ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

Master Thesis Financial Economics

THE EFFECTS OF SOVEREIGN AND CORPORATE RATING ANNOUNCEMENTS ON BONDS AND CREDIT DEFAULT SWAPS

Thomas Cicolini

Student ID number: 479908

Supervisor: Professor Eisert T.

Second assessor: Professor Zhu H.

Date: 31 January 2019

Abstract

I study the impact that rating events, namely the new announcements made by rating agencies concerning the rating of a debtor, have on the bonds and CDSs of the entity object of the releases. First, I focus on the sovereign markets and after I turn my attention to the corporate markets. In relation to the latter, I also investigate the effects of events concerning the government on the firms headquartered in that specific country. The main result is that there are some changes in the yields and prices of bonds and CDSs caused by the rating events, which are also in the direction expected by the economic theory. In addition, the announcements about the governments also affect the corporate markets. Another interesting result is that the downgrade of a country raises the probability of downgrade of the companies with the same rating of the country itself or higher, but not the intensity of the deviation.

Contents

1 Introduction

Rating agencies are private companies whose role is to judge the ability of an issuer to repay the debt to its creditor. The debt has to be paid back in total, meaning that both the principal and the interests are considered equally important in the determination of the verdict, and in time, meaning that the respect of the predetermined schedule of the payments is also evaluated. In short, they provide an opinion on the probability of default of the debtor. However, the judgements they provide are not quantitative: in fact, the result of their analysis is not a figure of the probability of default but, instead, they assign a qualitative rating based on a scale that gathers together issuers with similar ability to repay their debt. Each agency has its own scale, but it is possible to determine an approximate equivalence between their ratings. **Table ??** shows the comparison between the scales of the three major and most influential rating agencies in the world, Standard and Poor's, Moody's and Fitch Ratings, whose combined market shares add up to 93.2% in Europe (data provided by European Securities and Markets Authority) and 96.4% in the US (data provided by U.S. Securities and Exchange Commission) at the end of 2016.

The ratings of these agencies are normally considered crucial to the possibilities to

Table 1

The table shows and approximate comparison of the rating scales of the three largest rating agencies in the world, Standard and Poor's, Moody's and Fitch Ratings. The ratings are ordered from the highest at the top to the lowest a the bottom. Therefore, a AAA rating (corresponding to a Aaa on the Moody's scale) is given to the most credithwhorty debtors, a AA+ rating (Moody's: Aa1) to debtors a little bit less creditworthy and so on down the scales.

Standard and Poor's	Moody's	Fitch Ratings
AAA	Aaa	AAA
AA+	Aa1	AA+
AA	Aa2	AA
AA-	Aa3	AA-
A+	A1	A+
A	A2	A
A-	A3	A-
BBB+	Baa1	BBB+
BBB	Baa2	BBB
BBB-	Baa3	BBB-
BB+	Ba1	BB+
BB	Ba2	BB
BB-	Ba3	BB-
B+	B1	B+
B	B2	B
B-	B3	B-
CCC+	Caa1	CCC+
CCC	Caa2	CCC
CCC-	Caa3	CCC-
CC	Ca	CC
RD	C	C
SD		RD
D		D

issue debt of the rated entities: in fact, it is commonly known that the cost of debt of a country or a company is strictly related to its rating, which is a concise evaluation of its creditworthiness. The lower the rating, the higher the amount of the interests the investors demand in order to buy the debt and vice versa. In the worst case scenario, an extremely low rated entity may completely be excluded from the access to credit, because no investor is willing to tolerate levels of risk that high. However, it is important to highlight that this connection between the ratings and the amount of interests may exist just because both the agencies and the investors build their expectations about the likelihood of repayment of the issuer on the same information. Clearly, in an efficient market, this would mean that the agencies do not add anything significant to the data on which the participants in the markets base their analysis and determine their required return on the investment. Therefore, the publication of their scores would help the investors only to the extent that they could avoid the financial analysis of the potential debtors and consequently make the financing process quicker. However, in a different scenario it is possible that the rating agencies base their ratings not only on the public information available to all the participants in the market, but also on valuable private information. In this case, their role would be much more influential and may convince the investors to make different decisions than those that they would have made relying on the public information only.

In order to fully understand what the role of the rating agencies in the financial markets is and to what extent they are able to drive the decisions of the investors, an interesting strategy is to try to test the consequences of rating announcements on the financial instruments, in particular on their prices. In fact, if they are able to carry new information to the markets through these judgements, which means that they disclose some new information about the creditworthiness of a company (or a government), prices should move accordingly. For example, when they downgrade on put on negative watchlist a company, the price of the bonds issued by this company should decrease because they are now considered riskier than before. The inverse relation should apply to positive events. The ultimate purpose of this study is to reveal whether this theoretical mechanism applies to the real financial world and therefore whether the role of rating agencies is actually as central as it is thought to be.

Traditionally, the financial instrument whose price mostly reflect the default risk of the issuer is the bond, but in the last two decades there has been a huge increase of the traded volumes of credit default swaps (CDSs). These instruments are credit derivatives through which an individual buys protection (protection buyer) against the default of a subject (reference entity) from a third individual (protection seller). In practice, the protection buyer pays a fee to the protection seller, in exchange for the compensation of the losses resulting from the potential default of the reference entity within a period of time determined when the contract is signed. Clearly, the amount of the fee depends on the expected probability of default of the reference entity and therefore it is higher if

the default is considered more likely and lower otherwise. In my work, I want to study the effects of rating events on both bonds and CDSs because both are instruments whose price reflect the creditworthiness of the debtor.

I structure the analysis as follows: first, I investigate the government side of the market and therefore the impact of different typologies of rating events on the sovereign bonds and CDSs with three different methodologies, which should reinforce the findings. After, I turn my attention to the corporate side of the market. In this part, I study the impact of announcements on bonds and CDSs with one of the methodologies of the sovereign part. Furthermore, I enhance the analysis with two more focuses, connected with the issue of contagion from the country events to the corporate market. In particular, I study the effects of this contagion to the probability of downgrades of firms and to firms with the same rating or higher than the rating of their country. The structure of this work is as follows: section **??** is dedicated to the review of the existing literature on these topics, section **??** presents the two big datasets of the sovereign and corporate data, section **??** describes the methods and the models I apply to the data in order to obtain the analysis, section **??** shows tables and figures of the results and their description and, finally, section **??** contains a brief summary of the study and the conclusions.

2 Literature review

Over the years, the influence that credit rating agencies have, through their opinions and judgements, on the prices in the financial markets has been investigated by many different authors. The main target has been the relation between the rating announcements and the credit quality of the issuing entities, although none of the papers that I could find present a comprehensive view of the phenomenon. In fact, most of them focus on the effect on one category of financial instrument (usually either equities, bond or, more recently, CDSs), consider a small sample period, analyse a single segment of the market (governments or corporations, emerging countries or developed countries or even single countries or industries) or investigate only entities in specific rating classes (investment grade or high-yield grade). In the reminder of this chapter, I will briefly describe the content of the most important paper in the field, in particular those that are most relevant and most strictly connected with my work.

The earliest research on the effects of credit rating events on measures of the value of financial instruments dates back to the 70s, with Katz (1974) being the first significant work that tries to estimate the deviation of the yield to maturity attributable to such events. The author of this paper analyses the differential between the actual yield and an estimate of the expected yield of bonds of a number of companies in the electric utility industry in different rating classes between 1966 and 1972. The main results of the paper are that the rating events are not anticipated by the bond market and that the price of a bond takes between six and ten weeks after the event to converge to a price level suitable for the new rating class. The shortcomings of this paper are clear and mainly attributable to the shortage of relevant and dependable data: the low frequency of the data (monthly data) and consequently the low number of observations (twelve observation per year for seven years), the fact that the bonds included in the sample come only from the electric utility industry and the lower efficiency of the bond markets before the rise of the new technologies for trading purpose (nowadays, the liquidity of the financial markets is much higher also thanks to the huge number of people that have access to them) are only the most straightforward. However, this paper is important because it is the first one the addresses the connection between rating events and bond markets and therefore is a milestone of this research branch.

After these first findings, a wide range of paper on the topic has emerged: the most significant of those are Grier and Katz (1976), Weinstein (1977), Cantor and Packer (1996), Hand, Holthausen and Leftwich (1992), Steiner and Heinke (2001), which all focus on the bond market, and Pinches and Singleton (1978), Holthausen and Leftwich (1986), Hand, Holthausen and Leftwich (1992), Goh and Ederington (1993) and Dichev and Piotroski (2001), which, on the contrary, examine the impact of rating announcements on stock. Particularly relevant for my study is the is the work done by Cantor and Packer

(1996), which is famous worldwide for its analysis of the determinants of credit ratings but includes also a section that specifically addresses the impact of these ratings on government bonds. They conduct an event study which examines the average variation of sovereign bond spreads around the time of rating announcements in eighteen countries in the period between 1987 and 1994. They find that these events are followed by movements of the yields in directions coherent with the expectations of the theoretical background.

With the birth of derivatives at the beginning of the nineteens and their diffusion on a large scale between the 90s and the 2000s, the academic research has shifted its attention from the traditional bond and stock market to the credit default swap (CDS) market. In particular, most of the papers in the 2000s focus on the consequences of credit rating changes on the prices of the CDSs, which are instruments that should isolate the default risk of the underlying entity alone (Norden and Weber (2009), Alexopoulou, Andersson and Georgescu (2009)) and therefore should react more promptly and efficiently to rating announcements of the agencies than bonds and stock. Some papers that use this type of data are Norden and Weber (2004), Hull, Predescu and White (2004), Micu, Remolona and Wooldridge (2004), Afonso, Furceri and Gomes (2012) and Finnery, Miller and Chen (2013).

A paper that has proved to be extremely useful for my study is Afonso, Furceri and Gomes (2012), which investigate the topic with two different methodologies: first a standard event study approach, second a fixed effects panel regression. Their work is based on the effects of credit rating events on sovereign bond and CDS spreads of twenty-four countries in the European Union, in the fifteen years span between January 1995 and October 2010. This is the paper, among those in this field of research, that that takes into consideration the longest period of time and therefore, combined with the daily frequency of the data, its results should be considered some of the most solid and reliable in the literature. Their main finding is that there is a reaction of the financial markets and it is particularly significant to negative events rather than to positive events. Most notably, this study provides the methodology that I use and adapt to the different situations in my analysis.

In general, the results of most of these papers show similar responses to the matters discussed above, both in the sovereign and corporate sector. In fact, they usually find that primarily, if not only, negative events determine a variation in the spreads of the various financial instruments (decrease of the stock returns and bond prices, increase of the bond yields and CDS prices). Two notable exceptions are Cantor and Packer (1996) and Finnerty, Miller and Chen (2013), which state that also positive events have a significant impact on financial markets: the former on government bond spreads and the latter on corporate CDS spreads.

