysis even further, debt is looked at in more detail. On a sub-sample of previous firms and thanks to the EDGAR database, a breakdown of debt is manually created. This database is a public and free database that contains the SEK fillings from firms publicly traded in the United States of America. For this Dissertation, the Annual 10K fillings are used, especially the long-term debt note. It contains the specific breakdown of debt for the company in a particular year. Following the paper of Rauh and Sufi (2010), debt is classified into seven categories.

Table 4: Detailed sample debt categories

Debt Categories	**Includes**
Bank Debt	Revolving credit, lines of credit, term loans & bank overdraft
Bonds	Public debt issuances, industrial revenue bonds & international bonds
Notes and Commercial Paper	Medium term notes, floating rate notes & commercial papers
Debentures	Debentures
Mortgage or Equipment	Mortgages bonds & all equipment debt
Convertible	Convertible notes, convertibles debentures & foreign convertible debt
Other	Capital leases & all non-identifiable debt

A sample of 2038 observations is obtained, and it covers the whole range of credit scores and time. This is almost 20% of the original sample. For this data there will be several variables of interest in the model of NetDiss.

[2] According to the U.S. National Bureau of Economic Research (the official arbiter of U.S. recessions) the recession began in December 2007 and ended in June 2009, and thus extended over eighteen months.

Table 5: Detailed Debt sample variables descriptions

Variable name	Acronym	Description
Net Bank Debt Changes	NDBank	(ΔDBank − ΔE)/A
Net Bond Debt Changes	NDBonds	(ΔDBonds − ΔE)/A
Net Notes and Commercial Paper Changes	NDNotes	(ΔDNotes − ΔE)/A
Net Debentures Debt Changes	NDDeb	(ΔDPrivP − ΔE)/A
Net Mortgage or Equipment Debt Changes	NDMorE	(ΔDMorE − ΔE)/A
Net Convertible Debt Changes	NDConvD	(ΔDConvD − ΔE)/A
Net Other Debt Changes	NDOther	(ΔDOther − ΔE)/A

b. Methodology

In this Dissertation, the goal is to examine if firms near credit rating changes have different behavior when it comes to debt and equity usage to avoid financial constraints from a credit downgrade or benefit from an upgrade. To verify this, a regression of the net debt raised in the year minus the net equity of that year divided by total assets on different credit rating dummy variables is run under several forms.

The main equation is as follows:

$$\text{Eq (1)} \quad NetDiss_{it} = \alpha + \beta_0 CR_{pom} + FC + Covid + \varepsilon_{it}$$

Here, the net changes of equity minus the net changes of equity divided by the firm's total assets are regressed on the POM test dummy that includes firms near an upgrade or downgrade. Additionally, the two control variables of the main financial crisis present in the sample period are included.

Successively, to go further into detail, Eq (2) is run. The three control variables previously explained are integrated into the equations. The goal is to verify that the possible significance of the variable is not due to other macroeconomics factors, especially size, profitability, and leverage.

$$\text{Eq (2)} \quad NetDiss_{it} = \alpha + \beta_1 CR_{pom} + Size_{t-1} + Profitability_{t-1} + Leverage_{t-1} + FC + Covid + \varepsilon_{it}$$

Lastly, Eq (3) is used. It allows to verify that firms' behavior is the same when facing upgrades and downgrades while controlling for the same factor as the previous equation.

$$\text{Eq (3)}\quad NetDiss_{it} = \alpha + \beta_3 CR_{plus} + \beta_4 CR_{minus} + Size_{t-1} + Profitability_{t-1} + Leverage_{t-1} + FC + Covid + \varepsilon_{it}$$

The same process and types of equations are then repeated to the second way of computing credit score dummies: the high or low method.

$$\text{Eq (4)}\quad NetDiss_{it} = \alpha + \beta_5 CR_{horl} + FC + Covid + \varepsilon_{it}$$

$$\text{Eq (5)}\quad NetDiss_{it} = \alpha + \beta_6 CR_{horl} + Size_{t-1} + Profitability_{t-1} + Leverage_{t-1} + FC + Covid + \varepsilon_{it}$$

$$\text{Eq (6)}\quad NetDiss_{it} = \alpha + \beta_7 CR_{high} + \beta_8 CR_{low} + Size_{t-1} + Profitability_{t-1} + Leverage_{t-1} + FC + Covid + \varepsilon_{it}$$

Regarding the detailed debt sample, very similar computations will be made and the sole difference resides in the dependent variable. Indeed, now all six equations will be computed for the variables of table 5. Here is an example:

$$\text{Eq (8)}\quad NDBonds = \alpha + \beta_9 CR_{pom} + FC + Covid + \varepsilon_{it}$$

IV. Empirical Findings

a. Summary statistics

Table 6: Average leverage ratio, by credit rating of the main sample

Credit Rating	Observations	Mean	Median	Std. Dev.
AAA	142	45.66%	35.34%	32.21%
AA+	71	43.03%	24.07%	35.96%
AA	163	37.95%	34.62%	20.77%
AA-	330	43.36%	40.67%	26.52%
A+	571	43.13%	43.13%	25.73%
A	1112	47.25%	46.58%	22.79%
A-	1324	46.39%	47.29%	17.34%
BBB+	1503	47.13%	48.55%	17.60%
BBB	1623	47.20%	49.16%	18.08%
BBB-	1034	45.26%	45.34%	19.22%
BB+	528	48.49%	49.08%	22.59%
BB	574	51.57%	49.96%	21.96%
BB-	518	55.08%	57.88%	22.20%
B+	389	58.07%	61.33%	23.78%
B	265	57.85%	59.76%	24.13%
B-	111	63.94%	65.44%	21.65%
CCC+ or below	81	59.95%	61.25%	23.77%

This table highlights the expected trend that "better" credit scores tend to have a lower median debt to total capitalization ratios. For example, the first notch of ratings has a median lower than 35% while the BBB notch median is around 48%. Additionally, all standard deviations are between 17% and 35%, highlighting that the variations within each rating are important too. This table also shows the distribution of the sample, that is the number of firms in each rating, and it differs quite a lot, going from 71 for AA+ firms up to 1623 for BBB rated companies. Still, 9 of the 17 firms have between 500 and 1600 observations and the top-notch firm are rarer as it is in the market. Robustness tests will be computed to assure that no subsample leads the sample results.

Table 7: Main sample capital activity

	Offerings		Reductions	
	Observations	%	Observations	%
Debt	3794	36.7%	2334	22.6%
Equity	521	5.0%	2059	19.9%
Both	387	3.7.%	582	5.6%
Neither	5637	54.5%	5364	51.9%

Table 7 examines the capital activity by firm-years in the sample:

Offerings refer to increases in the financing methods that represent more than 1% of the company assets, while reductions summarize the decreases of the same minimum amplitude. The first interesting information is that firms tend to modify one or the other financing channel. Indeed, increases in both methods represent only 3.7% of offerings and 5.6% of reductions. Offerings show that firms prefer to increase debt (36.7%) rather than equity (5.0%). This is one of the reasons that we created or subsample on a debt breakdown. When it comes to reductions, both channels are used quite evenly, 2334 observations preferred debt and 2059 opted for equity.