The second important result that most of the papers seem to agree on is that part of the variation of the prices is anticipated by the markets in the days preceding the actual

rating announcement. The shared explanation for this phenomenon is that the ratings provided by the agencies are built, at least partially, on public information about the health of the rated subject which can be observed also by the other agents operating in the financial markets. Again, not everybody agrees with these findings: in fact, some authors claim that significant effects can only be observed the days following the event and therefore no information is disclosed to operators in advance. Notable studies that carried out these results are Kats (1974), Griffin and Sanvicente (1982) and Holthausen and Leftwich (1986). They base their analysis on bond data, stock data and, again, stock data, respectively.

One thing that is worth noticing is that the majority of the papers that I have mentioned in this paragraph is quite dated; as a consequence, it is possible that the circumstances they portray were true in the past but might be different nowadays. I have been able to find only two papers, namely Afonso, Furceri and Gomes (2012) and Finnerty, Miller and Chen (2013), written after the global financial crisis of 2007-2008 on the topic. The reason why I highlight this fact is that this collapse was a catastrophic event that changed dramatically the rules of the game in the financial market and their perception in peoples eyes. During this period, rating agencies were in the eye of the storm because of their inability, or unwillingness for some, to promptly correct their judgements on a number of financial intermediaries and instruments that afterwards proved to be junk. Their reputation has since been badly damaged and therefore the influence they used to have on the markets might be mitigated these days. The shortage of papers that use recent data might show an underestimation of the effects of the crisis on the relation between rating agencies and financial markets, which should be a matter of new analysis.

As I have just shown, there is an extensive amount of studies whose objective is to determine the effects of sovereign or corporate rating announcements on sovereign or corporate markets, respectively. However, a correlated issue is the interconnection between the two markets, in particular the effects that the sovereign risk has on the corporate risk, which has been far less investigated in the literature. In addition, this is definitely a much more recent topic, given that the first works about it date back to the mid 2000s. There are many different point of view from which the matter can be analysed. Examples of papers related to this topic are: Ferreira and Gama (2007), which analyses the spillovers that sovereign rating news have on other countries' stock markets, Borensztein, Cowan and Valenzuela (2013), which controls whether the rating of a country act as a ceiling for the rating of the companies in the country and Bedendo and Colla (2015), which addresses the effects of sovereign spreads variations over non-financial firm spreads.

The latter is particularly important for my work because it contains an analysis of the movements of corporate CDS spreads following a sovereign rating downgrade. The dataset employed for this specific analysis is quite small, including only data for Belgium,

Italy, Portugal and Spain from January 2008 and December 2011, but it is a first attempt to draw some conclusions on the topic. The main result is that, not only the downgrades cause the CDS spreads of the government bonds to widen, but also the spreads of the firms headquartered in that country to increase. Another objective of the paper is to draw a relation between the sovereign and corporate credit risk, trying to identify common factors that have an impact on both of them. They find that country specific factors, alongside firm specific factors, contribute to the changes in the corporate spreads.

3 Data

The research I conduct is divided in two parts which reflect the two different issues I discussed in the previous paragraphs. First, I want to focus only on the government bond and CDS markets and the consequences of different typologies of rating events on them. Second, I try to analyse the interconnection that should exist between markets at a sovereign and corporate level. In particular, after a brief analysis of the corporate markets on their own, my focus turns to the effects of sovereign downgrades on the firms which are headquartered in that country. In the following lines, I describe the dataset used in the first part and afterwards the dataset used in the second part.

3.1 Sovereign dataset

I use bond and CDS yields as the measures of the risk of the rated entities. I always use the commonly most liquid maturity for both the instruments, which are 10 years government bonds and 5 years government CDSs. The countries I include in the sample are 43, representing the countries from all around the world whose data are substantially complete throughout the majority of the period. In details, the countries are: France, Italy, Spain, Netherlands, Belgium, Ireland, Portugal, Austria, Finland, Greece, Slovenia, Slovakia, Lithuania, United Kingdom, Denmark, Sweden, Poland, Hungary, Czech Republic, Bulgaria, Romania, Croatia, United States, Canada, Australia, New Zealand, Israel, Japan, South Korea, Switzerland, Norway, Mexico, Brazil, Chile, Colombia, South Africa, Turkey, China, India, Indonesia, Thailand, Malaysia and Russia. Note that Germany in not included in this list because it is the benchmark for the calculation of the spreads that, for practical reasons, are more useful then the yields; I will come back later to this concept in the methodology section. I collect daily data from 01.01.2002 to 31-12.2017. However, the dataset is reduced to 29 countries and starts after the global financial crisis for the CDS market due to data constraints in this specific sector. In fact, CDSs are much more recent instruments than bonds and data collection was still full of gaps or completely missing, or even CDSs were not available, in some countries at the time. I arbitrarily set the date of the crisis in 15.09.2008, the day when the financial services giant Lehman Brothers filed for bankruptcy. All the data in this section are collected via Bloomberg.

Moving now to the rating events, I focus on four different categories: downgrades, upgrades, negative watchlisting and positive watchlisting. I also conduct the analysis of the aggregation of negative events (downgrades and negative watchlisting together) and positive events (upgrades and positive wathclisting together). I treat these observations as dummy variables which assume a value of 1 the days when an announcement referred to the issuer is provided by at least one of the rating agencies and a value of 0 otherwise. The agencies I consider in this study are the three largest and most influential in the

Table 2

The table shows the number of announcements made by the rating agencies classified by type of event in the comprehensive sample (top half), which includes all the 43 countries, and in the Eurozone sample (bottom half), which includes only the 10 countries in the Eurozone. Each number in the table represents the sum of the announcements of Standard and Poor's, Moody's and Fitch Ratings.

All the countries (43 countries)			
	Full sample (I a)	Post crisis subsample (II a)	Pre crisis subsample (III a)
Negative events	267	249	18
Positive events	322	104	218
Downgrades	216	202	14
Upgrades	285	98	187
Negative watchlisting	56	52	4
Positive watchlisting	37	6	31

Eurozone countries (10 countries)			
	Full sample (I b)	Post crisis subsample (II b)	Pre crisis subsample (III b)
Negative events	135	130	5
Positive events	40	32	8
Downgrades	109	105	4
Upgrades	40	32	8
Negative watchlisting	30	29	1
Positive watchlisting	0	0	0

world, namely Standard and Poor's, Moody's and Fitch Ratings. Again, the source of the data is Bloomberg. Column (I a) of **Table ??** aggregates the number of announcements for each category of event provided by these rating agencies.

I also create some subsamples in order to enhance the quality of the analysis for some specific periods and countries. First, referring to the sovereign bond yields, I split the data into two subsamples, one including the period from 01.01.2002 to 14.09.2008 and the other one including the period from 15.09.2008 to 31.12.2017. From now on, I call these subsamples "pre crisi" and "post crisis" respectively and summarise their statistics in column (III a) and (II a) of **Table ??**. As I clarified before, the data I have about the sovereign CDS yield are already limited to this second subsample, and therefore there is no analysis of the CDSs in the first period in my whole work. A second split of the sample is based on a geographic criteria. In fact, I limit the sample only to the countries in the Eurozone (France, Italy, Spain, Netherlands, Belgium, Ireland, Portugal, Austria, Finland and Greece) and, again, build two subsamples for the pre and post Lehman Brothers crash periods. The data concerning this subsample are shown in the bottom half of **Table ??**. Column (I b) represents the number of events for each cathegory in the entire period of the analysis, while, again, columns (III b) and (II b) display how the data are divided between the two temporal subsamples, the "pre crisi" and "post crisis" respectively. Unfortunately, not all the tests that I would like to conduct are possible because of the limited number of announcements in some categories of events in

the subsamples. I will provide more details on this aspect in the section of the results.

3.2 Corporate dataset

The second part of my study focuses on the corporate side of the markets. Again, bond and CDS yields are used as alternative measures of the risk of the firm. The CDSs I use are still those with the highest liquidity (namely, 5 years CDSs), however the matter get is a little bit more complicated for bonds. I want to include in the sample only bonds with similar characteristics between each other and therefore I select senior bonds of companies rated by Standard and Poor's, whose repayments are first priority in case of bankruptcy of the company. I decide to include only firms rated by Standard and Poor's because I want to avoid the problem of the different weight that the market may award to the announcements of different rating agencies and Standard and Poor's is the agency with the largest number of firms rated of the three. The issue is that not all the companies rated by this rating agency, in particular those operating in the non-financial sector, have had bonds outstanding throughout the whole sample period. Therefore, given the purpose of my analysis in this second part, I include in the sample only bonds of companies rated by Standard and Poor's which had bonds outstanding from at least six months before and to at least six months after the downgrades of the reference country. Given these issues with the bonds, I prefer to replicate the same analysis also on the bond prices, alongside the analysis of the bond yields and CDS yields, in order to corroborate the evidence of the results.

The sample is made with daily data of companies with the characteristics just explained headquartered in one of the 10 Eurozone countries (France, Italy, Spain, Netherlands, Belgium, Ireland, Portugal, Austria, Finland and Greece) whose companies are rated by Standard and Poor's. Note that Germany is excluded again, but this time because none of the three rating agencies has ever downgraded nor upgraded it and therefore it is not possible to conduct the analysis of the impact of announcements on financial instruments. For each company, I collect the data of the event categories downgrades and upgrades and transform them into dummy variables as I did with the government announcements. The data of the bonds are collected via Bloomberg; the data of the CDSs are collected via Bloomberg if available, otherwise the dataset is integrated thanks to Datastream. Column (III) of **Table ??** shows the final number of companies for which bond data are available divided by country, while column (VI) displays the same statistic for the CDS data.

Also in this second part I create two subsample in order to improve the analysis. The criteria by which the subsamples are distinguished is the typology of company: on one side I include the firms operating in the financial sector (e.g. banks, insurance companies), one the other side I include the firm that do not operate in the financial sector and therefore

Table 3

The table shows the number of companies in each Eurozone country that are included in the sample. The first three columns identify the number of companies whose bond data are availabe, while the final three columns identify the number of companies whose CDS data are available. In addition, an for both bonds and CDSs, the firms are classified according to their sector (either financial or non-financial).

	Corporate bonds			Corporate CDSs		
	Financial	Non-financial	Total	Financial	Non-financial	Total
	(I)	(II)	(III)	(IV)	(V)	(VI)
France	7	42	49	5	34	39
Italy	5	14	19	3	5	8
Spain	10	6	16	6	5	11
Netherlands	11	13	24	5	13	18
Belgium	1	5	6	2	3	5
Ireland	3	1	4	3	2	5
Portugal	3	2	5	2	1	3
Austria	6	7	13	1	2	3
Finland	3	10	13	0	7	7
Greece	1	1	2	3	1	4
Total	50	101	151	30	73	103

is a residual category. This distinction might be useful because it is reasonable to expect the financial companies to be more exposed to the sovereign downgrades through the acquisition of government bonds in their portfolios. Columns (I) and (IV) of **Table ??** display the number of firms in the financial sector, divided by country, for which bond and CDS data are available and therefore are included in the sample. The same applies to columns (II) and (V), this time referring to the non-financial firms.