Similar tests are computed for the second sample that analysis debt based on its provenance source.

Table 8: Average leverage ratio, by credit rating of the detailed debt sample

Credit Rating	Observations	Mean	Median	Std. Dev.
AAA	39	18.36%	15.42%	10.68%
AA+	24	25.32%	18.36%	20.26%
AA	12	30.16%	30.56%	8.79%
AA-	38	43.75%	34.62%	25.93%
A+	148	31.48%	28.36%	17.42%
A	300	42.04%	39.63%	18.86%
A-	225	42.85%	43.04%	17.24%
BBB+	231	42.97%	42.94%	16.27%
BBB	343	44.64%	43.68%	16.66%
BBB-	212	40.69%	38.22%	16.85%
BB+	122	52.22%	53.89%	20.67%
BB	131	51.90%	51.24%	20.98%
BB-	84	58.53%	65.16%	22.09%
B+	73	60.56%	63.48%	22.95%
B	36	60.30%	63.18%	21.73%
B-	12	56.96%	58.85%	15.90%
CCC+ or below	8	44.50%	45.65%	8.90%

Table 8 shows that the second sample, even if smaller than the main sample, is very similarly distributed to the main sample (see appendix 1). The same pattern of lower median debt to capitalization ratios can be noted. Additionally, the standard deviations of all credit ratings vary between 8.8% and 26% assuring a minimum of variation and hence representation in each category.

Table 9: Detailed sample capital activity

	Bank debt		Bonds		Notes and CM		Debentures	
Offerings	720	35.3%	768	37.7%	755	37.0%	776	38.1%
Reductions	573	28.1%	497	24.4%	552	27.1%	494	24.2%
Neither	745	36.6%	773	37.9%	731	35.9%	768	37.7%
Total	2038	100.0%	2038	100.0%	2038	100.0%	2038	100.0%

	Mortgage & Equipment Debt		Convertible Debt		Other	
Offerings	777	38.1%	780	38.3%	645	31.6%
Reductions	486	23.8%	490	24.0%	654	32.1%
Neither	775	38.0%	768	37.7%	739	36.3%
Total	2038	100.0%	2038	100.0%	2038	100.0%

Here the output is slightly different as the activity is broken down by source. It shows how many offerings and reductions of more than 1% of the company assets happened in the 2038 firm-year observations. Overall, the results are homogenous between the sources with approximatively 37% of increases and 27% of decreases. This also shows that no category is over or underrepresented.

b. Main Results

Table 10: Plus or Minus Test results

	Panel A			Panel B		
	EQ1	**EQ2**	**EQ3**	**EQ1**	**EQ2**	**EQ3**
CRpom	-0.0021	-0.0027		-0.0020	-0.0017	
	(0.0018)	(0.00163)		(0.0017)	(0.0016)	
CRplus			-0.0017			-0.0007
			(0.0019)			(0.0019)
CRminus			-0.0029			-0.0026
			(0.0019)			(0.0017)
Leverage t-1		-0.1001***	-0.1010***		-0.0801***	-0.0802***
		(0.0103)	(0.0103)		(0.0067)	(0.0068)
Profitability t-1		0.1840***	0.1840***		0.1610***	0.1600***
		(0.0511)	(0.0512)		(0.0201)	(0.0068)
Size t-1		-0.0085***	0.0085***		0.0058***	0.0058***
		(0.00143)	(0.0014)		(0.0010)	(0.0010)
FC	-0.0117***	-0.0130***	-0.0130***	-0.0114***	-0.0122***	-0.0122***
	(0.0024)	(0.0023)	(0.0023)	(0.0022)	(0.0021)	(0.0021)
Covid	-0.0108***	-0.0044	-0.0044	-0.0105***	-0.00472	-0.0048
	(0.0038)	(0.0040)	(0.0040)	(0.0035)	(0.0035)	(0.0035)
Constant	0.0068***	-0.0348***	-0.0348***	0.0122***	0.0166*	-0.0164*
	(0.0018)	(0.0128)	(0.0128)	(0.0015)	(0.0095)	(0.0094)
R^2 (%)	0.52%	11.01%	11.01%	0.52%	9.97%	9.99%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

The above table shows the result of the Plus or Minus regressions for two panels. In particular, Panel A reports the results for cases where debt issuances higher than 10% of the company assets are excluded and Panel B for cases where both debt and equity issuances of more than 10% of assets are excluded. As a reminder, this is due, following Kisgen's paper, to exclude big issuance that could bias the results (cf data and methodology).

Colum 1 reports the results of equation 1. As the output shows, the variable of interest, CRpom is not statistically significant in neither equation or panel, suggesting that managers do not adapt companies' capital structure to reach or avoid a possible notch upgrade or downgrade.

However, the computation shows that both crises present in the sample time spam, the financial crisis (FC) and the Covid-19 pandemic (Covid) negatively and significantly affect companies' capital structure at the 1% significance level. More specifically, in the years of the financial crisis (2008 and 2009), firms used approximatively 0.01% less debt than usual; similarly, firms used 0.01% less debt during the pandemic (2020 and 2021). The financial crisis results are in line with expectations and past literature (Balakrishnan, Watts and Zuo (2016) and Fosberg (2012)), as debt was less accessible during those years. On the other hand, Covid negative coefficient is opposite to expectation, as Altman (2020) finds that firms increase their debt in this period to take advantage of low interest rates.

Expectedly, the two following equations, whose purposes are to better understand the effect of the credit rating dummies on the variable net diss, present similar results. Equations 2 and 3 demonstrate that all the control variables implemented are significant at the 1% significance level. Leverage at time t-1 has a negative relationship with a company capital structure, indeed for a 1% increase in leverage, debt decreases by 0.08%. On the other hand, both size and profitability have a positive relationship with a company debt level, respectively they increase the leverage by 0.004% and 0.17% for a 1% change in their value. Importantly, when adding these control variables, the impact of the financial crises remains unchanged while the effect previously attributed to covid loses its significance. A possible explanation is that the firm characteristics that are used as control variables are the ones impacted by Covid but when they are not included in the equation the effect is absorbed by the time dummy making it significant. Equation 3 uses the two components of CRpom, CRplus and CRminus, as independent variables to further verify if the effect of CRpom on debt issuance can significantly be attributed to both firms near upgrades and downgrades. This allows us to verify that the results are not led by one of the two situations. Additionally, when comparing the results of panels A and B there is no significant difference, hence proving the robustness of the results to the exclusion of high equity issuances.

The non-significance of the CRpom, CRplus and CRminus variables is contradictory with Kisgen (2006) findings. In his paper CRpom negatively and significantly affects the dependent variables (cf appendix 2). However, there are some differences between the present Dissertation and Kisgen's regarding the data implemented, the statistical tool used, and the period considered. To have a fairer comparison, the same tests are done on a non-panel dataset, to follow Kisgen model, and the findings can be seen in the table below.

Table 11: Plus or Minus test on a non-panel database

	Panel A			Panel B		
	EQ1	**EQ2**	**EQ3**	**EQ1**	**EQ2**	**EQ3**
CRpom	-0.0031**	-0.0019		-0.0028***	-0.0015	
	(0.0014)	(0.0013)		(0.0013)	(0.0012)	
CRplus			-0.0004			-0.0003
			(0.0015)			(0.0015)
CRminus			-0.0026*			-0.0026**
			(0.0014)			(0.0014)
Leverage t-1		-0.0055***	-0.0503***		-0.0503***	-0.0503***
		(0.0109)	(0.0034)		(0.0034)	(0.0034)
Profitability t-1		0.1740***	0.1650***		0.1650***	0.1650***
		(0.0357)	(0.0138)		(0.0138)	(0.0138)
Size t-1		0.0050***	0.0038***		0.0039***	0.0038***
		(0.0005)	(0.0005)		(0.0004)	(0.0005)
FC	-0.0128***	-0.0135***	-0.0126***	-0.0122***	-0.0126***	-0.0126***
	(0.0023)	(0.0024)	(0.0021)	(0.0022)	(0.0021)	(0.0021)
Covid	-0.0107***	-0.0076**	-0.0058	-0.0914***	-0.0055	-0.0056
	(0.0021)	(0.0024)	(0.0034)	(0.0034)	(0.0034)	(0.0034)
Constant	-0.0012**	-0.0239***	-0.0139***	0.0133***	-0.0141***	-0.0139***
	(0.0011)	(0.0067)	(0.0044)	(0.0010)	(0.0044)	(0.0044)
R^2 (%)	0.50%	11.60%	10.40%	0.50%	10.30%	10.40%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

Using the same methodology implemented by Kisgen (pooled time-series cross-section regressions), the results are more in line with his findings. Indeed, CRpom of Equation 1 is significative at the 5% significance level and all significant variables have matching signs to previous findings. However, there is still a difference as in this sample for Equation 3 CRplus is not significant hence suggesting that managers will alter their capital structure to avoid downgrade but not with the goal of switching to a higher credit rating. This also highlights the importance of running Equation 3 not to misinterpret the CRpom results. The difference in results between the panel and non-panel sample are very interesting as they reveal a possible flaw of Kisgen paper. Indeed, the main difference between these two methods is that the panel

considers firms' characteristics that cannot be controlled such as management bias. This could mean that the results that Kisgen obtain could have been led by his sample firm characteristics.

Table 12: High- or Low-test results

	Panel A			Panel B		
	EQ4	**EQ5**	**EQ6**	**EQ4**	**EQ5**	**EQ6**
CRhorl	0.00511***	0.0031*		0.0042***	0.0026*	
	(0.0017)	(0.0016)		(0.0015)	(0.0015)	
CRhigh			-0.0016***			-0.0141***
			(0.0026)			(0.0023)
CRlow			0.0233***			0.0205***
			(0.0028)			(0.0024)
Leverage t-1		-0.1010***	-0.1360***		-0.0798***	-0.1140***
		(0.0103)	(0.0143)		(0.0068)	(0.0107)
Profitability t-1		0.1830***	0.1960***		0.1600***	0.1780***
		(0.0513)	(0.0513)		(0.0202)	(0.0215)
Size t-1		0.0085***	0.0110***		0.0058***	0.0083***
		(0.0014)	(0.0015)		(0.0011)	(0.0011)
FC	-0.0117***	-0.0130***	-0.0144***	-0.0114***	-0.0122***	-0.0136***
	(0.0024)	(0.0023)	(0.0023)	(0.0022)	(0.0022)	(0.0021)
Covid	-0.0108***	-0.0045	-0.0036	-0.0105***	-0.0046	-0.0035
	(0.0038)	(0.0040)	(0.0040)	(0.0035)	(0.0036)	(0.0034)
Constant	0.0018	-0.0389***	0.4360***	0.0071***	-0.0199**	-0.0261***
	(0.0019)	(0.0127)	(0.0126)	(0.0015)	(0.0095)	(0.0096)
R^2 (%)	0.52%	11.01%	13.99%	0.52%	9.97%	12.50%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

The above table presents the output of the same three equations and both panels but for the second method of controlling for credit rating changes. The high or low method is concerned with any upgrade or downgrade between the credit ratings themselves instead of notch ratings and the results are quite opposite to previous findings. As seen in table 12, CRhorl is positive and significant for both equations and panel but with different levels of significance. Equation 1 for panel A and B tell us, at the 1% significance level, that companies near an upgrade or a

downgrade tend to use 0.005% more debt than companies seemingly near a change when only excluding high debt issuances and 0.004% more when excluding high debt and equity issuances. This implies that managers adapt their capital structure to the possibility of a change in credit rating. This test is very contradictory to Kisgen's finding. The author also had significant results but all with negative coefficients. To ensure that this difference in findings is not due to the method used, computations are also calculated with the other technique, but the results remain unchanged. On the other hand, these results are in line with the findings of Colla, Ippolito and Li (2019).

When it comes to how crises affect the sample, the results remain logically unchanged compared to Pom testing, in Equation 1 both the financial crisis and Covid negatively and significantly affect companies' capital structure. When including the control variables in equation 2, CRhorl losses some economic significance from a 0.004% increase to a 0.003% for panel B but the overall conclusion that managers adapt their capital structure remains. Additionally, all control variables behave in an almost identical manner as they did for POM testing with all of them being significant at the 1% significance level except for Covid. Equation 3, bring very interesting insights, it confirms that managers adapt their capital structure for both upgrades and downgrades but in two opposite ways. As a matter of fact, those two variables have opposite signs. CRplus, which refers to companies near an upgrade, has a negative coefficient consequently reporting that firms near an upgrade tend to decrease their debt usage by 0.01%. On the other hand, CRminus is positive, accordingly, companies near a possible downgrade use less debt by 0.02%. These results are in line with Colla, Ippolito and Li (2019) findings. In the case of an upgrade, this is the expected result, indeed due to the advantages of obtaining a higher credit rating company will probably need less debt. This is explained by two different factors, first, higher credit scores help companies access to debt. Their choice of sources is broader, easier and less expensive as collaterals or premiums needed are lower and overall debt can easily be reduced when upgrading credit scores (Faulkender and Petersen, 2005). Secondly, an improvement in credit ratings is a very good image for investors, hence leading to easier equity financing (Cantor and Packer, 1995). This links back to the hypothesis presented by Kisgen that managers care about credit ratings for the benefits and costs that they represent. On the other hand, for downgrades, the findings are quite alarming. As a matter of fact, higher leverage is usually a synonym for financial deterioration. It could mean that managers are already experiencing the effect of downgrades or of financial distress instead of the original hypothesis which is that the increase in debt is a way of offsetting the possible

downgrade. Nevertheless, it is important to keep in mind that a drop in leverage of 0.02% does not automatically result in a downgrade, many companies tend to stay for several years with the same credit score. S&P check their score accuracy quarterly and then do an important annual revision, but the data showed many companies keep their ratings for several years, and some of them kept the same for the whole time-spam. This is even more impressive as Bahai, Serbs and Tamayo (2014) proved that obtaining a certain credit rating gets more difficult as time passes.