4 Methodology

In this section, I describe the different methodologies that I use for my study. For the part regarding the sovereign markets, I first introduce a descriptive model of the trend of the yields around rating events, and after I use two more formal models in order to capture the magnitude and the significance of the impact of the announcements on bonds and CDSs. In the second half, the one regarding the corporate side of the markets, I initially realize a similar study, but after I turn my attention on the different impact that downgrades have on firms that share the same rating with their government and on firms with lower ratings. In fact, especially in the past, it was habitual for firms operating in one country not to have a higher rating than the country itself.

4.1 Description of the methodology applyed to the study of the impact of rating announcements on sovereign bonds and CDSs

Before starting the description of the core of the model, it is important to show how I manage the data in order to produce better results. First, I want to have a common unit of measurement between bond and CDS yields. The yield of bonds is typically presented in percentage points, while the yield of CDSs is usually in basis points. Therefore, I transform the bond yields in basis points by multiplying the data by 100. This leads to a homogeneity of the results that is important for the comparison of the magnitude of the impacts on these two different instruments. The second operation is connected with the exclusion of Germany from the dataset, as explained before in the previous section. In fact, to every daily data in each country is subtracted the data available for Germany the corresponding day. With this procedure, I obtain the yield spreads. Germany is selected as the "benchmark" country because it is one of the standard countries used for this purpose, alongside with the US, but with lower yields, which helps to minimize the negative daily observations. A third operation of data management is the subtraction of the sample median spread each day. This expedient is useful because it should reduce the effect of other common factors to all the countries different from the announcements. In a nutshell, it should isolate the data from the general performance of the economy. One last note is that on the 05.12.2011, all the countries in the Eurozone, including Germany were put on the negative watchlist by Standard and Poor's. This is the only rating event that involves this country in the whole period. Therefore, given that the spreads are calculated on the yield of German 10 years bonds and 5 years CDS, all the events occurring on this date are eliminated from the sample.

Having established all these premises, it is now possible to start describing the how I structure the models for the purposes of the study. With the first one, I want to describe

the path of the spread of sovereign bonds and CDSs around the day of the announcements. I decide to use a time window that runs from 20 days before to 20 days after these days, which should be, according to the majority of the papers in the literature, long enough to capture the phenomenon. The first thing I need is a measure of the deviation of the spread from the value at the day of the event, which I call day 0 from now on. Therefore, I calculate, for every single announcement in the sample, the difference between the spread at day 0+t and the spread at day 0, with t included in the interval (-20,+20). I call this measure as spread differential. I divide the events between negative and positive and for both calculate the average spread differential throughout the whole sample. What I obtain with this process is an average of the bond and CDS spread differentials in each one of the 40 days considered for negative and positive rating events. The theoretical background suggests that the spread differential should be negative before negative events and after positive events, while it should be positive after negative events and before positive events. This is true for both bonds and CDSs.

The second and the third model, as anticipated in the literature review section, follow the methodologies of Afonso, Furceri and Gomes (2012). In particular, the second model consists of a country fixed effect panel regression with the dependent variable being alternately the bond spread or the CDS spread. The regression is presented in the following formula.

$$S_{it} = \alpha_i + \gamma S_{it-1} + \beta d_{it} + \epsilon_{it} \tag{1}$$

S_{it} is the spread of bonds or CDSs of country i at day t, a_i is the country fixed effect term of country i, $S_{it\text{-}1}$ is the spread at day *t-1* and therefore is the lag of the dependent variable, d_{it} is a dummy variable that alternately represents the different types of rating announcements and ϵ_{it} is the error term. I now need specify better how the dummy variable works: it takes the value 1 if a rating event occurs during day t and 0 otherwise. I consider six different rating events, as introduced in the dataset presentation: downgrades, upgrades, negative watchlisting, positive watchlisting, negative events as a whole and positive events as a whole. Therefore, I run six different regressions, one for each category of announcement, and the variable d_{it} represents every time one of these typologies. I perform this procedure for bonds and for CDSs and, as a consequence, the final number of regressions is doubled.

The third and last model that I use to analyse the impact of rating events on the spreads of sovereign bonds and CDSs is also derived from Afonso, Furceri and Gomes (2012). This methodology is similar to the descriptive model I already explained, but this time the spread differentials are calculated between t_{before} days before and t_{after} days after day 0. I use eight different time windows, four of which are symmetric ((-1,+1),(-5,+5),(-20,+20) and (-60,+60)) and four are asymmetric ((-1,0),(0,+1),(-20,0) and (0,+20)) and

calculate the average spread differential for two different types of announcements, negative events and positive events. For the symmetric windows, I expect the same results found with the descriptive model for the same reasons, while the asymmetric windows should be useful for capturing the anticipation or the late reaction of the markets.

For all the three models, I repeat the procedure with all the subsamples that I introduced in the dataset presentation.

4.2 Description of the methodology applyed to the study of the impact of rating announcements on corporate bonds and CDSs

In this second part of the study, I turn my attention to the corporate financial markets, to their behaviour in relation with announcements by the rating agencies and to the interconnection between sovereign market and corporate market, in particular the effects of the former on the latter. Also in this section I choose to employ three different model, but this time they do not represent just three alternative methodologies to study the same concepts, but each one tries to address different issues. In fact, one is used in a similar way to those used for the sovereign part and therefore is used to capture the trend of the yields around announcements. Another one is used to study the relation between downgrades of the country and downgrades of the firms headquartered in that country. The last one studies the different impact that these events have on firms which have the same rating of the country or higher (in the past the "country ceiling rule" applied by rating agencies was stricter) and those with lower ratings. Also here, two clarifications are required: bond yields are transformed in basis points and the variation of bond prices is also studies, alongside bond yields and CDS prices, because more evidence is needed due to the lower liquidity of corporate bonds that sovereign bonds and the more fragmented dataset.

All the three models are based on the fixed effect panel regression introduced by Afonso, Furceri and Gomes (2012) that I also used previously. However, this time the fixed effects are set at a firm level instead of a country level. The first model analyses a topic similar to the one of the previous section, which is the impact of rating events on financial instruments. However, not only I address the direct impact of announcements on a corporate basis, but also the impact of announcements of country rating changes. Therefore, I have four different rating typologies, namely, corporate downgrades, corporate upgrades, domestic country downgrades and domestic country upgrades. From now on, I call these last two types country downgrades and country upgrades. They represent the downgrades and upgrades of the country where the headquarters of the company are.

The regression I apply to this study is:

$$S_{it} = \alpha_i + \gamma S_{it-1} + \beta d_{it} + \epsilon_{it} \tag{2}$$

In the equation, S_{it} and $S_{it\text{-}1}$ are alternately the bond yield, bond price and CDS price at time t and *t-1* respectively, a_i is the firm fixed effect term, d_{it} is a dummy variable that takes the value 1 when rating announcements occur and ϵ_{it} is the error term. In turn, the dummy contains the four types of events, corporate downgrades, corporate upgrades, country downgrades and country upgrades. All in all, I have twelve regressions to run in this section: for every of the three dependent variables, I run a regression for every rating event typology.

The second model is built to study how more likely is the downgrade of a firm following a downgrade of the country where it is headquartered. For this purpose, I build a new dummy variable, which act as the dependent variable and takes the value 1 at day t if the company is downgraded between day t and day *t+60*. I call this variable "60 days downgrade". The company fixed effect panel regression looks like the following equation.

$$d60_{it} = \alpha_i + \beta D_{it} + \epsilon_{it} \tag{3}$$

Here, d60 is the 60 days downgrade, a_i is the fixed effect term, D_{it} is a vector which contains different variables and ϵ_{it} is the error term. More precisely, the vector D_{it} may contain:

- a dummy variable that signals country downgrades;
- a dummy variable, called "ceiling", which takes the value 1 if the company has the same rating of its country or higher at day t and 0 otherwise;
- the interaction of the two.

This last variable should capture the different impact on the probability of downgrades in the next 60 days that a country downgrade has on companies at the rating ceiling or not. I combine the three variables in four ways and therefore run four different regressions: the first one contains the country downgrades only, the second one the ceiling only, the third one both the country downgrades and the ceiling and the fourth all the three.

The third part of this section, which is also the last one of the whole work, goes back to the effect of downgrades on yields and prices of financial instruments, but tries to capture the difference in the variations for companies at the ceiling and for companies with lower ratings. The dependent variable is, alternately, the bond yield, the bond price and the CDS price. The methodology employed is again the same of Afonso, Furceri and Gomes

(2012), but in the following form.

$$S_{it} = \alpha_i + \gamma S_{it-1} + \beta D_{it} + \epsilon_{it} \tag{4}$$

S_{it}, $S_{it\text{-}1}$, a_i and ϵ_{it} are again the yields at time t and time *t-1*, the company fixed effect term and the error term respectively. More interesting is the content of D_{it}, which is a vector with the following variables:

- the corporate downgrades dummy;
- the country downgrades dummy;
- the ceiling dummy;
- the interaction between the country downgrades and the ceiling.

The last variable should capture the different impact of country downgrades on bonds and CDSs of companies with the same rating of their country or higher and companies with lower ratings. Also in this part, the variables are combined differently in five models: only ceiling, both ceiling and corporate downgrades, both ceiling and country downgrades, all these three together and the three together plus the interaction term. In total, I run five regression for each of the three dependent variables, which leads to fifteen models.

In the next section, I show the results of all these regressions and models. Keep in mind that all these procedures are repeated for all the subsamples introduced in the dataset section.

5 Results

In this section, I present the results of the all the regression and try to interpret them in economic terms. The first part is dedicated to the results of the sovereign bonds and CDSs, while the second one on the corporate bonds and CDSs.

5.1 Results concerning the impact of credit rating announcements on sovereign bonds and CDSs

The first results I provide are those of the descriptive model: they are the spread differentials in the period (-20,+20) days before and after the rating events. The results for negative events are shown in **Figure ??**; the plot on the left pertain to the bond market, the plot on the right pertain to the CDS market. As expected, before the event the average differentials are negative, meaning that they are lower than they are at day 0. Moreover, the differentials get smaller and smaller approaching the day of the event, going from -24.6bp in the bond market and from -26.2bp in the CDS market to 0 at day 0, which suggest some anticipation by the market. In the aftermath of the announcements, however, they follow two different paths: the CDSs are coherent with the economic view that the spread should increase due to a negative rating event, while the bonds seem to go back to their original lever, and therefore decrease. It is important to report that none of the days included in the window (0,+20) present spreads significantly different from 0 in the bond market.

Figure ?? shows the same kind of statistic, but this time they are considered around

Figure 1

These plots represent the spread differentials around negative announcements, which are the average difference between the spread at $0+t$ and the spread at day 0, as described in the methodology part. I do this operation for every day included in the window (-20,+20) days around the events. Bond spread differentials are on the graph on the left, while CDS spread differentials are on te graph on the right.

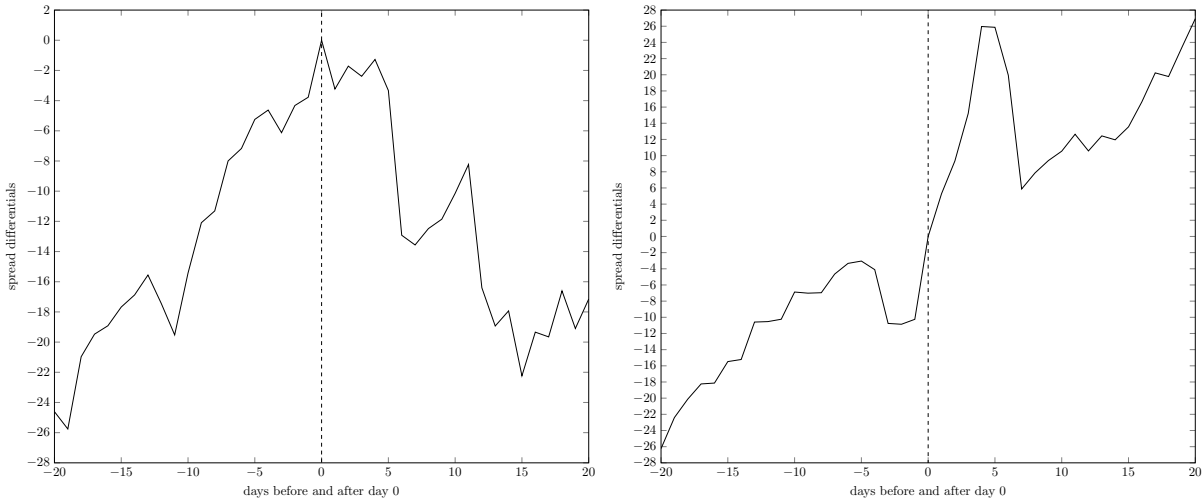
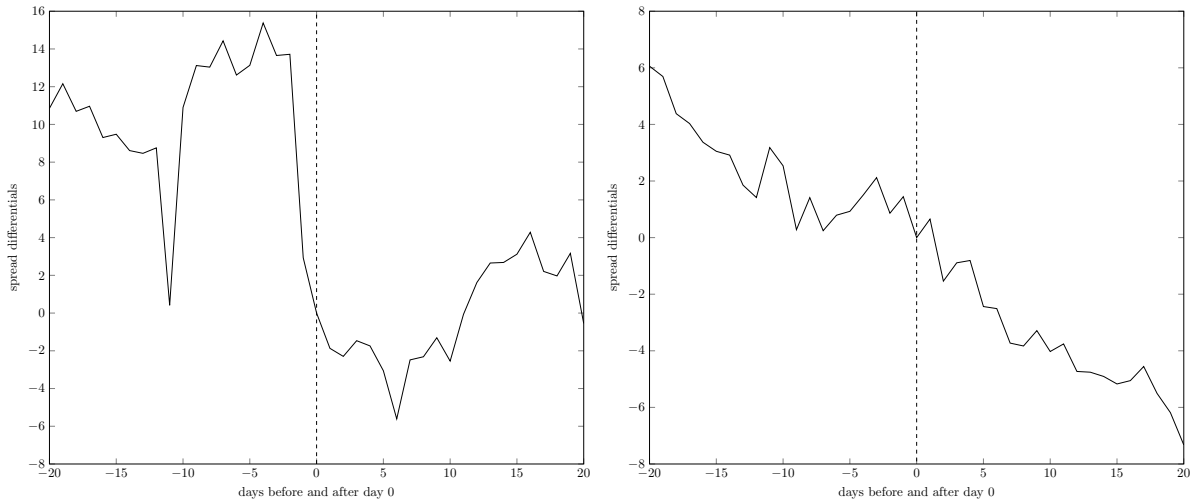


Figure 2

These plots represent the spread differentials around positive announcements, which are the average difference between the spread at $0+t$ and the spread at day 0, as described in the methodology part. I do this operation for every day included in the window (-20,+20) days around the events. Bond spread differentials are on the graph on the left, while CDS spread differentials are on te graph on the right.



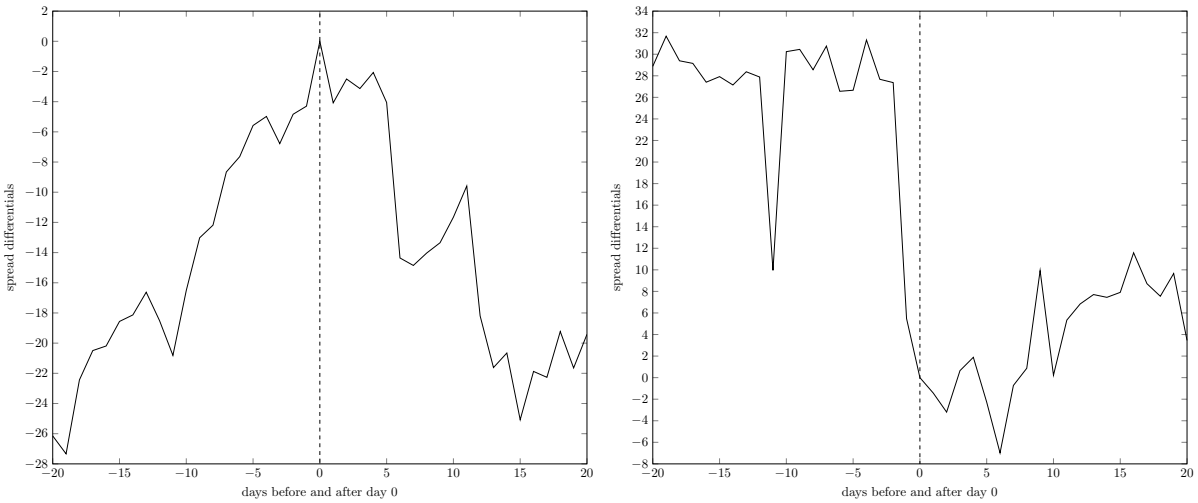
positive events. The results are qualitatively similar to those of the negative events for the CDSs, with a gradual and steady path of the spread differential. Clearly, the direction of the trend is opposite to the one of negative events and in line with the economic interpretation, going from 6.1bp to -7.3bp in the spread differential between day -20 and day +20. In fact, a decreasing spread is expected around positive rating events. The anticipation of the market is still present. However, the behaviour of the spread differential in the bond market is different than before: the anticipation is almost missing, with a sudden downfall of the spread just around one day before the announcement from 13.7bp at day -2 to 2.9bp at day -1 and -2.3bp at day +2. After, it sort of stabilises around 0. However, all the observations are not statistically significant, which means that positive events are not as influential as negative events on the bond spreads.

I now turn my attention to the subsamples: I firstly illustrate the results of the post Lehman Brothers collapse, then the results of the pre Lehman Brothers collapse and lastly the results of the subsample of the countries in the Eurozone. The results I have just shown correspond to those of the post Lehman Brother collapse for the CDSs, as clarified in the dataset section, therefore I conduct the analysis of this subsample only for the bonds. In addition, the analysis of the pre Lehman Brothers subsample is only possible for positive events because of the lack of a significant number of negative events. For the same reason, the Eurozone analysis refers only to the post Lehman Brothers collapse period. From now on, I call the pre Lehman Brothers collapse subsample "first subsample", the post Lehman Brothers collapse subsample "second subsample" and the subsample of the Eurozone countries "Eurozone subsample".

Starting with the second subsample, the results are shown in **Figure ??**, where it is

Figure 3

These plots represent the bond spread differentials around announcements, which are the average difference between the spread at $0+t$ and the spread at day 0, as described in the methodology part. I do this operation for every day included in the window (-20,+20) days around the events. Negative events spread differentials are on the graph on the left, while positive events spread differentials are on te graph on the right.



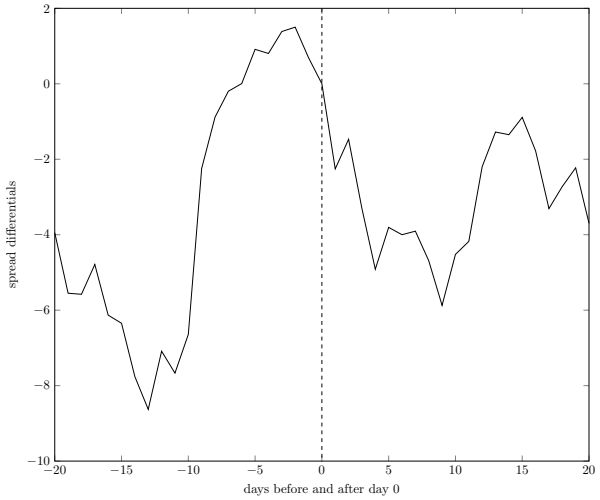
possible to see on the left the bond spread differentials around negative events and on the right the bond spread differentials around positive events. The results are nearly identical to the full sample for the negative events and qualitatively similar also for positive events. The difference is that the drop is way deeper, going from 27.4bp at day -2 to 5.5bp at day -1 and -3.2bp at day +2, but the results are still not statistically significant.

I now introduce the results for the first subsample, on which I could only work with bonds and positive rating events, which are shown in **Figure ??**. There is some difference compared to the second sample: the most important is that, in the first eleven days after the announcement, there are statistically significant variations of the spread differential from the spread at day 0. The decrease starts at day -2, when the differential is 1.5bp, and lasts until day 9, when the differential is -5.9bp; the result is in line with the expected direction of the change. This might suggest that the markets tended to react more vigorously to positive events in the pre Lehman Brothers collapse period than after. This seems to support the hypothesis that the markets rely less on the judgements of rating agencies now than before, at least when they release optimistic news.

The last subsample I want to analyse is the Eurozone subsample, whose results are depicted with **Figure ??**. Qualitatively, the results are not different from those regarding the full sample. It is possible to see, again, the CDSs reacting in the way they are expected to negative and positive announcements, and bonds reacting (significantly in a statistical meaning) only to negative events with anticipation. The true difference is the intensity of the changes, which is higher in the Eurozone: this is probably due to the larger weight that the Greek credit crisis has on the smaller sample of the Eurozone.