The previous tests include seventeen different credit ratings allowing us to have a very broad view on the matter. But companies and access to financing vary a lot, especially between investment and non-investment grade companies (Faulkender and Petersen 2005). To be certain that the results can be applied to all companies, computations are repeated on subsamples that divide the observations between investment grades firms, that is observations with a credit rating between AAA and BBB-, and non-investment grade firms, all observations with investment grade lower than BBB-.
Overall, it is possible to state that results hold for companies across the seventeen different credit ratings.

Table 13: Investment Grade test, High or Low results

	Non-Investment Grade			Investment Grade		
	EQ4	**EQ5**	**EQ6**	**EQ4**	**EQ5**	**EQ6**
CRhorl	0.0019	-0.0003		0.0050***	0.0032**	
	(0.0036)	(0.0036)		(0.0016)	(0.0015)	
CRhigh			-0.0195***			-0.0126***
			(0.0048)			(0.0023)
CRlow			0.0182***			0.0021***
			(0.0052)			(0.0028)
Leverage		-0.6230***	-0.0948***		-0.0842***	-0.1240***
t-1		(0.0109)	(0.0189)		(0.0062)	(0.0081)
Profitability		0.0792***	0.1020***		0.2001***	0.2150***
t-1		(0.0305)	(0.0333)		(0.0252)	(0.0266)
Size t-1		0.0044***	0.0063***		0.0049***	0.0082***
		(0.0015)	(0.0017)		(0.0014)	(0.0015)
FC	-0.0120**	-0.0145***	-0.0158***	-0.0109***	-0.0113***	-0.0127***
	(0.0053)	(0.0053)	(0.0051)	(0.0024)	(0.0023)	(0.0023)
Covid	-0.0048	-0.0019	-0.0034	-0.0103***	-0.0049	-0.0031
	(0.0074)	(0.0075)	(0.0074)	(0.0034)	(0.0034)	(0.0033)
Constant	-0.0065**	-0.0139	-0.0122	0.0133***	0.0124	-0.0236**
	(0.0030)	(0.0147)	(0.0155)	(0.0016)	(0.0115)	(0.0116)
R^2 (%)	0.31%	4.97%	7.93%	0.57%	11.23%	12.76%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

This table presents on the left the results of Equations 1 through 3 for a subsample only composed of companies with non-investment grades (2164 observations) and on the right all the ones with investment grades (7472 observations). Results are in line with previous findings, especially when looking at Equation 3, which was previously highlighted as the best representative result. A difference in the impact magnitude between the two groups is noticeable, especially on the CRlow variable, indeed non-investment companies close to downgrades experience a 0.023% increase in their debt while this increase is only 0.020% for investment grade companies.

Another difference between both subgroups is that for investment grade companies CRpom is significative to the 1% level in Equation 1 and to the 5% significance level in Equation 2 while

not significative for non-investment grade observations. This is very different from previous findings, especially because both coefficients are positive, which highlights once again the importance of referring almost solely to Equation 3 to avoid a subgroup bias.

When looking at the same breakdown for the plus and minus tests, no surprise arises. The variables of interest still are not significant while controls have the "usual" impact on both subgroups with only a slight difference in economic impact. (cf appendix 3)

To insure even further that these results apply to all the firms in the sample studied notch fixed effects are computed.

Table 14: Detailed High or Low tests for each notch credit rating

	AAA	**AA**	**A**	**BBB**	**BB**	**B**	**CCC**
CRhigh	-0.0144**	-0.0244***	-0.0140***	-0.0176***	-0.0225***	-0.0245***	-0.0302*
	(0.0069)	(0.0077)	(0.0025)	(0.0023)	(0.0037)	(0.0082)	(0.0167)
CRlow	0.0243	0.0298*	0.0168***	0.0170***	0.0172***	0.0185*	0.0017
	(0.0173)	(0.0154)	(0.0027)	(0.0023)	(0.0038)	(0.0101)	(0.0186)
Leverage t-1	-0.0507*	-0.0761**	-0.0639***	-0.0924***	-0.0849***	-0.0996***	-0.0064
	(0.0272)	(0.0308)	(0.0084)	(0.0083)	(0.0105)	(0.0176)	(0.0075)
Profitability t-1	0.5550	0.0613**	0.0360**	0.0702***	0.0498**	0.0394	0.0896
	(0.0736)	(0.0307)	(0.0162)	(0.0180)	(0.0218)	(0.0424)	(0.0681)
Size t-1	-0.0026	0.0095	0.0031***	0.0041***	0.0036***	0.0061*	0.0019
	(0.0059)	(0.0059)	(0.0009)	(0.0012)	(0.0014)	(0.0036)	(0.046)
FC	-0.0072	-0.0278**	-0.0069**	-0.0038*	-0.0052	-0.0173**	-0.1040**
	(0.0109)	(0.0117)	(0.0030)	(0.0022)	(0.0046)	(0.0082)	(0.0502)
Covid	-0.0127***	-0.0270***	0.0030	-0.0033	0.0001	-0.0170	-0.0058
	(0.0049)	(0.0100)	(0.0035)	(0.0033)	(0.0051)	(0.0195)	(0.0216)
Constant	0.0552	-0.0617	0.0023	0.0022	0.0036	-0.0033	-0.0169
	(0.0649)	(0.0472)	(0.0069)	(0.0091)	(0.0113)	(0.0274)	(0.0340)
R^2 (%)	1.44%	10.92%	3.02%	4.64%	5.93%	5.68%	29.99%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

This table shows the results for equation 3 on notch sub-sample groups. The results are very interesting: the CRhigh variable is significant across all notch ratings and with very similar

economic significance for all ratings. On the other hand, CRlow is significant for only five out of the seven ratings. As a matter of fact, companies in the highest and lowest ratings do not seem to be affected by capital structure changes in cases of downgrades. Possibly, the small size of CCC and below category (82 observations), affects the result. In particular, because it seems that managers do not take capital structure actions to avoid downgrades into the non-rated category. Colla, Ippolito and Li (2019) prove in their paper that there is a consequent change in capital structure between those two types of firms notably due to the related access to debt. This is considered a highly important motivation of manager behaviors to changes in credit ratings.

Additionally, this output gives us very interesting information about the impact of the control variables on each section. Notably, AAA rated companies seem not to be influenced by the financial crisis but, contrary to the other notch, to be highly impacted by Covid.

On the other hand, the outputs from Equation 5 for notch rating fixed effect show that CRpom is not significative for any of the Notch credits with the expectation of firms with A credit rating (cf appendix 4). These results suggest that companies with the top third of the tree credit rating of this notch tend to use 0.004% more debt. But as demonstrated by previous findings, the usage of debt tends to be the opposite for companies near upgrades and downgrades, so this test is disregarded.

The same tests are computed for the plus or minus test. Surprisingly, one variable is significant: CR minus seems to negatively affect capital structure for BB rated companies (cf appendix 5). This is very interestingly similar to the findings of Kemper and Rao (2013), which suggested that the results found by Kisgen in his 2006 paper are led by a subsample of B rated observations. This does not happen in the sample used, but BB rated companies are the only ones to have a significant CRpom and it is negative as in Kisgen's findings.