Figure 4

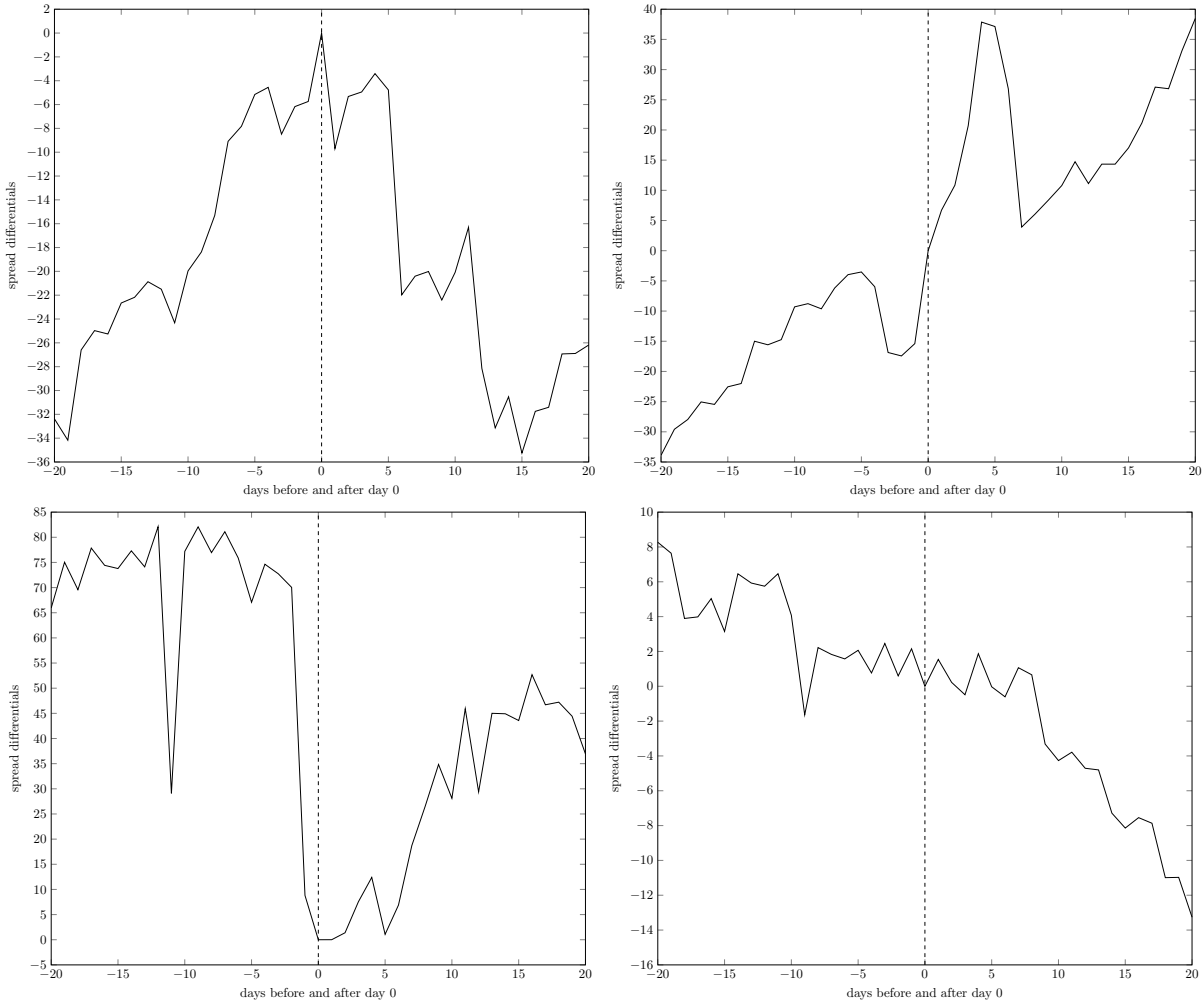
This plot represents the bond spread differentials around positive rating announcements, which are the average difference between the spread at $0+t$ and the spread at day 0, as described in the methodology part. I do this operation for every day included in the window (-20,+20) days around the events.



After the description of the results of the descriptive model, it is now possible to move to the second model, the country fixed effect panel regression firstly introduced by Afonso, Furceri and Gomes (2012). The inclusion in the regression of the lag of the dependent variable (which is the bond spread or the CDS spread, alternately) should lead the dummy variable that contains rating announcements to measure the difference in spread during days with rating events and without rating events compared to the day before the event. First, I analyse the full sample. I report in section a. of **Table ??** only the coefficient of the dummy variable because it is the term that is important for the analysis. Each column displays the results for the six typologies of event (which are analyses separately, in distinct regressions, not together) and each row displays the financial instrument on which acts as the dependent variable. First of all, it is important to notice that the signs of the coefficients are in line with the signs expected according to the economic interpretation. In fact, the day of negative events, downgrades and negative watchlistings the spread is expected to increase due to the bad news on the country provided by rating agencies and the day of positive events, upgrades and positive watchlistings the opposite reaction is expected. The only exceptions are both the sign of watchlistings for CDS, but they are statistically not significant. In general, it is possible to say that CDSs react more strongly to negative events and downgrades than bonds. In fact, in the days with these types of events the spread of CDSs is, respectively, 8.2bp and 9.9bp higher than the days without events, while the bond spread is "only" 4.9bp and 4.0bp higher. The opposite occurs with positive events and upgrades, when the reaction of bond markets is stronger that the reaction of CDS markets (moreover, the reaction of CDSs is not even significantly different from 0). One last important observation to do is that negative watchlistings have a higher impact on the spread of bonds than downgrades have. This result may arise due

Figure 5

These plots represent the spread differentials around announcements, which are the average difference between the spread at $0+t$ and the spread at day 0, as described in the methodology part. I do this operation for every day included in the window (-20,+20) days around the events. Negative events spread differentials are in the top row, while positive events spread differentials are in the bottom row. Bond market differentials are shown on the left, while CDS market differentials are shown on the right.



to the fact that usually countries are put on the watchlist before being downgraded, and therefore the effect of downgrades may be absorbed in advance as well.

Sections b. and c. of **Table ??** show the results of the same kind of regressions applied to the "post crisis" and "pre crisis" subsamples, respectively. I first focus my attention on the "post crisis" subsample. The regression for the positive watchlistings is impossible to run because of the lack of events of this type in the aftermath of the Lehman Brothers bankruptcy. Clearly, the results for the CDSs are identical to those of the full sample, because the full sample and the "post crisis" subsample coincide for this kind of instrument. Consequently, I focus on the bond market results. Qualitatively, they are the same I found in the full sample. The signs are correct and all the coefficients are statistically significant. What is more interesting is that the impact is slightly stronger in this subsample. In fact, comparing the top rows of section a. and section b. of **Table ??**, it is clear that all the coefficients are, in absolute value, higher in the latter than in the former. This may indicate that, after the crisis, investors penalize more countries whose reputation is lowered by rating agencies, maybe for prudential reasons and a higher awareness of the sovereign risk. Less interesting are the findings in the "pre crisis" subsample, where, even if the signs of the three regressions are correct, none of the coefficients is significant. This result is in line with those of most of the previous papers in the literature, which usually find that positive events have a lower or non-existent impact on the financial markets.

The last subsample is the one with the Eurozone countries only. Given the low number of events, both negative and positive, in these countries until the financial crisis, I only have the possibility to analyse the period after the crisis. Moreover, there are no positive watchlistings at all even in the this period, therefore also this coefficient is not available. The results are shown in **Table ??**. The results almost coincide with those of both the full sample and the "post crisis" subsample, at least in the direction of the changes (signs of the coefficients) and the significance of the coefficients in both the bond and CDS markets. It is important to notice that the impact of the announcements is even stronger than it is in the "post crisis" subsample, which in turn is stronger than it is in the full sample. This result confirms the finding of the descriptive model: rating agencies are even more influential in the aftermath of the crisis than they were before the crisis, in particular in the Eurozone, where the sovereign debt crisis of 2010-2013 exacerbated the awareness of potential sovereign default risk. Previously, sovereign bonds were considered almost risk-free, regardless of the government issuer of the financial instrument.

The last methodology I apply to the first part of this work, which focuses on the study of the effects of rating announcements on sovereign bonds and CDSs, is the second methodology inspired by Afonso, Furceri and Gomes (2012). Here, I have different time windows built like (t_{before}, t_{after}) and calculate the difference in the spread between day t_{after} and day t_{before}. The results for the full sample are shown in **Table ??**. The only difference I

Table 4

The table reports the results of the country fixed effect panel regressions. Section a. displays the results of the full sample, section b. the results of the post financial crisis period and section c. the results of the pre financial crisis period. The coefficients shown are those of the dummy variables which are included one at a time and contain the data of the different types of rating events, as described in the methodology section. The top row of each section of the table shows the results of the regressions applyed to the bonds, while the bottom row the results of the regression applyed to the CDSs. Only the results for the bond spread are available for the pre crisis subsample.
Dependent variables: bond spread and CDS spread, alternately.

	Negative events	Positive events	Downgrades	Upgrades	Negative watchlistings	Positive watchlistings
a. Full sample						
Bond spread	4.871	-2.923	4.003	-3.128	10.314	-0.594
	(4.602)***	(-2.663)***	(3.449)***	(-2.733)***	(4.547)***	(-0.155)
CDS spread	8.167	-1.234	9.923	-1.610	-0.182	3.562
	(7.172)***	(-0.679)	(7.846)***	(-0.853)	(-0.073)	(0.528)

b. Post crisis subsample						
	Negative events	Positive events	Downgrades	Upgrades	Negative watchlistings	Positive watchlistings
Bond spread	5.361	-5.896	4.420	-6.161	11.366	-
	(4.198)***	(-3.083)***	(3.125)***	(-3.183)***	(4.106)***	-
CDS spread	8.167	-1.234	9.923	-1.610	-0.182	-
	(7.172)***	(-0.679)	(7.846)***	(-0.853)	(-0.073)	-

c. Pre crisis subsample						
	Negative events	Positive events	Downgrades	Upgrades	Negative watchlistings	Positive watchlistings
Bond spread	-	-0.490	-	-0.272	-	-1.892
	-	(-0.626)	-	(-0.325)	-	(-0.885)

The numbers without brackets are the coefficients of the dummy, the number in brackets are the t-statistics of those coefficients. Asterisks describe the significance level of the variable, as described below:
***: 1% confidence level;
**: 5% confidence level;
*: 10% confidence level;
no asterisk: not significant even at 10% confidence level.

Table 5

The table reports the results of the country fixed effect panel regressions in the Eurozone subsample only. The coefficients shown are those of the dummy variables which are included one at a time and contain the data of the different types of rating events, as described in the methodology section. The top row displays the results of the regressions applyed to the bonds, while the bottom row the results of the regression applyed to the CDSs.
Dependent variables: bond spread and CDS spread, alternately.

	Negative events	Positive events	Downgrades	Upgrades	Negative watchlistings	Positive watchlistings
Bond spread	6.508	-9.244	5.901	-9.244	11.231	-
	(3.187)***	(-2.289)**	(2.605)***	(-2.289)**	(2.598)***	-
CDS spread	11.789	-1.404	14.764	-1.404	-0.913	-
	(5.776)***	(-0.282)	(6.442)***	(-0.282)	(-0.218)	-

The numbers without brackets are the coefficients of the dummy, the number in brackets are the t-statistics of those coefficients. Asterisks describe the significance level of the variable, as described below:
***: 1% confidence level;
**: 5% confidence level;
*: 10% confidence level;
no asterisk: not significant even at 10% confidence level.

make here in relation with the typologies of events is between negative and positive events. With regards to the bonds, it looks like the movements of their spread originate way earlier than the negative announcements, which means that investors feel the deterioration of the credit issuer in advance. In fact, only the 60 days window provides significant results in section a. of **Table ??**, which means that it is either with large advance or large delay that these movements happen. Thanks to section c., however, it is possible to exclude the delay hypothesis, given that both the (0,+1) and (0,+20) days windows do not show spread differentials significantly different from 0. The relation between bonds and positive events, on the contrary, seems to be null, apart from some turbulence in the spread just around the announcements, as shown by the significant coefficients of windows (-1,+1) and (-1,0).