Lastly, the sample is examined under the lens of year fixed effects. To have enough observations and similarly sized subgroups Equation 6 is applied to groups of three years of observations.

Table 15: Detailed High or Low method with year fixed effect

	2001 2003	2004 2006	2007 2009	2010 2012	2013 2015	2016 2018	2019 2021
CRhigh	-0.0174***	-0.0234***	-0.0297***	-0.0184***	-0.0124***	-0.0262***	-0.0127**
	(0.0041)	(0.0051)	(0.0042)	(0.0028)	(0.0028)	(0.0040)	(0.0058)
CRlow	0.0236***	0.0232***	0.0256***	0.0109***	0.0155***	0.0126***	0.0209**
	(0.0040)	(0.0048)	(0.0037)	(0.0033)	(0.0033)	(0.0036)	(0.0087)
Leverage t-1	-0.0692***	-0.0867***	-0.1080***	-0.0519***	-0.0425***	-0.0799***	-0.0561**
	(0.0084)	(0.0135)	(0.0107)	(0.0078)	(0.0076)	(0.0126)	(0.0253)
Profitability t-1	0.0977**	0.0121	0.0512**	0.0756***	0.0357***	0.0747***	0.5590***
	(0.0391)	(0.0253)	(0.0220)	(0.0206)	(0.0136)	(0.0253)	(0.0211)
Size t-1	0.0043***	0.0038**	0.0063***	0.0026***	0.0031***	0.0060***	0.0031
	(0.0016)	(0.0013)	(0.0018)	(0.0008)	(0.0009)	(0.0016)	(0.0020)
Constant	-0.0272	0.0074	-0.0082	-0.0007	-0.0036	-0.0123	-0.0110
	(0.0169)	(0.0081)	(0.0143)	(0.0073)	(0.0071)	(0.0113)	(0.0186)
R^2 (%)	5.14%	6.05%	13.84%	5.52%	3.92%	10.92%	4.83%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

This table shows the output for the yearly subsamples. It proves that the results for CRhigh and CRlow are robust for every period and the economic significance is also contained in a small range between the periods.

These tests are equally computed for the Plus or Minus test and CRhorl (cf appendix 6) but none of the variables of interest are significant.

It is now clear that managers adapt their capital structure to reach and avoid changes in credit ratings but not for changes in notch ratings. More precisely debt is less used by companies near an upgrade and on the contrary more used by firms close to a downgrade. Additionally, it is known that almost all managers have several sources of debt at their disposition (Graham and Harvey 2016, Rauh and Sufi 2009). Hence the goal of the second sample is to understand if managers apply this behavior to the different sources of debt. In this Dissertation, seven different categories are examined. Equations 4, 5 and 6 are computed on bank debt, bonds, notes and commercial papers, debentures, convertible debt, mortgage and equipment debt, and other debt (what they encompass is described in data and methodology). Out of all these equations, one of them has an economical significance.

Table 16: Detailed debt dataset significant output

	EQ4	EQ5	EQ6
CRhorl	-0.0012**	-0.0012**	
	(0.0005)	(0.0005)	
CRhigh			-0.0012*
			(0.00233)
CRlow			-0.0014**
			(0.0005)
Leverage		-0.0008	-0.0007
t-1		(0.0007)	(0.0008)
Profitability		0.0045	0.0044
t-1		(0.0252)	(0.0028)
Size t-1		0.0002*	0.0002*
		(0.0001)	(0.0001)
FC		-0.0009*	-0.0009*
		(0.00231)	(0.0005)
Covid		-0.0000	-0.0000
		(0.0007)	(0.0007)
Constant	0.0010**	-0.0012	-0.0012
	(0.0005)	(0.0012)	(0.0013)
R^2 (%)	0.29%	0.63%	0.64%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

These results are obtained on a subsample of 2038 observations of bond variation. The outputs are very interesting, both CRplus and CRminus are significant and most importantly they are both negative. Indeed, companies near an upgrade tend to use 0.0012% less bonds and firms near a downgrade 0.0014% less than the ones not near an upgrade or a downgrade. Overall, it seems that managers tend to use fewer bonds when near a possible change while there is no significant pattern for the other forms of debt studied in this Dissertation. Importantly, these findings do not correspond to previous results obtain when treating debt as a single entity. This links back to Rauh and Sufi (2010) affirmation that "traditional capital structure studies ignore debt heterogeneity and miss substantial capital structure variation".

V. Robustness Tests

To be certain of the validity of this paper results, several additional robustness tests are performed. Firstly, as presented in the above section, a thorough examination has been made to ensure that the results found are applicable across time and credit rating (cf tables 14 and 15). Then, thanks to the Walchi squared test, the importance and relevance of all variables used in the multiple regressions is confirmed.

Moreover, following Kisgen method, the regressions exclude debt and equity issuances that represent more than 10% of company assets. As this is an arbitrary decision, different values of exclusion are studied.

Table 17: Exclusion threshold robustness test for HorL test

	Excluding 5%			Excluding 20%		
	EQ4	**EQ5**	**EQ6**	**EQ4**	**EQ5**	**EQ6**
CRhorl	0.0040***	0.0024*		0.0028*	0.0015	
	(0.0015)	(0.0014)		(0.0017)	(0.0016)	
CRhigh			-0.0076***			-0.0214***
			(0.0022)			(0.0025)
CRlow			0.0136***			0.0262***
			(0.0023)			(0.0026)
Leverage t-1		-0.0783***	-0.0989***		-0.0941***	-0.1390***
		(0.0070)	(0.0105)		(0.0079)	(0.0124)
Profitability t-1		0.1180***	0.1290***		0.1590***	0.1780***
		(0.0191)	(0.0201)		(0.0268)	(0.0287)
Size t-1		0.0060***	0.0075***		0.0049***	0.0082***
		(0.0010)	(0.0011)		(0.0012)	(0.0013)
FC	-0.0128***	-0.0133***	-0.0141***	-0.0122***	-0.0132***	-0.0151***
	(0.0020)	(0.0019)	(0.0019)	(0.0025)	(0.0024)	(0.0023)
Covid	-0.0122***	-0.0077**	-0.0067*	-0.0109***	-0.0041	-0.0029
	(0.0036)	(0.0035)	(0.0035)	(0.0032)	(0.0034)	(0.00343)
Constant	0.0001	-0.0240**	-0.0281***	0.0141***	0.0015	-0.0062
	(0.0014)	(0.0098)	(0.0098)	(0.0017)	(0.0108)	(0.0109)
R^2 (%)	0.92%	11.26%	12.84%	0.40%	7.96%	10.84%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

This table shows the main equations for the plus or minus method. In the first panel, the results englobe all debt and equity issuance that are under 5% of company' assets solely while on the second panel all issuances up to 20% of firms' assets are considered. A light difference is noticeable based on the exclusion ceiling. When looking at the variables of interest (CRhorl, CRhigh and CRlow), even if no changes in significance are noticeable, the economic significance is somewhat different in-between datasets. Particularly, when focusing on Equation 6, an increase in the coefficient can be noted in both CRhigh and CRlow with the increase in the elimination threshold. For example, when excluding all issuances above 5% of the company assets, companies near updates tend to use 0.008% less debt, while they use 0.01%

and 0.02 % less if all issuances above 10% and 20% are excluded respectively. Considering this, more time shall be spent on determining the threshold. Even if the results remain robust this is a limitation of this paper.