Talking about the CDSs, at first sight it appears clear that they respond both to negative and positive rating announcements. Similarly to bonds, announcements are well anticipated through spread changes by the markets, but they are much more persistent even few days before and for a lot of time after the events. This is particularly true when talking about negative events, but, to a smaller extent, also for positive ones. This is shown by the higher absolute values of negative events compared to the absolute values of positive events (for example, 20 days after negative events, the CDS spread is on average 26.9bp higher than day 0, while 20 days after positive events it is only 7.3bp lower than day 0). These results seem to confirm those of the descriptive model.

I now move to the analysis of the subsamples, starting with the post crisis and pre crisis subsamples. Their results are displayed in **Table ??** and **Table ??**. Nothing different

Table 6

The table reports the results of the third methodology in the full sample. The table is divided in sections: section a. contains the results for negative events and symmetric time windows, section b. the results for positive events and symmetric time windows, section c. the results for negative events and asymmetric time windows and finally section d. the results for positive events and asymmetric time windows. The span of the windows in which the average differential is calculated is shown on top of each section. The top line of each section displays the results of the bond market, while the bottom line of each section displays the results of the CDS market.

a. Negative events, symmetric windows				
	(-1,+1)	(-5,+5)	(-20,+20)	(-60,+60)
Bond spread	1.196	4.015	-0.430	69.236
	(0.125)	(0.362)	(0.026)	(4.216)***
CDS spread	15.528	10.651	53.392	118.727
	(2.540)**	(1.235)	(4.706)***	(6.068)***

b. Positive events, symmetric windows				
	(-1,+1)	(-5,+5)	(-20,+20)	(-60,+60)
Bond spread	-4.398	-15.834	-11.890	-12.377
	(-2.939)***	(-1.446)	(-1.053)	(-0.966)
CDS spread	-0.911	-3.684	-10.770	-19.652
	(-1.032)	(-2.607)**	(-3.981)***	(-4.453)***

c. Negative events, asymmetric windows				
	(-1,0)	(0,+1)	(-20,0)	(0,+20)
Bond spread	3.775	-3.233	24.610	-17.146
	(2.269)**	(-0.349)	(3.577)***	(-1.150)
CDS spread	10.248	5.280	26.240	26.933
	(2.251)**	(2.404)**	(3.356)***	(2.754)***

d. Positive events, asymmetric windows				
	(-1,0)	(0,+1)	(-20,0)	(0,+20)
Bond spread	-2.930	-1.870	-10.852	-0.550
	(-2.695)***	(-1.384)	(-1.148)	(-0.078)
CDS spread	-1.446	0.654	-6.058	-7.325
	(-1.791)*	(0.881)	(-2.804)***	(-3.148)***

The numbers without brackets are the average spread differentials, the number in brackets are the t-statistics of those coefficients. Asterisks describe the significance level of the variable, as described below:
***: 1% confidence level;
**: 5% confidence level;
*: 10% confidence level;
no asterisk: not significant even at 10% confidence level.

Table 7

The table reports the results of the third methodology for the pre and post crisis subsamples in the symmetric time windows. The table is divided in sections: section a. contains the results for negative events and post crisis subsample, section b. the results for positive events and post crisis subsample and section c. the results for positive events and pre crisis subsample. The span of the windows in which the average differential is calculated is shown on top of each section. The top line of each section displays the results of the bond market, while the bottom line of each section displays the results of the CDS market.

a. Negative events, post crisis subsample				
	(-1,+1)	(-5,+5)	(-20,+20)	(-60,+60)
Bond spread	0.865	3.727	-0.584	74.939
	(0.087)	(0.321)	(-0.034)	(4.319)***
CDS spread	15.528	10.651	53.392	118.727
	(2.540)**	(1.235)	(4.706)***	(6.068)***
b. Positive events, post crisis subsample				
	(-1,+1)	(-5,+5)	(-20,+20)	(-60,+60)
Bond spread	-6.475	-27.056	-26.551	-42.957
	(-2.358)**	(-1.198)	(-1.144)	(-1.644)
CDS spread	-0.911	-3.684	-10.770	-19.652
	(-1.032)	(-2.607)**	(-3.981)***	(-4.453)***
c. Positive events, pre crisis subsample				
	(-1,+1)	(-5,+5)	(-20,+20)	(-60,+60)
Bond spread	-2.569	-5.476	-0.111	34.346
	(-1.796)*	(-1.833)*	(-0.016)	(2.410)**

The numbers without brackets are the average spread differentials, the number in brackets are the t-statistics of those coefficients. Asterisks describe the significance level of the variable, as described below:
***: 1% confidence level;
**: 5% confidence level;
*: 10% confidence level;
no asterisk: not significant even at 10% confidence level.

from what I found before emerges from the second subsample. Qualitatively, the results are identical to those of the full sample, both regarding signs and level of significance of the coefficients. In addition, the magnitude of the coefficients confirms that the impact of negative and positive events on bonds is higher in the second subsample, as previously stated. The results of the pre crisis subsample are quite confusing, in particular due to that big and significant positive spread differential in the window (-60,+60), which is difficult to explain. The other results are as expected, with lower differentials (in absolute value) than in the post Lehman Brothers subsample.

The last table of this section is **Table ??**, which shows the results of the Eurozone subsample. All the coefficients are just a confirmation of the results found with the previous methodologies. In fact, their absolute values are larger than the corresponding ones in the same period but also outside the Eurozone. This is evidence in support of the hypothesis that in the Eurozone the judgements of the rating agencies are more

Table 8

The table reports the results of the third methodology for the pre and post crisis subsamples in the asymmetric time windows. The table is divided in sections: section a. contains the results for negative events and post crisis subsample, section b. the results for positive events and post crisis subsample and section c. the results for positive events and pre crisis subsample. The span of the windows in which the average differential is calculated is shown on top of each section. The top line of each section displays the results of the bond market, while the bottom line of each section displays the results of the CDS market.

Negative events, post crisis subsample				
	(-1,0)	(0,+1)	(-20,0)	(0,+20)
Bond spread	4.297	-4.079	26.146	-19.417
	(2.508)**	(-0.422)	(3.641)***	(-1.241)
CDS spread	10.248	5.280	26.240	26.933
	(2.251)**	(2.404)**	(3.356)***	(2.754)***
Positive events, post crisis subsample				
	(-1,0)	(0,+1)	(-20,0)	(0,+20)
Bond spread	-5.481	-1.431	-28.881	3.455
	(-2.584)***	(-0.559)	(-1.553)	(0.236)
CDS spread	-1.446	0.654	-6.058	-7.325
	(-1.791)*	(0.881)	(-2.804)***	(-3.148)***
Positive events, pre crisis subsample				
	(-1,0)	(0,+1)	(-20,0)	(0,+20)
Bond spread	-0.693	-2.256	3.946	-3.697
	(-0.881)	(-1.902)*	(0.628)	(-1.276)

The numbers without brackets are the average spread differentials, the number in brackets are the t-statistics of those coefficients. Asterisks describe the significance level of the variable, as described below:
***: 1% confidence level;
**: 5% confidence level;
*: 10% confidence level;
no asterisk: not significant even at 10% confidence level.

influential. Not all the signs are in line with the economic theory: for example, bond spreads 20 days after negative events results 3.0bp lower than 20 days before the negative event, on average. However, all the cases where the sign is the opposite, the coefficients are also not significantly different from 0. On the other hand, differentials conformed to the expected direction of the change are statistically significant.

Table 9

The table reports the results of the third methodology in the Eurozone subsample. The table is divided in sections: section a. contains the results for negative events and symmetric time windows, section b. the results for positive events and symmetric time windows, section c. the results for negative events and asymmetric time windows and finally section d. the results for positive events and asymmetric time windows. The span of the windows in which the average differential is calculated is shown on top of each section. The top line of each section displays the results of the bond market, while the bottom line of each section displays the results of the CDS market.

a. Negative events, symmetric windows				
	(-1,+1)	(-5,+5)	(-20,+20)	(-60,+60)
Bond spread	-3.028	3.948	-3.388	94.349
	(-0.197)	(0.222)	(-0.133)	(3.786)***
CDS spread	22.106	12.232	72.765	170.040
	(2.371)**	(0.917)	(4.357)***	(5.881)***

b. Positive events, symmetric windows				
	(-1,+1)	(-5,+5)	(-20,+20)	(-60,+60)
Bond spread	-8.805	-62.046	-29.759	-110.501
	(-1.292)	(-0.982)	(-0.523)	(-2.494)**
CDS spread	-0.610	-2.896	-16.145	-36.481
	(-0.308)	(-1.405)	(-2.969)**	(-4.173)***

c. Negative events, asymmetric windows				
	(-1,0)	(0,+1)	(-20,0)	(0,+20)
Bond spread	5.743	-9.696	32.383	-26.183
	(2.663)***	(-0.635)	(3.177)***	(-1.072)
CDS spread	15.359	6.711	33.889	38.466
	(2.226)**	(2.061)**	(2.928)***	(2.602)***

d. Positive events, asymmetric windows				
	(-1,0)	(0,+1)	(-20,0)	(0,+20)
Bond spread	-8.812	0.006	-65.947	36.940
	(-1.888)*	(0.001)	(-1.288)	(1.073)
CDS spread	-2.152	1.542	-8.269	-13.260
	(-1.107)	(0.747)	(-2.125)*	(-2.553)**

The numbers without brackets are the average spread differentials, the number in brackets are the t-statistics of those coefficients. Asterisks describe the significance level of the variable, as described below:
***: 1% confidence level;
**: 5% confidence level;
*: 10% confidence level;
no asterisk: not significant even at 10% confidence level.

As a conclusion of this section, I report some general conclusions about these results. Overall, it is possible to say that both negative events and positive events have some impact on the financial markets, even if the effects of negative events are stronger and more frequent. Around negative events, usually with some anticipation by the markets, the spreads of sovereign bonds and CDS tend to increase, while the opposite happens with positive events. After the global financial crisis, rating agencies judgements were considered among the causes of the crisis and therefore it could be expected that their influence on the markets may be mitigated. However, this is not the case: the fluctuations of the spreads are even more accentuated after Lehman Brothers bankruptcy. The main reason for this may be that investors became more aware of the sovereign risk, which was considered almost zero before. This is particularly true for the Eurozone, where the sovereign debt crisis that followed the global financial crisis reinforced this awareness.

5.2 Results concerning the impact of credit rating announcements on corporate bonds and CDSs

I now move to the analysis of the reaction of the corporate bond and CDS markets to announcements of rating agencies. I employ the methodology firstly introduced by Afonso, Furceri and Gomes (2012), which is the fixed effects panel regression that I used also as the second model in the in the sovereign part, in order to address all the different issues of this section. This time, I use firm fixed effects, given that the subject of the analysis are not governments any more, but firms. The first issue I address in this section is the direct impact of events on three variables: bond yield, bond price and CDS price. I study the impact of four different rating events: corporate downgrades, corporate upgrades, country downgrades and country upgrades. The first two are easily understandable: they occur when the company itself is downgraded or upgrades. The second two, instead, occur when the country where the company is headquartered is downgraded or upgraded. The total number of regressions I run is twelve, four for each dependent variable.

The results are shown in section a. of table **Table ??** and report the coefficient of the corresponding event dummy variable. The first relevant observation is that both corporate and country events have an impact on bonds and CDSs. In particular, prices of both the instruments seem to be more affected than yield. In fact, three out of four types of events have a statistically significant impact on bond prices and CDS prices, while only one (corporate upgrades) have a statistically significant impact on bond yields. As it is expected, bond yields and CDS prices increase following negative events and decrease following positive events (the only exception is the effect of country upgrades on bond yield, but the coefficient is not significant), while the opposite occurs with bond prices. Another general conclusion that can be drawn from the table is that corporate announcements have a stronger influence than country announcements. This is particularly true for

Table 10

The table reports the results of the firm fixed effect panel regressions. Section a. displays the results of the full sample, section b. the results of the non-financial sector and section c. the results of the financial sector. The coefficients shown are those of the dummy variables which are included one at a time and contain the data of the different types of rating events, as described in the methodology section. The top row of each section of the table shows the results of the regressions applyed to the bond yield, the middle row the results of the regression applyed to the bond price and the bottom row the results of the regression applyed to the CDS price.
Dependent variables: bond yield, bond price and CDS price, alternately.

a. Full sample

	Corporate downgrades	Corporate upgrades	Country downgrades	Country upgrades
Bond yield	1.578	-27.268	0.342	0.886
	(0.857)	(-9.905)***	(0.244)	(0.246)
Bond price	-0.068	0.064	-0.038	0.046
	(-2.830)***	(1.778)*	(-1.942)*	(0.932)
CDS price	8.943	-1.722	4.656	-8.240
	(6.519)***	(-0.917)	(3.909)***	(-3.494)***

b. Non-financial subsample

	Corporate downgrades	Corporate upgrades	Country downgrades	Country upgrades
Bond yield	1.349	-1.703	-0.039	-0.444
	(0.689)	(-0.702)	(-0.029)	(-0.117)
Bond price	-0.058	0.073	0.013	0.048
	(-1.829)*	(1.866)*	(0.602)	(0.788)
CDS price	10.203	-1.690	2.276	-1.966
	(8.315)***	(-1.168)	(2.323)**	(-0.901)

c. Financial subsample

	Corporate downgrades	Corporate upgrades	Country downgrades	Country upgrades
Bond yield	0.756	-81.558	0.478	2.180
	(0.210)	(-11.703)***	(0.157)	(0.308)
Bond price	-0.079	0.047	-0.110	0.046
	(-1.969)**	(0.602)	(-2.979)***	(0.532)
CDS price	7.860	-1.849	7.234	-12.285
	(2.710)***	(-0.394)	(2.729)**	(-2.576)***

The numbers without brackets are the coefficients of the dummy, the number in brackets are the t-statistics of those coefficients. Asterisks describe the significance level of the variable, as described below:
***: 1% confidence level;
**: 5% confidence level;
*: 10% confidence level;
no asterisk: not significant even at 10% confidence level.

bonds, while for CDSs this result holds only in relation to negative announcements. For example, a corporate downgrade makes the CDS price of the company increase by 8.9bp the day of the announcement, while a country downgrade only by 4.7bp. The price of a bond decreases significantly by 6.8 cents with corporate downgrades and only 3.8cents with country downgrades.

I can now move to the subsamples, one containing firms not working in the financial sector and the other one containing financial companies, whose results are shown in sections b. and c. of **Table ??**, respectively. The first result to notice is that, for the majority of the typologies of event, the financial firms are affected more than non-financial firms. This can be inferred from the significance of the coefficients (more dummy variables are significant in the financial subsample and with higher levels of significance as well) and from their magnitude. In the non-financial subsample, bonds are hardly affected, in fact only corporate events are significant at a 10% level and only in the price regression, not in the yield regression. The results for CDSs are slightly different, with only downgrades (of the company and the country) being significant: thanks to corporate downgrades, their price increases by 10.2bp and thanks to country downgrades, their price increases by 2.3bp, confirming the stronger effects of corporate events as opposed to country events. This relation, however, seems to be much more mitigated in the financial sector. In fact, bond prices decrease by 7.9cents and 11.0cents the day of corporate and country downgrades, respectively and CDS prices increase by 7.9bp and 7.2bp the day of corporate and country downgrades, respectively. In addition, also the country upgrades dummy is significant for CDSs, with a decrease of their price of 12.3bp. The most plausible reason for these results is that financial companies typically hold in their portfolios big amounts of government securities, and therefore their creditworthiness relies much more on the creditworthiness of the country than it does in the non-financial sector. As a consequence, when a country is downgrade and the value of its instruments decreases, also the value of the portfolio of financial firms decreases, making their revenues riskier and therefore their financial situation more dangerous.

The second topic I investigate in this section regarding the corporate side of the market is connection between the rating of the country and that of its companies. In particular, I want to test whether the companies in a country that has been downgraded are more likely to be downgraded themselves in the near future as opposed to companies in countries with stable or increasing rating. The methodology I employ is again derived from Afonso, Furceri and Gomes (2012), but this time the lag of the dependent variable is not included, being the dependent variable a dummy as well (namely, the "60 days downgrade" dummy constructed in the methodology section); the model is described by **Equation (3)**. The results are summarized in section a. of **Table ??**. Model 1, 2 and 3 analyse the impact of single dummy variables, firstly included in the model alone and after included together. They clearly suggest that the probability of downgrade in the following 60 days

of a company headquartered in a country whose government is downgraded increases by around 22.2% and 24.3%. As much clearly, they show that companies with the same rating of their country or higher are more likely to be downgraded than companies with lower ratings by around 3.9-4.0%. What is more interesting here, however, is model 4, which includes also the interaction between these two dummy variables. This should reveal if, following a downgrade of the country, companies at the ceiling are more likely to be downgraded than the other companies. In fact, especially in the past, rating agencies used to apply a policy which does not allow companies to have a higher rating than the government of their country. Therefore, if this effect is still in play, the coefficient of the interaction should be significant and positive. This is exactly the case of the regression of model 4. In fact, the probability of being downgraded under these circumstances is 25.2% higher, with part of this result compensating the decreased but still positive coefficient of country downgrades, which moves from 22.2-24.3% to 15.3%. Therefore, the evidence of this regression tends to confirm that rating agencies still use this policy in their rating process.

It is also interesting to see the results applied to the subsamples of non-financial and financial firms, for which I report, respectively in sections b. and c. of **Table ??**, the results of models 3 and 4 only. Overall, it is possible to say that qualitatively all the results are confirmed in both the subsamples. In fact, all the coefficients are positive and highly statistically significant. The second prominent result is that the probability of downgrades of financial firms is increased much more than it is for non-financial firms due to country downgrades and/or to the fact of being at the rating ceiling. Precisely, the former factor affects this probability of non-financial and financial companies respectively by around 4.6-12.9% and 34.1-40.1%, and the second factor respectively by around 2.3-2.4% and 5.7%. Another interesting result is that, in the financial sector, the coefficient of the interaction of model 4 is much smaller than the coefficient of the country downgrades. This is different from the non-financial subsample and also from the full sample and means that being at the rating ceiling during a country downgrade does not add as much as it does in the other samples to the probability of downgrade in the next 60 days. The reason for this may be that financial firms hold much more government securities in their portfolios than non-financial firms and therefore, when the country is downgraded, the riskiness of their portfolios actually increases and therefore their downgrade becomes more likely not only due to the mechanic application of the rating ceiling policy by the agencies. In this scenario, sharing the same rating with the country is only a marginal factor compared to the intrinsic exposure of the financial companies to systematic risk.

I now turn my attention to the third and last issue of this part which deals with the corporate financial markets. The model applied is similar to the previous one, but it aims to verify the effects of the rating ceiling on bond yield, bond price and CDS price instead of its effects on probability of consequent downgrades. For this reason, the lag

Table 11

The table reports the results of the firm fixed effect panel regressions. Section a. displays the results of the full sample, section b. the results of the non-financial sector and section c. the results of the financial sector. The coefficients shown are those of the dummy variable in the corresponding row. The dummies are combined together in four different ways (4 models) as described in the methodology section. Rows represent the variables, while columns represent the different models.
Dependent variable: "60 days downgrade" dummy.

a. Full sample				
	Model 1	Model 2	Model 3	Model 4
Country downgrades	0.222 (28.466)***		0.243 (26.843)***	0.153 (13.475)***
Ceiling		0.040 (33.542)***	0.039 (33.241)***	0.039 (32.700)***
Interaction				0.252 (13.362)***

b. Non-financial subsample		
	Model 3	Model 4
Country downgrades	0.129 (11.598)***	0.046 (3.469)***
Ceiling	0.024 (15.739)***	0.023 (15.302)***
Interaction		0.280 (11.517)***

c. Financial subsample		
	Model 3	Model 4
Country downgrades	0.401 (25.492)***	0.341 (16.104)***
Ceiling	0.057 (29.257)***	0.057 (29.070)***
Interaction		0.134 (4.230)***

The numbers without brackets are the coefficients of the dummy, the number in brackets are the t-statistics of those coefficients. Asterisks describe the significance level of the variable, as described below:
***: 1% confidence level;
**: 5% confidence level;
*: 10% confidence level;
no asterisk: not significant even at 10% confidence level.

of the dependent variable goes back in the company fixed effect panel regression. The results are shown in **Table ??**. The stronger impact of corporate events (in this particular case, only downgrades) over country events on financial instruments is confirmed by the higher absolute value of their coefficients, even if some are not statistically significant. What is more interesting in this section, however, are the bottom two lines, where the coefficients of the rating ceiling and the interaction between country events and ceiling are displayed. Surprisingly, rating ceiling has a positive sign in both bond yield and CDS price regressions, which intuitively should be negative because to higher rating should correspond lower bond yield and CDS price. The reason for this may be twofold: first, in the countries with low ratings, the number of firms at the ceiling might be higher because even the most creditworthy companies are hardly rated much higher than the government itself; second, they may suffer from a higher probability of downgrade than other companies, as shown in the previous section. For what concerns the bottom line, that of the interaction term, two coefficients are not statistically different from zero and one, the one of the bond price, is significant ""only" at a 5% confidence level. This suggests that, even if the likelihood of downgrade for firms at the rating ceiling is higher than for firms with lower ratings, the effect in term of price and yield on them is not much different.