Unsurprisingly, when controlling for plus or minus outputs the alteration of the exclusion value does not alter the plus or minus results as they all remain insignificant. (cf appendix 7)

Lastly, the robustness of the result for a change in dependent variable is tested.

Table 18: Dependent variable robustness test for HorL test

	Only Debt			**Only Equity**		
	EQ4	**EQ5**	**EQ6**	**EQ4**	**EQ5**	**EQ6**
CRhorl	0.0003	-0.0004		-0.0038***	-0.0030***	
	(0.0012)	(0.0012)		(0.0008)	(0.0008)	
CRhigh			-0.0174***			-0.0032***
			(0.0017)			(0.0012)
CRlow			0.0177***			0.0027***
			(0.0020)			(0.0010)
Leverage t-1		-0.0462***	-0.0808***		0.0343***	0.0338***
		(0.0046)	(0.0080)		(0.0038)	(0.0043)
Profitability t-1		0.0429***	0.0609***		-0.1090***	-0.1090***
		(0.0107)	(0.0114)		(0.0154)	(0.0155)
Size t-1		0.0021**	0.0047**		-0.0040***	-0.0040***
		(0.0009)	(0.0001)		(0.0006)	(0.0006)
FC	-0.0061***	-0.0063***	-0.0077***	0.0054***	0.0060***	0.0060***
	(0.0019)	(0.0018)	(0.0018)	(0.0009)	(0.0009)	(0.0009)
Covid	-0.0074**	-0.0050	-0.0037	0.0035**	0.0002	0.0002
	(0.0030)	(0.0030)	(0.0030)	(0.0016)	(0.0015)	(0.0015)
Constant	-0.0011	-0.0007	0.0073	-0.0083***	0.0199***	0.0198***
	(0.0011)	(0.0081)	(0.0080)	(0.0009)	(0.0054)	(0.0054)
R^2 (%)	0.33%	1.71%	5.84%	0.58%	16.51%	16.51%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

This table presents the results of the three high or low equations (4,5 and 6) for a dependent variable of only debt divided by assets in the left panel and only equity divided by assets in the right one. The results of the main variables are robust to a change in the dependent variable,

allowing us to say that managers adapt their capital structure debt and equity wise when close to an upgrade or a downgrade in credit rating. It must be noted that the two financing channels are affected in the same way but not with the same magnitude. Indeed, debt experiences in the cases of upgrades and downgrades more consequent changes than equity.
But, shockingly, the five control variables are highly influenced by this change. Indeed, the signs of size, leverage, profitability, FC and Covid are completely reversed while the variables remain significant. Additionally, the same anomaly appears when testing for the plus or minus methods (cf appendix 8). This highlights that equity behaves differently from debt, and most probability this issue to the difficulty in adjusting equity.

VI. Limitations

This Dissertation has a few limitations. The first one is mentioned in the robustness section, it concerns the value of exclusion of issuances. Tt is an arbitrary decision that impacts the economic significance of the results.

Then, annual data is used and the company credit rating of January is assumed to reflect the whole year, but credit ratings can vary at any time during the year, therefore changes happening during that time lapse are not captured in the data. On a similar note, capital structure changes are not immediate: a lag could be present and hence not represented in the results. Additionally, these changes have costs that could be mistaken as changes in capital.

Lastly, regarding the high or low test, a limitation arises as the variables used in the computation of the credit score (EQ7) are very similar, if not the same, as the ones used as control variables in the paper, nevertheless, as the equation is only indirectly used in the regression through the dummy, this should not create any interference.

When it comes to the subsample, the same concerns as above apply but in addition, the sample size could be a limitation. Even if composed of 2038 observations, all categories have fewer observations as firms never use all seven types of debt simultaneously (most of them use only two).

VII. Conclusion

In a nutshell, this Dissertation establishes that managers do not make alterations when a possible change in notch credit rating arises. This is contrary to Kisgen (2006) paper that was followed through this paper. The original hypothesis of the author is that managers cared more about changes in notch rating because the regulations and benefits are made for notches instead of credit ratings themselves. This hypothesis is rejected by the present dissertation findings. Additionally, a flaw in the 2006 paper is discovered due to "old methods" being used, this also partially explains the difference in outcomes.

On the other hand, the results obtained for the High or Low method demonstrate that capital structure changes when close to a credit rating upgrade or downgrade. Nevertheless, those effects are opposite: indeed, companies close to an upgrade use on average 0.014% less debt than companies near a downgrade or "stable" firms, while companies close to a downgrade tend to see an increase in debt of 0.021% (results for the sample with all debt and equity and issuance higher than 10% of the company assets are excluded). This highlights that managers see a benefit or a cost in any type of credit rating fluctuation. Furthermore, the results are in line with Kemper and Rao (2013).

All findings are robustly applicable to investment and non-investment grade firms with only a small impact on the economic significance as well as across all seventeen credit ratings studied and all twenty-one years.

Similar tests are repeated on a breakdown of debt: through a smaller sample, similar behaviors seem to apply to one of the seven types of debt tested and, in a very interesting way. As a matter of fact, managers significantly adapt their usage of bonds when close to possible credit rating changes and this time the impact on the bonds is the same in both cases: companies near upgrades and downgrades tend to use respectively 0.0011% and 0.0014% less bonds. This result highlights the importance of exploring debt heterogeneity instead of treating debt as a single entity.

Lastly, all the control variables used in this Dissertation are significant at the 1% level of significance and with the expected sign, apart from Covid which is not a significant variable when also controlling for size leverage and profitability.

In light of these findings, it would be interesting to conduct a similar study on the capital structure behavior following the credit rating changes to see if the results found in this Dissertation are short-term or more definitive changes.

VIII. References

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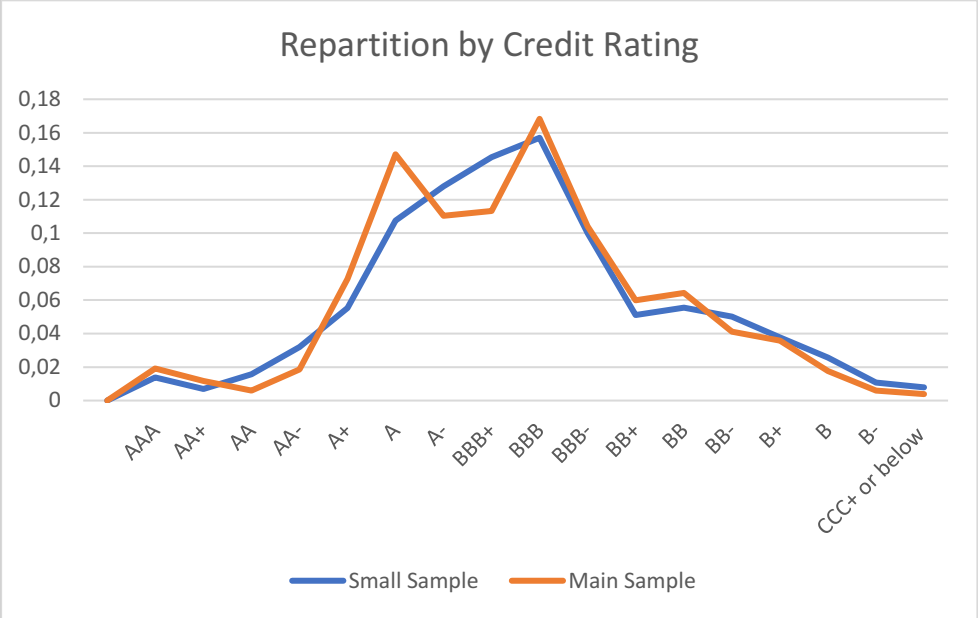
IX. Appendix

Appendix 1: Repartition chart



This chart purpose is to demonstrate that the detailed debt sample has a similar distribution to the main sample even if it is much smaller: 2048 observations instead of 10349.