The results of the two subsamples, those of non-financial and financial firms, are summarized in **Table ??**, respectively in sections a. and b.. The general feeling watching the tables is that they confirm the lower influence of rating agencies on the non-financial sector as opposed to the financial sector. Qualitatively, the results look similar to those of the full sample. Therefore, not even in the financial subsample, which should react more to downgrades, the intensity of the movements is amplified. Only the interaction coefficient of the bond price, in fact, is significant, but only at a 10% confidence level. Moreover, it is also verified the evidence in favour of a higher effect of country downgrades in the financial sector, in particular for the CDS market. In fact, this coefficient for the derivative is between 7.3bp and 9.2bp in the financial subsample, while it is only between 1.7bp and 2.3bp in the other subsample. The reason is again to be found in the closer link of the financial companies to the general economy of the country and, in particular, to the connection with the financial situation of the government.

In conclusion of this section, I sum up the main findings. In general, it seems to be confirmed the existence of the relation between rating events and financial instruments even in the corporate markets. This connection is particularly strong for corporate events rather than country events, which looks reasonable because the former highlights more directly the status of the companies creditworthiness. Two other results, which are connected to each other, are noteworthy. One is that the probability of downgrade for firms at the rating ceiling is more influenced by the downgrade of the country than it is for firms under the ceiling. The other one is that this higher probability does not translate

Table 12

The table reports the results of the firm fixed effect panel regressions. The coefficients shown are those of the dummy variable in the corresponding row. The dummies are combined together in two different ways (2 models), one with and one without the interaction term between country downgrades and country ceiling. Rows represent the variables, while columns represent the different models. On the left are shown the results for the bond yield, in the middle the results for the bond price and on the right the results for the CDS price.
Dependent variables: bond yield, bond price and CDS price, alternately.

	Bond yield		Bond price		CDS price	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Corporate downgrades	1.626 (0.883)	1.627 (0.884)	-0.067 (-2.760)***	-0.066 (-2.738)***	8.726 (6.354)***	8.729 (6.356)***
Country downgrades	-0.415 (-0.284)	-0.314 (-0.176)	-0.026 (-1.353)	0.007 (0.285)	4.516 (3.762)***	4.260 (2.797)***
Ceiling	2.127 (7.877)***	2.128 (7.875)***	0.015 (4.100)***	0.015 (4.189)***	0.881 (4.889)***	0.879 (4.874)***
Interaction		-0.306 (-0.098)		-0.099 (-2.422)**		0.674 (0.273)

The numbers without brackets are the coefficients of the dummy, the number in brackets are the t-statistics of those coefficients. Asterisks describe the significance level of the variable, as described below:
***: 1% confidence level;
**: 5% confidence level;
*: 10% confidence level;
no asterisk: not significant even at 10% confidence level.

Table 13

The table reports the results of the firm fixed effect panel regressions for the non-financial and financial subsamples. Section a. shows the results of the non-financial sector and section b. shows the results of the financial sector. The coefficients shown are those of the dummy variable in the corresponding row. The dummies are combined together in two different ways (2 models), one with and one without the interaction term between country downgrades and country ceiling. Rows represent the variables, while columns represent the different models. On the left are shown the results for the bond yield, in the middle the results for the bond price and on the right the results for the CDS price.
Dependent variable: bond yield, bond price and CDS price, alternately.

a. Non-financial subsample

	Bond yield		Bond price		CDS price	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Corporate downgrades	1.357 (0.693)	1.360 (0.694)	-0.057 (-1.820)*	-0.057 (-1.811)*	10.215 (8.325)***	10.216 (8.326)***
Country downgrades	0.051 (0.037)	0.142 (0.090)	0.007 (0.304)	0.019 (0.737)	2.269 (2.283)**	1.740 (1.525)
Ceiling	0.527 (1.938)*	0.528 (1.941)*	0.018 (4.041)***	0.018 (4.075)***	0.227 (1.421)	0.221 (1.378)
Interaction		-0.362 (-0.115)		-0.048 (-0.936)		2.191 (0.943)

b. Financial subsample

	Bond yield		Bond price		CDS price	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Corporate downgrades	0.945 (0.262)	0.951 (0.263)	-0.072 (-1.777)*	-0.072 (-1.795)*	7.171 (2.462)**	7.090 (2.432)***
Country downgrades	-1.691 (-0.513)	-2.114 (-0.480)	-0.075 (-2.034)**	-0.018 (-0.357)	7.310 (2.671)***	9.157 (2.292)**
Ceiling	1.241 (2.194)**	1.239 (2.188)**	0.010 (1.630)	0.011 (1.688)*	1.534 (4.006)***	1.543 (4.026)***
Interaction		0.958 (0.145)		-0.130 (-1.760)*		-3.465 (-0.634)

The numbers without brackets are the coefficients of the dummy, the number in brackets are the t-statistics of those coefficients. Asterisks describe the significance level of the variable, as described below:
***: 1% confidence level;
**: 5% confidence level;
*: 10% confidence level;
no asterisk: not significant even at 10% confidence level.

into a higher deviation of prices and yields of bonds and CDSs of the companies at the ceiling.

6 Conclusions

In this work, I investigate the effects of the announcements of the major rating agencies in the world on the financial markets. The typologies of announcements I consider are chosen every time according to the goal of the different analyses among downgrades, upgrades, negative watchlistings, positive watichlistings, negative events and positive events. The financial instruments on which the effects of these events are tested are bonds and CDSs, which should incorporate in their prices the expectations about the creditworthiness of their issuer. Therefore, this is also an analysis of the influence that rating agencies have on the markets and, as a consequence, of the amount and relevance of the new information they disclose through their judgements. The subjects of the study are divided in two categories, governments and companies, and different analysis with different aims are implemented.

In the past, many authors investigated these topics, but usually their work is specific of one short period of time, one category of issuers or few countries. Their most commonly acknowledged results are that the financial markets are affected by the new information released by the agencies and that they suffer more from negative events than what they benefit from positive events. My study introduces some innovations mainly from two points of view: firstly, it is based on data in a much longer period of time and secondly the same methodology is applied to both sovereign and corporate markets, which returns much more coherent results and simplify with the comparability of the results.

The results of my study are now summarized. First, it appears clear that rating events create some changes in both sovereign and corporate bond and CDS markets. The direction of these variations are in line with the economic theory expectations. Second, these findings are particularly true for negative events. For what concerns positive events, however, these results mostly hold, even if the effects are often softened. These is a result in contrast with a lot of papers in the literature, which state that positive events do not affect to any extent the prices of bonds and CDSs. Third, it is possible to say that CDSs are even more subject than bonds to variations in their spreads following the events. This result is highlighted by the higher number of significant coefficients in the regressions and by the fact that often these coefficients are also higher. Fourth, these effects are stronger in the post global financial crisis subsamples and in the Eurozone, for what concerns the sovereign markets, and in the financial sector subsample, for what concerns the corporate markets. Fifth, there is some evidence of anticipation of the announcements by the agents in the markets, in particular for the CDSs. Sixth, for a company at the rating ceiling, which means that it shares the same rating with the government of the country where it is headquartered or that it has a higher rating, increases the probability of downgrades in the 60 days following the downgrade of the country itself. Seventh, the magnitude of the variations for these category of companies does not differ from the magnitude of the

variation due to downgrades for the other companies. Basically, it changes the likelihood of a consequent downgrade but not its impact on the markets.

7 Bibliography

Afonso, A., Furceri, D., & Gomes, P. (2012). Sovereign credit ratings and financial markets linkages: application to European data. Journal of International Money and Finance, 31(3), 606-638.

Alexopoulou, I., Andersson, M., & Georgescu, O. M. (2009). An empirical study on the decoupling movements between corporate bond and CDS spreads (No. 1085). ECB Working Paper.

Bedendo, M., & Colla, P. (2015). Sovereign and corporate credit risk: Evidence from the Eurozone. Journal of Corporate Finance, 33, 34-52.

Borensztein, E., Cowan, K., & Valenzuela, P. (2013). Sovereign ceilings lite? The impact of sovereign ratings on corporate ratings. Journal of Banking & Finance, 37(11), 4014-4024.

Cantor, R., & Packer, F. (1996). Determinants and impact of sovereign credit ratings.

Dichev, I. D., & Piotroski, J. D. (2001). The longrun stock returns following bond ratings changes. The Journal of Finance, 56(1), 173-203.

European Securities and Markets Authority, Report on CRA Market Share Calculation, 20 December 2017

Ferreira, M. A., & Gama, P. M. (2007). Does sovereign debt ratings news spill over to international stock markets?. Journal of Banking & Finance, 31(10), 3162-3182.

Finnerty, J. D., Miller, C. D., & Chen, R. R. (2013). The impact of credit rating announcements on credit default swap spreads. Journal of Banking & Finance, 37(6), 2011-2030.

Goh, J. C., & Ederington, L. H. (1993). Is a bond rating downgrade bad news, good news, or no news for stockholders?. The Journal of Finance, 48(5), 2001-2008.

Grier, P., & Katz, S. (1976). The differential effects of bond rating changes among industrial and public utility bonds by maturity. The Journal of Business, 49(2), 226-239.

Griffin, P. A., & Sanvicente, A. Z. (1982). Common stock returns and rating changes: A methodological comparison. The Journal of Finance, 37(1), 103-119.

Hand, J. R., Holthausen, R. W., & LEFTWICH*, R. W. (1992). The effect of bond rating agency announcements on bond and stock prices. The journal of finance, 47(2), 733-752.

Holthausen, R. W., & Leftwich, R. W. (1986). The effect of bond rating changes on common stock prices. Journal of Financial Economics, 17(1), 57-89.

Hull, J., Predescu, M., & White, A. (2004). The relationship between credit default swap spreads, bond yields, and credit rating announcements. Journal of Banking & Finance, 28(11), 2789-2811.

Katz, S. (1974). The price adjustment process of bonds to rating reclassifications: A test of bond market efficiency. The Journal of Finance, 29(2), 551-559.

Micu, M., Remolona, E., & Wooldridge, P. (2004). The price impact of rating announcements: evidence from the credit default swap market.

Norden, L., & Weber, M. (2004). Informational efficiency of credit default swap and stock markets: The impact of credit rating announcements. Journal of Banking & Finance, 28(11), 2813-2843.

Norden, L., & Weber, M. (2009). The comovement of credit default swap, bond and stock markets: An empirical analysis. European financial management, 15(3), 529-562.

Pinches, G. E., & Singleton, J. C. (1978). The adjustment of stock prices to bond rating changes. The Journal of Finance, 33(1), 29-44.

Steiner, M., & Heinke, V. G. (2001). Event study concerning international bond price effects of credit rating actions. International Journal of Finance & Economics, 6(2), 139-157.

U.S. Securities and Exchange Commission, Annual Report on Nationally Recognized Statistical Rating Organizations, December 2017

Weinstein, M. I. (1977). The effect of a rating change announcement on bond price. Journal of Financial Economics, 5(3), 329-350.