Appendix 2: Kisgen plus or minus test results

Table III

Credit Rating Impact on Capital Structure Decisions—Plus or Minus Tests

Coefficients and standard errors from pooled time-series cross-section regressions of net debt raised for the year minus net equity raised for the year divided by beginning-of-year total assets on credit rating dummy variables and on control variables measured at the beginning of each year. CR_{POM} is a credit rating dummy variable equal to 1 if the firm has either a plus or a minus credit rating and 0 otherwise. CR_{Plus} and CR_{Minus} are credit rating dummy variables equal to 1 if the firm has a plus or minus rating, respectively and 0 otherwise. The control variables include $D/(D+E)$, book debt divided by book shareholder's equity plus book debt, *EBITDA/A*, previous year's *EBITDA* divided by total assets, and ln(*Sales*), the natural log of total sales. The sample covers security issuance from 1986 to 2001 and excludes observations with missing values for any of the variables. A large offering is defined as an offering greater than 10% of total assets in the year. Errors are White's consistent standard errors. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Panel A: Excluding Large Debt Offerings			Panel B: Excluding Large Debt and Equity Offerings		
	1	2	3	1	2	3
Intercept	−0.0787**	−0.0787**	−0.0006	−0.0384***	−0.0384***	0.0043***
	(0.0082)	(0.0082)	(0.0012)	(0.0051)	(0.0051)	(0.0010)
CR_{POM}	−0.0058***		−0.0102***	−0.0027**		−0.0050***
	(0.0016)		(0.0017)	(0.0013)		(0.0013)
CR_{Plus}		−0.0064***			−0.0012	
		(0.0020)			(0.0015)	
CR_{Minus}		−0.0051***			−0.0044***	
		(0.0019)			(0.0015)	
$D/(D+E)$	−0.0153**	−0.0153**		−0.0095**	−0.0095**	
	(0.0066)	(0.0066)		(0.0045)	(0.0046)	
EBITDA/A	0.1288***	0.1293***		0.1139***	0.1133***	
	(0.0265)	(0.0264)		(0.0123)	(0.0123)	
ln(*Sales*)	0.0090***	0.0090***		0.0042***	0.0042***	
	(0.0008)	(0.0008)		(0.0004)	(0.0004)	
Adj. R^2	0.0541	0.0542	0.0030	0.0407	0.0410	0.0015
N	10,842	10,842	10,842	10,573	10,573	10,573

Appendix 3: Investment Grade test Plus or Minus Results

	Panel A			Panel B		
	EQ1	**EQ2**	**EQ3**	**EQ1**	**EQ2**	**EQ3**
CRpom	-0.0027	-0.0027		-0.0011	-0.0011	
	(0.0037)	(0.001)		(0.0018)	(0.0017)	
CRplus			0.0016			-0.0011
			(0.0040)			(0.0020)
CRminus			-0.0103			-0.0010
			(0.0041)			(0.0019)
Leverage		-0.0624***	-0.0061***		-0.0845***	-0.0844***
t-1		(0.0108)	(0.0106)		(0.0062)	(0.0062)
Profitability		0.0790***	0.0080***		0.2010***	0.2010***
t-1		(0.0306)	(0.0030)		(0.0253)	(0.0252)
Size t-1		0.0044***	0.0040**		0.0048***	0.0048***
		(0.0016)	(0.0016)		(0.0014)	(0.0014)
FC	-0.0122**	-0.0144***	-0.0140***	-0.0108***	-0.0113***	-0.0113***
	(0.0054)	(0.0053)	(0.0053)	(0.0024)	(0.0023)	(0.0023)
Covid	-0.0478***	-0.0019	-0.0023	-0.0105***	-0.0050	-0.0050
	(0.0075)	(0.0075)	(0.0075)	(0.0034)	(0.0034)	(0.0034)
Constant	-0.0036	-0.0123	-0.0098	0.0174***	-0.0080	-0.0080
	(0.0032)	(0.0149)	(0.0149)	(0.0017)	(0.0113)	(0.0112)
R^2 (%)	0.29%	4.97%	5.37%	0.49%	11.19%	11.19%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

Appendix 4: High or low test for each credit notch credit rating

	AAA	**AA**	**A**	**BBB**	**BB**	**B**	**CCC**
CRhorl	0.0078	-0.0045	0.0043*	0.00032	0.0000	-0.0001	-0.0145
	(0.0089)	(0.0056)	(0.0025)	(0.0021)	(0.0033)	(0.0085)	(0.0132)
Leverage t-1	-0.0402	-0.0436**	-0.0811***	-0.091***	-0.0627***	-0.0812***	-0.0033
	(0.0281)	(0.0188)	(0.0086)	(0.0087)	(0.0090)	(0.0167)	(0.0071)
Profitability t-1	0.2490**	0.1650***	0.1860***	0.2010***	0.0890***	0.0283	0.0506
	(0.1050)	(0.0608)	(0.0392)	(0.0365)	(0.0284)	(0.0581)	(0.0726)
Size t-1	-0.0048	0.0097	0.0038***	0.0019	0.00310**	0.0042	0.0057
	(0.0063)	(0.0065)	(0.0012)	(0.0012)	(0.0015)	(0.0036)	(0.0051)
FC	-0.0077	-0.0331***	-0.0099***	-0.0089***	-0.0108**	-0.0110	-0.1340**
	(0.0137)	(0.0122)	(0.0034)	(0.0027)	(0.0055)	(0.0095)	(0.0575)
Covid	-0.023	-0.0176	-0.0023	-0.0041	0.0054	-0.0159	-0.0069
	(0.0053)	(0.0232)	(0.0046)	(0.0044)	(0.0060)	(0.0195)	(0.0224)
Constant	0.0678	-0.0673	-0.0014	0.0169	-0.0028	-0.0015	-0.0442
	(0.0716)	(0.0550)	(0.0105)	(0.0105)	(0.0133)	(0.029)	(0.0372)
R^2 (%)	21.90%	18.15%	11.88%	8.86%	4.23%	4.79%	30.52%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

Appendix 5: Detailed plus or minus test for each notch credit rating

	AAA	AA	A	BBB	BB	B	CCC
CRplus		-0.0093	0.0009	-0.0002	-0.0008	0.0093	0.0153
		(0.0108)	(0.0028)	(0.0018)	(0.0032)	(0.0080)	(0.0166)
CRminus		-0.0006	0.0004	-0.0018	0.0116***	0.0045	-0.0140
		(0.0059)	(0.0021)	(0.0020)	(0.0033)	(0.0119)	(0.0224)
Leverage	-00127	-0.0236*	-0.0272***	-0.0495***	-0.0365***	-0.0563***	0.0014
t-1	(0.0236)	(0.0141)	(0.0059)	(0.0087)	(0.0071)	(0.0143)	(0.0056)
Profitability	0.296	0.0124	0.0243	00514***	0.0122	0.1960	0.0940
t-1	(0.0612)	(0.0331)	(0.0158)	(0.0158)	(0.0189)	(0.0423)	(0.0754)
Size t-1	-0.0045	0.0057	0.0003	0.0003	0.0001	0.021	0.0012
	(0.0057)	(0.0045)	(0.0007)	(0.0011)	(0.0013)	(0.003)	(0.0041)
FC	-0.0048	-0.0264**	-0.0059**	-0.002	-0.0025*	-0.0129	-0.1180**
	(0.0103)	(0.0115)	(0.0030)	(0.0022)	(0.0049)	(0.0079)	(0.0551)
Covid	-0.0113**	-0.0257**	-0.0008	-0.0040	0.0023	-0.0150	-0.0063
	(0.0349)	(0.0102)	(0.0036)	(0.0034)	(0.0053)	(0.0203)	(0.0198)
Constant	0.0654	-0.0070	0.0175***	0.0205*	0.0017	-0.0043	-0.0344
	(0.0631)	(0.0486)	(0.0068)	(0.0095)	(0.0112)	(0.0275)	(0.0344)
R^2 (%)	0.70%	7.11%	0.50%	1.06%	1.69%	3.12%	26.66%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

Appendix 6: plus or minus test with year fixed effects

	2001 2003	**2004 2006**	**2007 2009**	**2010 2012**	**2013 2015**	**2016 2018**	**2019 2021**
CRhorl	0.0090**	0.0080**	0.0038	-0.0040	0.0036	-0.0067**	0.00229
	(0.0035)	(0.0036)	(0.0035)	(0.0029)	(0.0033)	(0.0032)	(0.0064)
Leverage t-1	-0.0506***	-0.0684***	-0.1010***	-0.050***	-0.0469***	-0.0599***	-0.0514***
	(0.0085)	(0.0111)	(0.0105)	(0.0088)	(0.0080)	(0.0111)	(0.0194)
Profitability t-1	0.2030***	0.1130***	0.0847***	0.2050***	0.2050***	0.2590***	0.1160**
	(0.0610)	(0.0431)	(0.0303)	(0.0336)	(0.0386)	(0.0377)	(0.0503)
Size t-1	0.0023	0.0028**	0.0044**	0.0027***	0.0035***	0.0058***	0.00365*
	(0.0017)	(0.0012)	(0.0018)	(0.0009)	(0.0010)	(0.0014)	(0.0020)
Constant	-0.0278	-0.0025	0.0067	-0.0052	-0.0127	-0.0255**	-0.0138
	(0.0177)	(0.0105)	(0.0164)	(0.0092)	(0.0097)	(0.0119)	(0.0216)
R^2 (%)	6.69%	7.31%	14.07%	14.76%	13.88%	16.11%	5.28%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

Appendix 7: Exclusion threshold robustness test for POM test

	Excluding 5%			Excluding 20%		
	EQ1	**EQ2**	**EQ3**	**EQ1**	**EQ2**	**EQ3**
CRpom	-0.0008	-0.0006		-0.0019	-0.0018	
	(0.0015)	(0.0014)		(0.0019)	(0.0017)	
CRplus			0.0005			-0.0008
			(0.0018)			(0.0021)
CRminus			-0.0016			-0.0027
			(0.0015)			(0.0019)
Leverage		-0.0785***	-0.0786***		-0.0943***	-0.0943***
t-1		(0.0070)	(0.0070)		(0.0079)	(0.0079)
Profitability		0.0119***	0.0119***		0.1600***	0.1590***
t-1		(0.0191)	(0.0191)		(0.0267)	(0.0268)
Size t-1		0.0060***	0.0059***		0.0048***	0.0049***
		(0.0010)	(0.0010)		(0.0012)	(0.0012)
FC	-0.0128***	-0.0133***	-0.0133***	-0.0122***	-0.0132***	-0.0132***
	(0.0020)	(0.0019)	(0.0019)	(0.0025)	(0.0024)	(0.0024)
Covid	-0.0123***	-0.0078**	-0.0077**	-0.0109***	-0.0040	-0.0041
	(0.0040)	(0.0035)	(0.0035)	(0.0032)	(0.0034)	(0.0034)
Constant	0.0034**	-0.0217**	-0.0215**	0.0172***	0.0040	0.0042
	(0.0015)	(0.0010)	(0.0099)	(0.0017)	(0.0107)	(0.0107)
R^2 (%)	0.83%	11.25%	11.28%	0.42%	7.97%	7.99%

Note: T-statistic in parenthesis
**Coefficients are statistically significant at 10% level.*
*** Coefficients are statistically significant at 5% level.*
****Coefficients are statistically significant at 1% level.*

Appendix 8: Dependent variable robustness test for POM test

Note: T-statistic in parenthesis

	Only Debt			Only Equity		
	EQ1	**EQ2**	**EQ3**	**EQ1**	**EQ2**	**EQ3**
CRpom	-0.0015	-0.0015		0.0005	0.0002	
	(0.0013)	(0.0012)		(0.0009)	(0.0009)	
CRplus			-0.0014			-0.0006
			(0.0015)			(0.0010)
CRminus			-0.0016			0.0009
			(0.0014)			(0.0009)
Leverage t-1		-0.0463***	-0.0463***		0.0346***	0.0346***
		(0.0046)	(0.0046)		(0.0038)	(0.0038)
Profitability t-1		0.0426***	0.0426***		-0.1100***	-0.1100***
		(0.0107)	(0.0107)		(0.0154)	(0.0154)
Size t-1		0.0021**	0.0021**		-0.0039***	-0.0039***
		(0.0009)	(0.0009)		(0.0006)	(0.0005)
FC	-0.0061***	-0.0063***	-0.0063***	0.0053***	0.0060***	0.0060***
	(0.0019)	(0.0018)	(0.0018)	(0.0009)	(0.0009)	(0.0009)
Covid	-0.0074**	-0.0050	-0.0050	0.0035**	0.0001	0.0002
	(0.0030)	(0.0030)	(0.0031)	(0.0016)	(0.0015)	(0.0015)
Constant	0.0000	0.0000	0.0000	-0.0111***	0.0174***	0.0172***
	(0.0011)	(0.0079)	(0.0099)	(0.0010)	(0.0056)	(0.0056)
R^2 (%)	0.37%	1.73%	1.73%	0.23%	16.29%	16.36%

**Coefficients are statistically significant at 10% level.*

*** Coefficients are statistically significant at 5% level.*

****Coefficients are statistically significant at 1% level.*